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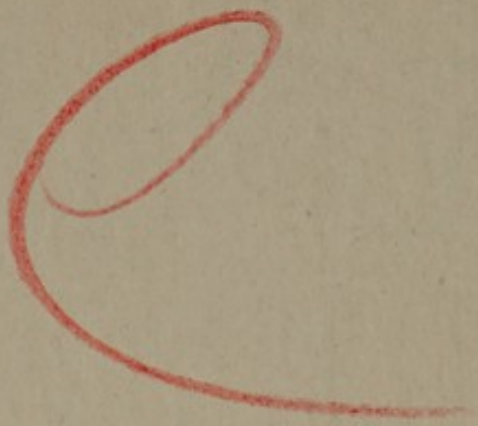
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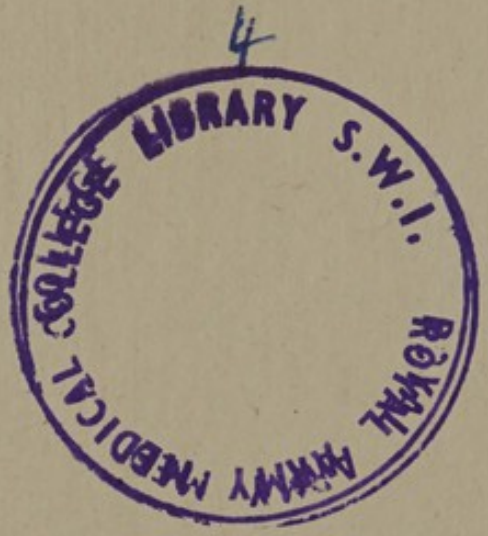
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GEOGRAPHICAL HANDBOOK SERIES FOR OFFICIAL USE ONLY

BELGIUM

NAVAL INTELLIGENCE DIVISION





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GEOGRAPHICAL HANDBOOK SERIES

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BELGIUM

February 1944

NAVAL INTELLIGENCE DIVISION

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PREFACE

IN 1915 a Geographical Section was formed in the Naval Intelligence Division of the Admiralty to write Geographical Handbooks on various parts of the world. The purpose of these handbooks was to supply, by scientific research and skilled arrangement, material for the discussion of naval, military, and political problems, as distinct from the examination of the problems themselves. Many distinguished collaborators assisted in their production, and by the end of 1918 upwards of fifty volumes had been produced in Handbook and Manual form, as well as numerous short-term geographical reports. The demand for these books increased rapidly with each new issue, and they acquired a high reputation for accuracy and impartiality. They are now to be found in Service Establishments and Embassies throughout the world, and in the early years after the last war were much used by the League of Nations.

The old Handbooks have been extensively used in the present war, and experience has disclosed both their value and their limitations. On the one hand they have proved, beyond all question, how greatly the work of the fighting services and of Government Departments is facilitated if countries of strategic or political importance are covered by handbooks which deal, in a convenient and easily digested form, with their geography, ethnology, administration, and resources. On the other hand, it has become apparent that something more is needed to meet present-day requirements. The old series does not cover many of the countries closely affected by the present war (e.g. Germany, France, Poland, Spain, Portugal, to name only a few); its books are somewhat uneven in quality, and they are inadequately equipped with maps, diagrams, and photographic illustrations.

The present series of Handbooks, while owing its inspiration largely to the former series, is in no sense an attempt to revise or re-edit that series. It is an entirely new set of books, produced in the Naval Intelligence Division by trained geographers drawn largely from the Universities, and working at sub-centres established at Oxford and Cambridge. The books follow, in general, a uniform scheme, though minor modifications will be found in particular cases; and they are illustrated by numerous maps and photographs.

The purpose of the books is primarily naval. They are designed first to provide, for the use of Commanding Officers, information in a

comprehensive and convenient form about countries which they may be called upon to visit, not only in war but in peace-time; secondly, to maintain the high standard of education in the Navy and, by supplying officers with material for lectures to naval personnel ashore and afloat, to ensure for all ranks that visits to a new country shall be both interesting and profitable.

Their contents are, however, by no means confined to matters of purely naval interest. For many purposes (e.g. history, administration, resources, communications, etc.) countries must necessarily be treated as a whole, and no attempt is made to limit their treatment exclusively to coastal zones. It is hoped therefore that the Army, the Royal Air Force, and other Government Departments (many of whom have given great assistance in the production of the series) will find these Handbooks even more valuable than their predecessors proved to be both during and after the last war.

J. H. GODFREY
Director of Naval Intelligence
1942

The foregoing preface has appeared from the beginning of this series of Geographical Handbooks. It describes so effectively their origin and purpose that I have decided to retain it in its original form.

This volume has been prepared for the Naval Intelligence Division at the Cambridge sub-centre (General Editor, Dr H. C. Darby). It has been written by Dr H. C. Darby, Mr I. L. Foster, Mr H. A. P. Jensen, Mr F. J. Monkhouse and Mr F. W. Morgan, with contributions from Mr S. H. Beaver, Mr G. R. Crone, Miss M. G. Jones, Professor A. A. Miller, Mr E. J. Passant, Dr Norman White and Dr S. W. Wooldridge. The maps and diagrams have been drawn mainly by Mr D. J. Bennett, Mr A. O. Cole, Miss K. S. A. Froggatt, Mrs Marion Plant and Miss J. D. I. Tyson. The handbook has been edited by Mr I. L. Foster

E. G. N. RUSHBROOKE
Director of Naval Intelligence

February 1944

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Chapter I

GEOLOGY AND PHYSICAL FEATURES

Introduction: Geological Formations: Regional Divisions: Belgian Lorraine: The Ardenne Plateau: The Southern Low Plateaux: The Northern Low Plateaux: The Northern Lowland: The River Systems: Note on the Structure of the Ardenne: Bibliographical Note

Introduction

Belgium is one of the smallest countries in Europe and covers only some 30,506 sq.km. or 11,755 sq. miles—that is, less than one-half the area of Scotland. But within this small area there is considerable variety of geology and relief, and the rocks of the country range from almost the oldest sedimentary to the most recent. The most outstanding feature is the contrast between the southern upland, lying over 200 m. (about 650 ft.) above sea level and built of Palaeozoic rocks, and the northern plains and low plateaux built of newer rocks (Mesozoic, Tertiary and Quaternary). The boundary between these two areas is roughly the line of the Sambre-Meuse valley. The upland of the Ardenne rises to 694 m. (2,277 ft.) in Botrange, while the lowlands fall to below sea level in the polders of western Flanders (Fig. 1).

Geological Formations

Palaeozoic Rocks

The older Palaeozoic rocks (*Cambrian-Silurian*) comprise slates and quartzites, and they outcrop over restricted areas in the higher parts of the Ardenne and in the valleys of the northward-flowing rivers of central Belgium (Dendre, Senne, Dyle). In the Ardenne they are responsible for no distinctive scenic or surface effects, because they are surrounded by wide expanses of later rocks (*Lower Devonian*) which give rise to very similar country. In central Belgium, the rivers have cut through a thin cover of incoherent Tertiary sands to the older rocks whose limited outcrops form a conspicuous feature on the geological map (Fig. 2). Moreover, they contain, as at Lessines and Quenast, masses of intrusive igneous rock which have been extensively quarried for road-metal and paving stones.

The succeeding *Devonian* system is developed in great force in the Ardenne, ranging thence across the frontier into the similarly constituted Eifel region of Germany. In the lower part, the system comprises considerable masses of sandstone which give rise to high and sterile country, but the middle and upper divisions, formed in considerable degree of limestone and shale, result in softer country (Fig. 6). The limestones sometimes occur in isolated knolls or lens-like masses—originally coral reefs—which form well-marked hills in the present landscape. The thicker and more conspicuous masses give rise to even more striking effects. Caves and underground water channels are numerous, the most famous example being that of Han-sur-Lesse. Here, the river Lesse has abandoned a great loop on its northern bank in favour of an underground channel, beneath a limestone ridge; the famous grottoes are a chain of caves representing a similar channel abandoned by the river (Plate 2). The same band of Devonian limestone in the country between Givet and Chimay well exemplifies the general role of these rocks in controlling settlement and agriculture. It here gives rise to a belt of open cultivated country some three miles wide, densely crowded with large villages, set amidst the thick and sparsely peopled forest which covers the lower Devonian sandstone. The limestone land is doubly favourable as a human environment in that it provides good arable soils and yields abundant water in wells.

The Devonian rocks must originally have been succeeded everywhere by those of the *Carboniferous* system, but erosion has removed the latter over much of the region, leaving them dominant only in the country around Dinant and in a narrow elongated belt extending from Mons via Namur and Liége to Aachen. They have also been proved in deep borings through the cover of newer rocks in the Kempen (Campine) region of north-east Belgium. In the Dinant area, the lower calcareous division, equivalent to the Carboniferous Limestone of Britain, is dominant. Like the Devonian limestones, these rocks give rise to characteristic conditions of surface drainage and water supply. Powerful springs emerge at the termination of underground channels, and galleries driven in the limestone afford other valuable supplies of pure water. Both these sources have been laid under contribution for the water supply of Bruxelles, the first in the Hoyoux valley above Huy, and the second in the Bocq valley, north-east of Dinant. The Coal Measures which succeed the limestone are scantily represented in the Dinant area, but are preserved in great thickness in the Mons-Aachen belt, and beneath the Kempenland (Campine).

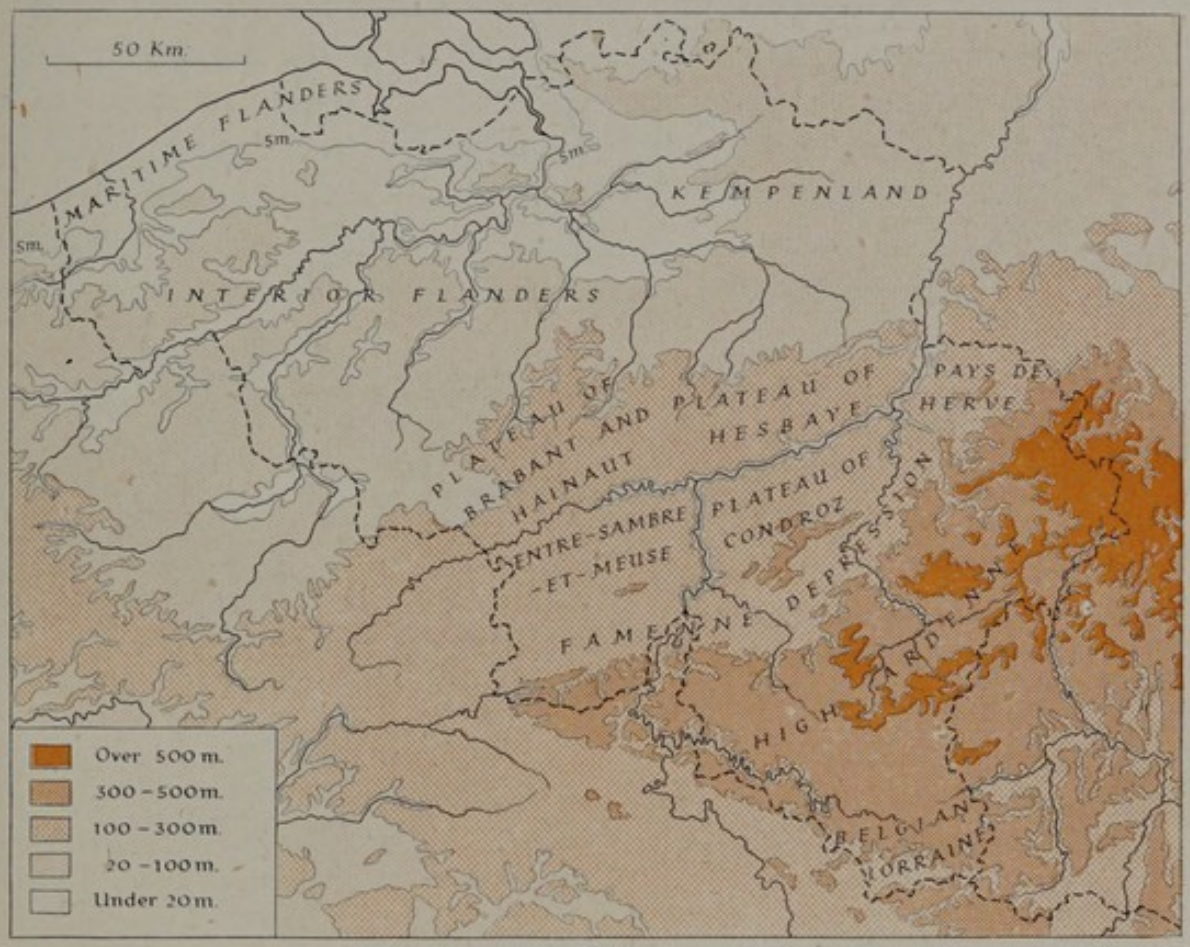


Fig 1. Relief of Belgium and its chief regions
Based on 1 : 500,000, *Belgique: Carte Oro-Hydrographique* (Turnhout, 1937).

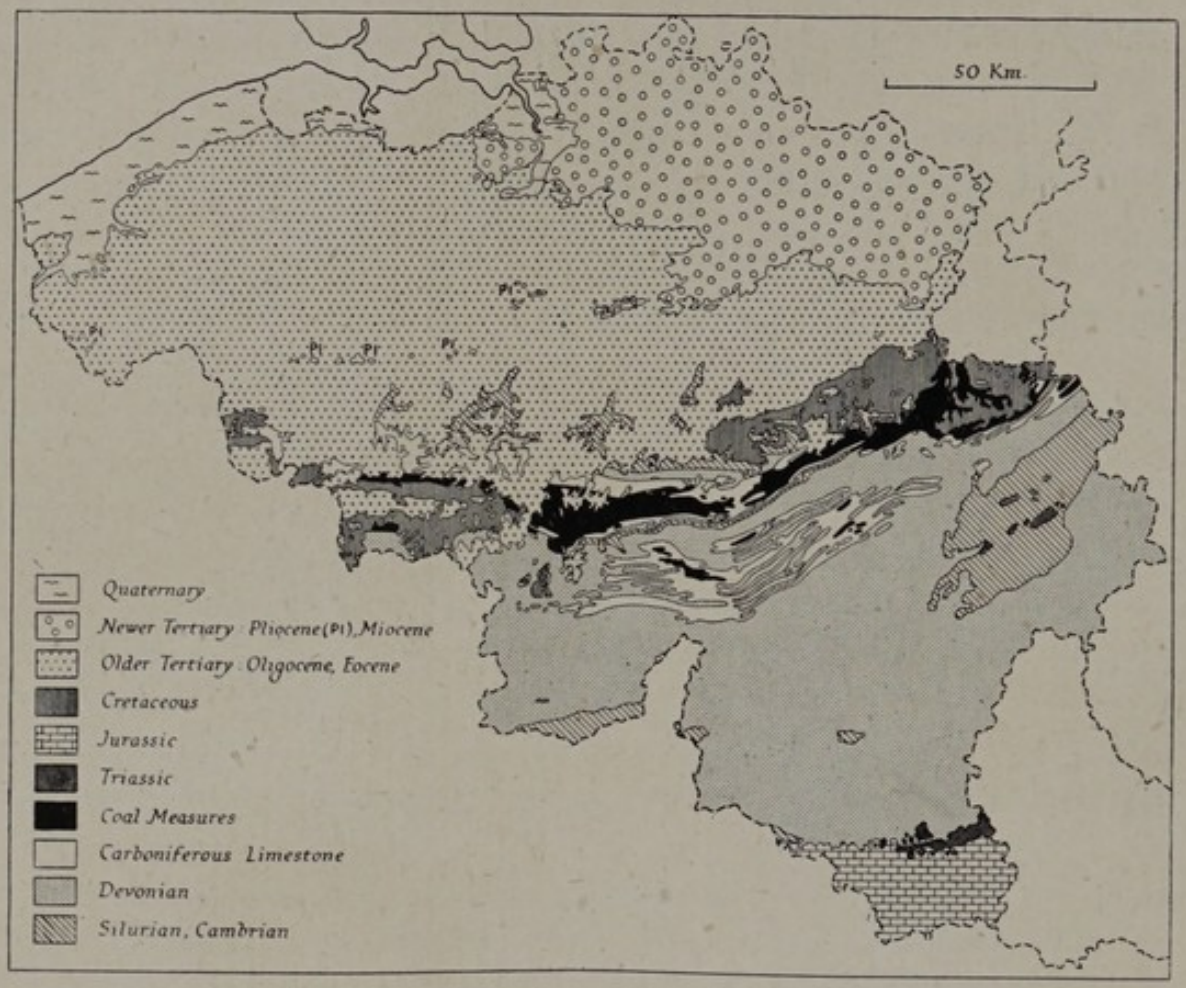


Fig. 2. Geological map of Belgium
Based on J. Halkin, *Atlas Classique*, Plate 16 (Namur, 1934).

Mesozoic Rocks

All the Palaeozoic rocks are intensely folded, for they were involved in the mountain-building movements that produced a great chain across what is now central Europe in Upper Carboniferous times—the so-called Hercynian mountains. The Ardenne uplands, like the Central Massif and Brittany in France or the Rhenish Highlands in Germany, are the relics of this former mountain system (see p. 21). *Triassic* and *Jurassic* rocks are absent over the greater part of Belgium. The former appear at the surface only on the Luxembourg border in the far south, and in outlying masses in the eastern Ardenne, but they have been proved below the surface in the Kempenland.

Table of main geological subdivisions

Quaternary	Recent Pleistocene	
Tertiary	Pliocene Miocene	Newer Tertiary
	Oligocene Eocene	Older Tertiary
Mesozoic	Cretaceous Jurassic Triassic	
Palaeozoic	Permian	
	Carboniferous	Coal Measures Carboniferous Limestone
	Devonian Silurian Ordovician Cambrian	
	Pre-Cambrian	

The Jurassic series, which is so prominent in Lorraine, and which wrap around the southern border of the Ardenne, cross the Belgian frontier in the south-east. They comprise a succession of shale, limestone and sandstone, and give rise to a typical scarpland tract, reminiscent of the Paris basin. The *Minette* iron ores, so important in Luxembourg and Lorraine, are developed over a small area on the frontier near Athus, but the accessible portions of the field have been largely worked out.

The *Cretaceous* rocks, despite their importance in northern France, are relatively unimportant in Belgium. The chalk of the Artois ridge plunges northward beneath the plains of Flanders, but it re-emerges at the surface only in the Mons district. It reappears farther east in the Hesbaye and Herve regions near Liége, associated in the latter

case with sands and clays. It is not present beneath the Tertiary cover of the Bruxelles area, and though it may once have covered all or most of the Ardenne it was removed by erosion at an early stage, prior to the deposition of the Tertiary beds (see p. 22).

Tertiary Rocks

The Tertiary deposits of the northern plain include representatives of both the older and newer Tertiary system. Those of the older group (*Eocene* and *Oligocene*) were the deposits of a sea which extended also across south-east England and the Paris basin though the older Tertiary beds of Belgium resemble those of Britain rather than those of France, being notably lacking in limestones such as control the landscape of the Paris region. For the most part they are sandy, but also include clay beds (Flanders Clay) which are dominant in the southern part of the Flemish lowland; elsewhere in the Belgian lowland the clay is less important than the geological map might seem to suggest (Fig. 3).

A radical transformation in the geography of the area took place in mid-Tertiary times, concurrently with the building of the Alps. The newer Tertiary (*Miocene* and *Pliocene*) sea of north-western Europe was evidently directly ancestral to the North Sea, though extending beyond its present limits over the coastlands of England and the Low Countries. The main mass of newer Tertiary deposits thus lies north of a line drawn from St Niklaas to Maastricht, and includes the great mass of Pliocene sands which underlies the Kempenland. It is evident, however, that the lower Pliocene deposits originally had a much wider extension, for small outlying masses cap the hills in southern Flanders around Geeraardsbergen (Grammont) and Ronse (Renaix), and reappear even farther west in similar situations at Kemmelberg, south of Ieper (Ypres). It is thus clear that Pliocene times were ushered in by a great southward extension of the sea, which marked the latest submergence of the greater part of northern Belgium. Thereafter the coastline retreated steadily northwards as the southern areas were uplifted. By the end of Pliocene times, the floor of the southern North Sea was a tract of lowlying land, across which the Rhine flowed to join the Thames. It is clear that the initiation of the river system of the Belgian plain, and the beginnings of landscape sculpture, date from the upheaval of this early Pliocene sea-floor.

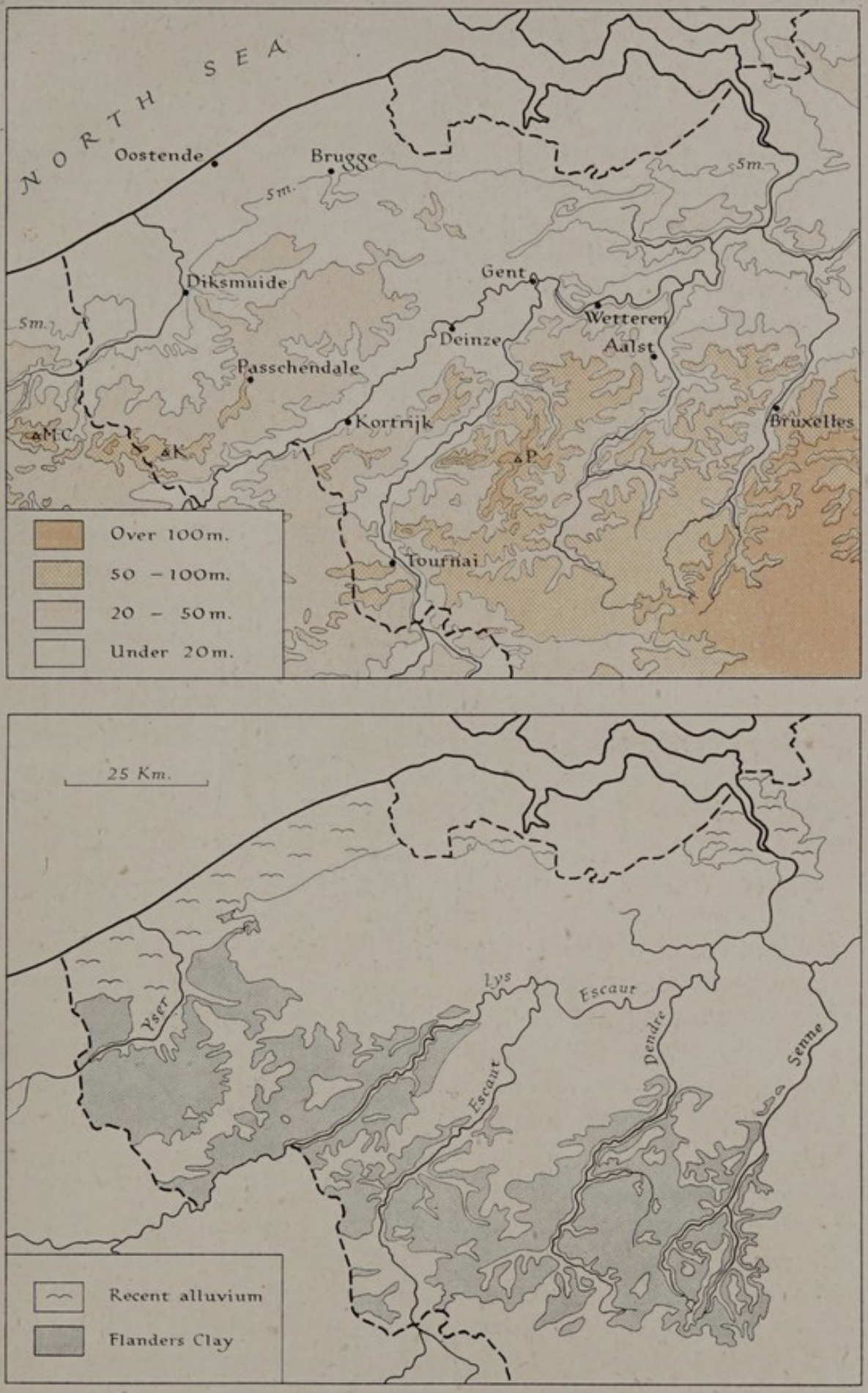


Fig. 3. The Flanders plain

Based on: (i) 1 : 500,000, *Belgique: Carte Oro-Hydrographique* (Turnhout, 1937) for the relief features (above). (ii) G.S.G.S. Series 3072, 1 : 160,000, *Geological Map of Belgium*, Sheets 5 and 6 (1915) for the distribution of Flanders Clay (below). The letters on the upper map refer to the following summits: *P.* Pottelberg ; *K.* Kemmelberg ; *M.C.* Mt Cassel.

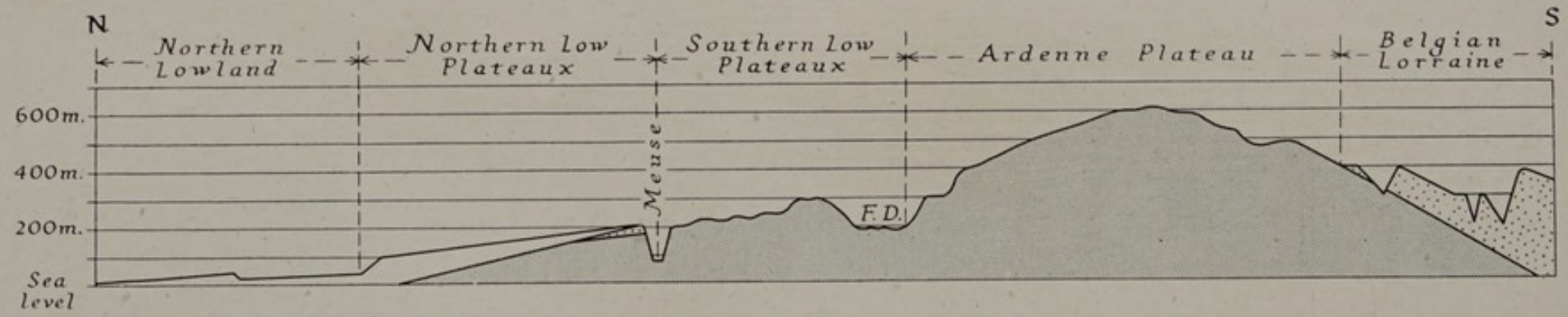


Fig. 4. Generalized section across Belgium

Based on M. A. Lefèvre, *Notice sur la carte oro-hydrographique de Belgique à* 1 : 500,000, Fig. 3 (Turnhout, 1937). Primary rocks are stippled, the Triassic and Jurassic rocks dotted and the post-Jurassic rocks left white.

Quaternary Deposits

Quaternary deposits are important in Belgium, though the country lay beyond the margin of the northern ice-sheets, and is thus free from 'glacial drift'. In common, however, with neighbouring parts of France and Germany, Belgium witnessed one or more phases of steppe conditions during the Ice Age, and large areas of the country were buried beneath a fine-grained wind-blown dust—the *limon* of French and Belgian geologists. The limon cover everywhere gives rise to highly distinctive conditions of soil, settlement and agriculture. It is conspicuous chiefly on the Hesbaye Plateau, whence it extends eastwards into the Herve region beyond Liége and westwards into Brabant, Hainaut and eastern Flanders.

A second important series of Quaternary deposits are the *marine muds* and *peats* of the polders in Flanders. The position of the North Sea coast fluctuated between wide limits during the Ice Age, in harmony with the waxing and waning of the ice sheets. At the times of greatest ice extension, the sea level was low, and the coast retreated far to the north, leaving the floor of the North Sea as an extension of the coastal lowlands. The intervening milder or interglacial periods witnessed a rise in sea level (due to water from the melting ice sheets) and the drowning of the coastal lands. This cycle of advance and retreat occurred not less than four times during the million odd years of the Ice Age. The last great advance of the sea, which has been termed the 'Flandrian Transgression', must have begun before man's advent. It was certainly in progress about 5000 B.C. and led in succeeding millennia to the separation of Britain from the continent, and the submergence of sites formerly inhabited by Neolithic man on the floor of the present North Sea. The coastline may have been stabilized for a while in later prehistoric times, but there was a renewal of submergence after the Roman occupation and, during the fifth century A.D., the coastal lands seem to have been inundated over a belt of 15–25 km. (10–15 miles) broad. Since then, a slow reclamation has taken place as a result of natural sedimentation supplemented by artificial draining and dyking (see pp. 26-30 and Figs. 17–19).

A further important element of Quaternary geology is provided by the great alluvial fan of *coarse sand* and *gravel* deposited by the Meuse below Maastricht during a late stage of the Ice Age. These gravels cover the Pliocene sands of the Kempenland, and the gently sloping surface of the great fan is still a visible feature in the landscape, and one which has been a factor in later drainage development (see p. 237).

Regional Divisions

The simple division into southern upland and northern plain and plateau does less than justice to the scenic variety of the country. Local variations within these two main areas make it possible to subdivide them into a number of smaller areas with individual characteristics.

Although the mass of older Palaeozoic rocks to the south of the Sambre-Meuse valley is a geological unity, it can be subdivided into two regions. The Ardenne proper occupies a much more restricted area than is usually denoted by the term 'Ardenne Massif', for in the north the 300 m. (about 1,000 ft.) contour coincides with a marked steepening of the general northward slope, at the foot of which lies the Famenne depression which is below 200 m. (about 660 ft.) in many places. The 300 m. contour therefore divides the whole upland into a higher portion to the south ('High Belgium'), and a lower plateau which stretches northward for about 30 km. to the line of the Sambre-Meuse. The highly folded rocks of this lower region are similar to those of 'High Belgium', both being Palaeozoic in age, but its physical history and relief link it rather with the low Mesozoic and Tertiary plateaux to the north. The two groups of low plateaux, north and south of the Sambre-Meuse, are but parts of the same general plateau surface sloping northward and, as shown on Fig. 4, lying at a considerably lower level than that of 'High Belgium'. While therefore the Sambre-Meuse furrow is a fundamental line from the strictly geological point of view, its significance can be over-emphasized. From the standpoint of relief the furrow is simply an incident separating two parts of a plateau surface formerly continuous with one another. This plateau surface, taken as a whole and ranging in elevation from 100 to 300 m. (330–1,000 ft.), is of the same origin throughout, representing one or more phases of river planation or, more probably, the product of marine erosion by late Tertiary seas, followed by later elevation. The result is that the general aspect of the landscape is similar in both the northern and southern low plateaux. Streams have not yet had time to cut deeply into this peneplain, so that its levelled surface remains comparatively unbroken and does not present a strong contrast of hill and valley. There are, of course, soil differences north and south of the Sambre-Meuse valley, for the area to the north has been covered by a thick layer of *limon*. But even so, its place as the parent of easily cultivated soils is partly taken by the limestones south of the river. Although the

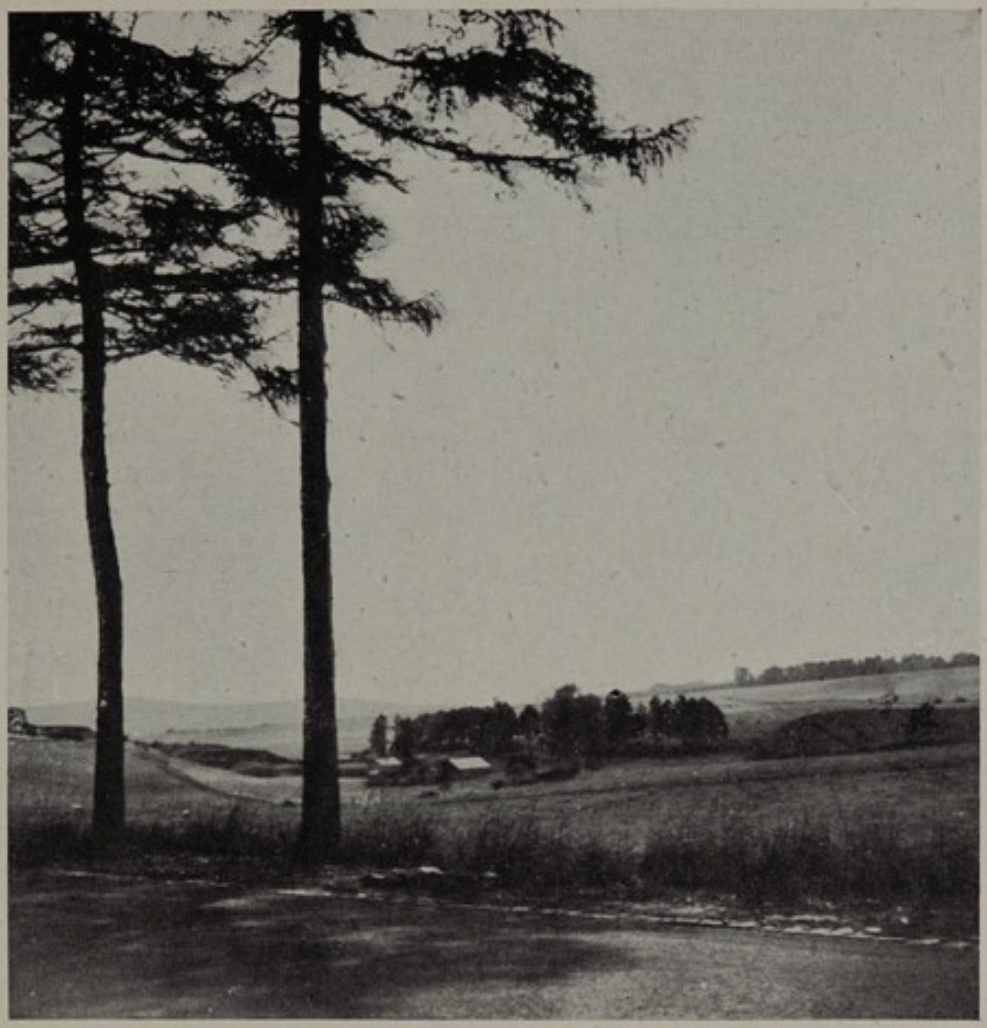


Plate 1. Landscape east of Dinant
A view of the gently undulating hill-country of the Condroz, east of the Meuse.

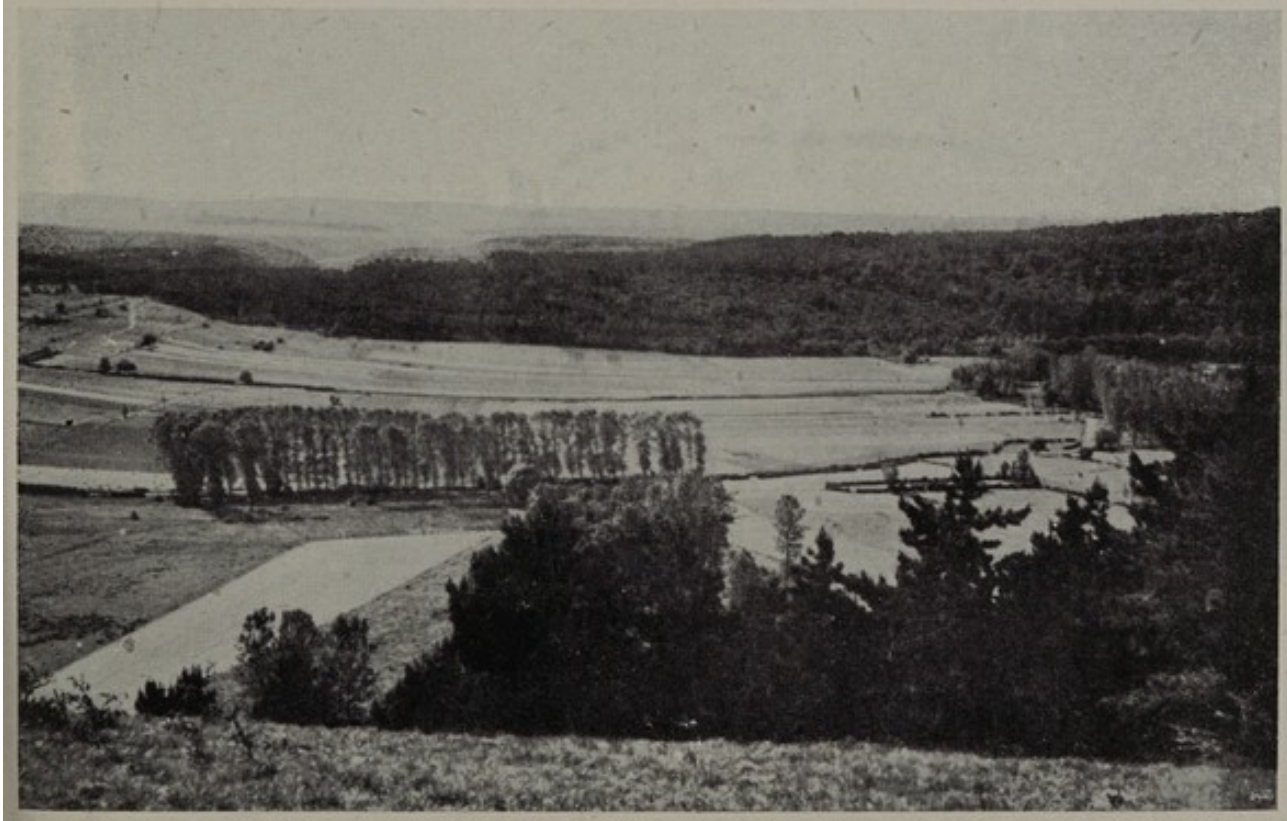


Plate 2. Limestone country near Han-sur-Lesse
Near Han, the river Lesse disappears into a series of underground caves, about 3 miles long, known as the *Grotte de Han*. This view, taken from the road above the caves, shows the dry valley formerly occupied by a great bend of the Lesse.



Plate 3. High moor in the Ardenne

This photograph, taken near Boigy-Pont, illustrates the heath country of parts of the Ardenne; in depressions it is frequently associated with bog.

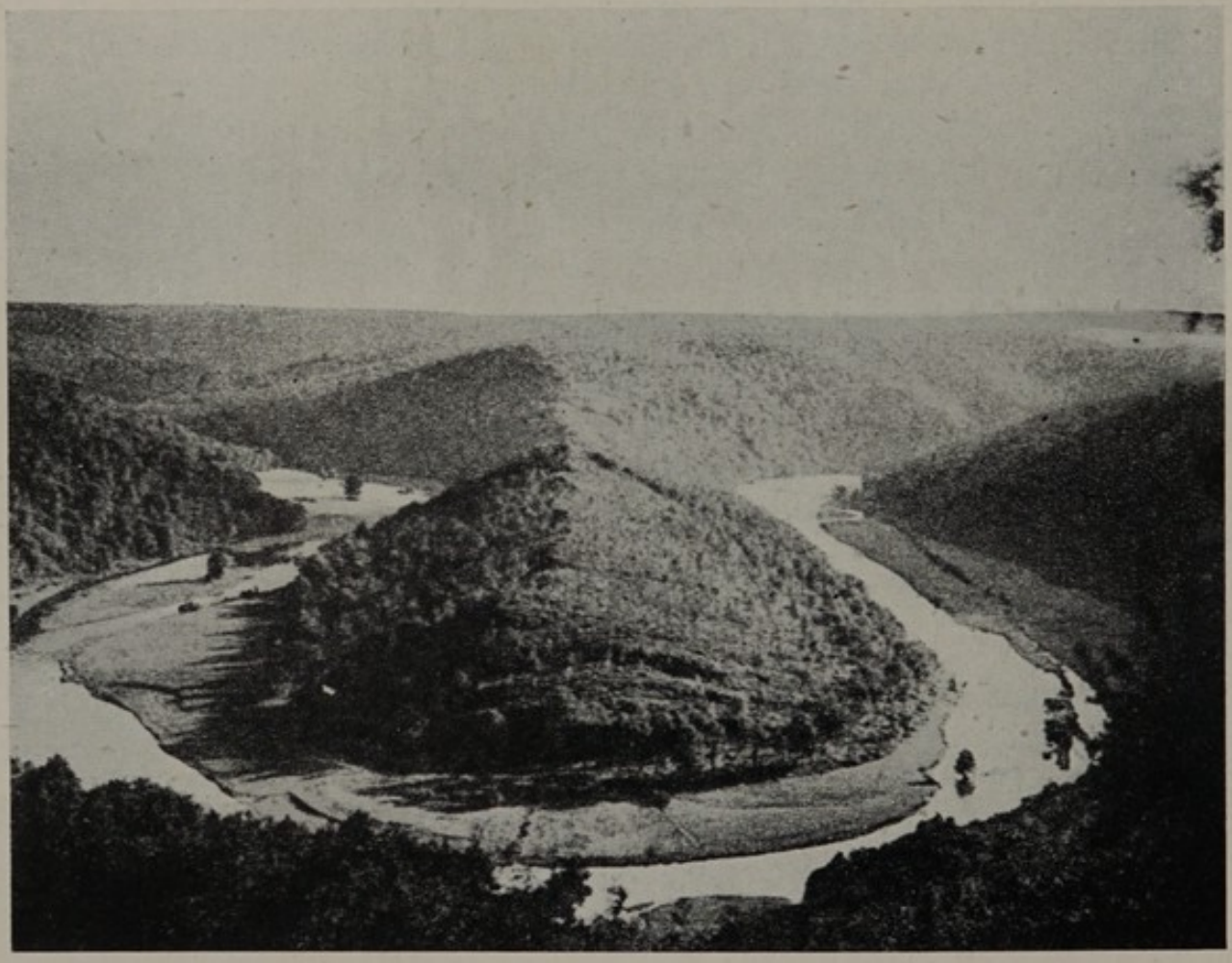


Plate 4. The Semois valley

The Semois valley is characterized by a series of deeply incised meanders; the steep valley sides are thickly wooded.

southern plateaux have a much greater cover of woodland than the exceptionally open lands of Hesbaye and Brabant to the north of the river, nevertheless there exist considerable stretches of open, cultivated and settled country, such as are well seen on both sides of the Meuse Gorge near Dinant. Such country clearly has more affinity with that of the northern plateaux than with the high lands of the Ardenne, despite its geological similarity to the latter.

Below the 100 m. contour (330 ft.), at the edge of the northern plateaux, stretches the northern lowland. But this, too, is far from being uniform in character. The interior of the Flemish plain is very different from the polder country, below 5 m. (about 16 ft.), and its margin of sand dunes; while yet again, the geology and geography of the north give a distinctive personality to the landscape of the Kempenland (Campine).

Finally, this survey of Belgium must also include one small region to the south of the Ardenne. Here, at about the 400 m. contour, the old rocks of 'High Belgium' dip beneath Mesozoic sandstones and limestones that are, geologically speaking, nothing other than a continuation of the scarplands of the Paris basin.

Local variations, therefore, make it possible to divide Belgium into a number of regions and sub-regions, each with individual characteristics (Fig. 1), and these must be considered separately from south to north:

(1) Belgian Lorraine.

(2) The Ardenne Plateau.

(3) The Southern Low Plateaux:
  (*a*) The Famenne Depression.
  (*b*) The Condroz Plateau.
  (*c*) Entre-Sambre-et-Meuse.
  (*d*) Pays de Herve.

(4) The Northern Low Plateaux:
  (*a*) Hesbaye.
  (*b*) The Plateau of Brabant and Hainaut.

(5) The Northern Lowland:
  (*a*) Interior Flanders.
  (*b*) Maritime Flanders.
  (*c*) The Kempenland (The Campine).

Belgian Lorraine

The south-east frontier of Belgium includes a region that stands in marked contrast with all other parts of the kingdom. This region is a continuation of similar country in Lorraine and in the Grand Duchy of Luxembourg, and it owes its physical features to the differential erosion of a succession of gently inclined Jurassic rocks. The more

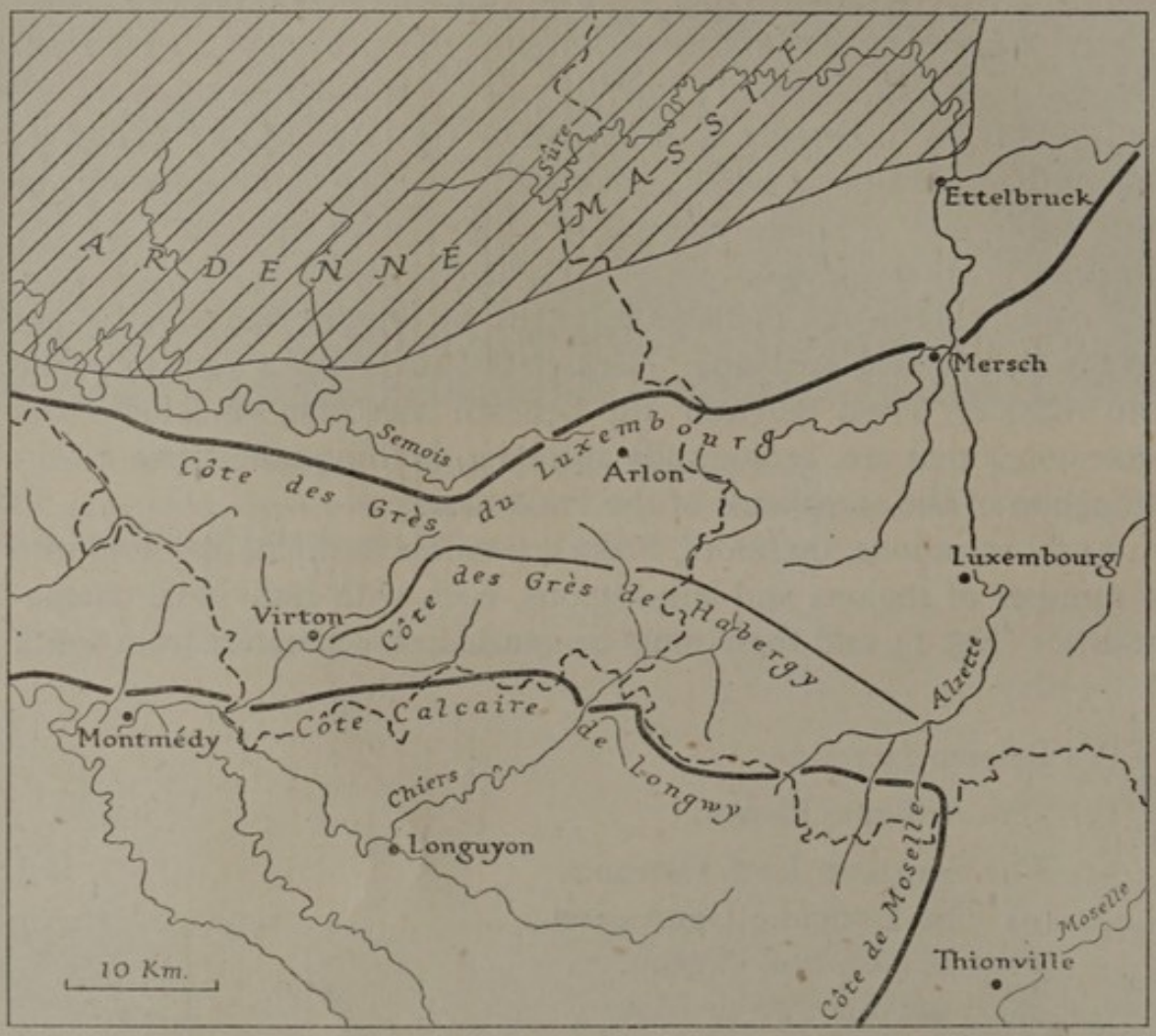


Fig. 5. The scarps of Belgian Lorraine

Based on (i) A. Demangeon, *Belgique—Pays Bas—Luxembourg*, p. 14 (Paris, 1927); this work forms vol. II of *Géographie Universelle*, edited by P. Vidal de la Blache and L. Gallois. (ii) G.S.G.S. Series 4042, 1 : 250,000, sheets 6 and 9 (1940–) for the outline of the rivers and the international frontier.
The line of the scarps is represented diagrammatically by black lines; the Côte des Grès de Habergy is lower than the other two. The approximate extent of the Ardenne Massif is indicated by diagonal shading.

resistant sandstones and limestones stand out in escarpments separated by vales developed in the intervening shales and marls. It seems as if the region once formed part of the 400 m. (1,300 ft.) platform that surrounds the central part of 'High Belgium', for the remnants of the

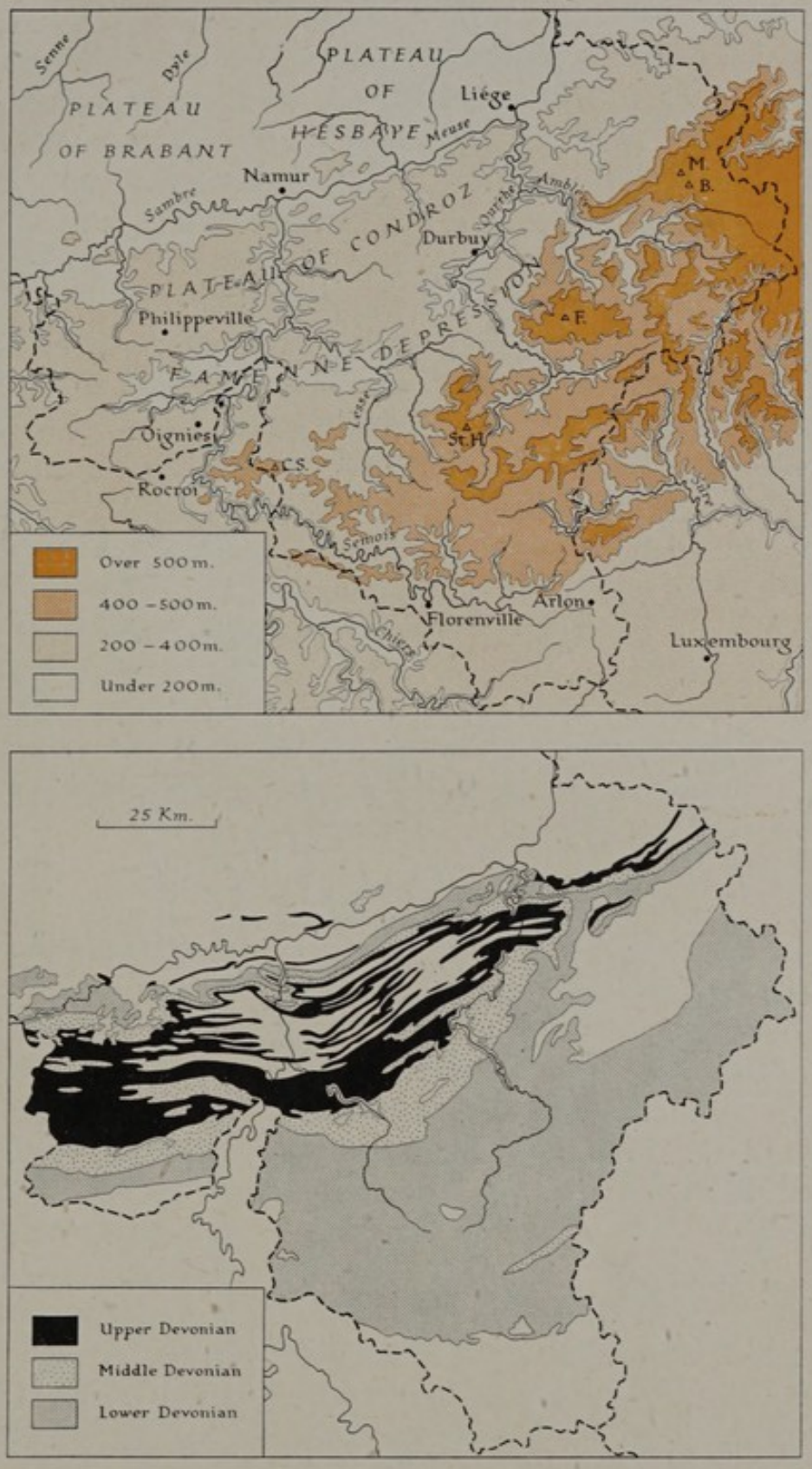


Fig. 6. The Devonian rocks of the Ardenne

Based on: (i) 1 : 500,000, *Belgique: Carte Oro-Hydrographique* (Turnhout, 1937) for the relief features (above). (ii) G.S.G.S. Series 3072, 1 : 160,000, *Geological Map of Belgium*, sheets 5 and 6 (1915) for the distribution of the Devonian rocks. The letters on the upper map refer to the main Ardenne summits in the following order: *M.* Baraque Michel; *B.* Botrange; *F.* Baraque de Fraiture; *St.H.* Forêt de St Hubert; *C.S.* Croix Scaille.

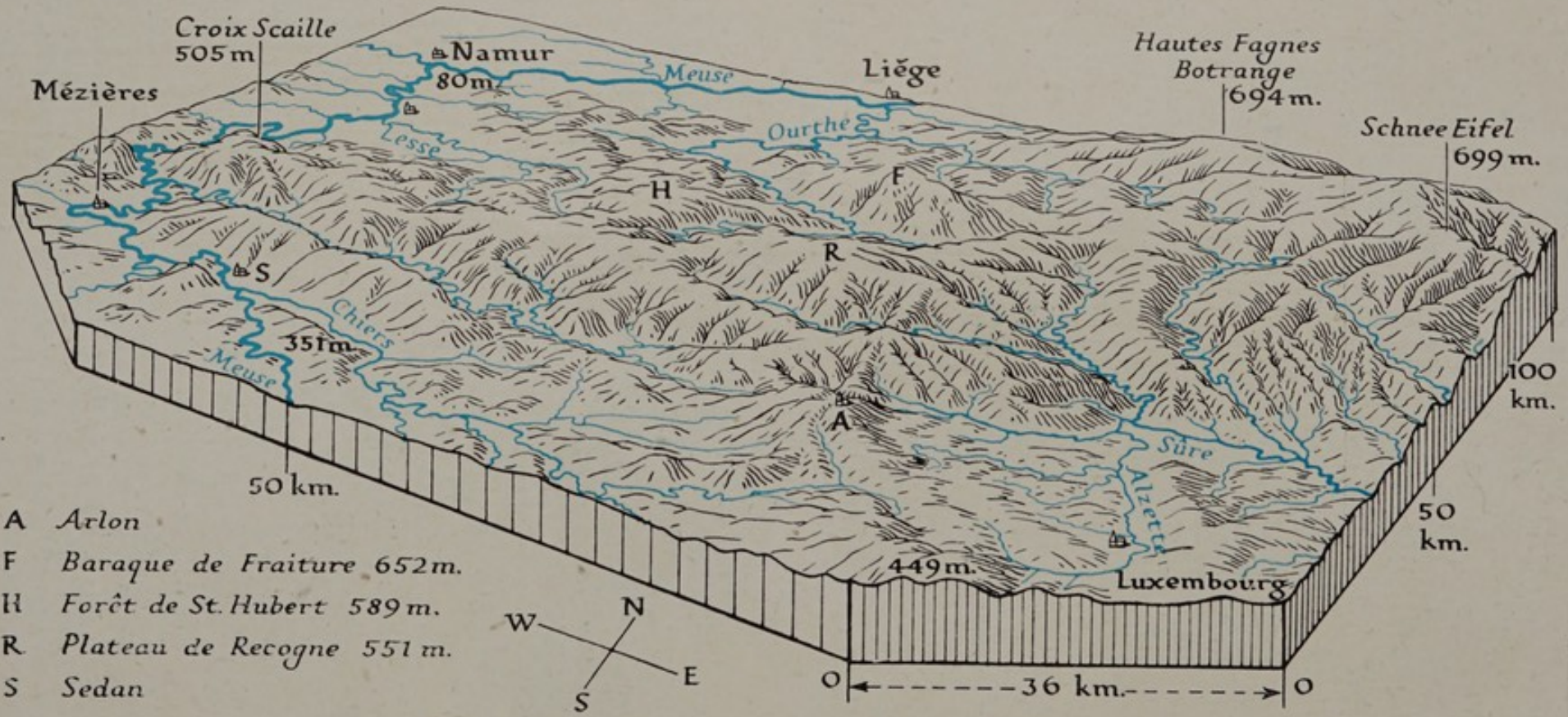


Fig. 7. Block diagram of the Ardenne (i)

higher escarpments preserve considerable tracts at or about this level (see p. 10). The escarpments themselves have only come into existence through the erosion of this former plateau.

Three escarpments can be distinguished (Fig. 5). One runs south of the Semois valley from Florenville eastwards into the Grand Duchy, where, however, it is broken by the long and narrow valley of the Alzette on the western brink of which the town of Luxembourg stands. This sandstone scarp is thickly clothed with beech woods and the country is strongly reminiscent of the Argonne in France and of parts of the western Weald of England. To the south, there is a smaller escarpment of sandy limestones near Habergy. Finally, across the frontier itself, is the great Longwy limestone escarpment which runs east beyond Montmédy and then turns sharply southward to form the Côtes de Moselle of France. The Franco-Belgian frontier lies everywhere near its crest, falling just south of it in the west and north of it in the centre and east.

The lower altitude of this region is reflected in a denser population as compared with the Ardenne (see p. 199), but the soil is not very fertile and stock-raising remains dominant (see p. 241).

The Ardenne Plateau

The Ardenne proper, or 'High Belgium', is the westward continuation of the Eifel uplands of Germany, and forms a crescent-shaped upland, concave towards the north. The greatest elevations occur in the north-east, near the German frontier, where heights of nearly 700 m. (about 2,300 ft.) are reached—Botrange (694 m. or 2,277 ft.) and Baraque Michel (675 m. or 2,215 ft.). Southward, the crest-line descends to Baraque de Fraiture (652 m. or 2,140 ft.) and the Forêt de St Hubert (589 m. or 1,933 ft.) until the Croix Scaille (505 m. or 1,657 ft.) is reached near the French frontier. Farther west, beyond the Meuse and south of Chimay, there is no clearly marked crest-line; the summits over a wide area lie at about the 350–400 m. (about 1,150–1,300 ft.) level. The actual water parting lies to the east and south of this curving crest-line from Botrange to Croix Scaille, for the head-streams of the northward-flowing rivers (the Amblève, the Ourthe and the Lesse) have cut their way back more rapidly than those flowing to the south (Figs. 6–9).

At the highest levels, above 500 m. (over 1,640 ft.), the surface comprises low flat-topped or rounded eminences separated by wide shallow depressions, often swampy, for the surface drainage is ill

developed. The summits themselves are indeed quite inconspicuous, and many parts of the surface appear to the eye almost as flat as the northern lowlands. Here, *par excellence*, can be seen the old eroded surface (or peneplain) of the one-time Hercynian mountains. This peneplain has been stripped of its cover of later rocks, and here, as in the Central Massif of France and the Rhenish Highlands of Germany, can be seen the 'roots' of the old Hercynian mountains (see p. 22). In the swampy depressions of this gently undulating surface, the streams of the area rise. At first they flow at the level of the general surface, but, followed downstream, they become increasingly incised below the adjoining plateau levels, and flow in narrow V-shaped valleys with forested slopes. The upland surface itself is also wooded, particularly at about the 400 m. level (about 1,300 ft.); the higher parts are more open and in the condition of wet upland moor (*Hautes Fagnes*) (Plate 3).

As might be expected, the soils of the region are poor, being derived from the underlying slates and quartzites. Agriculture is but little developed, and the main economic activities of the region are associated with woodland and pasture (see p. 240). The density of population is lower here than in any other region in Belgium (see p. 199).

The central upland appears to descend in two well-marked steps or benches—one at about 400 m. (1,300 ft.) and the other at about 300 m. (1,000 ft.) on the edge of the Ardenne itself (Fig. 4). The higher of these benches is best developed west of the Meuse in the vicinity of Rocroi and Oignies where elevations range from 380 to 390 m. (1,247–1,280 ft.). The same surface can be traced eastwards along the southern border of the upland, above the slopes of the Semois valley, and still farther east it extends on to the Jurassic rocks between Florenville and Arlon in Belgian Lorraine (see p. 9). There is a similar narrow bench at about 400 m. (1,300 ft.) along the northern margins of the Ardenne overlooking the Famenne depression. Below this a second bench occurs at about 300 m. (1,000 ft.); this is an obvious continuation of the Condroz plateau, north of the Famenne furrow. Opinion has differed about the origin of these benches. They have sometimes been regarded as reflecting the extension of the sea during later Tertiary times, in which case the steep slopes behind the benches can be interpreted as old cliff-lines, smoothed by later weathering and river erosion. As features of existing relief they stand out clearly enough, but their mode of origin may be regarded as problematical.

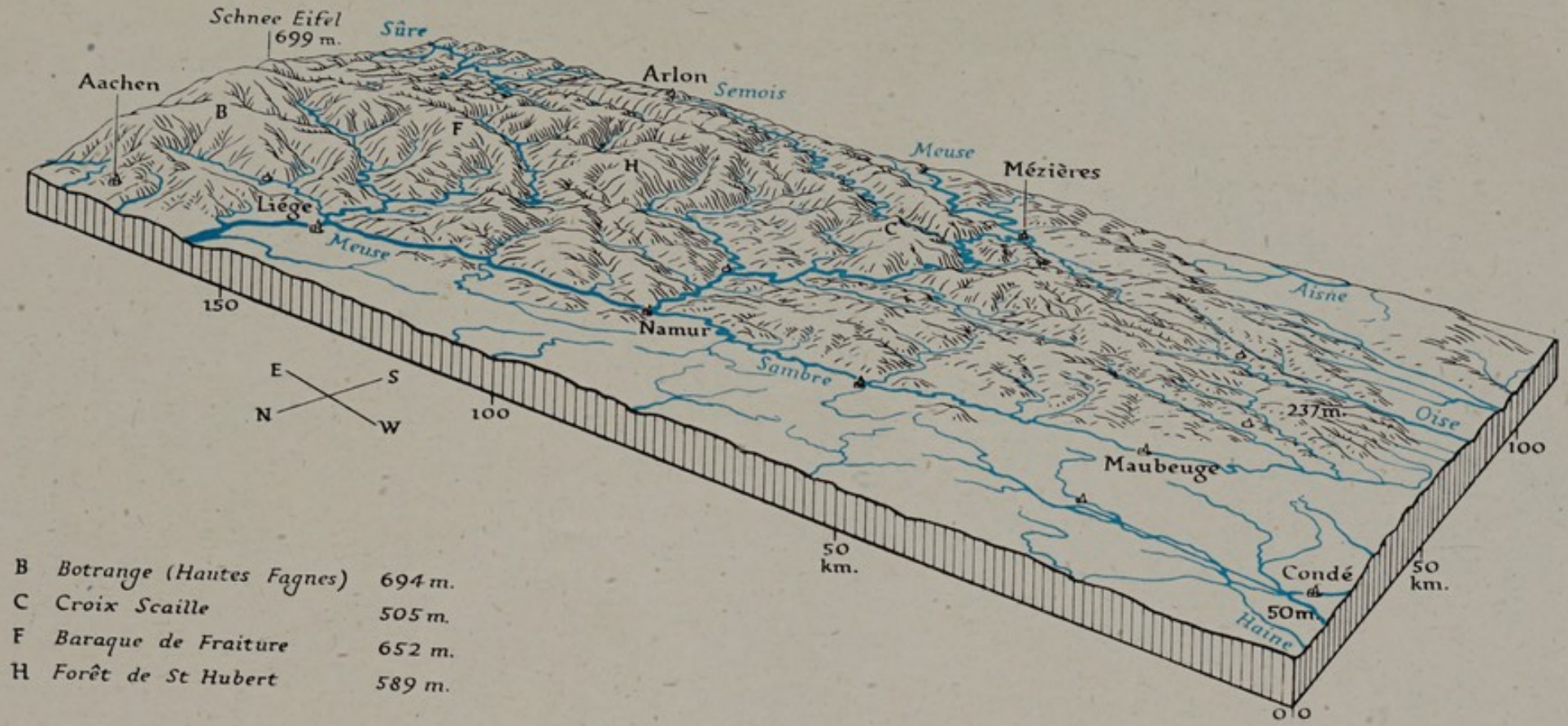


Fig. 8. Block diagram of the Ardenne (ii)

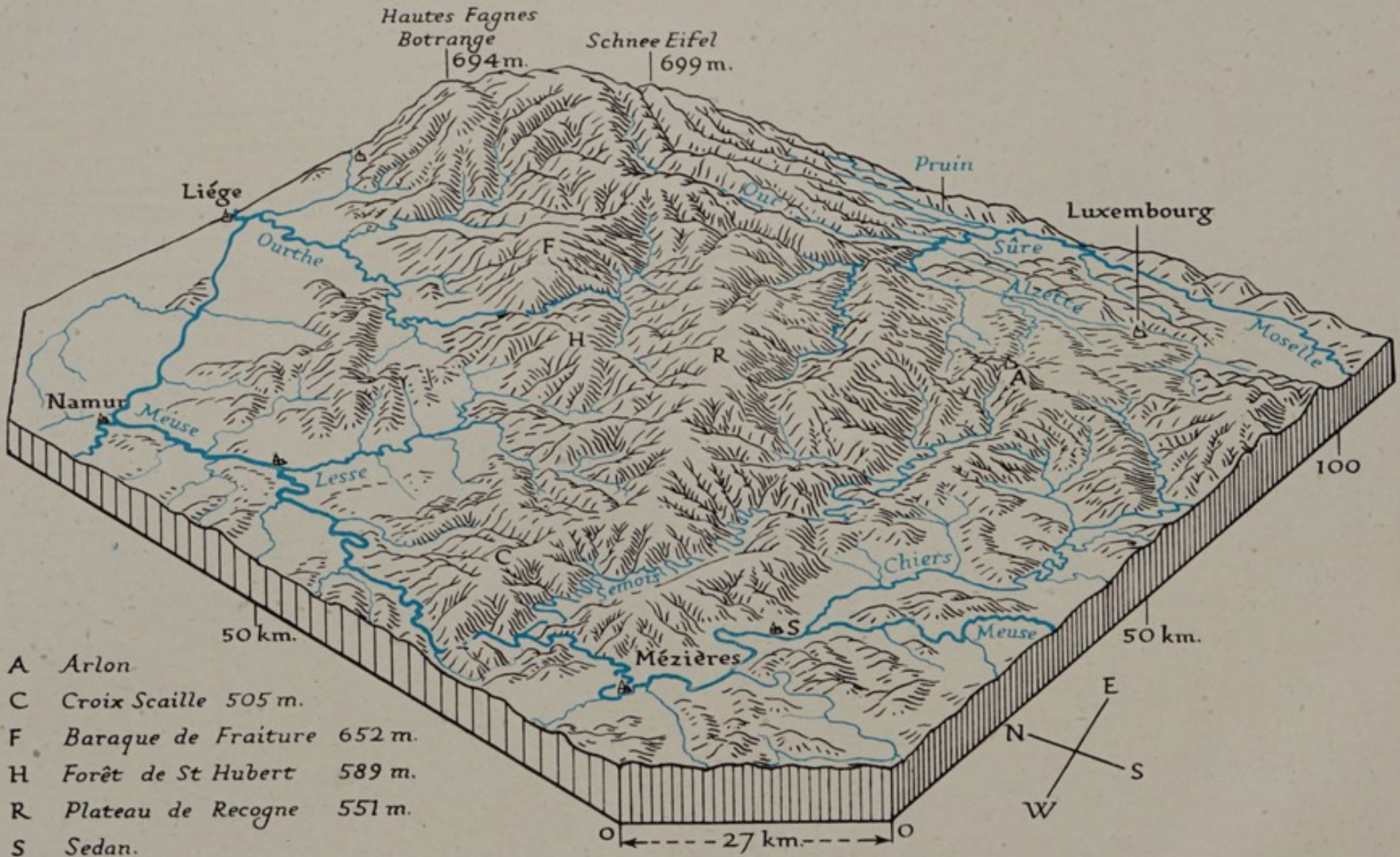


Fig. 9. Block diagram of the Ardenne (iii)

The Southern Low Plateaux

The southern plateau country, some 30 km. (20 miles) broad, is divided by the northward-flowing rivers Meuse and Ourthe into three compartments. From west to east they are the regions known as 'Entre-Sambre-et-Meuse', the Condroz plateau, and the Pays de Herve. The two former regions are separated from 'High Belgium' by the depression of Famenne. All are areas of Palaeozoic rocks; these include considerable stretches of limestone which give rise to peculiar conditions of drainage (see p. 18). The poorness of the soil has made the whole area largely a land of pasture, though locally there is some intensive cultivation (see p. 240). The density of population is correspondingly low (see p. 198), being round about 50 per sq.km.—intermediate between that of the Ardenne and that of the northern plateaux. The valley of the Meuse, however, forms a relatively prosperous corridor.

The Famenne Depression

The Famenne depression averages only about 180–200 m. (590–650 ft.) above sea level. It is a wide furrow, moulded in the less resistant Upper Devonian shales by the east-west tributaries of the Meuse and the Ourthe, while the main stream of the Ourthe itself runs in the furrow to the north, in the neighbourhood of Durbuy. The depression marks the southern limit of the plateaux of Condroz, and gives emphasis to the northern front of 'High Belgium'. In the west, the depression is sometimes known as 'La Fagne', which likewise lies between the plateau of 'Entre-Sambre-et-Meuse' and 'High Belgium'.

The Condroz Plateau (Fig. 10; Plate 1)

The Condroz region, between the Meuse and the Ourthe, shows the characteristic features of the southern plateaux to the best advantage. The general elevation ranges from 200 to 300 m. (650–1,000 ft.) with limited areas reaching 330–340 m. (1,083–1,115 ft.). It is a country of rounded crests and wide intervening depressions both alined NE-SW following the geological grain. The inconspicuous ridges, known locally as *Tixhes*, are developed as a rule on the sandstones, while the less resistant shales and limestones form the shallow vales. The crests stand at about 320 m. (1,050 ft.) and vales at about 280 m. (920 ft.)—some 40 m. or 130 ft. of local relief. The uplift of the plateaux relative to sea level has been too recent, however, for

differential erosion to etch out the less resistant belts in any very marked fashion. The process has indeed begun, for tributaries of the Meuse and the Ourthe have incised themselves deeply below the plateau near their confluence with the main stream. The *Tixhes* are usually wooded, with some pasture; the vales are cultivated though the soil is poor.

Entre-Sambre-et-Meuse

The district of Entre-Sambre-et-Meuse, to the west of the Meuse, is in no sense a distinct region, but is merely a natural compartment limited by the bordering valleys. The same belted structure and gentle relief of parallel ridges persist as far west as Philippeville. Beyond this point, the marked geological graining disappears, and the surface becomes even more uniform.

Pays de Herve

In the Pays de Herve, east of Liége, conditions diverge more widely from the type area, for here the Devonian rocks are replaced in part by Chalk. The low ridge and vale structure is therefore lacking. Moreover, the surface is covered by *limon*, which gives the area some of the features of the limon plateaux to the north of the Sambre-Meuse valley.

The Northern Low Plateaux

The plateau surface in Hesbaye and Brabant reaches somewhat lower elevations than in the Condroz, because the plateau surface as a whole declines gently northwards towards the plains (Fig. 4). The general elevation is about 100–200 m. (330–650 ft.); the highest points, occasionally exceeding 200 m., are on the brink of the Sambre-Meuse furrow, and there is a very regular slope northwards at about 2 m. per km. (1 ft. per 500 ft.). The whole plateau is covered by *limon* which provides one of the finest arable soils in Europe, and the rich agricultural opportunities of the area recall those of the similarly constituted Hellweg and Börde regions in Germany, and those of Picardy and Beauce in northern France. A chequer-board of wide hedgeless fields extends to the horizon and the only trees form clumps around the large prosperous villages. The main crops are wheat and sugar beet with dairying and market gardening in the neighbourhood of the industrial localities (see p. 238). The high density of population (100–200 per sq.km.) is a reflexion partly of the fertile soil and partly

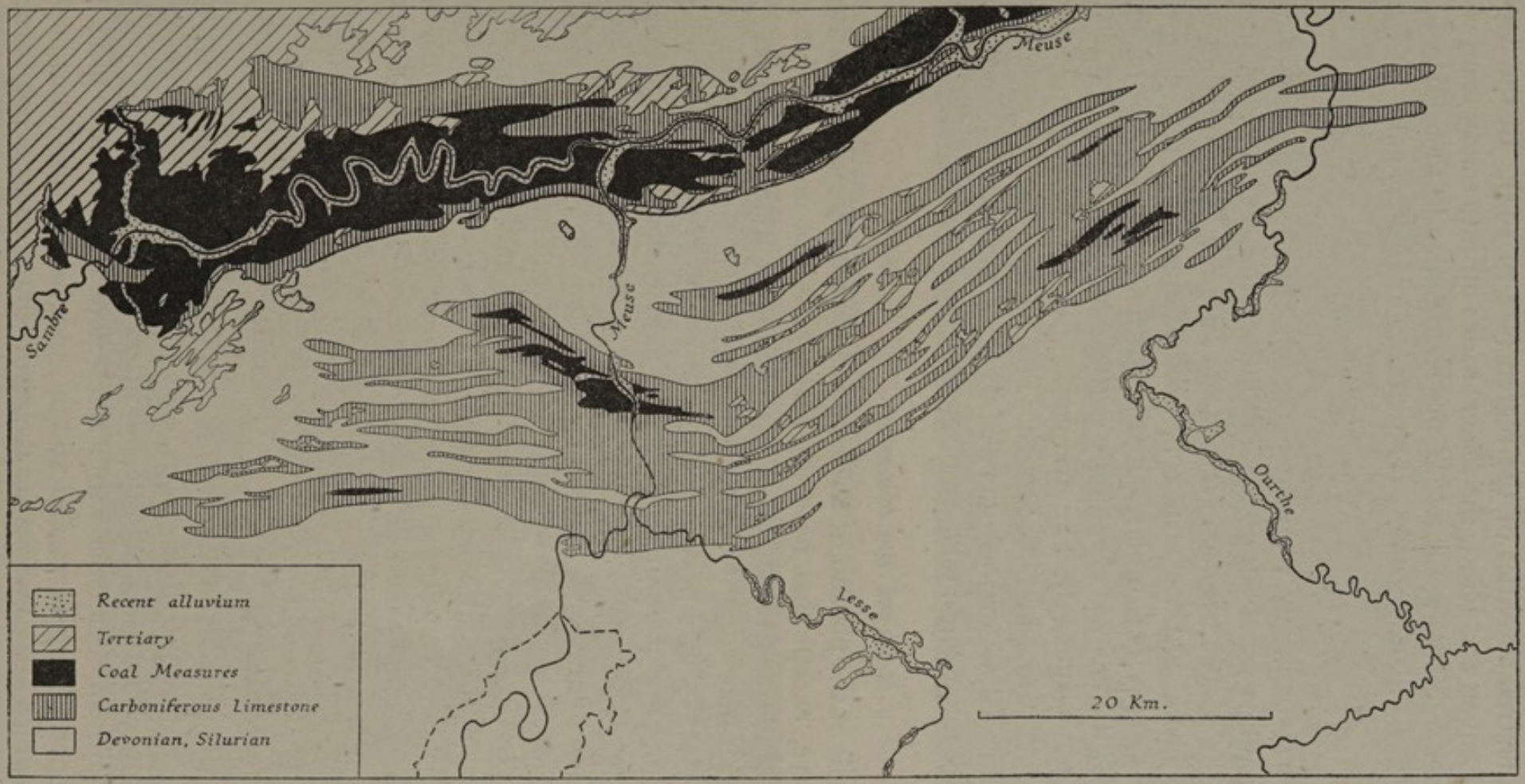


Fig. 10. Geological map of the Condroz

Based on G.S.G.S. Series 3072, 1 : 160,000, *Geological Map of Belgium*, Sheets 5 and 6 (London, 1915).

of the industrial activities of the region (see p. 194). In the north, towards Leuven and Diest, the *limon* shades off into sandy loam with trees that herald the approach of the Kempenland. Two main sub-regions can be distinguished—the plateaux of Hesbaye and Brabant.

Hesbaye

Hesbaye is a highly distinctive region, about 30 km. (20 miles) wide, extending for about 60 km. (40 miles) from west to east, on the north of the Meuse between Namur and Liége. The underlying rock is largely chalk, but its surface is buried, sometimes to a depth of about 20 m. (65 ft.), under a mantle of *limon*. Since the *limon* is porous and the chalk is also highly permeable, the surface drainage is extensively 'swallowed'. The drainage network is very open and the major valleys are widely separated. The plateau surface is covered with broad shallow depressions due to the subsidence of the underlying chalk following dissolution by underground waters (Plate 6).

The Plateau of Brabant and Hainaut

The soils of the plateau of Brabant and Hainaut are similar to those of Hesbaye, except that here the *limon* rests not on Chalk but on Tertiary sands, and these in turn at small depth on the old Palaeozoic rocks which here come to the surface (see p. 1). The sands, like the chalk of Hesbaye, are pervious, though they have not the same power of sustaining underground drainage. Further, the impervious rocks of the floor hold up water in the sands and are themselves within reach of the more deeply cutting rivers. Thus the conditions of land sculpture and water supply are wholly different from those of Hesbaye, and the consequences are seen in a much more abundant surface drainage. Spring-fed streams flowing in steep-sided valleys are frequent. These conditions are even more true on the east of the plateau in Hainaut where the *limon* rests directly on the underlying clays.

The Northern Lowland

Interior Flanders

Below the plateaux of Hesbaye and Brabant stretches the northern plain which, however, is far from being uniform in surface. Between 50 and 100 m. (165–330 ft.) lie the plateau margins, and the 50 m. contour normally coincides with a steep slope that serves to limit the plain proper. Between 50 and 100 m., too, lie outlying relics of the plateaux which serve to diversify the plain. These cover a considerable

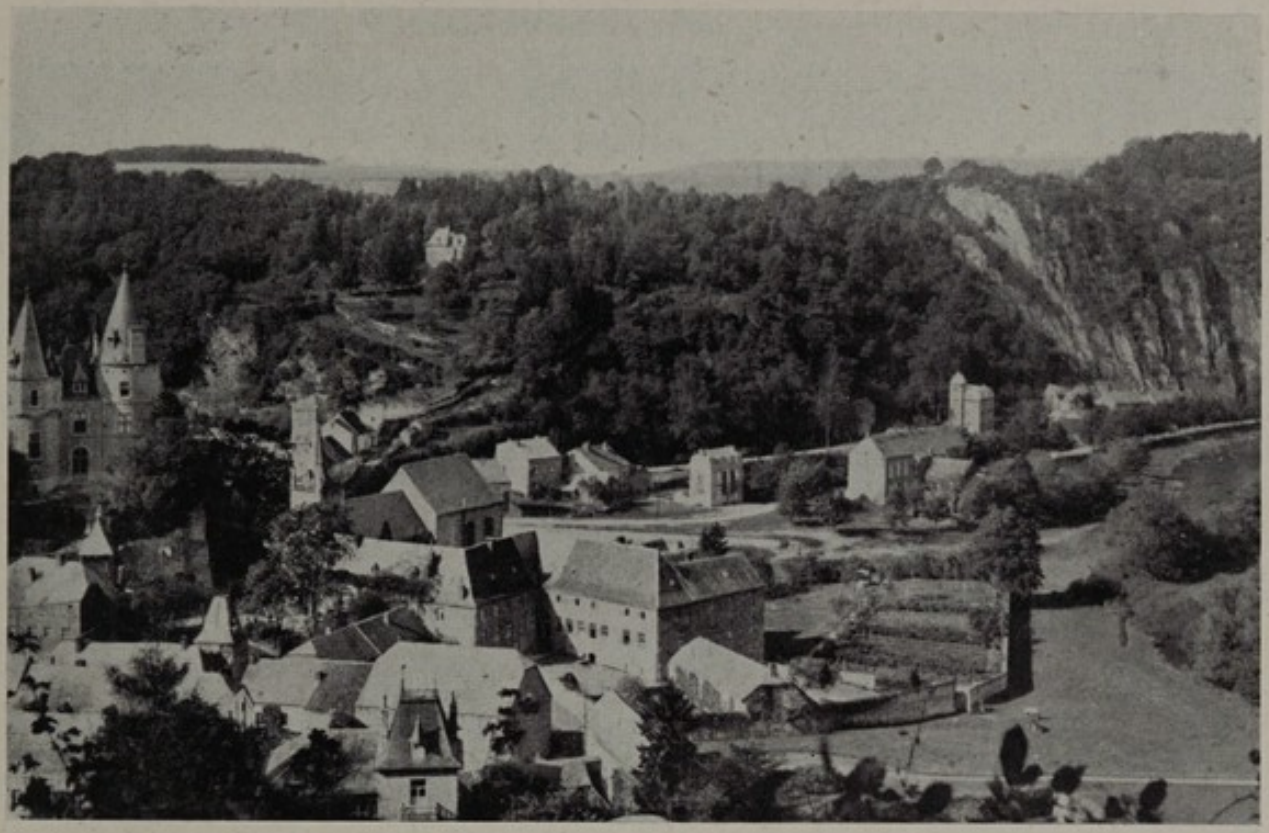


Plate 5. The Ourthe valley at Durbuy

Durbuy, a small summer resort in the Condroz, stands on the banks of the Ourthe (seen to the right).



Plate 6. The Hesbaye Plateau, north-east of Namur

Much of the level surface of the Northern Low Plateaux is covered with a chequer-board pattern of unhedged fields. The nucleated villages are typical of the eastern part of the Hesbaye.





Plates 7 and 8. The Flanders Plain

The upper photograph looks across the plain from the summit of Kemmelberg (512 ft.). The lower photograph shows one of the many drainage channels which intersect the plain. Lines of trees and wooded tracts are also common features.

area. Thus, between the Dendre and the Escaut (Scheldt), an outlying mass of the Brabant plateau culminates in the Pottelberg which reaches 157 m. (515 ft.). A similar outlier is represented by the chain of isolated hills in western Flanders, extending from Passchendale south-westward through Kemmelberg (156 m. or 512 ft.) to Mt Cassel (167 m. or 550 ft.) in France; these outstanding relics rise from a featureless plain and are conspicuous in their isolation.

Below the 50 m. contour (165 ft.) the Flemish plain shows a great uniformity of surface, as seen from adjoining high ground, so that at first sight it appears essentially indivisible. Nevertheless, it embraces two distinct land surfaces of essentially different origin. Between 20 and 50 m. (65–165 ft.) the land is gently undulating; low swellings separate the open valleys. Clearly this part of the surface has developed under the influence of river erosion. The rivers in their existing state are quite incapable of performing such erosion. The surface dates, in fact, from that phase of the Quaternary Ice Age, when the coastline had receded many miles to the north, thus giving the rivers, swollen by snow-melt, a greatly enhanced fall.

Between 5 and 20 m. (16–65 ft.) the surface is essentially that of river alluvium built up by the deposits of successive floods. Thus the flood plain of the Lys below Kortrijk (Courtrai) is no less than 4 km. ($2\frac{1}{2}$ miles) wide. This phase of river sedimentation was the result of the return of the sea to the vicinity of the present coastline. Since this time, the rivers have been steadily building up their flood plains, and thus raising the floors of the shallow troughs cut in the previous phase of erosion. In places the river alluvium is more than 30 m. thick, and over this alluvium the rivers pursue meandering courses marked by abandoned loops such as are well seen along the Escaut below Wetteren.

The net result has been to produce a fairly broken and varied surface that belies the first impression of uniformity. North of a line from Diksmuide to Deinze (on the Lys), sandy soils predominate, but to the south 'Flanders Clay' is dominant, and it is out of this latter that the upper plain above 50 m. has been cut. Cultivation is very intensive over the whole area and a striking variety of crops is grown (see p. 236). The dense rural population lives not in compact villages, but in isolated dwellings scattered everywhere over the countryside (see p. 220). Since much of the area is industrialized, the average density of population is as high here as anywhere in Europe (see p. 191). Much of the plain presents a well-wooded appearance on account of its numerous trees and coppices (Plates 7, 8).

Maritime Flanders

Below 5 m. (16 ft.) lies the true maritime plain underlain by marine clays and peats that mark the most recent trespass of the sea, from which the land has been regained by a combination of natural silting and artificial reclamation. Parts of the maritime plain lie 2 m. (6½ ft.) or less above the mean level of low tides and would be regularly inundated by the sea were it not for the protective coastal belt of dunes, supplemented by dykes (see p. 34).

The polders are characteristically flat, humid and treeless and are dissected everywhere by dykes and drainage channels. The basic economy of the region is associated with pasture, but cereals are also grown (see p. 235), and the population is dense (see p. 191). The sand-dune belt has a poor arid soil, and here the density of population is correspondingly lower (see pp. 190 and 220).

The Kempenland (The Campine)

The northern part of the lowland is occupied by the distinctive region known as the Kempenland (Flemish) or Campine (French). It is essentially the western part of a great bank of coarse sand and gravel laid down by the Meuse in the form of a fan during a late stage of the Quaternary Ice Age. It is highest in the east, reaching to 50–100 m. (165–330 ft.) above sea level and slopes gently downward. Its surface drainage is poor, its streams are sluggish, and there is some marshland. A large part of the sandy area is heath country. Since the beginning of the nineteenth century, a good deal of the land has been improved and turned into better pasture, while afforestation, too, has changed much of the surface (see p. 257). The density of population was very low until the demand of Antwerpen for market-garden produce, and the discovery of coal around Genk, brought people to the area (see p. 198) (Plates 9, 10).

The River Systems

Many references have already been made to the rivers of Belgium, since it is to their development that the significant patterns of relief are due. The pattern of the river system itself presents its own features and problems and merits separate treatment (Fig. 11).

The Meuse System

The main stream of the Meuse is composite in nature, being formed by the junction of several stretches having widely different relations

to the underlying structure of the country. In its French course above Mézières, the Meuse is on the whole a longitudinal stream—that is, it follows the direction of the geological grain of the country.

From Mézières downstream to Namur it is quite as clearly a transverse stream, cutting across the geological grain of the Ardenne.



Fig. 11. The river system of Belgium
Based on 1 : 500,000, *Belgique: Carte Oro-Hydrographique* (Turnhout, 1937).

Such a relation can only have arisen if its course was situated on a former cover of newer rocks, since completely stripped from the Ardenne (see p. 24). There is no doubt that Cretaceous and Tertiary rocks formerly covered the massif to beyond the line of the Meuse, and it was on the surface of these rocks that the river began to flow. It has cut itself deeply in the older rocks of the massif, flowing in a gorge which is perhaps the most notable scenic feature of Belgium. The gorge narrows and develops almost precipitous sides where the limestone belts cross it, but, in the intervening belts of shale or sandstone, the valley slopes are gentler and well-wooded. In the past, the

river followed a very meandering course through the gorge, but the 'necks' of several of the great loops have been cut through by the river itself, leaving isolated hills or 'meander cores' as at Profondeville, Anhée and Annevoie (Plate 11).

In following the line of the great coalfield furrow from Namur to Liége, the stream which bears the name of the Meuse is simply the downstream continuation of the Sambre. Inasmuch as the shaly rocks of the Coal Measures are only moderately resistant, easily excavated, the line taken by the stream is a natural one, but it must be remembered that this portion of the stream, like the gorge section, started to flow on the newer cover rocks, not on the floor. It must therefore owe its original direction to features since destroyed. Nevertheless, the stream, however initiated, inherited an advantage, as it cut down into the conveniently disposed Coal Measures.

It is known that the Meuse of an earlier (late Pliocene or Pleistocene) date continued its course eastwards beyond Liége and joined the Rhine east of Aachen. The cause of its later diversion westwards across the Kempenland is not certainly known. The great westward turn below Mook, which carries it into the Netherlands delta, was initiated in response to the barrier of ice-borne moraines deposited north of the Rhine mouth during the maximum extension of the northern ice sheets.

The tributaries of the Meuse present some features of note. The major northward-flowing streams of the Ardenne, such as the Lesse and the Ourthe, obviously developed as primary or transverse streams following the latest uplift of the massif (see p. 24). Both they and their tributaries have adapted themselves to the belted structure of the Condroz region (see p. 11); in particular the Famenne depression has developed as a longitudinal furrow, diverting the original northward-flowing drainage to the east and the west. The streams of the southern slope of the Ardenne are gathered up by the Semois, which, flowing over the Mesozoic rocks in the country west of Arlon, passes on to the older rocks below Florenville; it is notable for its long succession of incised meanders (Plates 4, 5).

The Semois, with its right-bank tributaries draining an upland area of relatively impervious rocks, is the dominant factor in the essentially torrential regime of the Meuse below Mézières. Above this point, the fluctuations of level in the Meuse are slow and moderate in amount, but thence downstream it is subject to violent and rapid floods in winter and sometimes in late summer following thunderstorm rains. The tendency is reinforced downstream by the other Ardenne



Plate 9. Aerial view of the Kempenland (Campine) near Genk
While part of the Kempenland is under cultivation, there are extensive stretches of sandy heath and woodland as well as shallow brackish lakes.

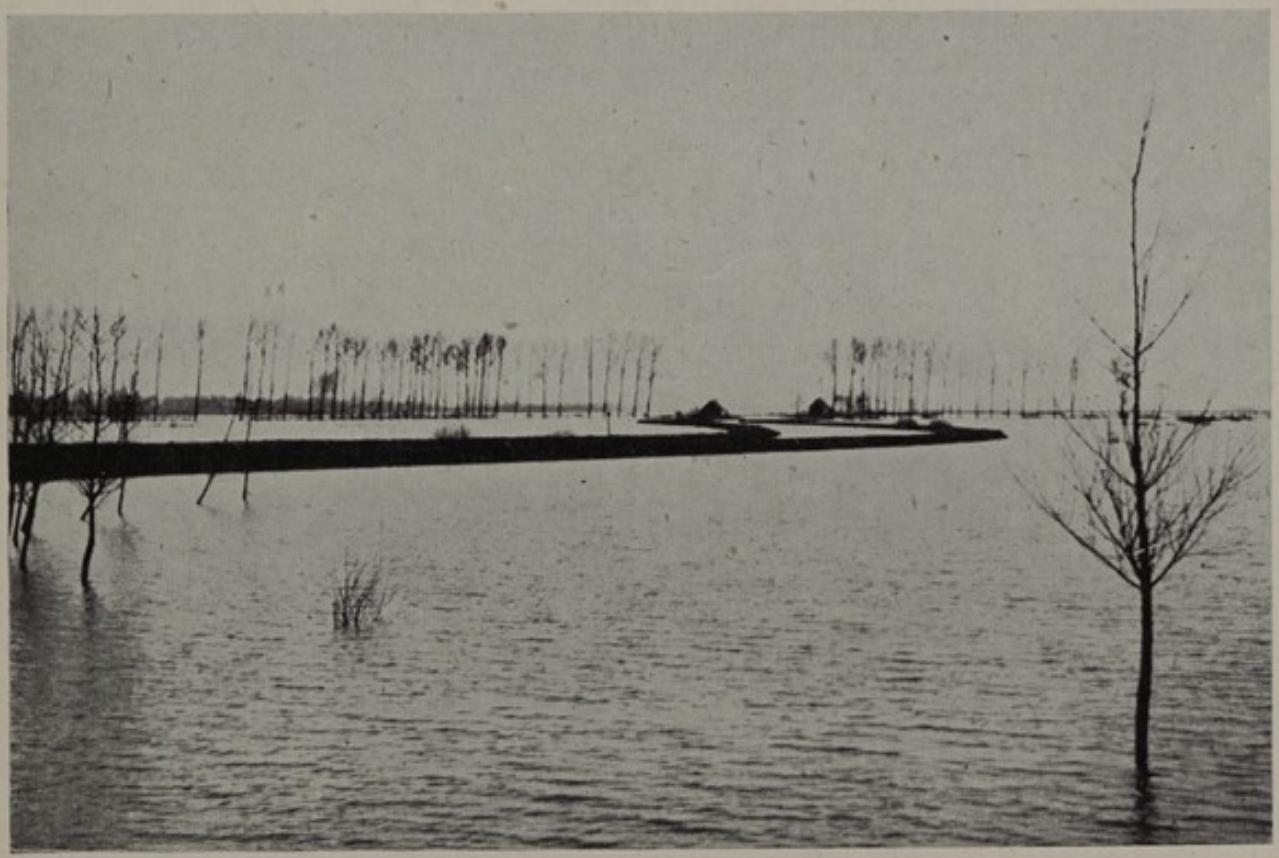


Plate 10. The Nèthe floods near Emblem
The Nèthe and its tributaries, which drain the western Kempenland, often flood over wide areas during the winter owing to the gentle gradient of the terrain.

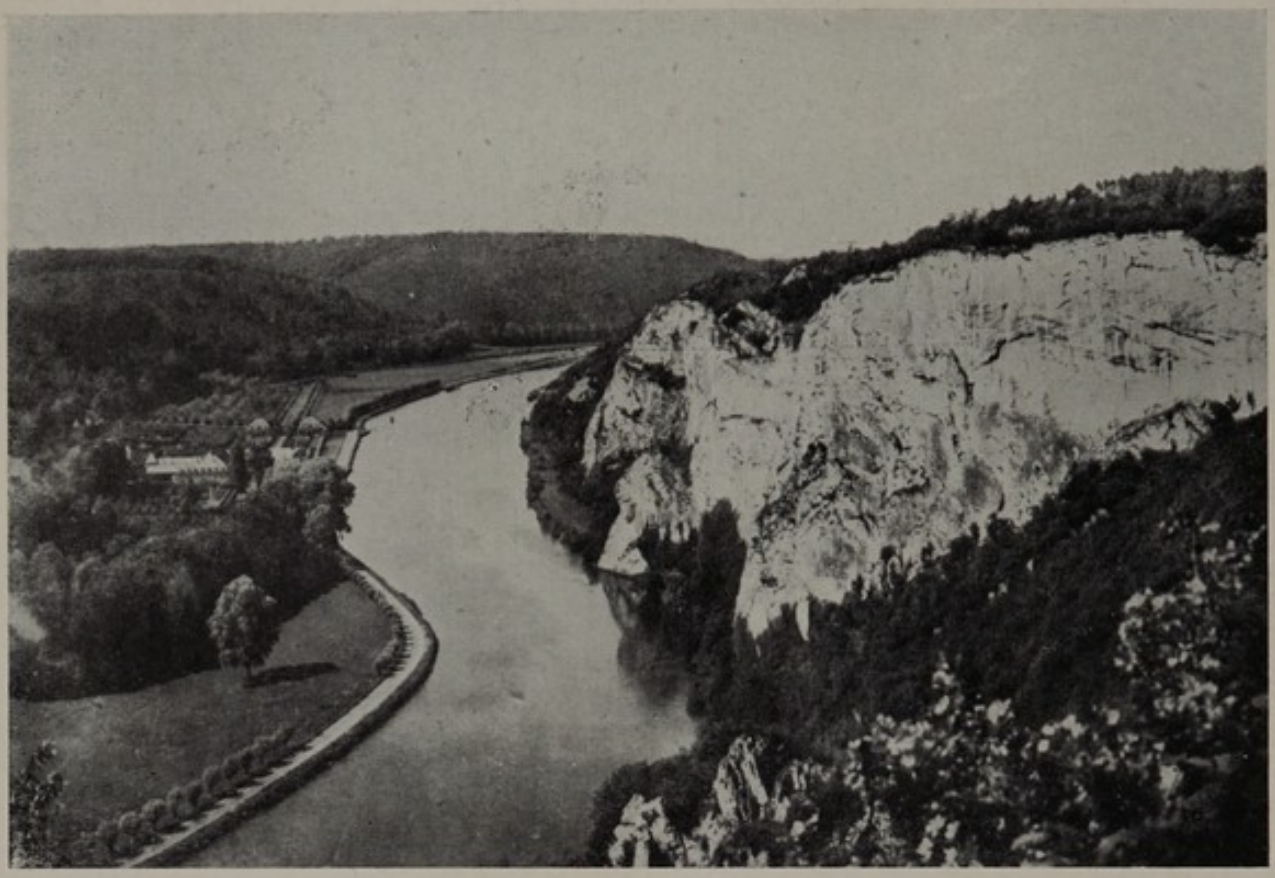


Plate 11. The Meuse valley near Dinant

Above Namur, the Meuse flows in a deep valley whose sides are often steep cliffs. The river has been regulated and carries a considerable amount of traffic.



Plate 12. The Meuse valley at Visé

Below Liége, the Meuse valley widens; between the river and the edge of the chalk plateau in the distance are extensive orchards and farmlands. The river has numerous sandy islands; it is very shallow in places and unnavigable. Traffic follows the Albert Canal which runs parallel to the west bank of the river.

tributaries, notably the Ourthe. When the rise of the latter coincides with that of the Meuse, widespread inundation takes place below Liége.

The Escaut (Scheldt) System

The main branches of the Escaut (Scheldt) system are a group of regularly spaced parallel streams trending south-west to north-east, and comprising the Lys, part of the Escaut above Gent (Ghent), and the main trunks of the Dendre, Senne, Dyle, Grande Gette and

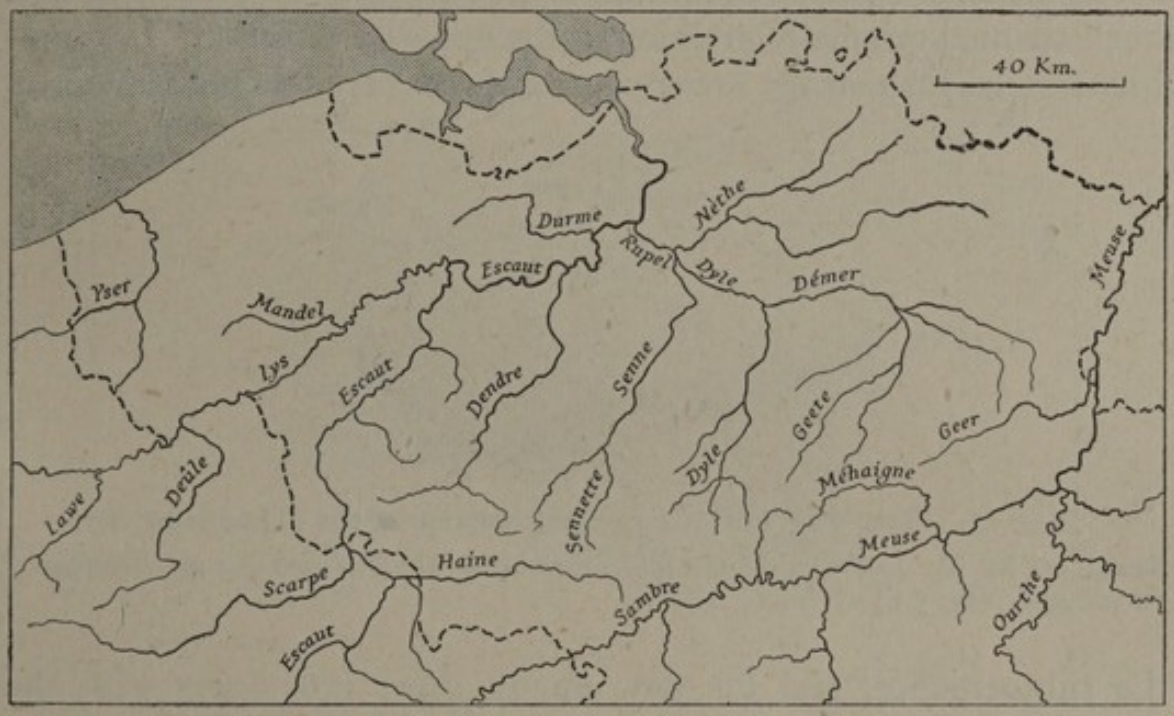


Fig. 12. The Escaut (Scheldt) basin

Based on 1 : 500,000, *Belgique: Carte Oro-Hydrographique* (Turnhout, 1937).

Petite Gette. The Yser above Diksmuide, despite its present separation from the Escaut system, may be regarded as a western member of the same series. These streams came into being with the northward tilt of the land, and the retreat of the Pliocene Sea (see p. 4). They must originally have pursued independent courses northwards towards a vanished coastline (Fig. 12).

The simple pattern of this system has been subject to considerable modifications, not all of which can be traced in detail. A notable later element in the drainage pattern is the east-west direction of the Démer, lower Dyle, Rupel and Escaut below Gent—all set athwart the original northward-flowing drainage. The first three seem to have originated in a furrow between the general northward-sloping surface and the south-west side of the great Kempen fan (Fig. 13), but it is

clear that no finality can attend speculations concerning the detail of the drainage evolution in this lowlying portion of the plain. The episodes concerned took place partly above the present surface, before it was worn down to its present level, and partly below it, i.e. beneath the thick covering of alluvium. In both cases the evidence is thus lost beyond recall.

Finally, the recent submergence of the coastal zone gave rise to a series of drainage diversions which are easily traceable. Thus the channel of the Escaut below Rupelmonde became established only during historic times as the result of the widening by tidal scour of a small channel originally draining in the opposite direction. In somewhat similar fashion the lower course of the Yser was obliterated by

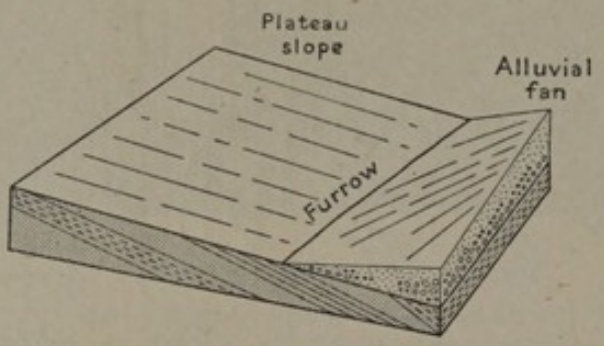


Fig. 13. Block diagram to show the formation of the Démer furrow
Based on M. A. Lefèvre, *Notice sur la carte oro-hydrographique de Belgique à* 1 : 500,000, Fig. 5 (Turnhout, 1937).

the submergence, and the new mouth came into being with the emergence of the maritime plain.

Another departure from regular drainage pattern is provided by the east-west Haine valley in the neighbourhood of Mons. This line is in reality a continuation of the Sambre-Meuse furrow, and follows the axis of a sharp syncline in the Chalk. It is to the structural advantage conferred by the syncline that the development of the Haine is due, and it is clear that it has captured two of the original headstreams of the Dendre—the Scarpe and the upper Escaut.

Note on the Structure of the Ardenne

The Ardenne once formed part of the Hercynian mountains that were raised up, at the end of Carboniferous times, across what is now central Europe. The rocks of the Ardenne are everywhere steeply inclined, being traversed by a series of roughly parallel east-west folds that recall similar trends in Brittany and South Wales to the west and

in the Rhenish Highlands and Bohemia to the east. All these uplands in present-day Europe reveal the roots, as it were, of the ancient Hercynian mountains. The history of these present-day relics, and of the Ardenne in particular, falls into three stages: (i) folding, (ii) erosion and subsidence, followed by (iii) uplift.

(i) *The folding of the Ardenne*

The succession of anticlines and synclines is shown on Fig. 14. On the ground itself, the structure of the ancient mountains is

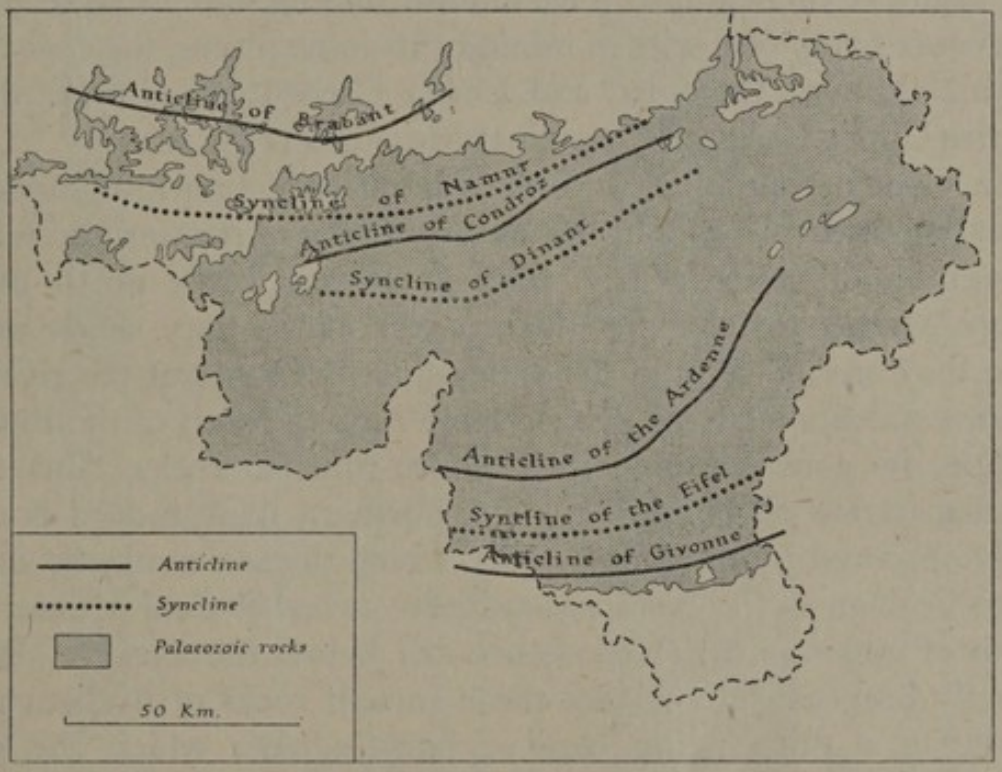


Fig. 14. The structure of the Ardenne Massif
Based on J. Halkin, *Atlas Classique*, Plate 16 (Namur, 1934).

strikingly displayed in the gorge of the Meuse as it flows across the upland northward to Namur. Fig. 15 summarizes the main features of a section along the line of the Meuse. It shows the Ardenne rising from beneath the newer Jurassic rocks of Lorraine in the south. The first of the east-west folds to be crossed is that of the Ardenne anticline, which raises the Cambro-Silurian rocks to the surface. The same axis continues north-eastwards and coincides closely with the crest-line of the Ardenne; it brings the Cambro-Silurian rocks to the surface again in the frontier region around Stavelot and Spa (Fig. 10). On the north-west, this anticline is succeeded by the complex syncline of Dinant composed of a number of smaller anticlines and synclines (synclinorium). The synclines preserve strips of

Carboniferous Limestone; the anticline crests give intervening belts of Upper Devonian strata. The simplified section of Fig. 15 shows only two of the minor synclines; actually, nine or ten are crossed in a distance of 10 km. (about 6 miles). North of the Dinant basin is the narrow over-folded Condroz anticline, associated with a great thrust fault—the famous 'Grande Faille du Midi'. Along this fracture, the rocks to the south have been driven northwards towards, and partly over, the next major syncline, that of the Namur basin. This, again, is a synclinorium rather than a simple syncline, and it provides the chief coalfield of Belgium. The intense folding and fracture of the strata cause many obstacles in mining. In some places, the coal shafts are sunk through Devonian and Lower Carboniferous rocks thrust over the Upper Carboniferous Coal Measures (Fig. 16).

The Condroz anticline and the Namur synclinorium mark the original mountain front, but the country to the north was also folded, although much more gently. The Palaeozoic rocks north of the Sambre-Meuse are obscured by a cover of Tertiary sands except where they are revealed in the valley-floors of some of the rivers of Hesbaye and Brabant (see p. 14). Here runs the crest of the Brabant anticline, its core occupied by Cambro-Silurian rocks, flanked by Devonian strata on both sides. The northern flank indeed is completely obscured by the newer rocks, which thicken markedly northwards; borings in the Kempenland have revealed Coal Measures at depths of 300–600 m. (1,000–2,000 ft.) below the surface. It has generally been considered that these ancient rocks of Brabant mark the site of a pre-existing core or horst against which the main Hercynian folds were driven; here was the 'foreland' of the old mountain range.

(ii) *The Erosion and Subsidence of the Ardenne*

The Hercynian mountains in their youth, at the end of Carboniferous times, must have equalled or surpassed the present Alps in height and grandeur. Their formation, however, was followed in Mesozoic times by a lengthy period of erosion which reduced them to a comparatively level surface (peneplain). But though the upstanding mountain forms had thus been levelled down, the rock folds, that penetrated deep below the surface of the ground, now outcropped on the worn-down plain, and formed a witness to the vanished mountains. Towards the end of Mesozoic times, in the Cretaceous period, the greater part of the old Ardenne upland sank beneath the sea; and while this sinking took place, the waves of the encroaching sea must

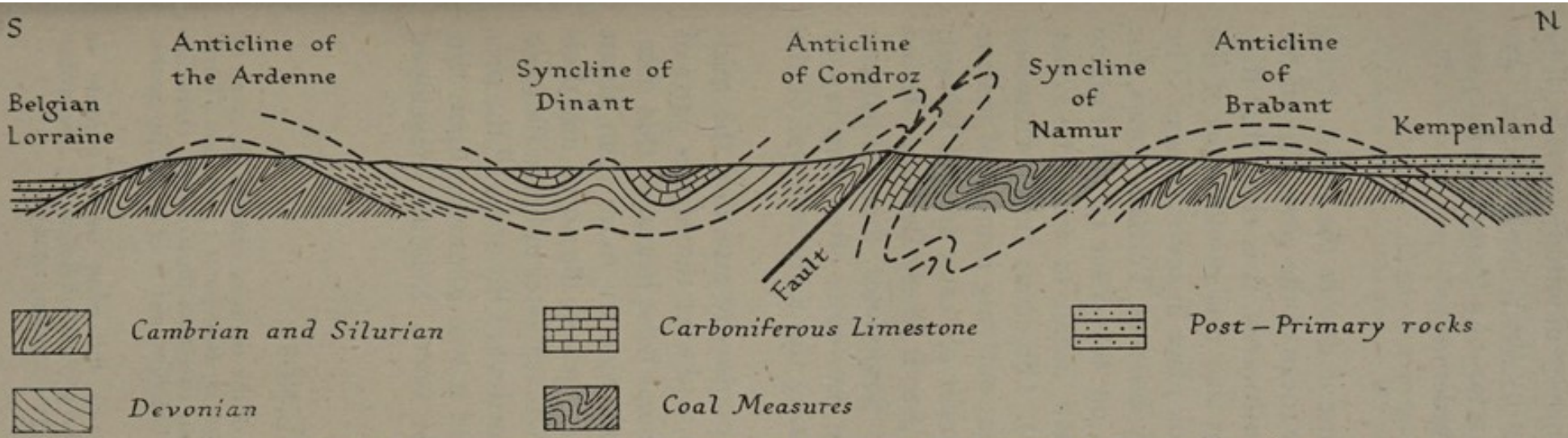


Fig. 15. Cross-section of Belgium from the Kempenland (Campine) to Belgian Lorraine
Based on M. Gignoux, *Géologie Stratigraphique*, p. 129 (Paris, 1936).

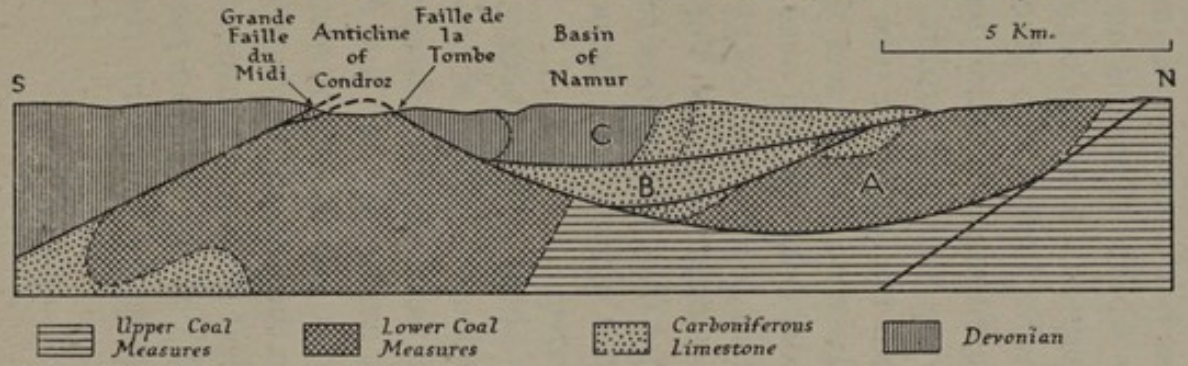


Fig. 16. General section across part of the Ardenne

Based on A. Briart, 'Etude sur la structure du Bassin Houiller du Hainaut dans le district du Centre', *Annales de la Société géologique de Belge*, vol. XXI, p. 125 (Liége, 1894).
The Lower Coal Measures in the basin are not part of the sub-adjacent Lower Coal Measures but have been transported from a long way south. The letters *A*, *B*, *C* represent three wedge-shaped pieces which as a whole present reversed bedding.

have completed the planation of the former mountain surface. The submerged peneplain was now covered by the deposits of the Cretaceous sea, for flint-bearing clays, the relics of a former chalk cover, occur at several places in the present Ardenne.

(iii) *The Uplift of the Ardenne*

The present landscape of the Ardenne is due to the uplift of this submerged peneplain. Since the newer rocks of the cover dip off the uplifted mass both northwards and southwards, it is clear that they shared in its uplift. There is no doubt that this re-elevation of the Ardenne occupied a long period and took place in several stages. The first uplift must have taken place very early in Tertiary times, for the Ardenne formed a major bastion on the coast of the Eocene sea. Fullowing this first uplift, erosion began to strip the cover of Chalk from the Ardenne (see p. 10). Oligocene times witnessed another advance of the sea over the area; outlying patches of marine sands are widely distributed over the lower plateaux around Dinant, and even attain the height of 555 m. (1,820 ft.) near Baraque Michel on the high plateau south of Verviers. Sometimes, these Oligocene rocks rest on a thin Cretaceous remnant, but more often they repose directly on the older rocks, demonstrating the early removal of the Cretaceous cover.

A further uplift of the Ardenne undoubtedly attended the mid-Tertiary (Miocene) folding of the Alps, and over the higher parts of the mass the work of river dissection must have begun at this date. Yet there is evidence that the Ardenne rose no more than about 300 m. (1,000 ft.) above the newer Tertiary seas to the north, and their dominance in the present landscape reflects still later uplift in Pliocene times. This last movement imposed a northward tilt upon all the pre-Pliocene rocks of the Belgian plain, and it was following upon this movement that the primary rivers of north Belgium developed see (p. 19).

BIBLIOGRAPHICAL NOTE

1. A valuable summary of the main features of the regional divisions is given by M. Lefèvre, *Notice sur la carte oro-hydrographique de Belgique à* 1 : 500,000 (Turnhout, 1937). This admirable résumé, containing excellent illustrations, embodies the most recent views about the structure of Belgium and it is an indispensable work.

2. For the geological formations of Belgium, the most useful account in English is by L. Dudley Stamp and others, 'The geology of Belgium', *Proceedings of the Geologists' Association*, vol. XXXIII, pp. 1–72 (London, 1922).

3. There is a comprehensive survey of the physical geography of Belgium in A. Demangeon, *Belgique—Pays Bas—Luxembourg* (Paris, 1927), which forms vol. II of the *Géographie Universelle*, edited by P. Vidal de la Blache and L. Gallois.

4. General descriptions of the relief and scenery of the country are contained in W. Tuckermann, *Länderkunde der Niederlande und Belgiens* (Leipzig, 1931).

5. There are detailed descriptions of the Flanders plain in R. Blanchard, *La Flandre* (Lille, 1906) and A. Briquet, *Littoral du Nord de la France* (Paris, 1930).

Chapter II

THE COAST

The Evolution of the Coast: General Description: Coastal Communications: Bibliographical Note

The coast of Belgium extends for a distance of only 67 km. (42 miles) between the Dutch and French frontiers. It is lowlying and almost featureless, being characterized by a broad stretch of gently shelving low-water sands, with a belt of sand dunes of varying width above the high-water mark. Behind this natural barrier, supplemented along some sections by a sea wall, lies an extensive area of lowlying plain or polder land, reclaimed from the sea by dyking and draining (Figs. 17, 18 and 19).

The Evolution of the Coast

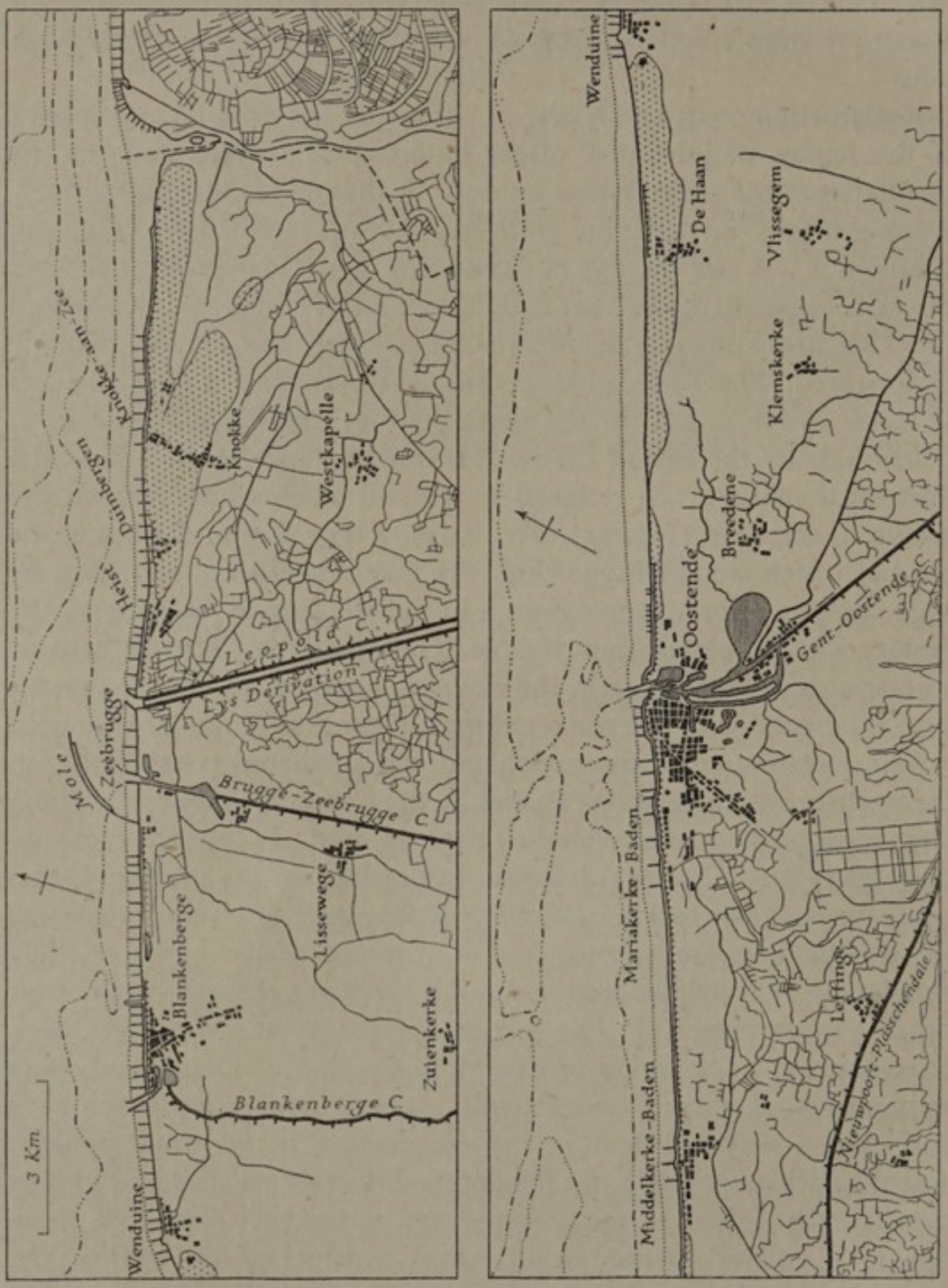
The present form of the North Sea and English Channel has resulted from the subsidence of the land in geologically recent times when man was already on the earth. On the basis of geological and archaeological evidence, it is probable that the coastline at the beginning of the Christian era differed little in outline from that of to-day, and that a Gallo-Roman population was established on the coastal plain. In the fifth century A.D., there occurred a widespread marine inundation which attained approximately the present 5 m. contour line, and traces of the old shoreline can still be seen in places at a distance of some 16–25 km. from the present coastline. At its maximum, the whole coastal plain was covered at high tide by several metres of water, with only a few sandy islands, while at low tide it became a vast tract of mud and sand, intersected by channels. During this period a considerable thickness of fine silt was laid down over the whole plain.

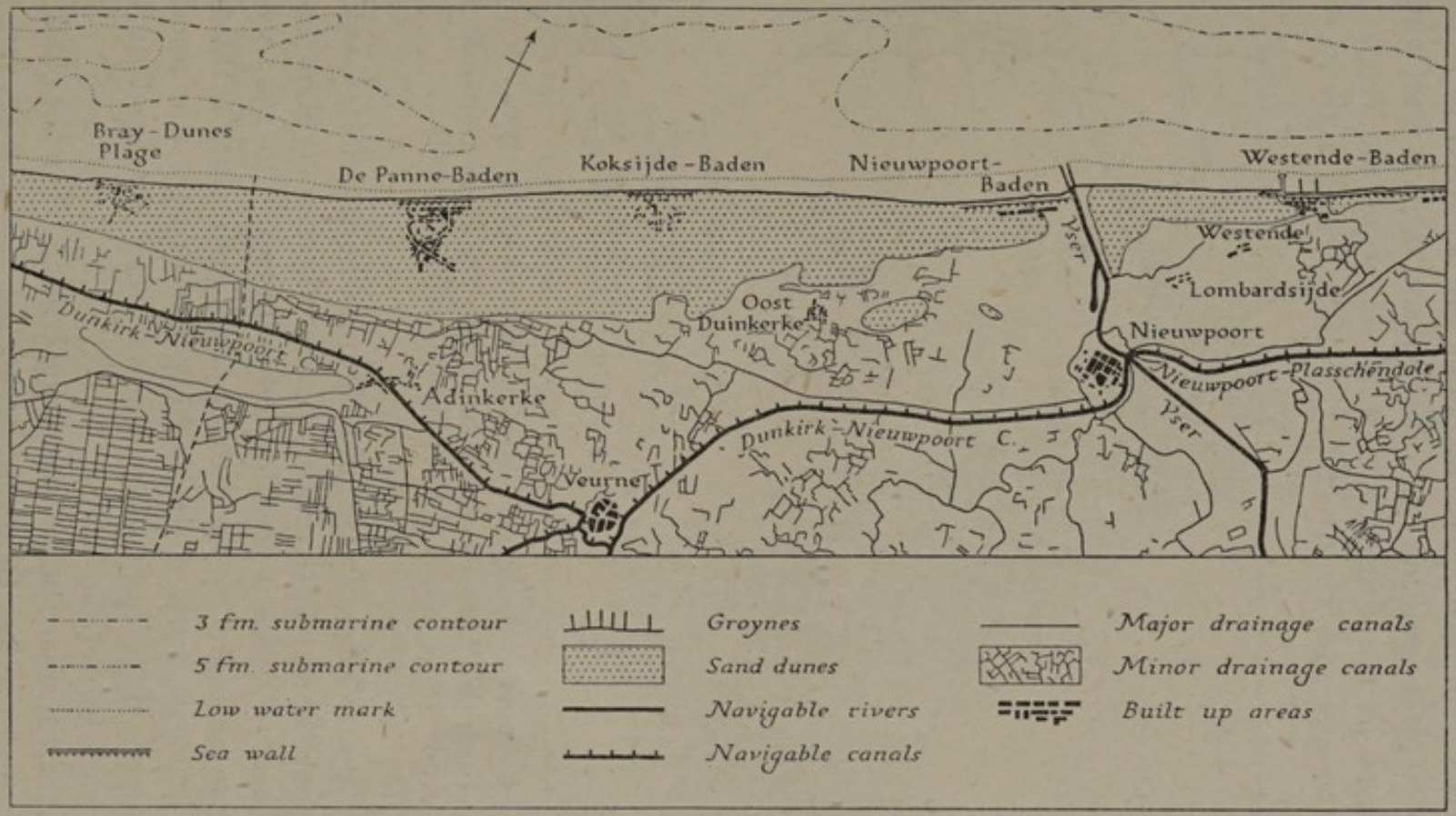
The sea gradually receded, leaving numerous lagoons and channels amongst the mud flats. The subsequent gradual drying out of this area was helped by the formation of a line of sand dunes, which originated as an offshore bar on which sand was piled by the waves. The marshy area behind the dunes was gradually reclaimed both by natural processes such as sedimentation and the accumulation of vegetation, and by artificial means such as draining and dyking.

Efforts to increase the protection afforded by the dunes are first recorded in tenth-century documents which describe the construction of dykes, although it is probable that some dykes were older than this. This barrier along the coast helped to limit the temporary but disastrous inundations caused by storms or by exceptionally high tides.

Reclamation went on slowly, as shown by the gradual appearance of the names of inhabited places in medieval records such as the cartularies of the ecclesiastical houses. By the end of the tenth century, it appears that the maritime plain had become 'solid' land (Fig. 20), although it was still marshy in most parts. The chief exceptions were the wide estuaries of the Yser and Zwin, and an extensive inlet behind Dunkirk, now known as the *Moëres de Ghistelles*. These, too, gradually disappeared. The Yser estuary, which had extended as a broad sheet of water as far as Loo in the tenth century, had been restricted to Diksmuide by the end of the twelfth century, and by the end of the thirteenth century was reduced to a small creek which formed the mouth of the river (Fig. 21). The Zwin, a long arm of the sea at the head of which stood Brugge (Fig. 35), began to silt up later. But by 1490, despite efforts to maintain a navigable channel to Brugge, the estuary was completely unnavigable. The *Moëres de Ghistelles* became a great area of marshland in the eleventh century, and at the present time is covered with a dense rectilinear network of drainage channels.

The reclamation of the marshland was furthered considerably in the twelfth and thirteenth centuries by the Cistercian monks, to whom large areas of the coastal plain had been granted. In fact, the reclamation was in places too rapid, for the enthusiasm of the drainers sometimes outran their technical ability. Dykes were often built too weak to withstand severe storms, and it was not realized that as tidal currents were restricted into fewer and narrower channels their scour became more powerful. The thirteenth century seems to have been characterized by a period of exceptionally severe storms, and there were a number of widespread floods. Inundations took place in 1277 and 1288, a very bad flood in 1357 submerged many recent polders, and the catastrophe of 1377 flooded twenty-two villages and greatly enlarged the Honte. In 1404, there was a particularly disastrous flood, due to a violent onshore wind which accelerated the rising tide, prevented the ebb and thus piled up water against the coast. The natural and artificial defences gave way along a considerable length of coast, and inundation was widespread. As a result, a determined effort was made to protect the polder lands. The famous 'digue du


Wenduine
De Haan
Vlissegem
Klemskerke
Breedene
Oostende
Gent-Oostende
Mariakerke-Baden
Middelkerke-Baden
Leffinge
Nieuwpoort-Plaatschendaele
Knokke-aan-Zee
Duinbergen
Heist
Knokke
Westkapelle
Leopold
Lys Dérivation
Zeebrugge
Mole
Brugge-Zeebrugge C.
Lissewege
Blankenberge
Zuienkerke
Blankenberge C.
Wenduine
3 Km.



Figs. 17, 18, 19. The Belgian coast

Based on (1) G.S.G.S. Series 4040, 1 : 50,000, Sheets 20, 21, 29, 30 (1937–8, revised in part 1942); (2) G.S.G.S. Series 4336, 1 : 100,000, Sheets 1, 2 (compiled from G.S.G.S. Series 2364 (1910–18)); (3) Admiralty Charts, Nos. 325 (1928, small corrections 1942) and 1872 (1881, large corrections 1940).

Comte Jean', built after 1404 by the Counts of Flanders, can still be traced intermittently from Gravelines to Sas-van-Gent in Zeeuwsch-Vlaanderen. Fences were also erected on the dune faces to strengthen the natural barrier. However, periodic floods still occurred, especially during times of neglect resulting from the civil and foreign wars which ravaged Flanders in the fifteenth century. During the reigns of Charles V (1506–55) and Philip II (1555–98), dyking activity was

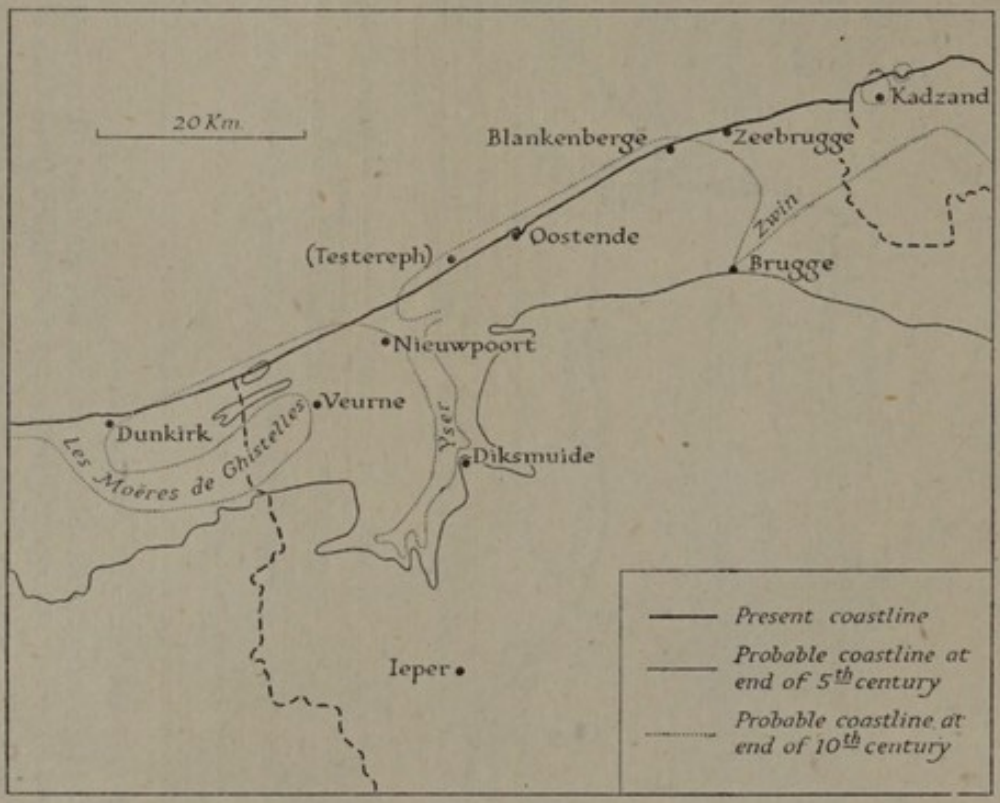


Fig. 20. Changes in the Belgian coastline within historic times

Based on R. Blanchard, *La Flandre*, p. 159 (Lille, 1906). The present coastline was taken from G.S.G.S. Series 4042, 1 : 250,000, Sheet 2 (2nd ed. 1942).

renewed with vigour. The only area in Belgium where serious flooding has occurred since the sixteenth century has been in the neighbourhood of the Yser estuary. Twice it was flooded voluntarily: in 1783 when Nieuwpoort was besieged by the French, and again during the war of 1914–18. In 1928, part of the Nieuwpoort district was flooded when a temporary dyke built after the war was destroyed during exceptionally high tides (Fig. 21).

Apart from the silting up of the inlets, the coastline has not changed appreciably during the last thousand years. In places, however, the land formerly extended a little farther seaward than it does at present, especially west of Nieuwpoort and east of Westende (Fig. 21), but part of the coastal margin has been removed by storm waves. Several

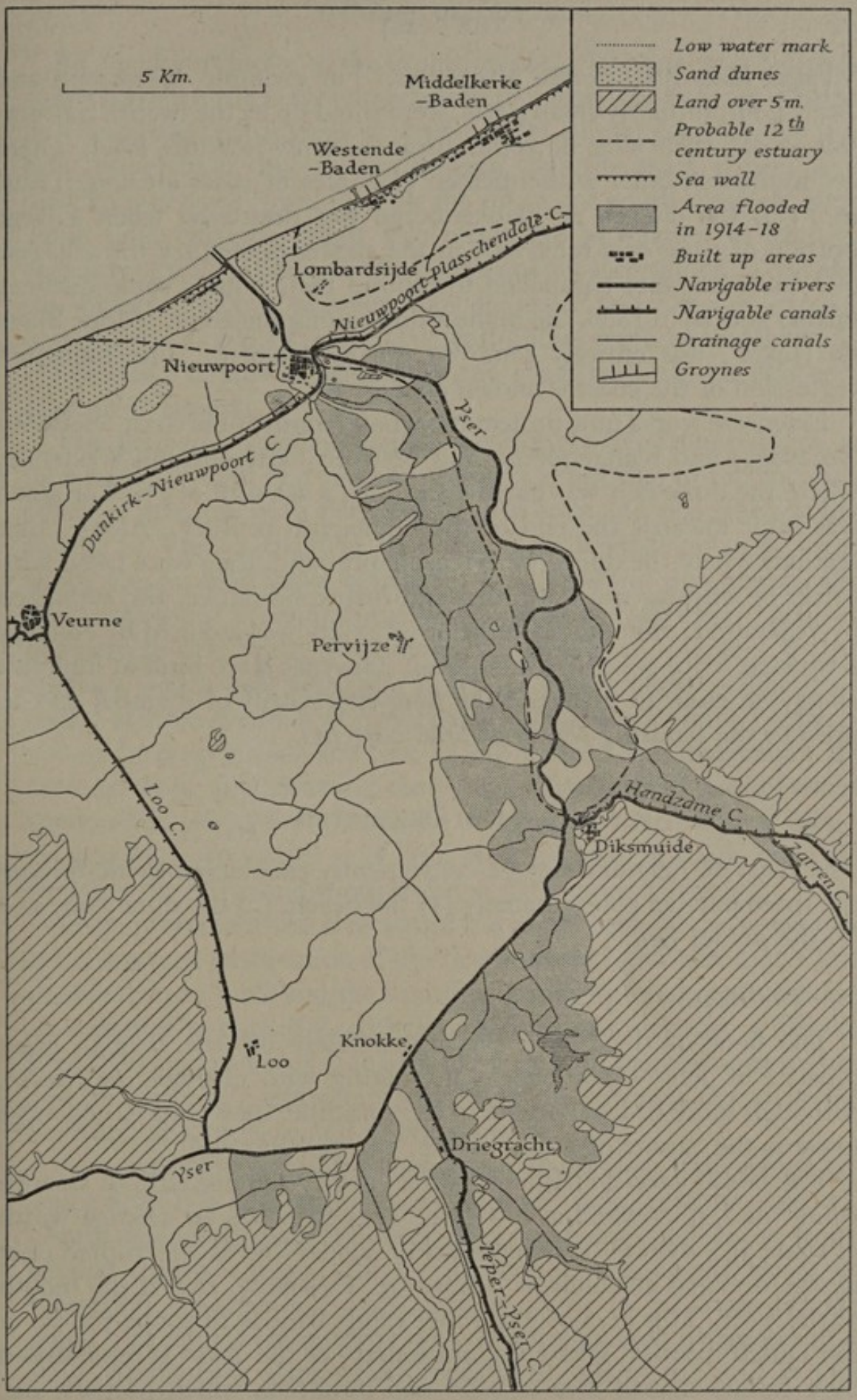


Fig. 21. The Yser estuary

Based on (1) G.S.G.S. Series 4040, 1 : 50,000, Sheets 29, 30, 40, 41 (1937–8, revised in part 1942); (2) A. Briquet, *Littoral du Nord de la France*, p. 350 (Paris, 1930), which delimits the area of flooding; (3) R. Blanchard, *La Flandre*, p. 168 (Lille, 1906), which reconstructs the probable twelfth-century estuary.

villages have disappeared altogether. For example, Testereph and Scarphout, formerly small ports, were silted up by the twelfth century, but to-day their sites lie some distance below low-tide level. There are numerous other authenticated examples of coast erosion. Thus, in 1334, the church at Blankenberge was destroyed when a large portion of coast was removed; in the sixteenth century the villagers of Wenduine were compelled to rebuild their houses some distance farther south; in 1886, the highest dune along the coast, 'Mont Blanc de Heyst', was entirely removed during a storm. The estimated regression of the coast is shown on Fig. 20.

Extensive works now protect the whole length of the coast. Between Zeebrugge and Blankenberge, and between Oostende and Westende, where the dune belt was narrow and low, a sea wall of brick or stone was built towards the end of the nineteenth century. Along other sections where the dunes were reasonably solid, they were faced with bricks or with fascine work, that is, brushwood lattice, and stabilized by vegetation. Sometimes sufficient stability was attained by erecting a wooden fence near high-tide level. Groynes were built at intervals along the coast to intercept the long-shore drift of material and to prevent the scouring action of tidal currents.

General Description

The coast of Belgium may be conveniently considered by describing the three parallel zones, namely (1) the beach, (2) the dune belt, and (3) the polder land.

(1) *The Beach*

The floor of the North Sea immediately off the Belgian coast consists of long sandy shoals alternating with channels or 'lows'. Although more or less parallel to the coastline, they tend to converge towards the Straits of Dover (see p. 334 and Fig. 94).

The beach itself consists of a broad gently sloping strip of smooth white sand, uncovered at low tide. This strip has an average width of some 350–450 m. It is remarkably regular and is interrupted only by the dredged channels at Zeebrugge, Oostende, and at the mouth of the Yser. This area of low-water sands widens to about 700 m. at the Dutch frontier, where the old estuary of the Zwin is represented by a funnel-shaped area of sand and mud-flats which partially dry out at low tide. These mud-flats, submerged at high tide, are known as *slikkes* (Plate 14).

An important factor in the evolution of the Channel and North Sea coasts has been the long-shore drift of material. East of Cap d'Antifer in France the drift is from west to east. The exact cause of this is not fully understood, but it would seem that the main reason is the up-Channel swell, produced by the prevalent south-westerly winds, while tidal currents might also affect the movement of sand and certainly of mud, although to a degree not yet ascertained. Thus along the French beaches between Cap d'Antifer and Dieppe, extensive deposits of shingle form annually from flints freed as the chalk cliffs are eroded. Grains of silica from the chalk travel as far east as the coast of Denmark.

The Belgian coasts, however, are strikingly free from pebbles, and movement of sand and mud is probably slight due to the stabilizing effects of groynes, both along the Belgian coast and along the adjoining stretch of French coast to the west. The Belgian groynes, usually about 180 m. long, have been built at intervals of 250–300 m. along the coast east of Wenduine and also in front of Oostende. They serve not only to stop the drift of material, but also to intercept the tidal currents which flow along the 'lows' or long hollows parallel to the coast. If these currents were not checked, the 'lows' would be scooped out more deeply near the foot of the dunes, thus steepening their seaward slope and allowing them to be attacked by more powerful waves. The groynes are made of wood piles driven deeply into the sand or set in concrete, or of an arched pitching of brick, or of solid masonry, or of fascine work fastened with stakes (Plate 13).

More prominent features across the beach include the breakwaters at the seaward termination of the Leopold and Lys Derivation Canals, the breakwater mole and the stone breakwaters protecting the entrance channel to the port of Zeebrugge, the pleasure pier east of Blankenberge, the piers on each side of the entrance to Blankenberge harbour, and the harbour breakwaters protecting the entrance channels to the harbours at Oostende and at Nieuwpoort.

At a distance varying between 0 and 40 m. from the average high-water level is a discontinuous sea wall of brick, stone or cement. It occurs where the dune wall is narrow or absent, and also in front of seaside resorts situated among the dunes. Its height varies considerably; near Knokke-aan-Zee it is about 4·5 m., near De Haan about 3 m. high. Its seaward slope is often masked by masses of soft sand, particularly after strong gales. The top of the wall in places forms a promenade backed in some places by hotels and villas. The largest resorts are Oostende and Blankenberge, but there are many

smaller 'Bains' ('Baden') and 'Plages', and individual villas among the dunes. Sloping ramps and flights of stone steps run down at intervals from the top of the wall to the beach (Plate 13).

The flat, unindented coastline has no natural harbours. Along the more irregular coast of medieval times, when vessels were of shallow draught, there was a number of flourishing ports. The earliest was probably Lombartzijde, near the mouth of the Yser; later came Nieuwpoort, then Testereph and Scarphout, the forerunners of Oostende and Blankenberge, and then Brugge at the head of the Zwin, succeeded by Damme, Sluis and in modern times Zeebrugge. To-day only Oostende (see pp. 397–403), situated at the terminus of an important trans-continental railway route and with tourist and packet services, Zeebrugge (see pp. 404–7), and Nieuwpoort (see pp. 394–7) are of any importance. Constant dredging is necessary to keep these ports from silting up. Blankenberge is of little importance, and is used almost entirely by fishing boats (see p. 274). It consists merely of an entrance channel between two wooden piers which extend out below low water, and a tidal basin; both the channel and basin dry out at low tide.

(2) *The Dune Belt*

The line of dunes is almost continuous along the Belgian coast, although between Heist and Wenduine, and again between Oostende and Westende, it diminishes to a single low ridge less than 15 m. wide. The line is completely cut through in four places; at the mouth of the Yser, near Oostende where the Gent-Oostende Canal reaches the sea, near Zeebrugge at the mouth of the ship canal, and at the Zwin estuary.

The most extensive zone of dunes lies between the French frontier and the Yser, where in places it stretches inland for a distance of over 2 km. Between Oostende and Wenduine the belt varies in width from 500 to 1,000 m., and in the neighbourhood of Knokke it is nearly 1,500 m.

The height of these sand hills is also very variable, usually 5–25 m.; in places they are much higher, averaging 39 m. between Nieuwpoort-Baden and Koksijde. The highest dune along the coast is the 'Blekker', a prominent white steep-sided hill 51 m. high, situated east of Oostduinkerke-Baden. Many other dunes have become prominent and stable enough to have names; these include the 'Spioenkop' near Wenduine, which was fortified during the war of 1914–18, the 'Hoogen Blekker' near Koksijde, and the 'Zeeberg' and 'Spelleplek' near Oostduinkerke.



Plate 13. The Belgian coast near Heist

There are numerous resorts along the Belgian coast. The promenade usually ends in a sloping seawall from which ramps and temporary stairways lead down to the beach. The beach of soft sand is crossed by numerous short groynes of fascine work while longer groynes extend below the low tide mark.

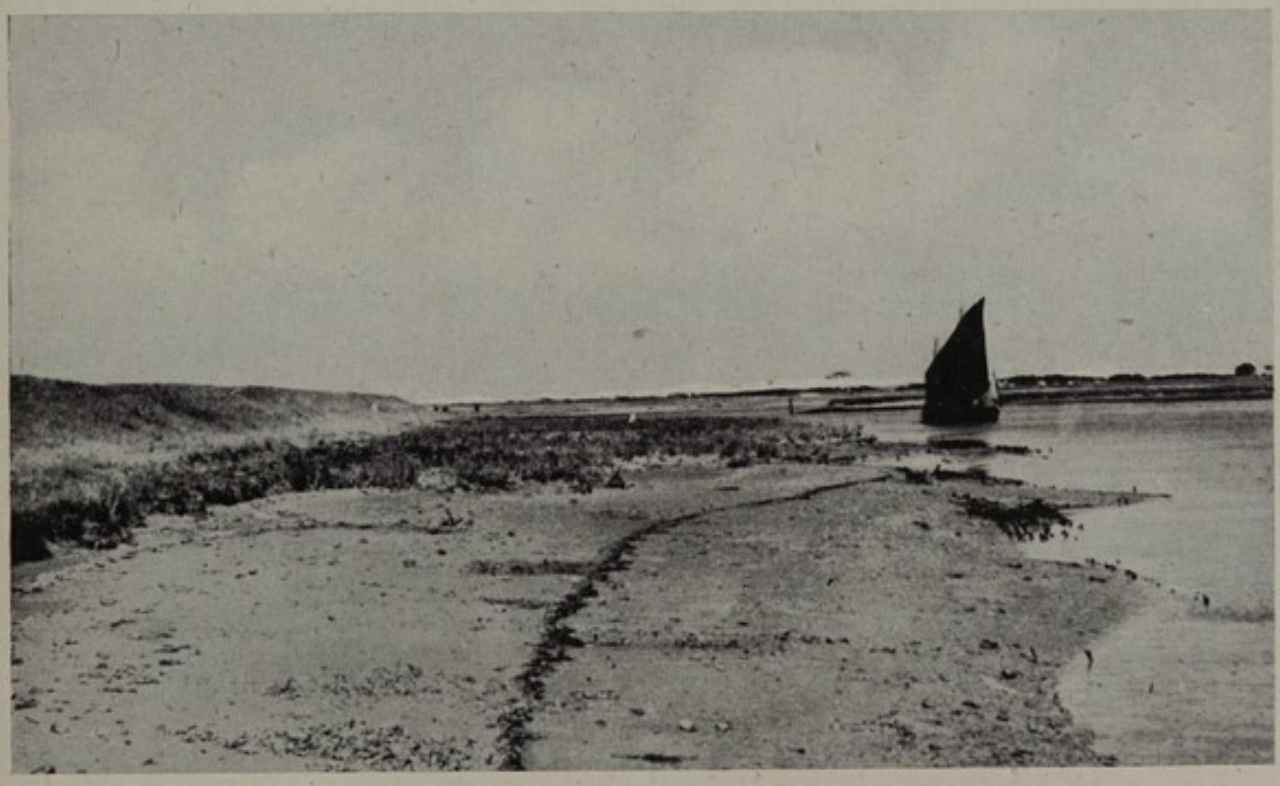


Plate 14. The Yser marshes

At low tide, extensive stretches of mud are exposed on both banks of the channel between the town and the mouth of the Yser. On the left there can be seen a dyke covered with vegetation.





Plates 15 and 16. The dune belt

A belt of sand dunes of varying width extends along most of the Belgian coast. The upper photograph shows the dune region near Oostduinkerke; the lower shows a number of villas among the dunes near Duinbergen.

Individual dunes rarely present the typical cross-section of the true wind-formed dune, which has a gentle slope on the windward slope and a steep one on the lee. The line of dunes bordering the high-tide mark has average slopes of 45° and 30° on the seaward and landward sides respectively. The line of dunes marking the landward limit of the zone has its steep slope on the southern side. Between these two demarcating lines is an extraordinary confusion of irregularly orientated dunes and depressions. In some places are long lines of crests of uniform height, surmounted in places with bizarre little summits fixed by vegetation. Some dunes stand isolated in the middle of depressions. Others are alined in chains obliquely to the shoreline, approximately in a south-west to north-east direction. Sometimes the dune ridges are cut through by steep-sided gaps. Among the dunes are extensive basin-shaped depressions or *pannes* (Plates 15, 16).

Much of the surface area of the dunes has an irregular cover of vegetation consisting in some places of thick bushes alternating with bare patches of sand. Marram grass, various aromatic shrubs, osiers, willows, Canadian poplars, and plantations of conifers (particularly *Pinus sylvestris*) have been planted to help fix the loose sand. The *pannes* have a more continuous carpet of moss or coarse grass. The most extensive plantations occur east of Knokke, on either side of De Haan, in the neighbourhood of Nieuwpoort, and near De Panne.

The dune vegetation has helped to fix the loose sand, resulting in the double advantage of making a more permanent barrier and of preventing the inland movement of the sand. The Belgian dunes have never possessed the mobility, for example, of those along the coasts of Gascony and Denmark. In fact, except for some erosion by the waves of the seaward side of the dunes before the completion of modern coast defences, it seems that the dune belt has not changed appreciably since the twelfth century.

(3) *The Polder Land*

South of the dune belt lies a wide expanse of flat plain crossed by a maze of drainage channels. Most of this plain is less than 2 m. above the mean low-tide level, and would be regularly inundated by spring tides but for the dunes and sea wall. The landward limit of this coastal plain is demarcated approximately by the northern edge of the more consolidated Tertiary sediments (Fig. 3), at a height of about 5 m.

Fine muds and sands were deposited on the old sea floor during the Quaternary period. These were overlain by a layer of peat varying

in thickness from a few centimetres to about 4 m., formed from vegetation which flourished before the later oceanic transgression in the fifth century. It was during this period that the silts and sands which form the floor of the polders were deposited. The present soils consist of heavy grey or bluish clays, overlain by small patches of yellow sand.

A maze of ditches drains into a few major channels, known variously as *leeds*, *vaarts*, and *grachts*, thence into the larger canals. Up to the seventeenth century, the navigable waterways served to carry off the water. Owing to the conflict of interests between drainage and navigation, however, a system of main channels independent of the navigable waterways was gradually devised; these large channels include the Langegracht, the Leopold Canal, the Lys Derivation Canal and the Noord Eede. A number of these drainage channels run parallel to the navigable waterways, sometimes even crossing them by locks or passing under them in siphon culverts.

On the polders the water table is maintained at a fixed level. Any excess water due to heavy rainfall is able to escape by natural flow when the locks are opened at low tide. In some of the more lowlying areas, however, the water is raised into the major channels by pumps operated by small Diesel or petrol engines. The regularization of the polder drainage is under the control of syndicates or *wateringues*, first organized in the twelfth century.

Near the edge of the dunes, large areas of the polders consist of mud flats or *schorres*; they are occasionally flooded, and are grass covered. These formed the salt marshes, or *prés salés*, where grazed the sheep which were the basis of the prosperity of the medieval Flemish woollen industry. Farther inland, the polder lands are under permanent pasture and are used for dairy farming, although cereals are grown on the higher parts farther inland. Apart from lines of willows along the ditches and poplars along some of the roads, the plain is treeless.

Coastal Communications

(*a*) *Roads*

A road runs along the coast from Knokke-aan-Zee to De Panne. It is rarely more than a few metres from high-tide level, and for a considerable distance it forms a promenade along the top of the sea wall. Between Zeebrugge and Blankenberge it widens out into a dual carriage-way, each 7·5 m. wide. Running parallel to it, near the dune-polder margin, is a second road, linking up the villages situated

a few kilometres inland from the coast resorts. A third road runs through the polder land, linking Brugge and Dunkirk, through Nieuwpoort, Veurne and Adinkerke.

Main roads run inland from the coast; they include those from De Panne to Veurne, Nieuwpoort to Diksmuide, Oostende to Torhout, and several roads which converge on Brugge from Wenduine, Blankenberge and Knokke-aan-Zee. The new 'Anvers à la Mer' *autostrade* from Knokke-aan-Zee to Antwerpen was under construction in 1939 (see p. 466). Most of these roads are paved with stone setts, although some sections of the promenade road have an asphalt or concrete surface. They are usually embanked across the polders, and are flanked by drainage ditches and lines of poplars.

Numerous minor roads, paved or cobbled, and unsurfaced sandy tracks run inland through the dunes, linking up the scattered villas and connecting the two coast roads. Minor roads in the polder country are less frequent. Movement away from the roads, both in the dune belt and in the polder land, is extremely difficult.

(*b*) *Railways*

Double-track railways run inland from Oostende to Brugge, thence to Bruxelles and Namur, and from Oostende to Torhout and Roeselare. A double-track railway links Blankenberge and Brugge. The polder country west of the Yser is crossed by a double-track railway from Dunkirk across the French frontier to Veurne and Diksmuide. Single-track lines connect Nieuwpoort and Diksmuide, and Zeebrugge and Brugge.

A light railway runs along most of the coast; in places it runs beside the road a few metres above high-tide level, in others it winds through the dunes. Other light railways run from Knokke to Brugge, with a branch to Sluis in the Netherlands, from Oostende across the polders to Diksmuide, and from both Koksijde and De Panne to Veurne (Plate 72).

(*c*) *Waterways*

The navigable waterways of the Flanders plain are shown on Fig. 124 and are described on pp. 515-18. In brief, waterways which run inland from the coast comprise the canalized Yser, the Gent-Oostende Canal, and the Brugge-Zeebrugge Maritime Canal. Both form a route to Gent and so to the lower Escaut and Antwerpen. The Blankenberge Canal is officially classified as navigable, but in recent years it carried no freight traffic.

A line of navigable waterways runs through the polder land from the French to the Dutch frontier. From Dunkirk to Oostende there are the Dunkirk-Nieuwpoort and Nieuwpoort-Plasschendale Canals through Veurne and Nieuwpoort, while the Gent-Oostende and Brugge-Sluis Canals continue the line east of Oostende. Many of the larger drainage channels, although not classified as navigable, are used by punts and by other shallow-draught vessels.

BIBLIOGRAPHICAL NOTE

1. The most detailed description of the evolution of the Flanders coast is R. Blanchard, *La Flandre* (Lille, 1906). There are two informative articles in the *Etudes d'Histoire dédiées à Henri Pirenne* (Bruxelles, 1937). These are (i) G. G. Dept, 'Etude critique sur une grande inondation marine à la côte flamande', pp. 105–24, and (ii) A. de Smet, 'L'origine des ports du Zwin', pp. 125–41.

2. There is a complete survey of the coast of French and Belgian Flanders in A. Briquet, *Littoral du Nord de la France* (Paris, 1930).

3. W. Tuckermann, *Länderkunde der Niederlande und Belgiens* (Leipzig, 1931), contains a useful section on the coast and polder lands of Belgium.

4. There is an account of the polder land in A. Demangeon, *Belgique, Pays-Bas, Luxembourg* (Paris, 1927); this is vol. II of the *Géographie Universelle*, edited by P. Vidal de la Blache and L. Gallois.

5. A detailed scientific account of the origin of the Straits of Dover and North Sea, and of their coasts, can be found in J. van Keen, *Onderzaekingen in de Hoofden* ('s Gravenhage, 1936).

6. There is an old but interesting account of the sea walls, groynes, etc., in W. H. Wheeler, *The Sea Coast* (London, 1902).

7. The *Admiralty Pilot* referring to the coast of Belgium is *North Sea Pilot*, Part IV, 9th ed. (London, 1934), with later Supplements.

Chapter III

CLIMATE

Pressure and Winds: Temperature: Visibility and Cloud: Precipitation: Snow and Snow-Cover: Thunderstorms and Hail: Sequence of Weather: Bibliographical Note

The two main physical regions of Belgium—upland and lowland—are marked by different climates. The north-west lowland, relatively dry, has a uniform climate, the only variations being slight ones due to increasing distance from maritime influence; the south-east upland, much wetter and cloudier, has a more varied climate with sharp local differences due to changes of altitude and exposure.

Pressure and Winds

Belgium, like the other countries around the North Sea, lies in a transition area between the Icelandic low-pressure area to the north-west, the 'Azores High' to the south-west, and the continental pressure system, high in winter and low in summer, to the east. Any of these may temporarily extend its influence over the country, but on the majority of occasions, Belgium lies in a stream of air flowing between two or more of the centres.

In winter the prevailing wind is from the south-west, part of an air stream originating in the 'Azores High' and following a curved track directed towards the 'Icelandic Low', but the passage of a depression frequently causes considerable and rapid changes of wind direction. The centres of these depressions usually lie to the north-west of the country, and, in consequence, the wind generally veers from the south to west as a storm passes (67 % of winds in January at Oostende come from between south and west). Less frequently, the flow of air is from the 'Continental High' towards the low pressure to the west, an arrangement commonest in late winter and early spring—which explains the relatively high frequency of easterly and north-easterly winds at this season.

In summer, when the continent is an area of relatively low pressure, there are fewer southerly and south-westerly winds, and more from west and north-west. The south-westerly, however, is still the prevailing wind though less predominantly than in winter (68 % of

winds in July at Oostende are from between south-west and north-west.) The relative frequency of wind from each direction at Uccle (Bruxelles) and Oostende is given in the table below. The mean monthly atmospheric pressure throughout the year at Uccle varies from 753·6 to 751·7 mm.; the amplitude is thus very small (1·9 mm.), but the monthly mean is an abstraction and is entirely masked by the daily and hourly variations, especially those connected with the passage of depressions.

Wind Direction at Uccle and Oostende (Ostend).
(Percentage of observations from each direction.)

	N	NE	E	SE	S	SW	W	NW	Calm
Uccle:									
Jan.	2	7	11	7	16	28	20	7	2
Feb.	5	8	12	8	19	23	16	7	2
Mar.	8	13	11	9	14	19	17	7	2
Apl	10	16	13	6	9	18	16	10	2
May	9	15	15	8	10	16	15	10	2
June	9	13	9	5	8	16	20	18	2
July	11	10	7	5	9	21	21	13	3
Aug.	8	9	8	5	11	24	22	11	2
Sept.	9	8	10	9	12	20	20	9	3
Oct.	4	13	14	11	16	20	14	6	2
Nov.	4	9	12	9	15	24	18	7	2
Dec.	2	8	8	7	19	27	20	7	2
Oostende:									
Jan.	3	7	12	7	19	35	13	4	0
Feb.	4	9	13	7	13	29	17	8	0
Mar.	6	10	13	7	11	26	17	10	0
Apl	9	16	14	6	9	21	15	10	0
May	12	14	13	5	9	21	15	11	0
June	11	11	9	5	7	24	19	14	0
July	8	8	6	4	8	30	23	13	0
Aug.	9	8	8	5	9	30	21	10	0
Sept.	7	10	12	7	12	29	16	7	0
Oct.	3	7	11	7	18	34	15	5	0
Nov.	3	9	12	7	17	33	14	5	0
Dec.	3	7	13	7	16	35	15	4	0
Year	7	10	11	6	12	29	17	8	0

The information for Uccle is taken from various numbers of the *Bulletin Climatologique Mensuel* (Bruxelles) and is based on 20 years' observation; that for Oostende from the Admiralty *North Sea Pilot*, part IV, p. 381, and is based on 25 years' observation.

Force of Winds and Gales

Winds of gale force are always associated with the passage of depressions, and are commonest from a westerly direction. Generally, they spring up from the south-west and veer to the north-west. They are most frequent during the winter months when depressions are

most numerous and deepest; they may be expected on almost three days per month in midwinter but are rare in summer. They are most numerous on the coast and diminish rapidly in frequency and strength inland.

Diurnal Variations of Wind

The diurnal variation of wind strength is slight and only detectable by long-term averages. There is a tendency for winds to be strongest after midday when turbulence and convection are at a maximum causing a mixing of upper and lower air layers, and thus by friction transmitting some of the higher velocity of the upper layers to the surface air. At night, when convection ceases, the surface wind speed falls to a minimum. This tendency to a diurnal variation is greatest in summer and is very slight in winter.

In addition, there is a small land and sea breeze effect, which is most marked during spells of fine calm weather. Winds tend to be onshore during the afternoon and offshore during the night and early morning. The effect is most marked along the coast and becomes feeble inland.

Temperature

The table on p. 43 gives the mean and mean extreme temperatures at Oostende and Uccle, and also includes three stations just beyond the frontiers of Belgium. The influence of the sea is conspicuous at Oostende, where February is as cold as January, and August is as warm as July; but away from the coast January is everywhere the coldest month and July the warmest.

In midwinter, the average temperature on the coast is about 3°C. (37·4° F.); the interior is 2 or 3 degrees colder, but the extremes differ more widely, and frost is frequent away from the coast. The mean daily minimum (i.e. during the night) at Oostende is just above freezing for each of the three winter months; away from the coast, it is slightly lower. The mean daily maximum on the coast is also some 3 degrees warmer than at Bruxelles. The number of days with frost is shown in Fig. 22. The effect of proximity to the sea is marked; coastal stations have about 32 days with frost, but the figure increases rapidly inland; and, at 20 km. from the coast (about 12½ miles), 60 days with frost occur, distributed as follows (at Bruxelles):

Jan.	15	Apr.	4	July	—	Oct.	—
Feb.	13	May	—	Aug.	—	Nov.	8
Mar.	9	June	—	Sept.	—	Dec.	12

Year 61

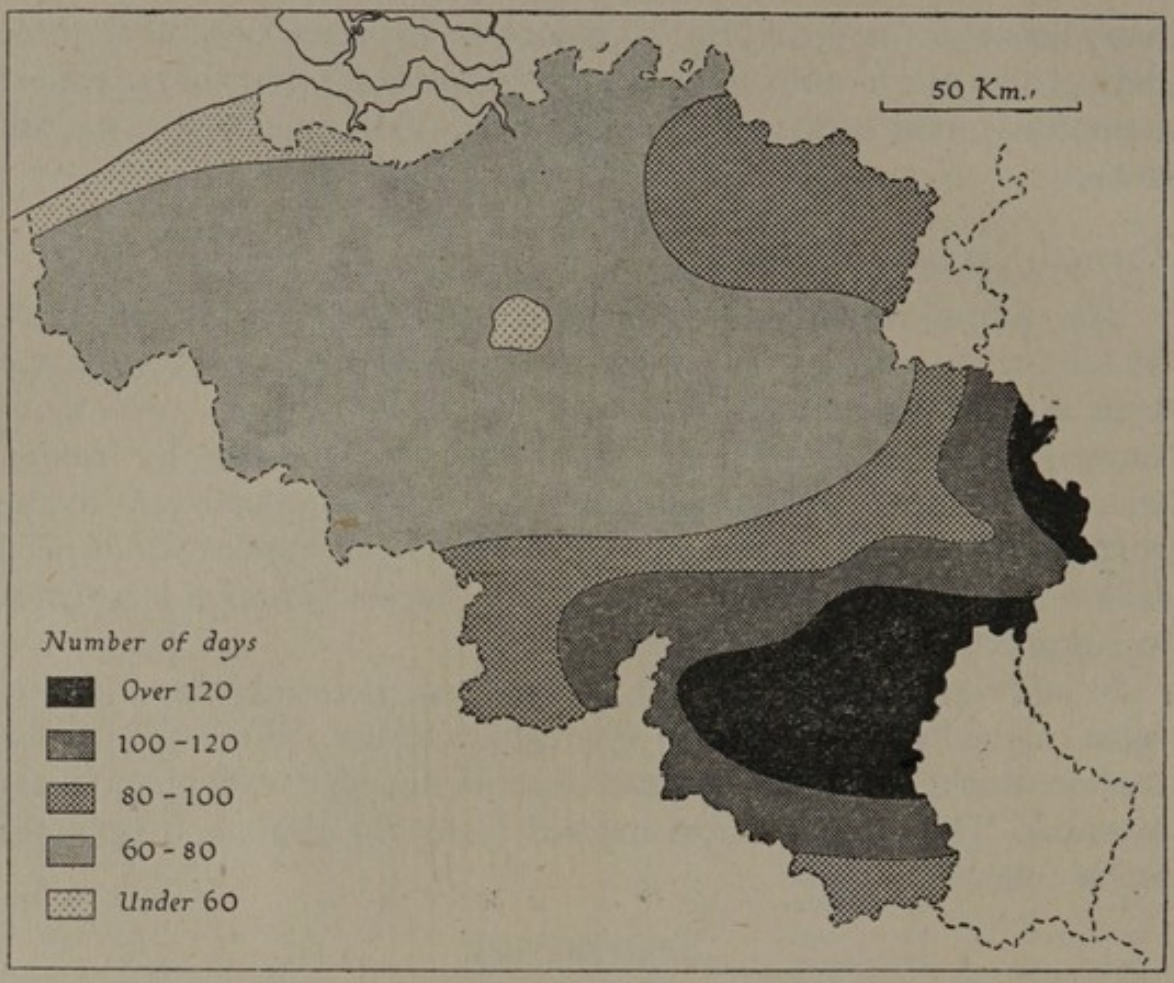


Fig. 22. Number of days with frost

Based on A. Demangeon, *Géographie Universelle: Belgique, Pays-Bas, Luxembourg*, p. 57 (Paris, 1927).

There is a further increase eastwards to the Kempenland (80 or 90 days), and to the Ardenne where, in the highland, frost occurs on 120 days or more in the year. But it must be remembered that the temperature from day to day is strongly influenced by the source of the air. East winds bring a low temperature in winter; west winds carry mild weather some distance inland.

In summer, mean temperatures are about a degree hotter inland than on the coast; but the mean daily maximum is 3° C. higher, and really hot days are much commoner. Highest temperatures are reached in calm anticyclonic weather, but east winds are decidedly hotter and drier than those from a westerly direction.

In the hilly regions of eastern Belgium the effect of altitude must be taken into account; approximate allowance may be made in the assumption of a decrease of about 2° C. per 300 m. (about 1,000 ft.). The January mean here is some 5° C. colder than in the lowlands; winter is much more severe, and the growing season is some 6–8 weeks shorter. Few crops can ripen, and the vegetation, except in

Average monthly temperatures (° C.)

	Oostende	Uccle	Aachen	Charleville	Trèves
Height	6 m.	100 m.	204 m.	145 m.	148 m.
Jan.	3·3	2·3	1·5	1·4	0·0
Feb.	3·3	3·1	1·8	3·0	1·5
Mar.	5·5	5·6	4·5	5·2	4·4
April	7·9	8·8	8·1	9·4	8·5
May	12·2	13·2	12·2	13·0	12·5
June	14·4	15·9	15·3	16·5	16·0
July	16·6	17·6	16·7	18·3	17·4
Aug.	16·6	17·2	16·4	17·8	16·5
Sept.	16·1	14·8	13·7	14·7	13·5
Oct.	11·6	10·4	9·8	9·7	9·0
Nov.	6·1	5·6	5·2	5·2	4·6
Dec.	3·9	3·1	2·2	2·0	1·6
Year	10·3 (51° F.)	9·8 (50° F.)	9·0 (48·2° F.)	9·7 (50° F.)	8·8 (48° F.)
Range	13·3 (56° F.)	15·3 (59° F.)	15·2 (59° F.)	16·9 (62·6° F.)	17·4 (63·5° F.)
Mean yearly max.	28·3 (83° F.)	31·5 (89° F.)	31·9 (89·6° F.)	35·0 (95° F.)	32·3 (90° F.)
Mean yearly min.	−6·1 (21° F.)	−12·9 (8·6° F.)	−11·5 (11° F.)	−13·5 (8° F.)	−12·8 (9° F.)

Source: E. Alt, 'Klimakunde vonMittel- und Südeuropa', pp. 150–164, being vol. III, part M of the *Handbuch der Klimatologie*, edited by W. Köppen and R. Geiger (Berlin, 1932).

the most bleak areas, consists mainly of forest (see p. 257). But aspect and exposure make a considerable difference, and sharp contrasts of temperature may be expected at places quite close together.

Visibility and Cloud

Fog in Belgium is generally the result of nocturnal cooling of air below the dew-point or of the drift of moist air over cold surfaces; it therefore occurs only in calm weather or with gentle air movements, especially with a drift of air from the south. Coastal regions have less fog than those inland. Bruxelles has 28 days with fog in the three winter months compared with 21 at Oostende. Winter is the foggiest season, especially away from the coast where occasional sea fogs occur in summer, as the following figures for Oostende show:

Number of Days with Fog

Jan.	8	Apr.	3	July	1	Oct.	6
Feb.	6	May	1	Aug.	2	Nov.	8
Mar.	5	June	2	Sept.	4	Dec.	7

Year 53

Belgium and northern France have large manufacturing and industrial areas, and contamination of air from these sources causes a deterioration of visibility and an increase in intensity of fog. In the Ardenne and the hilly region of the south-west, where the rainfall is heavy, bad visibility is often caused by low cloud and rain. Cloudiness

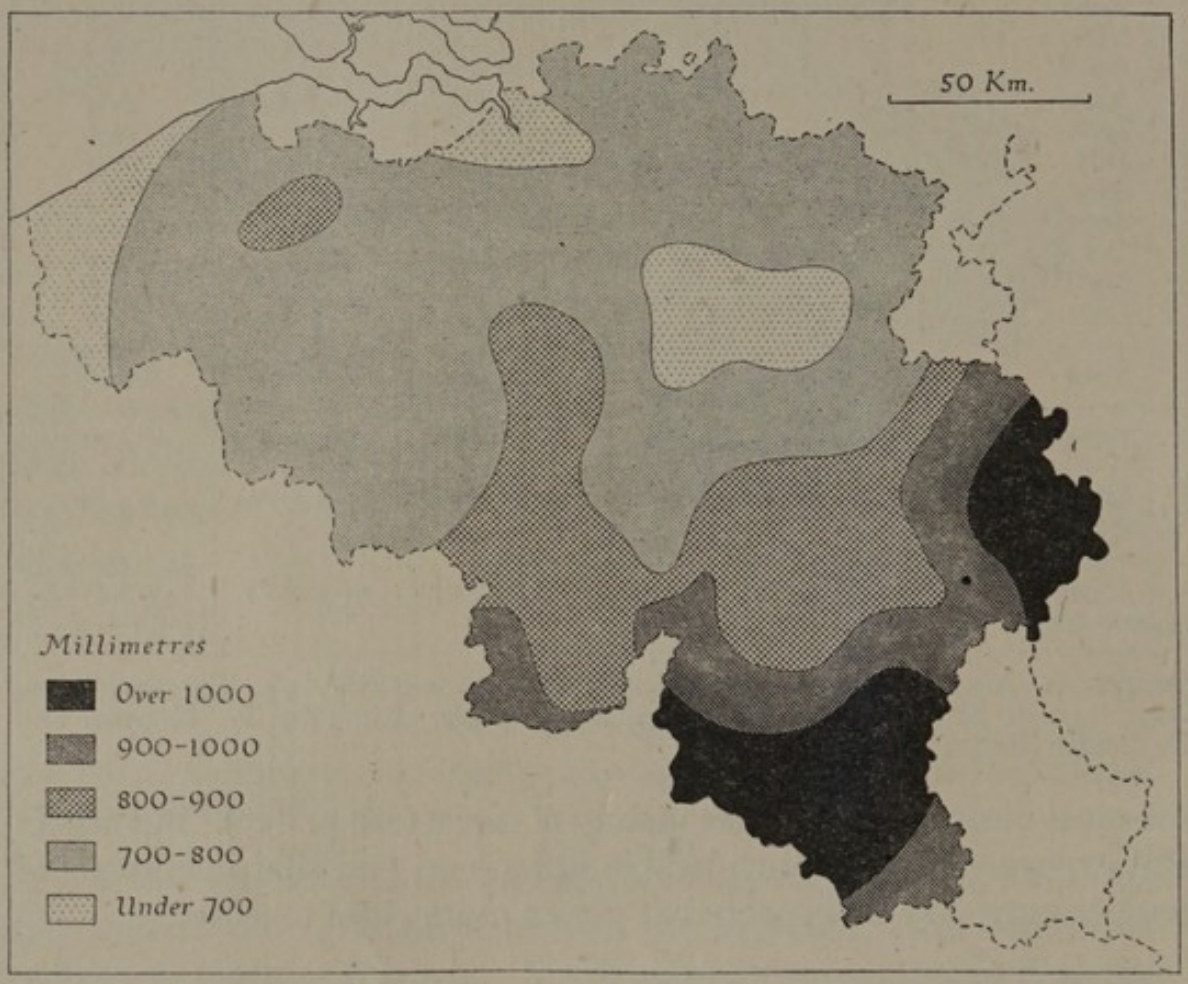


Fig. 23. Annual precipitation

Based on E. Vanderlinden, *Sur la distribution de la Pluie en Belgique*, Fig. 2 (Bruxelles, 1927).

is greatest in winter (7·5) and least in summer (6·0–6·5). The difference is not very great, but in summer the sun's heat disperses layer cloud though it may generate convection cloud. The winter cloud is therefore a more continuous cover of stratus type, while summer cloud often consists of detached cumulus, especially during the afternoon.

Precipitation

The table on p. 47 gives the mean precipitation for eight stations, and shows that the rainfall over the lowlands varies little on either side of 800 mm. a year, but that in the hilly region it exceeds 1,000 mm.

The distribution is shown in Fig. 23. The conspicuous feature is the contrast between the country to the north-west and that to the south-east of the Sambre-Meuse valley. To the north-west, the rainfall is evenly and uniformly distributed, the amount being 700–800 mm. To the south-east the rainfall is much heavier and much more unevenly

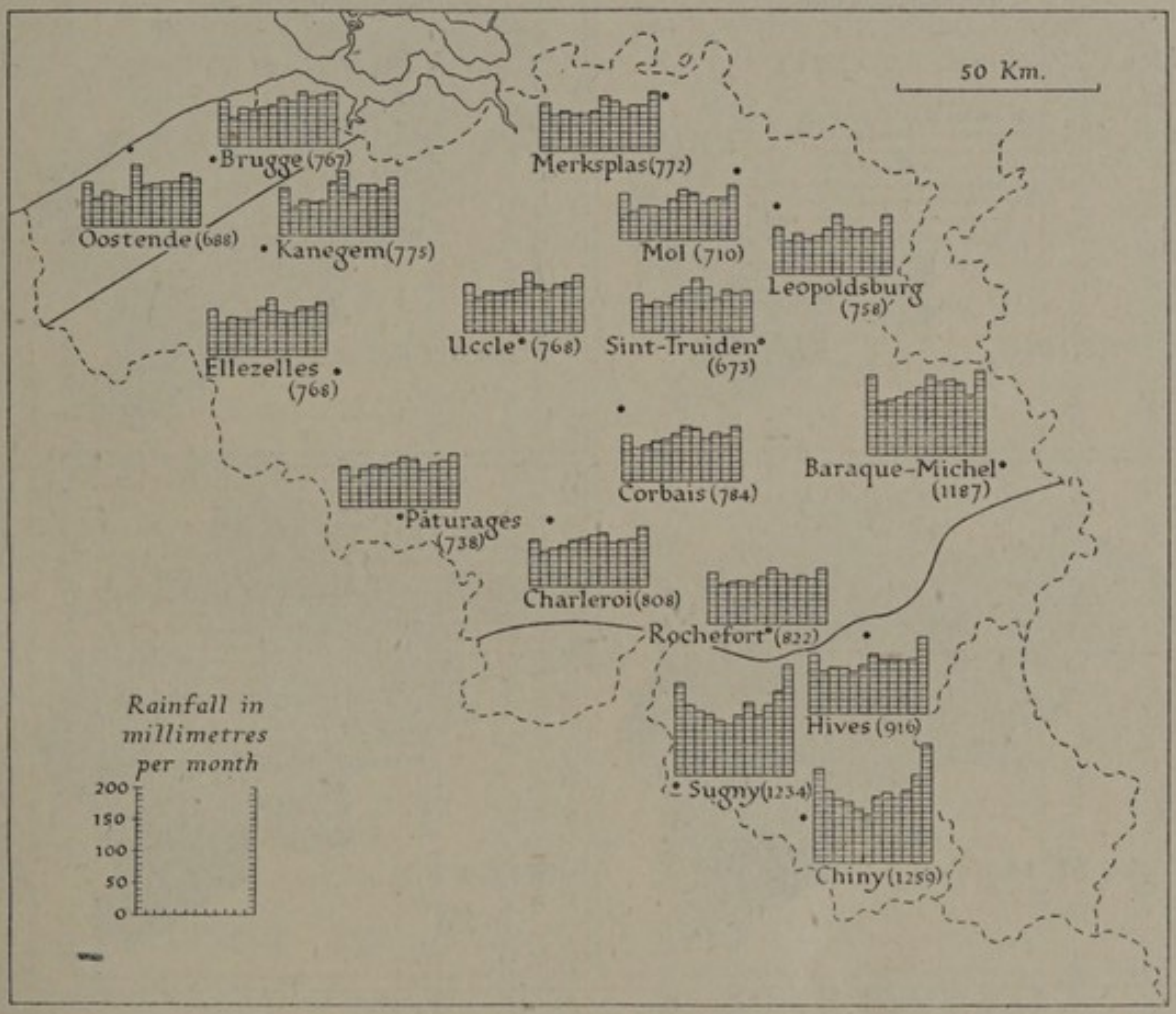


Fig. 24. Rainfall regimes

Based on E. Vanderlinden, *Sur la distribution de la Pluie en Belgique*, pp. 16–50 and Fig. 1 (Bruxelles, 1927).

distributed, the cause of this phenomenon being the greater average height together with the variety of relief in this region. Two areas of high rainfall, exceeding 1,000 mm., occur, one in the Hautes Fagnes around Baraque Michel, and the other in the south-western Ardenne around Chiny. These are separated by an embayment of lower rainfall corresponding with the upper Ourthe Valley.

Rainfall Regime

In spite of its small size, Belgium has three distinct rainfall regimes which are indicated on Figs. 24 and 25:

(1) A narrow zone extending only a little way from the coast has a temperate maritime regime with a clearly marked maximum in autumn and early winter (November is the wettest month) and a

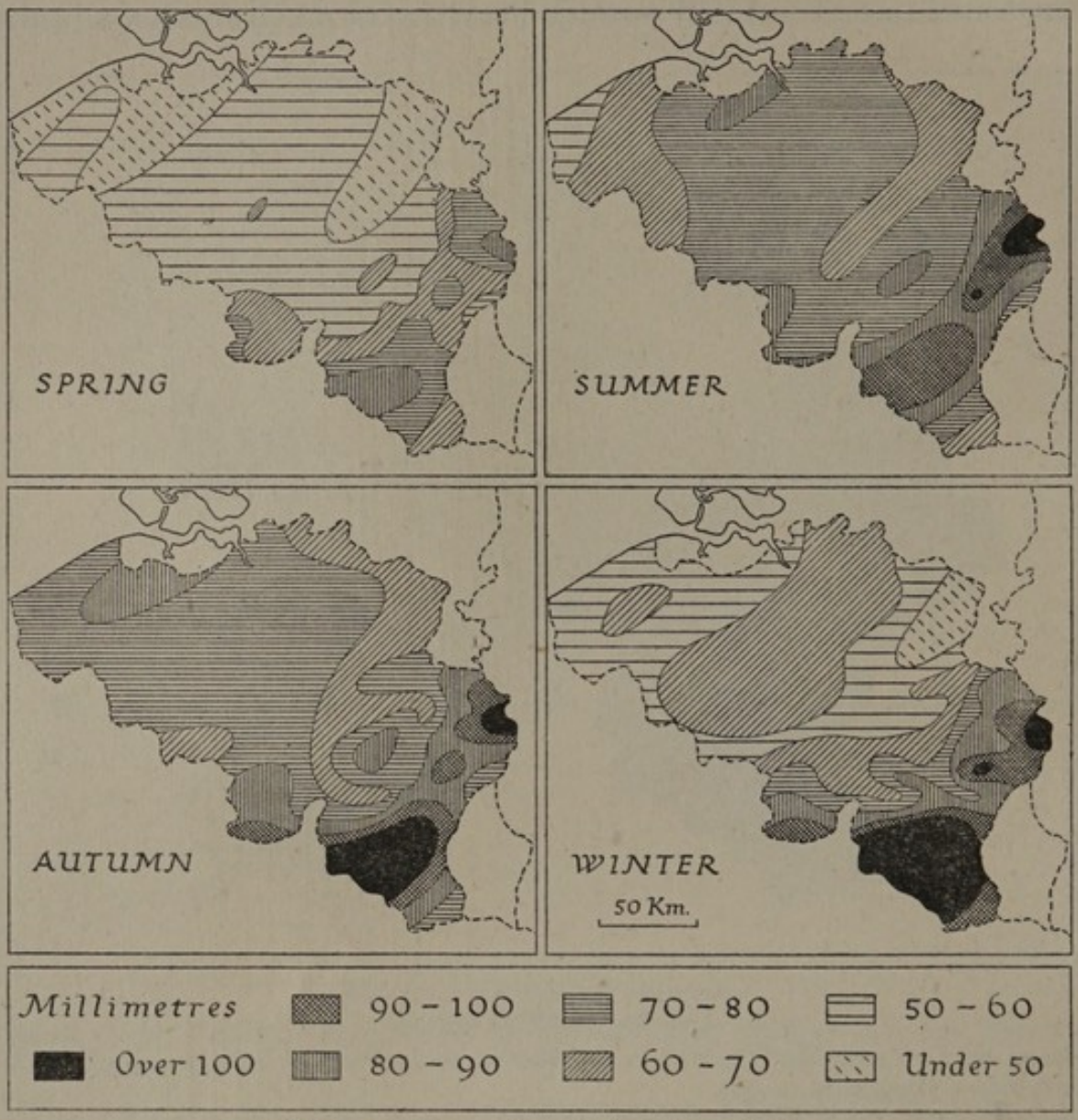


Fig. 25. Seasonal variations in rainfall

Based on L. Poncelet, 'Les Caractères principaux de la Pluie en Belgique', *Miscellanées, Inst. R. Mét. de Belgique*, Fasc. III, Figs. 1–4 (Bruxelles, 1939).

clearly marked minimum in early spring. (February is the driest month.)

(2) The lowland and the margin of the highland resemble the coast in having a minimum in spring, though rather later (March is sometimes drier than February), but the maximum is earlier and more complex, showing signs of three rain-generating causes. The first, and generally the largest, peak is in July and may largely be ascribed

Average Annual and Monthly Rainfall Figures (mm.)

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Oostende	62	42	44	48	45	55	63	66	68	76	83	68	720 (28·3 in.)
Brugge	63	45	46	54	62	67	73	71	81	80	82	72	796 (31·3 in.)
Ellezelles	66	46	50	61	55	72	78	66	71	76	75	71	787 (30·7 in.)
Leopoldsburg	64	46	51	60	59	77	88	74	69	78	68	76	810 (31·9 in.)
Uccle	72	51	52	66	64	68	86	74	71	81	79	81	845 (33·1 in.)
Charleroi-Atelier	72	50	47	66	64	77	78	77	70	81	72	78	832 (32·7 in.)
Hives	94	69	62	85	70	87	96	92	91	104	92	109	1,051 (41·3 in.)
Etalle	115	81	74	83	67	75	77	69	71	90	105	129	1,036 (40·6 in.)

Source: L. Poncelet. 'Les Caractères principaux de la Pluie en Belgique', *Miscellanées, Institut Royal Météorologie de Belgique*, Fasc. III, pp. 8–10 (Bruxelles, 1939).

The averages are based on those for the period 1910–36, and have been standardized to a 30-day month. Since this rather short period was one of abnormally high rainfall (see p. 51), the values have been adjusted to make them representative of the long-term period 1887–1936 which includes samples of wet and dry spells, and may be considered as a representative mean.

Average Number of Days with Rain per Month

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Oostende	16	13	11	14	12	10	12	12	13	14	14	16	157
Brugge	15	11	10	14	12	12	13	13	13	15	14	15	157
Ellezelles	14	11	11	14	12	12	13	13	12	14	14	16	156
Leopoldsburg	17	13	12	16	13	13	15	14	14	15	14	17	173
Uccle	22	17	16	19	17	16	19	17	17	19	19	22	220
Charleroi-Atelier	17	12	11	14	12	12	15	12	13	14	14	15	161
Hives	17	12	12	13	11	12	15	14	14	15	15	17	167
Etalle	18	14	12	16	14	12	13	14	15	15	17	16	176

Source: L. Poncelet. 'Les Caractères principaux de la Pluie en Belgique', *Miscellanées, Institut Royal Météorologie de Belgique*, Fasc. III, pp. 12–14 (Bruxelles, 1939).

The averages are based on those for the period 1919–36. Poncelet says that the table includes 'les nombres de jours donnés sont ceux où l'on a mesuré de l'eau en quantité appréciable' (p. 6). The measure frequently adopted is 0·1 mm.

to convection; August has less rain and September is quite a dry month, but a second peak is reached in October with the return of saturated south-westerly winds and cyclonic storms. November is generally drier but a third peak is reached in December when depressions are at a maximum.

(3) The rainfall region of the Ardenne and of the hilly region of the south-east has resemblances to that of the coastal region in having a winter maximum and a spring or early summer minimum. The

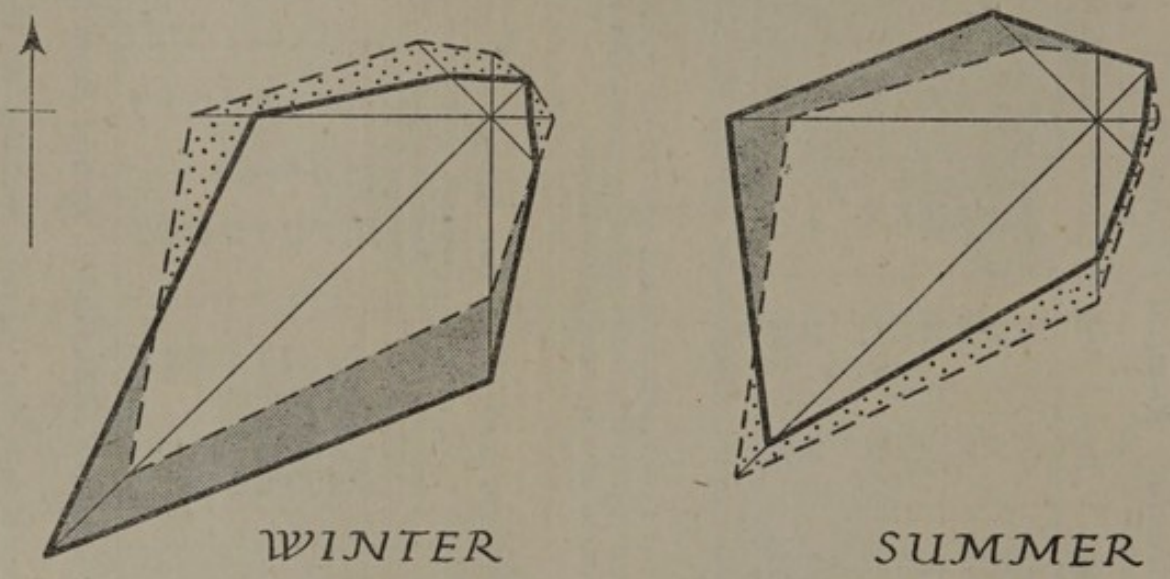


Fig. 26. Rainfall and wind direction

Based on L. Poncelet, 'Notes climatologiques sur la Pluie en Belgique', *Miscellanées, Inst. R. Mét. de Belgique*, Fasc. v, Fig. 8 (Charleroi, 1939).

summer half-year is relatively dry, but there is a tendency to increased rainfall in July due to convectional storms.

Rainfall and Wind Direction

By far the most frequent rain bearer is the south-westerly wind; west is also a rainy quarter and, to a less degree, south; 75 % of the annual rainfall comes from one of these directions. In Fig. 26 the dotted polygon on both roses shows the frequency of rain-bearing winds for the year. The full-line polygons show the frequency of rain-bearing winds for winter and summer respectively, and it will be seen that the preponderance of rain from southerly and south-westerly winds is even more marked in the winter (shaded area), but that in summer, though the south-west is still the rainiest direction, the westerly and north-westerly winds bring an increased proportion of the rain. This is in accordance with the general shift of prevailing wind direction and may be regarded as a sort of monsoon.

Rain Days

The table on p. 47 gives the number of days on which a measureable amount of rain falls. Everywhere the number of days with rain

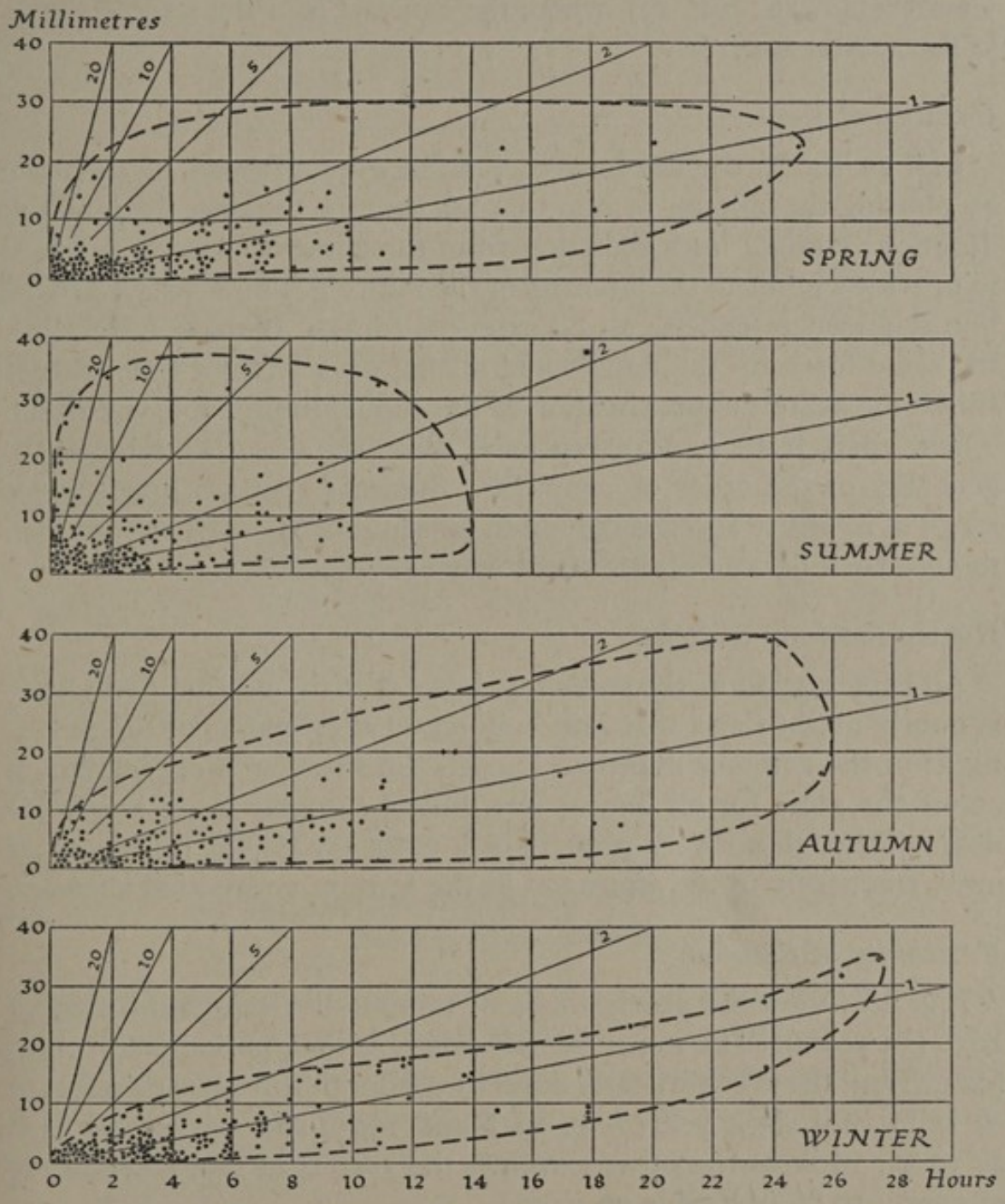


Fig. 27. Intensity of rainfall

Based on L. Poncelet, 'Notes climatologiques sur la Pluie en Belgique', *Miscellanées, Inst. R. Mét. de Belgique*, Fasc. v, Fig. 10 (Charleroi, 1939).

is less in summer than in winter, even at those stations which have a maximum rainfall in summer. This is explained by the difference in nature of summer and winter rain, the former being heavier while it

lasts, but shorter in duration and less frequent. The difference in the number of rain days between January and July is greatest on the coast (Jan. 16; July 12) least in the Kempenland (Jan. 17; July 15) and increases again in the Ardenne (Jan. 18; July 15) and beyond in Gaume (Jan. 18; July 13), where the contrast is of the same order as in the coastal zone.

Intensity of Rain

Fig. 27 shows the intensity of rainfall over a period of six years by plotting the amount of rain that fell (in mm.) against the hours of duration; straight lines radiating from the point of origin are added to provide a guide to the intensity of the rain, e.g. 3 mm./hr. A broken line is drawn to enclose all occurrences (dots). If these were all of the same intensity the dots would all fall on a straight line. Winter shows the nearest approximation to this highly improbable condition. Then, apart from some exceptional short showers, the intensity is generally of the order of 1 mm./hr. Summer shows a much wider range of intensity and the rain often falls at rates of 15 or 20 mm./hr., though such heavy falls are short lived.

Hourly Incidence of Rain

An examination of the statistics shows that the diurnal periodicity is poorly marked and that rain may occur at any hour of the day or night in the summer months. During the winter the expectation is about the same for all hours; but during summer there is a well-defined, though not very pronounced, tendency for the rain to occur more frequently in the afternoon in the form of convection showers.

Variability of Rainfall

Fig. 28 shows the yearly totals of rainfall at Uccle from 1887 to 1939 (53 years). The mean rainfall over this long period is 811 mm. (32 in.) and the average yearly departure from this mean is 94 mm., or ± 12 %, but some years (e.g. 1916 and 1925) had excesses as high as 30 %, while at the other extreme, the year 1921 had a deficiency of nearly 50 % (see table on p. 51).

More than one year in four may be expected to be within 5 % of the normal rainfall; nearly half the years are within 15 %; and one year in 13 is notably wet or dry (25 % departure). Over shorter periods, of course, abnormalities are much more pronounced; thus, in July 1921 only 6 mm. fell at Uccle (7 % of the normal), while November 1928 had 151 mm. (228 % of the normal).

Departure from normal (1887–1939)		No. of years		Total years	Frequency %
mm.	%	Excessive	Deficient		
41	5	9	5	14	26
41– 81	5–10	4	8	12	22
82–121	10–15	8	3	11	21
122–162	15–20	4	5	9	17
163–203	20–25	1	2	3	6
203	25	2	2	4	8
		28	25	53	100

It is clear, however, that the present century has been wetter than the end of the last; the average rainfall from 1887 to 1913 was 777 mm., while from 1914 to 1939 it was 845 mm. In fact, 13 years out of the 16 between 1887 and 1902 were drier than the normal (1887–1939),

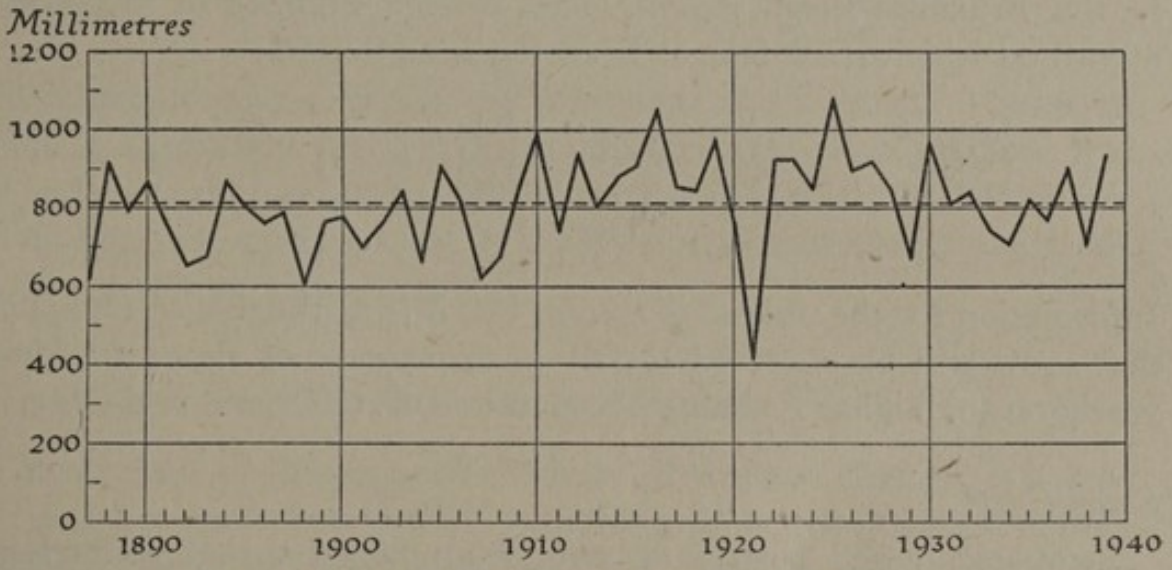


Fig. 28. Yearly totals of rainfall at Uccle, 1887–1939
Based on official statistics.

while 22 years out of the 30 between 1903 and 1932 were abnormally wet. In the prolonged wet spell between 1914 and 1932, 16 years out of 19 had an excess over the average. This long wet spell, however, seems to be coming to an end, and from 1932 to 1939 four years out of seven have been drier than normal.

Snow and Snow-Cover

Snow

Over the greater part of Belgium, snow has about the same climatic significance as in East Anglia; that is, it occurs now and then in winter but less frequently than rain, with occasional showers and

more rarely a belated day of snow-cover in spring. Further, while winter mean temperatures are below those of East Anglia they are still slightly above freezing-point; snow-cover therefore is often of brief duration, but there are great variations in frequency from year to year on the low ground. Thirdly, as in East Anglia, snow when it lies for a few days may give a little trouble on account of slippery roads, but it seems clear that falls sufficient in quantity to interrupt traffic through drifting must be very rare indeed, except in the Ardenne.

The frequency of snow increases rather more rapidly with distance from the sea than in eastern England. Figures given by the meteorological services of France, Belgium and Holland are somewhat conflicting, but it appears that snow is observed to fall on less than 15 days yearly on the coast of West-Vlaanderen, increasing to 25–30 days in the Bruxelles-Liége region. The average number of days per month on which snow falls at Bruxelles is as follows:

Jan.	6	Apr.	2	July	0	Oct.	0
Feb.	6	May	0	Aug.	0	Nov.	2
Mar.	6	June	0	Sept.	0	Dec.	5

Year 27

Information for the upland is scanty, but it is reasonable to estimate that snow will be observed to fall on an average of about 50 days yearly on the higher Ardenne between mid-October and mid-May.

Snow-Cover

Estimates, based largely on data from neighbouring countries, indicate that snow-cover is likely to be reported on an average of 5–10 days yearly on and near the Flanders coast (average for Norwich 12 mornings yearly), increasing to 12–15 in central Belgium, and to nearly 20 on the higher ground bordering the Meuse (about the same frequency as on the high Chilterns). Throughout the lowlands it must be emphasized that the variability from year to year is great.

In the Ardenne, where snow falls more heavily, it may be expected to lie for 25–30 days yearly at 300 m., and for about 50 days at 500 m. increasing to over 80 days on the summit plateaux (about 650 m.). These figures may be compared with parts of the Scottish Highlands where, for example, an average of 68 mornings yearly is recorded at Braemar (1,755 ft. or 535 m.). These figures indicate that snowdrifts will generally be found here and there in the Ardenne from December until late in March, although snow does not quite last as a continuous

cover in a normal year. Precipitation in the Ardenne is rather heavy, and rain removes much of the snow-cover at intervals even on the summits. Nevertheless, snow is a prominent feature of the climate of these rather raw and chilly uplands in the winter and early spring.

Thunderstorms and Hail

Winter thunderstorms, which are always associated with the rapid ascent of air at a cold front or squall line, are very rare and short lived. Nearly all thunderstorms are convectional and therefore have a maximum in midsummer, as the following table of frequencies for Bruxelles shows:

	J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.	Year
Days with													
Thunder	0	0	1	1	3	4	4	4	2	1	0	0	20
Hail	1	1	2	2	1	1	0	0	1	1	1	1	12

They occur mostly during the afternoon and evening. The atmospheric instability that produces thunder may also produce hail, especially in the spring months when freezing level is still fairly low. Hail also frequently occurs as a result of violent ascent along cold fronts in winter and spring.

Sequence of Weather

The weather of Belgium, like that of all western Europe, is subject to sudden and considerable variations of a non-periodic nature. There is, however, a tendency for certain types to dominate at certain seasons, and thus to merit consideration as elements of the climate.

In winter, the weather is mainly cyclonic and the most usual path of depressions lies to the west of the country. The wind, therefore, veers from south-east to south-west and then north-west; those from south-west to north-west may be very strong and nearly all gales are of this type. Temperatures are mild while the wind is south of west and persistent rain is likely. With the shift of wind to the north of west, there is likely to be a marked fall in temperature; rain will be less persistent but is likely to occur in heavy showers. In the later half of winter, and the early part of spring, the procession of depressions is often interrupted by the establishment of a persistent anticyclone over the continent which brings easterly winds and little or no rain. These winds are abnormally cold, and, in January and February, may bring long spells of bitter weather with severe frost.

Summer weather may also be cyclonic, but the cyclones are not so deep as in winter, and strong winds are less likely. But anticyclonic spells are more frequent and may be regarded as a northward extension of the Azores high-pressure system. Fine weather of this type is fairly frequent in early summer and again in early autumn (Indian Summer), but the weather of the intervening months, July and August, is apt to be unsettled by shallow depressions or by convectional rain. The effect of these expectable weather types is clearly recognizable in the yearly rainfall regimes (see p. 45).

BIBLIOGRAPHICAL NOTE

1. Belgium is well supplied with a close network of observation stations, many of which have continuous reports extending over a long period of years, though they were much interrupted between 1914 and 1918. The political unit is, however, in no sense a climate unit, and its climate cannot be studied without reference to the stations of adjacent countries.

2. The main sources of statistical data for Belgium itself are the official publications of the Institut Royal Météorologique de Belgique at Bruxelles, and they include the *Bulletin Climatologique Mensuel* and the *Annuaire Météorologique*.

3. There is no satisfactory and up-to-date summary of the climate as a whole, and it receives very scant treatment in E. Alt, 'Klimakunde von Mittel- und Südeuropa' (Berlin, 1932) in the *Handbuch der Klimatologie* edited by W. Köppen and R. Geiger.

There are, however, numerous articles on individual elements of climate, of which the most satisfactory are those on rainfall, especially the following:

L. Poncelet, 'Les Caractères principaux de la Pluie en Belgique', *Miscellanées, Inst. R. Mét. de Belgique*, Fasc. III, pp. 43 (Bruxelles, 1939).

L. Poncelet, 'Notes climatologiques sur la Pluie en Belgique', *Miscellanées, Inst. R. Mét. de Belgique*, Fasc. V, pp. 24 (Charleroi, 1939).

E. Vanderlinden, 'Sur la distribution de la Pluie en Belgique', *Mémoires Inst. R. Mét. de Belgique*, vol. II, pp. 50 (Bruxelles, 1927). This is written chiefly from the viewpoint of water supply.

Chapter IV

THE PEOPLE

Physical Characteristics: Languages: Religion: Education: Social Conditions: Bibliographical Note

Physical Characteristics

There are two major groups in the population of Belgium, namely, the Flemings, found mainly in the north, and the Walloons in the south. The distinction between the two groups is now primarily one of language rather than of physical differences. The Flemings broadly represent the stock of the Salian Franks—the Germanic invaders of the fourth and fifth centuries. The Walloons, on the other hand, represent the Celto-Roman population who inhabited the country before the Franks began their penetration from the north and north-east (Fig. 29). The present distribution of the two groups is largely the result of the impact of the Teutonic invaders upon the Roman frontier.

There has been a constant admixture of the Frankish and Celtic strains for many centuries, and it has become extremely difficult to draw a clear line of physical difference between Flemings and Walloons. Thus it is no longer true to assert that the former are Nordic types and the latter Alpine types. Various tendencies, however, can be noted which help to distinguish the people of the Flemish-speaking area from those of the Walloon area. For example, measurements have been made which show that broad-headedness persists largely in the Ardenne, with some dilution along the Meuse and the Sambre, and that there is a tendency towards medium rather than broad-headedness in the lowlands to the north-west. The region of the broad-heads coincides approximately with the Walloon country while the lowlands are mainly the home of the Flemings. In the Flemish-speaking areas the head measurements increase westwards.

Again, Flemings tend on an average to be taller than Walloons, although the differences are often almost imperceptible between individuals. The Flemish-speaking province of Limburg, which has the highest proportion of long-heads, has the highest stature mean. The difference in stature between Flemings and Walloons has been

succinctly expressed in the statement that, owing to Flemish influence, Belgians are, on an average, 1 cm. taller than the French, whilst

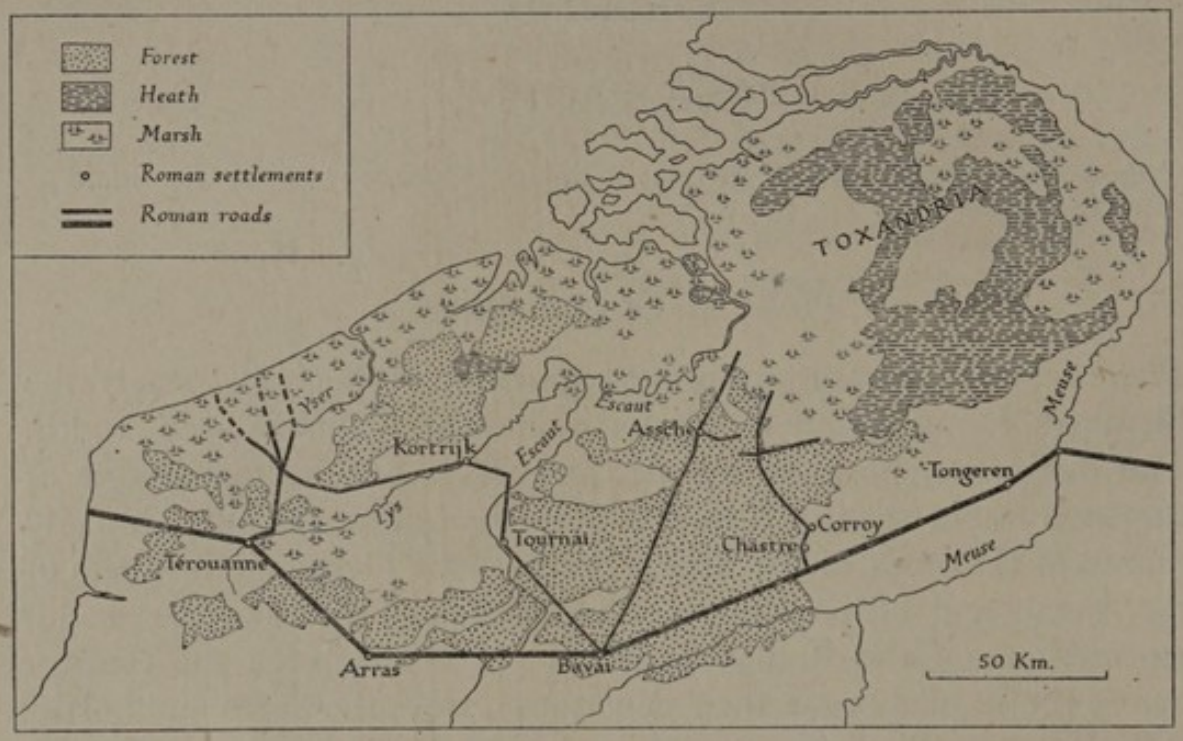


Fig. 29. Frankish settlement in the fourth and fifth centuries A.D.

Based on G. des Marez, 'Le problème de la colonisation franque et du régime agraire en Belgique', *Mémoires de l'Académie royale de Belgique*, 2nd series, vol. IX (Bruxelles, 1926).

By the third century A.D. the Salian Franks dominated the country between the Yssel and the lower Maas; later they occupied the fertile land between the Lek and Waal channels of the Rhine. They attempted to establish themselves across the Waal but were overcome by the emperor Julian who, in A.D. 358, permitted them to settle in Toxandria which roughly corresponded to modern north Brabant. It was not the most favourable region for agricultural settlers, but in spite of the difficulties of its sandy moorland, the Franks slowly extended their sphere of settlement. Their method was one of slow infiltration carried out by family groups. This expansion was completed between 358 and 450; during this period, the higher ground above the marshes of the Escaut (Scheldt) estuary as well as the westward valleys of the Escaut and Lys were gradually penetrated and occupied. The Roman frontier, with its important road system primarily connecting Cologne and Boulogne, was avoided. The fortified Roman outpost of Tournai capitulated to the Franks in the fifth century and its fall marked the end of the first invasion of the Franks; the land which they occupied became the region in which Flemish speech developed.

owing to Walloon influence they are 1 cm. shorter than the Dutch. On the whole Belgians are of medium stature.

Both Flemings and Walloons are of medium colouring but Flemings are generally slightly fairer.

There are three national languages in Belgium—French (including Walloon), Flemish (Dutch) and German. Of these three, the first two are official and have complete legal equality.

French and Walloon

Walloon is a dialect of French and the adjective is derived from the term *Walah*, 'foreigner, newcomer' (compare *Welsh*), used by the Frankish conquerors to describe a Gallo-Roman. Walloon has preserved a large number of dialectal differences, many of which it shares with the Picard dialect of French. In addition to these differences, however, its political separation from French has given Walloon an increased importance as a dialect.

There are three groups within the dialect: (i) Eastern Walloon or *Liégeois*, which is spoken in an area roughly corresponding to that of the former episcopal principality of Liége. Close proximity to Flemish and German has given it a fairly strong Germanic flavour. (ii) Central Walloon, which consists of *Namurois* and *Chestrolais*, the latter spoken around Neufchâteau. (iii) West Walloon, which is mainly a mixture of Namurois and Picard.

Standard French became general in the Walloon area early in the Middle Ages, since when the inhabitants have continuously used both the major language and their own dialect. Despite attempts to eliminate the latter, it holds its ground tenaciously and is still heard both in the streets and in the home. There is a considerable amount of literature written in Walloon (see p. 138).

Flemish (*Dutch*)

The language of the Franks is generally referred to by linguists as Low Franconian. It is classified among the west Germanic group of the Teutonic family of Indo-European languages. Modern English, modern Frisian and the modern German literary language have developed from this group.

The Frankish speech of Belgium and the Netherlands has been known by various names. Until the end of the sixteenth century, Netherlanders called it *Duitsch*, which is the same as the English *Dutch* and the German *Deutsch*. Later the language came to be known as *Nederlands*[*ch*] and this is now its official name. The people of the Netherlands often call their speech *Hollands*[*ch*] and in Belgium it is referred to as *Vlaams*[*ch*]. The latter term has come into English as

Flemish, and although it is, in one sense, a 'local' name, it is used throughout this book.

There are various dialects of Dutch in both Belgium and the Netherlands, and dialect boundaries often overlap the political frontiers. Standard Dutch is now an official language in Belgium; it is the language of instruction in schools in the Flemish area (see p. 68), and it is the medium of expression for Flemish newspapers and of conversation for educated Flemings.

The distribution of the dialects in Belgium is as follows:

(i) *Holland-'Dutch'*, which has been considerably influenced by the speech of Saxon and Frisian invaders, is represented by West-Flemish. This is spoken in West-Vlaanderen and beyond, as far east as Eekloo and as far south as French Flanders.

(ii) *Brabant-'Dutch'*, which most closely represents the speech of the Salian Franks, is spoken in the provinces of Antwerpen, Oost-Vlaanderen and Brabant.

(iii) *Limburg-'Dutch'*, which is spoken in Limburg, in north-east Brabant and in the north-east of the province of Liége, has close affinities with the German dialect of Aachen and Cologne.

After the separation of the Netherlands in 1609 (see p. 100), French became the official language in the south, and the Flemish dialects, rapidly becoming more divergent, were seldom found outside the home and the inn. A strict religious censorship, acutely suspicious of any heresy which might come from the Protestant north, further deepened the growing gap between the divided Netherlands. In the southern provinces, a few clergymen published moralistic writings, and Flemish literature returned to its medieval character with miracle plays and pietistic poetry.

The Dutch dialects in Belgium became more and more disintegrated until the nineteenth century (see pp. 132–5). There is now considerable literary activity in dialect, the literature being mainly of an imaginative and romantic type, while the dialects remain on the whole more important relatively to the standard language than in the Netherlands.

German

West Middle German dialects are spoken in eastern and south-eastern Belgium. These are Middle Franconian (Ripuarian) in a part of the cantons of Eupen, St Vith and Malmédy, and Moselle Franconian which is spoken around Arlon in the province of Luxembourg.

The present Linguistic Position

For statistical purpose in Census returns, Walloon is included with French. The following table shows the number of inhabitants speaking the three languages as indicated by the last three Censuses:

Language	Absolute figures			Percentage of total population			
	1910	1920*	1930	1910	1920*	1920†	1930
French only	2,833,334	2,850,825	3,039,315	38·16	38·52	38·24	37·56
Flemish only	3,220,662	3,185,100	3,473,291	43·38	43·03	42·66	42·92
German only	31,415	16,863	69,033	0·42	0·18	0·83	0·85
French and Flemish	871,288	967,813	1,045,601	11·74	13·08	12·96	12·92
French and German	74,993	45,206	67,140	1·01	0·60	0·72	0·83
Flemish and German	8,652	2,336	9,332	0·12	0·03	0·03	0·12
The three languages	52,547	33,862	54,086	0·71	0·46	0·46	0·67
None of the three languages‡	330,893	303,564	334,206	4·46	4·10	4·10	4·13
Total	7,423,784	7,405,569	8,092,004	100·00	100·00	100·00	100·00

* Excluding gains of 1919. † Including gains of 1919. ‡ Including children under two years of age and adults speaking none of these languages.

Source: *Annuaire statistique de la Belgique*, pp. xxii–xxiii (Gand, 1939).

There are many inhabitants who, though bilingual or trilingual, show more preference for one language than for another. The following table summarizes the combined returns for monoglots and for those who stated that they used one language more frequently than others. It should be noted, however, that a preference for French was often stated out of social pretence.

Language Preferred

Language	Absolute figures			Percentage of total population		
	1910	1920*	1930	1910	1920*	1930
French	3,183,303	3,278,756	3,513,321	42·88	43·92	43·42
Flemish	3,832,193	3,791,469	4,135,568	51·62	50·78	51·10
German	77,395	88,652	100,163	1·04	1·19	1·24
Not expressed	—	905	8,746	—	0·01	0·11
None of the three	330,893	306,000	334,206	4·46	4·10	4·13
Total	7,423,784	7,465,782	8,092,004	100·00	100·00	100·00

* Gains of 1919 included.

Source: *Annuaire statistique de la Belgique*, pp. xxii–xxiii (Gand, 1939).

There are four provinces where it can be said that Flemish is dominant: West-Vlaanderen, Oost-Vlaanderen, Antwerpen and Limburg. French is predominant in four others: Hainaut, Namur, Liége and Luxembourg. The province of Brabant forms an interior linguistic island of special interest.

The following table shows the distribution of the three languages in each province in 1930, indicating the percentage of inhabitants who spoke one language exclusively or by preference:

Province	French %	Flemish %	German %
Antwerpen	4·08	90·68	0·60
West-Vlaanderen	8·34	87·04	0·03
Oost-Vlaanderen	3·37	92·55	0·02
Limburg	4·63	86·35	1·61
Hainaut	93·08	2·60	0·10
Liége	87·11	2·74	6·26
Namur	96·05	0·40	0·02
Luxembourg	87·26	0·17	8·65
Brabant	45·83	50·26	0·31
Total	43·42	51·10	1·24

Sources: *Annuaire statistique de la Belgique*, pp. xxii–xxiii (Gand, 1939) and F. L. Schoell, *La Langue française dans le monde*, p. 34 (Paris, 1936).

The number of bilingual speakers in the Walloon provinces in 1930 was 125,109 compared with 439,815 in the Flemish provinces. There were 24,658 Flemings who could not speak French in the industrial areas of the Borinage and Liége, but many of them were married to French-speaking wives and seemed likely to be linguistically assimilated into the speech of those regions. Nearly all bilinguals are Flemings, and Walloons rarely learn French.

Bruxelles

The linguistic position in Brabant is peculiarly significant. The province comprises three arrondissements: the arrondissement of Nivelles is almost entirely French-speaking; that of Leuven (Louvain), in the north-east, is Flemish-speaking; the arrondissement of Bruxelles is of particular importance. Its present linguistic position marks the northernmost extension of French speech in Belgium. One reason for this is the continuation of the Forêt de Soignes to the south-east of the city; the forest zone was formerly but thinly populated and it served as a linguistic corridor between Bruxelles and the Walloon area to the south. Within Bruxelles itself, the western section along the river and canal, is now the artisan Flemish-speaking quarter. To

the east and south-east, where the residential area has now extended, French is favoured. The following table gives an indication of the position within the Bruxelles agglomeration (see p. 216) in 1930:

Language	Number of speakers		
	Bruxelles	Suburbs	Total
French only	67,408	259,521	326,929
Flemish only	25,858	92,643	118,501
Bilingual	95,991	276,202	372,193

Source: F. L. Schoell, *La Langue française dans le monde*, p. 36 (Paris, 1936).

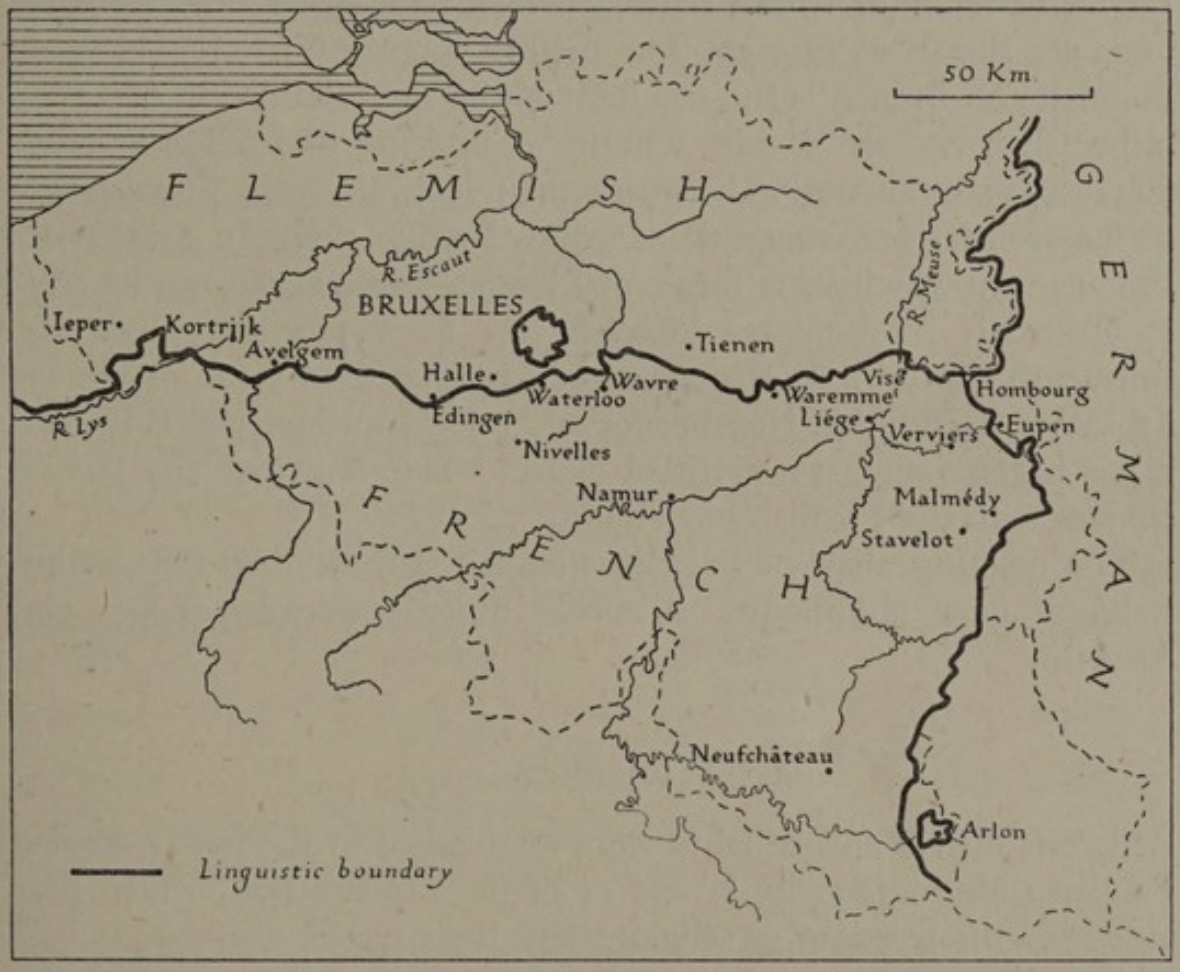


Fig. 30. Linguistic frontiers in Belgium

Based on M. Valkhoff, *Philologie et Littérature Wallonnes*, Fig. 1 (Groningen, 1938). The area of Walloon speech forms a rough rectangle. In the north, it extends approximately from Edingen (Enghien) to Hombourg, following in the main the boundary between the provinces of Liége and Limburg. In the east, it merges into the German-speaking part of the country, with Hombourg as the meeting point of the three languages. In the west, Walloon is gradually supplanted by the Picard dialect of French, roughly along a line between Edingen and Halle, southwards to the French frontier, including Nivelles, Thuin and Chimay. The southern limit of the area runs within the French frontier.
The district around Arlon is frequently spoken of as German, but it is bilingual. French is still the language of the upper classes and the percentage of French speakers in the district justifies the map's interpretation.

It must be remembered, however, that although the statistics suggest a greater use of French for every-day purposes in the Bruxelles agglomeration, the majority of the inhabitants are of Flemish descent, and that most of the members of the industrial classes tend to regard French as an auxiliary language to their Flemish mother tongue.

The Linguistic Frontiers

The linguistic boundary in Belgium can be defined as the line separating the area in which over 50% of the inhabitants speak one language from that in which over 50% speak another language. The Flemish-French and the French-German boundaries drawn on this basis are shown in Fig. 30. The present linguistic frontier between Flemish and French is the resultant of the slow stabilizing of a zone rather than a sharp divide. The increasing use of French in commerce and administration has made the transition on the Flemish side of the frontier less sharp than on the French side. In north-west France, into which early forms of Flemish were carried on the crest of Frankish movements, Flemish has been receding since the thirteenth century. It is now mainly restricted to some of the inhabitants of Dunkirk, Hazebrouck and a few communes of Lille, and it has become almost a petrified dialect which has gradually lost its contact with the Flemish of Belgium.

The meeting place of French, Flemish and German falls within Belgium near Hombourg, a village directly between Liége and Aachen.

Religion

Religious liberty and equality were established in the newly created Belgian state of 1831 by article 14 of the Constitution, which provided for the freedom of religions and their public exercise, as well as the right to the expression of opinions on all subjects with the exception of misdemeanours committed in exercising this liberty.

It is difficult to give an exact assessment of the membership of the religious bodies in Belgium because the Census returns do not provide a full statistical account of individual confessions of faith.

The overwhelming majority of the country's inhabitants belong to the Roman Catholic Church. The depth of attachment to the Church varies, however, from part to part, and depends very often on social position and on sex. Practising Catholics are more numerous in the Flemish areas than in Bruxelles and the French-speaking regions.

Further, they are more numerous in rural areas than in large towns and among the industrial population. In the Flemish-speaking provinces and in the agricultural areas of Namur and Luxembourg, the priests play an important part in the every-day lives of the people.

The kingdom of Belgium maintains diplomatic relations with the Holy See. The state is responsible for a proportion of the stipends of recognized ministers belonging to the three main religious bodies—Roman Catholic, Protestant and Jewish. The state also provides subsidies for the erection of buildings designed for religious use, as well as grants for upkeep and repairs. Since 1921, priests, ordained ministers and candidates for holy orders have been liable to military service, though in practice exemption is frequent.

The Roman Catholic Church

The metropolitan province of Mechelen (Malines) is divided into six dioceses which cover the whole of Belgium (Fig. 31). The following table shows the territorial organization of the Church in 1938:

Diocese	Date of foundation	Civil provinces	State-paid clergy
Mechelen (Malines)	1559; metropolitan see 1561	Antwerpen Brabant	1,635
Brugge (Bruges)	1559; suppressed 1801; restored 1834	West-Vlaanderen	717
Gent (Gand)	1559	Oost-Vlaanderen	899
Liége	A.D. 720	Liége Limburg	1,256
Namur	1559	Namur Luxembourg	1,057
Tournai	1146; archbishopric until 1561	Hainaut	910

Source: *Annuaire statistique de la Belgique* (Gand, 1939).

Out of the total of 6,474 state-paid clergy, eighty-seven were higher dignitaries, including the cardinal-archbishop, bishops, vicars-general, canons and administrative secretaries. The auxiliary bishop at Mechelen is not paid by the state, and many other clergy, employed in church seminaries and schools, are not recognized by the state for salary purposes. The mean annual figures for entry into the priesthood have shown a slight variability of between 25 and 37 ordinands since 1871.

The six dioceses were divided in 1938 into 262 deaneries, consisting of 3,257 parishes. Each parish has its own church; its temporal affairs are supervised by a 'conseil de fabrique', elected by the

parishioners with the parish priest and the burgomaster as *ex officio* members.

The strength of Catholic devotion in Belgium has owed much to the contribution of the various monastic orders and religious communities. The Jesuits, in particular, have been important factors for

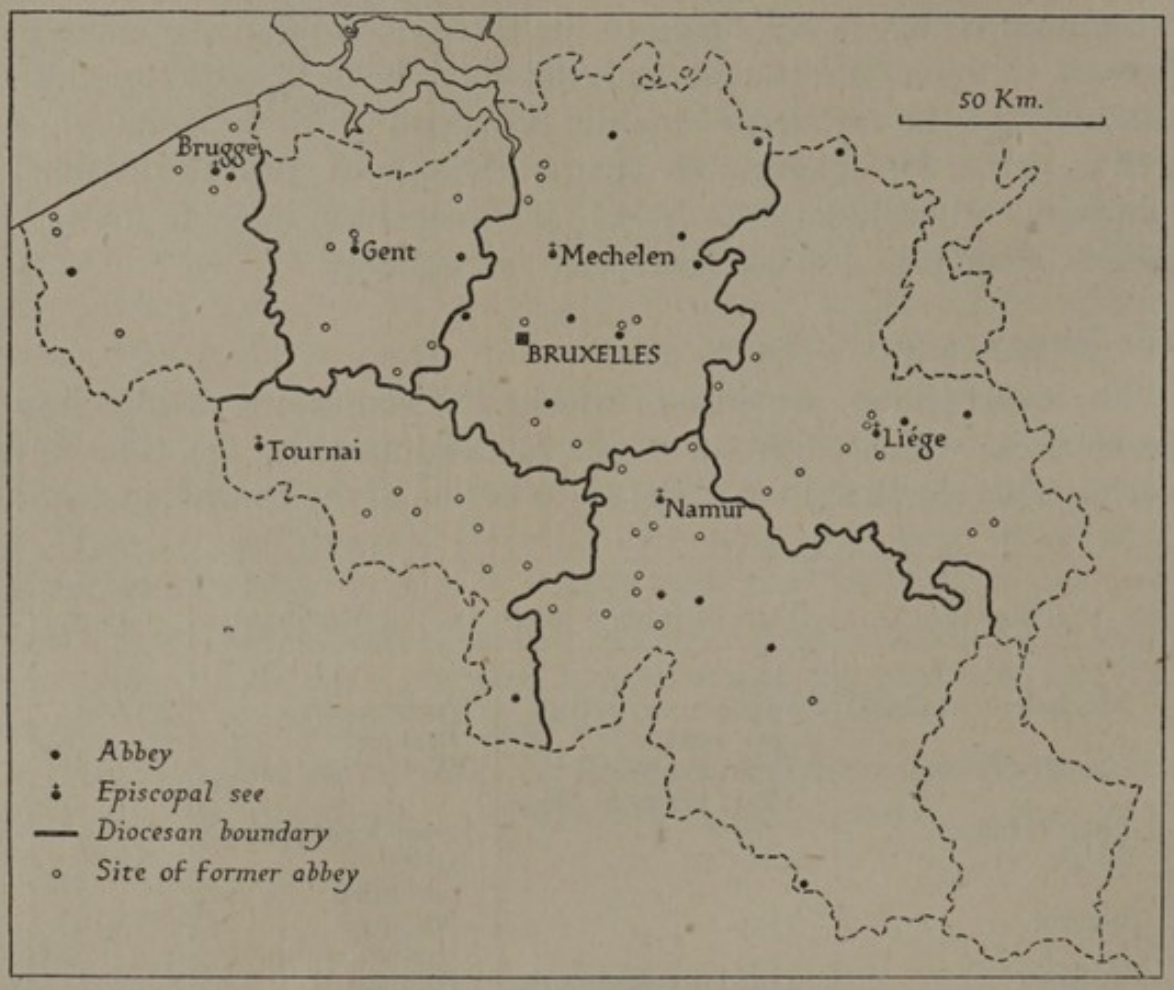


Fig. 31. Ecclesiastical divisions of Belgium

Based on (i) J. Halkin, *Atlas Classique*, Fig. 108 (Namur, 1934) and (ii) *Grande Encyclopédie de la Belgique et du Congo*, vol. 1, Fig. 146 (Bruxelles, 1938).

several centuries, and there was an already large number of religious communities in Belgium in the latter half of the nineteenth century when an influx of German religious orders, expelled by the actions of the *Kulturkampf*, sought sanctuary in the country. The most important of the orders, apart from the Jesuits, have been the Benedictines, the Franciscans and the Carmelites (Fig. 31). In 1930 there were 58,973 members of religious communities, a considerable increase on the total of 30,098 in 1890 and of 11,968 in 1846. The number of foreign-born members in 1930 amounted to 11,816. Of the 2,303 communities, 456 were for men and 1,847 for women.

Protestants

There are three Protestant bodies in Belgium with a total membership estimated at 65,000. Two of these bodies are recognized by the state in the matter of ministerial stipends:

(i) The Protestant Evangelical Church of Belgium was formed in 1839 when the scattered Protestant communities met to hold the first synod of the *Union des Eglises évangéliques protestantes de Belgique.* The central synod is responsible for the general administration of all the churches belonging to the union, which had a membership of about 20,000 in 1938 with twenty pastors and five assistant pastors.

(ii) The Anglican Church in Belgium is under the jurisdiction of the Bishop of London, through the commission of the Bishop of Fulham, while its internal affairs are administered by a central committee. The salaries of its chaplains come in part from state funds. In 1938 chaplains were found in the following provinces: Antwerpen, Brabant (two), West-Vlaanderen (four), Oost-Vlaanderen, Liége. There were Anglican churches at Antwerpen, Brugge, Bruxelles, Gent, Knokke, Oostende and Ieper (Ypres). There are no published returns of the numbers of communicants.

(iii) The Free Protestant Church (*Eglise libérale de Bruxelles*) is not recognized by the state. There are branches at Gent, Charleroi and Antwerpen.

Jews

After the creation of the Belgian kingdom, a central consistory council for Jews was set up and the chief rabbinate was established at Bruxelles. There was a total of seventeen rabbis and readers in 1938.

Although exact figures are not available, the Jewish population in Belgium has been estimated at 60,000, forming 7% of the total population. There has been a rapid increase in their number since 1890 when they totalled about 3,000; in 1900 they numbered about 12,000, and in 1920 it was estimated that there were about 44,000. The majority of them are obviously recent immigrants, and the largest communities are found at Antwerpen, Bruxelles and Charleroi, their members being diamond-cutters, goldsmiths, merchants and artisans. A further number of refugee Jews, estimated at 25,000, entered Belgium in the years immediately preceding the outbreak of war in 1939.

Education

Two main problems have dominated the history of education in Belgium from the time of its inception as an independent state in 1831: the struggle between Liberals and Clericals for state or Church control, and the struggle of the Flemings to secure recognition of their tongue as an official and cultural language.

The Religious Question

Differences between Catholics and Liberals became acute in the early forties of the last century. The secularization of public instruction and its organization under the centralized control of the state were essential points in the Liberal programme, while the Catholic party, on the other hand, stood for decentralization, obligatory inclusion of religious instruction in all schools, and state subsidies to private or voluntary or Church schools. The Education Act of 1842 was the attempt of a moderate government to meet the rival claims by a compromise which was necessarily displeasing to both sides. By it the Liberal claim that the state should control public instruction in primary schools was accepted, and the duty of maintaining one or more schools was laid upon the communes; on the other hand, the Catholic claim for obligatory religious instruction was not only admitted, but the communes were given the right to 'adopt' or support a private (i.e. a Church) school, and if the local funds were inadequate, the state or province was to come to its assistance. This measure established collaboration between Church and state in state-aided education, though the Church schools retained their independence of control even when receiving subsidies from the state.

Liberal opposition to this act was strong and sustained. In 1850 another law aimed at the establishment of ten *Athénées* (higher classical schools) and forty intermediate schools, dependent on the state. In the schools the clergy were to be invited to give or to supervise religious instruction, but the state reserved the right to nominate and to appoint the teachers, to draw up the curriculum and to inspect the schools. Bitter opposition from the Catholics obliged the moderate government in power from 1850 to 1853 to suggest, as a compromise, the 'Regulation of Antwerp', a local arrangement which permitted instruction to be given only in the religion professed by the majority of the pupils, namely, that of the Roman Catholic Church.

In 1878 the campaign for the banishment of religion from the schools began in earnest. The new education bill of January 1879

secularized primary education, introducing, in place of denominational religious instruction by the clergy, lay and 'neutral' instruction under the direct control of the state. It forbade any form of religious instruction in school hours, but to avoid the reproach of impiety ministers of religion were permitted to give instruction out of school hours to children whose parents desired it. The responsibility of each commune for the establishment and maintenance of at least one state school within its boundaries was reaffirmed. Private schools, in accordance with the terms of the Constitution, were not affected, but the communes were forbidden to 'adopt' them. When the bill became law in 1879, the bishops followed up their original attack by instructing their clergy to refuse absolution to teachers who taught in the 'Godless schools' and to parents whose children attended them. Throughout the country, the 'war' (*la Lutte scolaire*) was waged for years with extreme bitterness and intolerance. State schools in some parts of the country were emptied of children, and pupils and teachers moved from the state schools to the private schools which rapidly increased. It was estimated that in the Flemish-speaking provinces over 80% of the children went to the Catholic schools.

The elections of 1884 reflected the popular distaste of 'neutral' instruction. The Catholic party was returned by a large majority, and under the new government the recent legislation was annulled. The Ministry of Public Instruction was abolished and the communal authority regained the right to organize the public schools and to 'adopt' private schools. It was left to the communes to decide whether denominational religious teaching was to be included in the curriculum, but if twenty-five heads of families demanded religious or neutral instruction, the communes were obliged to act in accordance with their wishes.

The Catholic programme of instruction was completed by the Education Acts of 1895 and 1914, by which primary instruction was made free and compulsory, religious instruction became obligatory, subject to a conscience clause, and equality in the distribution of state subsidies to public and private schools was established.

The Language Question

It was not until 1910 that a number of Flemish secondary schools were established by law to meet the demands of Flemish-speaking parents. In 1914, when attendance at school until the age of fourteen became compulsory, it was further stipulated that every child should be taught in his mother tongue after a declaration by the parents.

University education, however, remained unaffected and Flemish was not included as a subject for degree examinations. The struggle for a Flemish university was waged with much bitterness, and the University of Gent, founded in 1816, became the storm centre of the movement. The government's bilingual compromise proposal of 1922 was vehemently opposed by the Walloons, and the Flemish youth, objecting with equal vehemence, boycotted the university. Finally, a bill for the flamandization of the university was passed by a small majority in 1930. Flemish became the medium of instruction in all subjects except in foreign languages. In the University of Leuven duplicate courses in French and Flemish are given. In other higher institutions the French language is used.

By a majority of one vote in July 1932, settlement was reached on the question of the schools. Instruction in the primary schools was henceforth to be given in the language prevailing in the district—with the inclusion of German for the territories acquired in 1919. The local authorities may provide for the teaching of Flemish in Walloon provinces and of French in Flemish provinces. In intermediate and secondary schools, a second modern language is obligatory, otherwise the conditions regulating languages in the primary schools are applied.

Administration

The Belgian system is a decentralized one. The Ministry of Education at the centre, by means of state grants and an efficient state inspectorate, exercises control in all branches of instruction, from the state universities at Gent and Liége at the apex to the *Ecoles gardiennes*, the most highly developed system of kindergarten schools in the world, at the base. The central state control is exercised through the provinces and communes and through the many private associations concerned with education. Each commune is by law obliged to set up one or more primary schools; each commune is responsible for the maintenance and contributes to the cost, but the greatest share of the expense is borne by the state. The communes retain considerable independence and have the right to appoint teachers. In the communal school proper, religious instruction, which is compulsory, is given either by the clergy or by their deputies before the opening or at the close of secular instruction. Schools which are 'adopted' by the communes (*Ecoles adoptées*) are voluntary or private schools, usually schools of religious associations which accept the control of the communes in return for specified advantages. They are assimilated to the communal schools in secular instruction but retain their

religious character by means of the freedom allowed to them in their choice of books and method, and in the appointment of teachers. *Ecoles adoptables* form a third type; they are voluntary or private schools and most of them are conducted by members of a religious order, who reject adoption by the communes. They, too, enjoy financial aid from the state.

In intermediate and secondary education the local authorities play a part of considerable importance. Some of the schools are provided and equipped by the state, others by the communes, helped by subsidies from the state and provinces. In general, religious instruction as provided in the primary schools is given in intermediate and secondary schools, but moral instruction is obligatory for pupils whose parents desire exemption for them from religious instruction. Private secondary schools have rather more pupils than state secondary schools.

Adult education also enjoys considerable independence. Since 1921 the government has granted subsidies to existing institutions, and in 1930 the *Conseil supérieur d'Education populaire* was set up under the Ministry of Education. Its work is to co-ordinate the many different associations concerned with adult education. The provinces also assist in the work by making grants through the *Loisirs des Ouvriers*, a provincial organization. Similar freedom is enjoyed by the many organizations concerned with technical and vocational education.

A well-organized system of state inspection provides the connecting link between the ministry and the local authorities. General, principal and regional inspectors exercise wide powers of control in matters concerning curricula methods and administration. Since the establishment of the linguistic divisions by the Act of 1932, separate bodies of inspectors operate in the two linguistic regions.

Pupils may be transferred from one type of school to another at any stage and without waste of time. Attendance at school is obligatory from six to fourteen years, but after six years of primary instruction a child may choose one of three courses of secondary education: (i) a lower course which is given in the intermediate or middle schools; (ii) a higher course for which pupils must attend the *Athénées* and prepare for admission to the universities; (iii) a school for vocational education.

The numbers of public or state schools in 1938 were as follows:

Type	Male	Female	Mixed	Total
Ecoles enfantines	9	6	1,558	1,573
Ecoles primaires	2,391	1,304	1,480	5,175
Ecoles secondaires	164	71	74	309
Ecoles professionnelles	269	219	—	488
Ecoles normales	16	34	—	50
Universités	—	—	2	2

Source: *Annuaire statistique de la Belgique*, p. 92 ff. (Gand, 1939).

Side by side with the state or public schools are the independent schools of religious associations, the overwhelming majority of which belong to the Roman Catholic Church and are found mostly in the Flemish area. The Church assists and controls a large number of vocational and technical schools, and takes an active interest in the normal schools for training primary school teachers. The University of Leuven is a Roman Catholic university and has some 40% of the total number of university students in Belgium. Its *Rector magnificus* is appointed by the Pope.

The following table showing the number of educational institutions supported by religious associations clearly indicates that the Church controls more 'Ecoles professionnelles' and 'Ecoles normales' than the state:

Type	Male	Female	Mixed	Total
Ecoles enfantines	5	5	2,542	2,552
Ecoles primaires	95	1,585	992	2,672
*Ecoles secondaires**	—	—	—	—
Ecoles professionnelles	435	428	—	863
Ecoles normales	20	81	1	102
Universités	—	—	1	1

* Statistics not returned.

Source: *Annuaire statistique de la Belgique*, p. 92 ff. (Gand, 1939).

In primary education (from three to six and six to fourteen), the curriculum consists of religious instruction, the mother tongue, the three R's, geography, natural sciences, domestic science, agriculture, hygiene, singing and physical training. Teachers for the *Ecoles primaires* are trained at the *Ecoles normales primaires*; the age of entry is from fifteen and the course is for four years. Departments for teachers in kindergarten schools are attached.

In intermediate schools (*Etablissements d'enseignement moyen du degré inférieur*), for the twelve to sixteen age group, the curriculum

includes religious instruction moral instruction, two languages, history, geography, mathematics, natural sciences, drawing, physical training and domestic science. Commercial and classical sections are added to some schools. Teachers are trained at the *Ecoles normales moyennes*.

For secondary education (*Enseignement moyen du degré supérieur*), from the ages of twelve to eighteen years, there are four types of schools: (i) state *Athénées royaux*, provincial and communal *Athénées*; (ii), provincial and communal *Lycées*; (iii) schools of the Catholic *Fédération nationale de l'enseignement moyen libre*; (iv) denominational *Collèges patronées*. There are classical and modern sides to these schools, but religious or moral instruction is obligatory in both. School-leaving examinations are held for admission to the universities and other higher institutions where teachers are trained.

Among the vocational and technical schools are the *Ecoles supérieures*, for training high executive officers; the *Ecoles de commerce*; the *Ecoles de dessin*; the *Ecoles et classes ménagères*, for domestic science and management; the *Ecoles industrielles*, for future foremen and managers.

For higher education there are first the universities: (i) the state Universities of Gent and Liége (founded in 1817); (ii) the Roman Catholic University of Leuven, founded in 1425; (iii) the free University of Bruxelles, founded in 1834. Leuven and Bruxelles have more students than the two state universities. For commerce and industry there are the *Institut supérieur de Commerce* at Antwerpen, the School of Mines and Metallurgy at Mons, and the *Ecole des Textiles* at Verviers. For music and the fine arts, there are *Conservatoires royaux* at Bruxelles, Liége, Gent and Antwerpen, in addition to a number of communal academies of music; and the royal academy of fine arts is at Antwerpen. The Colonial School and the School of Tropical Medicine at Antwerpen form the *Université coloniale*. The *Ecole militaire* is situated at Bruxelles.

Recent Developments

There has been a marked progress in all branches of Belgian education since 1918, but in no sphere has it been so outstanding as in that of technical and vocational instruction. Industrial technique has been developed alongside with vocational education; children are selected and guided from their school days so that they may later find work best suited to their tastes and capacities in the industrial life of the country. In this respect, vocational education does not replace but

supplements primary instruction. Belgium has suffered, with other states in recent years, from unemployment due in part to the dislocation of industry arising out of the war of 1914–18, and in part to overcrowding in the learned and clerical professions. In Belgium, vocational instruction is expected to go some way to remedy these defects both by encouraging skilled technique and by providing a rival attraction to the 'abstract, liberal, humanistic' trend of traditional instruction. In many experiments which have been made, the

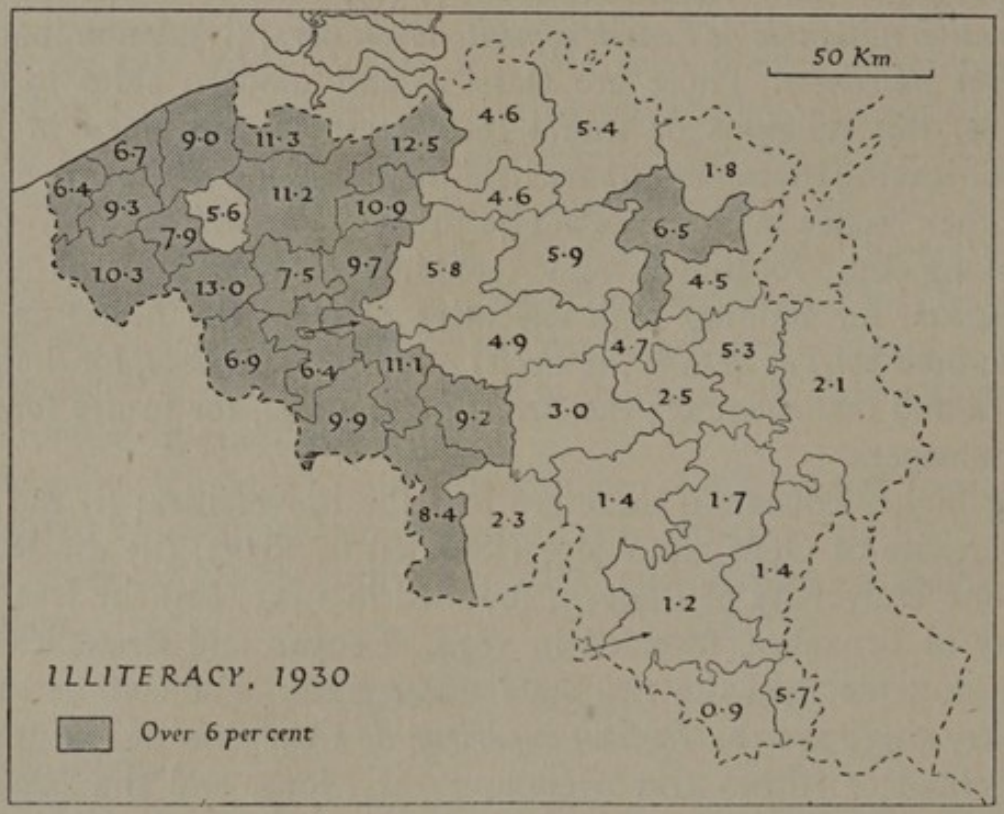


Fig. 32. Illiteracy, 1930

Based on *Recensement général*, 1930, vol. III, pp. 10–16 (Bruxelles, 1937). The figure shows the percentage, by province, of persons over 21 years of age who were unable either to read or write.

state has allowed the initiative to be taken by private organizations, such as trade associations and labour unions. The schools are usually provided by local organizations; the state has confined itself to assisting their efforts. The Ministry of Education shares with those of Economics and Agriculture the administration and financing of the schools. The work of the ministries is co-ordinated by the *Office de l'Enseignement technique*.

Most remarkable of Belgian experiments in technical education has been the establishment of the *Université du Travail* at Charleroi. It is attended by over 400 students from the ages of thirteen to twenty-two. It aims at training a generation of skilled workers and organizers

of different grades to act as a storehouse of information on scientific and technical matters. The *Université* at Charleroi is a training centre for all grades of employment in the heavy industries, but it does not confine itself to technical instruction. All sorts and conditions of workers attend for instruction on the different sides of industrial work. The courses are planned so that the first three years are devoted partly to a continuation of general instruction, partly to non-specialized practical work, and partly to making a general acquaintance with the work in other departments of allied industries. A third year course may be taken by students who do well in the examinations at the end of the second year, when more specialized work is followed. At the end of the third year a diploma is awarded. The general cultural interests are usually catered for in evening classes at the *Université* and returns show that these are well attended.

University education has been brought within the reach of all classes of society in Belgium by an enlightened system of awarding money prizes and scholarships. Promising students whose parents cannot afford the cost of a university education are granted loans (*prêts d'honneur*) by the *Fondation universitaire*.

A complementary development to the spread of educational facilities has been the increase in the number of public libraries. The following table shows distribution of libraries by province in 1937:

Antwerpen	297	Liége	357
Brabant	293	Limburg	194
West-Vlaanderen	236	Luxembourg	215
Oost-Vlaanderen	286	Namur	229
Hainaut	334	Total	2,441

Source: *Annuaire statistique de la Belgique*, p. 104 (Gand, 1939).

There were 618 communes, out of a total of 2,670, which were not equipped with a public library.

The Press

Under article 18 of the Constitution, the Belgian press was granted complete liberty and for more than a hundred years it has jealously guarded this privilege. Belgian newspapers have been steadily increasing in numbers since 1831, partly because of the constitutional liberty granted to the press and partly because of the larger issues involved in the Flemish-Walloon problem (see pp. 134–45). The table on the following page sets out the official classification of periodical literature published in Belgium in 1938.

	Political	Finance	Agriculture Commerce Industry	Art Literature Science	Various	Total
Daily	64	9	2	—	15	90
Weekly	276	173	109	52	519	1,129
Others	190	62	184	199	1,216	1,851
Total	530	244	295	251	1,750	3,070

Source: *Annuaire statistique de la Belgique*, p. 105 (Gand, 1939).

Since French newspapers have a wide circulation in the country, the average sale of the Belgian daily newspaper is rather small but keen competition has kept prices very low. It has been estimated that *Le Soir* (Bruxelles), an independent democratic paper and *Het Laatste Nieuws* (Bruxelles), which is Liberal, have the largest circulation with 300,000 and 250,000 respectively; the majority of the other political daily newspapers have a circulation of between 50,000 and 60,000 each.

Social Conditions

Belgian society does not differ radically from that of England. Politically and economically, the bourgeoisie are the predominant class, supplying most of the professions, with the possible exception of the Church, and providing the country with most of its leading politicians. On the other hand, the nobility are of minor importance; they have no special political rights and few of them enter the legislature; they own the majority of the large estates, but large estates are so few in the country that rural Belgium is not in any way dominated by their owners.

A large proportion of the Belgian population is urban, and over 21% of the inhabitants live in the four great agglomerations of Antwerpen, Bruxelles, Gent and Liége (see pp. 216-17); over 60% live in communes of more than 5,000 inhabitants. In addition, as a result of transport facilities, many people work in the towns but live in the country where they and their families cultivate a small plot of land. The distinction between town and country life in Belgium is consequently not one to be sharply defined (see p. 188).

Family life is protected by law, which ensures the authority of the husband over the wife and of the father over children not yet of age. Marriage takes place before a civil registrar, but a religious ceremony may follow. A married woman has no legal competence and she cannot dispose of her property, institute legal proceedings or enter

a trade without her husband's permission or without the special mandate of the courts. The law also recognizes and protects private property; confiscation of property is illegal and expropriation in the public interest is accompanied by compensation. Freedom of testamentary disposition is not absolute; a part of a man's property on his death is automatically assigned to his near relatives. The effect of the inheritance law, therefore, has been to break up large fortunes fairly rapidly, and the distribution of wealth is somewhat more even in Belgium than in England.

Social Services

Since 1918, Belgium has done much in the sphere of social legislation, and there has been a large increase in the number of social agencies and institutions. There are many voluntary organizations as well as co-operative and mutual-aid societies. The state, the provinces and the communes each share in granting subsidies to social services that owe their origin to private initiative.

Social Insurance. All workers engaged by a public or private undertaking under a contract of employment, including apprentices and salaried employees earning not more than 24,000 francs per annum, are legally entitled to compensation for industrial accidents. Insurance against certain occupational diseases is compulsory for employers (see p. 171). Old-age and widows' and orphans' insurance falls into two types: (i) it is compulsory for wage-earning workers, male and female, employed in Belgium or abroad in an undertaking with its head office established in Belgium and for independent workers whose incomes do not exceed 18,000 francs per annum; (ii) it is compulsory for salaried employees of both sexes of either Belgian or foreign nationality, whether employed by a private employer or by the state. The pensionable age for old-age pensioners is 65 for men and 60 for women; a lower rate of pension can be claimed from the ages of 60 and 55 respectively. In 1938 there were 287,968 recipients of old-age pensions, receiving a total payment of 580,470,602 francs at an average of 2,015 francs per person per annum. Special measures have been introduced for miners and seamen (see p. 390). There has been a considerable development of voluntary insurance in the sphere of public health and this is described on pp. 170-3.

Unemployment Insurance. Voluntary unemployment insurance is usually open to all wage-earners or salaried employees from 15 to 65 years of age, provided they have been regularly employed for at least twelve months in industry and commerce. This does not apply to

domestic servants, agricultural workers and people engaged in public entertainments. Contributions come from the insured persons, generally paid to the different trade unions, from the provinces and communes and from various state subsidies. The rate of benefit varies with the resources of the fund and with the occupational class of the insured person. In some cases, unemployed persons assisted by the fund are required to attend courses of vocational training or, if they are over twenty-one years, to take part in relief work organized by the central or provincial authorities. (For family allowances, see pp. 228–30.)

Housing. Many of the town workers own their houses and an even greater proportion own or rent a garden, an allotment or sometimes enough land to keep a cow or a few goats. There are few large tenements in the towns, and in general the Belgian urban worker is better housed than the town worker in England. An ambitious housing programme has been undertaken since 1918; slum clearance has gone on apace and good cheap houses have been erected on a large scale. Much of the work has been done by co-operative societies—helped by the *Société Nationale des Habitations à Bon Marché*, with a subscribed capital of over 300 million francs, two-thirds of which came from state, provincial or communal grants. Up to 1936, the 290 co-operative societies involved in the scheme owned over 20,000 dwellings. At the end of that year, the number of houses constructed or under construction amounted to 57,500, including 45,500 single family dwellings and 12,000 flats.

Co-operative Societies. Most of the co-operative societies are run under either Socialist or Catholic auspices, and at the end of 1936 they numbered 3,363, exclusive of agricultural co-operatives (see p. 253). Some of these societies compete with the largest firms in the country, particularly in retail food distribution. Among the Socialist co-operative enterprises were bakeries, grocery stores, breweries and restaurants; their *Maisons du Peuple* (*Volkshuisen*) contain concert halls and cinemas, and the executive offices of the various political and trade union organizations also are housed in them. The *Maisons d'œuvre catholiques* similarly provide centres for the social activities of Catholic life.

Labour Organization

The industrialization of Belgium in the nineteenth century was accompanied by several movements to improve labour organization and working conditions (see pp. 117–21).

Conditions of Work. The 'Hours of Work' Act of July 1921 fixed the daily limit at 8 hr. and the weekly limit at 48 hr. A 40 hr. week was introduced in 1936 for certain industries, but the act was not fully enforced. By 1939 diamond workers and dock labourers were the only categories of workers who had benefited from it, but a number of industries had been able to secure a reduction on the 48 hr. week. Underground workers in the mining industry have a 45 hr. week with 7½ hr. as the maximum for any one day. Night work is prohibited for all women and for boys under 18 years of age. By an act of 1936, passed as a result of the strikes of that year (see p. 284), annual paid holidays of six days are granted to all salaried employees and to wage earners in commerce, industry and the public services.

Trade Unions. The development of trade unions in Belgium has been a rather slow process. Up to 1867 strikes were illegal, and from then until 1921 the law made it difficult for strike organizers to avoid committing criminal acts. In 1920 the state set up mixed commissions of employers and employees to make recommendations in trade disputes.

The trade unions, in addition to defending the interests of their members, organize unemployment insurance and mutual benefit funds. They are generally affiliated to a political party, and trade unionism in Belgium has been closely interlocked with political and religious differences. Trade unions remain, however, free organizations, not set up by law and outside the control of the public authorities. The workers, for their part, have also rejected the idea of a single or compulsory trade union, and freedom of choice and affiliation is closely guarded. There are two main groups of trade unions—Socialist and Catholic. The former, known as the *Confédération générale du Travail* (C.G.T.) was originally founded in 1898, and in 1938 it had a membership of about 600,000, incorporating twenty-four *centrales* and trades councils. In general, the Socialist party in Belgium is a federation of the unions and societies grouped under the C.G.T. The Catholic trade unions, with a membership of 360,000, were first established in the last decade of the nineteenth century, and in structure they closely approximate to the C.G.T. In addition to their efforts in obtaining improvements in working conditions, the Catholic unions strive to preserve the influence of the Church, both political and religious, on their members. The Liberal trade unions, numbering about 70,000 members, have not gained much popularity among the industrial classes. The Socialist unions are strongest in the industrial Walloon provinces and in the larger towns of the Flemish provinces. The Catholic unions draw their members mainly from the

Flemish regions, especially from the smaller communes. The Liberal unions are strongest among the workers in the sugar industry of Brabant and in certain regions of Oost-Vlaanderen.

Standard of Living

During the last fifty years, and especially since 1918, the standard of living in Belgium has been rising, although in 1938 it was still lower than that of Great Britain and the Netherlands.

Wages. During the past decade wages in Belgium have fluctuated considerably in response to the uncertainty of economic conditions. In 1935 the government drafted a scheme to ensure that in a period of rising prices and increasing employment there should be a corresponding rise in wages. The application of the scheme, however, has been slow and far from uniform; the chief increases were in the iron and steel industry, mining and dock work. An indication of the hourly current or minimum wage for some representative industrial workers in 1938 is given in the following table:

Francs per hour

Mining:		Mechanical engineering:	
All workers	6·13	Turners	6·75–7·75
Hewers	7·59	Fitters	6·55–7·20
Underground	6·65	Labourers	4·75–5·30
Surface	4·96		
Building:		Transport:	
Masons	6·27	Trams and Buses	6·00
Carpenters	6·27	Railway porters	4·75
Labourers	5·08	Platelayers	5·80
Food:		Clothing:	
Bakers	6·30	Tailors	6·00
Confectioners	5·50–6·50	Hatmakers	8·20

Based on official statistics.

Nominal wages are on the whole low, but the level of rents and other factors affecting the standard of living tend to make a comparison of real wages between Belgium and other countries more favourable to the former.

Diet. Because of her highly industrialized condition, Belgium has to import half of her total food supplies (in terms of calories). The staple food is bread, but there is also a large consumption of potatoes. In comparison with Great Britain, Belgium consumes much larger quantities of bread, potatoes and margarine but smaller quantities of sugar, meat, butter, lard, and, rather surprisingly, fish. Consumption of beer, at nearly a pint a day per head of population, is the highest in Europe. The following table, which compares the average annual

consumption of food per head in Belgium and Great Britain before the outbreak of war, indicates that while the Belgian diet contained more of the cheap energy foods and less of the more expensive protective foods, there is little difference in calorific value between the two diets.

	Belgium		Great Britain	
	kg.	lb.	kg.	lb.
Grain	172	379	129	285
Potatoes	168	370	84	185
Sugar	29	64	43	95
Meat	40	88	63	139
Milk	78	137 (pt.)	94	165 (pt.)
Butter	8·2	18	10·9	24
Margarine	8·9	19·6	4·4	9·7
Pig fat	2·6	5·7	4·6	10·1
Eggs (number)	163	163	189	189
Fish	9	19·8	21·3	47
Cheese	4·8	10·6	4·1	9
Calories per day	2,950		3,100	

Based on official statistics.

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1. A summary of the chief physical characteristics of Flemings and Walloons is given in C. S. Coon, *The Races of Europe* (New York, 1939). W. Z. Ripley, *Races of Europe* (London, 1900) is still useful.

2. There are two authoritative accounts of the history and structure of Flemish and Walloon respectively: J. van Ginneken, *Handboek der nederlandsche Taal*, vol. I ('s Hertogenbosch, 1928) and M. Valkhoff, *Philologie et Littérature Wallonnes* (Groningen, 1938). For the general background of French, Dutch and German there are (*a*) A. Ewert, *The French Language* (London, 1933); (*b*) M. J. van der Meer, *Hist. Gram. der niederl. Sprache*, vol. I (Heidelberg, 1927); (*c*) R. Priebsch and W. E. Collinson, *The German Language* (London, 1934).

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3. In addition to the works mentioned on p. 129, there is a useful historical survey of religion in Belgium in the *Dictionnaire d'histoire et de géographique ecclésiastique*, edited by A. Baudrillart, vol. VII (Paris, 1934). Information about the Jewish church is given in the *Jewish Encyclopedia*, edited by A. M. Hyamson and A. M. Silbermann (London, 1938).

4. The general background of Belgian education is described by G. Vrancken, 'Notre vie scolaire', in the *Grande Encyclopédie de la Belgique et du Congo*, vol. I (Bruxelles, 1938).

Accounts of developments are included in recent volumes of *The Year Book of Education* (London) and of the *Annuaire International de l'Education et l'Enseignement* (Geneva).

5. Information and statistics concerning social conditions in Belgium are contained in various volumes of *The International Labour Review* (Geneva, 1920– and *Industrial and Labour Information* (Geneva, 1920–).

Chapter V

HISTORICAL OUTLINE

The Netherlands: Introduction: The Middle Ages: The Burgundian Lands: The Seventeen Provinces, 1506–55: The Revolt of the Netherlands, 1555–1609
The Southern Provinces, 1609–1831: The Spanish Netherlands, 1609–1715: The Austrian Netherlands, 1715–92: French Rule, 1792–1813: The Union of Belgium and Holland, 1813–31
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Bibliographical Note

THE NETHERLANDS

Introduction

The territories which came to be known as the Low Countries or the Netherlands have been characterized neither by linguistic nor political unity. The origins of the linguistic division are to be found in the invasions of the Germanic tribes in the fourth and fifth centuries. The linguistic boundary seems to mark a difference between the earlier and later stages of the invasions. During the earlier stages, Franks settled in large numbers up to what is approximately the present-day linguistic boundary, but later Frankish conquests beyond this were not followed by a large-scale migration of people. The folk movement of the Franks had been broken by the natural obstacles of the forests of Flanders and Brabant and by the Roman frontier organization of the area; the main movement of the Frankish people stopped, but the conquests of Frankish kings and nobles continued into the Paris basin. The military advance about the year A.D. 431 to Tournai, Arras and Cambrai introduced a Frankish element into northern Gaul, but did not displace the great mass of the Gallo-Roman inhabitants. From this time forward the linguistic division was more or less fixed. To the north of the woodland lay the Germans (and Flemings), while in the south the French (and Walloons) were dominant (Fig. 29).

The political disunity was due to a later development. The successful advance of the Franks under the house of Clovis was followed by the great organizing ability of the Carolingian dynasty, and in the course of three centuries the imposing structure of the Carolingian

empire was built up. But after the death of Charlemagne in 814, the break-up of this empire did much to make the territory around the mouths of the Rhine, the Meuse and the Scheldt the debateable land which it continued to be throughout later history. A partition treaty of A.D. 843 included the greater part of the area within a middle kingdom set between what were to become the realms of France and Germany (Fig. 33). At a later partition treaty, in 870, this middle kingdom disappeared; another alteration in 887 made the Scheldt the boundary between 'France' and 'Germany'; 'France' remained in possession of the county of Flanders on the left bank of the river, while 'Germany' obtained what was to become the duchy of Lower Lorraine on the right bank. Henceforward, this area was subject to two separate allegiances until it ultimately achieved an independent position between them. It is interesting to note that this political division into eastern and western areas contrasted with the north-south linguistic division.

The Middle Ages

Political disintegration

Until the beginning of the twelfth century, the weakness of the French crown enabled the counts of Flanders to become very largely independent. But when the French monarchy consolidated its power under the House of Capet, one of its main objectives was to compel the obedience of this northern area; and, to some extent, it succeeded, although its control was always fluctuating. In the duchy of Lorraine, however, the German emperors, absorbed by the internal troubles of the Holy Roman Empire, and by their conflict with the Papacy, could pay but little attention to the Low Countries, and were never able effectively to assert their supremacy. The nobles of Lower Lorraine were left free to develop their estates into independent feudal principalities (Fig. 34). The duchies of Brabant, Luxembourg and Limburg and the counties of Hainaut, Namur, Gelders, Holland and Zealand, though belonging in theory to the Empire, became very largely separated in practice. The episcopal principalities of Liége, Cambrai and Utrecht also gained many immunities and accumulated considerable territories. The story of the mutual relations of these units is exceedingly complicated, but all their rivalries and difficulties were overshadowed by one great fact—their tremendous economic progress. The medieval history of the Netherlands may be summed up in two phrases—political separatism and economic prosperity.



Fig. 33. The northern part of the Middle Kingdom of A.D. 843

Based on the *Geschiedkundige Atlas van Nederland*, vol. I, plate 10 ('s Gravenhage 1913–32).

At the partition of Meersen in 870, the middle kingdom (Lotharingia) disappeared. At the later division of 887 it remained suppressed, but the eastern boundary of Carolingia now followed, roughly, that of 843. The Duke of Lorraine (Lotharingia), however, wavered in his allegiance between the eastern and western kingdoms, and his territory was not finally incorporated into Germany until 928. The map follows the original in showing the present-day coastline.

Economic progress

The location of the provinces at the mouths of the Scheldt (Escaut), the Rhine and the Meuse had enormous possibilities from an economic point of view. With the revival of economic life in Europe in the eleventh and twelfth centuries, they were in a splendid position to become the focus for the commerce of the northern seas. From England, from France and from the Baltic, commercial routes converged by sea, and were continued inland by numerous navigable waterways. To these possibilities of commerce was added a tradition of industrial activity. Since Roman times, a metal industry had been extensively carried on in the Meuse valley, and a cloth industry in the basin of the Scheldt. The raids of the Norsemen and the disorders of the ninth century had interrupted this progress, but the industries developed anew as the awakening of commerce in Europe gave them a fresh impulse. In the eleventh century, the copper industry revived at Huy and at Dinant, and at the same time the cloth industry was growing in Flanders; Liége, too, was early famed for its iron work.

One of the results of this economic renascence of the eleventh and twelfth centuries, was the rise of towns in Europe. Hitherto, 'towns' had been mainly military and administrative centres or the seats of bishoprics; but now a new element was being added to the castle or the cathedral. Merchants and craftsmen were settling around the town walls which had been constructed after the raids of the Norsemen. The town, in an economic and social sense, was coming into being, and in a legal sense, too, for the new townsmen demanded corporate rights and privileges from their feudal lords. The result was a new social group that stood in contrast both with the rural agricultural peasantry and the territorial feudal nobles. And it was with the appearance of this intermediate category of wealthy merchants and artisans that the rise of the medieval town was particularly associated. The territorial lords had tried at first to administer these growing centres of prosperity without making allowance for the new conditions. But the laws and customs that controlled the lives of peasants and serfs could hardly be applied to wealthy merchants and organized artisans; the towns sooner or later succeeded in obtaining autonomous municipal administrations. The rise of Cambrai is typical. A settlement of traders and artisans had grown up close to the episcopal castle at the beginning of the eleventh century; in 1070, it was surrounded with walls and became a *bourg*. The members of the guilds resolved to shake off the bishop's yoke, and meetings were held in

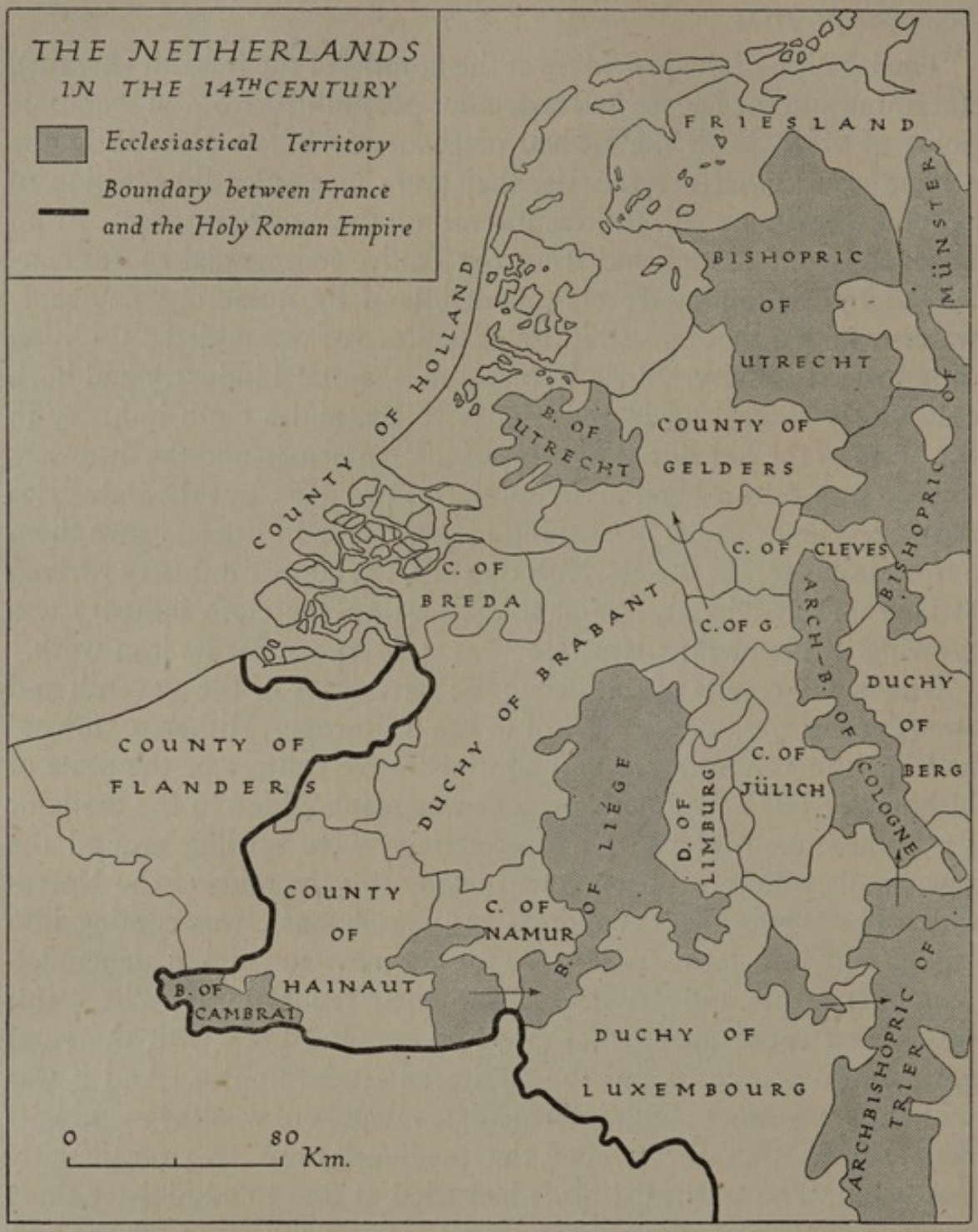


Fig. 34. The feudal principalities of the Low Countries in the fourteenth century

Based on (1) R. Muir and G. Philip, *Historical Atlas*, p. 53 (London, 1930); (2) *Geschiedkundige Atlas van Nederland*, vol. 1, plate 16 ('s Gravenhage, 1913–32). The main political units are indicated, but it must be remembered that the details of their boundaries often changed.

the *halle* (the guildhall). Their rising in 1077 was suppressed, but the burgesses did not give up the struggle until, though not for many years, they had taken all temporal power from the bishops, and were in complete control of the city.

These tendencies were abroad over the greater part of Europe, but the two areas where town growth was most in evidence were northern Italy and Flanders. By the thirteenth century, Flanders and neighbouring districts had become the principal market and manufacturing area of north-western Europe. Nowhere on the continent, save in northern Italy, were the towns so numerous, so large and so active. Indeed, it has been said that Flanders had the aspect of 'a continuous town'. The medieval buildings of these towns, especially their Cloth Halls and their *Hôtels de Ville*, tell their own story of prosperity—at Liége, Antwerp, Lille, Arras, Cambrai, Douai, Ypres (Ieper), Ghent (Gent), St Omer, Bruges (Brugge), Maastricht, Tournai, Valenciennes and at many other places. It has been estimated, for example, that at Ghent in the middle of the fourteenth century, the weavers alone numbered 4,500, and besides these, there were fullers, shearers, dyers and others—all engaged in cloth-making; the total population of Ghent at this time has been estimated at about 50,000; some estimates put it as high as 80,000. Ypres, according to some estimates, was similar in size to Ghent. Almost every town had its particular weave and pattern and dye, and the names of some textiles are derived from these places. Arras gave its name to the hanging curtain called arras; Cambrai to cambric; Valenciennes manufactured valence; the diaper pattern came from Ypres. Then again, other cities excelled in metal work, especially Liége in iron, and Dinant in copper. From the latter, the French word for copper-smithing (*dinanderie*) has been derived.

Very soon, production in these towns was linked up with the boundless possibilities of the international market. From the beginning of the eleventh century, the Flemings had sold their cloth in London and bought wool in return. In the fairs of Champagne, wool became one of the principal objects of barter and of credit transactions between the merchants of Italy and those of the Low Countries. In the south, the port of Genoa provided a point for its distribution in the Mediterranean. To the north, it was carried into the North Sea and the Baltic as far as the fairs of Novgorod. With these wide contacts, and serving so prosperous a hinterland, Bruges became the chief centre of international trade in northern Europe; its population in the fourteenth century has been estimated at some 100,000. The

great Italian banks had important branches there, and its colony of foreign merchants included not only Italians but Spaniards, Portuguese, Bretons and Germans. Along the inlet of the Zwin new quays were built to accommodate the ever-increasing number of vessels that came to the port (Fig. 35).

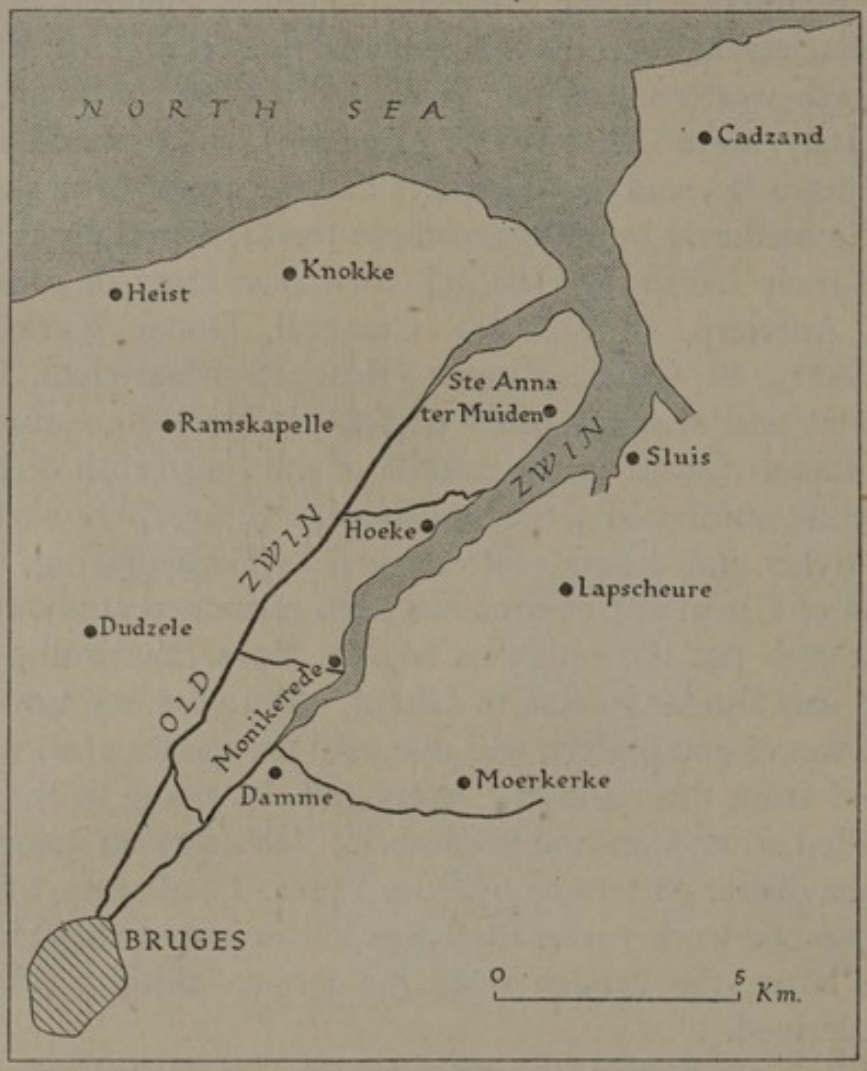


Fig. 35. The inlet of the Zwin about 1300

Based on A. de Smet, 'L'origine des ports du Zwin: Damme, Mude, Monikerede, Hoek et Sluis', in *Etudes d'histoire dédiées à la mémoire de H. Pirenne, par ses anciens élèves*, pp. 125–41 (Bruxelles, 1937).

The political importance of the towns

This economic prosperity was reflected in the political importance of the Flemish towns. Their oligarchic form of government under the wealthy wool and cloth merchants gave way in time to a more democratic form. The great mass of the townsmen were organized in trade guilds —fullers, dyers, smiths, leather workers, brewers, butchers, bakers

and others, but the most powerful of all was that of the weavers. As these guilds grew in strength, they succeeded in rebelling against the upper *bourgeois* element (called *leliaerts*). The territorial counts, not loath to see the power of these patricians of the towns reduced, were usually in alliance with the workers (called *clauwaerts*). Thus, by the strangest of accidents, the democratic movement of the workers was allied to the cause of feudalism. The *bourgeoisie*, in turn, relied upon the support of the French crown, always ready to oppose the pretensions of the vassal counts. The battle of Courtrai (1302), in which the craftsmen laid low the French knights, secured the triumph of democracy. It was a victory that astonished Europe—the double triumph of the workers over the *bourgeoisie* and of the Flemish counts over the king of France.

During the fourteenth century there were perpetual disturbances that reflected the clash of interests between the towns themselves, and between the different guilds. Town policies changed according as *leliaerts* or *clauwaerts* were in power. Moreover, the needs of the cloth industry necessarily aligned the Flemish towns with England, and so involved them in the complications of the Anglo-French wars. With the crushing defeat by the French king at Roosebeke (1382), the political greatness of the municipalities had entered on its decline.

The political complexity and class struggles of the Flemish cities were repeated in Brabant, Hainaut and Namur, but nowhere else was there such vigorous independence and civic splendour as in Ghent, Bruges and Ypres. To the north, at Dordrecht, Leiden, Haarlem, Rotterdam, Delft, Middelbourg and other places, the growth of the communal movement was, likewise, less tempestuous than in Flanders and the south.

The fifteenth and early sixteenth centuries saw certain changes in the relative importance of the towns. The older cloth-making centres lost their predominating position. The woollen industry in Flanders had passed through three phases. At first, home-grown wool was sufficient; then, as Flemish manufacturing developed, wool was imported from England; but, by now, the English cloth industry had developed to such an extent that it was not only absorbing English wool, but was also competing with Flemish cloth in the international market. Ypres, Ghent, Louvain (Leuven) and other seats of the cloth industry were in decline, partly because of this English competition for wool and for markets and partly because of the hampering regulations of their own guilds. The cloth industry accordingly took refuge in the more rural districts where labour was cheaper and more

plentiful, e.g. at Armentières, Hondschoote, Poperinghe, Tourcoing, Verviers and Warneton. A new form of cloth industry, the making of light fabrics at low prices, developed; serges and worsteds were produced in place of the finer types of cloth that were becoming the specialities of the English market. Linen manufacturing was developed to make up for the loss of wool, and the water of the Lys proved to be especially suitable for the retting of flax. Then, too, the making of tapestry flourished at Arras, Tournai, Oudenarde and Brussels. Moreover, in the east, around Liége, smelting works prospered, and collieries increased to supply the needs of the metal industry.

These changes in industrial centres were paralleled by a displacement in trade. At the beginning of the fourteenth century the gulf of the Zwin began to silt up. In the winter of 1404–5, a great storm inundated great stretches of the coast of Flanders. One result was to widen the western branch of the Scheldt and provide a direct route from Antwerp to the sea; hitherto, vessels had been forced to go round the island of Walcheren. Another result was the deposition of a vast quantity of silt in the Zwin. All efforts to clear the channel were fruitless, and by 1490 the silting was complete. The decline of Bruges was not, however, entirely the work of nature, for its narrow policy of oligarchic control already stood in contrast with the larger and freer forms of international trade that were being developed at Antwerp. It was Antwerp, not Bruges, that was to attract the new and rich commerce of Europe overseas.

While these economic changes had been working themselves out, the fifteenth century saw a most remarkable efflorescence of painting in the Low Countries. Flemish art was to bequeath a great legacy of masterpieces to the galleries of Antwerp, Bruges, Brussels and indeed of all Europe. Hubert van Eyck (? 1366–1426) and Jan van Eyck (? 1385–1440) were the forerunners of the great Flemish tradition. After them, the names come crowding; the Walloon, Roger van Weyden (1399–1464) at Brussels; Hans Memlinc (? 1430–94) at Bruges; Hugo van der Goes (? 1435–82) at Ghent; Quinten Matsys (? 1466–1530), the founder of the Antwerp school—these are only four of the crowd of artists that shed lustre upon the fifteenth century.

Tendencies towards political union

As the bonds which bound Lower Lorraine to the Holy Roman Empire, and Flanders to France, were loosening, other ties were slowly forming between the various provinces. And these new ties,

in a sense, foreshadowed the new state which the dukes of Burgundy were to create in the fifteenth century. From the eleventh century onwards, the local dynasties were becoming more closely interconnected. After 1051, the counts of Flanders became for a short time counts of Hainaut; the latter, in turn, became counts of Flanders in 1191, and this connexion lasted until 1280, when French policy succeeded in separating the two territories. In 1288, Brabant was joined to Limburg; and in 1299 the counts of Hainaut became rulers in Holland and Zealand.

Dynastic alliances and agreements did not form the only influence towards union. Despite their rivalries, towns found it convenient and profitable to act in common for the protection of their merchants. But although the towns of the same principality were thus acting more and more in agreement, the principalities themselves did not seek economic alliances until the fourteenth century. Indeed, during the earlier Middle Ages the economic life of the area had drained in two directions—Flanders had French and English connexions; Brabant and Liége were associated with Cologne and the German realm. But with the great development of trade in the thirteenth century, the whole economic life of the area began to flow towards Bruges and Antwerp.

'A single example', writes Professor Pirenne, 'will suffice to indicate the change. Until the end of the twelfth century, the "batteurs" of Dinant exported their copper products and provided themselves with raw material by way of Cologne. From the following century they abandoned the metropolis on the Rhine to frequent, almost exclusively, the market places of Bruges or Antwerp. The fact that all the commerce of the southern Netherlands flowed toward the sea evidently helped greatly to favour that consolidating of the various districts already begun by the policy of the princes. It was henceforth a fundamental necessity for all the cities of the region to be able to count on the freedom of the routes leading toward the ports, to see the number of market tolls thereon diminished, and especially to remove the excuses for the armed conflicts which interrupted transit.'*

After the beginning of the fourteenth century, treaties and agreements between the principalities became numerous. Thus commissions of arbitration were established between Flanders and Brabant early in the century, and between Brabant, Hainaut and Holland in 1328. The most famous of these agreements was the commercial

* H. Pirenne, 'The formation and constitution of the Burgundian state', *American Historical Review*, XIV, 487 (New York, 1909).

treaty between Flanders, Brabant, Hainaut, Holland and Zealand in 1339. The ecclesiastical principality of Liége concluded a similar treaty with Brabant in 1347, and there were other similar witnesses to the economic solidarity of the area. These economic tendencies towards amalgamation were at last overcoming the division that had persisted since A.D. 843. Before the fourteenth century was out, they were realized in a political sense by the union of the principalities under the overlordship of the duke of Burgundy.

The Burgundian Lands

It was during the fourteenth century, while the political greatness of the towns was declining, while the various displacements of industry and trade were taking place, and while the great tradition of Flemish art was developing, that the various provinces of the Netherlands successively fell under the dominion of the house of Burgundy. The foundation of Burgundian rule in this area was laid by the succession of Philip the Bold of Burgundy to the counties of Artois and Flanders in 1384 through the right of his wife. In the years that followed, various semi-independent states of France and the German realm came, by marriage or by inheritance, by purchase or by force, into the possession of the Burgundian family (Fig. 36), and Philip the Good (1419–67) seems to have had the ambition of building up a middle kingdom. During the Hundred Years' War, Philip had at first been on the side of England, but in 1435 he was reconciled to France, and received, in return, release from his position as vassal. On the other hand, he also neglected to pay homage to the emperor for his German territories.

The provinces of the Netherlands formed the richest part of the Burgundian state, and both Philip and his successor Charles the Bold (1467–77), while forced to acknowledge the various rights of the different provinces, attempted to achieve as far as possible a centralization of authority and administration. Two steps were taken towards unification. The first was the summoning of representatives from all the provincial 'Estates' to meet as a States-General—twice by Philip and three times by Charles. The other was the reorganization of the ducal council into a Grand Council (1446), with supreme judicial and financial functions; this was divided by Charles into a council of state and a supreme court of law (1473). The general assemblies did not absorb the provincial governments. On the contrary, it was still with the provincial 'Estates' that any final decision



Fig. 36. The growth of the Burgundian state

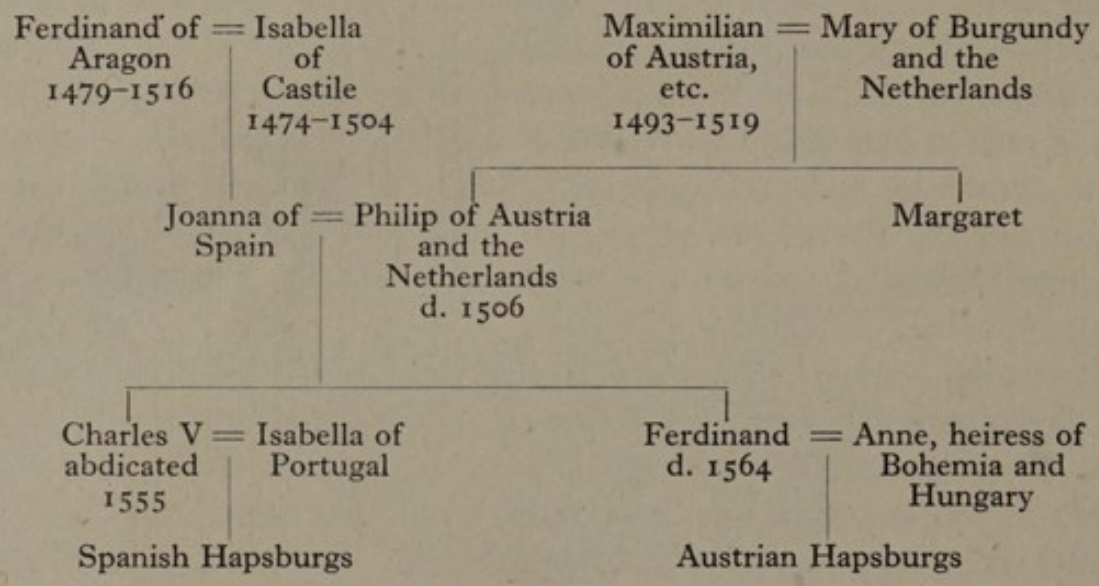
Based on (1) *The Cambridge Modern History Atlas*, map 6 (Cambridge, 1924); (2) W. R. Shepherd, *Historical Atlas*, p. 84 (London, 1930); (3) *Geschiedkundige Atlas van Nederland*, vol. 1, plate 45 ('s Gravenhage, 1913–32).

The dates of the main acquisitions up to the death of Charles the Bold in 1477 are indicated. Apart from these direct acquisitions, the prince-bishoprics of Liége, Utrecht and Cambrai were under the 'protection' of Charles. Note that the Burgundian lands did not include the northern provinces of modern Holland; these were acquired later by Charles V (Fig. 37). It is interesting to compare this attempt to form a 'middle kingdom' with the partition of A.D. 843 (Fig. 33). The county of Burgundy was also known as 'Franche-Comté'; in the south-western portion of the duchy of Burgundy lay the county of Charolais (see p. 93).

rested. Without their assent, the deputies of the States-General could do nothing. Here was the spectacle of modern unification above, and medieval diversity below. But the central institutions, extending their action throughout the Netherlands, were transforming the provinces into a collective state. It was the Burgundian state, set between France and Germany, that laid the foundations upon which the kingdoms of Belgium and Holland were to arise. The Burgundian dukes were in effect the makers of Belgium.

The untimely death of Charles the Bold in 1477 left his young daughter and heiress, Mary, faced with many difficulties. At home, the States-General met at Ghent and promised support only in return for a charter, the *Groote Privilegie* which restricted the power of the ruler and which confirmed each province in its privileges. A Grand Council, consisting of representatives of all the provinces, was instituted to assist in the work of government. It was an indication of the fact that the Burgundian Netherlands had already acquired some sense of unity. The separate states of the thirteenth century were on the way to becoming a corporate entity.

THE HAPSBURG DYNASTY



Abroad, Mary of Burgundy faced other difficulties. The sudden death of her father in 1477 threatened the loosely knit Burgundian dominions with dissolution, and, indeed, they fell into three portions —some became independent, some became French, some became Austrian. In the first place, the ecclesiastical territories of Liége and Utrecht recovered their independence, and so did Gelderland, while Lorraine went back to its duke. In the second place, France obtained

Picardy and the duchy of Burgundy itself. The French also claimed Flanders, Artois, Charolais and Franche-Comté, but resigned their rights at the Treaty of Senlis in 1493; and this renunciation was repeated in later treaties—those of Madrid (1526) and Cambrai (1529). It was not until the time of Louis XIV that Artois and Franche-Comté became French territory (see p. 105). In the third place, the rest of the Burgundian lands passed in 1477 to the House of Austria, for Mary of Burgundy, a few months after her father's death, married Maximilian of Austria, son and heir of the Emperor Frederick III.

Mary died in 1482, leaving two children—Philip and Margaret. But the death of Mary did not mean that the Netherlands became an Austrian dominion, for Maximilian only became regent, with very limited powers, during the minority of his son. Philip himself succeeded to the Netherlands in 1494, and, two years later, he married Joanna, the heiress to Spain. He died in 1506, leaving his young son Charles heir to the Burgundian Netherlands. It was this Charles who inherited Spain in 1516 and Austria in 1519, so that the fate of the Netherlands became linked up with the wider issues of the Hapsburg Empire.*

The Seventeen Provinces, 1506–55

The reign of Charles V (1506–55) was of critical importance in the political evolution of the Netherlands. To his existing Burgundian territories he added various fiefs of the German empire, thus becoming ruler of almost the whole of the Netherlands (Fig. 37)—Tournai in 1521, Friesland in 1524, Utrecht in 1527, Overysel in 1528, Groningen in 1536, and Gelderland, Zutphen and Cambrai in 1543. He held the area under seventeen different titles—duke of Brabant, of Gelderland, of Limburg and of Luxembourg; count of Artois, of Flanders, of Hainaut, of Holland, of Namur, of Zealand and of Zutphen; marquis of Antwerp; lord of Friesland, of Groningen with its dependent districts, of Mechlin, of Overysel and of Utrecht. The seventeen states had each a separate constitution, and differed considerably in social and political character, but they were united to form a single autonomous unit over which Charles placed a regent. Moreover, he declared them to be a single and indivisible inheritance. Only the lands of the bishopric of Liége and the Abbot

* The Austrian lands were handed over to his brother Ferdinand in 1521, but Charles himself retained the imperial title in Germany.



Fig. 37. The Netherlands under Charles V, 1506–55

Based on (1) W. R. Shepherd, *Historical Atlas*, p. 117 (London, 1930); (2) *Geschiedkundige Atlas van Nederland*. vol. 1, plate 49 ('s Gravenhage, 1913–32).
It is difficult to be certain about many details of the boundaries, partly because they were changing continually and partly because the status of some territories was ambiguous and can be given different interpretations. Hence it is not surprising that different authorities give different outlines of, say, the bishopric of Liége. An example of some of these complexities is provided by Fig. 41.

of Stavelot broke their geographical unity, and Charles drew even these more and more under his influence.

Charles was really placed in a double relation towards these provinces of the Netherlands. As successor of Charles the Bold of Burgundy, he was the immediate ruler of the territories. But most of them were vassal states (however nominally) of the Holy Roman Empire, and Charles, as successor to the Emperor Maximilian, was also their overlord. Maximilian, in dividing his empire into 'circles' for administrative purposes, had placed the Netherlands in the Burgundian circle (1512).* When Charles, however, tried to exercise his authority *as emperor*, and attempted to obtain a contribution towards imperial expenses, the various provinces of the Netherlands refused to send any contributions or to furnish any contingents of men. After much controversy, the provinces were, in 1548, declared to be 'free and independent of the Emperor and the Empire'. It was another stage in the evolution of the countries of Holland and Belgium.

The economic development that accompanied this political evolution was dominated by the amazing prosperity of Antwerp. As opposed to Bruges (see p. 88), Antwerp was characterized by freedom of trade and by individual initative; here was no narrow commercial oligarchy hampered by medieval restriction. Nursed by the dukes of Burgundy, it was to grow into a city of some 200,000 people. To this deep and accessible harbour came the new merchant fleets of the sixteenth century; the new bourse of the city, opened in 1531, had inscribed over its entrance the words, 'For the use of the merchants of all nations and tongues'. As well as being the chief centre of trade, Antwerp became also the chief money-market of the time, and was the headquarters of the most powerful German and Italian banks. Englishmen, Danes, and Hansards came here in great numbers. Portugal established a royal agency here to handle the spice trade, and, when Spain began to ship cargoes from the New World, Antwerp, as the commercial centre of the Hapsburg Empire, reaped its reward. Apart from these wide connexions, Antwerp had also a rich immediate hinterland. The new textiles, linen and tapestry, made up for the decline of the cloth industry (see p. 87); while, in the basin of the Meuse, the coal and metal industries were prospering. At the abdication of Charles V in 1555, Antwerp was at the highest point of its prosperity.

* The bishopric of Liége, alone, as an episcopal principality, retained its direct connexion with the Empire and was included in the 'circle' of Westphalia.

The Revolt of the Netherlands, 1555–1609

Political and religious discontent

Charles V, weary of the government of so many realms, abdicated in 1555. The imperial title in Germany went to his brother Ferdinand; while Spain and the Netherlands formed the inheritance of his son Philip, and, after the accession of Philip, the name 'Spanish Netherlands' came into common use. Really, however, the provinces were ruled by Philip not as king of Spain but as the heir of Mary of Burgundy. The new king, in the presence of the deputies of the seventeen provinces, swore to maintain the ancient rights and privileges of each province. But Philip, brought up in Spain, did not even understand the languages of his subjects in the Netherlands, and from the first they regarded him with suspicion. He himself never felt at home among them, and in 1559 he left for Spain never to return again; a regent was appointed to govern the provinces.

Even before his departure, discontent had begun to accumulate; it arose partly from political and partly from religious causes. There were complaints that taxation was raised arbitrarily, that the offices of state were filled with foreigners, and that large numbers of Spanish soldiers were being maintained in the country. There was also discontent about the reorganization of the bishoprics in the Netherlands, and many believed its object was to effect more stringent measures for the stamping out of heresy. The doctrines of the Reformation had spread over the whole Netherlands before the accession of Philip in 1555. As early as 1518, Lutheranism had appeared at Antwerp, and an Inquisition had been set up on the Spanish model by Charles in 1522. The teachings of the Anabaptists had spread from Münster into Holland and Gelderland by 1530; more important than these, was the advent of Calvinism round about 1543, and Antwerp became a rallying point for Calvinist congregations. The Inquisition aroused indignation everywhere. Disorders broke out, and armed conflicts were feared. Calvinism soon became the dominant dissenting religion. In the summer of 1566, the Calvinists, swollen by the unemployed of the industrial districts, were roused to a pitch of excitement that culminated in an outburst of image-breaking. The iconoclasts entered churches and religious houses, wrecking altars and destroying images and pictures. The unrest was felt over a wide area—in Antwerp, Ghent, Oudenarde, Tournai and Ypres, and it spread to the north, into Zealand, Holland and Friesland. As yet, there was nothing

'which would seem to announce in any way the sharp separation into a northern Protestant and a southern Catholic block which was to result from the fast approaching crisis'.*

To deal with this growing unrest, the Duke of Alva, one of the great Spanish generals, was sent in 1567 with a well-equipped army. Alva established a council (called by its enemies the 'Council of Blood') to deal with all cases of treason against Spain. It kept its executioners ceaselessly at work, and spread a reign of terror throughout the whole of the Netherlands; large numbers of refugees fled to England. For a time, all effective opposition seemed to have been crushed. But then, Alva, in order to maintain his army, was forced to resort to such heavy taxation that everywhere the result was uncompromising resistance.

William of Orange

One of the anti-Spanish leaders was William, count of Nassau and prince of Orange. William had been made stadtholder (or governor) of Holland, Zealand and Utrecht by Philip himself, but their relations soon developed into distrust and antagonism, and the Spanish policy stirred William into resistance. He was at first a Catholic, but passed through Lutheranism to Calvinism, which he professed after 1573. Finding constitutional opposition fruitless, he left the country in 1567; and, from outside, living in Germany or France, he organized resistance. The towns of the south were at the mercy of the Spanish soldiery, but Holland and Zealand, protected by the sea and by their rivers, were able to maintain an active hostility to Spain. Ships were encouraged to prey upon Spanish commerce in the Narrow Seas, and, in 1572, the sailors of the north ('Sea-Beggars' as they were called) succeeded in taking the important ports of Brill and Flushing by surprise. Other gains followed, and these striking successes produced a wave of revolt throughout the northern provinces of Holland, Zealand, Utrecht and Friesland. The war that followed was largely one of sieges, for it was only behind walls, protected by floods, that the Dutch could struggle with any chance of success. The siege of Haarlem, of Alkmaar (1572–3) and of Leiden (1574), not only gave the insurgent provinces a chance to organize themselves, but cost the Spaniards many men and much effort. Alva had been recalled in 1573, but after some futile negotiation, the war continued. By 1576, the Spanish troops, to whom long arrears of pay were due, were in a state of mutiny; the excesses of the soldiery at Antwerp, in which

* P. Geyl, *The Revolt of the Netherlands*, 1555–1609, p. 64 (London, 1932).

7,000 people lost their lives, were remembered as the 'Spanish Fury'. William was now able to enter into negotiations with the States-General at Brussels for a union of all the provinces upon the basis of religious freedom and the exclusion of foreigners. On 19 October, a congress met at Ghent to consider what measures should be taken to restore order. The result was the 'Pacification of Ghent'. This guaranteed liberty of conscience, but left the religious question to be settled by the States-General, provided that Holland and Zealand, although containing many Catholics, should remain Calvinist. It also stipulated that foreign soldiers should be expelled, but that the Spanish king should be recognized as sovereign.

This agreement was destined to be but short-lived. To many Catholics the domination of the heretics was appearing less tolerable than the evils of Spanish rule; and the moderate thinkers on both sides were overwhelmed by the extremists. Many towns experienced a new regime of persecution—this time at the hands of the Calvinists. Not even the diplomacy of William of Orange could smooth out these differences. Nor was the Spanish party slow to take advantage of the situation. In 1578, Alexander of Parma was appointed by Philip of Spain to the office of Governor-General; and in him, William was to find an adversary equal in ability to himself.

Parma set to work at once to win over the Catholic nobles of the south to the Spanish cause. In 1579, the League of Arras was formed by the representatives of Artois, Hainaut and Walloon Flanders which aimed, amongst other things, at the defence of the Catholic religion. The northern provinces responded with the Union of Utrecht which came to include Holland, Zealand, Utrecht, Gelderland (with Zutphen), Friesland, Groningen and Overysel. In 1581, the northern states disowned the sovereignty of Spain. From this time onward, except for the brief interlude of 1815–30, the northern provinces constituted a unit distinct from that of the royal provinces to the south. The wider union, which at the Pacification of Ghent, had seemed a possibility, was doomed to failure.

The Final Separation, 1579–1609

The states of Brabant and Flanders, outside both the Catholic and the Protestant leagues, were still under the control of William of Orange; and, through his influence, they accepted in 1582 the duke of Anjou as their sovereign—for a time he became duke of Brabant and count of Flanders, but he soon withdrew. Even before the assassination of William in 1584, Parma, by diplomacy and by force,

had done much towards restoring the authority of Spain throughout the two provinces. Antwerp was defended obstinately by its Calvinistic burgomaster, but, after a long siege it fell on 16 August 1585. By this time, all the southern provinces had been restored to the

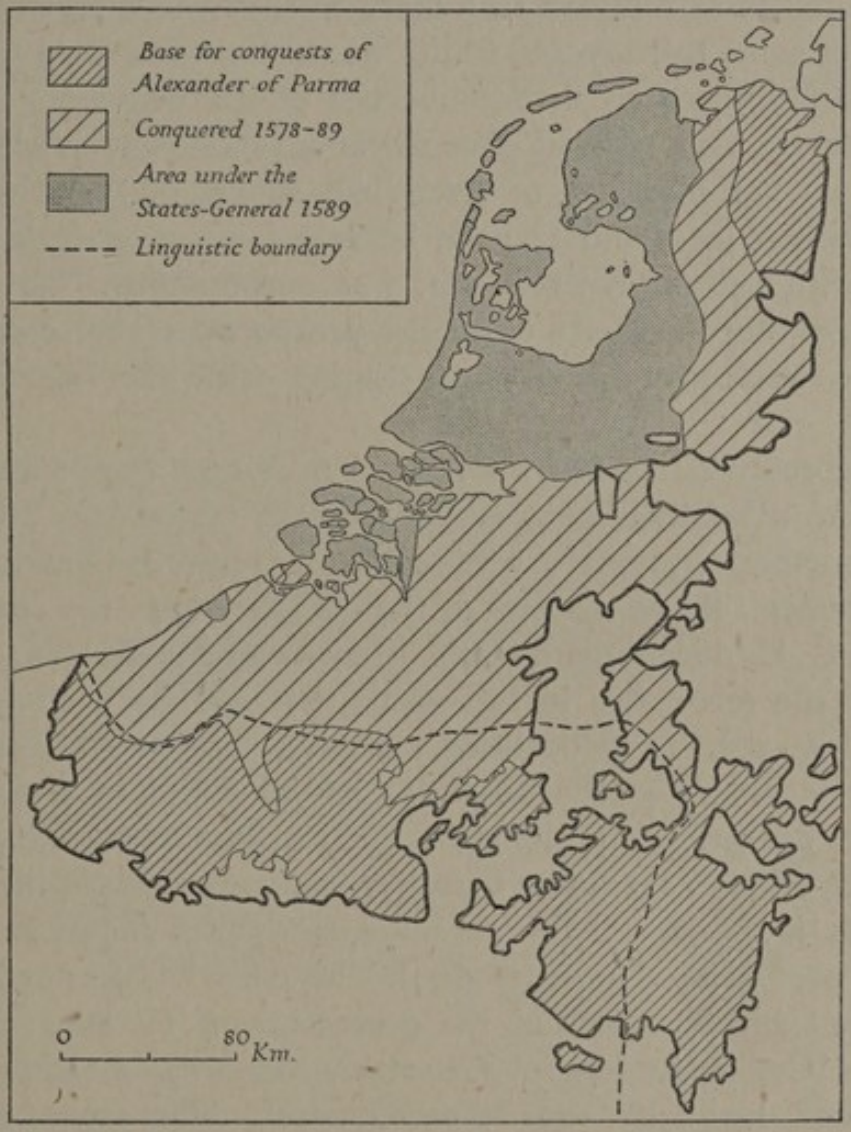


Fig. 38. The conquests of Alexander of Parma, 1574–89

Based on (1) P. Geyl, *The Revolt of the Netherlands*, 1555–1600, p. 180 (London, 1932); (2) *The Cambridge Modern History Atlas*, map 22 (Cambridge, 1924).
The linguistic frontier is generalized. For the exact present-day position, see Fig. 30. Note how the territory of the Dutch, apart from the islands, lay mainly to the north of the strategic frontier formed by the great rivers of the Meuse, the Waal and the Rhine. Cambrai, in the south, is left white because it was in French hands 1580–94.

Spanish allegiance. The Spanish successes were not confined to the southern provinces. From their base in the south and from the disaffected province of Groningen in the north, Parma and his lieutenants were able to extend their conquests almost up to the limits of the natural defences of the northern provinces (Fig. 38). Large

numbers of the southern Protestants left the country to make their homes in the north or in England; others acquiesced and were converted back to Catholicism.

This Spanish success did not mean, however, that the southern Netherlands were reduced to a mere Spanish dependency. After a struggle of some thirty years, Philip was at last compelled to acknowledge his failure to crush the liberties of the provinces. In 1598, shortly before his death, he gave the area as a dowry to his daughter Isabella on her marriage to Archduke Albert of Austria. By this arrangement Albert and Isabella became joint sovereigns of a state which, with certain reservations, was autonomous. One of these reservations bore severely upon the prosperity of the country—the provinces were prohibited from trading with the East and West Indies.

The representatives of all seventeen provinces were summoned to Brussels to meet their new rulers, officially styled 'the archdukes'; but the northern provinces were still firmly resolved to maintain their independence. Being masters of the sea, they kept the coast closely blockaded. Under William's son, Maurice of Nassau, they regained much of the territories in the north that had been conquered by Parma (Fig. 39). They declined tentative proposals for peace, and demanded complete recognition as an independent power. After indecisive operations and long discussions, Spain and the archdukes were compelled to agree to a truce for twelve years with the northern provinces 'in the capacity of free states over which Albert and Isabella made no pretensions' (9 April 1609). This truce left the northern parts of Brabant and Flanders in the possession of Holland; they were known as 'Generality Lands' (*Generaliteitslanden*), and were governed as common lands by the States-General. The truce, moreover, brought no opening of the Scheldt to any but Dutch shipping; Antwerp thus remained in decline to the great benefit of the Dutch ports.

The separate histories of Holland and Belgium may be said to have begun in 1609. The former was to attain a remarkable degree of prosperity; the latter, drawn into the decadence of Spain, and then attached to Austria, was to continue for long in obscurity under its foreign governors, and to serve as a battleground for the armies of Europe even after it had attained independence.

Two points must be noted about this division of 1609. In the first place, there was no circumstance about the separation that suggests racial or linguistic cleavage. The Flemings made no attempt to

separate from the Walloons. The linguistic frontier never became a political frontier. On the contrary, many southern provinces presented a bilingual character—as they had always done. Flanders, Brabant, Luxembourg and Liége—all included within their frontier both Flemish- and Walloon-speaking peoples.

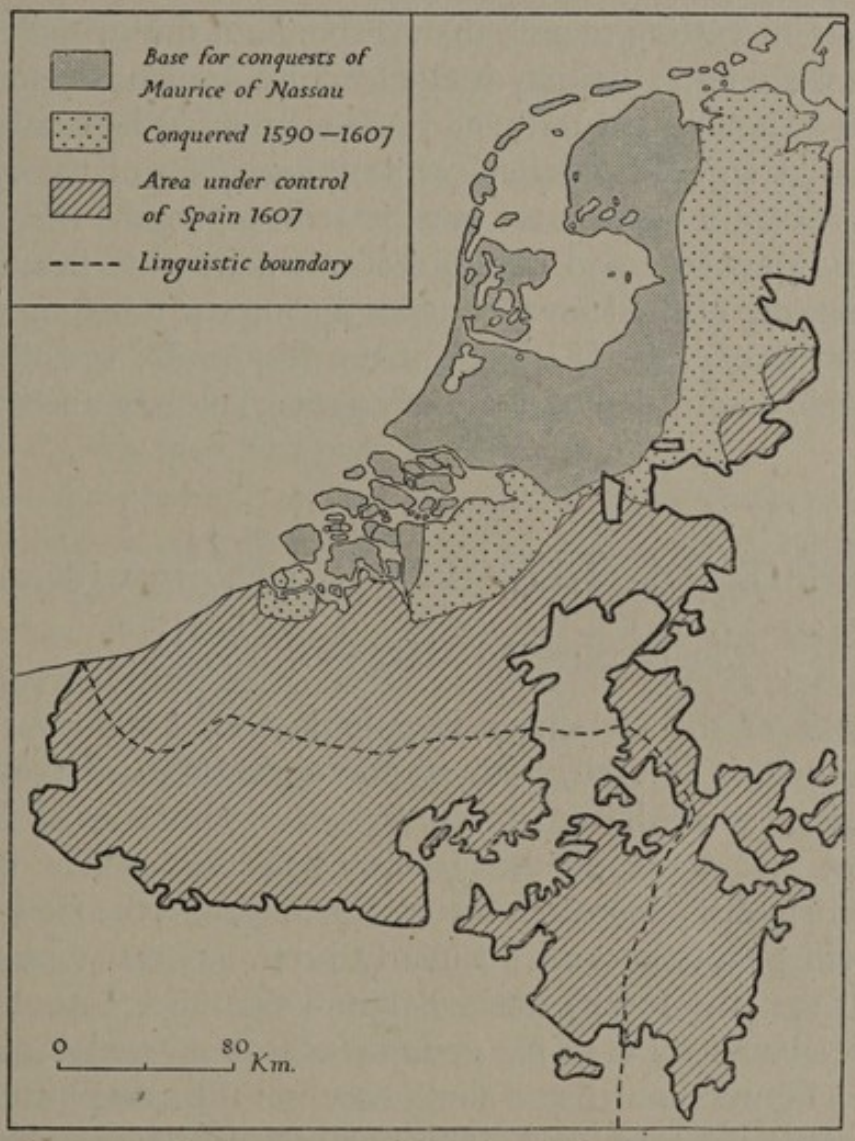


Fig. 39. The conquests of Maurice of Nassau, 1590–1607

Based on (1) P. Geyl, *The Revolt of the Netherlands*, 1555–1600, p. 221 (London, 1932); (2) *The Cambridge Modern History Atlas*, map 22 (Cambridge, 1924). See underline to Fig. 38.

In the second place, the separation corresponded to no clear-cut religious dividing line. There were Protestants in the southern provinces, and Catholics in the north. In many of the northern provinces there was a feeling of wavering and hesitation, especially in the east. The northern Catholics were afraid of Calvinist policy, and in 1580, the province of Groningen deserted to the Spanish cause (Fig. 38).

Indeed, the division between north and south at this time corresponded not so much to the religious temper of the people as to the balance of forces between Parma and William of Orange. The determining factor affecting this balance was geographical and strategic, for the great strength of the northern rebels lay in their waters and rivers.

It is also interesting to note that, throughout the struggle, Flemish painting went on, although influenced by Italian schools. Many Flemish painters visited Italy; and Antwerp, it has been said, became the centre of an Italian school of painting. One of the few representatives of truly Flemish art was Pieter Brueghel the Elder (? 1525–69), whose drawings and paintings form admirable illustrations of the popular life of the Low Countries during the religious wars. His interpretation of 'The Massacre of the Innocents' is nothing other than a tragic description of a raid of Spanish soldiery upon a Flemish village.

THE SOUTHERN PROVINCES, 1609–1831

The Spanish Netherlands, 1609–1715

The regime of the archdukes was marked by a vigorous Catholic renascence. The Church, with all the enthusiasm of the Counter-Reformation, exerted itself to strengthen its hold on the southern provinces; the work of the Jesuits was particularly important. Protestantism disappeared almost completely, and the Catholicism of the Belgian people became peculiarly profound and rooted. It has been said that the Jesuits made Belgium the most Catholic country in Europe. Professor Geyl has gone so far as to say that the divergence in religion between north and south was 'not the cause but the result' of the political separation.* The northern provinces were cut off from the influence of the Counter-Reformation, and, there, the victorious Calvinists put great pressure upon the Catholic population. As the south became more Catholic, the north became more Protestant.

The long war of the revolt had left the southern provinces in a state of acute economic depression and distress. All commerce and industry was at a standstill, and it was said that grass grew in the streets of Bruges and Ghent; the trade of Antwerp was lost to Amsterdam. But, despite the decay of Antwerp, and the emigration of artisans,

* P. Geyl, *The Netherlands Divided*, 1609–1648, p. 17 (London, 1936).

the country, after 1609, made some economic progress in directions other than that of foreign trade; canals were constructed; land was drained; the metal industries flourished; rural textile industries recovered; the manufacture of linen and of lace gave employment to thousands; while at Antwerp a silk industry was making progress. Brussels began to develop remarkably; glass, cloth, leather, china, soap and salt were among the products now produced there. But all this activity was circumscribed by the closing of the Scheldt, by the Thirty Years' War which ruined the German market, and by high protective tariffs in France. Labour was therefore attracted more and more to agriculture and it was in the seventeenth century that the intensive cultivation of Flanders began. On the cultural side, the names of Rubens (1577–1640) and van Dyck (1599–1641) bear witness to the continued glory of Flemish art during this period. It is significant of the age that Rubens was chosen by the Jesuits to decorate the great church they had built in Antwerp.

Despite the presence of Spanish soldiers, the southern provinces were left with a considerable degree of autonomy. The regime has been described as absolutism tempered by autonomy. When Albert died in 1621, the year which marked the end of the Twelve Years' Truce, Isabella was confirmed by Spain in her office of regent. Unfortunately they were childless, and the agreement of 1598 had provided that, should the archdukes have no children, the provinces were to revert to the crown of Spain. Accordingly, on the death of Isabel in 1633, a governor-general was appointed and the country passed more directly under the control of Spain.

The success of Spanish conciliation in the southern provinces was not reflected in the relations of Spain with the northern United Provinces—now greatly increasing in prosperity on the sea. War had broken out again in 1621, and desultory fighting continued for well over 20 years. At length, Philip IV of Spain, with Portugal and Catalonia in revolt, and menaced by the growing power of France, was compelled to seek peace. At the Peace of Westphalia in 1648, and in a subsequent treaty of 1661, the United Provinces were not only finally recognized as independent, but they were confirmed in the possession of various territories conquered during the struggle (Fig. 40); all these were added to the 'Generality Lands' of 1609. What is more, the closing of the Scheldt was confirmed. This latter clause registered the complete success of Holland. The southern provinces, deprived of their only great port, were thus prevented from reviving their ancient commercial and industrial prosperity; the

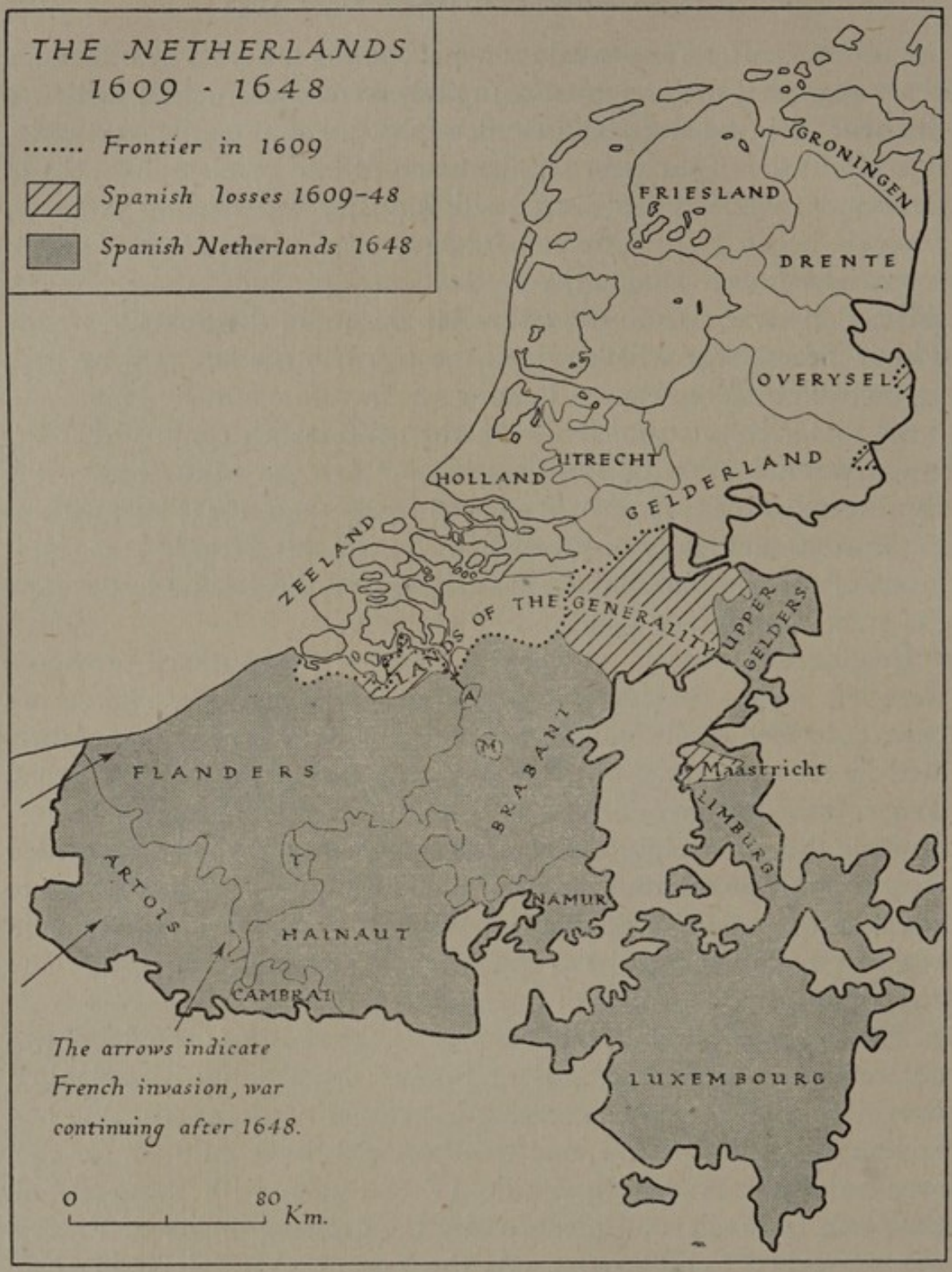


Fig. 40. The Netherlands in 1609–48

Based on (1) P. Geyl, *The Netherlands Divided*, 1609–1648, p. 154 (London, 1936); (2) *The Cambridge Modern History Atlas*, map 22 (Cambridge, 1924).
The province of Drente, although it took part in the revolt, was, because of its poverty and sparse population, not admitted into the union as a separate province. Though unrepresented in the States-General, it retained some measure of local independence. Its claim to admission in 1651 was not admitted, and it was not until 1796, under the French occupation, that it obtained the privilege of being reckoned as an eighth province with representation in the States-General of the Batavian Republic.

quays and canals of Antwerp served only to evoke the memory of lost glory, and the port remained cut off from free access to the sea until the end of the eighteenth century.

Following upon this economic set-back came political disaster. During the long reign of Louis XIV in France (1643–1715), the unfortunate Spanish Netherlands became the battlefield of Europe. The numerous wars between France on the one hand, and England, Holland and Spain on the other, meant that the Belgian provinces, set between these powers, constantly suffered from the ravages of hostile armies. The wars which terminated with the treaties of the Pyrenees (1659), of Aix-la-Chapelle (1668), of Nimwegen (1678) and of Ryswick (1697), resulted in the loss of a considerable strip of territory to the French (Fig. 41). The climax came in the great duel of the War of the Spanish Succession (1701–14). The old enemies, France and Spain, were now reconciled. The Spanish king, Charles II, had bequeathed the whole of his possessions to the grandson of Louis XIV, and the acceptance of this heritage was quickly followed by a Grand Alliance, organized by Holland and England, to prevent so great an increase of French influence in Europe. The Dutch were fearful partly for their independence and partly lest the Scheldt should be opened. Britain, eager to preserve the balance of power in Europe, was intent on preventing the nearby Belgian provinces from being ruled by a French prince. The victorious campaigns of Marlborough and Prince Eugene enabled the Grand Alliance to impose its terms upon France and Spain. By the treaties of Utrecht (1713) and of Rastadt (1715), the Spanish Netherlands were handed over to the Austrian Emperor for safe-keeping. Moreover, the Dutch right to close the Scheldt was confirmed. Indeed, such was the dread of France that Holland retained the privilege, granted to her by the Treaty of Ryswick (1697), of maintaining garrisons in a chain of 'barrier' fortresses along the French border. By this means both England and Holland hoped to provide a safeguard against any future French aggression.

The Austrian Netherlands, 1715–92

The Spanish Netherlands now became known, until 1795, as 'the Austrian Netherlands', and they were ruled over as a personal possession by Charles VI of Austria. For a few years (1744–8) the provinces were overrun by the French during the War of the Austrian Succession, but the Treaty of Aix-la-Chapelle restored them to

Austria in 1748. Apart from this interruption, and despite the ban upon the Scheldt, the country made solid economic progress during the century. The drainage works started by the archdukes (see p. 103)

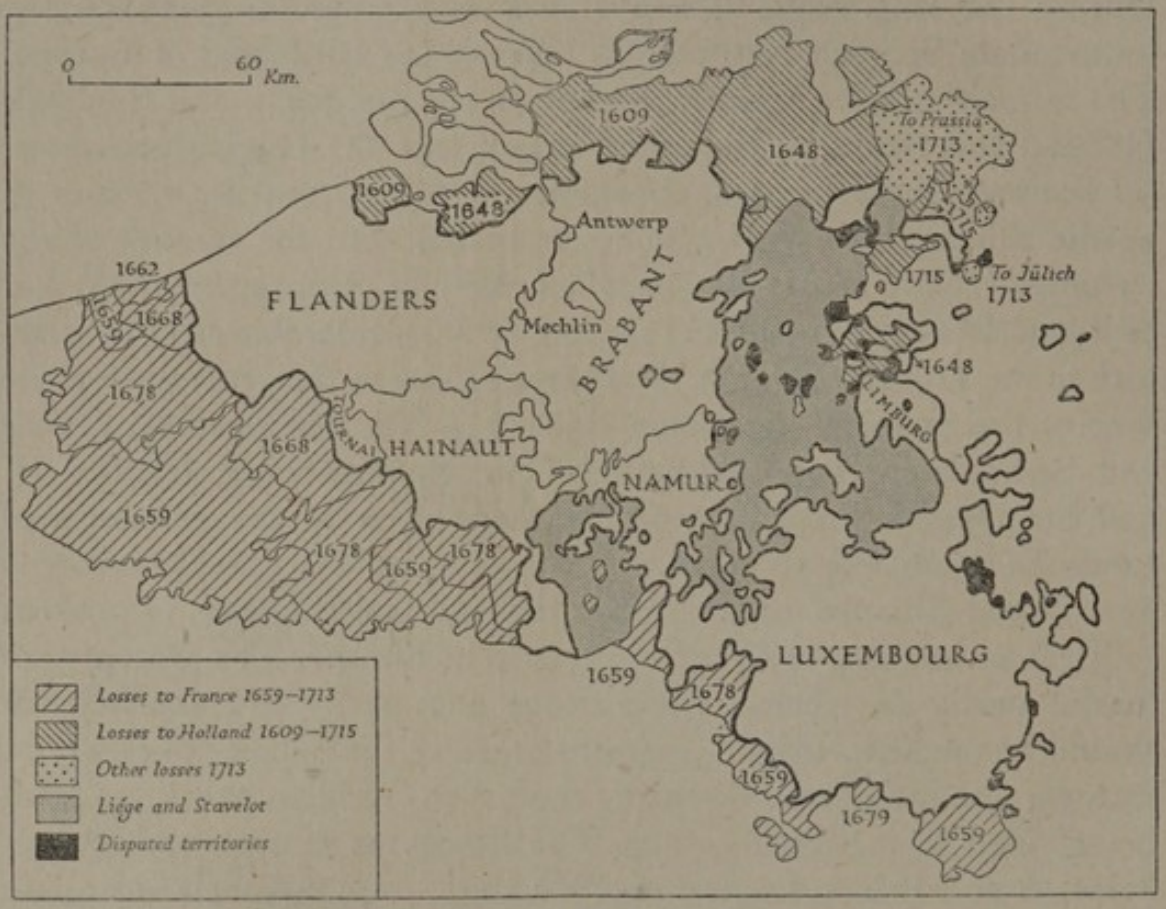


Fig. 41. The Spanish Netherlands, 1659–1715

Based on L. Van der Essen, *Atlas de Géographie historique de la Belgique*, map viii (Bruxelles et Paris, 1927). This authoritative source shows the boundaries in much more detail than is customary in general historical atlases.

The main feature of the map is the loss of territory to France. It is difficult to plot all the changes at successive treaties because many outlying towns were held for only short periods of years up to 1713. The map shows, however, the permanent loss of territory.

Apart from the loss of territory to Holland in 1609 and 1648, there were also other changes along the northern and eastern frontiers, for the peace of 1648 had left many disputed territories. Thus, Upper Gelderland went to Prussia in 1713; Venloo and some districts to the south went to Holland in 1715. The limits of the Dutch strip along the southern bank of the lower Scheldt also fluctuated in detail. The disputed territories show the complexity of the eastern frontier.

were completed. The government encouraged small ownership at the expense of great estates, and promoted the breaking up of new ground; the cultivation of potatoes was spreading. Industry, strongly encouraged by protective measures, made a great recovery. The linen industry benefited by the invention of the flying-shuttle; lace-making

made further progress, especially in Brussels; the manufacture of silk at Antwerp continued to be important; attempts to revive Flemish weaving failed, but the cloth industry was greatly stimulated at Tournai, Ghent and Courtrai; Tournai also became the centre of a china industry, and glass factories were established in a number of other places; the carpet industry, too, was flourishing, for the making of carpets had replaced the making of tapestries. Coal-mining was increasing and the exploitation of the Charleroi area began; the employment of steam pumps, from 1730 onwards, greatly facilitated the extraction of coal from the deeper seams. The iron industry seems to have languished, but at Namur the working of copper was sufficient to make export possible. Finally, there was great activity in canal building and road making. To sum up: the activity of this century of peace formed a solid preparation for the intense industrialization that was to take place in Belgium during the nineteenth century.

Apart from this steady economic development, the period of Austrian rule was marked by two features—one was an effort to free the provinces from the Dutch grip upon the Scheldt and from the Dutch occupation of the barrier fortresses; the other was an attempt to interfere with the local rights of the provinces.

As the closing of the Scheldt had ruined Antwerp and crippled the whole country, Charles VI determined to make the utmost possible use of the inferior harbour of Ostend. In 1722, he granted a charter enabling the merchants of Brabant and Flanders to form the Ostend Chartered Company for trade with the East and West Indies. The step at once aroused strong opposition from Holland and Britain, and the company was suppressed in 1731, although these formal treaties did not entirely abolish the activities of its merchants (see p. 401). Later in the century, Charles VI's grandson, Joseph II, demanded the opening of the Scheldt, but the Dutch, though hard pressed at the time by war with England, refused to give way (1784). Two Belgian vessels that attempted the passage were seized, and the Scheldt remained closed. Joseph was, however, able to take advantage of the Anglo-Dutch war to compel the withdrawal of the Dutch garrisons from the barrier towns (see p. 105).

These efforts to free the Belgian provinces from Dutch control, though not completely successful, won the support of the Belgian people for their Austrian rulers. But it was far otherwise with the Austrian policy of internal reform. The attempts early in the century to treat the country as an Austrian dependency met with vigorous resistance, and the Austrian rulers found it politic to maintain the

old forms of administration and to respect the local privileges of the various provincial 'Estates'. Towards the end of the century, however, the Austrian government under Joseph II again tried to replace the local privileges by a uniform system of administration. The result was a most fierce opposition that broke out into rebellion. The insurgents, stirred by the taking of the Bastille by the people of Paris (July 1789), defeated the Austrian forces; and in January 1790, the provinces, following the lead of Brabant, declared their independence under the name of the 'United States of Belgium'. In the independent principality of Liége, too, there were revolutionary rumblings.

The death of Joseph II, a few weeks later, changed the situation. The offer of his brother, Leopold, to restore the ancient constitution was at first refused, but after a strong army had been sent, Austrian authority was restored in return for a confirmation of the privileges of provincial self-government. These provincial privileges, however, were not to last much longer, for two years later the revolutionary armies of France entered the country.

French Rule, 1792–1813

In 1792, the armies of revolutionary France attacked Austria at her weakest point by an invasion of Belgium and of the ecclesiastical principality of Liége. The battle of Jemappes (7 November) made the French masters of the south; they were driven out in 1793, but, in the following year, the battle of Fleurus (26 June) put an end to Austrian control.

On 1 October 1795, the whole of the Austrian Netherlands, and the episcopal territory of Liége, was incorporated by decree into the French Republic, although the loss was not formally acknowledged by Austria until the Treaty of Campo-Formio in 1797. In 1795, too, Dutch Flanders and the enclaves in the east were included with the Belgian territory. The provincial governments were abolished, and the country divided up into nine departments; some frontier readjustments of territory were also made (Fig. 42). For nearly twenty years the Belgian provinces remained an integral part of the French state, sharing in the fortunes of the Republic and the Empire. There was little liking for French rule. The introduction of conscription led to a revolt in 1797, but this was easily suppressed. The anti-clericalism of the early years of the new regime, too, was especially offensive. At first Antwerp enjoyed a few years of remarkable prosperity, but with the establishment of the continental blockade in 1806, the port

was converted into a powerful naval base and a great centre of naval dockyards, with but little benefit to the rest of the country.

Yet the French rule, although it was the tyranny of a foreign power, brought many benefits. French administration laid the foundations



Fig. 42. Belgium under French domination

Based on L. Van der Essen, *Atlas de Géographie historique de la Belgique*, map xi (Bruxelles et Paris, 1929).
The new departments created by the French are indicated. 'Jemmapes' is the French form of the modern 'Jemappes'. To the north, Holland was formed into the Batavian Republic in 1795, then into a dependent kingdom in 1806, and finally annexed directly to France in 1810.

of a new social and political order. It abolished the complicated rights and ancient constitutions of the various provinces, and this clearing and simplification prepared the way for a more unified state. The administrative machinery had been made uniform, and a criminal and civil code modelled upon the *Code Napoléon* had been introduced. What was true of Belgium was also true of Holland, but the union of the two countries in 1815 came about not through any internal desire but through outside pressure.

The Union of Belgium and Holland, 1813–31

The news of the defeat of Napoleon at the battle of Leipzig on 19 October 1813, had led to a general uprising of the Dutch, and the formation of a provisional government in Holland. Prince William of Orange accepted the offer of sovereignty and landed in December. William had the support of the British government who now, as in 1715 (see p. 105), wished to see a state at the mouth of the Rhine strong enough to be a barrier against French aggression. This need for a strong barrier was the predominant factor in the sequence of events that followed. In the meantime, the Belgians had asked that the southern provinces should be made an independent state under the rule of an Austrian archduke, but the allies were in agreement about the need for a strong state, and an Austrian general was placed at the head of a provisional government with instructions to prepare the Belgains for the coming union with the northern provinces, which was authorized by the Protocol to the Treaty of London, 21 June 1814.

The completion of these arrangements was interrupted by the news of Napoleon's return from Elba, and soon the Dutch and Belgian soldiers alike were defending the existence of the new state of the Netherlands on the fields of Quatre Bras (16 June). After the Hundred Days' campaign was over, the Congress of Vienna (1814–15) confirmed the agreements made by the preliminary treaties. The new kingdom was to include the ecclesiastical principality of Liége and the small duchy of Bouillon. There were also some adjustments along the frontiers (Fig. 43); thus, the German territories of the new king (of the House of Orange-Nassau) were given to Prussia, but, in exchange, William was to become, in a personal capacity, grand duke of Luxembourg; this grand duchy was to be a member of the Germanic Confederation. On 27 September 1815, he was crowned king of the Netherlands at Brussels. The new state was divided into a number of provinces. In the north, these corresponded to the old divisions of the Dutch republic; in the south, they very largely reproduced the departments as organized by the French. The governing body, still called the 'States-General', was divided into an Upper House nominated by the king, and a Lower House elected by the people. The new constitution guaranteed freedom of worship and of the press.

From the outset, the union of Belgium and Holland presented great difficulties despite the affinities of the Flemish and the Dutch. North and south were divided by two centuries and a half of widely

separate national life; the closing of the Scheldt and the Dutch control of the 'barrier towns' had left bitter memories in the south. Holland was a commercial country desiring free trade, while Belgium was agricultural and industrial and wished for protection. The situation, too, was complicated by financial difficulties. Holland's debt was some 2,000 million florins, that of Belgium was only 30 million, yet



Fig. 43. Belgium in 1815–30

Based on L. Van der Essen, *Atlas de Géographie historique de la Belgique*, map xii (Bruxelles et Paris, 1929).
The departments of the new kingdom are indicated. There were various changes along the southern frontier between the new kingdom and France, but the map shows the net result. The main territorial arrangements were the result of the treaties of 1814–15; but the clearing up on the eastern frontier was accomplished by various treaties up to 1819.

she was forced to bear one-half of the total liabilities. Above all, they were separated by quite different religious beliefs. The Belgians, Flemings and Walloons alike, had become intensely Catholic (see p. 62), and hostile to a king who was a Dutchman by birth and training and a Calvinist by religion. Moreover, despite the good intentions of the king, the idea was current that Holland was the predominant partner. Though the population of Belgium was nearly three and a half million and that of Holland only a little over two

million, the two countries had equal representation in the States-General. The seat of the government was established in Holland, despite an early agreement that the States-General should meet alternatively in a Dutch and Belgian city. The public offices were filled by northerners. In 1830, of the seven members of the government, only one was a Belgian; in the Home Department, out of 117 officials only eleven were Belgian; in the army, only 288 Belgians were officers out of 1,967. Moreover, in 1822, Dutch had been made the official language in the Flemish districts. This was particularly offensive to the Walloons and also was unpopular with very many Flemings themselves who had only an incomplete knowledge of the popular language.* Thus this measure alienated the Flemish *bourgeoisie* without conciliating the working classes.

On the other hand, it must be said that during the years of union with Holland, the Belgian provinces enjoyed a remarkable degree of prosperity. The extensive colonial and foreign trade of the Dutch furnished them with markets, and the opening of the Scheldt to Belgian ships raised Antwerp once more to a high degree of prosperity. The Dutch king paid great attention to the economic interests of all his realm, and manufacturers were further aided by new inventions and by the increasing use of machinery. The mineral wealth of the southern provinces was developed; the production of coal made surprising progress; the iron industry of Liége prospered greatly; the woollen manufactures at Verviers received a great stimulus. In Ghent and other places, cotton goods were produced which rivalled those of England and surpassed those of France. Progress was also made in the production of velvets and of cloth in Flanders; and the tapestry and porcelain industries at Tournai were expanding.

Nor was social and intellectual improvement neglected. New universities were founded at Ghent (1816) and Liége (1817); training colleges for teachers were instituted; numerous elementary and other schools were established. But these very measures, carried on as they were by a Protestant government, were received with suspicion by the Catholics. In particular, the establishment of a Philosophical College at Louvain (1825) at which every priest was required to spend two years gave great offence to the clerical party (see p. 115).

At length, in 1828, the two extreme parties, the Catholic ultramontanes and the revolutionary Liberals, united in their hatred of

* Yet later there was to be a Flemish-speaking movement which forced the Belgian government to adopt Flemish (i.e. Dutch) as well as French for official purposes, and which was in favour of establishing close cultural relations with the sister people to the north (see chap. VI).

the Dutch regime, formed an alliance for the overthrow of the government. Petitions were submitted setting out the Belgian grievances and demanding a separate administration. It was while these discussions were going on that the news of the success of the July revolution of 1830 at Paris reached Brussels, and the first riot took place on 25 August. From a performance of Auber's opera *La Muette*, whose theme is liberty, the excited audience rushed into the streets shouting 'Imitons les Parisiens'. The news of the riot at Brussels spread throughout the provinces, and similar scenes took place in most of the large towns. These popular riots grew into national revolt. There was street fighting in Brussels, and the principal towns clamoured for separation. A provisional government formed at Brussels declared Belgium to be independent, and summoned a national congress to establish a new system of government. The efforts of King William at negotiation broke down. At his request, representatives of the five great powers (Austria, Britain, France, Prussia and Russia) met at London in November, and both sides were induced to cease hostilities.

The result of the negotiations that followed was to establish an independent kingdom of Belgium.* Out of a number of possible rulers, Prince Leopold of Saxe-Coburg, the widower of Princess Charlotte of England, was found to be acceptable to the government at Brussels and to the great powers. He made his first public entry into Brussels on 21 June 1831. A subsequent treaty, drawn up by the London Conference, arranged the details of the separation. By this, the grand duchy of Luxembourg was to be divided, and the king of Holland was to receive a portion of the province of Limburg in exchange for that part of Luxembourg assigned to Belgium (Fig. 44). The Scheldt was to be opened to navigation, but Holland was to have the right to impose tolls at the mouth of the river. The national debt was divided. The powers recognized the independence of Belgium as a neutral state, hoping this to be an obstacle to French aggression.

The Dutch refused, however, to accept the new arrangements, despite a show of force by Britain and France. They still held two forts which enabled them to command the navigation of the Scheldt. Belgium, therefore, kept the whole of Limburg and Luxembourg, and these provinces sent representatives to Brussels. A final settlement

* The name Belgium (Fr. *Belgique*; Flem. *België*) goes back to the 'Belgae' and the 'Gallia Belgica' of Roman times; and throughout the Middle Ages the adjective 'Belgica' was used to describe the southern Netherlands and its people. The leaders of the revolution of 1790 proposed the name 'Belgique' for their country; and this name, again suggested in 1814, was adopted in 1830.

was not achieved until 1838–9 when Holland accepted the treaty of 1831. Belgium then very reluctantly gave up eastern Luxembourg and north-eastern Limburg. The navigation of the Scheldt was also



Fig. 44. Belgium in 1831–9

Based on L. Van der Essen, *Atlas de Géographie historique de la Belgique*, map xiii (Bruxelles et Paris, 1929).
At this time the official names of all provinces were in French; for their present forms, see p. 623.

opened, subject to a toll, and it was not until 1863, and only after long negotiation, that Belgium was able to buy out this right. Finally, the treaty of 1839 confirmed the neutrality of the new state.

THE KINGDOM OF BELGIUM, 1831–1940

The independent state of Belgium, as constituted in 1831, had two main characteristics. Its Constitution was the most liberal in Europe, and its position of guaranteed neutrality was unique. The history of Belgium from its recognition as a separate state to the present day revolves round these two poles—the working out of its internal development within the terms of the Constitution, and the reactions

upon its foreign policy of the neutral position which the five great powers, Great Britain, France, Prussia, Austria and Russia had guaranteed.

Internal History

The Constitution

The throne which Leopold of Saxe-Coburg accepted as Leopold I in 1831 had been constituted as a parliamentary monarchy by the union of Catholics and Liberals in the National Congress. It was regarded by Metternich and the other conservative powers as 'revolutionary' in character. Certainly it laid down for all Belgians the right to freedom of association, of religion, of the press; declared the equality of all before the law; and explicitly announced that 'all Powers emanated from the nation'. It provided for a two-chamber government—a Senate and House of Representatives—both elective, though on different principles, and adopted in express terms what had become the English practice of constitutional government—that the ministers of the Crown were responsible to the Chambers for all executive acts, including those of the monarch himself. Yet, though fully responsible parliamentary government was established, the electorate was narrowly restricted and consisted at first of only some 55,000 citizens out of a population of 3,500,000. It was most unlikely that a parliament representative solely of the upper-middle and upper classes would adopt any kind of 'revolutionary' legislation. Even when, in 1848, the tax payment necessary to qualify for a vote was reduced to the lowest limit permissible by the constitution, the electorate still numbered less than 100,000; and it was not until the great extension of the suffrage in 1894 that Belgium became a democracy.

The Catholic and Liberal parties which, as has been said, combined in the so-called Union to create the Belgian state were profoundly divided in principle on one main question—the relation of religion and religious education to the state (see p. 66). This was of such primary political importance that it is necessary to emphasize the points at issue. In 1830 the Catholics had revolted, in union with the Liberals, against a Protestant king who had sought to impose, by state action, a secular education even on candidates for orders. In reaction against this policy of a Protestant regime they accepted the principle of a 'Free Church in a Free State' and helped to embody it in the constitution. But they intended to use their new freedom to exercise control by means of the clergy over the whole educational

system, for they regarded education as a matter for the Church and not for the state. The Liberals, on the other hand, whilst mostly Catholics themselves, were 'bad Catholics' to the extent of holding that, religion being a matter of individual conscience, the state was charged with the duty of seeing that its citizens were adequately educated in the arts and sciences. Religious instruction might be left to the voluntary efforts of the clergy, but in each individual case should correspond to the wishes of the parents of each child. The struggle between these two conceptions was rendered the more acute by the hardening of papal dogma during the century, especially after 1848, and was also cut across by the language controversy (see p. 137).

From 1830 to 1846 the union of the Catholic and Liberal parties was maintained in a series of mixed governments, and its continuance was backed by the influence of the king who greatly preferred 'national' to 'party' government. But the differences between the points of view represented by the parties grew rather than diminished with the passage of time and necessarily reduced the work of legislation either to a series of compromises or, at times, to sterility. Because of these differences no law on primary education was passed until 1842, and then the compromise arrived at, whilst formally vindicating the state's right to insist on a primary school in every commune, left the Catholics free to have their own schools 'adopted' by the communes as fulfilling this obligation (see p. 66). It is true that Charles Rogier, one of the most influential of the Liberal leaders, was able to lead the government to take the bold initiative, for that period, of constructing a network of state-owned railway with Mechlin as its centre. But, after 1842, the virtue had gone out of 'unionism' and during the Government of Nothomb (1841–5), both Catholics and Liberals became increasingly opposed to the continuance of the system of compromise which it involved. And at the same time an acute economic crisis demanded a strong and united government to deal with it.

Capitalism and Labour problems

The transition to capitalism was rapid and painful. The textile industries were transformed by the introduction of machinery in the thirties and forties and many handworkers were thrown out of work. At the same time workers were forbidden to form industrial unions and the cost of living was raised by tariffs for the protection of agriculture imposed in 1834, 1842 and 1844. When this last law was

followed by a series of bad harvests, and by a rising tide of unemployment due to the inability of the manufacturers to find an outlet for their goods, the government was forced to take the condition of the people into serious consideration and to attempt to find remedies for the prevalent distress. A Commission of Enquiry into working-class conditions made its report in three volumes published between 1846 and 1848 which, despite the incompleteness of the evidence taken, revealed that Karl Marx's description of Belgium as 'a paradise for capitalists and a hell for the workers' had a considerable basis in fact. A working day of fifteen hours for adults and children alike, a diet of black bread, coffee made with chicory, potatoes and an occasional piece of meat on Sundays; housing conditions which neglected the first elements of sanitation and decency—such was the picture shown by the Commission's report.

Yet the Belgian proletariat, despite its sufferings, was not inclined to revolution. In 1847 a parliamentary 'revolution' took place when, after a congress of the Liberal party, the party won the elections on a programme of electoral reform, civil control of education and a vague declaration to introduce 'those improvements which the condition of the labouring classes and the poor imperatively demand'. Leopold accepted the verdict of the elections and entrusted the government in 1847 to a wholly Liberal ministry led by Charles Rogier and Frère-Orban. The Liberals at once reduced the suffrage to the minimum tax qualification permitted by the constitution and, although this only gave a further section of the middle-class the vote, and did not admit the labouring class at all, the year of revolutions (1848) passed without any serious disturbances in the interior of Belgium. An armed band was sent by a self-designated 'General Association of Belgian Workers' at Paris, and was supported by Ledru-Rollin, the socialist Minister of the Interior in the French provisional government. But its attempt to enter Belgium and rouse the workers to revolt proved a complete fiasco.

So far from shaking the Belgian state, the revolutions of 1848 greatly enhanced its international prestige and the self-confidence of its own people. Frederick William of Prussia had prophesied a life of not more than two generations for the new and 'artificial' state. But, in 1848, whilst Frederick William had to flee from Berlin, Metternich from Vienna, and Louis-Philippe from Paris, Leopold I, ruling as a constitutional king, remained secure in his capital. The contrast did not remain unobserved either in Belgium or abroad, and especially in England. The tranquillity with which the related small

constitutional monarchy passed through the European crisis greatly increased the confidence of English governments and English capitalists in the state which English support had done so much to create.

The Liberal Era

From 1847 to 1884 the Liberal party remained in power in Belgium except from 1855 to 1857. It has been seen that, at the outset, they were faced with a severe economic crisis and their long continuance in office was largely the result of their success in overcoming it. In the main they were opposed to direct state intervention, but they were wise enough to see that some exceptions were necessary. Rogier, in 1847, gave direct government assistance to the distressed textile industry of Flanders and provided not only model and instructional workshops, but also public loans to enable employers to carry on. He and his successors also continued the policy of developing the state railway system and provided employment for the coal, iron and steel workers by doing so. The Liberals, too, were active in reducing the barriers to trade both within and without the country. They became Free Traders and, in 1860, secured the suppression of the *octrois* which hindered trade between country and town; in 1866 they abolished the turnpike dues on the state roads; whilst abroad, from 1857 to 1861, they at last bought out the Dutch right to levy tolls on the Scheldt traffic, to the great advantage of Antwerp, and they made commercial treaties with the German *Zollverein*, England and France and some other countries, which greatly reduced the barriers to trade. Belgium rapidly increased both her exports and imports during the period of Liberal rule and became an important factor in the international trade of the world. With this general policy of economic *laisser-faire* they also provided some more direct benefits for the workers by establishing savings banks (1865), by granting them the right of association (1866), by providing for workers' season-tickets on the railways (1869–70), and by abolishing the tax on salt (1870) which bore heavily on poor households.

But, by 1870, the work of the Liberals was finished. They desired, indeed, more ardently than ever to secure a system of state education from the primary school to the university which should be free from clerical control. Yet the efforts of Rogier in this direction resulted only in the establishment of a weak compromise (see p. 66), and the more sustained and radical campaign pursued by the government of Frère-Orban from 1878 to 1884 resulted in a signal defeat and in a schism within the Liberal party itself.

Moreover, new problems and parties were arising which cut across the old political divisions. On the one hand, the rise of the Flamingants (see p. 139) brought further popular support for the Catholic party which depended more on the Flemish-speaking countryside and was more inclined to a decentralizing policy than the Liberals. On the other hand, there developed a genuine Socialist movement in Belgium after 1870 which tended to draw off some of the more radical members from both parties and which assisted the growth both of a 'Jeune Droite' more radical in views than the majority of the Catholics and contributed to the schism in the Liberal party and to the founding in 1883 of the Liberal League, formed from those members of the party who were dissatisfied with the minor extensions of the franchise made in 1883 and who demanded universal suffrage.

The conflict of the Catholic and Socialist parties

In the elections of 1884 the Catholics won a majority of thirty-six over their Liberal opponents and were clever enough to base their electoral campaign on the issue of the increased taxation which the economic crisis of 1876, as well as the cost of the development of state secondary education, had forced the Liberals to introduce. But, although the Liberal party never recovered power during the years 1884–1914, the Catholics were immediately faced by the rise of organized Socialism and were themselves driven to adopt a much more democratic policy than their Conservative leaders desired to follow. In 1869 Frère-Orban had expressed the view of both Liberal and Catholic parties when he refused to entertain proposals for the state regulation of the hours of labour on the ground that 'regulation of work is a form of servitude'. Both parties had, up to 1884, been strong supporters of *laisser-faire*. The rise of Socialism and of the Belgian Labour party rapidly changed the whole situation. The Catholics were forced to accept universal suffrage, with some modifications, and were forced to compete with the Socialists in the field of social reform in order to retain their hold on the enlarged electorate.

The first movements towards Socialism in Belgium partook of the revolutionary character of the contemporary Socialist movements in other countries. But the Belgian Socialist party, founded in 1879 at a congress held in Brussels, was replaced in 1885 by the Belgian Labour party (*Parti Ouvrier Belge*), which was more moderate and practical in its programme, and which issued from the Co-operative movement already rapidly spreading amongst the working-classes. In 1880 the Co-operative Bakery, *Vooruit* (Progress), was founded

at Ghent, and the principles of co-operative socialism were soon advocated in a newspaper directed by Edouard Anseele which took the same name. The Walloon country had already begun to tread the same path, and in 1886 the 'Maison du Peuple' of Jolimont adopted the statutes which had proved so successful at Ghent. There followed a rapid and remarkable development throughout the industrial districts of the country. Co-operative bakeries were followed by general stores; 'people's houses' for recreation and instruction were developed. Dispensaries, mutual insurance societies and other services grew up, until all the material needs of the working-class family from the infant's baby-clothes to the old man's shroud and coffin could be obtained from these institutions. A great machinery on a perfectly legal basis against the exploitation of the working-class was successfully brought into being.

This practical character lies at the roots of the Belgian Labour party as of its British counterpart. Its programme demanded universal suffrage as the necessary means to the end of securing a programme of social reform favourable to the working-class. Restriction of hours of work; workmen's compensation for accidents; social insurance; recognition of the rights of trade unions to share in control of industry; socialization of public services—these were the main objects at which the party aimed. At the same time the party was wise enough to recognize the strength of Catholicism in the country and confined its religious programme to a declaration that religion was a matter of the individual conscience. Marxism as a creed was rejected by Belgian labour leaders.

Yet, though moderate in outlook, Belgian Socialism was vigorous in action, particularly in its early days. The victorious Catholic majority of 1884 was quickly taught that the religious benevolence which was, at first, the only remedy it would propose for social discontent was insufficient. In 1886, serious rioting broke out in Liége, and spread over the country to the accompaniment of strikes. When order had been restored, the government announced a large grant for public works to relieve distress, and appointed a *Commission du Travail* to enquire into labour conditions, whilst the Catholic Congress of 1886 at Liége explicitly abandoned the doctrine of *laisser-faire* and the Catholic party began to move towards a programme of social legislation similar to that which Bismarck had already begun to carry through in Germany. Industrial and labour councils were instituted (1887), on which both employers and employed were represented; the building of workmen's houses and the

labour of women and children were regulated by law (1889); the law regulating Friendly Societies was improved (1890).

Constitutional Reform

Yet such reforms were still insufficient to satisfy the working-classes. Nothing short of a radical reform of the limited suffrage could do this, and this, in turn required a change of the Constitution. Once again the conservatism of the two historical parties prevented, for a time, the admission of the working class to a direct share in political power. But once again a general strike accompanied by violent demonstrations in Brussels convinced the government that the suffrage must be greatly extended. A compromise with universal suffrage was found in a measure that gave the vote to all male Belgians over twenty-five, but gave additional votes to married electors with children, citizens over twenty-five with a property qualification, and to those with certain educational qualifications. The solution increased the electorate for the Chambers tenfold, but it was unsatisfactory both to Liberals and to Socialists; to the former, because they found themselves hopelessly under-represented in a three-party system with single-member constituencies; to the latter, because the plural vote appeared as an obnoxious piece of class legislation. The Liberals were placated by the law of 1899 which introduced proportional representtion. The Socialists had to wait for the elections of 1919 when their loyalty during the war was rewarded by the quite unconstitutional decision of the cabinet to hold the elections on the basis of universal suffrage *pur et simple*.

Since 1893, then, the history of Belgium has been that of a parliamentary monarchy with three parties of which the Catholic party has usually been the largest, though in at least one parliament since 1919 the strength of the Catholic and Socialist parties has been equal. The Liberals, since 1893, have always been the smallest of the three. The effect of this situation before the war of 1914–18 was to force the Catholic party, which held power until 1914, to continue the development of social legislation for fear lest its own left wing, the 'Jeune Droite', should join hands with the Socialists. Thus, in English terms, workmen's compensation, factory acts, old-age pensions, recognition of Trade Unions as corporations, as well as other social measures, such as the first steps towards regulation of hours of labour, were all passed before 1914, and in 1913 elementary education was at length made compulsory.

Meanwhile the Belgian Labour party developed on lines closely

similar to those subsequently followed by the British Labour party. It became increasingly moderate, not to say 'respectable'; it abandoned, as it showed at the marriage and at the accession of King Albert, its earlier theoretical republicanism, and, when war broke out in 1914 with the invasion of Belgium, it not only proved its patriotism both in occupied Belgium and in the army, but its leaders were ready to enter a national coalition government at the king's invitation. Emile Vandervelde, the Socialist leader, became a Minister of State and, during the war, at the express invitation of the king, addressed meetings of the Belgian army, encouraging their stout resistance in the small corner of Belgium west of the Yser still free from German control.*

With the Armistice of 1918, King Albert and his ministers, who had been working at Le Havre, returned to their country and a government of the *Union Sacrée* drawn from all three parties ruled until 1921. The vicissitudes of Belgian internal politics in the post-war era cannot be described in detail here, but its main features were these. In the first place, the Belgian Labour party was represented in several coalition governments both in partnership with Liberals and with the 'Jeune Droite' of the Catholics and, in M. Vandervelde, produced a leader able to match his abilities as Foreign Minister with those of the Foreign Ministers of any other state. In the second place, the rôle of the Liberal party proved more rather than less important than it had been before the first world-war. M. Hymans as Foreign Minister, and other Liberals concerned in handling the recurrent financial crises arising from reparations and the world depression of 1929 onwards, rendered invaluable service to the country. Finally, the Flamingant movement, accentuated in significance by the Activists who had served Germany's interests on the 'Council of Flanders' during the war of 1914–18, proved, after the 'flamandization' of the university of Ghent (p. 140) and the wise and statesman-like speeches of King Albert—made in both languages—during 1930, that no serious desire for union with Germany existed in the country. The only danger that threatened its institutions internally, the semi-Fascist Rexist movement of Léon Degrelle, itself lost ground heavily in the last elections before the outbreak of war (1939) when the party was reduced from 39 to 8 members of the Chamber. And when, once again, Germany decided to tear up the repeated documents—no single scrap of paper—pledging her word to respect Belgian neutrality, the government was again enlarged to include members of all three parties

* For an account of the German occupation 1914–18, see Appendix I.

and the Belgian people have shown since 1940, though under still more difficult circumstances, no less patriotism and self-sacrifice, no less devotion to the cause of liberty and justice than during their earlier martyrdom of twenty-five years ago.*

Neutrality and Foreign Policy

Neutrality and army policy

Little has been said of the Belgian monarchy in the above account. Yet it would be a wholly false picture of the development of modern Belgium if the work of her kings were not taken into account. Leopold I, Leopold II, Albert and Leopold III all played a notable part in the history of their country, more especially in the sphere of foreign affairs, including colonial development, and in the related sphere of army policy. Belgian neutrality was laid down in the twenty-four articles of October 1831, which were incorporated in the treaty of April 1839, by which the existence of the new state was given formal recognition not only by the five great powers—Austria, France, Great Britain, Prussia and Russia—but also by the king of the Netherlands. According to Article 7 of the treaty: 'Belgium within the limits specified in Articles 1, 2 and 4 shall form an independent and perpetually neutral state. She shall be bound to observe the same neutrality towards all other states.'

This neutrality, as M. Demetrius Boulger has pointed out in his *Reign of Leopold II*, was imposed on Belgium, at the instance of Lord Palmerston, to secure European peace. Whilst Prussia could not view the possible absorption of Belgium into France with equanimity, whilst England could not accept a settlement by which Antwerp, to say nothing of Ostend, would be in the hands of a great power, the guaranteed neutrality of Belgium provided a solution which contributed towards stability in the relations of all the guaranteeing powers. But, if it was at the same time a source of strength to Belgium itself, it also created a serious division of opinion within the new state.

For two views of the consequence of guaranteed neutrality were possible amongst the Belgians themselves. It could be maintained that the guarantee of the Powers rendered any anxiety about the size, equipment and training of the army superfluous; that, in fact, nothing more than a civic guard was required. On the other hand, it could be argued that the neutrality imposed on Belgium required that 'the army of the guarantor, which intervenes to protect Belgium, must find

* For an account of the present occupation see Appendix II.

the Belgian Army ready and properly organized to co-operate with it on its arrival in Belgium'.* The first, and passive, view was held by large sections of all classes and parties, largely as a means of avoiding general conscription and heavy taxation for defence. The second view was held by an active minority of the Liberal and, to a lesser degree, of the Conservative parties, and consistently by Belgium's kings.

Leopold I showed his interest in the army from the first moment of his reign, and it was largely through his efforts that between 1831 and 1839 the army was built up and trained. But the system of recruitment, which permitted the practice of substitution, by which members of the wealthier classes could pay a poor man to do their service for them, was a weakness which was only remedied in 1909, and every other army reform met with serious opposition in Parliament and the country. Yet every European crisis made the problem of Belgian defence more pressing.

In 1848, the revolutions in the neighbouring states did not spread to Belgium, and the band of Socialists sent by Ledru-Rollin were, as has been said, easily dealt with. But the accession of Napoleon III, and his steady hostility and designs for absorbing the Belgian state justly alarmed both Leopold I, who died in 1865, and his successor Leopold II. Yet the proposal to turn Antwerp into a fortified stronghold, which the Belgian army might hold whilst waiting for aid from other guarantors in the event of a sudden attack, was only passed with great difficulty in 1859, and lost the Liberal government which passed it the whole of its seats in Antwerp at the elections of 1863.

A much more serious crisis arose with the outbreak of the Franco-Prussian war. Superficially its course seemed to prove the validity of the arguments of those who believed in passive neutrality. Neither Prussia nor France violated Belgian neutrality and England was able to negotiate treaties with both the belligerents reaffirming their intention to maintain it. But the danger had come so close that the possibility of invasion in a future war between France and the new German Empire at last began to be grasped by wider sections of Belgian public opinion.

Colonial development

Moreover, after 1876, a new incentive to interest in Belgium's armed forces, and a new danger to the policy of merely passive neutrality, was offered by the gradual development of 'The International Association for the Exploration and Civilisation of Central

* D. C. Boulger, *The Reign of Leopold II*, 1865–1909, vol. 1, p. 94 (London, 1925).

Africa', founded after a conference held in Brussels in that year, into the Congo Free State. The members of the conference which founded the Association were not representatives of their governments but of geographical societies, or had been invited on the ground of their own eminence in exploration. The Association held one plenary session at Brussels in 1877 when it adopted a flag under which its work of exploration and philanthropy was to be carried out. But, apart from the enthusiastic moral support of General H. S. Sanford, at one time United States Minister to Belgium, the Association rapidly lost its international character. Leopold II provided a large part of the funds himself; he persuaded Stanley to carry on explorations for the Association and met his expenses; and he conducted negotiations with Portugal, France and Germany which led to the summons of an international conference at Berlin in 1884. As a result of the jealousies between the powers, Leopold was able to secure from each in turn its recognition of the flag of the International Association and of the Association's territorial claim to control the Congo basin. The Berlin Act (February 1885) itself did not mention the creation of a new state. It dealt with freedom of trade and navigation in the Congo basin. Yet in fact Leopold II was creating the Congo Free State of which he became the personal and absolute ruler; and, in 1885, the Belgian parliament gave him the necessary authorization to accept the sovereignty of the Association's territories in Africa on the express condition, however, that the union between Belgium and the new state was to be entirely personal. For the next thirty years, through evil report and good report, using Belgian officers and administrators and, at times, Belgian loans, as in 1895, Leopold carried on the vast task of developing the huge territories entrusted to him. Leopold's personal rule was directed largely towards the rapid exploitation of the resources of the Congo territories for financial gain. The methods employed and, in particular, the treatment of the native population gave rise to an international agitation against the whole system which Leopold had built up. Both in England and America feeling ran high and Sir Edward Grey brought pressure to bear on the Belgian Government to induce it to force the King to introduce reforms. Largely as a result of this external pressure the Belgian Government in 1908 took over the Congo as a colony and appointed a Minister for the Colonies, whose first duty to was to reform the abuses which had grown up under Leopold's II's personal rule.

From 1908, then, Belgium was an empire, and, by becoming so, had become a vastly richer prize for any invader. Moreover, her

neutrality was less likely to be maintained in a world in which three of the great powers upon whom it rested—Germany, France and Great Britain—were acutely interested in the development of Africa.

The reform of the army adopted in 1909, and the increase in the contingent to be called up for training in 1913, cannot be separated from the acceptance of the Congo as a Belgian colony at a time of acute international rivalry. But, before the new army reforms had had time to produce much result, the German invasion of 1914 brought three of her guarantors to Belgium's assistance, but at the same time ended the era of neutrality.

The end of neutrality

The invasion of 1914 was not unexpected. The plan drawn up by von Schlieffen, Chief of the German General Staff, had been modified by his successor von Moltke, but still included the invasion of Belgium in order to roll back the French left flank. Leopold II, before his death, as well as Albert I, had been aware of it. But joint preparations by the Belgians with the French and English could have been represented by the Germans as a violation of neutrality, since the existence of the Schlieffen plan did not necessarily mean that it would be used. Neutrality, therefore, involved Belgium in isolation until such time as her guarantors were able to bring her aid. It made the overrunning of the country by the German hosts almost inevitable. Yet Belgium resisted. Its army, though forced back to the Yser, remained intact under King Albert's command and, during the four years of war, constituted the left wing of the allied forces which stretched from the Channel to Switzerland. The story of the occupation of Belgium is told elsewhere (see Appendix I) but the Belgian army, fighting on though separated from their homes and relatives, deserved well of their allies, as did the whole country for its resistance to German domination.

Yet, after the Treaty of Versailles, the position of Belgium was less, rather than more, secure in the event of a German revival, since the guaranteed neutrality was gone, and as a signatory of the treaty, and the gainer by the cession of Eupen and Malmédy, she would appear as a natural enemy to a Germany seeking revenge (Fig. 45). The League of Nations now represented her one security. But the League, deprived of American support, might prove an ineffective protection. To remedy this situation she entered, in 1920, into a defensive military alliance with France, which included a provision for staff talks. In 1926, the Locarno Treaty brought ber some relief. In addition to



Fig. 45. Belgian gains in 1919

Based on G.S.G.S. Series 2157, 1 : 380,160, Belgium and North-east France (1910 and 1938).

By the Treaty of Versailles, Belgium acquired from Germany the *Kreise* of Eupen and Malmédy, and also gained sovereignty over the so-called neutral Moresnet and Prussian Moresnet. In the Middle Ages, Eupen and the greater part of the *Kreise* of Malmédy had been in the possession of the dukes of Burgundy. Later they had successively belonged to the Spanish and the Austrian Netherlands and to France. They were acquired by Prussia at the Congress of Vienna in 1815.

The *Seigneurie* of Moresnet had formed part of the duchy of Limburg but it was annexed by France in 1795. In 1816 when the final boundaries between Prussia and the Kingdom of the Netherlands were demarcated, Moresnet became divided into three parts: (i) Dutch Moresnet, (ii) Prussian Moresnet, and (iii) 'neutral' Moresnet, which had been overlooked in the Treaty of 1815. This division was made because of the valuable deposit of zinc in the commune; the concession was to be worked under joint Prussian and (after 1839) Belgian supervision.

Belgium laid claim to these territories in 1919 on historical, ethnic and economic grounds. The cession of Eupen and Malmédy was agreed to on condition that the inhabitants agreed, as they subsequently did, to the transfer. Belgium made no attempt to suppress the use of German in the German-speaking parts of these territories, and the language became the medium of instruction in the schools and it was used for administrative purposes. Three cantons were formed—Eupen, Malmédy and St. Vith—in the arrondissement of Verviers. On 18 May 1940, Hitler decreed that Eupen, Malmédy and Moresnet were to be incorporated in the Reich.

the general provisions of the Covenant promising assistance to any state which was a victim of aggression, she now entered into the system of mutual guarantees of the frontiers of Germany on the west. And, in the preamble to the treaty, one reason given was 'Taking note of the abrogation of the treaties for the neutralization of Belgium, and conscious of the necessity of ensuring peace in the area which has so frequently been the scene of European conflicts'. Locarno gave the Belgians guarantees from Germany, France, Italy and Great Britain. But it also involved the guarantee by Belgium of the German western frontier and therefore involved her necessarily in joint action with e.g. France, if the Germans attacked Alsace-Lorraine.

The rise of Hitler was, for this reason, watched with acute anxiety in Belgium. When Germany rearmed; when the League failed to prevent the Italian attack on Abyssinia, and when France and Great Britain lost the friendship of Italy in that attempt; when Hitler denounced the Locarno Treaty, re-entered and remilitarized the Rhineland, while at the same time international tension increased, the position of Belgium became even worse than it had been in the years before 1914. It was to remedy this situation that King Leopold III on 14 October 1936 addressed a speech to his cabinet which, at their request, was published. He declared that Belgium must pursue an entirely independent policy, whilst maintaining a military machine large enough to dissuade any neighbour from using Belgian territory for attacking another state. In December 1936 the first steps were taken by the Belgian parliament to implement a new programme of military defence and, between 1936 and 1939, the proportion of the total expenditure of Belgium spent on defence rose from 9 per cent to 24 per cent. The Antwerp-Namur line was strengthened; the fortifications of Liége and Namur modernized, and, after the outbreak of war in 1939, the forces under arms were gradually raised to 600,000 men. Meanwhile, in April 1937, the British and French governments issued a declaration releasing Belgium from the obligations of the Locarno Pacts, whilst maintaining their guarantee of her territorial integrity against any aggressor, and to complete the reversion to the 1914 situation Germany followed suit in October 1937.

Yet, despite these guarantees, and despite the drawing together of the Scandinavian states with Holland and Belgium, German military 'necessity' once again overrode all considerations of political morality and, on 10 May 1940, the Germans once again violated their pledged word and with no shadow of excuse invaded Belgium. After a brief

campaign of seventeen days not only was Belgium overrun but the Belgian army was separated from its allies. On 27 May, King Leopold decided that he must surrender to the Germans to spare his men further and, as it seemed to him, futile losses. He sent a plenipotentiary to ask for terms and was informed that he must accept unconditional surrender. At 11 p.m., after consultation with his staff, the king accepted. The 'cease fire' was agreed on for 4 a.m. on 28 May. King Leopold and his whole army became prisoners of war and the king was given the castle of Laeken as his residence. But the resistance of Belgium was not at an end. The story of that resistance and of the second German occupation is to be found in Appendix II.

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Among the many other shorter works by Pirenne, two articles dealing with the earlier period deserve particular mention:

(*a*) 'The Formation and Constitution of the Burgundian State', *American Historical Review*, XIV, 477–502 (New York, 1909).

(*b*) 'The Low Countries', being chapter X of *The Cambridge Medieval History*, vol. VIII (Cambridge, 1936).

Another study by Pirenne, published by the Carnegie endowment, deals with the war of 1914–18: *La Belgique et la Guerre Mondiale* (Paris, 1928).

2. There is also a detailed historical account in the *Grande Encyclopédie de la Belgique et du Congo*, vol. I (Bruxelles, 1938).

3. Very clear summaries of the history of Belgium, Luxembourg and Limburg, the Scheldt, and the question of the neutrality of Belgium are contained in *Peace Handbooks: The Netherlands* (H.M.S.O., London, 1920).

4. Convenient short summaries in English that cover the whole history of Belgium can be found in:

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H. Vander Linden, *Belgium: The Making of a Nation* (Oxford, 1920).

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D. C. Boulger, *The Reign of Leopold II*, 1865–1909, 2 vols. (London, 1925).

E. Cammaerts, *Albert of Belgium* (London, 1935).

5. The story of the revolt has often been told, and the classical account is J. L. Motley's *The Rise of the Dutch Republic*, first published in 1856. Both he and many later writers viewed the conflict as a struggle between the northern provinces and the enemies of Protestantism and of liberty. But Protestantism in its early

stages was very strong in the southern provinces, and Professor P. Geyl has recently shown that the divergence in religion between north and south was 'not the cause but the result' of the political separation. His two studies are:

The Revolt of the Netherlands, 1555–1600 (London, 1932).
The Netherlands Divided, 1609–1648 (London, 1936).

6. An historical atlas edited by L. Van der Essen has been projected: *Atlas de Géographie historique de la Belgique* (Bruxelles et Paris). Several folios have already appeared (see p. 573).

Chapter VI

THE FLEMISH-WALLOON PROBLEM

Introduction: Growth of the Flemish Movement: The Flemish Movement, 1914–18: Between the Two Wars: Developments since the German Occupation in 1940: Bibliographical Note

Introduction

The main factor in the separation between Flemings and Walloons has been linguistic, although language does not in itself provide the final key to an understanding of the problem. The powerful cultural influence of France has, over many centuries, helped to shape the form of the present position. Thus it was inevitable that the high prestige of French culture between the eleventh and fourteenth centuries should impress the feudal states of Flanders, where, in the early part of the fourteenth century, Flemish for a brief spell enjoyed the dignity of an official language. In the county of Flanders, the duchy of Brabant and the episcopal principality of Liége, Flemish stubbornly held its ground, but French was playing an increasingly decisive role in official circles and administrative affairs. Nevertheless, throughout the Middle Ages, when Flemings and Walloons lived side by side in the feudal states, both Flemish and French were generally used for matters of political importance. French was becoming more favoured by the new *bourgeoisie*, while Flemish was the language of the mass of the people.

When the United Provinces secured their independence in 1648, it was mainly military expediency and geographical reasons, rather than linguistic, or, indeed, religious considerations that had determined the political boundary separating the north from the south (see p. 100). Throughout the Burgundian and early Hapsburg periods, every new prince had taken the oath in Flemish. Flemish, however, was being gradually supplanted by French for formal occasions and, under Spanish dominion, French became the language of official correspondence between individual provinces and the central government, as well as the language of acts relating to the whole country.*

* The ecclesiastical divisions of the Spanish Netherlands did not follow any clear line of linguistic demarcation. As a result of the diocesan reorganization of 1559 (see p. 96), the province of Mechelen came to form a central belt, entirely

Still, the underlying principle seemed to be that the governors should employ the language of the governed, and, in general, this policy was executed for local affairs. The Austrian Hapsburgs (see p. 105), perhaps, were the first to discard this guiding principle. This is partly accounted for by the fact that the eighteenth century was the period when French prestige was at its highest; children of *bourgeois* Flemish families were sent to France, or, nearer home, to a Walloon city for their education. Yet Flemish was still being used for official business in provinces and cities.

Growth of the Flemish Movement

The eighteenth-century awakening

The beginning of a conscious, organized Flemish movement can be traced as far as the last fifteen years of the eighteenth century when, in 1788, a Bruxelles lawyer, Verlooi, published his *Verhandeling op d'onacht der Moederlyke Tael in de Nederlanden*, dealing with the neglect of the mother tongue in the Netherlands. The author deplored the effects of the domination of French culture on the minds of the upper classes since the sixteenth century, for the cultural poverty of the Netherlands was directly due to this gallicizing of the higher circles. Although Verlooi associated himself with the anti-French reaction which was then developing in the German states, calling on the Flemings to quicken their consciousness of membership of the Teutonic family of nations, his voice was a solitary cry in the wilderness, and it evoked no apparent response.

The French Revolution, and the conquest of the Austrian Netherlands by the French armies, checked any development of Verlooi's teachings. When the Belgian lands came under French dominion, at least half of the population spoke Flemish, but the National Convention decreed in 1794 that every act and public document should be drawn up in French, with severe penalties for any violation of the decree. Although the decree was relaxed within a few months, war was declared on all 'dialects' which stood in the way of propagating Parisian French. German, Flemish and Walloon were therefore classed as patois, and after 1805, when the provinces which now form the kingdom of Belgium were formally united to France, all laws were promulgated in French, with a *proviso* for translations in those districts where the language was entirely unintelligible to the inhabitants.

Dutch speaking, and it was intended to group together 'the churches which use the French tongue'.

French officials were placed in all the administrative positions, and a further edict ordered that French alone would be employed in all official documents, even in those recording transactions between private persons. In 1812, however, Flemish was allowed to be used with French before the courts and in public documents. Education was also placed on a French linguistic basis, and, to the end of the French occupation, Flemish was confined to the primary schools. The publication of Flemish journals was entirely prohibited until 1812, when they were allowed to appear with a French translation accompanying them. The obvious inability of the French censors to pass fair judgement on Flemish books was no stimulus to publishing. It was natural, therefore, to find a deepening cleavage between an educated class, on the one hand, thoroughly schooled in the French discipline, recruiting its members both from the upper class and from the *bourgeoisie*, speaking French, enjoying a monopoly of the press, and, on the other, an uneducated peasantry, speaking Flemish and devoid of almost all literary forms. Religion and language, however, did not coincide; the Roman Catholic priesthood threw in its lot with the peasants and endeavoured to preserve the nucleus of a literary Flemish in the form of devotional literature. Small societies were found in widely scattered points, maintaining 'Chambers of Rhetoric' for the performance of plays in Flemish. These 'Chambers' originated from religious societies which spread from northern France during the Burgundian period; they gained a strong footing throughout the Dutch-speaking Netherlands. But the cleavage between the French-speaking and Flemish-speaking classes was already wide, and it may well have been that the rift between Walloon Liberalism and Flemish Catholicism originated here.

There was still no definite and organized movement in Flanders in support of the Flemish language and culture at the time of Napoleon's downfall. The Congress of Vienna, in 1815, brought together the Austrian Netherlands and the United Provinces, which had been separated for nearly two centuries, to form the kingdom of the United Netherlands (see p. 110). The union was not entirely an even one, and there was a tendency in the north to regard the southern provinces as conquered territory. Despite many apparent divergences, the close identity between standard Dutch and the Flemish dialects, however, created an interest in Dutch matters among the Flemings. This new interest, coupled with a powerful reaction against French, considerably hastened the development of a Flemish movement and, not unnaturally perhaps, it encouraged a rather aggressive 'flamingantisme'. Dutch

became the language of official business in the Flemish-speaking provinces of Limburg, Oost-Vlaanderen, West-Vlaanderen and Antwerpen; plans were later devised to transfer monoglot Walloon workers in Flanders to other regions, where French alone was sufficient. Now came the turn of a few Walloon writers to plead for toleration, and to urge that the process which had made the upper classes French should be taken as an accomplished fact. The government compromised by retaining French in administration, and by reintroducing Flemish as far as possible in education. It was in this setting that universities were founded at Gent, Leuven and Liége during 1816–17. On the whole, the aim of William I was to make Dutch dominant in the Flemish areas, and to preserve the supremacy of French in the Walloon-speaking region. Similarity of language, however, did not imply close cultural affinity. Dutch contempt of the Belgians, and the Belgian dislike of Dutch Protestantism had a detrimental effect even on the attempts to raise the standard of Flemish. Indeed, a few journals expressed their anti-Dutch feelings by giving up the publishing of articles in Flemish.

The year 1831 brought Belgium not only its independence but also the task of facing the emergence of problems that had for long been more or less latent (see p. 115). The majority of the members of the provisional Belgian government were French-speaking and admirers of French culture. They adopted French for their deliberations and made it the official language of the newly constituted state. This decision, of course, represented an immediate reaction against all things Dutch and Flemish, although the justification put forward was that the dialectal differences in Flemish made uniformity impossible. Nevertheless, provisions were made for the use of both Flemish and German in areas where these languages were predominant, on the condition that the language employed was intelligible to the judges. Flemish was also permitted in correspondence between private citizens and the government, as well as in public notices.

The linguistic policy of the provisional government was accepted in general by the Constitutional Convention. After a lengthy debate, article twenty-three of the constitution was thus formulated: 'The use of languages current in Belgium is optional. This matter may be regulated only by law and then only for acts of public authority and for judicial proceedings.' A misleading impression was given that this article aimed at effecting linguistic equality. The absence of detail led to chaos; government officials and servants could use whatever language they pleased, but the control of administration in the new

kingdom was in the hands of French-speaking persons, and it followed that French became firmly established for all state purposes, including education. Flemish was also forced to a secondary place in business affairs. This was due mainly to three reasons: the preference of the Flemish *bourgeoisie* for French; French and Walloon industrial interests were becoming powerful, especially at Liége and Charleroi; the wealth which had been accumulating during the initial stages of the Industrial Revolution in Belgium was now chiefly in the hands of French speakers, and their language followed the course of their financial influence. It seemed, therefore, despite Verlooi, that Flemish, which had not yet become a standardized literary language, was destined to become either a mere lower-class dialect, or, perhaps, a loose agglomerate of dialects. Actually, however, it was still to demonstrate its virility.

One of the first signs of this quickened virility appeared in 1832. P. Blommaert, a comparatively recent adherent to the Flemish cause, published from Gent a short pamphlet, *Aenmerkingen over de verwaerloozing der nederdietsche Taal*, and in this brief survey of the general neglect of the Flemish dialects, he called on all Flemings to defend their language and culture. Blommaert was joined in 1834 by Jan Frans Willems, who came from the stronghold of Flemish-speaking territory between Antwerpen and Lier, and who had been, until 1814, a fervent admirer of the French regime. In 1814, Willems, a former notary-public's clerk, was appointed assistant archivist to the city of Antwerpen. Between 1818 and 1830 he had become known as a student of Dutch language and literature. His bitter opposition to the new regime of 1831 led to his being deprived of his status as archivist, and being given an entirely inferior position at Eekloo near Gent. Here he began to study medieval Flemish literature, and became the first of the Flemish literary romanticists. His work was similar in some respects to that of the brothers Grimm in Germany, and, indeed, Willems came under the direct influence of Jacob Grimm, who had earlier edited the text of a medieval Flemish epic, publishing it in Middle Dutch. Grimm and Willems corresponded, with the result that the latter prepared an edition of the epic in Flemish—*Reinaert de Vos*, published at Eekloo in 1834. The main significance of this edition is that the introduction to a study of Flemish literary history became the manifesto of a new Flemish movement. Two years after the publication of the epic, Willems moved to Gent where an active society, *De Taal is Gansch het Volk* ('The language is the whole folk'), had just been formed. Friends and

pupils gathered around Willems at Gent; the foremost of these was Jan David, a Catholic priest and teacher, who later became Professor of History and Flemish Literature at the Catholic university of Leuven. Willems and David were primarily responsible in 1836 for the foundation of the important Society for the Propagation of the Flemish Language and Literature, with branches at Gent, Leuven, Antwerpen and Brugge. This society became a rallying centre for intellectual Flamingants throughout the country. It was not long before what had started as a pseudo-academic revival of interest in medieval Flemish literature developed into a contemporary literary movement, led by romanticists like Ledeganck, Theodor van Rijswijck, and Hendrik Conscience. These writers, not unlike Scott and Byron in England, popularized the results of investigations by enthusiastic scholars and enlightened amateurs; they created an interest among the people in things belonging to the Flemish past. Flamingant societies were formed in schools and colleges, their programme covering the publication of popular scientific works in Flemish, the patronage of writers, and the establishing of libraries. The press, too, was enlisted in support of the literary movement, but its power did not reach its maximum effect until the eighteen-eighties.

Political Flamingantism

The cultural ground which had been covered by these various societies gradually became a basis for the introduction of the Flemish movement into politics. Between 1830 and 1840, the Flamingants had been vaguely conscious that one of their primary aims was to secure the use of Flemish in government affairs. They had become more conscious of this, and more articulate in their demands, by 1840, when a petition, prepared by Willems, and claimed to have been signed by 100,000 people, was presented to the Chamber. It demanded the official recognition of Flemish in the Flemish provinces, the foundation of a Flemish academy, and an equal status with French for the Flemish language at the university of Gent. This petition was ineffective, but it had served its purpose as a channel through which Flamingant enthusiasm was first given a political direction. In 1856, a scathing and fiery letter from the Antwerpen poet, Jan van Rijswijck, brother of the Flamingant writer, excited P. de Decker, a Flemish sympathiser who was then Minister of the Interior, to advise his government to appoint a Royal Commission which might investigate the Flemish question, consider the grievances of the Flamingants, and suggest reforms. A commission was appointed, consisting of

David Conscience and other literary men of Flemish sympathies. The commission's report was bitter in tone and far-reaching in its recommendations. Its publication was delayed by de Decker and his successor, Charles Rogier, an anti-Flamingant who had been one of the leaders of the 1830 revolt (see p. 113). The Chamber, however, demanded publication of the report, and when the findings of the 'Grievance Commission' were made public they at once served as an indictment and a confession of faith. The state was accused of wilful neglect, the Flemish language and Flemish culture were defended, recommendations were made covering the general use of Flemish in education and all official affairs. The report was adopted as a manifesto by the constantly growing Flemish movement; it was so comprehensive that it has continuously served as the expression of Flamingant demands even until recent years. Nevertheless, its only immediate outcome was the forming of a literary convention with Holland in 1858, protecting the rights of authors and establishing the free exchange of printed matter.

An attempt had been made by Hendrik Conscience and others, in 1846, to form an active political organization—*Het Heilig Verbond* ('The Holy Union')—but its members soon drifted back into either the Liberal or Catholic party. There was a second attempt, with the formation of the *Vlaamsche Verbond* of Gent in 1861, which demanded to know of all candidates for public offices in Belgium their attitude to the Flamingant programme. Both this union, and its counterpart in Antwerpen, the *Nederduitsche Bond*, were disrupted by the inevitable division of their members into Liberals and Clericals.

The report on a second enquiry into the Flemish question was presented to the Chamber in 1866. It condemned the general policy, which had been pursued since 1831, of neglecting Flemish, because, as the report argued, this neglect had delayed the formation of a true sense of nationality and had, therefore, reduced Belgium to be nothing more than an intellectual parasite of France. This policy, it was further stated, had split the already linguistically divided Flanders into two hostile social classes. The report also contained an embittered protest against the conditions which made it impossible for a Fleming to defend himself in his own language before the courts. This latter protest was formulated into a bill, presented to the Chamber in 1867, ruling that no court official who was ignorant of Flemish should be appointed in Flanders. This bill, like the remainder of the report's recommendations, was rejected, but it led to further efforts

by the Flemish organizations, and most of these efforts were to meet with considerable political success after 1870.

Economic circumstances had been changing for many years. Backward Wallony had evolved into an industrial region, while the villages of Flanders remained relatively dormant (see p. 290). In 1869 Baron de Maere, a Flemish deputy for Gent, spoke in the Chamber about the social, intellectual and moral backwardness of the Flemish provinces. He argued that the rapid increase of population in the Walloon provinces between 1830 and 1864, in marked contrast to the Flemish provinces, and the higher incidence of crime and illiteracy in Flanders were due partly to economic reasons, and partly to the way in which the educated upper class had held itself aloof from the people. The really significant part of de Maere's contention was his stress on the sociological implication of the Flemish question. This emphasis on the disruptive effect of the long internal struggle on the social structure of Belgium put the problem in a new light, and gave the lead to succeeding propagandists.

The Walloon Renaissance

While the Flemish movement was thus adopting a dual policy covering cultural and political self-expression, a cultural awakening had also occurred among the Walloons. The *Société* (*liégeoise*) *de Littérature wallonne* had been established in 1856, and there was an active productivity in dialectal literature, distinct from the literature which drew its inspiration from Paris. A Walloon theatre was set up at Liége, and Walloon papers appeared at Charleroi, La Louvière, Liége, Namur and Verviers, while writers like André Delchef, Nicolas Defrecheux and Edouard Remouchamps were making a valuable contribution to the various forms of this regional literature. This renaissance, however, was essentially cultural.

Reforms and changes, 1870–1914

The period from 1870 to 1914 was marked by several political successes for the Flemish movement. These successes were usually preceded by extensive cultural activity and intensive propaganda. Carefully planned attempts were made to win the support of the masses, who were now made fully conscious of the message of the Flemish movement by the works of the most important Catholic writers of the time—men like Gezelle, Verriest and Rodenback. New literary reviews were published, for example, *Van Nu en Straks*

('From now on'), *Vlaanderen*, *Vlaamsche Arbeit* and *Boomgaard*. Flemish music, drama and art were also brought to the foreground. The press, too, was becoming a more important agent of propaganda. In 1840, there were twenty-six Flemish journals, appearing once, twice or three times a week: their price was high and their circulation narrowly limited. In 1857, their number had increased to eighty-five; six of these appeared daily, but none of them gave unqualified support to the Flemish cause. By 1900, there were thirty-nine daily papers, and 334 weekly.

The Liberals were defeated in 1870 and under the Jules Malon ministry conditions now appeared more favourable to the Flamingants. The first of a long series of linguistic reforms was introduced in 1873 with a law stating that an accused party in the provinces of Antwerpen, Oost-Vlaanderen, West-Vlaanderen, Limburg and the arrondissement of Leuven could claim the right to engage counsel speaking his own language, and that within certain limits, the case could be heard in that language. Another law of 1878 secured further rights for the Flemings in the administrative sphere, but its application was hindered by the general ignorance of standard Dutch. A second judicial reform, approved and sanctioned in 1889, established the use of Flemish in the courts of Flemish towns, and decreed that the state should use the language chosen by the defendant. Between 1899 and 1908, the relative positions of Flemish and French were more strictly equalized in every branch of public life where French had formerly dominated, more especially in education, administration and the army. Although these advances did not signify a fundamental solution of the problem, they served to prevent any disastrous disintegration of Belgian national life, for, when common dangers brought Flemings and Walloons together again in 1914, Belgium stood united against German aggression.

The Flemish Movement, 1914–18

The reorientation of the general trend of the Flemish movement from a cultural and linguistic direction towards the realization of political demands was almost complete by 1914. Thus, proposals came from extreme Flamingants for an administrative division of Belgium on a linguistic basis, the creation of a Flemish-Walloon dual monarchy, the political independence of Flanders or even its union with Holland. The Walloon movement had also shown a slight political tendency: the *Société de Propagande wallonne*, of 1888, was followed in 1897 by

La Ligue wallonne de Liége which had acclaimed, in 1912, the idea of a political partition on political lines. An *Assemblée Wallonne* had been held at Charleroi in 1912 with *La Défense Wallonne* as its organ. This tendency, however, did not gather much momentum in Wallony, although most Walloons were generally antipathetic to the Flemish movement.

Activists and Passivists

When the German invasion of Belgium in 1914 reached its full force, the Flamingant leaders found themselves in the dilemma of having to choose between co-operation with the invaders, in the hope of receiving the reforms which they desired, or else striving to expel the enemy. Some leaders chose the first alternative and became known as 'Activists'; others decided on passive resistance and were given the name of 'Passivists'. The Activists soon became a serious problem, although the vast majority of Flemings supported the passivist policy. Many Belgians fled to Holland; most of them were Passivists, but a few approved of the activist stand.

The Germans, declaring that the protection of Belgium from the ruinous influence of French life and culture was one of their major aims, effected some reforms in education in an attempt to win the sympathies of both groups of Flemings (see p. 122). The Passivists remained unresponsive, the Activists unsatisfied. Early in 1917, the latter group formed a Council of Flanders to act as a provisional government, but every action which it took was controlled by the Germans. Although the members of the provisional government were not in agreement over their plans for the future of Flanders, an administrative division was made in March 1917, in spite of Passivist protests. On the one hand were the provinces of Antwerpen, Oost-Vlaanderen, West-Vlaanderen, Limburg, the arrondissements of Bruxelles and Leuven (in the province of Brabant); on the other, the provinces of Hainaut, Liége, Luxembourg, Namur and the arrondissement of Nivelles (in the province of Brabant). Bruxelles became the capital of Flanders, and Namur that of Wallony. The Activists then attempted to declare the complete political independence of Flanders, but in reality Flanders was never regarded by the Germans as more than a dependency. Numerous journals were published to spread activist propaganda. A second Council of Flanders, elected in 1918, was not more successful than its predecessor. Discontented Flemish soldiers formed a Frontist party, but it did not gain any strength before the final German *débâcle*. The end of the war saw the

greater part of the Activists fleeing into the Netherlands, and the return of loyal and passivists Belgians from all over the world.

Between the Two Wars

Belgium emerged from the war with her sovereign rights restored but with her great internal problem still unsolved. After the return of the government in 1918, the Legislative Chambers expressed their intention to allow each of the two linguistic groups to develop fully its own language in official affairs, and to establish a Flemish university at Gent. The few leading Activists who had not fled to the Netherlands were brought to justice, while the others were tried in their absence. The judicial proceedings caused considerable tension which was heightened by the severity of the sentences. Agitation for an 'Activist Amnesty' was begun about 1924, and events were to show that clemency would prevail.

Minimalists and Maximalists

Immediately after the war of 1914–18, the passivist evolutionaries became known as Minimalists, while the former activist sympathizers, who aimed at administrative autonomy, complete independence, or union with the Netherlands, were named Maximalists. Both groups were found in each of the three parliamentary parties, but the most important minimalist elements were those in the Catholic and Socialist parties. The Catholic party had always been strong in Flanders, but although the Socialists were gaining ground there as a result of increasing industrialization, the stronghold of the party remained in Wallony. The Liberal party was slow to discard its anti-Flamingant tendencies, and the Liberal minimalist group was not influential. The Minimalists were agreed that the Flemish question could be solved if Flemish were used in every administrative office in Flanders, and if it were given an equivalent status to French in all the centralized state services.

The Maximalists soon began to rally themselves around the Front party of 1918, among whose leaders was Gustaf de Clercq. Their party, which adopted a policy of aiming at Flemish autonomy, was unable to win the full approval of the many ardent former Activists who had fled to Holland. This latter group formed, in 1921, the *Katholick Vlaamsch National Verbond* and the *Katholicke Christen Volkspartij van Vlaanderen*. The *Vlaamsche Nationale Partij* was established by another group of extreme radicals. But this slow

disintegration of the extreme maximalist elements did not hamper the growth of the Front party. For example, at the elections of 1919, the party polled 57,422 votes and returned five deputies; in 1921, 57,630 votes, out of a total maximalist poll of 58,769, returning four deputies; in 1925, 79,603 votes from a maximalist total of 84,143, with six deputies; in 1929, when the total maximalist returns were 132,962 votes, the Frontists had nine deputies and the other Maximalists two.

Further reforms

A law passed in 1921 divided Belgium into two linguistic zones for administrative purposes, corresponding to the division of 1917 (see p. 140). The second language could be introduced when there was any sign of a linguistic *irredente* being developed, but the one language could not be substituted for the other. A bilingual regime was set up for the special area of Bruxelles.

The Army Reform Law of 1928, which came into force in 1930, decreed that a soldier should be assigned to a regiment or battalion where his mother tongue, or the language of his native province, is employed. Both French and Flemish were placed on an equal basis in the military school at Bruxelles, and the act required commissioned officers to know the language of the men serving under them.*

An Amnesty Bill was passed in January 1929; it granted a general pardon and civil liberties, but it did not quash the sentences which had been imposed on the Activists, neither did it allow the return of their property nor restore civil rights to those who had been condemned to more than ten years in prison.† In this connexion, it is interesting to note that the former activist leader, Borms, while still in prison, had been returned to the Chamber in 1928 by an Antwerpen constituency.

In the meantime, Flamingants were continuing to express discontent with the scope of the 1921 act: it was not sufficiently explicit. In June 1932, a new bill was passed, and eventually given royal assent, to expand still further the use of Flemish in every branch of public administration in the Flemish provinces, and to restrict even more the much curtailed but still powerful influence of French. One practical outcome of this legislation was the establishing of a

* Another law in 1937 more rigidly enforced the language tests for officers and extended their application to N.C.O.'s. It further provided for Dutch and French sections to be set up at the military academy.

† In 1937 civil rights were restored to those who had been imprisoned, but reprieved Activists were not allowed to sit in Parliament.

Permanent Commission, under the presidency of the Minister for the Interior, to supervise the actual working of the act's provisions. Flemish and French were thus put on a basis of equality for all official purposes—in state documents, in parliamentary debates, and in parliamentary reports.

Meanwhile, internal dissension had begun to weaken the Front party; at the election of 1932, eight maximalist deputies were returned, with a total vote of 130,419 for the extremist candidates. The dissension manifested itself in the formation of two new groups. In 1931, the *Verbond van Dietsche Nationaalsolidaristen* (known as the Dinaso) was founded by van Severen; its programme visualized the creation of a state formed of the Netherlands, Belgium, the Grand Duchy of Luxembourg and French Flanders, but constitutional methods of attaining it were to be disdained. The *Vlaamsch National Verbond* (the V.N.V.) was formed in 1935 with Declerq, a former Frontist, as its leader; its immediate programme called for an autonomous Flanders. While the V.N.V. favoured an authoritarian system of government, it contested parliamentary elections, and in 1939 it had seventeen deputies with a total vote of 184,905.

The Flemish movement, in its varying forms, had now become more broadly nationalist, with economic schemes to supplement the earlier manifestos on language and administration. There had been a prodigious increase of Flamingant societies since 1920; their activities ranged from touring and the safeguarding of the interests of Flemish war veterans, to the subsidizing of the new writers of Flemish literature. A few Walloon extremists were often dismayed by the activities of their counterparts, and other Walloons viewed with misgiving the growing birth-rate in the Flemish provinces (see p. 213). Nevertheless, the general trend of relations seemed to be towards a mutual recognition of Wallony and Flanders as distinct regions, with the Bruxelles agglomeration as a special district. Various federalist projects were put forward from time to time, but it became clear that Federalism might well make the problem more complex. An unofficial *Centre d'Etudes pour la Reforme de l'Etat* was set up in 1936. This body commissioned a representative panel to study the language question; in its report, the committee completely discounted federalism; it stressed the existence of a Belgian nation, and emphasized the unity of tradition and culture which binds together the two communities forming the nation. This committee recommended that while Flemings and Walloons should be equally represented in the central administrative offices of the state, and that a

proportion of higher officials should be bilingual, it was advisable for Walloons to be appointed to posts in Wallony, and Flemings in Flanders.

In spite of the conciliatory nature of this report, the Flemish question still provoked bitter outbursts. Thus, in 1938, when Dr Martens, a former Activist who had been condemned to death but had received clemency under the laws of 1928 and 1937, was nominated by King Leopold to membership of the new Flemish Academy of Medicine, there was a motion of censure on the government. The government had a majority of only two votes, and subsequently resigned. A general election followed and Dr Martens resigned his membership of the Academy.

At the outbreak of war in 1939, full understanding between Flemings and Walloons had not yet been attained, but the gravity of events once again showed how urgent was the need for national unity.

Developments since the German Occupation in 1940

Immediately after the invasion of Belgium in 1940, Van Severen (later shot by the French), Declerq (who died in 1942) and other extreme Flamingants were arrested; *Volk en Staat*, the organ of the V.N.V. was suppressed. Since the Occupation, a minority of extremists, some of them belonging to the V.N.V. and the Dinaso, have practised activism. On the other hand, several patriotic Flemish papers have been published surreptitiously. The Germans at first granted a certain amount of restricted freedom to both the V.N.V. and the Dinaso. Two commissions were set up in the autumn of 1940; one consisted exclusively of Flemings and its task was to give redress to those Activists of 1914–18 who had been punished. Both Flemings and Walloons sat on the second commission which was instructed to supervise the execution of the language laws.

In May 1941, the Dinaso and the V.N.V. were united and the joint party became known under the latter name; it was to be the only recognized party in Flanders, while the Rexists (see p. 122) were to be the only party in Wallony. French-speaking Rexists living in Bruxelles, and Flemings resident in the Walloon area were permitted to retain membership of their respective parties.

Staf Declerq had designated himself *Leider* of the Flemings; many of his followers, who are now led by Elias, have loudly proclaimed their Germanic kinship and their unswerving allegiance to the combined cause of Flanders and Hitlerite Germany, but the V.N.V. has

not been installed in power. Although the appointment of Romsée, a prominent member, as Secretary-General of the Ministry of the Interior resulted in the distribution of many administrative posts among party members, the V.N.V. has not yet gained control over central administration. Meanwhile, 'activist' propaganda has made it clear that the extreme Flamingants hope not only to reduce the Walloons into subjection but also to reclaim French Flanders and Artois.

The leaders of the Church have shown more than passive disinterest in the various V.N.V. declarations (see p. 552) and it is safe to assume that the overwhelming majority of Catholic lay opinion is definitely opposed to the party.

The Flemish problem, however, remains; its final solution will call for close and careful attention when Belgium has been liberated from German occupation.

BIBLIOGRAPHICAL NOTE

A considerable amount has been written on the Flemish-Walloon problem, but the most comprehensive account in English is S. B. Clough, *A History of the Flemish Movement in Belgium* (New York, 1930), which contains a full bibliography. There is valuable information in P. Fredericq, *Geschiedenis der Vlaamsche beweging*, 3 vols. (Gent, 1906), and the general background of the problem in recent times can be found in the works mentioned on p. 129, as well as in Baron Beyens and others, *Histoire de la Belgique Contemporaine*, 3 vols. (Bruxelles, 1928–30).

Chapter VII

GOVERNMENT, ADMINISTRATION AND LAW

Central Government: Political Parties: Local Government: Legal System: Police System: Bibliographical Note

When the first national congress of the independent state of Belgium assembled in Bruxelles on 10 November 1830, its major task was to examine a bill for a constitution drafted by the central committee of the provisional government. After being discussed article by article, the constitution was finally ratified in January 1831. With various modifications made in 1893, 1920 and 1921, primarily to extend the suffrage, this constitution remains in force, the oldest written constitution in Europe still valid with the exception of the greatly transformed constitution of the Netherlands.

A strange variety of ideas and practices were embodied in the constitution to make it 'a work of practical good sense, of moderation and of toleration'. The influence of contemporary liberal thought deriving from the Declaration of the Rights of Man in 1791 permeates the second part which deals, in twenty-one articles, with the rights of Belgian citizens: they are all equal before the law and there is unqualified liberty of religion, education and association. A considerable amount of the *Code Napoléon* was preserved intact, and it accounts for the close similarity between many features of French and Belgian administration. A few Dutch laws, too, were incorporated. On the other hand, the spirit of the medieval charters and constitutional privileges of the various provinces and cities, after surviving centuries of political and religious vicissitudes, influenced the makers of the new constitution. This continuity of tradition has made Belgian local government a stronger administrative force than in most other European countries.

Central Government

The Monarchy

The kingdom of Belgium is a constitutional monarchy in which legislative power is exercised collectively by the king, who approves and promulgates the laws, by the Chamber of Representatives and by the Senate. Each of these has the right of initiating legislation.

The authority of the monarchy is exercised under ministerial control after the pattern of the French charter of 1830. Although the king has executive power, no act of his can be effective unless it is countersigned by a minister. In practice the powers of the crown include (*a*) the right of appointment to all civil and military posts, the granting of pardon, the conferring of titles and decorations, and (*b*) the right to order the coining of money, the command of the armed forces, the declaration of war and the concluding of treaties, except those which involve the nation in financial obligations or in territorial changes. Despite the apparent subordination of the royal powers to ministerial control, the kings of the Belgians have hitherto been far from inactive in the formulation of national policy.

The Belgian monarchy descends from male to male; females of the royal house and their descendants are entirely barred from succession. In the absence of male heirs, a king may nominate his successor, subject to the approval of both houses of parliament.

The Council of Ministers

Although there is no specific reference to collective ministerial responsibility in the Belgian constitution, the English convention has been adopted in practice by the council of ministers. As a council it concerns itself with formal affairs, but as a 'cabinet' it decides on matters of active policy. The council is presided over by the prime minister who is formally appointed by the king and who normally commands a majority in the two chambers. Occasionally, however, and especially in times of crisis, the king goes outside the political parties to find a prime minister. The number and functions of the ministers are determined by royal decree, although the Chamber of Representatives retains the right of final determination. Numbers vary from one government to another, but there are usually at least eleven or twelve members on the ministerial council.

Ministers may sit in either house and they have the right to speak in both even if they are not members of either. For example, the Minister for Defence is usually a professional soldier and the Minister for Finance has often been an expert without a parliamentary seat. Such ministers have the right of access to the two chambers although they cannot vote or, indeed, take an informal part in a discussion arising from their speeches.

On assuming office, a minister brings with him a small group of personal advisers who form his 'cabinet' and who retire with him. The minister's official adviser, however, is the *secretaire-général*, a

permanent official at the head of an established hierarchy of civil servants. In recent years, several ministers have also set up a number of advisory committees consisting of civil servants, deputies and outside experts. In January 1940 the Belgian council of ministers consisted of fourteen members: the prime minister, the ministers for Justice, Foreign Affairs, Defence, the Interior, Education, Finance, the Colonies, Public Works, Economic Affairs, Agriculture, Labour, Communications and Public Health.

Parliament

The Belgian parliament meets in Bruxelles and consists of two chambers—the Senate and the Chamber of Representatives. Both houses are renewed every four years; members are elected by compulsory manhood suffrage (the voting age being twenty-one) under a system of proportional representation. When this system, devised by Professor d'Hont of Gent, was accepted in 1899, Belgium became the first country to adopt proportional representation. Certain categories of women who suffered bereavement or hardship during the war of 1914–18 are allowed to vote in parliamentary and provincial elections; in 1939 they numbered 71,760 out of a total of 2,677,341 parliamentary voters. It has been suggested that fear of clerical influence on the exercise of female suffrage has hitherto been the strongest deterrent in the way of universal suffrage. For the elections to the Chamber, the country is divided into thirty districts, each lying wholly within a province. The number of representatives for each district varies from thirty for the electoral division of Bruxelles to three for the combined divisions of Arlon, Bastogne and Marche-en-Famenne in Luxembourg. There are twenty-one electoral districts for the Senate. Here again numbers vary from fifteen for Bruxelles to three for the entire province of Luxembourg. No person can be at the same time a member of both houses.

The two chambers assemble each year, on the second Tuesday in November, unless they are previously summoned by the king. Each session lasts for at least forty days, but the normal length is from November to July, with adjournments for Christmas and Easter vacations. No session can be closed except by royal decree, and the king has the right to convene extraordinary sessions. The king may dissolve both houses either simultaneously or separately. Dissolution is automatic when the throne becomes vacant or when the constitution is to be amended; otherwise the executive may request dissolution at any time. A new election must be held within forty

days of dissolution. General elections are normally held every four years.

Although both chambers have formally equal legislative power, custom has given the Chamber of Representatives a degree of prior importance. Bills are not often introduced in the Senate, and it is seldom that bills passed on to it from the Chamber are either rejected or amended. The Senate does not sit except when the Chamber is in session, and the fate of ministries depends entirely on the latter.

The Senate. The Senate, which has a president, who ranks as the first citizen of the land, three vice-presidents and six secretaries, consisted in 1939 of 167 members, including three women. Apart from the sons of the king, who become members at the age of eighteen and acquire the right to vote at twenty-five, membership of the Senate falls into three groups:

(i) Elected senators, whose number is one-half of the membership of the Chamber of Representatives, are elected at the general parliamentary elections. They are chosen from twenty-one categories clearly defined in the constitution and covering the whole professional life of Belgium. In 1939 they numbered 101.

(ii) Provincial senators, generally drawn from the ranks of former politicians, are chosen by the provincial councils (see p. 153) on a proportional basis of one senator for every 200,000 inhabitants in the province, with an increase of 125,000 giving the right to a further senator. At least three senators are elected by each provincial council and there was a total of forty-four in 1939. Provincial councils cannot choose as senator a person who has been a member of the council during the two years preceding the election.

(iii) Co-opted senators, whose number must not exceed one-half of the provincial senators, are chosen by senators elected in groups (i) and (ii). They are usually drawn from among university professors and other Belgians distinguished in the cultural life of the country.

All senators must be at least forty years of age and of Belgian citizenship. They receive no emolument but they are entitled to free railway travel and to an expenses allowance of 4,000 fr. per annum.

The Chamber of Representatives. The number of members in the Chamber is determined after each decennial census on a basis of not more than one representative for each 40,000 inhabitants. Membership is open to every Belgian citizen over the age of twenty-five resident in Belgium. There were 202 representatives, including two women, in 1939. Each member receives an annual salary of 12,000 fr. and free railway travel.

At the beginning of a new session the Chamber of Representatives elects a president, who ranks as second citizen of the land and receives extra remuneration, four vice-presidents and five secretaries who together form the bureau of the Chamber. Unlike the Speaker in the British House of Commons the president of the Belgian Chamber retires at each change of the majority in the house.

There are few standing committees in the Chamber, but there is a special committee to deal with the allocation and execution of parliamentary business. This committee is set up after every general election and consists of the president, the vice-presidents and six members drawn proportionately from the various parties. A more important part is played by the groups appointed after the election of a new chamber to consider in detail all propositions which come before the house. Each group—the total corresponds to that of ministerial departments—consists of twenty-one members, but no member can serve on more than two. A *rapporteur* is appointed by each group; together, the *rapporteurs* form a co-ordinating group, and it is through the *rapporteur* of this latter group that the findings of the other groups are presented to the Chamber.

All important measures, including the budget, are presented first before the Chamber. Bills may be introduced and speeches made in either French or Flemish; they are immediately translated into the other language. German, too, is occasionally used by deputies from the 'cantons of the east'. Government bills and those which have the support of not less than five members are presented for a preliminary discussion before being referred to one of the groups or, occasionally, to a select committee. After the report of the co-ordinating group has been received, the bill is brought up for general discussion and considered article by article before a final vote is taken on the bill as a whole. The delegation of parliamentary work to various groups obviously removes a considerable amount of responsibility from both cabinet and chamber, but more than once in the past the co-ordinating group has contained an opposition majority which has been able to hinder important government measures.

The official journal of both houses is the daily *Compte-rendu analytique*. Laws and official decrees, after being signed by the king and countersigned by a minister, are published weekly in French and Flemish in *Le Moniteur Belge*, while the proceedings of the chamber are reported *verbatim* in the *Annales parliamentaires*.

Political Parties

The three main political parties in Belgium are the Catholics, the Liberals and the Socialists. The name of the Catholic party does not mean that all Roman Catholics—and Roman Catholicism is the religion of the vast majority of Belgians—are members of the party. The differences between Catholics and Liberals and the rise and character of the Socialist party are discussed elsewhere (see pp. 116-21), but the existence of these three parties has necessitated the acceptance of coalition government as a regular practice in Belgium. Since 1918 all Belgian governments have been coalition, formed either of the three parties or of the Catholic party and one of the other two. Up to 1935, when M. van Zeeland, a non-party minister, became premier, all the prime ministers had been members of the Catholic party. While the Catholics have for many years held the largest number of seats in the Chamber of Representatives, the Socialists have followed closely and on two occasions, in 1926 and 1936, their poll was actually greater. Although the numerical strength of the Liberals has been steadily decreasing throughout the past fifty years, the social importance and the undoubted ability of many of its leaders have given the party an influence which is entirely disproportionate to its numbers.

Since coalition ministries have become the established rule of Belgian governments, it is not surprising that ministries tend to be unstable and that legislative measures are usually merely working compromises. Coalition has also tended further to minimize the significance of the three older party labels and to encourage divisions, particularly within the Catholic party. The 'opposition' in the chamber has often been in part composed of sections of the parties represented in the government. Thus the Catholic party now includes the Walloon Catholic Social party and the Flemish Catholic People's party, and the rift between its right and left wings is by no means small. The Socialists, for their part, have become more moderate. The Liberals, after a slight move to the left, have not gained in cohesion.

In addition to the three main parties in Belgium there are three smaller ones. The development of the Flemish Nationalist party is described in Chapter VI. The Rexist party of Léon Degrelle, with its vague corporative and semi-fascist ideas (see p. 122), had some initial success when it won twenty-six seats in the 1936 elections. This success was short-lived. Degrelle himself was defeated by a

vast majority by M. van Zeeland in a by-election held in 1937. The forces of the Catholic hierarchy were ranged against the Rexist cause, and in the 1939 elections they were able to return only four deputies. The Communists, though vigorous in propaganda and especially active among the Borinage miners, have not made much headway in Belgium.

After the elections of April 1939 the position of the various parties was as follows:

Party	Votes	Deputies	Senators
Catholic	763,000	73	62
Socialist	713,000	64	61
Liberal	406,000	33	25
Flemish Nationalist	184,000	17	12
Communist	126,000	9	3
Rexist	103,000	4	4
Independent	47,000	2	—

Local Government

The province and the commune are the main units of local government. Local authorities administer local affairs under the control of the central government through the Minister for the Interior, and although the influence of the central authority remains powerful, a considerably greater amount of autonomy is exercised by the Belgian local authorities than, for example, by the departments and communes in France.

The Province

Belgium is divided into nine provinces whose boundaries were arbitrarily drawn after the French occupation of 1795 but which roughly correspond to the medieval divisions of the country. The area and population of each province are set out in the table on p. 190.

The executive head of each province is the governor, appointed by the king on the advice of the Minister for the Interior. The governor is both a national official, representing the central authority, and head of the provincial government. In his first capacity he transmits instructions from Bruxelles to the communal councils within his jurisdiction and holds a general watching brief for the central authority over the local councils. In his second role he is responsible for the execution of the provincial council's decisions in

matters affecting public services within the province, with the exception of the army and the courts of justice. The governor appoints the subordinate personnel of various provincial services. In practice, however, his powers are more restricted than those of the French prefect. Provincial governors resign automatically with a change in the central government but it is not unusual for them to be reappointed.

The legislative power of the province is vested in the provincial council (*conseil provincial*). Its members, who are unpaid, are elected by the parliamentary voters for a period of four years. Membership of the councils varies from fifty to ninety according to population; in 1939 there were 696 provincial councillors, including eight women. The council is charged with the construction and upkeep of provincial roads, waterways and drainage and with the maintenance of charitable and educational institutions. It also elects provincial senators and nominates candidates for certain judicial posts (see p. 149). The annual budgets voted by the council are under the supervision of the *Cour des Comptes* (see p. 158) and they must be approved by the king.

The working administrative body of the council is the *Députation permanente* which is elected every four years by the council from among its own members and usually from the majority party. The permanent deputation, which meets at least once a week, consists of six members who receive a salary from the state; the governor is *ex officio* president. All administrative matters relating to the province are delegated to the deputation, and it is especially charged with the preparation of financial estimates and reports. In its capacity as advisory body to the governor, the deputation is able indirectly to supervise and control the activities of the communal authorities. The deputation cannot be suspended or dismissed by the central government.

Attached to each council there is a provincial registrar (*greffier*), appointed for a term of six years by the central government on the nomination of the permanent deputation. His status is that of a government official and he assists the provincial authority in the execution of their duties. The *greffier* is in attendance as secretary at meetings of both the deputation and the council.

The Arrondissement

For administrative purposes, the province is divided into arrondissements which vary from three to eight in the various provinces. At the head of each arrondissement there is a *commissaire d'arrondissement*,

a civil servant appointed on the recommendation of the governor to supervise the administration of communes with less than 5,000 inhabitants. In 1939 there were forty-one administrative arrondissements (Fig. 46), but some of them are grouped under one commissary.



Fig. 46. Administrative arrondissements in Belgium
Based on 1 : 320,000 *Carte de la Belgique* (Bruxelles, 1938).

The arrondissement is subdivided into electoral cantons of which there were 211 in 1939.

The Commune

The commune is the basic unit of local government and there were 2,670 communes in 1939. The demarcation of communal boundaries is the result of centuries old processes. In area, the largest commune is that of Mol, in the province of Antwerpen, with an area of 11,419 ha. and a population of 17,701, while the smallest is that of Groot-Loon, in the province of Limburg, with an area of 55 ha. and a population of 158. Despite such differences in area and population, all communes are governed by the same system, and there is no distinction between urban and rural communes. Local

authority in the commune again is exercised by three groups: the burgomaster, the communal council and the college of burgomaster and aldermen (*Collège des Bourgmestre et Echevins*).

The burgomaster is selected by the council but the appointment must be confirmed by the central government; he is the executive head of the communal council and the chief of the local police (see p. 160). Usually a member of the council is appointed, but, subject to the approval of the permanent deputation of the provincial council, a person from outside may be appointed. In practice the burgomaster is more the representative of the commune than the delegate of the central government. He holds office for a term of six years, and in the larger communes he receives a salary fixed by the communal council. It is usual for the burgomaster to be re-elected, and there have been many instances where a person has held the office for twenty or thirty years. Burgomasters of the larger towns have often been leaders of Belgian national life.

The communal council (*Conseil communal* or *Gemeenderaad*) is elected for six years by universal franchise on the basis of proportional representation. Since communal elections are by universal franchise, the percentage of female voters is greater than that of male. Thus, in 1938, out of a total of 5·4 million qualified voters, 2·8 million were women. The predominance of women voters is particularly noticeable in the larger agglomerations as shown in the following table:

Communal voters in 1938

	Male	Female	Total
Antwerpen	229,850	253,197	483,047
Bruxelles	387,240	456,226	843,466
Gent	140,800	153,835	294,635
Liége	183,575	200,136	383,711

Source: *Annuaire statistique de la Belgique*, p. lii–liii (Gand, 1939).

Membership of the council varies from seven where the population is under 1,000 to forty-five if it is over 300,000. The sessions of the council are not fixed; it can sit only when convoked by the aldermanic college or when a meeting is requested by at least one-third of the council.

The communal council is relatively more important than the provincial council since its terms of reference are more comprehensive. They cover the voting of the annual budget, the organization

of police, public institutions, public services, works and property together with the maintenance of primary schools (see p. 68). Public utility schemes can either be granted to private companies or operated as municipal *régies* (see p. 305). Thus nearly the whole water distribution of Belgium is a part of public administration, whereas most tramways are operated by private companies. The communal council is not directly responsible to any higher authority in the exercise of its powers, but any decrees which exceed its terms of reference may be suspended by the provincial governor and annulled by the king. The budgets of the council must finally be approved by the king after being examined by the *Cour des Comptes*; nevertheless, the central control over communal expenditure is much less than over that of the provincial authority. As the delegate of the central government the communal council is responsible for electoral registers and for the enforcement of laws and decrees. In 1939 there were 26,684 communal councillors, including 185 women.

The executive power of the council is entrusted to the college of burgomaster and aldermen. The burgomaster is *ex officio* president and the *échevins* (Flemish *schepenen*), whose numbers vary from two to seven according to the size of the council, are elected for a term of six years from among the council members. The salaries of the members of the college are fixed by the permanent deputation, and in the larger communes they are fairly high. In the larger communes, too, various administrative departments are allocated to individual *échevins*. Those of Bruxelles, for example, are naturally fully occupied with communal affairs.

Finally, there are the secretary of the council, generally a lawyer employed full time in the larger communes or, in the smaller communes, a schoolmaster; the treasurer (*receveur*) and, in the larger communes, the *commissaires* of police who act under the burgomaster.

Legal System

In addition to establishing that the executive power is vested in the king, subject to constitutional control, the Belgian constitution declares that judicial power, on the other hand, is exercised by the courts and tribunals whose decrees and judgements are executed in the name of the king. Thus, just as the pattern of civil administration in Belgium recalls that of the *Code Napoléon*, so too does its legal system bear a marked resemblance to that of France, and the administration of justice is entirely centralized under the control of the

Minister of Justice. The law is codified and the courts have no power to decide on the constitutional regularity of laws, except on that of provincial and communal decrees.

Courts

The lowest court is that of the *juges de paix*; in 1939 there were 173 justices of the peace and 230 judicial cantons. The *juge de paix* has summary jurisdiction in cases where police regulations are contravened, and he may give judgement in civil disputes where the amount in litigation does not exceed 3,000 fr.

Next in the grade comes the *Tribunal de première Instance* for each of twenty-six judicial arrondissements. The Court of First Instance consists of one or more chambers, with a president, vice-president and other judges. Three judges hear every case and give judgement. The court has unlimited civil jurisdiction, and its 'correctional' jurisdiction includes misdemeanours but excludes serious crimes (e.g. homicide and arson). In cases of misdemeanour, the court imposes sentences, the three judges deciding the issue by a majority vote if necessary.

A Court of Assize (*Cour d'Assise*) is held every quarter in the chief town of each province to try serious cases which involve more than five years' imprisonment. This court again is collegiate, consisting of a judge of the Court of Appeal as president and two judges of the Court of First Instance. Juries are empanelled for cases coming before this court, and appeals go direct to the *Cour de Cassation*. Political offences and offences of the press are also tried before this court.

The three Courts of Appeal (*Cours d'Appel*) established by the constitution hold their sessions at Bruxelles, Liége and Gent. Presided over by five judges, each court deals with all ordinary appeals, except in cases of crime, and also gives judgement in cases arising out of the criminal misconduct of magistrates as well as hearing appeals against the disciplinary actions of the Bar (*Conseil de l'Ordre*). On all questions of fact the Court of Appeal is the final arbiter, but on questions of law an appeal may be taken to the supreme Court of Final Appeal for Belgium and the Colony (*Cour de Cassation*) in Bruxelles. This court consists of two presidents and seventeen judges; it is divided into two chambers, criminal and civil, with seven judges sitting in each. It should be noted that, except in the trial of ministers, the Court of Cassation deals with points of law only. When its chambers do not confirm the judgement against which the appeal

has been brought, the case is sent back for retrial by a different court of the same grade as the court which first gave judgement. Furthermore, should the new court repeat the decree of the first trial court, the Court of Cassation, in full session, may give a new judgement which is binding on the lower court.

In addition to the courts presided over by professional judges, Belgium, like France, has two types of special tribunals of experts in the larger cities. The first is the *Tribunal de Commerce*, consisting of a panel of unpaid judges elected by business groups and exercising a restricted jurisdiction over commercial litigation. In 1939 there were twenty-one tribunals each assisted by one or more professional lawyers appointed by the king. The second type, of which there were fifty-four, is the court of industrial relations (*Conseil de Prud'hommes*) administered by employer and employee representatives authorized to arbitrate in labour disputes, subject to the consent of both parties and always with a right of appeal to a Court of First Instance.

The *Cour des Comptes* in Bruxelles is the chief government accounting authority which examines and finally approves all state, provincial and communal expenditure. Membership of the court, which is divided into eight sections, consists of professional accountancy experts and a number of honorary judges elected by the Chamber of Representatives for life.

Flemish is used in legal proceedings in the Flemish-speaking areas and French in the provinces where that language is dominant (see p. 142). Both languages are employed in the local courts at Bruxelles as well as in the *Cour de Cassation*. French and German are permitted in the judicial arrondissement of Verviers, and all three languages are used in the Court of Appeal at Liége.

Criminal Procedure

Within twenty-four hours of his arrest, the preliminary but rigorous examination of an accused person is begun by the *juge d'instruction*, an investigating officer of the Court of First Instance, who decides whether a *prima facie* case has been made. If the *juge d'instruction* states that a case has been established, the entire record goes to the *chambre du conseil* of the same court; this chamber, if it is satisfied with the decision of the investigating officer, either passes judgement or prepares a lengthy statement of 'accusation' for the *Chambre des Mises en Accusation* of the Court of Appeal—the latter course naturally depends on the gravity of the offence. The process

of investigation is so careful and laborious that when the final *dossier* reaches the Court of Assize or the Court of Appeal, the probable guilt of the accused is already well established. In the Courts of Assize, juries decide their verdicts by a majority vote, but the court (that is, the three judges) may, by supporting the minority, turn a verdict of guilty into an acquittal. Juries, too, share in deciding the nature of the sentence to be imposed.

Legal Appointments

Regulations governing the appointment of judges are laid down in the constitution. Justices of the peace and judges of the Courts of First Instance are appointed directly by the king. Members of the Courts of Appeal and the presidents and vice-presidents of Courts of First Instance are appointed by the king from two double lists submitted by these courts and by the provincial councils respectively. The members of the Court of Cassation are similarly appointed by the king from two double lists submitted by the court itself and by the Senate respectively. The candidates named on one list may also be nominated on the other, and all names are published at least a fortnight before the appointments are made. Judges are appointed for life and their salaries are fixed by law; the majority usually retire on pension at ages varying from seventy to seventy-five. All judges must be doctors of law: for Courts of First Instance they must have been justices of the peace for at least two years and be members of the Bar or former teachers of law in a university; in the case of judges of the other courts the length of previous judicial service is five years.

Many state officials are attached to the courts. They vary from the *commissaire de police* (see p. 160) in the court of the *juge de paix* to the *procureur-général* and the *avocats-généraux* of the higher courts. These officials act as public prosecutors and they are appointed directly by the king.

The interests of private individuals before the courts are in the hands of *avocats*, of whom there are about 3,500 in the country. There is no distinction in Belgium between solicitors and barristers, but the *avocats* form a corporation, roughly corresponding to the Bar in Britain, which admits candidates to membership (*inscrits au Tableau de l'Ordre*). There is a special list of *avocats* for the *Cour de Cassation*. In civil cases the services of an *avoué* are usually employed. Appointed by the king, he is the court officer who instructs clients in all the technicalities of legal procedure. His fees are regulated by law.

Police System

There are two branches of police in Belgium, namely, the state police and the communal police, and their functions are of two types. The first function is one of administration and the prevention of infringements of the law and of breaches of the public order. The second deals with criminal investigation and the collection of evidence for the courts.

State Police

The state police falls into two divisions—the *Gendarmerie* and the *Police judiciaire du Parquet* (state detective police).

In 1939 the *gendarmerie* consisted of 171 officers and 7,200 men. In matters of personnel, supplies and discipline it comes under the authority of the Minister for National Defence; in its administrative functions, the *gendarmerie* comes under the Minister for the Interior, and as a judicial body it is controlled by the Minister for Justice. In addition to the protection of life and property and the maintenance of public order, the state police supervises national mobilization and patrols the frontiers. The units of organization are as follows:

Unit	Command
Brigades	In charge of non-commissioned officers
Districts	Four or five brigades under an officer
Companies	Four or five districts under a commandant
Groups	Two companies under a major or a lt. colonel. The group centres are at Antwerpen, Brugge, Bruxelles, Gent, Hasselt, Liége, Mons and Namur
Regiments	Two or three groups under a colonel

In 1939 the *gendarmerie* had two armoured mobile regiments.

The state detective police was founded in 1920, and several of its members are attached to the staffs of the public prosecutor in the large towns.

Communal Police

Communal police administration falls under the control of the burgomaster. In all communes of 5,000 or over, the burgomaster is assisted by a *commissaire de police* who also acts as public prosecutor in the police court and is appointed by the Minister for the Interior from names submitted to him by the communal council. At the discretion of the minister there may be more than one *commissaire* in the large cities; in these circumstances one is delegated to act as

chief of police. Although the *commissaires* are appointed by the central government, they act under the burgomaster's authority in respect of local traffic control, patrol duty and the execution of security and sanitary regulations. There are usually three or four policemen (*agents*) to every 5,000 inhabitants. Most of the large towns have a small *brigade judiciaire* or communal criminal investigation department.

In villages without a communal police, the *garde champêtre* patrols the countryside to prevent damage to crops and poaching. The members of this rural guard, who number between 2,000 and 3,000, are appointed by the provincial governor and are under the supervision of the *commissaire d'arrondissement*.

BIBLIOGRAPHICAL NOTE

(1) There is an English version of the Belgian constitution in B. Shiva Rao, *Select Constitutions of the World* (Madras, 1934).

(2) There are three useful works which give a comprehensive account of central and local government in Belgium: (i) T. H. Reed, *Government and Politics of Belgium* (London, 1924); (ii) G. M. Harris, *Local Government in Many Lands* (London, 1933); (iii) James T. Shotwell (editor), *Governments of Continental Europe* (New York, 1942).

(3) The statutory regulations affecting civil servants in Belgium are described by F. Cattoir in *The Civil Service in the Modern State*, ed. L. D. White (Chicago, 1930).

Chapter VIII

PUBLIC HEALTH

Administration: Vital Statistics: Causes of Death: Infectious Diseases: Bibliographical Note

Administration

Central Administration

The state of the public health of Belgium compares not unfavourably with that of some other western European countries in spite of the fact that public opinion, parliament and the government have never attached the same importance to the responsibilities of the central administration in the field of public health as has been shown in other countries. Following the example of other countries, a Ministry of Health has been created, but its duration as an independent ministry varies from time to time, and frequently it has been combined with the Ministry of the Interior.

Public health activity in Belgium is characterized by communal autonomy and by the government's financial support of independent organizations, often political or religious in character, which are responsible for very important public health functions which in other countries are incumbent on the state.

The Ministry of the Interior and Public Health has two completely independent departments directly concerned with public health: the Public Health Section, with a medical Secretary-General at its head, and the Central Statistical Department. The Public Health section has the following technical personnel and equipment:

(i) Eleven medical inspectors of health, one for each of seven provinces, two each for the remaining two. Each of these inspectors has a woman health officer as an assistant and one or two disinfection officers.

Five sanitary inspectors.

Eleven inspectors of food and sixteen deputy inspectors.

Four inspectors of pharmacies.

One controller of narcotics.

Four inspectors of public assistance and two auxiliary social workers.

Three inspectors of physical training.

The port and Escaut Health services.

(ii) A central laboratory of bacteriology and serology.
An analytical pharmaceutical laboratory.
An analytical laboratory for foodstuffs.
The Central Vaccine Office.

The Minister of the Interior and Public Health may obtain technical advice from the Royal Academy of Medicine, the Central Health Board, the Public Assistance Board, the Physical Training Board, the Nursing-School Board, the Pharmacopoeia Board, the Alcoholism Commission, the Cancer Commission and the Nutrition Commission.

There is no general law on the organization of public health activity in Belgium, but before the war a Royal Commission had been formed to frame such legislation. The multiplicity of enactments that are enforced by the Public Health section of the ministry concern infectious diseases, poisons and narcotics, public assistance, and the practice of medicine and its ancillary professions.

The Ministries of Economic Affairs and Agriculture are concerned with the inspection of domestic animals. Lunacy laws are the concern of the Ministry of Justice. Regulations concerning drink shops are enforced by the Ministry of Finance. The Ministry of Labour is charged with the enforcement of laws relating to factory inspection and compulsory social insurance which covers accidents, occupational diseases, old-age pensions and family allowances: labour legislation since 1920 has done much to safeguard health. Unemployment insurance and sickness insurance are unofficial but subsidized by the state (see p. 76).

Provincial Administration

Some of the provincial administrations have directly interested themselves in public health, medical care, public assistance, housing, physical training, social work, and the employment of leisure. The provinces maintain institutes of bacteriology, disinfection services, two sanatoria, three lying-in hospitals, a colony for mental cases, an ophthalmic institute, a number of clinics, three institutes for deaf, blind or abnormal children, six schools for midwives and six schools for nurses.

Communal Administration

The care of public health in Belgium is first and last the concern of the commune, and legally very little pressure can be brought to

bear on communes that fail to acquit themselves well of that task. The commune is responsible for the provision of water supplies, sewers, scavenging services, health bureaux, and school medical inspection. The communal public assistance committee, which is appointed by the communal council (see p. 155), supervises hospitals, orphanages, almshouses and kindred institutions, and it gives financial help to the destitute as well as administering free medical assistance.

The degree of public health and sanitary development is more or less proportional to the size and resources of the commune and to local initiative. Obviously the smaller communes can do but little unaided. Fortunately for them, certain very important public health activities, including maternity and child welfare, the prevention and treatment of tuberculosis, and the prevention and treatment of venereal disease, are carried out by independent organizations subsidized by the state (see p. 171). Moreover, sickness insurance societies concern themselves to a certain limited extent with preventive medicine.

Administration in Urban Areas

In the large centres of population very adequate provision is generally made for safeguarding the public health, but several peculiarities of Belgian administration are responsible for a lack of co-ordination and a duplication of effort that are incompatible with economic efficiency. The administration of large urban areas is shared by a number of independent communes (see p. 154). Thus only 21 % of the population of the urban agglomeration of Bruxelles live within the city proper. The remaining districts of what to all appearance is one large city constitute fifteen independent communes, each with its own health administration and institutions, and its own municipal hospital. Bruxelles is not unique in its subdivision of administrative authority though it is the most outstanding example; Antwerpen, Gent and Liége are similarly subdivided.

The type of administration is apt to vary in accordance with local politics. Political and religious considerations influence public health activity in Belgium to no small extent. A single commune may have a Catholic, a Liberal and a Socialist child welfare centre and there may be a 'neutral' child welfare centre as well.

The functions of a city health department are much more limited in scope than they are in England or in the United States. The work of the Bruxelles city health department, for example, is confined to general sanitation, the control of epidemic diseases, the verification

and medical certification of births and deaths, most of the factory inspection, and the medical control of prostitutes. For these duties the city of Bruxelles employs a staff of one full-time medical officer of health; eighteen part-time physicians, ten of whom are mainly concerned with the verification of births and deaths, five with vaccination and the medical care of the personnel of the city administration, and three with the venereal dispensary and the medical control of prostitutes; seven sanitary inspectors; four public health nurses; four disinfectors, and nineteen other employees, mostly clerical staff.

The only laboratory work done by the Bruxelles city health department relates to the diagnosis of diphtheria. Other bacteriological and serological work is done either by the provincial Pasteur Institute or by private laboratories. Water examinations are carried out by the co-operative water company which supplies the city of Bruxelles and the fifteen other communes included in the metropolitan area. There is also an intercommunal laboratory for the examination of food and drink; this laboratory is also responsible for milk inspections.

Of the four public health nurses employed by the city health department two are engaged in anti-venereal disease work and two assist in the control of epidemic diseases.

Public Health in Small Communes

All small communes in Belgium are not essentially rural (see p.188). Luxembourg is the only Belgian province that is almost completely rural, and here, apart from a praiseworthy effort in recent years to improve water supplies, communal public health activity is almost negligible. In 1936, the average expenditure of the 233 communes of Luxembourg per head of population was as follows: water supply and sewerage, 45·50 francs; contribution to the public assistance budget, 6·60 francs; improvement of housing, 0·03 francs; encouragement of physical training, 0·01 franc; communal health services, including school medical inspection, maternal and child welfare, etc., 3·12 francs; communal social services and grants to social organizations and mutual insurance institutions, 0·55 franc. Out of more than two hundred communes in the province only twenty-two had a health bureau; none of these was adequately housed, and none was in charge of a qualified hygienist. Six communes had engaged nurses and one commune a social worker. Only twenty communes regularly employed the services of doctors and midwives, and only twelve had a staff for the registration of births and deaths.

Reports of the activities of communal public assistance committees in Luxembourg illustrate the disadvantage of the excessive subdivision of the country from the administrative point of view and of the time-honoured and jealously guarded autonomy enjoyed by communes. A few communal public assistance committees are so rich that their incomes are hoarded or used for road construction, while committees in nearby villages may have only a few hundred francs to spend annually. Assistance to one chronic invalid is sometimes sufficient to exhaust the budget of a village assistance committee. Committees in such poor communes have been advised to insure indigent people in mutual insurance societies and to pay the premiums on their behalf, but the advice does not appear to have been widely followed.

Small communes in other parts of Belgium acquit themselves better of their public health responsibilities. Here most villages of any size possess, if not a health service, a health bureau, a doctor and a midwife. The doctor and midwife give free attendance to the poor, receiving small fees from the public assistance committees for services rendered.

School Medical Service

All communes are required to arrange for the medical examination of all pupils entering school for the first time, and for a monthly visit of a medical inspector to each school. School medical inspectors are usually elected by the communal council from among local medical practitioners. The results of the medical examination of the pupil are entered on a special form which has recently been remodelled to bring it into line with the *carnet sanitaire*, or personal health book, which has been coming into more and more general use for the general population in towns and industrial regions. This *carnet* may be completed either by the child's private doctor or by the school medical officer. The latter also keeps his own records which contain fuller information than is contained in the *carnets sanitaires*. School medical supervision is also obligatory for private schools.

A few communes have organized excellent school medical services, but on the whole, especially in rural areas, these services are rudimentary. School buildings, however, have to satisfy hygienic requirements which have been formulated by the state. Smallpox vaccination is compulsory on entering school.

Water Supplies and Sewage Disposal

All communes, irrespective of size, are responsible for the provision of water, the disposal of excreta and scavenging.

While the water supplies of big centres of population appear to be satisfactory, this is not true of many villages in rural areas. Some villages, either independently or in conjunction with others, have installed piped water supplies, but such villages are few. Not more than 60 % of the total population of Belgium are provided with piped water. In communes with a piped supply householders cannot be compelled to connect with it. The situation is worst in villages in the lowlying parts of the country; here wells are shallow and the water is frequently polluted.

There is a National Water Supply Company which, at the request of communes, may plan, construct and operate communal or regional water supplies. Such schemes if approved are subsidized by the state; some progress in this direction has been made in recent years.

Water supplies in the maritime plain and polder region are inadequate for the present population. The smaller settlements obtain fresh water from wells in the dune belt, but the larger towns like Oostende are dependent on other areas for water. There is abundant surface water in this region but it is contaminated, and near the coast it is brackish. Towns in the Flanders plain obtain their supplies mostly from purified river water or water piped from other areas; many towns are served by the Bruxelles distribution system. There are also some artesian wells. Most of the towns of the Kempenland draw their supplies from wells but the Antwerpen supply is derived from the river Nèthe. The plateau of Brabant is the principal artesian-well area; the artesian supply, however, has been drawn on too heavily and the salinity is increasing with over-pumping. Local supplies are obtained from springs in the transverse river valleys at the zones of contact of sands and older rocks, or at the top of clay layers in the sands. Most of the urban supplies now come from outside the area, largely through the Bruxelles distribution system. The industrial towns of the Sambre and Meuse valleys obtain part of their water supply from the water-bearing gravels of the river beds, thus augmenting the supply from springs developed by tunnels in the limestone of Hesbaye. The right bank of the Meuse, especially the Condroz region, is a source of supply for the Bruxelles distribution system as well as for the towns of the Meuse valley. Streams which disappear in limestone belts emerge in the transverse valleys

as springs which are enlarged by tunnels. In the Ardenne proper, ample water supplies for the limited local requirements are derived from the numerous surface streams, from small springs and from wells. With the construction of reservoirs, this region is likely to become the source of supply for the larger part of the country north of the Sambre–Meuse valleys.

Sewage systems and sewage disposal works are almost confined to towns. In the majority of villages, human excreta are deposited in watertight cesspools which are periodically emptied, the contents being applied to the land as manure. In some suburban communes, bucket latrines are still in use. Very few villages, however, have a scavenging service.

Inspection of Foodstuffs

The inspection of foodstuffs is carried out by the city health services in towns, and by inspectors of the Central Health Department, at infrequent intervals, in villages. All communes must employ a veterinary surgeon for the inspection of carcasses slaughtered locally for human consumption.

The conditions in which milk is produced have improved, but many cow sheds are said to be dark and ill-kept and the milk to be of poor quality owing to a general lack of cleanliness. The Ministry of Agriculture makes grants for the improvement of cow sheds. Co-operative dairies, which were constantly increasing in number before the war, have been responsible for marked improvement. The price paid by co-operative dairies for milk varies directly with the cleanliness and with the fat content of the milk.

Medical Personnel

There is a Faculty of Medicine in each of the four universities (see p. 71), and the number of medical students enrolled at the end of 1937 was 2,873. The course for a medical degree extends over seven years, for pharmacy five years, and for dentistry five years. For medical students, one year's additional study is necessary for the diploma of public health or for a licentiate of physical training. A diploma of public health is not essential for medical inspectors of health. Courses for midwives last two years, for hospital nurses three years, and for social workers three years. There are state veterinary schools at Bruxelles and Gent.

At the beginning of 1938, there were in Belgium 6,455 doctors, 1,107 dentists, 2,474 pharmacists, 2,976 midwives, 157 druggists

and 711 veterinary surgeons. As in all other countries towns are, proportionally to their populations, much better supplied with doctors and dentists than are the smaller communes. The distribution of the medical and ancillary professions in 1938 was as follows:

	Average number of persons served by each			
	Doctor	Dentist	Pharmacist	Midwife
Communes with population over 5,000	1,055	5,181	2,603	3,083
Communes with population under 5,000	2,067	30,193	6,605	2,454

Source: *Annuaire statistique de la Belgique*, p. 124 (Gand, 1939).

The number of doctors is high having regard to the population; in France there is one doctor for 1,125 persons in communes with populations over 20,000, and one for 2,374 in communes with less than 10,000 inhabitants. Midwives are similarly more numerous proportionally in Belgium than in France. Dentists, on the other hand, are not numerous; in French communes of over 20,000 inhabitants there is one dentist for every 2,882 inhabitants, and in the communes with less than 10,000 one for 14,265. The proportion of doctors to midwives differs strikingly in the different provinces of Belgium. A much higher proportion of confinements are attended by midwives in rural areas than in the large towns. The distribution of doctors and midwives by province in 1938 was as follows:

Province	Doctors	Midwives
Antwerpen	815	328
Brabant	1,898	442
West-Vlaanderen	526	251
Oost-Vlaanderen	685	228
Hainaut	964	669
Liége	948	511
Limburg	181	217
Luxembourg	134	126
Namur	304	204
Belgium	6,455	2,976

Source: *Annuaire Statistique de la Belgique*, p. 124 (Gand, 1939).

By a law promulgated in 1938, an association or *collegium* was created which includes every medical practitioner in Belgium. This association is governed by nine provincial medical councils, each of which is composed of members of the profession elected by the compulsory secret vote of all medical practitioners in the province who

have attained the age of 35. These nine provincial councils elect a superior council for the whole of Belgium. The provincial councils have the duty of upholding the honour, dignity and discretion of the medical profession. The superior council has disciplinary powers, and it can impose penalties which may involve the suspension of the right to practice medicine for a period up to two years, or in extreme cases the complete withdrawal of the right to practice medicine in Belgium.

In addition to private medical practice much contract work is done for sickness insurance societies (see below). In some towns groups of doctors run dispensaries at which the poor pay nothing, others a small fee. Nursing homes are numerous in towns. These may be provided by a doctor, or a group of doctors, or religious orders, or by the Red Cross, or by philanthropists. In addition, there are the dispensaries of insurance societies who have also provided a certain number of hospitals and sanatoria. The public assistance committees of the wealthier communes have hospitals of their own. Some employers of labour and some insurance societies employ whole-time doctors.

Sickness Insurance

Sickness and invalidity insurance has been popular in Belgium for many years and has been encouraged and subsidized by the state. There are five chief national unions of sickness insurance societies: the Socialist National Union, the Catholic National Union, the Neutral National Union, the Employers' National Union, and the Liberal National Union. In 1935 there were no less than 3,193 approved societies. Of these 2,770 submitted returns; their membership totalled 1,233,807, exclusive of family dependents who are eligible for benefit. It would seem that more than a half of the total population of Belgium are covered by some sickness insurance scheme. In 1935 the beneficiaries of the medico-pharmaceutical services of these societies numbered 3,136,143. The benefits conferred by these societies and the contributions vary considerably. Some societies do a considerable amount of anti-tuberculosis work: free treatment in sanatoria is provided for sufferers as well as a service of visiting nurses. The expenditure of societies for anti-tuberculosis work in 1937 totalled 27 million francs; 3,149,808 persons were eligible for such benefits. Half the cost of this anti-tuberculosis work is contributed by the state. Maternity benefits are likewise important. An indemnity is paid to the insured mother

on the birth of the child and a daily allowance for the subsequent six weeks or longer. In 1936, maternity indemnities totalled 10·4 million francs and daily allowances 11 million francs.

The medical service of each society is independently organized. The insured person is generally called upon to pay one-fourth of the cost of medical treatment and of drugs. The arrangements for the provision of hospital and specialist services vary in different societies. Some of the national unions of insurance societies have polyclinics, sanatoria and such-like institutions. The insured person may choose his own hospital, in which case the society pays about half the cost of treatment.

Accident Insurance

Accident insurance is obligatory on all employers of labour, and the employer pays the whole of the premiums.

Industrial Hygiene

Since 1920 labour legislation has resulted in a noteworthy decline in the prevalence of occupational diseases. Real wages have risen and there has been a marked improvement in the standard of living. Unemployment allowances are paid to insured workers (see p. 75). Revised measures to protect the health of employees in industrial and commercial firms and in public utility services were promulgated in a royal decree in February 1939. Damp and unhealthy premises were prohibited; each employee had to have 10 cu. m. of space and not less than 4 sq.m. of floor space. The minimum height of work rooms was fixed at 2·50 m. The decree further dealt with precautions against fire, with lighting, heating, seating accommodation, drinking water, and first-aid outfits.

Unofficial Health Agencies

Semi-official or unofficial organizations in Belgium play an important part in the field of public health and social welfare; their activities are generally subsidized by the state.

The National Child Welfare Association, *l'Œuvre Nationale de l'Enfance*, was created by Act of Parliament in 1919, with the object of bringing together under one direction all the numerous organizations and institutions that were dealing with child welfare. A council directs its work: this consists of at least forty members who were nominated in the first instance by the king; vacancies are filled by the council itself. The council regulates the activities of all local

committees in organizing child welfare centres. Towards the cost of each centre, which is usually under the charge of a local doctor, the state contributes a half, and the province and the commune each contribute a quarter. Any twenty mothers or future mothers may demand the creation of a new centre. In about 1,086 of the 2,670 communes there is an infant welfare centre or a supervision service for infants. Most of the centres are in towns, but 212 communes with populations below 2,000 had them. In 1938, the 1,180 centres cared for 42,300 children under one year of age, a number which is about a third of the annual number of births. In addition the association had formed 140 centres for visiting nurses who visited 10,600 infants in 465 communes, mostly rural. Pre-natal care, however, is less well developed; the 279 pre-natal clinics were attended by 5,369 expectant mothers in 1938.

As in most other countries, older children of pre-school age receive less attention, though this aspect of the work of the association was receiving increased attention. One centre recently built in Bruxelles consists of five storeys, one storey for each age group. Colonies for delicate children were an interesting development of the work. At Knokke, an old convent has been converted into a home for 300 boys, and at Dongelberg there was a colony for 300 delicate children and a home for twenty babies.

The state contribution to the National Child Welfare Association amounted to about 25 million francs a year.

The National Association for defence against tuberculosis is another autonomous institution that is subsidized by the state to the extent of about 10 million francs a year. The supervision exercised by the government seems to be very limited; neither the state nor the commune exercises any real control though they supply the money. There are local committees, but a central committee and a director supervise the branches throughout the country. The association in 1938 was managing or supporting twenty-nine sanatoria (3,613 beds), 107 tuberculosis dispensaries, ten preventoria, one nursery school and three homes. All the dispensaries were in towns. Each dispensary has one or more visiting nurses who visit patients in their homes. The expenses of patients in sanatoria may be paid by insurance societies, or by the public assistance committees of communes if the patient be poor and uninsured. Public assistance committees in rural areas, however, are generally short of funds, and only a small proportion of the inhabitants of such areas are insured.

The National League against venereal diseases is yet another

autonomous organization that is subsidized by the state. It has a central committee with a president and a secretary-general. The League does much propaganda work and does much to foster the work of venereal disease clinics of which there were 130 in 1930. The contribution of private medical practitioners to the campaign appears to be more important than that of the dispensaries. Anti-syphilitic drugs are supplied free by the government to dispensaries and to selected doctors for the treatment of poor patients. Provinces and communes contribute to the running costs of the dispensaries which are free to all regardless of social position. Doctors may not request the name of the patient coming to the clinic for treatment. There has been a noteworthy decrease in the incidence of syphilis in Belgium during recent years; gonorrhoea is still prevalent. Venereal diseases appear to be much more prevalent in towns than in rural areas, but rural sufferers may go to towns for treatment.

The Belgian Red Cross Society, with 200 committees throughout the country, makes an appreciable contribution to public health and propaganda. At Watermael-Boitsfort, adjoining greater Bruxelles, it has established a rural health centre, with a pre-natal clinic, three maternity wards, an infant consultation clinic, a school medical inspection department, a gymnasium, a tuberculosis dispensary, bathrooms and shower baths. It employs visiting nurses in addition to operating a motor ambulance service; there are forty-seven motor ambulances in thirty-five centres, so that no house is more than 40 km. from an ambulance station. It has also a first class service for streets, mines, etc. The Junior Red Cross has a membership of some 80,000 schoolchildren, many of them from rural districts.

Vital Statistics

The Central Statistical Department is concerned with nearly all national statistics, including vital statistics. Statistics of infectious disease, however, are dealt with in the Public Health section of the ministry.

In every commune in Belgium there are registers of population, of births, of still-births, of marriages, of deaths and of causes of death. The burgomaster is the registrar and is responsible for the upkeep of these registers. A few towns have special statistical bureaux. The tabulation of information contained in the registers is done in the communes on special forms devised by the Central Statistical Department. The tables of births, deaths and the general movement of the

population, certified by the burgomaster, are forwarded, annually, through the commissioner of the arrondissement, who also certifies their accuracy, and then through the governor of the province, to the Central Statistical Department. This department checks and corrects the data so received and summarizes them in a series of tables for the whole country. The annual results of the movement of population thus established are published in *Le Moniteur Belge*; the details appear in the *Bulletin Trimestriel* and in the *Annuaire statistique de la Belgique*.

Registration

The registration of births in Belgium has been compulsory since 1805. Registration must be made, within three days of the birth, by the father of the child, or, in his absence or default, by the doctor, midwife, or other person assisting at the birth. This is done in the burgomaster's office, in the bureau of the *officier de l'état civil*. In all the large towns and in some other communes there is a communal service of verification of births and deaths; the doctor of the *état civil* visits the home and verifies the fact of birth and other details. A separate register is kept for still-births. Still-births include all infants born dead after the 180th day of gestation, and also children born alive who die before the registration of birth, that is, within the first three days of life. Such children dying within the first three days of life are not recorded in either the birth or death register.

The registration of deaths has been compulsory since 1803 and is complete. The nearest relative of the deceased informs the *officier de l'état civil* of the fact of death. Thereupon this official, or the doctor of the *état civil*, visits the place where the dead body is lying and obtains all the necessary information for the completion of the *acte de décès*. A burial permit is then issued. In some places the certificate of the doctor in attendance is accepted, the visit of the official doctor then being unnecessary. The superintendents of hospitals and military medical officers furnish the necessary certificates for deaths that occur within their respective spheres of activity.

Certification of the cause of death is not legally compulsory in Belgium, but medical practitioners are urged to supply this information in all cases, and this is generally done. Sometimes the doctor in attendance leaves a sealed note with the family detailing the cause of death: this is handed to the registrar when the death certificate is being drawn up. The registrar sends it unopened to the local bureau of hygiene, or of statistics if such exist. Here the information

is extracted for transmission to the Central Statistical Department. The certificate of the cause of death is thus treated as a confidential document throughout, and when information of a statistical value has been extracted therefrom the certificate is burnt. In the smaller communes information as to the cause of death is commonly obtained only from the verbal statements of the declarant or other members of the household of the deceased. Such information must of necessity be of doubtful accuracy in many cases. The fact that there is no legal compulsion for certification of cause of death militates against the value of statistical records. Statistics of the causes of death are believed to be most incomplete in respect of diseases likely to bring discredit on the family of the deceased or to affect the matrimonial prospects of its members.

Rates of Death, Infant Mortality and Births

The general death-rate, the infant mortality rate and the birth-rate in Belgium for each year from 1925 to 1940 are tabulated below. Corresponding rates for England and Wales are inserted for comparison.

Year	Death-rate per 1,000 inhabitants		Infant mortality. Death of infants under 1 year per 1,000 live births		Birth-rate per 1,000 inhabitants	
	Belgium	England and Wales	Belgium	England and Wales	Belgium	England and Wales
1925	13·1	12·2	94	75	19·8	18·3
1926	13·3	11·6	97	70	19·0	17·8
1927	13·5	12·3	92	70	18·3	16·6
1928	13·2	11·7	87	65	18·4	16·7
1929	15·0	13·4	104	74	18·1	16·3
1930	13·3	11·4	93	60	18·7	16·3
1931	13·2	12·3	82	66	18·2	15·8
1932	13·2	12·0	87	65	17·6	15·3
1933	13·1	12·3	85	64	16·5	14·4
1934	12·2	11·8	76	59	16·0	14·8
1935	12·8	11·7	77	57	15·4	14·7
1936	12·8	12·1	79	59	15·2	14·8
1937	13·1	12·4	74	58	15·3	14·9
1938	13·1	11·6	72	52	15·8	15·1
1939*	13·8	12·1‡	73	50	15·3	14·9
1940*	16·4†	14·3‡	89	55	13·4	14·6

* Preliminary figures. † War losses included. ‡ Exclusive of war losses.

Deaths

Since 1925, Belgium has had a relatively steady death-rate, indicative of the absence of any severe epidemic manifestation except

for influenza in 1929. War losses contributed to the high rate recorded in 1940.

The general death-rates are some 50 % lower than those recorded at the end of the last century; the improvement was continuous. Average annual death-rates were:

1881–90,	20·7 per thousand	1921–25,	13·4 per thousand
1891–00,	19·3 ,,	1926–30,	13·7 ,,
1901–10,	16·7 ,,	1931–35,	12·9 ,,
1911–13,	15·3 ,,		

In the years preceding the outbreak of the present war, birth-rates consistently exceeded death-rates, but this natural increase of population was diminishing steadily. The excess of births over deaths varied markedly in the different provinces of Belgium; in some, deaths exceeded births in number. In 1937 deaths were in excess in Hainaut, Liége and Namur.

Excess of Births over Deaths per 1,000 *population in the Provinces of Belgium in* 1937

Antwerpen	6·4	Liége	−2·6
Brabant	0·1	Limburg	14·8
West-Vlaanderen	7·2	Luxembourg	1·4
Oost-Vlaanderen	4·3	Namur	−1·7
Hainaut	−4·1	Belgium	2·2

In the city of Bruxelles proper, and in Liége and Gent, death-rates consistently exceed birth-rates.

The general death-rates of Belgium closely approximate those of Scotland. They are appreciably higher than those of England and Wales, very much higher than those of the Netherlands, but considerably lower than the death-rates of France (Fig. 47).

Crude death-rates are of limited significance as indices of health conditions in different countries or different communities. Among other factors count must be paid to the possibly different age and sex constitutions of the populations compared. For this purpose specific death-rates for the age and sex groups of the populations are determined. From these figures standardized death-rates are calculated, rates that would be observed if national specific rates referred to populations with identical age and sex distribution. It is immaterial what standard population is used for calculating these hypothetical standardized death-rates, provided of course the same standard is used for all the communities compared. In the calculation of the

standardized rates in the table on page 178 the population of England and Wales as disclosed by the 1901 census has been used as the standard population.

The standardized death-rate of Belgium was 1·1 per thousand higher than that of England and Wales and 0·8 per thousand lower

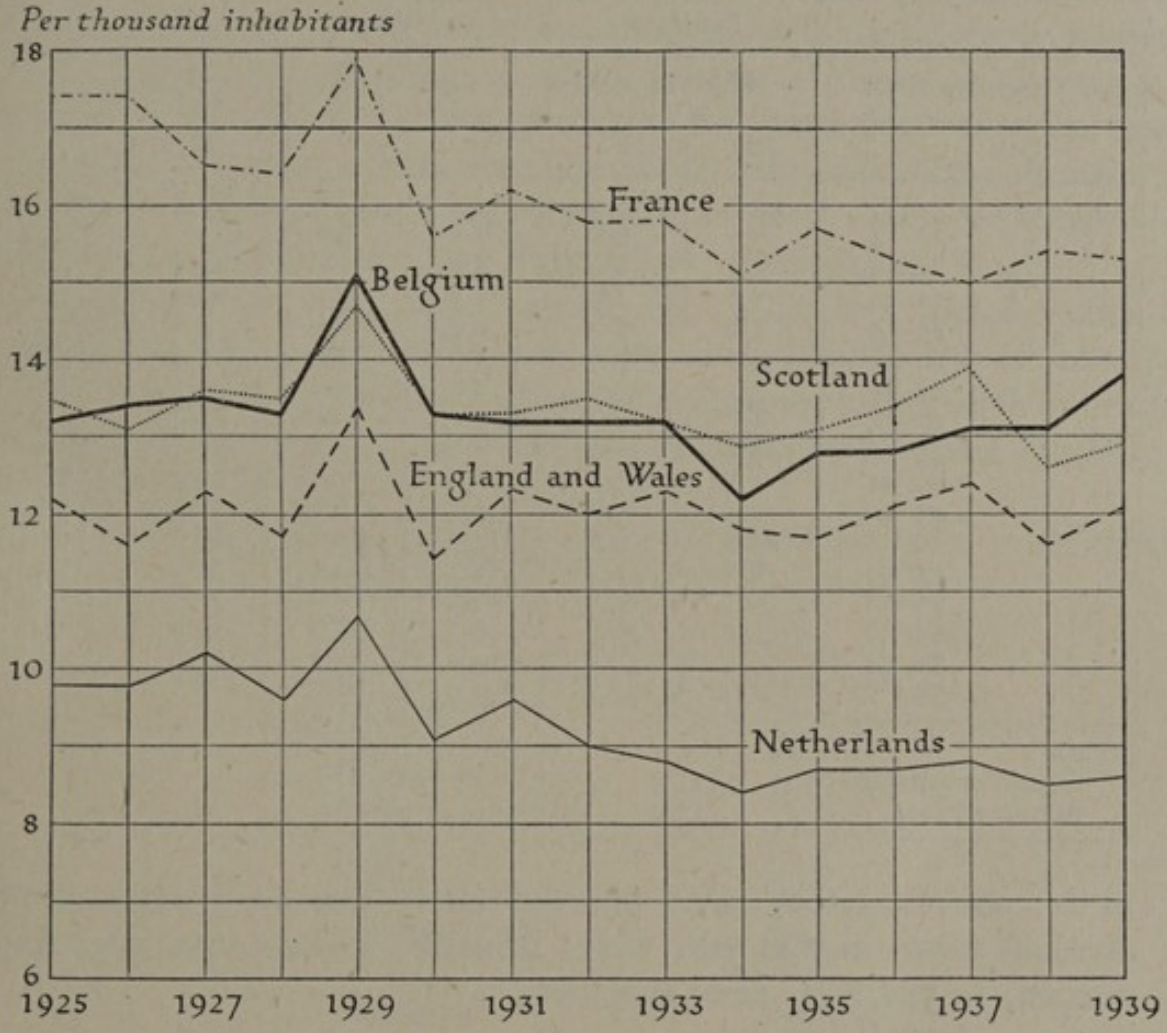


Fig. 47. General death-rates of Belgium, England and Wales, Scotland, France and the Netherlands

Based on official statistics.

that that of France. In all three countries the male mortality exceeded the female mortality in all age groups except ages 10–19 in France. During the first four years of life the Belgian mortality rate is higher than that of either France or England; in all older age groups Belgian death-rates are appreciably lower than those of France. English rates are lower than the Belgian for all age groups up to 55.

The largest Belgian communes have higher death-rates than the smaller. The death-rates of communes according to population in 1937 were: under 2,000, 13·37; 2,000–5,000, 12·49; 5,000–25,000,

Average Specific Rates of Mortality of Belgium, of England and Wales and of France for 1930–2 by Age and Sex per 1,000 of each Group, according to Censuses taken during the Period considered, and Standardized Death-rates

	Belgium		England and Wales		France	
Census ...	Dec. 1930		Apr. 1931		Mar. 1931	
Sex ...	M.	F.	M.	F.	M.	F.
Age group: 0– 1	98·4	76·3	72·2	54·9	85·8	67·9
1– 4	7·7	6·8	7·5	6·8	7·0	6·4
5– 9	2·3	2·0	2·3	2·0	2·3	2·2
10–14	1·6	1·5	1·5	1·4	1·9	2·0
15–19	3·0	2·7	2·5	2·3	3·1	3·2
20–24	4·0	3·7	3·3	2·8	5·1	4·8
25–29	4·1	3·9	3·3	3·1	5·3	4·7
30–34	4·6	4·1	3·6	3·3	6·4	4·8
35–39	5·4	4·7	4·8	3·9	7·9	5·4
40–44	7·1	5·6	6·4	4·9	9·5	6·4
45–49	9·5	7·1	9·3	6·7	12·5	8·1
50–54	13·2	9·8	13·1	9·5	16·5	10·6
55–59	19·6	14·6	19·1	13·9	23·7	15·3
60–64	29·1	22·6	29·2	21·4	33·0	21·6
65–69	45·1	36·6	46·5	33·8	50·1	35·4
70–74	70·8	59·0	74·4	55·5	123·0	103·0
75+	151·2	133·8	149·9	128·7		
Total:						
Crude death-rate	13·3		11·9		16·1	
Standard rate	10·9		9·8		11·7	

12·21; above 25,000, 14·20 per thousand. The death-rates of individual towns in that year were: Bruxelles and suburbs, 9·5; Antwerpen, 10·5; Liége, 14·6; and Gent, 13·7.

Births

Belgium participated in the decline of birth-rates that characterized most countries of western Europe during the inter-war period (see table on p. 207). From 1911 to 1913 the birth-rate averaged 22·7 per thousand; in 1925 and 1926 it exceeded 19 per thousand; since 1935 it has been persistently below 16 per thousand (see pp. 207-9). The birth-rate per thousand by province is shown on p. 214. Small communes have higher birth-rates than the large centres of population. In 1937 birth-rates in communes classified according to population were: under 2,000, 15·68; 2,000–5,000, 16·72; 5,000–25,000, 14·94; above 25,000, 14·26 per thousand. The birth-rates of all the big towns are generally much below the rate for Belgium as a whole.

Thus, in 1937 the birth-rates were: Bruxelles and suburbs, 9·9; Antwerpen, 11·3; Liége, 8·8; Gent, 11·1; with 15·3 per thousand for the whole country.

Infant Mortality

The infant mortality rates of Belgium have fallen remarkably since the beginning of the century, but they are still considerably higher than the rates prevailing in other northern European countries. From 1911 to 1913 the average annual Belgian infant mortality rate was 139 per 1,000 live births. The lowest rate ever recorded was 72 in 1938; in that year rates recorded in other north European countries were: the Netherlands, 37; Norway, 37; Sweden, 42; England and Wales, 52; Germany, 60; France, 66. Moreover, Belgian infant mortality rates are an under-statement, since infants who die shortly after birth, before registration, are not included in either birth or death registers. If such infants had been included the infant mortality rate of 76 in 1934 would have been 82.

The infant mortality rates vary considerably in the different provinces. In 1937 these were:

Province	Infant mortality rate
Antwerpen	77·8
Brabant	65·6
West-Vlaanderen	79·2
Oost-Vlaanderen	82·6
Hainaut	75·1
Liége	68·5
Limburg	73·3
Luxembourg	60·3
Namur	69·3
Belgium	74·2

Infant mortality rates are higher in rural area than in towns; they are about 25 % higher in communes with less than 2,000 inhabitants than in those with over 25,000. This may be in large measure ascribed to the activities of child welfare organizations which are very well developed in large centres of population. Bruxelles has consistently much higher infant mortality rates than have other large towns. In 1938 these rates were: Bruxelles, 102; Antwerpen, 61; Liége, 83; Gent, 47. In Bruxelles the rate is not excessive during the first month of life, but from one to twelve months it is very high. A high rate of mortality continues also during the second year of life for which age group the Bruxelles death-rate is about double the rate of Belgium as a whole. Diarrhoea and broncho-pneumonia

figure prominently among the causes of death of these small children of Bruxelles.

Prominent among the causes of infant deaths in 1937 were: congenital debility, 24·5 (percentage of total infant deaths); pneumonia, 16·7; diseases of nervous system, 14·8; diarrhoea and enteritis, 9·9; influenza, 5·4; bronchitis, 3·3; and whooping cough, 3·1.

Causes of Death

The table on p. 181 gives the number of deaths ascribed in Belgium to each of the forty-three causes of death, according to the abridged international nomenclature of 1929, during the years 1936 and 1937. The figures are also expressed as rates per 100,000 inhabitants. Corresponding rates for England and Wales for 1937 are also included.

The death-rates under the rubric 'Cause of death not specified or ill-defined', reach over 80 per 100,000, or 6·3 % of the total death-rate, and they are unsatisfactorily high. In England and Wales such deaths form not more than 0·2 % of the total deaths. When it is recalled, however, that the certification of the cause of death is not legally compulsory in Belgium, and that many deaths in small rural communes are reported by a relative or other person present at the death, and that their statements may furnish the only information obtainable as to the cause of death, it is surprising that still more deaths are not included in this meaningless category. In France, where there is likewise no compulsory certification of the cause of death, the proportion of persons dying from unknown causes is much higher than in Belgium, often amounting to 20 % of the total deaths. The death-rates from old age in Belgium generally exceed 130 per 100,000, more than three times the rates recorded in England and Wales. In such circumstances it is not profitable to make too close a comparison between the death-rates attributed to individual causes of mortality in Belgium and in England and Wales respectively. In both countries more deaths are ascribed to heart disease than to any other cause. In both countries cancer occupies the second place; the reported incidence of cancer is about 50 % higher in England and Wales, but it is very probable that many deaths from cause unknown should have been attributed to cancer.

In the large towns the registration of the causes of death is much more complete than it is in small communes and in Belgium as a whole. More than a third of the total deaths in Bruxelles take place in hospitals; in these exact diagnoses are the rule. In only 2·5 % of

Causes of death (abridged nomenclature of 1929)	Belgium				England and Wales
	Deaths		Rates per 100,000		Rates per 100,000
	1936	1937	1936	1937	1937
Typhoid and paratyphoid fever	97	119	1·2	1·4	0·5
Typhus fever	0	0	0·–	0·–	0·–
Smallpox	0	0	0·–	0·–	0·–
Measles	336	224	4·0	2·7	2·6
Scarlet fever	124	95	1·5	1·1	0·8
Whooping cough	433	386	5·2	4·6	4·3
Diphtheria	377	476	4·5	5·7	7·2
Influenza	1,915	2,058	23·0	24·6	45·4
Plague	0	0	0·–	0·–	0·–
Tuberculosis of the respiratory system	4,681	4,478	56·2	53·6	58·4
Other forms of tuberculosis	1,311	1,442	15·7	17·2	11·1
Syphilis	39	50	0·5	0·6	3·0
Malaria	12	10	0·1	0·1	0·0
Other infectious or parasitic diseases	753	717	9·0	8·5	7·9
Of which acute poliomyelitis	*25*	*36*	*0·3*	*0·4*	*0·3*
Cancer and other malignant tumours	9,166	9,801	110·0	117·2	163·3
Tumours, non-malignant, or of which the nature is not specified	759	684	9·1	8·2	6·3
Chronic rheumatism and gout	544	488	6·5	5·8	9·1
Diabetes mellitus	1,589	1,644	19·1	19·7	17·8
Alcoholism (acute or chronic)	111	86	1·3	1·0	0·2
Other general diseases and chronic poisonings	698	648	8·4	7·8	20·5
Progressive locomotor ataxia and general paralysis of the insane	853	866	10·2	10·4	3·5
Cerebral haemorrhage, cerebral embolism and thrombosis	8,398	8,647	100·8	103·4	66·5
Other diseases of the nervous system and of organs of special sense	3,845	3,602	46·2	43·1	27·2
Diseases of the heart	17,707	18,797	212·5	224·8	313·7
Other diseases of the circulatory system	2,655	2,653	31·9	31·7	69·5
Bronchitis	2,609	2,606	31·3	31·2	43·6
Pneumonias	7,037	7,218	84·5	86·3	72·0
Other diseases of the respiratory system (tuberculosis excepted)	3,804	4,068	45·7	48·7	11·8
Diarrhoea and enteritis	1,188	1,344	14·3	16·1	12·0
*Of which under two years**	*931*	*968*	*7·3*	*7·6*	*5·5*
Appendicitis	689	626	8·3	7·5	6·9
Diseases of the liver and biliary passages	1,689	1,724	20·3	20·6	9·1
Other diseases of the digestive system	3,357	3,386	40·3	40·5	31·7
Nephritis	2,668	2,950	32·0	35·3	36·7
Other diseases of genito-urinary system	1,295	1,238	15·5	14·8	20·3
Puerperal septicaemia*	199	155	1·6	1·2	1·0
Other diseases of pregnancy, child-birth and the puerperal state*	385	339	3·0	2·7	2·3
Diseases of the skin and cellular tissue and of the bones and organs of locomotion	478	456	5·7	5·5	6·7
Congenital debility and malformations, premature birth and other diseases of early infancy*	2,307	2,318	18·2	18·2	31·9
Senility	11,079	11,442	133·0	136·8	41·4
Suicide	1,319	1,487	15·8	17·8	12·6
Homicide	94	83	1·1	0·9	0·4
Violent and accidental deaths (suicide and homicide excepted)	2,783	2,863	33·4	34·2	42·5
Cause of death not specified or ill-defined	6,807	6,866	81·7	82·1	3·0
Total	106,190	109,140	1,274·6	1,305·2	1,241·9

* Rate per 1,000 live births.

the deaths that occurred in Bruxelles in 1935 was the cause ill-defined or unknown.

Death-rates attributed to tuberculosis of the respiratory system closely approximate the English rates; other forms of tuberculosis are responsible for 50 % higher mortality rate than in England and Wales. The pulmonary tuberculosis incidence in large towns, with some exceptions, does not appear to differ much from that of Belgium as a whole. In 1937 it was responsible for death-rates per 100,000 of 52·8 in Bruxelles, 54·1 in Antwerpen, 73·9 in Liége and 47·1 in Gent as compared with 53·6 for Belgium as a whole. During the three years 1933–5 in Bruxelles the male tuberculosis death-rate was three times the female rate at the ages 30–50 and five times at the ages 50–70. No explanation of such an excessive male tuberculosis mortality is forthcoming. Recent work done in testing the tuberculin reaction of children aged six to fourteen in the large towns and in some of the rural districts seems to show that tuberculosis infection is diminishing in Belgium.

Infectious Diseases

There is no compulsory notification of cases of infectious disease in Belgium except for the quarantine diseases which are controlled by the International Sanitary Convention to which Belgium is a signatory. The quarantine diseases are plague, cholera, typhus fever, relapsing fever and smallpox, none of which have prevailed in Belgium in recent years. The last case of typhus fever notified in Belgium was in 1928, and the last case of smallpox in 1932. Smallpox vaccination is compulsory for all children entering school. There was evidence that the vaccination of younger children was becoming increasingly neglected. Consequently a decree was issued in August 1940 making anti-smallpox vaccination compulsory between the third and eighth month of life. If vaccination fails it must be repeated, and medical contra-indications must be attested by medical certificate; parents or guardians who fail to comply are liable to be fined or imprisoned from one to seven days. Burgomasters must organize free public sessions for vaccination every three months. Vaccination performed by a private practitioner must be certified.

Though the notification of the common infectious diseases is optional, practising physicians appear to notify cases of typhoid fever, diphtheria and scarlet fever, but such notifications are very incomplete except perhaps in the larger towns where a large proportion

of these cases are treated in hospitals. During 1933–5 three-quarters of the deaths from infectious diseases in Bruxelles occurred in hospital. The minor infectious diseases of childhood are rarely notified except for cases occurring at school age. In all but the larger communes with special health departments the practitioner reports to the medical inspector of health of the province, who may also receive information from the headmasters of schools, communal authorities or other persons. On receipt of such information the medical inspector and his assistant, a woman health adviser, visit the locality and arrange with the burgomaster the measures to be taken. Such measures as the exclusion of the patients' brothers and sisters from school may be ordered, but neither isolation of the case at home, nor removal to hospital can be legally enforced. The health adviser visits the patients and tries to make their families adopt the necessary precautions. For the most part she seems to be well received and her advice acted on. The provincial disinfection service carries out the necessary disinfection in the small communes. In towns all this work is carried out by the city health department. Two of the visiting nurses of the Bruxelles health department are engaged exclusively on infectious disease control.

The number of cases and deaths of certain infectious diseases reported during three recent years in Belgium are tabulated below:

	1936		1937		1938	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Typhoid and paratyphoid fever	368	97	363	119	286	117
Scarlet fever	2,472	124	3,068	95	4,236	127
Diphtheria	1,916	377	2,090	476	2,572	499
Acute poliomyelitis	22	25	160	36	44	21
Influenza	—	1,915	—	2,058	—	1,789
Measles	—	336	—	224	—	231
Whooping cough	—	433	—	386	—	380
Cerebro-spinal meningitis	29	—	24	—	21	—
Encephalitis lethargica	9	—	4	—	4	—

Cases of typhoid and paratyphoid fever are evidently incompletely notified. The case mortality rate according to the above figures is about 32 %; it is unlikely to have much exceeded 12 %. In England and Wales in 1938 it was 11 %. The incidence of these diseases of the typhoid group have decreased during recent years, but small outbreaks still occur from time to time, mostly in small communes with unprotected water supplies. In 1937 the typhoid and paratyphoid death-rates in large towns were: Bruxelles, 0·2; Antwerpen,

2·2; Liége, 3·1; and Gent, 2·4 per 100,000 as compared with 1·4 for Belgium as a whole.

Scarlet fever is said to be for the most part of a very mild type, as it is in most of north and western Europe. The case mortality rate of the cases recorded in the table on p. 183 is 3·5 %, as compared with an English case mortality rate over the same period of 0·4 %. Here then is probably another illustration of very incomplete case notification.

Diphtheria death-rates on a population basis are generally about 50 % higher in England and Wales than in Belgium. Very imperfect notification is evident in the case of this disease also. In the three years listed above the diphtheria case mortality rate averaged 20 %; the corresponding rate in England and Wales was 3·5 %. Propaganda in favour of vaccination against diphtheria is actively carried on and has made considerable progress in some towns. With the consent of parents a large proportion of children entering primary public schools in Bruxelles are immunized by the Ramon method, a smaller proportion in denominational schools, and in kindergartens. Between 1930 and 1936 the average annual number of diphtheria immunizations carried out in the city of Bruxelles was 1,174. Though there is very little evidence that the incidence of diphtheria decreased in Bruxelles during this period the value of immunization is shown by the fact that only 6·7 % of the diphtheria cases were reported from primary schools, whereas 22·1 % of the scarlet fever cases were so reported. Much attention is also given in Bruxelles to the search for diphtheria carriers in schools and among contacts of cases. In 1937 the diphtheria death-rate of Belgium was 5·7 per 100,000; that of the four large cities was: Bruxelles, 1·6; Antwerpen, 8·0; Liége, 11·8; and Gent, 11·0.

Of other communicable diseases little need be said. *Dysentery* is a rare disease: a small epidemic of bacillary dysentery (Flexner's bacillus) recently occurred in a crèche. A few cases of *undulant fever* have been reported. There is no endemic *malaria* in Belgium. *Rabies* is said to be non-existent.

The following table contains information regarding the vital statistics and the mortality caused by important infectious diseases in Bruxelles, Antwerpen, Liége and Gent, and in Belgium as a whole:

		Bruxelles and suburbs pop. 912,774	Antwerpen pop. 273,317	Liége pop. 162,229	Gent pop. 162,858	Belgium
General death-rate per 1,000	1936	9·4	10·9	13·4	12·7	12·8
	1937	9·5	10·5	14·6	13·7	13·1
	1938	9·7	10·6	13·7	13·6	13·1
Birth-rate per 1,000	1936	10·0	11·2	8·8	11·6	15·2
	1937	9·9	11·3	8·8	11·1	15·3
	1938	10·5	11·8	9·0	11·6	15·8
Infant mortality per 1,000 live births	1936	110	65	80	56	79
	1937	92	64	78	60	74
	1938	102	61	83	47	72
Typhoid and paratyphoid fever, deaths per 100,000	1936	0·9	0·4	2·5	2·4	1·2
	1937	0·2	2·2	3·1	2·4	1·4
	1938	0·3	0·7	1·2	0·0	1·3
Measles, deaths per 100,000	1936	1·7	14·6	1·9	3·0	4·0
	1937	1·2	2·6	5·0	2·4	2·7
	1938	0·9	6·6	1·8	8·6	2·7
Scarlet fever, deaths per 100,000	1936	0·3	0·0	0·0	0·6	1·5
	1937	0·2	0·0	1·9	9·6	1·1
	1938	0·0	0·4	1·2	8·0	1·5
Diphtheria, deaths per 100,000	1936	0·6	6·6	3·7	4·3	4·5
	1937	1·6	8·0	11·8	11·0	5·7
	1938	1·5	8·0	4·9	8·0	5·9
Influenza, deaths per 100,000	1935–36	2·8	5·8	3·4	7·3	23·0
	1936–37	4·6	13·9	6·2	10·4	24·6
	1937–38	3·1	8·0	7·5	9·2	21·3
Tuberculosis of the respiratory system, deaths per 100,000	1936	54·3	63·2	77·3	46·8	56·2
	1937	52·8	54·1	73·9	47·1	53·6
	1938	46·5	48·9	70·3	42·9	—
Other forms of tuberculosis, deaths per 100,000	1936	9·5	4·1	10·5	12·2	15·7
	1937	9·7	6·9	15·5	17·7	17·2
	1938	8·3	6·6	16·6	12·9	—
Pneumonia and bronchopneumonia, deaths per 100,000	1935–36	55·8	75·2	121·4	176·7	84·5
	1936–37	59·3	62·3	141·0	178·7	86·3
	1937–38	63·0	67·8	140·9	172·0	—

BIBLIOGRAPHICAL NOTE

Most of the statistical information contained in this chapter was obtained from the *Annual Epidemiological Report* for the year 1938 published by the Health Organization of the League of Nations, Geneva, 1941. All data published in these reports are official in the sense that they are submitted for correction to the health administrations and statistical offices of the countries concerned. The text of these reports is in both French and English.

The *Annuaire statistique de la Belgique et du Congo Belge* (Gand, 1939) also provides useful information in summary form.

An account of the *Official Vital Statistics of the Kingdom of Belgium* by Greenwood and Edge forms no. 2 of the Statistical Handbook series published by the Health Organization of the League of Nations, Geneva, 1924.

Much authoritative information is contained in 'The organization of public health in the rural areas of Belgium', by Dr René Sand, Secretary-General of the Public Health Section of the Ministry of the Interior and Public Health, and Professor in the University of Bruxelles in the *Bulletin of the Health Organization*

of the League of Nations (Geneva, 1939), vol. VIII, p. 617. As an annex to this paper there is a description of 'Public health organization of the province of Luxembourg', by M. Graffar.

International Studies on the Relation between the Private and Official Practice of Medicine with Special Reference to the Prevention of Disease, by A. Newsholme, vol. II, chap. I (London, 1931), gives an account of conditions in Belgium.

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Chapter IX

THE GROWTH AND DISTRIBUTION OF POPULATION

General Features
Distribution of Population: The Northern Lowland: The Central Uplands: The East-West Industrial Belt: The Kempenland: The Southern Highlands: Belgian Lorraine
The Growth of Population: The Balance of Births and Deaths; Age Groups; The Death-rate: The Birth-rate, Fertility and Reproduction Rates
Regional Variations in Growth: Areas of Increase, 1846–1935: Areas of Decline 1846–1935: Pre-war Tendencies
Towns and Cities
Rural Settlement
Foreign Population: Foreigners in the Economic Life of Belgium: Refugees
Note on Family Allowances
Bibliographical Note

General Features

The population of Belgium at the end of 1938 was officially estimated at 8,386,553, so that the average density over the whole country was 275 per sq. km., i.e. 712 per sq. mile. The following table shows how this compares with neighbouring countries:

Estimates of Population on 31 December 1938

	Population	Area in sq. km.	Density per sq. km.	Density per sq. mile
France	41,980,000	551,000	76	197
United Kingdom	47,600,000	244,000	195	505
Germany*	67,500,000	470,000	144	373
Netherlands	8,727,000	33,000	264	684
Belgium	8,387,000	31,000	275	712
Luxembourg, G.D.	301,000	2,600	116	300

* 1937 frontiers (i.e. including the Saar territory); the date of the estimate is June 1938.
Source: *Statistical Year-Book of the League of Nations*, 1938–9, p. 18 (Geneva, 1939), and ibid. 1939–40, p. 17.

This high density of population—the highest in Europe—is due mainly to the great industrial development of the country. According

to the census of 1930, the effective working population was 3,750,285, over one-half of which was occupied in mining and industry. The occupational distribution of the workers was as follows:

Category	Totals	Percentages
Agriculture and forestry	635,032	16·9
Fishing	2,572	0·1
Mining and industry	2,047,905	54·6
Commerce and transport	543,757	14·5
Liberal professions	140,336	3·7
Civil Service	168,661	4·5
Domestic service	183,796	4·9
Others	28,226	0·8
Total	3,750,285	100

Source: *Recensement général*, 1930, vol. v, p. 20 (Bruxelles, 1937).

Another factor making for a high density is the very intensive nature of Belgian agriculture, especially in Flanders. The result is that much of the countryside supports a population that compares in density with that of many industrial areas. Moreover, one of the characteristic features of Belgian life is that, quite apart from the agricultural population, a large proportion of industrial workers live in the countryside. The cheapness of workmen's season tickets and the dense network of railways make this possible. It is not surprising to find people who live 10, or even 30, miles away from their work. The distinction between urban industrial population and rural agricultural population is far from being a sharp one. Moreover, any percentages of occupational groupings cannot be regarded as clear-cut categories, for many industrial workmen cultivate small plots of ground with the aid of their families. In short, the life of Belgium can best be described as an economy in which agriculture and industry are closely integrated.

The balance between agricultural and industrial employment has been changing during the last 50 years or so, to the advantage of the industrial element. Although, as we have seen, it is impossible to draw hard and fast lines between the different categories of workers, the following table is sufficiently exact to show the general tendencies at work.

Occupation Groups, 1880–1930 (in percentages)

	1880	1890	1900	1910	1920*	1930
Agriculture and forestry	31·0	22·1	21·1	16·0	15·3	16·9
Mining and industry	34·5	36·8	41·6	48·5	46·8	54·6
Commerce	8·8	11·2	11·7	16·8	18·1	14·5
Others	25·7	29·9	25·6	18·7	19·8	14·0

* Pre-1914 territory.

Sources: (1) *Recensement général*, 1930, vol. v, p. 62 (Bruxelles, 1937); (2) ibid. 1920, vol. III, p. 257 (Bruxelles, 1926); (3) P. L. Michotte, 'La Belgique est-elle surpeuplée?' *Bulletin de la Société belge d'Etudes géographiques*, vol. IV, p. 143 (Bruxelles, 1934).

These tendencies are to some extent reflected in changes in the relative importance of settlements of varying sizes. The following table shows by percentages the population in different categories of communes between 1866 and 1930:

Categories of communes no. of inhabitants	1866	1876	1880	1890	1900	1910	1920	1930
Over 100,000	8·08	10·41	10·61	11·48	11·57	10·95	12·00	11·61
25,000–100,000	5·66	7·92	8·73	11·47	13·00	15·58	14·82	17·30
5,000– 25,000	22·58	23·27	23·62	23·29	27·73	29·94	30·70	31·57
2,000– 5,000	27·26	26·16	25·42	25·15	22·77	21·25	20·61	20·01
Under 2,000	36·42	32·24	31·62	28·61	24·93	22·28	21·87	19·51
Total	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00

Source: *Annuaire statistique de la Belgique*, p. xix (Gand, 1939).

The population has tended to concentrate more and more into communes with over 5,000 inhabitants. In 1866, the population of communes with less than 5,000 inhabitants represented 64 % of the total; by 1930 it had fallen to 40 %, though the decline was only a relative one, for the absolute number of people in this category remained static.* The surplus went to swell, not the cities with over 100,000 inhabitants, but the intermediate towns with 25,000–100,000, in which category the numbers of people have trebled since 1866. To talk, therefore, of a rural exodus is somewhat misleading, for the absolute number of people in the smaller communes has not decreased.

* 3,046,460 in 1866 as compared with 3,198,321 in 1930; see the 1880 *Recensement général*, p. xix (Bruxelles, 1884), and *Annuaire statistique de la Belgique*, p. xix (Gand, 1939).

Distribution of Population

The average figure of 275 people per sq. km. for the whole of Belgium is misleading, for the density of population varies considerably between the various provinces.

Population of Belgium, 31 December 1938

Province	Area in sq. km.	Total population 1938	Per sq. km.	Per sq. mile
Brabant	3,283	1,771,038	539	1,396
Antwerpen	2,860	1,254,242	439	1,137
Oost-Vlaanderen	2,971	1,192,034	401	1,039
Hainaut	3,721	1,238,537	333	862
West-Vlaanderen	3,234	965,910	299	774
Liége	3,951	972,481	246	637
Limburg	2,408	416,547	173	448
Namur	3,660	356,198	97	251
Luxembourg	4,418	219,566	50	130
Belgium	30,506	8,386,553	275	712

Sources: (1) *Annuaire statistique de la Belgique*, p. xvii (Gand, 1939); (2) *Moniteur Belge*, 13 April 1939 (Bruxelles).

In general, there is a broad contrast between the sparsely inhabited mountainous region in the south with a density of less than 100 per sq. km., and the populous north and centre where the density is above 100 over the greater part of the area (Figs. 48, 49, 50). The dividing line between the two districts is, roughly, the east-west industrial belt with its dense industrial population. These variations can best be described in terms of six regions—the northern lowland, the central uplands, the Kempenland, the east-west industrial belt, and, lastly, the southern highlands and Belgian Lorraine. The figures used in each case are the official estimates for 31 December 1938.

The Northern Lowland

The coast is bordered by a continuous line of sand dunes, and has no large town apart from Oostende (50,263), the chief Belgian fishing port and also an important harbour for cross-Channel services (see p. 397). There are, however, many small bathing resorts that have become increasingly popular as European centres of pleasures, e.g. Blankenberge (1,960), Heist (6,639), and De Panne (4,444). In the dune area outside these settlements, the density falls to 50–100 people per sq. km., and occasionally even below 50—comparatively high figures when the infertile nature of the sandy soil is considered.

Here, rye, turnips and potatoes are grown, and, with the rise of the coastal resorts, market gardening has become important (see p. 235). Standing some 15 km. from the coast is Brugge (51,884), which in the nineteenth century regained something of its former industrial importance (see p. 594).

The interior of Flanders, with its intensive system of cultivation both on the polder land and on the upland alike, has a density of 200–400 per sq.km. Houses are dotted thickly over the countryside. On his small holding, sometimes less than one-fifth of a hectare (half an acre) in size, the Flemish agriculturalist works with a spade rather than a plough. The extensive use of fertilizers, together with ingenious methods of cultivation, have enabled almost every corner of available land to be tilled, and Flanders provides one of the best examples of intensive farming in Europe. The result is a wide variety of crops—cereals, flax, chicory, sugar beet, tobacco, hops and animal feedstuffs. Industry is closely bound up with agriculture, and supplements the farmer's income. Lace, embroidery and wooden shoes are still made at home, although this domestic industry is on the decline. Moreover, many factory workers often live some distance out in the country, and their families cultivate a small patch of land. Flanders is outstanding for its close integration of rural and industrial activity.

In the midst of this highly cultivated countryside there are many urban centres, for the interior of Flanders is not only an intensively cultivated area but is also the main seat of the Belgian textile industry (Fig. 83). The largest city is Gent (162,858), whose dual character as an horticultural centre and an industrial town symbolizes the diverse activity of Flanders. With its cotton, linen, jute and hemp mills, Gent is the greatest textile centre in Belgium (see p. 418). If its industrial satellites be included, the total makes an agglomeration of over 200,000 people (see p. 217).

To the east of Gent, there is an area of dense population in the valleys of the Escaut and its tributaries. From Ath northwards, there are a number of considerable manufacturing towns in the valley of the Dendre—Lessines, Geeraardsbergen, Ninove—each with over 10,000 inhabitants. Further downstream comes Aalst (41,131), a weaving and brewing town, and then Dendermonde (9,468), where the Dendre joins the Escaut. Between Dendermonde and Gent stands Wetteren (18,674), while, on the rising ground to the north and west of the lower Escaut are Lokeren, (25,398) and Sint-Niklaas (41,933). On the estuary stands Antwerpen (273,317).

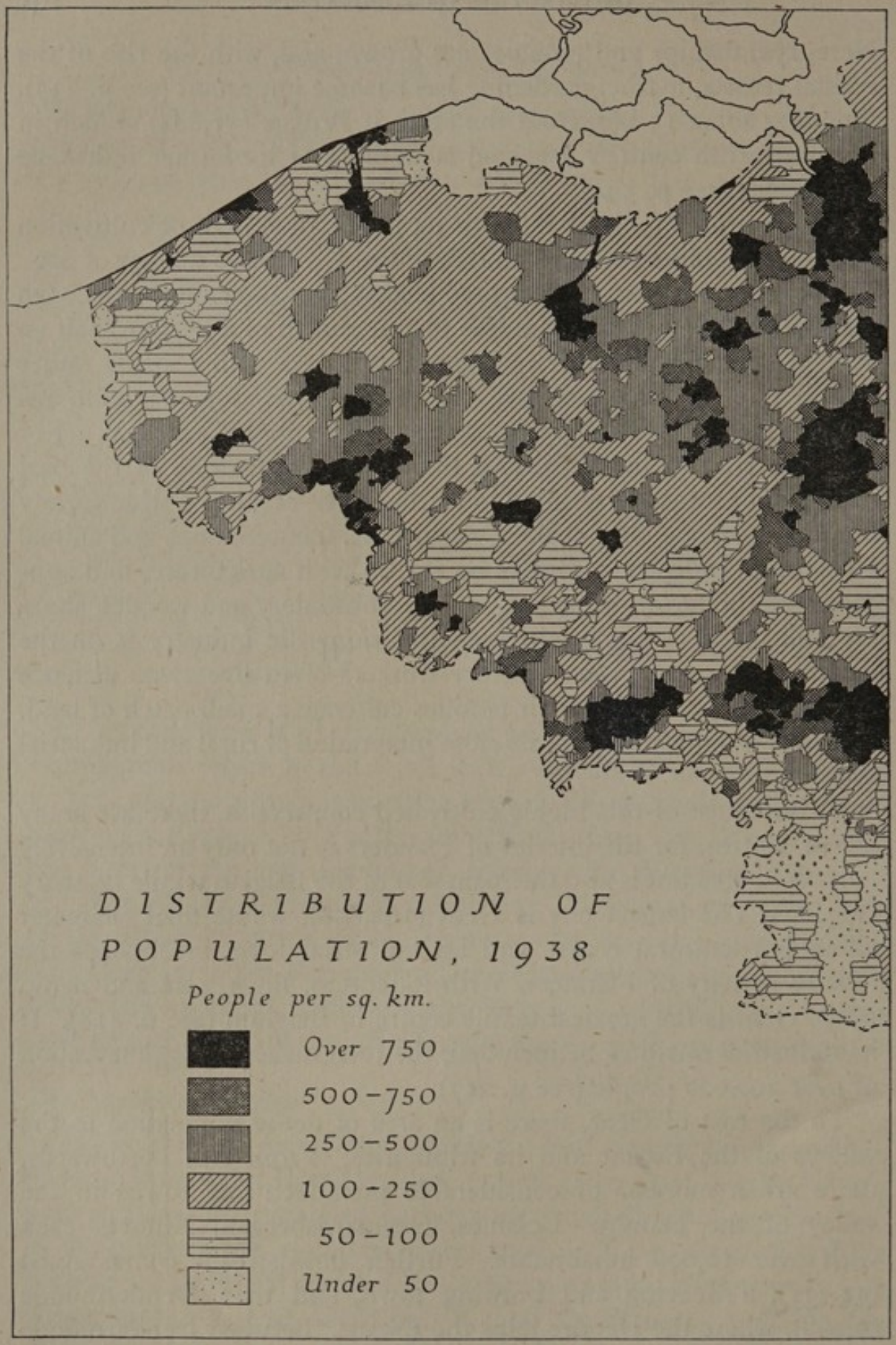


Fig. 48. The distribution of population in Western Belgium, 1938

Based on the estimates for 31 December 1938, in *Le Moniteur Belge*, 13 April 1939 (Bruxelles).

The figures are calculated on the basis of communes.

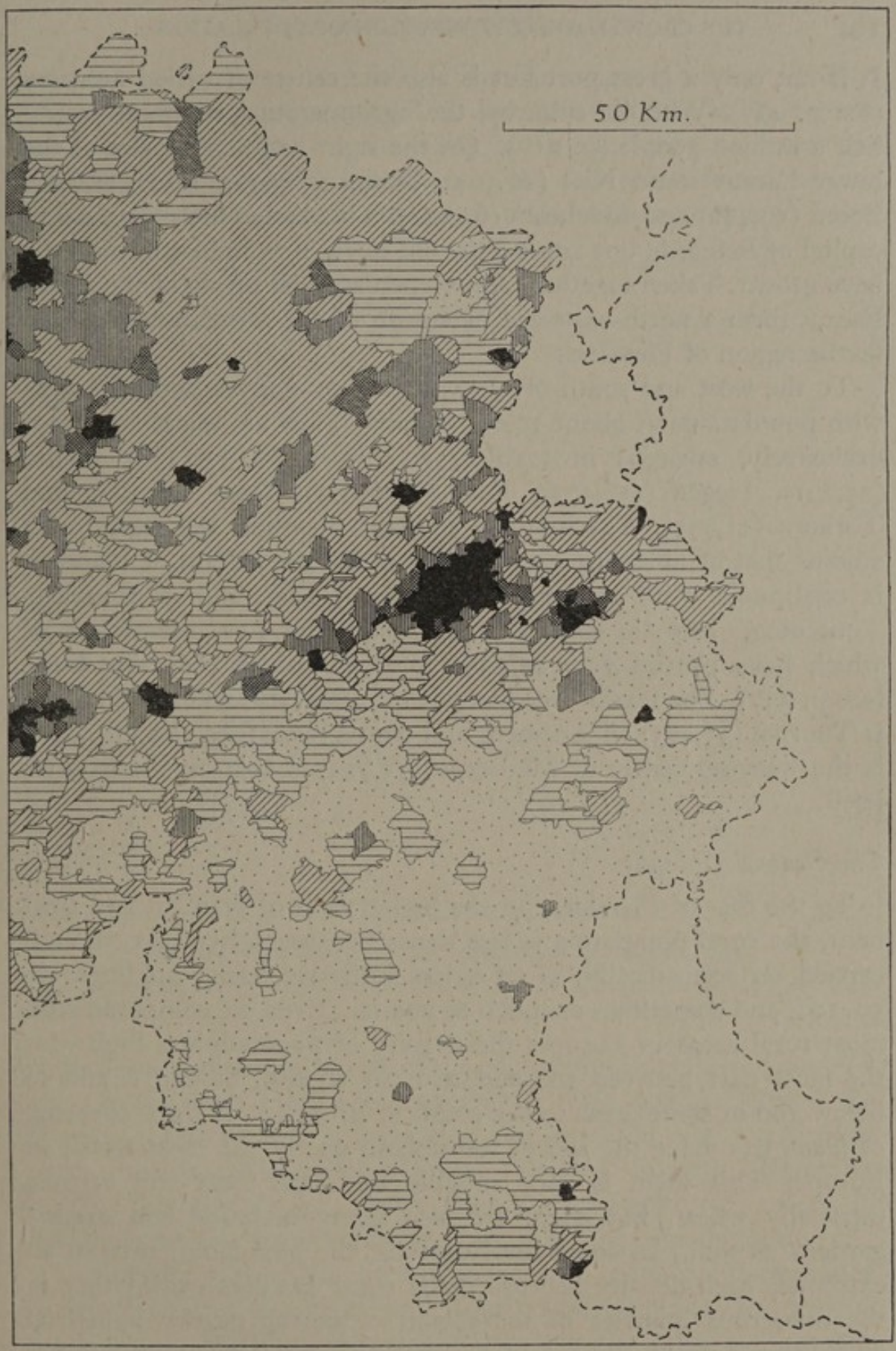


Fig. 49. The distribution of population in Eastern Belgium, 1938

Based on the estimates for 31 December 1938, in *Le Moniteur Belge*, 13 April 1939 (Bruxelles).

The figures are calculated on the basis of communes.

It is not only a great port but is also the centre of varied industry (see p. 427). With its suburbs, the agglomeration numbers nearly half a million people (p. 217). On the right-bank tributaries of the lower Escaut stand Niel (10,564), Duffel (10,990), Lier (28,631), Boom (19,442) and Mechelen (62,311). This last is the ecclesiastical capital of Belgium, but around the old town, new industrial suburbs have grown. Taken together, Antwerpen and the towns of the lower Escaut form a north-eastward extension of the great industrial and textile region of Flanders.

To the west and south of Gent, there are many industrial towns with populations of about 10,000–30,000. They are mainly, but not exclusively, engaged in textiles, e.g. Roeselare (30,334), Ronse (25,261), Izegem (16,375), Eekloo (16,063), Ieper (16,128) and Torhout (11,777). Towards the southern frontier, the textile area adjoins that of northern France. The dense population of Flanders is continuous with the agglomerations of Lille and of Roubaix-Tourcoing. Here is Kortrijk (40,979) on the Lys, the waters of which have proved very suitable for retting and bleaching linen (see p. 337). The textile area extends into Hainaut, and not far away is Tournai (35,463) with cement and textile industries. To the south is the weaving centre of Mouscron (35,722) almost on the frontier itself.

The Central Uplands

To the east of Flanders, on the higher land of Hainaut and Brabant, the rural population is less dense because agriculture, though carried on scientifically, is on a less intensive basis; holdings are 50–100, and sometimes as much as 200 ha. Even so, compared with most rural areas in Europe, the density of population is high—for the most part between 100 and 200 per sq.km., though it falls to below 100 in some areas to the south of Bruxelles. A thick covering of *limon* has made the soil of the upland one of the most fertile in Europe. This loam is very suitable for sugar beet and cereals, especially wheat, but there are also many orchards and market gardens as well. In some rural cantons, the population rises to an extremely high density because many rural dwellers work either in the numerous quarries of the region or in the nearby industrial cities; thus a density of 326 is reached in the rural canton of Assche.

To the east of the Dyle is the district known as Hesbaye, and here, in the north along the medieval route from the Rhineland to Brugge and Antwerpen, is a line of substantial towns with miscellaneous

industries—Tongeren (12,661), Sint-Truiden (17,058), Tienen (21,952) and Leuven (37,141). This last, situated on the Dyle itself, is not only famous for its university but is the centre of varied industrial activities—breweries, flour mills, saw mills, foundries (see p. 601). With its suburbs, the total population amounts to some

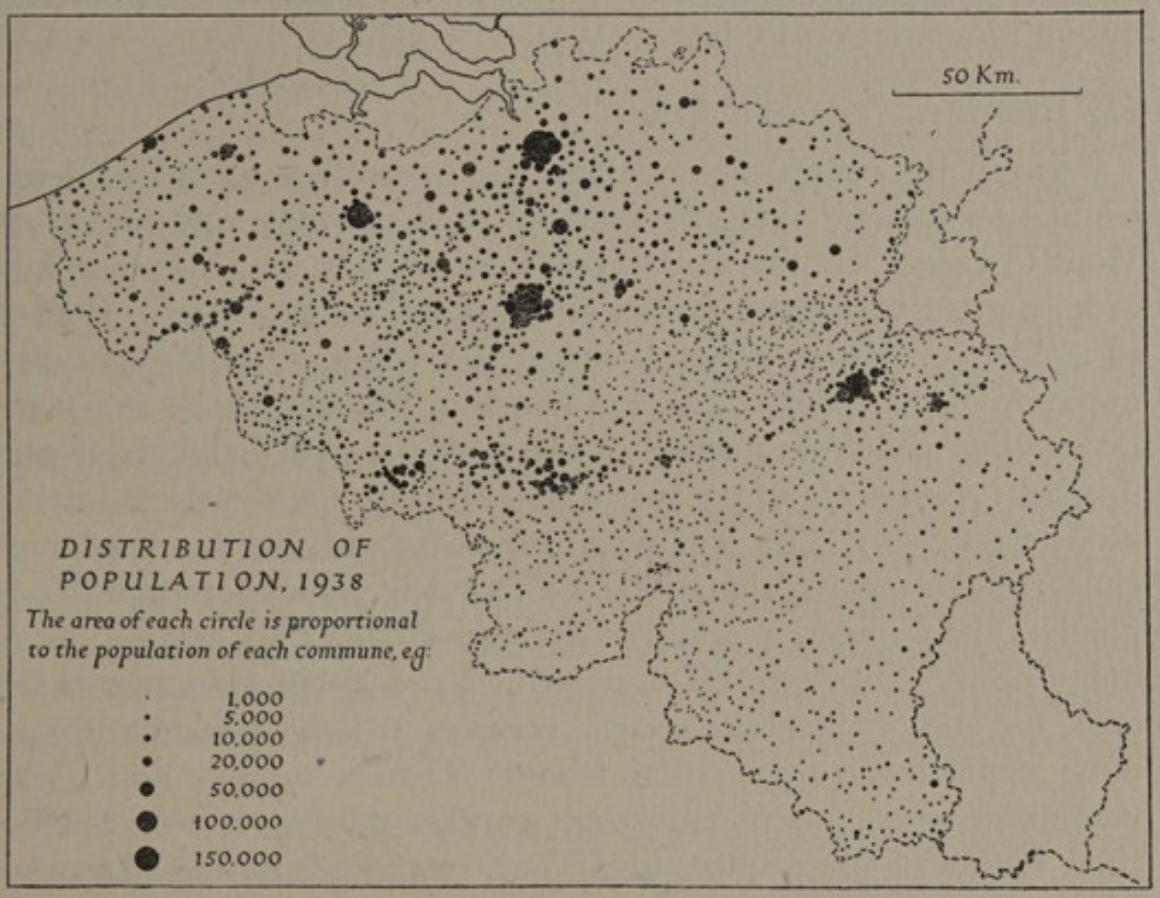


Fig. 50. The distribution of population in Belgium, 1938
Based on the estimates for 31 December 1938, in *Le Moniteur Belge*, 13 April 1939 (Bruxelles).

65,000—located within 20 km. of the edge of the Bruxelles agglomeration. In southern Hesbaye, between the Dyle and the Meuse, the towns are agricultural in character and small in size, with under 5,000 inhabitants—Landen (3,697), Perwez (2,543), Waremme (4,788), Jodoigne (4,132); even Gembloux, despite its cutlery, its distilleries and its sugar refineries, has only 5,341 inhabitants.

To the west of the Dyle, the towns are more industrial in character. Nivelles (12,873) has paper and flour mills; Soignies (10,537) has quarries and limekilns; Péruwelz (7,751), in the extreme west near the French frontier, has textile and metal factories; Braine-le-Comte (9,892) also has metal works; Braine-l'Alleud (11,953) and Halle (17,474), with their miscellaneous industries, lie to the south of the

Bruxelles agglomeration. This agglomeration includes nearly one million people within an elongated area some 30 by 15 km. lying in the valley of the Senne. So large a mass of people, set between the northern lowlands and the central uplands, forms one of the most outstanding features of the population map of Belgium—as indeed might be expected from the function of Bruxelles as a capital city and an industrial centre (see p. 592).

The East-West Industrial Belt

Between the central uplands and the Ardenne is a zone of dense population situated along the coal belt that stretches east-west from Mons to Liége. On this narrow belt some 170 km. long by 3 to 17 km. wide, a great variety of industrial activities has grown up. Here is an almost continuous series of towns and villages that forms a continuation of the industrial area of northern France. Altogether, some two million people (a quarter of the inhabitants of Belgium) live in this belt. Few areas in the world present such a spectacle of intense industrialization. The coalfield somewhat resembles the thick clusterings of people that are to be found in Lancashire and Westphalia. The population attains a density of over 1,000 per sq.km. in many parts. Nor does this represent all the labour resources of the area, for one of the characteristic features of Belgian industry is its close dependence upon rural labour. Thanks to easy and cheap communications, many industrial workers return each evening to their homes in the countryside. Thus, workers from the plateau of Herve come down to the mines and factories of Liége and Verviers; the centres of Charleroi and Mons are likewise fed not only from the uplands to the north and south of the coal belt but even from Flanders. There is only one great city—Liége. The other main centres are Mons, Charleroi and Verviers. The satellite towns of these centres are hardly towns with long civic traditions, but merely great mining villages; altogether, the industrial population is disposed in some fifty of these urban villages.

In the west, Mons itself is not a very large town (26,417), but it is the centre of the great coal-mining district of the Borinage, employing some 80,000 miners (Fig. 77). The chief of its satellite industrial centres are Quaregnon (18,017), Wasmes (14,671), Jemappes (13,535), Frameries (12,634), Boussu (12,193) and Hornu (11,291). While coal-mining dominates the whole life of the district, there are several subsidiary activities, e.g. the making of cables, explosives and briquettes (see p. 610).

To the east, there is another area of very dense population around Charleroi in the valley of the Sambre. The town itself includes only 27,274 people, but it is the centre of an area that specializes not only in coal-mining but in glass making, chemicals and metal working (see p. 597). Some of its satellite towns are as large as itself and even larger—Jumet (28,919), Gilly (24,565), Montignies (24,043), Marchienne (21,619), Marcinelle (20,461); but, indeed, it is not really possible to distinguish one town from another, as an almost continuous area of workers' dwellings stretches as far west as La Louvière (22,657) and Binche (18,894) and beyond (Fig. 77). Lying somewhat apart from the main agglomeration is Thuin (6,498) with tanneries and saw mills.

Farther east still, lower down the Sambre valley, at its junction with the Meuse, stands the town of Namur (32,831), capital of the province of Namur and seat of a bishopric. Its industries include tanneries, soap factories, boiler works, and the making of briquettes and cutlery. If the nearby centres of Jambes (9,688) and Saint-Servais (7,989) be included, the result is a figure of nearly 50,000 for the Namur agglomeration (see p. 611). Between Namur and Liége, the Meuse flows through a comparatively less densely peopled area. The main centre in this tract is the town of Huy (13,773), the seat of an ancient copper industry and of more recently developed paper mills.

Where the Ourthe and the Vesdre join the Meuse, stands the great city of Liége (162,229); the agglomeration of Liége includes over a quarter of a million people (see p. 217). Nearby is the town of Seraing (42,981), and, indeed, if one includes this and all the other adjoining towns, Liége appears as the centre of a district of not less than half a million people (Fig. 76). The basic activity of this swarm of people is coal-mining, but metallurgical industries (especially steel and zinc) are important, and here is the centre of the Belgian armaments industry. Besides a miscellany of trades, Liége has a great cattle market, and its market gardens are famous.

To the east of Liége, up the valley of the Vesdre and just outside the coal belt, lies the smaller centre of Verviers (42,931), which is the seat of a woollen industry favoured by the excellence of its water. With its suburbs it forms an agglomeration of some 80,000 people. In the angle between the Vesdre and the Meuse is the small plateau of Herve, the home of Belgian stock breeding and now a rich dairy country with a density of about 100 people per sq.km.

The Kempenland (The Campine)

This northern area is of little value from an agricultural point of view. Despite attempts to improve its sandy and gravelly soil, it still remains mainly a land of cattle, rye, oats and potatoes. The most highly cultivated area is towards Antwerpen, where market gardens have been made to supply the city. Much of the area is occupied by heather, pines and bog, and has a density of less than 100 people per sq. km. especially in the north where the heathland extends across the frontier into Holland.

Towards the east, in Limburg, conditions have changed greatly within the last 20 years. The discovery of underlying coal, first worked in 1917, has turned the district into an industrial area, and settlements of miners form an outstanding feature of the landscape. There has been considerable immigration into the area, both from the rest of Belgium and from foreign countries. Thus the population of Genk (27,021) increased sevenfold between 1920 and 1936. The capital of the province of Limburg is Hasselt (26,828) with gin distilleries.

Outside the coal area, many medium-sized manufacturing and market towns are scattered uniformly over the countryside. Mol (17,701) and Herentals (13,649) are woollen towns; Turnhout (29,305) and Geel (20,838) manufacture linen. To the south, Diest (8,464) has breweries and distilleries, while Aarschot (10,109) is an agricultural market. In the west, Lier (28,631) and Duffel (10,990) form part of the area of dense population between Antwerpen and Mechelen. The industrialization of Flanders has spread into this corner of the Kempenland.

The Southern Highlands

Immediately south of the Mons-Liége coal belt is the plateau country of Entre-Sambre-et-Meuse and the Condroz, lying some 250–350 m. above sea level, and, in many ways, transitional in character between the Ardenne and the rest of Belgium. It is a country of forests, oats, cattle and horses. Its population decreases rapidly away from the Sambre-Meuse valley to below 50 per sq.km. In this comparatively poor environment, urban life is but feebly developed. Small towns, at the same time markets and fortresses, have grown up at cross-roads in the clearings, e.g. Ciney (5,650), Chimay (3,248), Couvin (3,328), Walcourt (1,987). The ancient fortresses of Marienbourg (1,524) and Philippeville (1,224), at one time held by the French, are now but small settlements. Only one big natural routeway crosses the plateau; this is the valley of the Meuse which forms

a relatively populous corridor. The largest settlement in the valley is Dinant (7,057), at one time a copper-working town, but now an important tourist centre.

To the south of Entre-Sambre-et-Meuse and the Condroz, the Ardenne rises abruptly. Its elevation (over 500 m.) and its heavy rainfall give a distinctly bleak character to the whole area. The soil is cold and impermeable, and the country is a land of moors, peat bogs and forests. Over the greater part of the area, the population is below 50 per sq.km. and, in places, even falls to below 25; it has been estimated that only 10 % of the villages have more than 300 inhabitants each. Agriculture is not important, save in the deeply cut valleys of the Meuse tributaries—the Semois, the Lesse, the Ourthe, and the Amblève. Here oats are mainly grown. The towns of the district are few in number. Bastogne (5,076), Marche (3,982), Neufchâteau (2,602) and Rochefort (3,488) in the south are market towns and route centres. Towards the north, the influence of Liége, and of Aix-la-Chapelle across the border, is felt, and here the towns are larger. The fashionable resort of Spa (9,372), with its mineral springs, has over 12,000 visitors annually. Nearby are Malmédy (5,907) and Stavelot (4,781).

Belgian Lorraine

To the south of the Ardenne, the Belgian territory includes a small district that geographically is a continuation of Lorraine. Its lower altitude and milder climate are reflected in a great density of population (over 50 per sq.km.). Its only large town is the administrative centre of Arlon (11,768), a frontier station on the Luxembourg-Bruxelles line.

The Growth of Population

Despite the lack of a reliable census before 1846, there are many indications that the population of Belgium grew enormously during the second half of the eighteenth century (see p. 107). This growth continued into the nineteenth century and, by 1846, the total population of the country was 4,337,196. Between 1846 and 1938 this figure nearly doubled—an increase of 93 %.* The growth was

* The increase for 1846–1935 was 91 %. It has been calculated that, making allowance for territorial changes, the increases for neighbouring countries during the same period were: the Netherlands 174 %, England and Wales 136 %, Germany 90 %, and France 18 %—H. M. Kendall, 'A survey of population changes in Belgium', *Annals of the Association of American Geographers*, vol. XXVIII, p. 148 (Lancaster, Pa., 1938).

greatly checked by the war of 1914–18, and there was a decrease of population in Belgium between the censuses of 1910 and 1920.

The German attack on Belgium in 1914 followed by the occupation had resulted in a great dislocation of population (see Appendix I). The military deaths in 1914–18 amounted to 40,367, but the total effect of the war was much greater than this, owing to an increase in civilian deaths and a decrease in births.* The addition of new territory in 1919, however, more than compensated for the loss. Since 1920, a significant feature has been a slowing down in the rate of increase.

The Population of Belgium, 1846–1931

Year	Population	Births*	Deaths	Excess of births	Per 1,000 inhabitants		Marriages
					Births	Deaths	
1846	4,337,196	119,610	107,835	11,775	27·6	24·9	5·9
1856	4,529,460	134,187	97,395	36,792	29·6	21·5	7·3
1866	4,827,833	158,010	151,116	6,894	32·7	31·3	7·8
1876	5,336,185	176,915	116,787	60,128	33·2	21·9	7·2
1880	5,520,009	171,864	123,323	48,541	31·1	22·3	7·1
1890	6,069,321	176,595	126,545	50,050	29·1	20·9	7·4
1900	6,693,548	193,789	129,046	64,743	29·0	19·3	8·6
1910	7,423,784	176,413	112,826	63,587	23·7	15·2	7·9
1920†	7,405,569	163,738	102,505	61,233	22·1	13·8	14·4
1930	8,092,004	151,406	107,468	43,938	18·7	13·3	8·9
1931	8,159,185	148,538	108,017	40,521	18·2	13·2	8·1
1932	8,213,449	144,835	108,226	36,609	17·6	13·2	7·6
1933	8,247,950	135,769	108,377	27,392	16·5	13·1	7·9
1934	8,275,552	132,568	100,731	31,837	16·0	12·2	7·6
1935	8,299,940	127,405	106,226	21,179	15·4	12·8	7·6
1936	8,330,959	126,710	106,190	20,520	15·2	12·8	7·8
1937	8,361,220	127,506	109,140	18,366	15·3	13·1	7·6
1938	8,386,553	130,604	108,682	21,922	15·6	13·0	—

Sources: (1) *Annuaire statistique de la Belgique*, p. 44 (Gand, 1939); (2) *Statistical Year-Book of the League of Nations*, 1939–40, pp. 33–4 (Geneva, 1940).

* 'Naissances et décès de fait.' Still-births are not included. Because of the different basis of computation, the excess of births over deaths does not agree with that of the table on p. 201.

† Pre-1914 territory. With the addition of Eupen, Malmédy and Moresnet, the population was 7,465,782.

By 1938, the total population of the kingdom was made up as follows:

Males	4,142,064
Females	4,244,489
Total	8,386,553

That is to say, for every 1,000 males there were 1,025 females.

* For a discussion of the effect of the war of 1914–18 upon the population of Belgium see 'La Population,' by R. Olbrechts in *La Belgique Restaurée*, ed. by E. Mahaim (Bruxelles, 1926).

The Balance of Births and Deaths

While the population has been gradually increasing, the number of births after 1900 has shown, almost without exception, a successive decline each year (see table on p. 200). The number of deaths, too, has been declining but very much more slowly. The excess of births over deaths has therefore been continually diminishing. The decline in births, incidentally, was not a result of a decrease in the number of marriages, for they rose from 57,131 in 1901 to 63,425 in 1937.

In contrast with France, the balance between emigration and immigration has had but little influence upon the growth of population in Belgium in recent decades. The main facts are summarized in the table below, which shows the part played by migration in relation to natural increase. These figures, however, do not include those people who crossed the frontier each day to work, particularly in the region of Lille and Maubeuge, nor do they include the large numbers who helped in the harvests of northern France.

Natural Increase and Migration, 1881–1937

Period	Increase of population	Excess of births over deaths	Balance of migration
1881–1890	549,312	568,558	− 19,246
1881–1900	624,227	648,598	− 24,009
1901–1910	730,236	717,563	+ 12,673
1911–1920*	−22,431	209,841	−232,272
1921–1930	626,222	486,692	+139,530
1931	67,181	43,716	+ 12,794
1932	54,264	39,603	+ 7,926
1933	34,501	30,114	+ 3,096
1934	27,602	34,885	− 2,492
1935	24,388	24,172	+ 157
1936	31,019	23,916	+ 4,145
1937	30,261	21,332	+ 7,986

Source: *Annuaire statistique de la Belgique*, p. xviii (Gand, 1939).

* Pre-1914 territory.

The figure for increase of population does not agree with that obtained by adding the excess of births and the balance of migration because of imperfections in registration. The balance is between 'naissances et décès de droit' in the 'population de résidence habituelle' (see *op. cit.* p. 42).

As a result of these movements, the foreign population has risen a little (see p. 223). But, while the foreign element has made an

important contribution to Belgian economy, it does not materially affect the demographic situation.

Age Groups

The age composition of a population is the product of its past, and has a vital bearing upon its future. Conditions in Belgium as compared with those in some other countries are shown below:

Quinquennial Age Groups as Percentages of Total Population

Age group	Belgium (1938)	France (1936)	Nether-lands (1937)	England and Wales (1937)	Germany* (1937)
0– 4	6·8	8·2	9·5	6·8	8·1
5– 9	7·5	8·4	9·6	7·2	7·2
10–14	7·8	8·6	9·5	7·8	8·0
15–19	8·3	5·6	9·2	8·1	7·8
20–24	5·5	7·3	8·5	7·9	6·9
25–29	7·9	8·0	8·3	8·4	9·1
30–34	8·2	8·0	7·7	8·2	8·9
35–39	8·3	7·5	6·9	7·6	8·3
40–44	7·6	6·4	6·2	6·8	6·9
45–49	6·5	6·1	5·3	6·4	6·1
50–54	6·0	5·8	4·8	6·0	5·6
55–59	5·5	5·5	4·2	5·5	5·0
60–64	4·9	4·8	3·6	4·7	4·5
65+	9·3	9·8	6·7	8·5	7·6
	100	100	100	100	100

Source: *Statistical Year-Book of the League of Nations*, 1939–40, pp. 26–30 (Geneva, 1940).

* Including the Saar Territory.

It is clear that the age composition of the Belgian people is very roughly similar to that of France and of England and Wales, but that it differs from that of the Netherlands in having a smaller proportion of children. The proportion of the Belgian population at the younger ages (0–5 years) is lower than that in any other five-year age group until the 45–49 group is reached, with the exception of the 20–24 group which shows the marked effects of the war of 1914–18. These general features stand in contrast to the situation some years ago. Fig. 51 shows how radically conditions have changed over the 50 years between the two censuses of 1880 and 1930. During these years, the excess of births over deaths has been decreasing, and the result has been a rise in proportion of older people in the population. The table on p. 203 shows, decade by decade, how the population has been growing 'older':

Age Groups (%) 1880–1937

Age group	1880	1890	1900	1910	1920	1930	1937
Under 20	43	43	41	40	35	31	30
20–39	28	29	31	31	32	33	30
40–59	19	18	18	20	23	24	25
60 and over	10	10	10	9	10	12	14

Sources: (1) *Grande Encyclopédie de la Belgique et du Congo*, vol. 1, p. 203 (Bruxelles, 1938); (2) *Annuaire statistique de la Belgique*, p. xxv (Bruxelles, 1938).

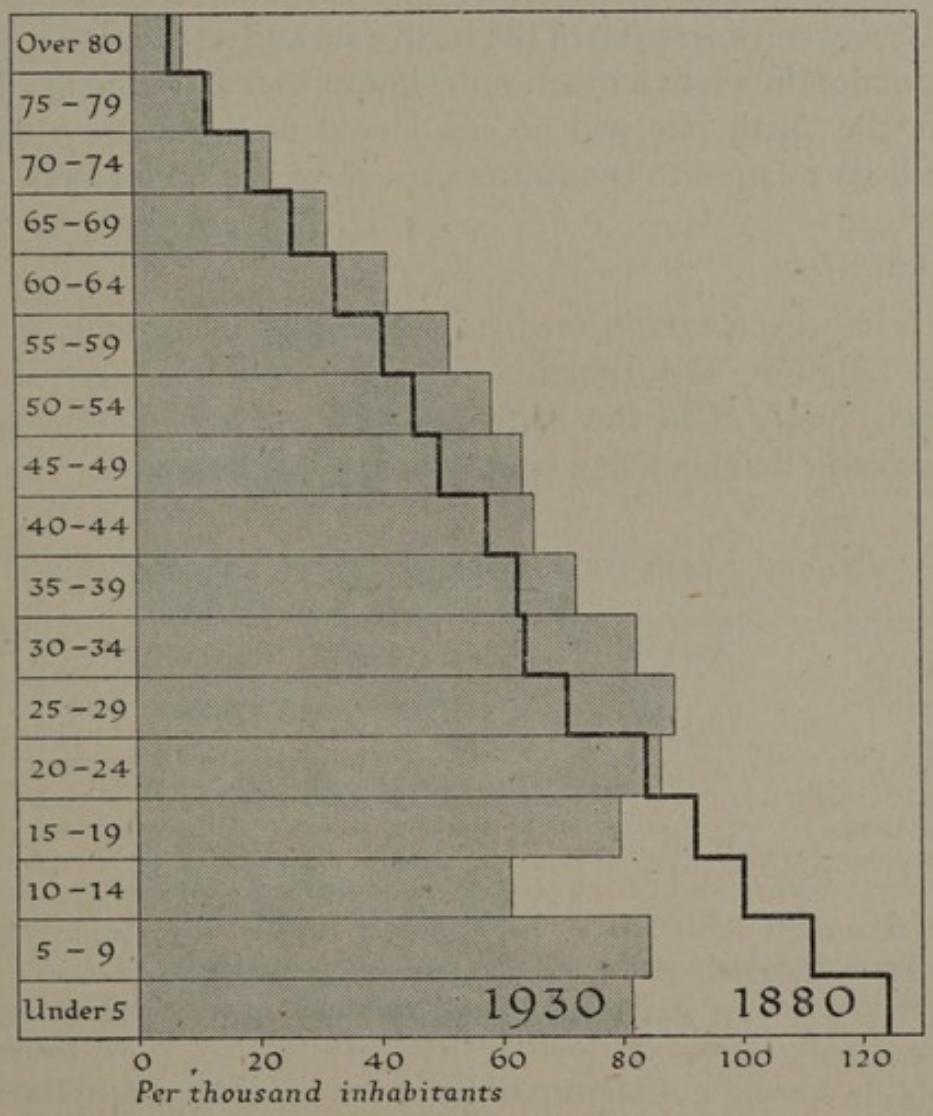


Fig. 51. Age Groups in 1880 and 1930

Based on *Recensement général*, 1930, vol. 4, p. 11 (Bruxelles, 1937). The figures for 1937 show a still greater contrast with those for 1880—see the table above, but this, however, does not distinguish between the separate categories above 65 years.

Two consequences eventually result from an 'ageing' population:

(*a*) An increase in the death-rate—because the higher death-rate of the older people will play an increasingly important part in

influencing the total death-rate. Further, it should be remembered that the amount by which the span of life can be lengthened is diminishing, for the extent by which the chances of death can be reduced is limited.

(*b*) A decrease in the number of births—because the older generations, which will become more numerous, are likely to produce fewer children.

These factors must now be analysed separately, but, whereas the death-rate is a comparatively simple idea that can be dismissed quickly, any consideration of the birth-rate and its relation to effective reproduction involves a much more complicated argument. For that reason, the death-rate will be considered first, and then the birth-rate and its relation to the future growth of the population.

The Death-rate

With improvements in medical science and in hygiene, the death-rate in Belgium, as in neighbouring countries has been declining, but less rapidly than the birth-rate (Fig. 52). A comparison with conditions in neighbouring countries is given below:

Table of Death-rates, 1911–38 (*per* 1,000 *inhabitants*)

	1911–13	1921–25	1926–30	1931–35	1936	1937	1938
Belgium	15·3	13·4	13·7	12·9	12·8	13·1	13·0
France	19·0	17·2	16·8	15·7	15·3	15·0	15·4
Germany*	14·8†	13·3	11·8	11·2	11·8	11·7	11·7
United Kingdom	14·2	12·4	12·3	12·2	12·3	12·6	11·8
Netherlands	13·1	10·4	9·9	8·9	8·7	8·8	8·5
Luxembourg, G.D.	17·5	13·4	14·2	12·7	11·5	11·9	12·6

Source: *Statistical Year-Book of the League of Nations*, 1939–40, p. 38 (Geneva, 1940). For a discussion of the various causes of death, see p. 180.

* 1937 frontiers (i.e. including the Saar Territory). † For 1913 only.

Roughly speaking, Belgium comes between France and the Netherlands, and the analysis of mortality by age and sex further emphasizes this intermediate location (see table on p. 206).

The mean expectation of life at birth is not as great as that in a number of European countries, though it compares favourably with that in France.

Mean Expectation of Life at Birth

	Male	Female
Belgium (1928–32)	56·0	59·8
France (1928–33)	54·3	59·0
Netherlands (1931–5)	65·1	66·0
England and Wales (1930–2)	58·7	62·9
Germany (1932–4)	59·9	62·8

Source: *Statistical Year-Book of the League of Nations*, 1939–40, pp. 66–8 (Geneva, 1940).

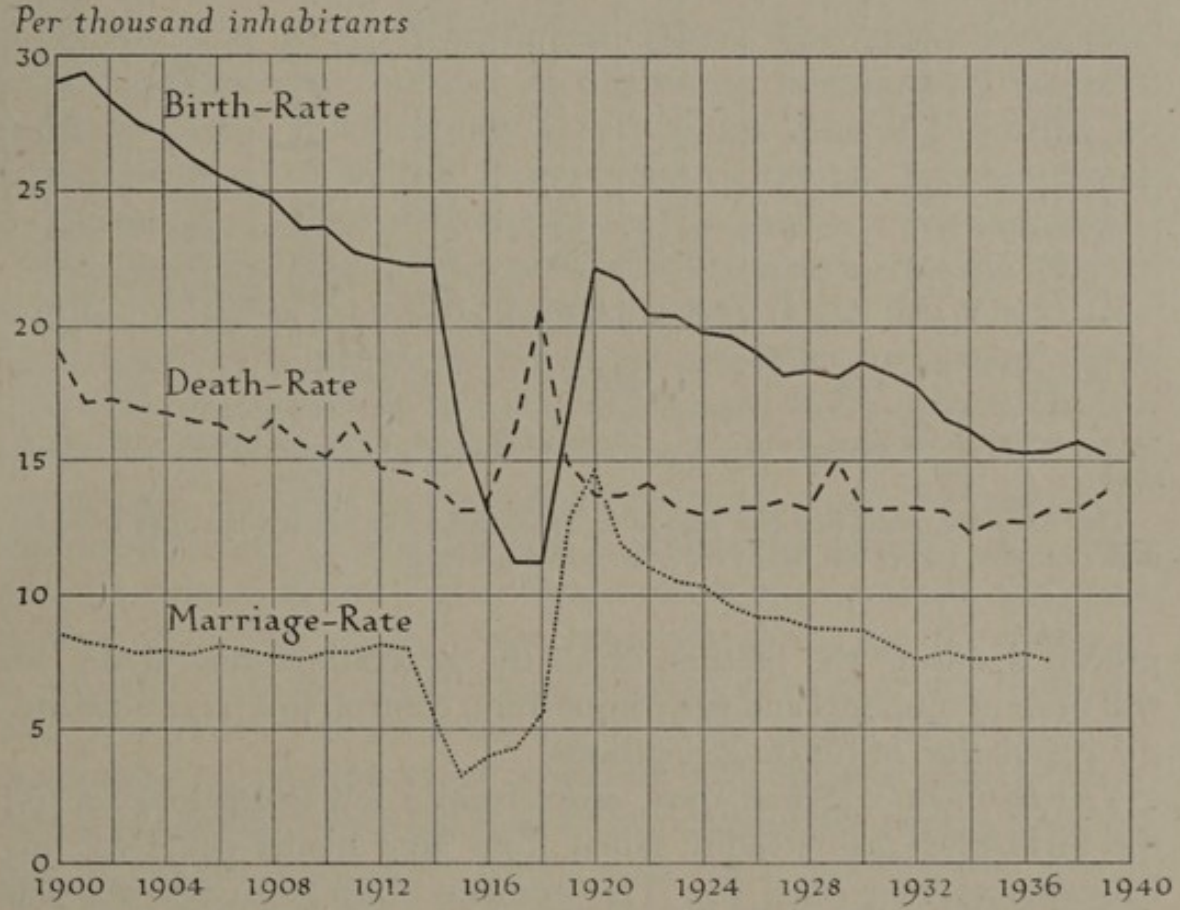


Fig. 52. Birth-rate, Death-rate and Marriage-rate, 1900–1939

Based on *Annuaire statistique de la Belgique*, p. 44 (Gand, 1939).
For a comparison of the death-rate with that of other countries see p. 177.

The Birth-rate, Fertility and Reproduction Rates

In Belgium a good deal may yet be done to lengthen the span of life, until a figure comparable with that of many other states is reached, but clearly the process cannot be continued indefinitely. It is the number and rate of births which are the more important factors in deciding the future population. Just as the present numbers of a population and its age composition are determined not by the birth- and death-rates now prevailing, but by the rates which have

Mortality by Age and Sex

Age groups	Belgium, 1936–7		France, 1936		Netherlands, 1936–7		England and Wales, 1937	
	Males	Females	Males	Females	Males	Females	Males	Females
0– 1	848	675	185	149	118	93	647	502
1– 4	63	54					54	48
5– 9	21	16	18	17	12	10	20	17
10–14	15	14	13	13	9	8	12	11
15–19	22	20	29	29	15	13	21	18
20–24	38	31	40	35	20	16	28	26
25–29	37	32	47	39	19	19	29	27
30–34	41	35	60	41	23	23	32	29
35–39	50	40	80	48	27	30	42	35
40–44	65	49	103	60	37	38	59	44
45–49	93	67	125	76	54	52	87	62
50–54	135	94	172	105	84	80	136	91
55–59	188	135	229	139	130	125	197	129
60–64	272	208	353	223	211	199	309	212
65–70	421	331	486	320	352	318	460	335
70–75	656	543	1,229	1,006	569	550	749	564
Over 75	1,381	1,222			1,310	1,277	1,530	1,299
Total	129		156		88		124	

Source: *Statistical Year-Book of the League of Nations*, 1939–40, pp. 61–3 (Geneva 1940).

The rates are calculated per 10,000 of each age group, except that the rates for infants under 1 year are based on 10,000 living births.

prevailed during the lifetime of all the generations now living, so will present numbers and age composition control, to a large measure, the population of future generations.

The Birth-rate. Since 1901, apart from a few exceptional years, the birth-rate* has steadily fallen from 29·4 births per 1,000 inhabitants to 15·3 (Fig. 52). The number of children per married couple has been decreasing very markedly:†

1910, 2·63; 1920, 2·13; 1930, 1·96.

This decline in the birth-rate is part of a widespread phenomenon in Europe, and its complex causes (economic and social) are not restricted to Belgium alone. The following table shows how Belgium compares with its neighbour in this respect. In particular, it will be seen how Belgium is ahead of France, but very much behind the Netherlands in its birth-rates:

* For the method of registering births in Belgium, see p. 174.

† In 1932, it was estimated that it needed 2·85 children per marriage to maintain a stable population. For a discussion, see D. V. Glass, *The Struggle for Population*, pp. 75–8 (Oxford, 1936).

Table of Birth-rates, 1911–39 (*per* 1,000 *inhabitants*)

	1911–13	1921–25	1926–30	1931–35	1936	1937	1938
Belgium	22·7	20·4	18·6	16·8	15·2	15·3	15·6
France	18·1	19·3	18·2	16·5	15·0	14·7	14·6
Germany*	27·0†	22·1	18·4	16·6	19·0	18·8	19·7
United Kingdom	24·3	20·4	17·2	15·5	15·3	15·3	15·5
Netherlands	28·1	25·7	23·2	21·2	20·2	19·8	20·6
Luxembourg, G.D.	26·8	20·4	21·0	17·0	15·2	15·1	14·9

Source: *Statistical Year-Book of the League of Nations*, 1939–40, p. 37 (Geneva, 1940).
* 1937 frontiers (i.e. including the Saar Territory). † For 1913 only.

Fertility and Gross Reproduction Rate. The crude birth-rate merely expresses the number of births per thousand of the total population, and provides only a very rough idea of the trend of population growth. Neither this rate nor the balance between it and the death-rate is a true measure of the capacity of a population for further increase. Thus, in spite of the fact that births still exceed deaths, a population may no longer be replacing itself. Even while it is increasing in numbers, it may be preparing for decline. This paradox arises from the fact that the capacity of a population for further increase depends upon its fertility and mortality in different age groups. Fertility, in turn, clearly depends upon the number of women between 15 and 50, the reproductive period. But since younger women have a higher fertility than older women, the composition of the population by age, especially by the age of its women, is important. If the numbers of children born to every thousand women in every year up to the age of 50 are added, the result gives the number of children which would be born on an average to every thousand women before the end of the reproductive period, *provided that* no women died before reaching 50 years, and that the current fertility of women at different ages remained unchanged. This figure is known as the 'total fertility' of the population. The total fertility of the Belgian people compares with that of other countries as follows:

Total Fertility

Belgium*	(1939)	2,097	Luxembourg	(1930–2)	2,396
France	(1935)	2,045		(1935–6)	1,841
	(1936)	2,045	Netherlands	(1936)	2,591
Germany	(1934)	2,032		(1937)	2,543
	(1936)	2,212		(1938)	2,633
England and Wales	(1931)	1,920		(1939)	2,641

Source: *Statistical Year-Book of the League of Nations*, 1940–1, pp. 46–7 (Geneva, 1941).
* Details are not given for earlier years. See comment on table of net reproduction rates on p. 209.

The figure for Belgium means that, according to fertility rates in 1939, a thousand women would give birth to 2,097 children, assuming that none of the women in question die before they are 50 years old, and that current rates of fertility at all ages remain unchanged. But as this number includes both boys and girls, it is not a measure of the extent to which the population is equipping itself for further reproduction. This is expressed by reducing the figures for 'total fertility' in the same proportion as the ratio between females born and total births; the result is called the 'gross reproduction rate', and it is usually expressed not per thousand but per unit. The gross reproduction rate for Belgium in 1939 was 1·025. This gives the number of girls (potential mothers) that would be born to every woman during the child-bearing years, always assuming that no woman dies before she is 50 years old.

Net Reproduction Rate. As all the thousand women will not reach the age of 50, a further adjustment is necessary to turn gross rates into net rates. When allowance is made for deaths among the thousand women at successive ages between birth and 50, the resulting net rates are necessarily lower than the gross rates, the difference obviously being due to the mortality of women at different ages. Thus, when this correction is made for Belgium, it is found that, according to the fertility and mortality rates of 1939, a thousand women were being replaced not by 1,025 girls but by 859. This figure, usually expressed in terms of unity (0·859), is known as the 'net reproduction rate'. It shows the probable ratio between female births in two successive generations, and so provides an indication of the extent to which a generation is likely to reproduce itself according to current rates of fertility and mortality. If maintained, a net reproduction rate of 1·0 means that the population is likely to remain constant, for then the number of girls (future mothers) will be equal to the number of existing mothers (always provided that fertility and mortality rates do not change).

The population of Belgium is, therefore, not replacing itself. In this, it is not alone in Europe, and a similar state of affairs exists in several other countries. In some countries, the net reproduction rate is even lower, and the decline in population is likely to be more rapid than in Belgium, as the table on p. 209 suggests.

These figures are merely indications of the general trend of population. They are not absolute measures. The population of a country may alter because of migration, or, again, the rates of fertility and mortality may change and so upset any argument. But if current

Net Reproduction Rates

Belgium	(1934–5)	0·802	Sweden	(1935)	0·729
	(1936)	0·831		(1936)	0·756
	(1939)	0·859	Netherlands	(1936)	1·140
France	(1936)	0·880		(1937)	1·119
	(1937)	0·870		(1938)	1·158
	(1938)	0·890	Germany	(1935)	0·906
England and Wales	(1936)	0·773		(1936)	0·934
	(1937)	0·782			

Source: *Statistical Year-Book of the League of Nations*, 1940–1, pp. 48–9 (Geneva, 1941); and ibid. 1939–40, pp. 48–9. The Belgian rate for 1934–5 is from D. V. Glass, *Population Policies and Movements in Europe*, p. 200 (Oxford, 1940).

The calculation of the rates for Belgium and for England and Wales cannot be regarded as entirely satisfactory, as, for example, the Belgian statistics do not provide data relating to the distribution of births by the age of the mothers. For a critical note on the Belgian statistics, see D. V. Glass, op. cit. pp. 199–200 and 447.

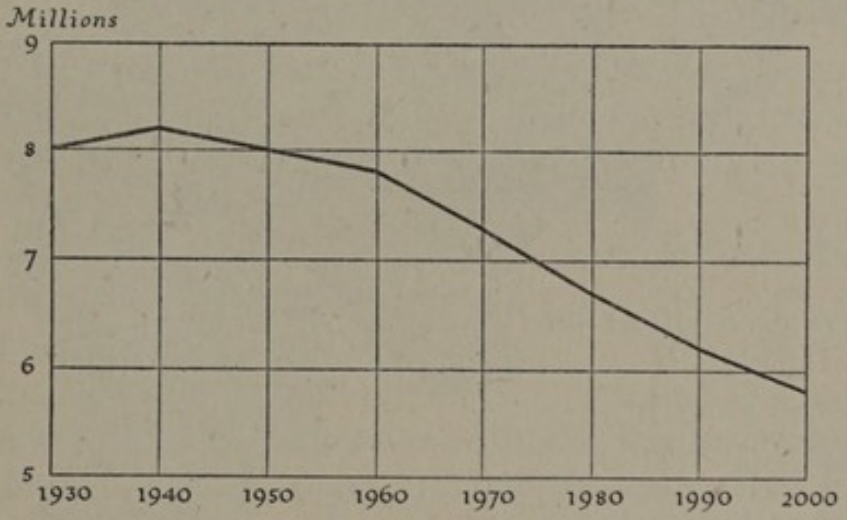


Fig. 53. An estimate of the future population of Belgium

Based on D. V. Glass, *The Struggle for Population*, p. 77 (Oxford, 1936).
The estimate was made by Professor Baudhuin in 1931—'L'Avenir de la Population Belge', *Bulletin d'information et de documentation publié par la Banque Nationale de Belgique, Service des Etudes économiques*, 20 June 1931 (Bruxelles).

fertility and mortality rates persist, the population of Belgium will soon begin to decline, and many Belgian economists have forecast a fairly rapid decline before the end of the century. These forecasts differ in detail, but all agree that a comparatively rapid decrease of population is imminent (Fig. 53).

Regional Variations in Growth

The continuous rate of growth since the first reliable census of 1846 has not been uniform throughout the whole of Belgium. Some 10 % of the communes have remained stable; the rest have either grown or declined (Fig. 54).

Areas of Increase, 1846–1935

The increases have been associated mainly with industrial development, and have taken place in the following areas:

(1) An almost continuous belt from west of Mons to Namur; here, the exploitation of the coal basin has been responsible for rapid growth.

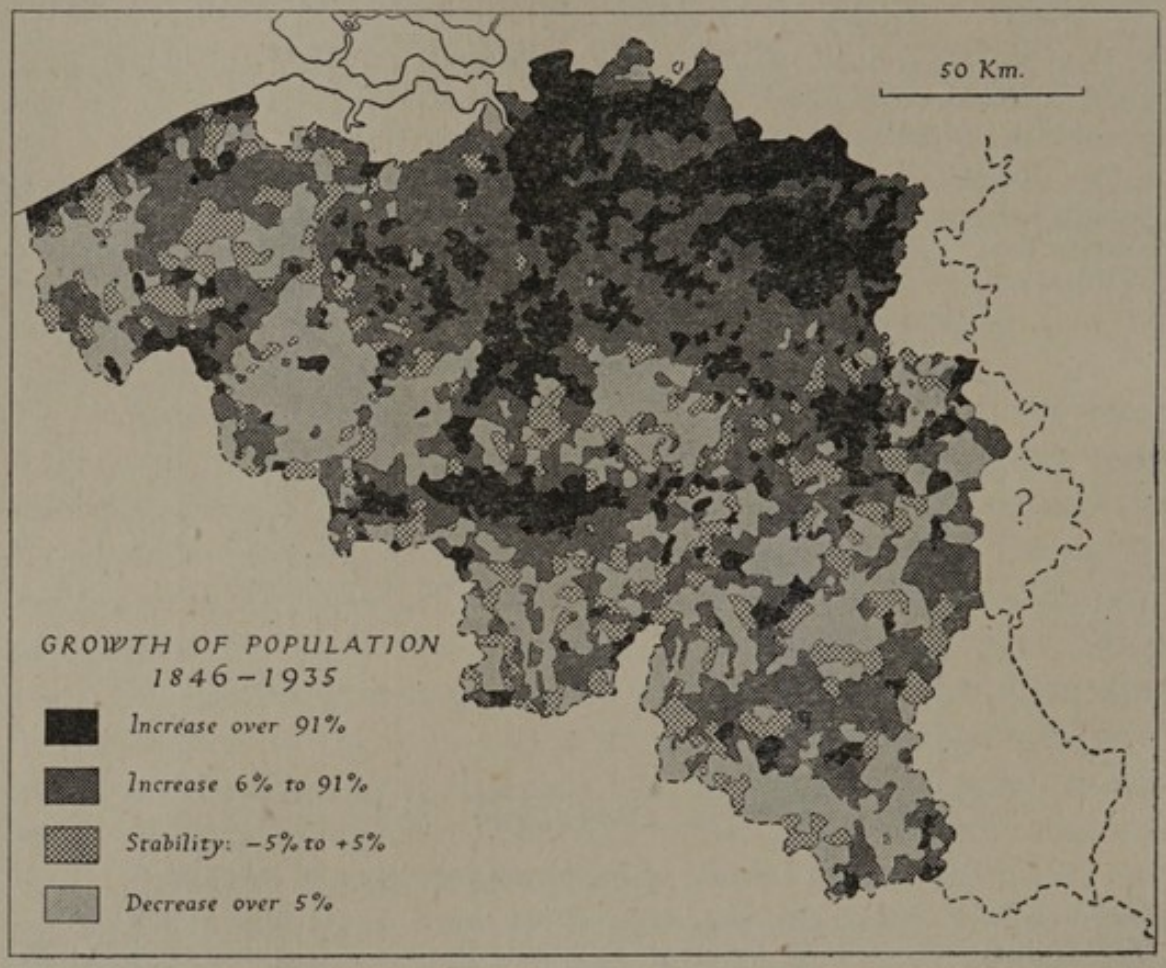


Fig. 54. The growth of population, 1846–1935

Based on H. M. Kendall, 'A survey of population Changes in Belgium', *Annals of the Association of American Geographers*, vol. XXVIII, p. 160 (Lancaster, Pa., 1938).

These figures are calculated on the basis of communes. Between 1846 and 1935, the population of Belgium as a whole increased by 91 %.

(2) Similarly, in the coal basin of Liége there has been a like increase of population.

(3) The development of the Kempen coalfield since 1917 has also been reflected in a rapid increase; thus the population of Genk increased sevenfold in 1920–36.

(4) To the west and south of Kortrijk, the increase has been associated with the industrial development of Lille, outside Belgium. Here, workers cross the frontier to and from France each day.

(5) Other areas of increase have been associated with the urban development of Antwerpen, Brugge, Bruxelles, Gent and Leuven—mainly in the suburbs (see p. 218).

(6) The rapid growth along the coast has resulted from the rise of seaside resorts.

Areas of Decline, 1846–1935

The areas of declining population, on the other hand, are largely agricultural in character. They are widely distributed over the country, but certain areas stand out. Some represent incomplete recovery from the devastation of 1914–18; others can only be explained by the attraction of towns and cities which is so characteristic a feature of western Europe. The main areas of decline can be summed up as follows:

(1) The region of Veurne-Diksmuide-Ieper. This area was the scene of much fighting in 1914–18, and did not fully recover from the destruction and disorganization of that period, e.g. from the flooding of the Yser valley.

(2) A large area situated roughly in the triangle Bruxelles-Mons-Kortrijk, to the north of the coal zone.

(3) A large area to the north of Namur.

(4) A small area to the west of Gent.

(5) A large number of communes in the territory between the Sambre-Meuse lowland and the Ardenne also show decline.

(6) The southern border of the Ardenne, particularly in the valley of the Semois. Here, specialization in tobacco has decreased the local demand for labour and so aided the urban trend.

Pre-war Tendencies

The complete picture of these changes, between 1846 and 1935, is summarized in Fig. 54, but this does not take into account the vicissitudes of the intervening years. For example, some areas in the province of Namur reached their population peaks in 1866, or in 1880, and have since been declining, though their total populations are still above those of 1846. Or again, many areas in Hainaut and Liége have been declining since 1910, others since 1930. An attempt to show the relation of the present-day population to the peak population of the past is made in Fig. 55. Thus Fig. 54 shows the great growth in the coal belt during the nineteenth century, while Fig. 55 shows that the population of this area has now become relatively stable. Fig. 55, moreover, shows that it is mainly the

northern areas that have continued to contribute to the growth of population in the country as a whole. The communes of the south-eastern area, on the other hand, either show a decline or appear to have become stable; a few isolated communes alone show an increase.

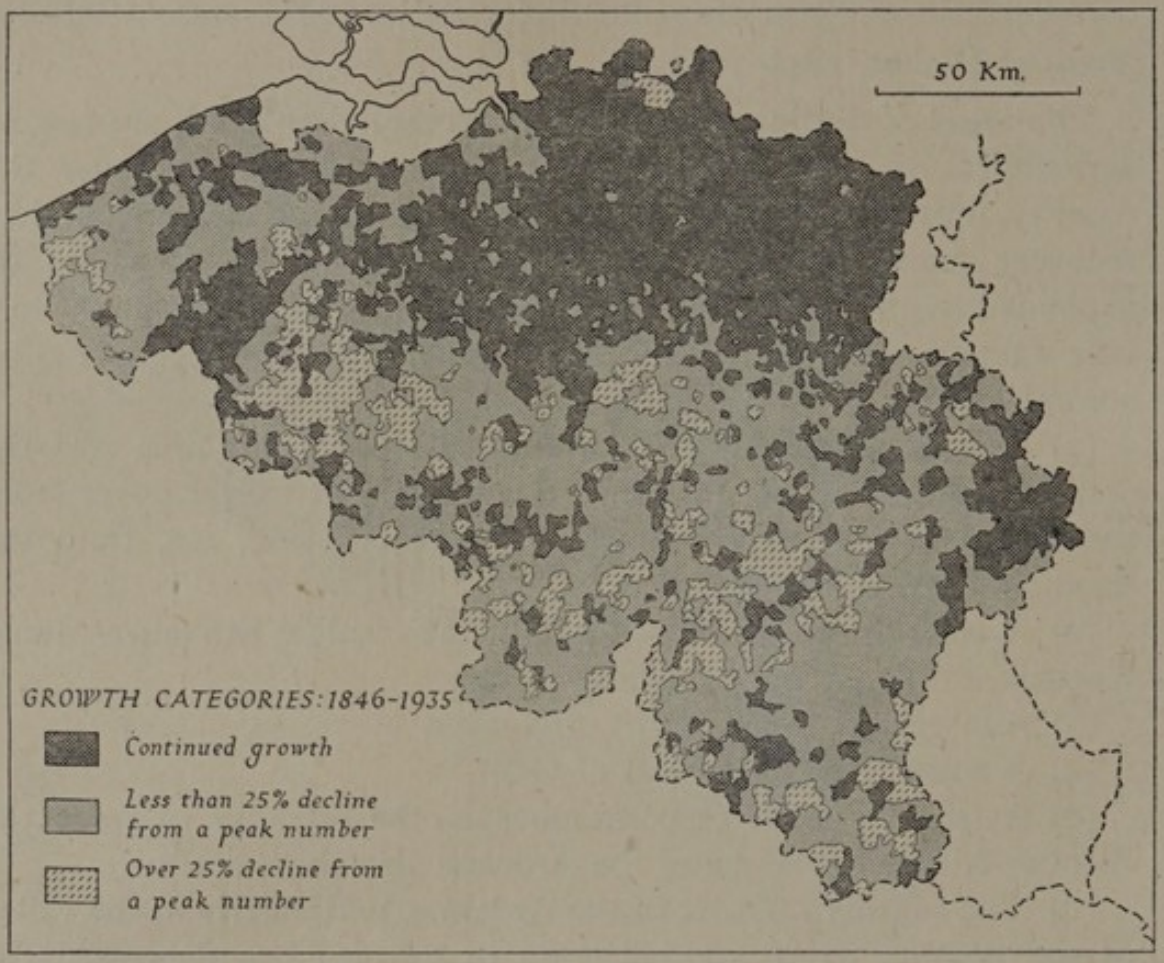


Fig. 55. Relation of population at end of 1935 to past peak figures since 1846
Based on H. M. Kendall, 'A survey of population changes in Belgium', *Annals of the Association of American Geographers*, vol. XXVIII, p. 152 (Lancaster, Pa., 1938). The figures are calculated on the basis of communes.

The trend in recent years (1930–8) before the war illustrates these long-term tendencies. A summary of the percentage annual increase or decrease for each province shows that in five provinces the population increased appreciably, and that the other four either showed a decrease or remained more or less stable:

Annual percentage increase or decrease of population, 1930–8

Limburg	+1·66 %	Namur	+0·01 %
West-Vlaanderen	+0·89 %	Liége	−0·01 %
Antwerpen	+0·86 %	Luxembourg	−0·08 %
Brabant	+0·68 %	Hainaut	−0·41 %
Oost-Vlaanderen	+0·46 %	Belgium	+0·44 %

Sources: (1) *Recensement général*, 1930, vol. I, p. 102 (Bruxelles, 1934); and (2) *Moniteur Belge*, 13 April 1939 (Bruxelles, 1939).

Variation in Size of Family. The northern area of growing population may, in part, be a reflexion of the high Flemish birth-rate. In 1937, the highest birth-rate was in Limburg (26·2), and the lowest in Hainaut (10·9). The variations between the provinces during 1930–7 are shown by the table on p. 214. Fig. 56 shows how the excess of births over deaths varies in different parts of Belgium, and

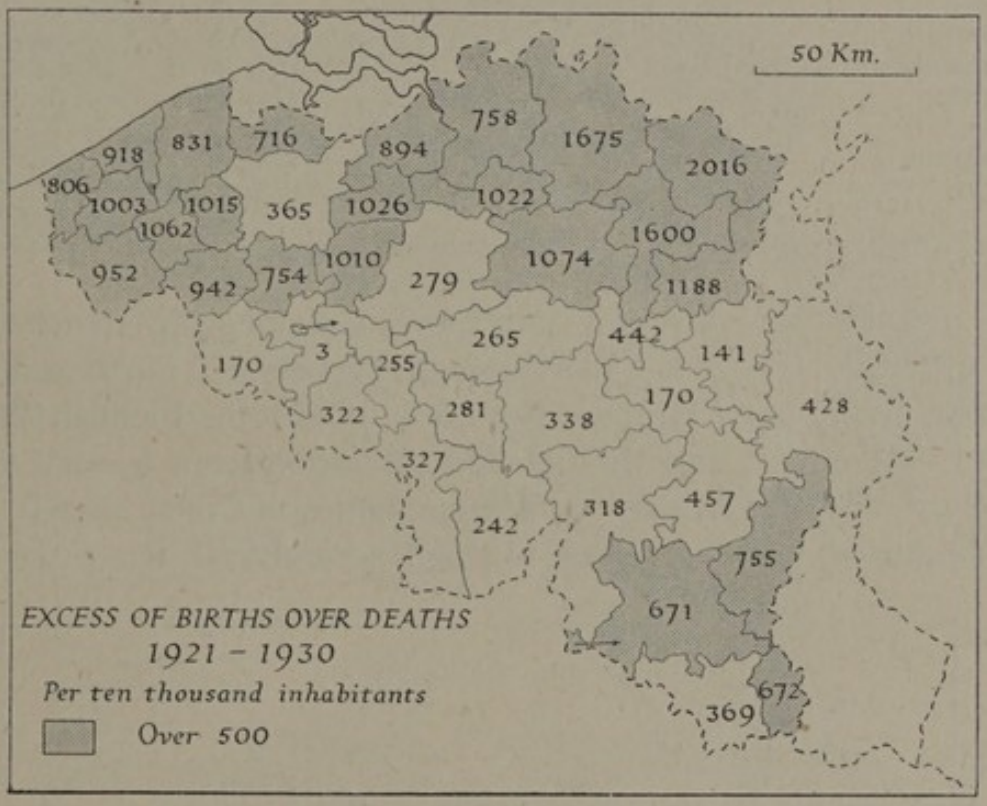


Fig. 56. Excess of births over deaths, 1921–30

Based on *Recensement général*, 1930, vol. I, p. 115 (Bruxelles, 1934).
The figures represent the total excess for the ten-year period, and are calculated on the basis of arrondissements.

the contrast between the Walloon industrial regions and the rest of the country is at once apparent. This difference may possibly be due to the tendency of the Walloons to be affected by French manners and ideas, and to the fact that Socialist advocation of family restriction had made especial headway in the Walloon industrial districts (see p. 141).

Fig. 57 shows the variation in size of family over the whole country. As might be expected, the Walloon industrial area has the smallest families, though the arrondissements of Gent and Antwerpen stand low also. An interesting commentary on these conditions is provided by Fig. 58, which shows the density of inhabitants per house. For Belgium, where a house is normally occupied by one family, the

Table of Birth-rates, 1930–7 (*per* 1,000 *inhabitants*)

	1930	1931	1932	1933	1934	1935	1936	1937
Antwerpen	21·5	20·3	19·9	18·5	18·1	17·9	17·9	17·5
Brabant	15·9	15·2	14·8	13·9	13·3	12·6	12·4	12·7
West-Vlaanderen	22·6	22·6	22·0	20·8	20·4	19·4	19·2	19·7
Oost-Vlaanderen	20·5	20·5	19·9	19·2	18·5	17·7	17·6	17·4
Hainaut	15·2	14·9	14·1	12·3	11·9	11·2	11·1	10·9
Liége	15·3	14·6	14·0	12·9	12·6	11·8	11·6	11·6
Limburg	30·2	29·2	29·0	27·0	27·1	26·2	25·9	26·2
Luxembourg	18·7	18·6	17·2	16·6	16·1	15·5	15·0	15·2
Namur	16·9	16·5	15·9	14·7	14·3	13·6	13·2	13·7
Belgium	18·7	18·2	17·6	16·5	16·0	15·4	15·2	15·3

Source: *Annuaire statistique de la Belgique* (Gand), for 1934, 1936, 1937 and 1939.

map provides a very rough indication of regional differences in the size of family. There is a marked contrast between north and south. The boundary between these two areas follows the Flemish-Walloon linguistic frontier, and the detailed correspondence is very marked in many places. The correspondence comes out most clearly where the linguistic frontier passes through agricultural areas. It is less

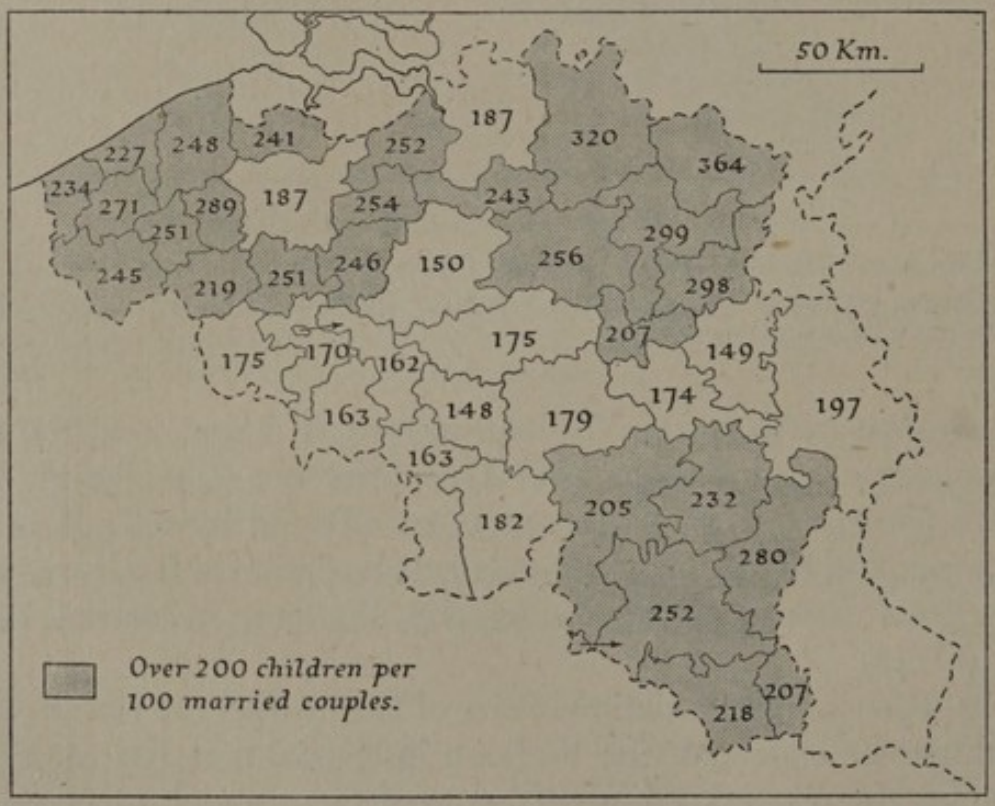


Fig. 57. Size of family, 1930

Based on *Recensement général*, 1930, vol. VIII, pp. 32–3 (Bruxelles, 1938). The figures are calculated on the basis of arrondissements.

clear in the industrial areas, for these have been affected by a considerable Flemish immigration. Thus, around Liége, Namur, Hersaux and Mouscron, many large Flemish families have extended the area of high density southward over the linguistic frontier into the

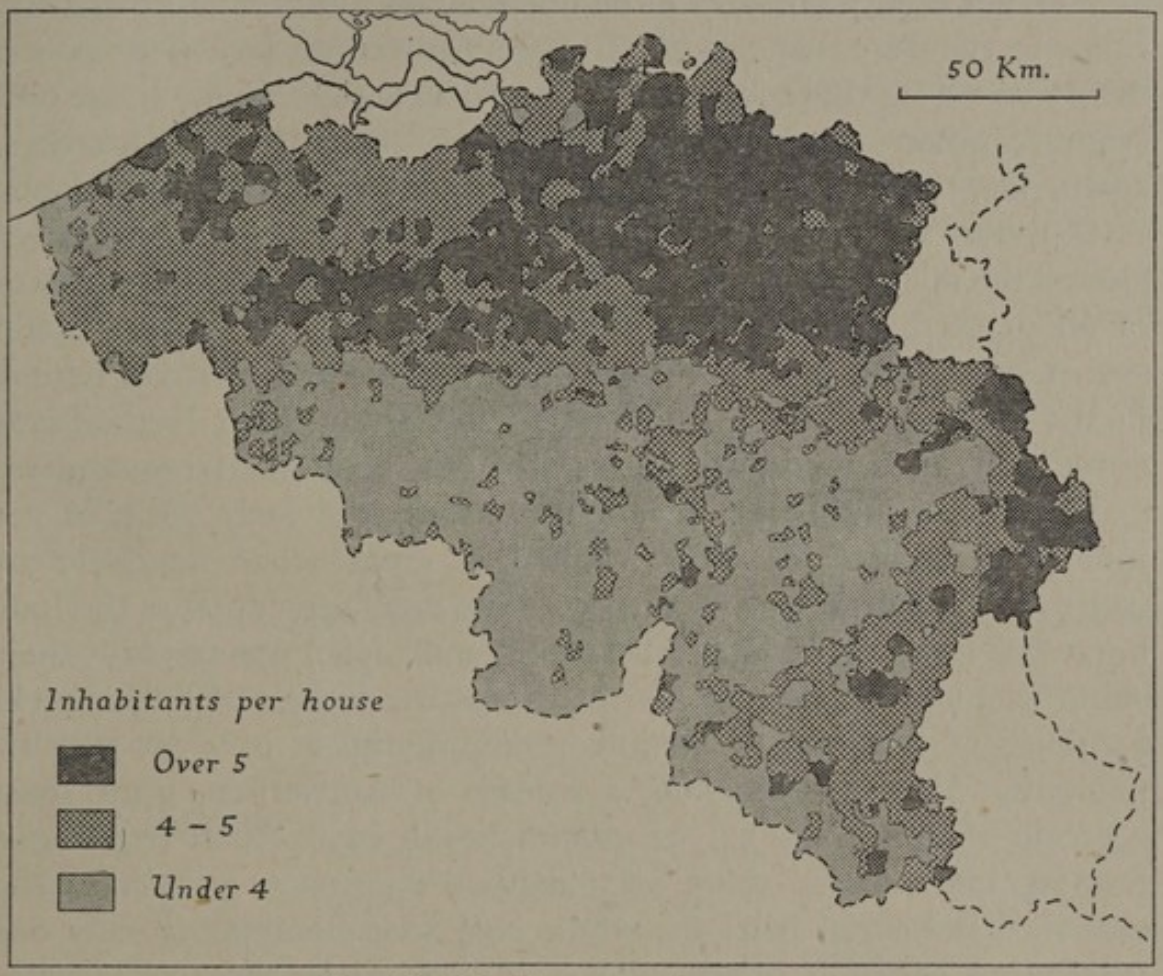


Fig. 58. Inhabitants per house, 1920

Based on F. Leyden, 'Die Volksdichte in Belgien, Luxemburg, und den Niederlanden', *Petermanns Mitteilungen*, Ergänzungsheft No. 204 (Gotha, 1929). The original is a folding map on a scale of 1 : 925,000 and has been constructed on the basis of the communes. The numbers of inhabitants per house for the whole of Belgium for the period 1890–1930 were as follows :—1890 – 5·1; 1900 – 5·0; 1910 – 4·8; 1920 – 4·8 ; 1930 – 4·5; see *Recensement général*, 1930, vol. I, p. 177 (Bruxelles, 1934). For a discussion of the method of counting houses (e.g. the inclusion of flats, hospitals, etc.) see *Recensements des maisons et autres bâtiments et des logements en* 1930 (Bruxelles, 1935).
Compare this map with Fig. 30 showing the linguistic boundary between Flemish and Walloon.

Walloon district. In the poor backward Ardenne, families are still moderately large, and the number of inhabitants per house is greater than in the rest of the Walloon area. The division between high and low density per house does not coincide with the linguistic frontier between Walloon and German, but runs parallel to it at some distance to the west.

Towns and Cities

Belgium is one of the areas where the medieval town reached its finest flowering in Europe, and the medieval cloth-halls and *hôtels-de-ville* tell their own story of commercial and industrial prosperity. Some towns were seaports like Brugge, Antwerpen and Nieuwpoort; others stood at the confluence of two rivers, like Gent, Liége and Namur; others were on navigable rivers, like Mechelen; others, again, like Leuven and Bruxelles, were on the Flanders-Cologne trade route. Towards the end of the Middle Ages, economic changes altered the relative prosperity of many of these towns, and the fortunes of all of them suffered during the period of revolt against Spain (see p. 96). Despite some improvement under the Austrian regime in the eighteenth century, the towns of the southern Netherlands never really recovered their prosperity until the industrial revolution.

The intense industrial development from the early years of the nineteenth century onward, resulted in great urban development (see p. 117). Between 1850 and 1910, the total population of the four big towns (Antwerpen, Bruxelles, Gent and Liége) was trebled; their suburbs, too, became large towns. Thus the village of Schaerbeek, a suburb of Bruxelles, grew into a community of over 100,000 inhabitants; likewise Hoboken, a suburb of Antwerpen, grew from 2,630 in 1856 to some 32,592 inhabitants in 1938. Apart from these four agglomerations, there was likewise enormous growth in the east-west industrial belt; the whole coal zone became virtually one continuous series of urban villages. According to the 1938 census, there were in Belgium 140 towns with populations exceeding 10,000; altogether, some two-thirds of the population of the country live in these towns; the corresponding figure for Great Britain is three-quarters, but, then, many workers in the Belgian towns live out in the countryside (see p. 188).

The population figures for individual towns, however, frequently give a misleading picture of urban development, in that suburbs, which are functionally part of large cities, are sometimes counted separately owing to their local administrative independence. It may be assumed that most towns are, in fact, larger than they appear to be. In particular, the Belgian census for 1930 distinguished four 'agglomerations' or clusters of towns around larger centres. These are:

(1) Antwerpen, comprising the communes of Antwerpen, Berchem, Borgerhout, Deurne, Hoboken and Merksem (p. 427).

(2) Bruxelles, comprising the communes of Bruxelles, Anderlecht,

Auderghem, Etterbeek, Forest, Ixelles, Jette, Koekelberg, Molenbeek-Saint-Jean, Saint-Gilles, Saint-Josse-ten-Noode, Schaerbeek, Uccle, Watermael-Boitsfort, Woluwe-Saint-Lambert, and Woluwe-Saint-Pierre (p. 589).

(3) Gent, comprising the communes of Gent, Gentbrugge, Ledeberg, and Sint-Amandsberg (p. 412).

(4) Liége, comprising the communes of Liége, Angleur, Bressoux, Grivegnée, Herstal and Ougrée (p. 602).

In 1930, these four agglomerations accounted for one-fifth of the total population of Belgium, and the inhabitants of each city, and its agglomeration respectively, were as follows:

	1930 census		1938 estimates	
	City	Agglomeration	City	Agglomeration
Antwerpen	284,373	484,350	273,317	492,645
Bruxelles	200,433	869,281	191,678	912,774
Gent	170,358	218,580	162,858	213,844
Liége	165,631	252,297	162,229	253,689

Sources: (1) Estimates from *Moniteur Belge*, 13 April 1939 (Bruxelles); (2) *Recensement général*, 1930, vol. I, pp. 326 et seq. (Bruxelles, 1934).

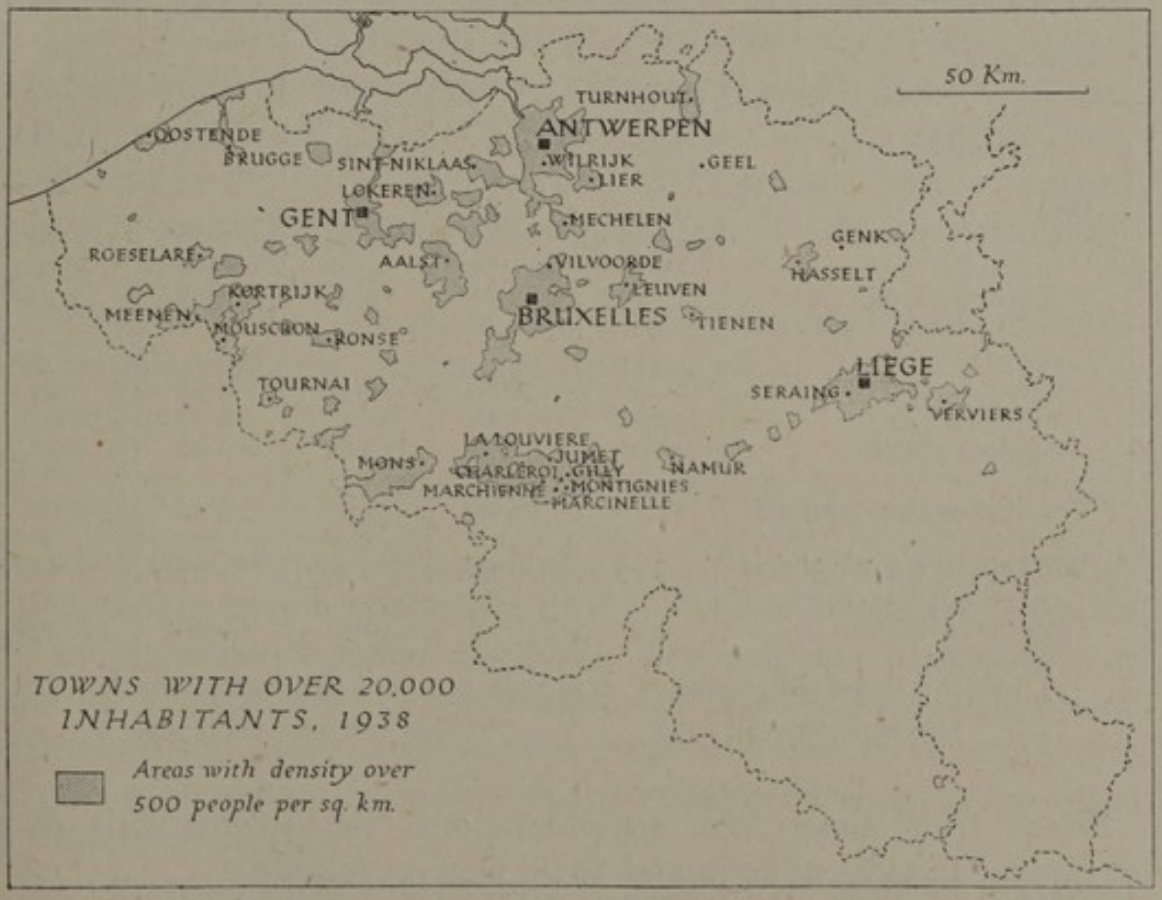


Fig. 59. Towns with over 20,000 inhabitants, 1938

Based on the estimates for 31 December 1938 in *Le Moniteur Belge*, 13 April 1939 (Bruxelles).

The communes that form part of the four agglomerations of Antwerpen, Bruxelles, Gent and Liége are not named—see above; these four agglomerations are shown more prominently than the other towns.

In some ways, the total figure even for an agglomeration hardly does justice to the full mass of people assembled together. Thus, beyond the agglomeration of Liége there are satellite towns which bring the total population centred on Liége up to not less than half a million people (see p. 197).

The continued development of these great centres is marked by a feature that is also characteristic of London—an enormous growth of the population living in the suburbs, and a slow growth (sometimes even a diminution) of the inhabitants of the city itself. The table below shows the percentage increase or decrease in the population of the four areas between successive censuses since 1880:

Growth of the Agglomerations of Antwerpen, Bruxelles, Gent and Liége, 1880–1930

	1880–90	1890–1900	1900–10	1910–20	1920–30
Antwerpen:					
City	32·10	21·80	10·48	0·04	−7·06
Suburbs	50·83	32·31	43·67	11·88	41·34
Agglomeration	35·92	24·18	18·49	3·51	8·24
Bruxelles:					
City	11·88	6·60	0·16	−7·27	−1·29
Suburbs	24·31	29·11	32·81	10·99	13·77
Agglomeration	19·03	20·13	21·25	5·65	9·90
Gent:					
City	13·16	7·67	3·94	0·36	1·99
Suburbs	43·97	21·78	14·80	2·09	7·39
Agglomeration	17·55	10·13	6·04	0·72	3·13
Liége:					
City	19·92	6·84	6·19	−2·52	1·43
Suburbs	30·01	32·48	31·11	2·55	12·93
Agglomeration	22·06	12·63	12·81	−0·96	5·11
The four agglomerations	23·10	18·40	17·06	3·47	7·93
The rest of the kingdom	7·19	8·33	9·29	−1·37*	8·52†
The total kingdom	9·95	10·28	10·91	−0·30*	8·39†

Source: *Recensement général*, 1930, vol. I, p. 151 (Bruxelles, 1934).

* Old territory for 1920. † New territory for 1920.

Apart from these four agglomerations, the towns with over 20,000 inhabitants in 1930 and 1938, were as follows:

	1938 estimate	1930 census		1938 estimate	1930 census
Mechelen	62,311	60,438	Genk	27,021	24,574
Brugge	51,884	51,397	Hasselt	26,828	22,296
Oostende	50,263	46,952	Mons	26,417	27,619
Seraing	42,981	45,133	Vilvoorde	26,110	23,569
Verviers	42,931	44,098	Wilrijk	25,752	20,361
Sint-Niklaas	41,933	38,937	Lokeren	25,398	24,403
Aalst	41,131	38,429	Ronse	25,261	24,295
Kortrijk	40,979	38,639	Gilly	24,565	26,094
Leuven	37,141	38,752	Montignies-sur-Sambre	24,043	25,177
Mouscron	35,722	33,000			
Tournai	35,463	35,440	La Louvière	22,657	23,852
Namur	32,831	31,437	Tienen	21,952	20,935
Roeselare	30,334	26,850	Meenen	21,996	20,484
Turnhout	29,305	26,657	Marchienne-au-Pont	21,619	23,678
Jumet	28,919	29,819			
Lier	28,631	27,835	Marcinelle	20,461	21,358
Charleroi	27,274	28,640	Geel	20,838	18,638

Sources: (1) Estimates from *Moniteur Belge*, 13 April 1939, pp. 2644–55 (Bruxelles); (2) *Recensement général*, 1930, vol. I, pp. 326 et seq. (Bruxelles, 1934).

Again, these figures hardly do justice to massing of people that can be observed around, say, Charleroi. Here, there are a number of satellite towns with populations almost as large as Charleroi itself (p. 597). Mons is likewise a much more important centre than its own population would suggest (see p. 610); indeed, the whole east-west industrial belt can be regarded as one great agglomeration. Farther west, the towns of Kortrijk and Mouscron form an area of dense population continuous with the Roubaix-Tourcoing agglomeration in France (Fig. 59).

For an account of the ports, see Chap. XV.; for the other towns with populations over 20,000, see Appendix VI.

Rural Settlement

An important element in the landscape of a region is the way in which people have come to live in it—whether in large villages, or in hamlets, or in scattered dwellings. For Belgium it is possible to make fairly satisfactory generalizations because the study of types of settlement has made considerable progress there in recent years. Belgian geographers have themselves recognized three main types of rural settlement:

(1) *Nucleation*, or the clustering of houses into compact nucleated villages separated by wide stretches of open land. This, for example, is the type of settlement in the fertile upland of the Hesbaye (Fig. 60),

in the plateau of the Condroz, and also in the Ardenne itself (Fig. 61) —though here the village clusters are small and widely spaced. To the south of the Ardenne, in Belgian Lorraine, the same type is encountered.

(2) *Dispersion*, or the loose scattering of houses in a disorderly fashion over the countryside; the characteristic unit of settlement is the isolated house in its own field. Thus, in the province of Oost-Vlaanderen, it has been said that 'the soil disappears under a veritable

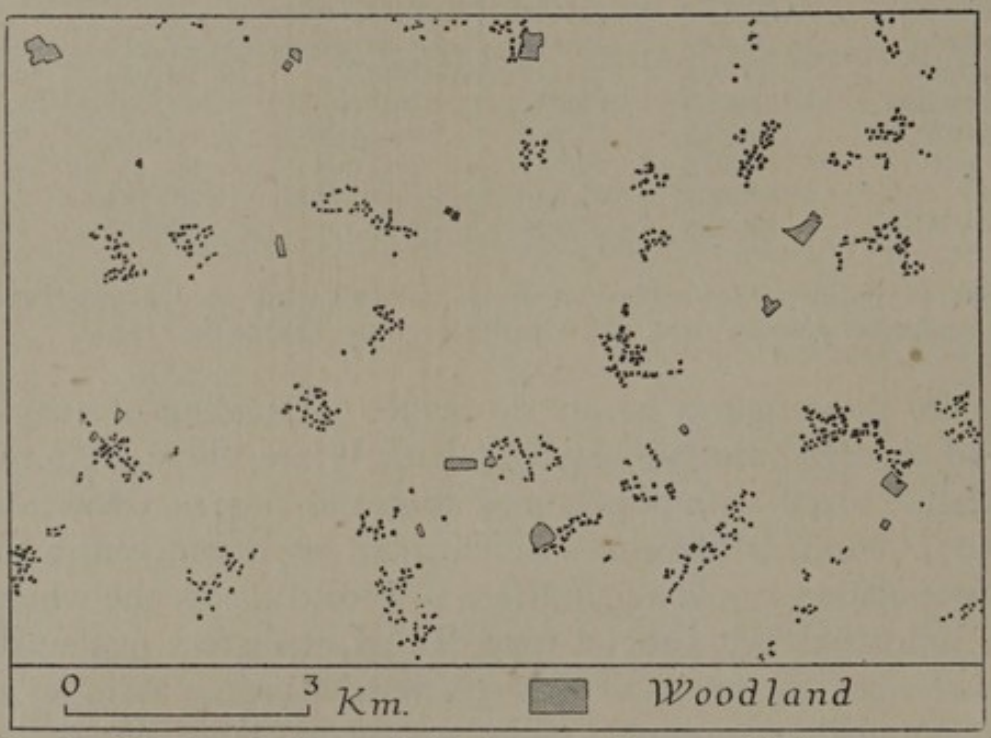


Fig. 60. Nucleated villages in Hesbaye, to the west of Waremme, 1938

Based on G.S.G.S. Series 4040 (1 : 50,000, 1938), Sheet 68, Ambresin (based on the Belgian 1 : 40,000, 1913).

dust of houses'. Only the frequent belfries indicate that there are distinct centres. There are variations—the higher interior has the maximum scattering (Fig. 62); the polders have great isolated farms with outbuildings; semi-rural industrial suburbs complicate the picture. But dispersal remains the characteristic feature. Quite separate, in the east of Belgium, is a curious isolated area of dispersed settlement, in the country of Herve.

(3) *Intermediate Types*, the loose grouping of houses in an intermediate fashion, savouring sometimes of (*a*) dispersion, sometimes of (*b*) concentration.

(*a*) In the Kempenland, there are hamlets, small in the south, larger and less frequent in the north. Between Gent and Antwerpen, the houses of the Waasland are arranged in linear bands. To the south of the Escaut, they follow the sinuosities of the roads. In all

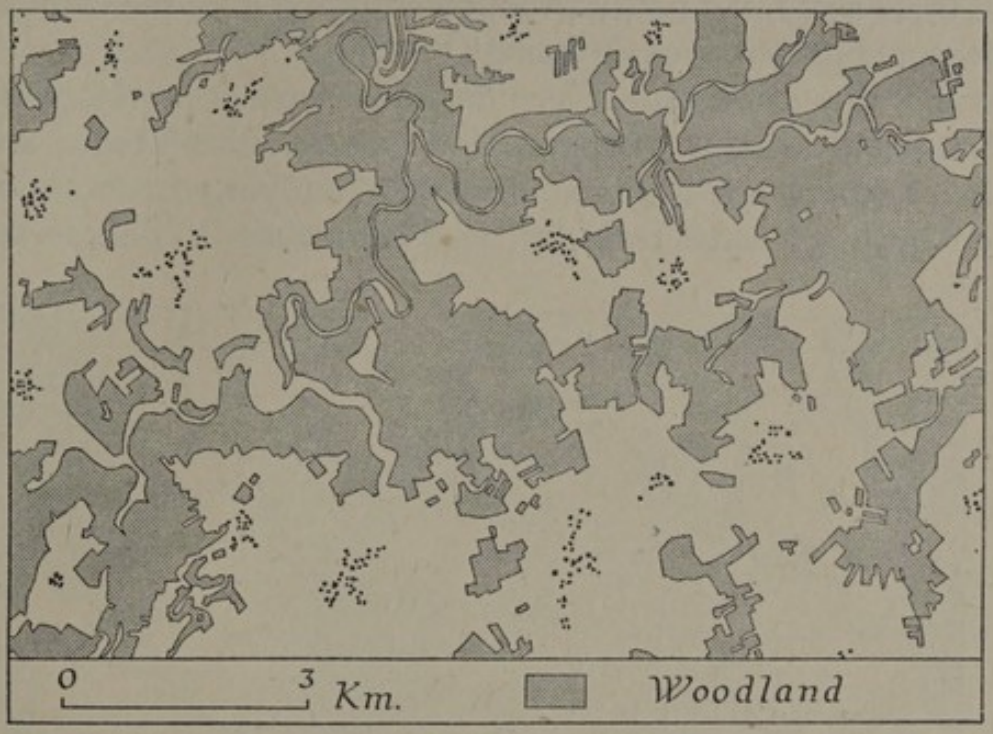


Fig. 61. Nucleated villages in the Ardenne, to the east of St Hubert

Based on G.S.G.S. Series 4040 (1 : 50,000, 1939), Sheet 106, St Hubert (based on the Belgian 1 : 20,000, 1922–4).

The villages are situated on the uplands (400–450 metres above sea level), and the winding courses of some rivers can be seen threading the forest areas on the map.

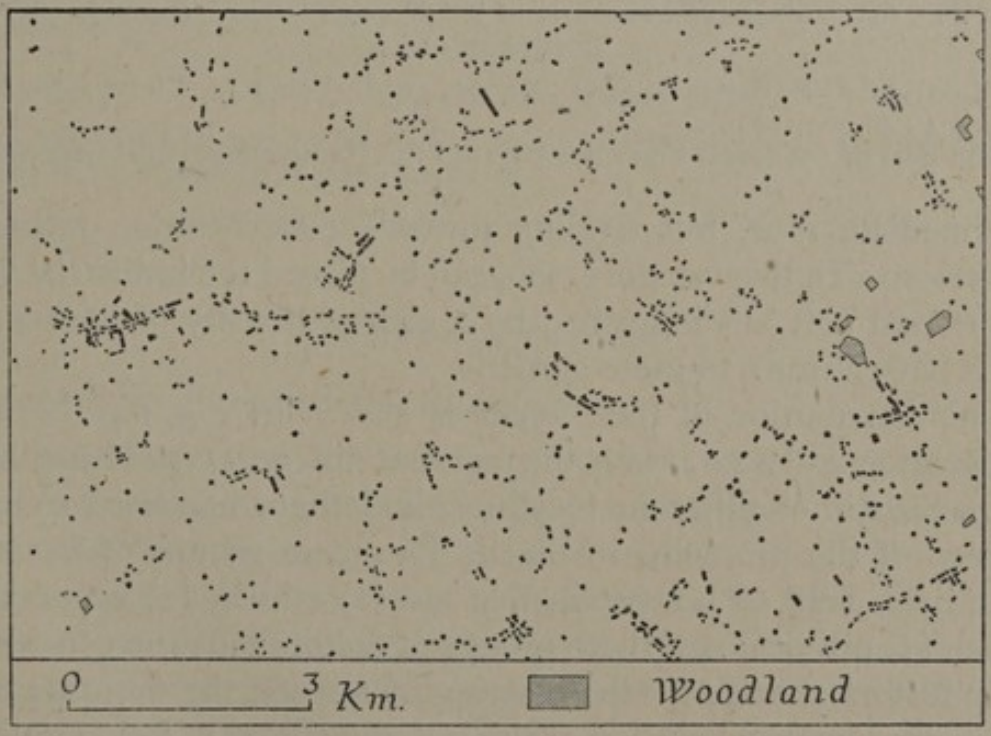


Fig. 62. Dispersed settlement in Flanders, to the east of Kortrijk (Courtrai).

Based on G.S.G.S. Series 4040 (1 : 50,000, 1942), Sheet 53.

these three areas, the houses, though scattered over the countryside, follow some principle of grouping (Fig. 63).

(*b*) To the south, however, on the plateaux of Hainaut and Brabant, and also in eastern Liége between the Vesdre and the Amblève, there are large hamlets with outlying farms, best described by the French term 'villages nebuleuses'. This is another

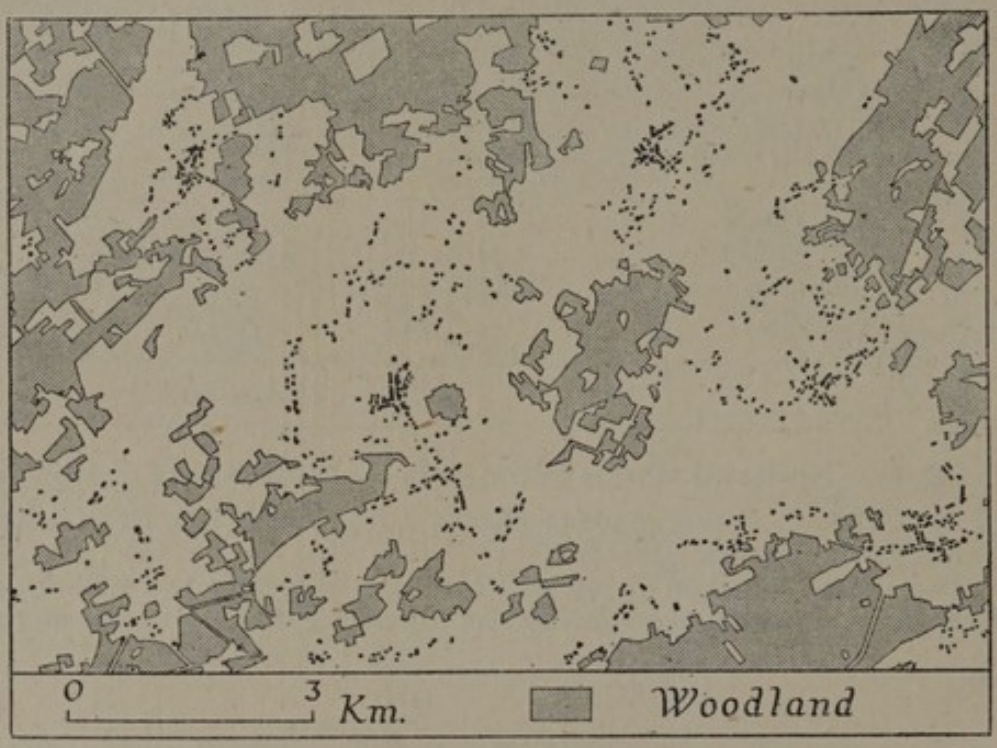


Fig. 63. Villages and Hamlets in the Kempenland (Campine), to the north-east of Lier

Based on G.S.G.S. Series 4040 (1 : 50,000, 1938), Sheet 34, Lierre (based on the Belgian 1 : 40,000, 1929).
A good deal of the forest that once covered the Kempenland still remains.

intermediate type, but tending towards concentration rather than dispersion. In this category, too, can be placed the industrial villages of the coal belt, distinguished by a greater density of houses; here, fields have shrunk to mere gardens.

The distribution of these types is shown in Fig. 64. No simple explanation will account for the fact that different types have become characteristic of different localities, and there has been much discussion of the problems involved. The main groups of factors that have been held to be responsible are (1) ethnic, (2) economic and social, (3) physical. All these groups of factors must be considered in their historical setting—the clearing of forests, the drainage of lowlands, the closer cultivation of the soil, the effects of industrialization. Even so, it is difficult to provide a satisfactory explanation of the

distribution as a whole. Thus, an essential condition of any settlement is water supply. Yet, in the Ardenne, where water is everywhere abundant, houses are concentrated, while in the Herve, where water is not so easy to obtain, houses are dispersed. A full discussion of the many factors involved and of their complications will be found in M. A. Lefèvre, *L'Habitat rurale en Belgique* (Liége, 1925).

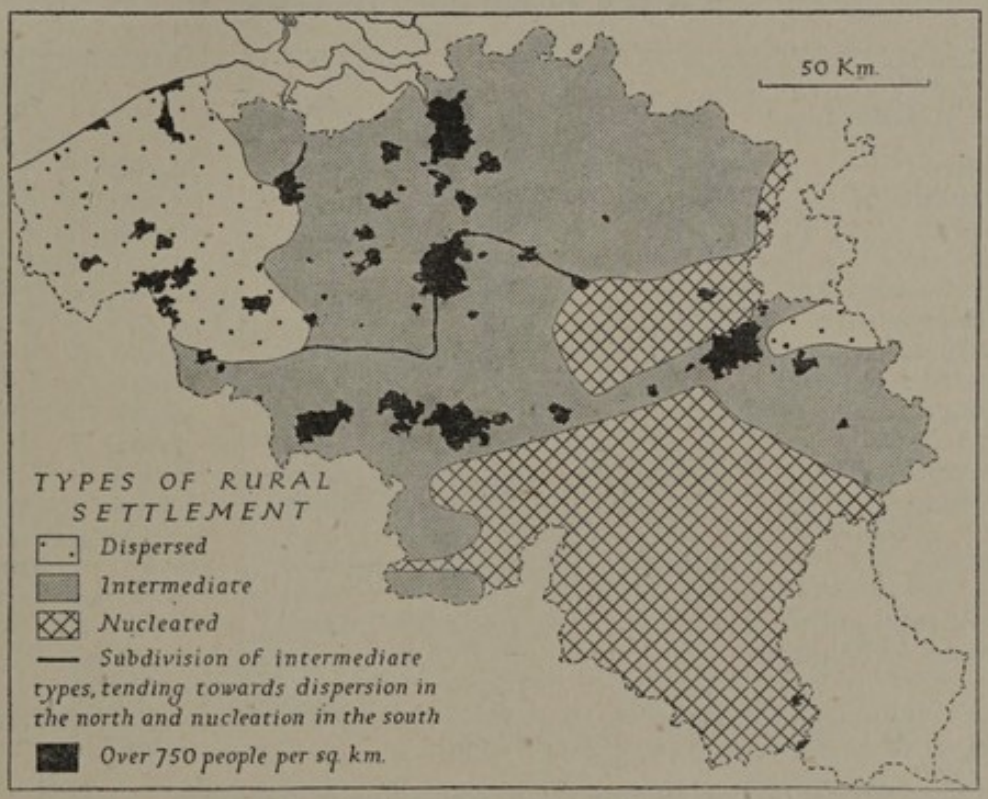


Fig. 64. Types of rural settlement

Based on (1) a folding map in M. A. Lefèvre, *L'Habitat rurale en Belgique* (Liége, 1925); (2) Figs. 48 and 49 of this Handbook.

Foreign Population

Foreigners in the Economic Life of Belgium

The main facts about the foreign population of Belgium are summarized in the table on p. 224. From this it can be seen that the foreign element rose from being 3·4 % of the total inhabitants in 1910 to 3·95 % in 1930, and to just over 4 % in 1938. In 1920, of course, conditions were still abnormal after the war. These figures, however, hide a great change that had taken place, for while the total foreign element showed only a slight increase, its composition underwent radical changes. The number of Germans decreased almost to a

fifth of their previous number. The number of Frenchmen and of Dutchmen each shows some decrease also. But this reduction was more than made up by the influx of Poles, Italians and Czecho-Slovaks. The distribution of the total foreign population and of the four main groups of foreigners, by arrondissement in 1930, is shown in Figs. 65 and 66 respectively.

Foreign Population, 1900–38

Country of origin	1900	1910	1920*	1930	30 June 1938
France	56,576	80,765	67,309	74,163	71,322
Netherlands	63,923	70,950	39,051	65,200	68,014
Poland	—	—	5,329	50,626	61,809
Italy	3,543	4,490	3,723	33,491	37,134
Czecho-Slovakia	—	—	712	10,866	16,230
Luxembourg	10,417	10,367	5,793	9,587	11,185
Germany	53,758	57,010	7,960	12,070	14,472
United Kingdom	5,748†	6,974†	6,246†	11,410	9,161
Hungary	—	—	215	4,522	6,063
Jugoslavia	—	—	170	7,711	5,917
Switzerland	2,231	2,335	1,770	6,094	5,420
Others	9,805	21,656	10,899	22,490	33,072
Total	206,061	254,547	149,677	319,230	339,799
% of total population of Belgium	3·09	3·43	2·02	3·95	4·06

Sources: (1) *Recensement général*, 1930, vol. III, p. 73 (Bruxelles, 1937); (2) *Annuaire statistique de la Belgique*, p. 29 (Gand, 1939).

* These figures do not include the newly acquired territories.
† Including southern Ireland. On 30 June 1938, there were 185 from Éire.

In the decade following the war of 1914–18, there was a shortage of labour in Belgium despite the increased use of machinery and modern equipment. Nor was the situation helped by the growing emigration of Belgian workers to factories just over the French and Dutch borders. In 1929, the Belgian consul at Lille estimated the number of Belgian immigrants in the Lille-Roubaix-Tourcoing area alone to be about 100,000, apart from some 50,000 non-resident Belgians who crossed the frontier daily or weekly to work in France. On the other hand, many foreigners were working in Belgium. In 1926, when a census was made of industrial establishments employing a minimum of ten workers, foreigners numbered some 35,000 out of a total number of over a million workers, i.e. 3·5 %; the largest number of foreigners were found in the coal mines, where 17,242 foreign workers were employed out of a total of 182,002 miners, i.e.

about 10 %. The number in the new Kempen coalfield was particularly high; 30 % of the labour employed in the Limburg mines was foreign. The native Belgian workers were deserting the mining industry for easier occupations. By 1930, over 17 % of the miners in Belgium were foreign—some 30,887 out of a total of 178,850. This fell to 16 % in 1934 (see p. 226)—i.e. about 20,000 foreigners out of a total of 124,000 miners. A similar replacement of natives by foreigners in the unskilled occupations was also observable in France.

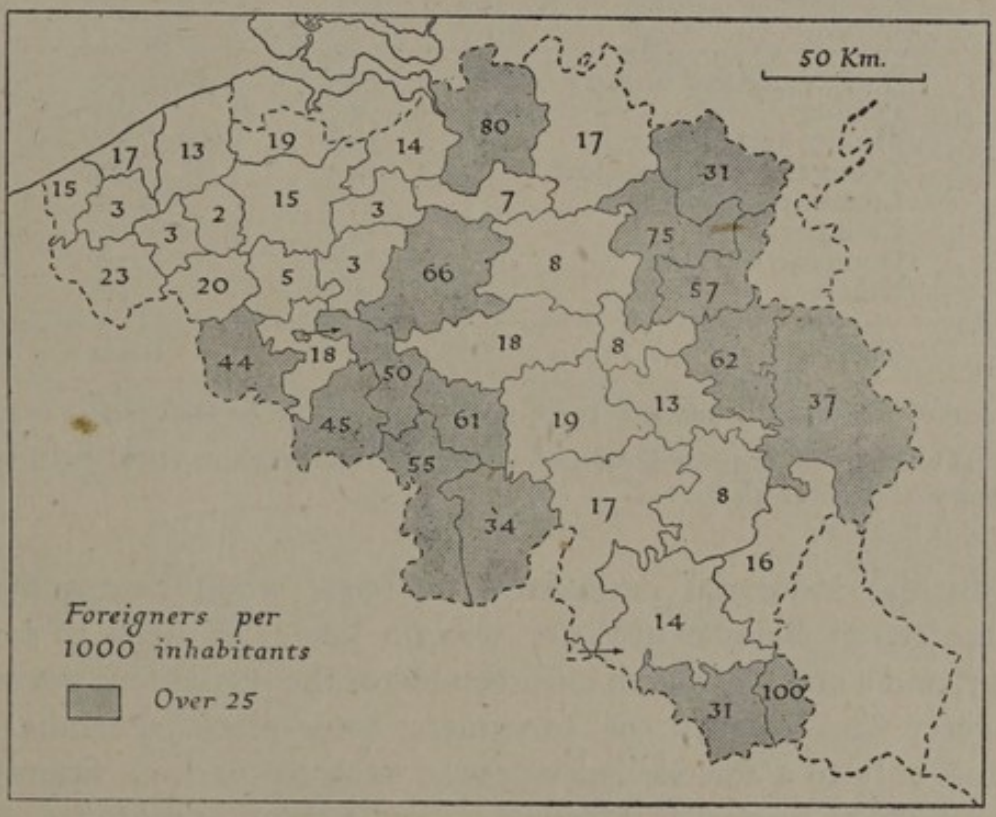


Fig. 65. The distribution of foreigners, 1930

Based on *Recensement général*, 1930, vol. III, pp. 70–71 (Bruxelles, 1937). The figures are calculated on the basis of arrondissements.

The D.O.T. Report for 1929 declared that 'expert writers are of the opinion that if Belgian industry is to continue its expansion some 50,000 workers will have to be absorbed to make good the present deficiency'. As this lack could not be supplied by native labour, the employment of foreigners was the only alternative. But this alternative raised many social and political problems connected with equality of treatment, with housing and with protection against abuses. Then, too, some foreigners did not confine themselves to the unskilled occupations, but set up small workshops and competed with native establishments. A bill regulating the immigration and sojourn of foreigners became law on 15 December 1930; it contained

a clause stating that foreigners could not be employed without a permit from the Minister of Justice and the Minister of Industry and Labour. The occupational grouping for the whole country and for foreigners respectively, at the 1930 census, is shown in the table below:

Occupational Groupings, 1930

	Total for Belgium %	Foreigners %
Agriculture and forestry	16·9	3·2
Fishing	0·1	0·0
Mining and industry	54·6	59·2
Commerce and transport	14·5	18·7
Liberal professions	3·7	10·0
Civil Service	4·5	0·0
Domestic Service	4·9	7·7
Others	0·8	1·2
Total	100·0	100·0

Source: *Recensement général*, 1930, vol. v, pp. 62 and 73 (Bruxelles, 1937).

Out of a total working population of 3,750,285 in Belgium in 1930, 168,129 were foreigners—i.e. some 4½ %.

With the industrial depression of 1931, when unemployment became acute, Belgian industry was no longer in need of foreign labour, and a more stringent enforcement of the regulations governing the entry and sojourn of foreigners took place. Permits were granted only to a few skilled workers, such as machine fitters; and the number of foreign workers who were refused admittance, in the two years of 1932–3, has been estimated at 250,000. A decree of 8 December 1934 gave the Minister of Labour and Social Welfare power to regulate the percentage of foreign workers and to repatriate those in excess of definite quotas; by this means it was hoped to provide work for the native Belgians who were unemployed. Thus, in the course of 1935, steps were taken in the Charleroi mining district to replace 10 % of the foreign labour employed; the recruitment of Belgian miners, however, raised such difficulties that doubt was expressed about the possibility of carrying out fully the government quota measure. By a decree of 31 March 1936, the quota system was replaced by a system of individual workers' permits. These permits could not be refused to any foreigner who had lived in Belgium or in the Belgian Congo for ten or more years. Moreover, owing to the reduced working hours of Belgian miners, and in view

of the scarcity of coal, the Belgian government authorized the introduction of Polish miners in the early part of 1937. Some of these foreign workers were brought within the scope of unemployment benefit by mutual agreement with their country of origin. The scheme of family allowances introduced by the act of 1930 included foreign as well as native workers.

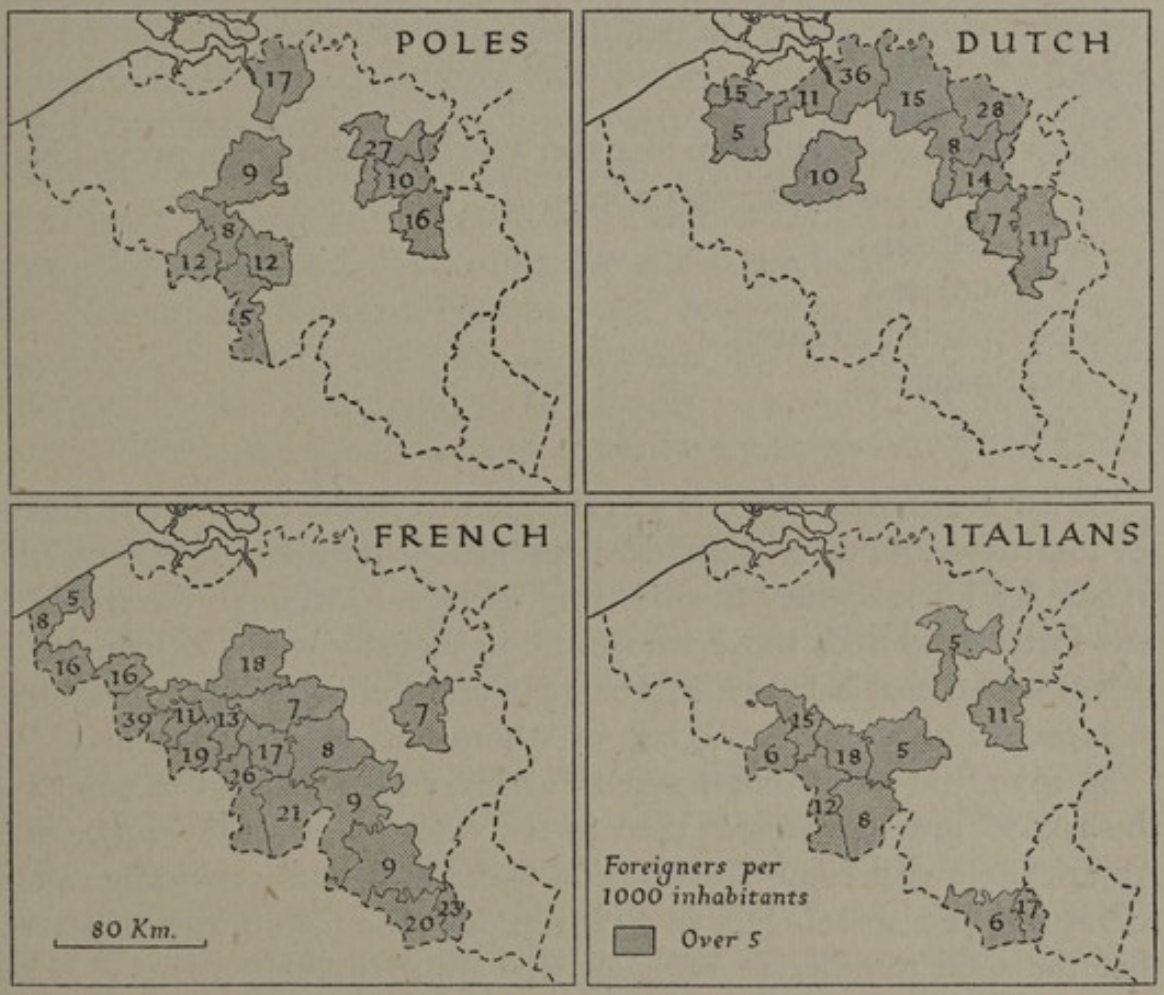


Fig. 66. The distribution of French, Dutch, Italians and Poles, 1930
Based on *Recensement général*, 1930, vol. III, pp. 78–79 (Bruxelles, 1937). The figures are calculated on the basis of arrondissements.

Refugees

Since 1918, Belgium has been affected by the two waves of refugees that have appeared in Europe. The first group coming in the twenties was composed mainly of Russians with some Armenians and Assyrians. The Russian Church was given a special status in the country, and the general condition of the Russian refugees was reported as good.

With the rise of Hitler to power in 1933–4, the refugee problem assumed new dimensions. Widely differing estimates have been given of the number of German refugees that came into the country; these

differences were partly due to the fact that many stayed only a short time before proceeding to more permanent homes. In 1938, the Belgian government closed the frontiers, but illegal entries from Germany and Luxembourg continued, and the gendarmerie posts along the German frontier had to be strengthened. Estimates of the numbers of refugees in the country in July 1938 may be summarized as follows:

7,500 Russians.
800 Armenians.
2,000 Germans (exclusive of 4,000 who had been given provisional asylum and afterwards left).
800 Austrians.
80 Stateless.
3,000 Spanish children.
120 Spaniards.
250 Italians.

On 18 November 1938, it was decided to throw open the frontier for four days, and there were many resolutions urging the government to adopt a liberal policy in admitting refugees. Although the frontier was formally closed, those who came in illegally were not expelled. It was stated that between March 1938 and February 1939, Belgium received 12,000 refugees, 9,000 of whom had entered illegally. In June 1939, the government asked Parliament for a credit to support the 10,000 Jewish refugees then in the country. By May 1940, the American-Jewish Joint Distribution Committee was providing relief for 15,000 Jewish refugees in Belgium, and the Committee believed that the total number of refugees was approximately 30,000. It is difficult to estimate precisely the fate of these refugees because figures relating to occupied Belgium do not distinguish clearly between 'Belgian' and 'immigrant' Jews; but it is safe to assume that the number in the country has been affected by the German policy of deporting Jews from western to eastern Europe.

Note on Family Allowances

The declining birth-rate has aroused public opinion in Belgium as in many other European countries, and it is not surprising that increasing emphasis has come to be laid upon the use of family allowances in stimulating the growth of population.

The initial step was taken by the Civil Service in 1907–10, when Post Office employees were given 36 francs a year for the third, and each succeeding, child—to be paid until the child was 14 years old. The war of 1914–18 prevented any expansion of the scheme. Post-war inflation, however, gave the movement a new impetus. Rising prices caused the workers to demand increased wages, and at the same time the labour shortage in France, together with the French system of family allowances, were attracting workers from Belgium. It was to meet these difficulties that the first equalization fund (based upon the French model*) was set up at Verviers in 1921. The movement was thus sponsored by employers for industrial reasons, mainly to secure a stable labour supply, but it soon attracted public attention as a possible method of arresting the fall in the birth-rate. In 1920, the 'Ligue des Familles Nombreuses' had been formed, and this became a powerful influence in pressing for economic and social changes to the advantage of the family. In 1923, an anti-birth-control law was passed. By 1929, there were forty-four equalization funds in private industry covering 581,600 employees and paying allowances for 331,200 dependent children. The equalization funds were of two kinds: (1) the professional, including workers in the same occupation, and sometimes covering the whole country; and (2) the regional, including different kinds of occupations in a given area.

The spontaneous movement on the part of employers, coupled with increasing public interest in the problem, soon resulted in official action. In April 1928 came an act applying the family allowance system to all contracts for public works; and in September 1928 a royal decree extended the law to many public undertakings, including the National Bank, the Belgian National Railways, and both the free and the state universities. Finally, in August 1930, at the instigation of Monsieur H. Heyman, the Minister of Labour, an act was passed which made the system of family allowances compulsory. All employers were to belong either to existing equalization funds or to new ones formed with the approval of the government.

* D. V. Glass explains the equalization fund thus: 'Instead of giving allowances directly to his workers and thus having to bear a heavier charge if the bulk of his workers were married men with children, the employer made a regular contribution to the equalization fund, which distributed the allowance itself. The employer's contribution varied directly with the total number of workers employed, and not simply with the number of married workers, and there was thus no incentive to discriminate against married men' (D. V. Glass, *Population Policies and Movements in Europe*, p. 102 (Oxford, 1940)). The funds were either occupational or regional in scope.

A national super-equalization fund was to be established to adjust differences between the individual funds. The system was to be financed by contributions from employers and by a state grant of thirty million francs a year. Minimum allowances were fixed, but these have been adjusted several times. An idea of the relation between allowances and basic wages can be obtained from some typical wage rates in Bruxelles in 1935:

Family Allowance as a Percentage of Basic Wage
(*Bruxelles—January*, 1935)

No. of children	Lowest wage groups	Medium wage groups	Highest wage groups
	%	%	%
1	1·3	0·8	0·5
2	3·0	2·0	1·2
3	7·6	4·9	2·9
4	16·9	10·9	6·6
5	30·5	19·7	11·8
6	44·0	28·5	17·1

Source: D. V. Glass, *The Struggle for Population*, p. 66 (Oxford, 1936).

The lowest group of wage earners received 700 francs per month; the medium, 1,080 francs; and the highest, 1,800 francs.

In June 1937, the scheme was extended to include employers and independent workers—the whole category included in the term *non-salariés*. In practice, this included everyone not already covered by the 1930 act, with the exception of *rentiers*.

There has been much discussion and some criticism about the scope and administration of the scheme, e.g. about the relation of individual funds to the super-equalization fund, and about the institution of regional rates to cover varying costs of living in different localities. Many equalization funds, with surplus money, provide special services and cash payment to their members, e.g. birth premiums, holiday camps, funeral expenses, visiting nurses. Other advantages, sponsored by the state, have aimed at reducing the burden of a large family, e.g. by tax reduction, remission of school fees, concessions in length of military service, and cheap rail fares.

The vital question that arouses interest is to what extent have the family allowances been successful in increasing the birth-rate. Many assertions have been made in Belgium, as in France, that this is so, but not enough time has yet elapsed, nor are the available statistics sufficiently detailed to enable any general conclusions to be reached.

BIBLIOGRAPHICAL NOTE

1. A census of the population of Belgium was first made in 1846, and was repeated every 10 years until 1876. It was then decided to make the intercensal period correspond with each decade of a century; another census was therefore made in 1880, and the enumeration has been repeated at intervals of 10 years. Some estimates are available for dates earlier than 1846, but their reliability can be questioned. The most recent census is that for 1930—*Recensement général de la population* (Bruxelles). As well as providing total figures, the returns contain a great deal of other information, e.g. concerning age groups, foreign population, etc.

In addition to the census returns, there is another source available for a discussion of the growth of population in Belgium. The registration of births and deaths, arrivals and departure in each commune, enables its population to be calculated at the end of each year, and these annual estimates can be used to supplement the information of the census returns themselves. The estimates are published in *Le Moniteur Belge* (Bruxelles). Those for the period ending on 31 December 1938 are contained in the issue of 13 April 1939.

In addition, there is a third source of information which gives a variety of information about population and other matters in summary form. This is the *Annuaire statistique de la Belgique et du Congo Belge* (Gand.) The most recent number available for use in writing this account is that of 1939.

2. *The Statistical Year-Book of the League of Nations* (Geneva) provides comparative data for Belgium and other countries, and gives also much information about fertility and reproduction rates. For further details on gross and net reproduction rates, see R. R. Kuczynski, *The Measurement of Population Growth* (London, 1935.)

3. A good account of the distribution of population (based on the figures for 1926) is given in F. Leyden, 'Die Volksdichte in Belgien, Luxemburg und den Niederlanden', *Petermanns Mitteilungen*, Ergänzungsheft No. 204, pp. 54 (Gotha, 1929). This contains three maps, on the scale of 1:925,000, showing the distribution of population, of houses, and of inhabitants per house. All three maps are calculated on the basis of the communes, and are much more detailed than the map in the census returns, which shows the distribution of population of the basis of arrondissements only. There is a long review of Leyden's work by M. A. Lefèvre in *Annales de Géographie*, vol. XXXIX, pp. 940–8 (Paris, 1930). There is also an interesting article, based on the census returns of 1930, by O. Tulippe, 'Une carte des communes belges', *Bulletin de la Société royale belge de Géographie*, vol. LXIII, pp. 41–9 (Bruxelles, 1939).

A discussion of the economic background to the distribution of population will be found in A. Demangeon, *Géographie Universelle: Belgique, Pays-Bas, Luxembourg* (Paris, 1927).

4. Among many articles dealing with various aspects of the growth of population the following provide useful material:

H. M. Kendall, 'A survey of population changes in Belgium', *Annals of the Association of American Geographers*, vol. XXVIII, pp. 145–64 (Lancaster, Pa., 1938).

E. Lesoir, 'La Démographie de la Belgique', *Grande Encyclopédie de la Belgique et du Congo*, pp. 199–210 (Bruxelles, 1938).

V. Fallon, 'La Population Belge', *Population*, vol. I, pp. 65–72 (London, 1933).

P. L. Michotte, 'La Belgique est-elle surpeuplée?', *Bulletin de la Société belge d'Etudes géographiques*, vol. IV, pp. 142–62 (Bruxelles, 1934).

Some useful historical material will also be found in *Exposé de la Situation du Royaume de 1876 à 1900*, 3 vols (Bruxelles, 1907–14).

5. A discussion of the effect of the war of 1914–18 upon the population of Belgium will be found in an article on 'La Population', by R. Olbrechts, in *La Belgique Restaurée*, ed. by E. Mahaim (Bruxelles, 1926).

6. There is a comprehensive account of population policy and family allowances in D. V. Glass, *Population Policies and Movements in Europe* (Oxford, 1940). The reports on Belgium issued by the Department of Overseas Trade contain useful references to the system of family allowances.

7. The authoritative account of types of rural settlement in Belgium is M. A. Lefèvre, *L'Habitat rurale en Belgique* (Liége, 1925).

8. An account of the foreign element in Belgium will be found in:

G. de Leener, 'La question de la main-d'œuvre étrangère en Belgique', *Bulletin d'information et de documentation publié par la Banque Nationale de Belgique, Service des Etudes économiques*, IV année, vol. I, no. 10; and vol. II, no. 3 (Bruxelles, 1929).

P. L. Michotte, 'La main-d'œuvre étrangère en Belgique', *Annales de Géographie*, vol. XXXIX, pp. 213–15 (Paris, 1930).

Full statistics of the foreign population will be found in the 1930 census returns. There is also much later information dealing with the foreign element in the reports on Belgium issued by the Department of Overseas Trade.

The refugee problem is fully examined in two authoritative accounts by Sir John Hope Simpson. *The Refugee Problem* (Oxford, 1939) carries the story up to October 1938; *Refugees* (Oxford, 1939) brings it up to June 1939.

Chapter X

AGRICULTURE AND FORESTRY

Introduction: Agricultural Regions: Arable Farming: Dairying and Stock-raising: Market Gardening and Orchards: Working Population and Size of Holdings: Land Tenure: Legislation: Forestry: Bibliographical Note

Introduction

Though only one-third of Belgium is naturally fertile, and industry predominates in its economic structure, agriculture is developed to a high level, supporting a relatively denser rural population than any other western European country, on what are essentially small holdings. In these respects it differs from Britain, but in the relative position of farming to industry, in the methods of adjustment to changes in economic trends, and in the general attitude of the government towards farming, there is much resemblance. The development of farming in Belgium has been influenced in part by historical factors, but its characteristics are largely due, apart from unremitting labour, to the skill and knowledge applied to extracting from each plot the highest yield possible, and to the adjustment of production to changing markets.

Belgian agriculture supplies most of the domestic food requirements with the important exception of wheat, four-fifths of which is imported, and of cheese. The total agricultural production for 1932–3 was valued at 10 milliard francs; of this, 5·75 milliards were accounted for by animal products (beef, milk, butter, eggs, etc.), 3 milliards by vegetables, fruit, flowers and 1·25 milliards by cereals, root and industrial crops. This total is much lower than that for the years preceeding the economic crisis; in 1929 the comparable figure was 16 milliard francs. The export of eggs, flowers and vegetables has also played a part in the balance of trade, though against this must be set off the large imports of potash for fertilizers, and of fodder such as oil-cake and maize.

Agricultural Regions

Belgium may readily be divided, on the basis of relief, soil and climate, into three main agricultural regions. Local variations within

these, and differences arising from the technique employed, make it possible to subdivide these into a number of smaller areas with individual characteristics (Fig. 67):

1. The Northern Lowland:
   (*a*) Coastal dunes
   (*b*) The Polders
   (*c*) Interior Flanders
   (*d*) The Kempenland (The Campine)
2. The Central Uplands:
   (*a*) Hainaut (*limon* on clay)
   (*b*) Brabant (*limon* on sands)
   (*c*) Hesbaye (*limon* on sands and chalk)
3. The Ardenne:
   (*a*) The Pre-Ardenne (the Condroz and Entre-Sambre-et-Meuse)
   (*b*) Ardenne plateau
4. Belgian Lorraine



Fig. 67. Agricultural regions of Belgium
Based on J. Halkin, *Atlas Classique*, Figs. 100 and 109 (Namur, 1934).

1. *The Northern Lowland*

(*a*) *Coastal Dunes*

The narrow belt of recent sand dunes along the present sea coast has a poor arid soil, and the main impetus to the development of cultivation has been the increasing pressure on the available land elsewhere in Flanders. Thus though the soil requires much labour to render it productive, cultivation is by no means negligible, partly as supplement to a living derived from fishing. Owing to the amount of labour necessary, the holdings in the 'pannes' between the dunes are small; the crops, suited to the poor soil, are principally rye, followed by catch crops of turnips, or other roots for fodder, and potatoes. Moreover, the rise of artificially created ports has provided a market for milk and vegetables, and between Oostende and Nieuwpoort, market gardening is profitable. Thus despite apparently forbidding conditions the density of population is about 85 per sq. km. (Fig. 48).

(*b*) *The Polders*

The landward boundary of the polder land or maritime plain is marked by the 5 m. contour, and parts are below high-water level. Reclaimed within recent centuries from the sea, these polders are characteristically flat, humid, and treeless, and are dissected by the dykes and drainage canals of the reclamation works. Most of the work of draining was completed by the thirteenth century (see p. 27). The impetus towards draining was due mainly to the demand of the rapidly developing cloth towns for an easily accessible supply of food. Owing to the lowlying nature of the country, it is necessary not only to prevent inroads by the sea, but both to regulate the supply of the fresh water so that the salt does not infiltrate into the subsoil, and to avoid the danger of flooding. The necessary works and their maintenance are expensive, and impose heavy charges on the land. The soils of the polder land are largely clays of recent marine origin, they are impermeable and heavy to work, but become very fertile under intensive cultivation. The basis of farming on the polders is the rich pasture, carrying dairy cattle, with pig-raising as a subsidiary, but wheat, barley and oats are extensively grown. Green fodder crops and pasture, however, tend increasingly to replace cereals in general. The expenses of reclamation have made the cost of land high, consequently the work has been carried out by capitalist associations, and peasant farming is rare. Thus the size of holdings

is large for Flanders; 15 % of the area is in holdings above 30 ha. Near Antwerpen, the growing of fruit and vegetables is developing, and some farms require as many as three hundred pickers to deal with these crops each season.

(*c*) *Interior Flanders* (Plate 19)

In contrast to the maritime plain, inland Flanders, though nowhere save in the south rising much above 50 m. in elevation, presents a broken, varied surface, and a well-wooded appearance on account of its numerous tree rows and coppices. North of a line running approximately from Diksmuide to Deinze on the Escaut, sandy soils are predominant, though the clay subsoil tends to hold up the surface water; south of this line, more permeable clayey loams occur, finally merging into the *limon* characteristic of the central plains. Despite this diversity, however, the agriculture of inland Flanders has everywhere pronounced common characteristics, a high outlay of labour and of fertilizers, varied combinations of crops, a search for profitable industrial crops, in a word a most intensive system which in its extremes approaches horticulture rather than farming. Coincident with the reclamation of the maritime plain, and to meet the same demand from the rising industrial towns, the cultivators were stimulated to obtain the heaviest possible returns from their not naturally fertile lands. This was achieved by using every possible tract of land, by abolishing fallow, and by growing catch crops after the main harvest. This was only possible by continual working of the land and by very heavy manuring. On a third of each holding two crops a year were grown, generally rye, with a catch crop of turnips; these fed the cattle which passed most of the year in the stables, and whose main function, apart from work in the fields, was the production of the essential manure. All other sources of manure were also utilized, including from an early date refuse of all kinds from the cities, conveyed by barge along the rivers. Later the same object was secured by the introduction of crop rotation. Apart from this lesson in the value of manuring, Flanders was a good school of industry, for the poor soils encouraged deep working in the hope of finding a more fertile layer, and constant hoeing was necessary to keep the hard-won land free from weeds. Much of the work, especially in the north, is done with the spade by the peasant and his family, and the horse is rarely employed. High labour requirements and the constant pressure of population on land have kept the holdings small. Interior Flanders is predominantly a land of small holdings, and subdivision has been

carried almost to the possible limit. Half the area is in holdings of less than 5 ha., and farms of 20 ha. are to be considered large.

Most of the farm produce in the sand districts is used to feed the dairy cattle and stock. Except near markets for beef the general tendency in the country for the proportion of pasture to increase is not so marked here. Where the growing of industrial crops has been abandoned, the land tends to be put down in clover and fodder roots. Sugar beet, however, is important around Zomergem and Nevele. The growing of early vegetables and fruit for the home and export markets has also expanded very much, particularly around Brugge and Gent. In the north a patch of fertile loams gives to the 'pays de Waes' a more prosperous character. Flax has done well here in recent years, and much rye is grown for its straw. The proximity of Antwerpen has also encouraged stock raising (Plate 18).

The area around Aalst, which lies partly across the boundary of the *limon* plateau, with clays exposed in the valleys, is an area of particularly intensive cultivation. In addition to wheat, beet, and potatoes, hops are grown, and horticulture is developed. This portion of Oost-Vlaanderen is characterized by very small holdings and a dense rural population remarkable even for Flanders. It is therefore a centre of rural emigration, partly seasonal in character. Owing to the well-developed system of communications many workers are able to travel to industrial centres at a distance, and to cultivate their small holdings in their spare time.

In the southern areas the land use changes somewhat with the improvement of the soils, and approximates more to that of the central plains. Trees and hedges become rarer, the holdings tend to be rather larger, and cultivation depends less upon the spade and more upon the plough. Wheat is the dominant cereal, sugar beet becomes important, and there is a marked concentration on special crops. Flax is grown in and near the valley of the Lys around Kortrijk and Tielt; chicory around Roeselare, tobacco in West-Vlaanderen around Ieper, and hops at Poperinge.

(*d*) *The Kempenland* (*The Campine*)

This area forms the western portion of the detritus fan of the Meuse. Its surface drainage is undeveloped, with shallow valleys, sluggish rivers, and some marshland. The climate is more extreme than that of Flanders. The soils developed on the coarse gravels and the permeable sands are heavily leached and they are therefore infertile: a layer of tuff often forms in the subsoil, leading to the

development of scrubby heathlands, or *landes*, composed of common heath, juniper, and birch, interspersed with areas of sand dunes, in place of the original woodlands destroyed by the medieval peasantry. Until the beginning of the nineteenth century large flocks of sheep were maintained on these heaths. In the course of the last hundred years, however, this unpromising area has been greatly improved. About one-eighth of the area has been afforested, largely with pines. Increased use of artificial manures has extended and improved the pastures; the *landes* are no longer of significance, and the numbers of sheep have declined very considerably. Some 2,200 ha. along the Meuse-Escaut Junction Canal have been irrigated.

Dairying is the principal activity of the farmers; three-quarters of the farm land is in arable, to supply fodder for the cattle, but the proportion of pastures is increasing with the adoption of more up-to-date methods. The crops grown are those suited to the poor conditions—rye, oats and potatoes, with fodder and roots as a second crop. The influence of the Antwerpen market is extending in the western Kempenland, leading to the rearing of calves for veal, and to market gardening, particularly in the direction of Mechelen. Rural labour also finds part-time employment in the docks and industries.

The Kempenland has always been characterized by small farms, and since 1918 many large estates have been broken up. Of the area in holdings 60 % is under 10 ha., and farms of 20 ha. are rare. The number of owner farmers is increasing, and co-operative creameries are important.

2. *The Central Uplands*

This now includes the most important of Belgian agricultural areas. The significant factor is the cover of *limon* forming an easily worked and very fertile soil. North of Bruxelles this shades off into a wooded area of sandy loam which foreshadows the approach of the Kempenland. In the main this central area is a featureless, rolling, open plateau of moderate elevation, suited to the development of large-scale farming, with large farms and isolated farm houses with few trees, and hedgeless fields. Almost a quarter of the area is in farms of over 30 ha., and there are some of 200 ha. Horses are used in place of oxen for field work, machinery has been widely introduced, and on the whole farming is more nearly 'industrialized' than elsewhere in Belgium.

The three sub-regions into which it may broadly be divided,

Hainaut, Brabant and Hesbaye, arise to some extent from the character of the underlying subsoil—clay in Hainaut, sands in Brabant, and sands or chalk in Hesbaye. With the exception of Hainaut the proportion of pasture to farmland is lower than elsewhere in the country and in Hesbaye it does not exceed 25 %. The area is characterized by intensive cultivation of wheat, sugar beet, and oats, the breeding of horses, and the fattening of cattle, mainly from the Ardenne.

(*a*) *Hainaut* (*limon on clay*)

Hainaut is the centre of the horse-breeding industry, which is also important in Brabant, and the Mehaigne. Of the various types of large, heavy, and powerful horses suited to intensive farm work which evolved on the loam plateau, three in particular were outstanding, and these were native to the valley of the Dendre, the district of Nivelles, and the Mehaigne area. From these is being bred a type of embodying the best features, the 'cheval de trait belge'.

In the neighbourhood of the industrial centres of Mons and Charleroi there is an increasing tendency to put land down to pasture, and to concentrate on dairy produce, pigs and poultry to meet the local demands. In south-west Hainaut sugar beet is the foundation of the system, and this area with southern Hesbaye produces three-quarters of the total Belgian crop.

(*b*) *Brabant* (*limon on sands*) (Plates 20, 21)

In Brabant, pasture is less in evidence than in Hainaut. In the transitional zone, particularly in the neighbourhood of Bruxelles, dairy farming, fruit growing and flower and vegetable raising are extensively carried on, the cereals and roots being consumed on the farms as fodder. To the north-west of Bruxelles, at Berchem and Groot-Bijgaarden, there are extensive glasshouses for flowers and early vegetables, and to the south-east around Hoeilaart, Overijsche, and La Hulpe, large quantities of grapes are grown under glass. There are about 3,000 ha. of market gardens around Bruxelles; Mechelen and Leuven are other important market-garden centres.

(*c*) *Hesbaye* (*limon on sands and chalk*)

In Hesbaye, the proportion of pasture is even less, and the main concentration is upon the intensive cultivation of beet and wheat, though some cattle are fattened there. As the transitional area in the north is approached, extensive wet pastures replace the arable, and

there is some horse breeding. This is also an area of fruit orchards, especially around Tongeren.

3. *The Ardenne*

(*a*) *The Pre-Ardenne* (*the Condroz and Entre-Sambre-et-Meuse*)

North of the Ardenne is the elevated 'pre-Ardenne' plateau of primary rocks and ridge and valley structure which in the main coincides with the regions known as the Condroz and Entre-Sambre-et-Meuse. In the valleys are the bands of calcareous rocks, and it is here that cultivation is mainly concentrated. The intervening *Tixhes*, or outcropping anticlines of slates and sandstones, are largely wooded with some pasture. The general poorness of the soil, the fall in grain prices, and the dearth of labour owing to the attraction of the Liége industrial area, have all accelerated the turn over to dairying and stock raising. In some areas, e.g. the Fagne, the whole farm may be in pasture. With a less extreme climate than the Ardenne proper, however, cultivation is locally more intensive, particularly on the loams and clays of the 'calcareous corridor' between Chimay and Couvin, which contrasts with the heavily forested ridges and damp grassy bottoms of the Fagne. Some wheat is grown, but oats and fodder crops predominate. Owing to the general conditions, farms tend to be large, from 40 to 50 ha. and occasionally as much as 100 ha. in extent, mostly held on tenancies.

(*b*) *The Ardenne Plateau*

Similar conditions, modified by the more extreme climate and the greater extent of the infertile soils, prevail in the Ardenne. This upland country lying over 300 m. above sea level, is one of the least productive areas of Belgium. The surface drainage is ill developed, marshes abound, and the soils are mainly derived from slates and quartzites. Over the greater part of the area there are more than one hundred days of frost a year (Fig. 22). As a consequence, a considerable area is in forest, and economic activity is largely concerned with the production of timber. As much of the area is in pasture the basis of farming is the production of butter, with pig-raising on skimmed milk, and some export of young cattle to the richer areas. In favoured areas the intensity of animal husbandry is high. The Ardenne type of horse, small and lightly built, has in the past been in demand, mainly for military purposes. This is an area of working peasant proprietors with fairly large holdings up to 60 ha. The

isolation of the region and the independence of its people have delayed the adoption of advanced methods of agriculture, but co-operative societies are becoming more numerous.

4. *Belgian Lorraine*

Belgian Lorraine, lying at a lower altitude to the south of the Ardenne and sheltered by them from cold winds, has also a less sterile soil, developed from Triassic sediments and Jurassic limestones. The forest cover thins out, but stock-raising remains dominant, as the soil is not easily worked and requires much manuring. Pasture, therefore, may amount to three-quarters of the area of a farm. Oats are the principal cereal, but in favoured areas wheat is grown. The milder climate allows fruit growing on a considerable scale, and much fruit is exported.

Arable Farming

In 1938 approximately 60 % of the total area of Belgium was in farmland; 18 % in forests and woods, and 7 % uncultivated or waste. This proportion of farmland to total area is lower than that in any other north-western European country with the exception of Germany, where it is approximately the same (Fig. 68). It is largely accounted for by the forests and infertile tracts of the Ardenne and the Kempenland. The farmland, including permanent pastures and orchards, covered an area of 1,832,433 ha.; of this slightly more than 1 million ha. or 57 % were arable. Thus the proportion of arable to total farmland is roughly midway between that for Germany (69 %) and the Netherlands (42·5 %). Of the arable land rather more than half (56 %) was under cereals, a fifth (20·7 %) in rotation meadow, one-seventh (14·7 %) under root and food crops, and a twelfth (8·6 %) under industrial crops. If these figures are compared with those for Germany, it will be seen that Belgium has relatively less land in cereals and food crops, more in rotation and permanent meadow, and considerably more in industrial crops. This comparison brings out some of the characteristic features of Belgian farming, the general tendency to dairying and stock-raising and the production of special crops such as flax and tobacco rather than to the growing of food for human use.

Over the last seventy years, the area under cereals has declined very considerably, owing to the influx of overseas supplies of grain and the turn-over to dairying and stock-raising. In 1866, the area

sown to the four main crops (oats, wheat, rye and barley) amounted to 845,868 ha.; in 1938, it was 572,304 ha., a decline of nearly one-third. The relative proportions of the four crops have also altered somewhat over the whole period. Wheat has decreased slightly and rye rather more (from 34·4 to 27 %), while oats have correspondingly

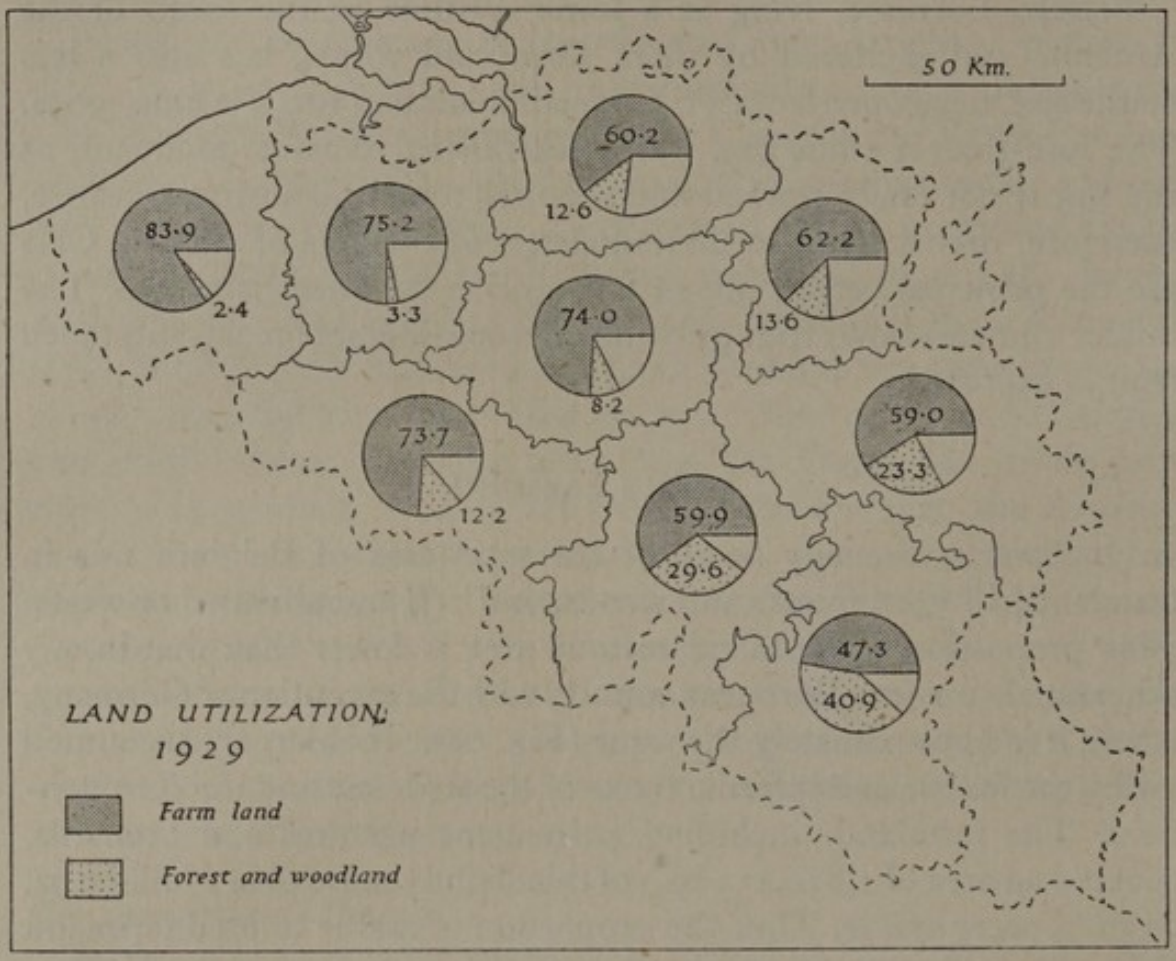


Fig. 68. Land utilization by provinces in 1929
Based on *First World Agricultural Census* (1929), No. 14; *Belgium* (Rome, 1936).

increased (from 26·4 to 37 %), a further indication of the present importance of stock-raising.

The proportion of farmland under various crops varies with the size of the holdings. Cereals figure considerably in most classes, but are more prominent on the larger farms. For the smaller holdings, which include market gardens, potatoes are very important, and vegetables and fruits to a lesser degree. In contrast, over one-third of the larger farms are under cereals, and over one-half in permanent or rotation meadow, while industrial crops are also more important.

The chief grains grown, with the percentage of the cereal area under each are: oats 37 %, wheat 30 %, rye 26 %, and barley 5·3 %



Plate 17. Flax-retting in the Lys

Fibres are removed from the vegetable matter which surrounds them by steeping the flax stalks in the lime-free water of the Lys. The harvested flax is placed in large open-sided wooden cases, which are weighted down with stones. On the far bank small stooks of flax are seen drying, after harvesting and before retting.



Plate 18. The Waasland (Pays de Waes) near Temsche (Tamise)

The Waasland is a level region bounded on the east and south by the meandering Escaut (Scheldt). It is protected from inundation by dykes and is seamed with drainage channels. The whole *pays* is intensively cultivated.



Plate 19. Arable land between Tournai and Kortrijk (Courtrai)

Alternate narrow strips of root and corn crops are among the features of the undulating country of Interior Flanders. The farms are scattered at fairly even intervals. The farmhouse is usually single-storeyed with three divisions: the stable, the house and the barn. Occasionally, however, the buildings are irregular and separated from each other.

Oats

Oats are grown mainly in West-Vlaanderen, the central plains and the uplands of the Condroz and the Ardenne as cattle fodder. The area had declined by 27·5 % between 1934 and 1938, with the encouragement given to wheat growing; the yield averages about 25 quintals per ha. (rising to 29 quintals in 1938), a return which is surpassed only in the Netherlands and Denmark.

Wheat

In recent years, wheat has resumed some of its former importance, owing to legislation requiring the use of a fixed percentage of home-grown flour in bread. The area sown increased by 16 % between 1934 and 1938. It is the main crop of the central plains, over half the production being grown in Hainaut and Brabant. The yield is also high, about 25 quintals per ha. The output, however, is only about one-fifth of domestic requirements.

Rye

Rye is the principal cereal grown in the Kempenland and in the less fertile parts of Flanders. The yield at about 22 quintals per ha. is higher than that in any other European country, and in the exceptional harvest of 1934 reached 26 quintals. The area sown has decreased by nearly one-third in recent years. Most of the rye is used as forage, though in some districts it is grown for its straw, which is suited for packing.

Barley

Though the yield of barley is high, it is not widely grown in Belgium, and most of the grain used in brewing is imported. Winter barley is grown in Hainaut and Brabant, spring barley chiefly in the Ardenne.

Potatoes

Throughout the last century the area under potatoes was steadily increasing, and this tendency was further stimulated by the search for a crop to replace grain in the third quarter. Thus by 1880, nearly 200,000 ha. were devoted to potatoes, but since then the area has declined, less rapidly in recent years. In 1938, at 147,495 ha. it was somewhat below the average of 1909–13 (156,988 ha.), but as the yield has increased from 186·4 to 220·9 quintals per ha. in this period,

the harvest of 1938 was 32·6 million quintals as compared with the average of 29·25 million quintals for those years. A quarter of the crop is raised in Oost-Vlaanderen and half of the remainder in West-Vlaanderen and Antwerpen. Belgium on the whole produces sufficient potatoes for her own requirements, though since 1932 there has been a small excess of imports; this, however, even with a maximum of 932,000 quintals in 1938, does not exceed 3 % of the home harvest.

Fodder Beet and Sugar Beet

Of these important root crops, the former is grown particularly extensively in Oost- and West-Vlaanderen and in Hainaut, while sugar beet is grown throughout the central plains and in West-Vlaanderen. In 1938, the respective areas were 82,285 and 49,300 ha. With the decline of grain growing, both had increased very rapidly; in 1880, 26,188 ha. were in fodder beet and 32,627 ha. in sugar beet. The area under fodder beet has been maintained fairly constantly in recent years, but that under sugar beet has declined. In the periods 1909–13 and 1928–32 the annual average was about 57,500 ha. with an output of just under 17 million quintals. For 1938, a year of low yield, it had fallen to 12 million quintals. The output of raw sugar in 1909–14 averaged approximately 2·5 million quintals; since then the quantity has declined to 2·16 (1937–8) and 1·75 (1938–9) million quintals. There are about fifty sugar-beet factories, of which fifteen are refineries only.

Turnips, Carrots and other Roots

A small quantity is grown for fodder as a main crop, but the chief source of this supply is the turnips grown as a catch crop after the main crops of cereals. The area thus planted amounted to 91,596 ha. in 1938, and the produce to 21·8 million quintals. Though the area is decreasing (123,484 ha. in 1929) increasing yields give a larger total.

Flax

Under the Flemish system of intensive cultivation flax was an important crop; the pulling and retting gave additional employment to the rural population, who also found a source of employment in the extensive domestic weaving industry. Despite competition from other fibres and the attraction of labour to the modern industrial centres, cultivation was well maintained until the latter half of the

last century, reaching the maximum area of 57,045 ha. in 1866. Increasing scarcity of labour, less efficient methods of cultivation, and foreign competition then led to a decline, and in the years 1909–13 the average had fallen to 19,802 ha. After the war of 1914–18 there was a short period of high prices, and in 1920 the area rapidly increased to nearly 51,000 ha. The ensuing fall was sudden, but it has been succeeded by a slow yet steady increase, and the area sown in 1938 amounted to 31,147 ha. West-Vlaanderen is the chief flax-growing district, but it is also grown in Oost-Vlaanderen, Hainaut and other areas of the central plains. The output, 354,000 quintals of fibre, is much less than the demands of industry, and 1·7 million quintals were imported in 1938, much of it from northern France. Some of this import is processed in Belgium and exported to weaving centres such as Belfast (Plate 17).

Hops

For a considerable part of the last century hops were second only to flax among the industrial crops, but their position has not been so well maintained. The area under hops in 1880 was 4,185 ha.; since then the decline has been acute, in the face of rapidly fluctuating prices, lack of labour, changes in the public taste in beer, and the competition of German supplies. In the years of 1909–13 the area had declined to one-half, and by 1938 to 742 ha. only, almost all in West-Vlaanderen, producing 10,000 quintals, a quantity almost negligible compared with the import balance of 1·8 million.

Tobacco

In 1938 tobacco was grown on 1,146 ha. mainly in West-Vlaanderen and Hainaut. Cultivation in recent years has been declining, the figure for 1929 being 3,012 ha., which was about one-quarter less than in the years preceding 1914. The output of 48,000 quintals in 1938 equalled about a quarter of the imports.

Chicory

Chicory for coffee is another industrial crop of some importance, and again, 90 % was grown in West-Vlaanderen. The area in 1938 was 6,100 ha., and this represents about the average of recent years.

Dairying and Stock-raising

With the competition of overseas grain and fluctuations in the profitability of industrial crops, dairying and stock-raising have now become the mainstay of Belgian farming. In the last fifty years the area of pasture has increased very considerably at the expense of the arable. In 1866 permanent meadows amounted to 317,700 ha. By

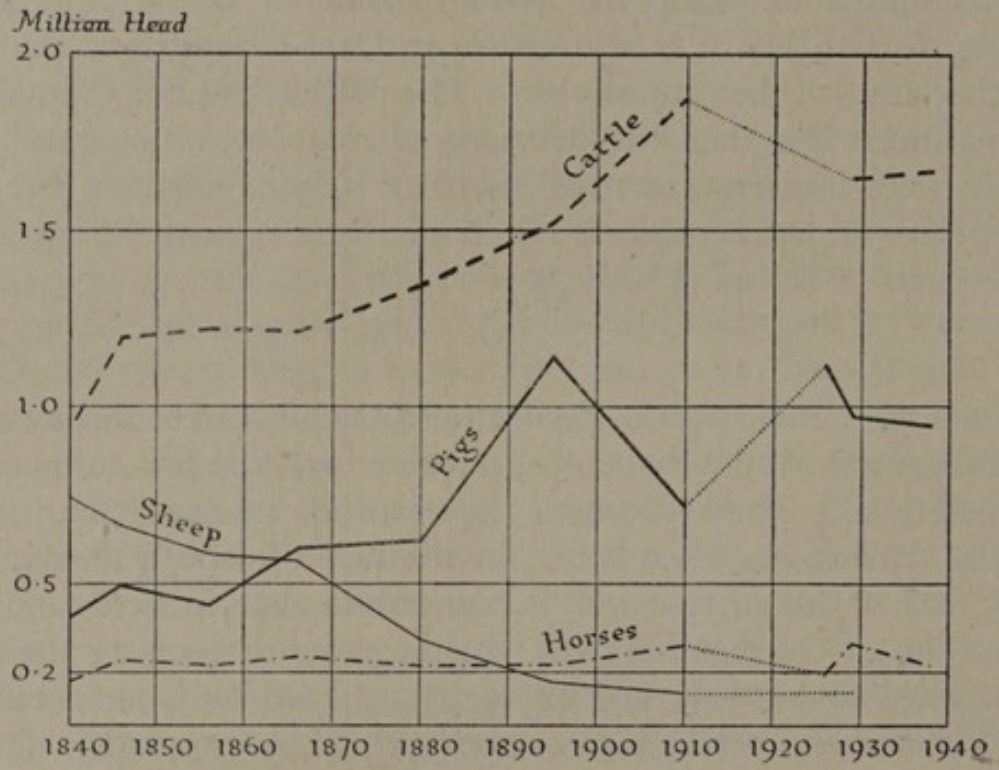


Fig. 69. Numbers of cattle, sheep, pigs and horses, 1840–1938
Based on various issues of *Annuaire statistique de la Belgique* (Gand).

1938 this area had more than doubled, to become 714,700 ha. The great change took place in the period 1895–1910, when the competition of foreign, particularly American, grain brought prices tumbling down. Over a wide area more than one-third of the farmland is pasture and over one-half in parts of the pre-Ardenne. As a quarter of the arable land is also given up to rotation meadow and fodder crops, it will be seen how much the farms are concerned in feeding animals (Fig. 69).

Cattle

Cattle have always formed an important element in the system of farming. Their prime function formerly was, besides aiding in the work of the fields, to serve as a source of manure. Thus their numbers were high in relation to the pasture area. In the new conditions their

importance is in the supply of milk and meat, and more attention is paid to quality. Between the years 1866 and 1938 the number of cattle increased by approximately 35 %, a much slower rate of growth than that of the pastures. The total number was 1,690,000 in 1938, of which 966,000 were milch cows, and 540,000 under two years old. The great demand for veal leads to the slaughtering of some 350,000 calves a year. About 20 % of the milk produced goes to the consumer, 12 % is fed to stock, and the remainder to other uses, principally butter and some cheese. In 1938, 64,150 metric tons of butter were produced; this met practically all the domestic demands, imports being 1,150 tons only. For some years around 1927 indeed there was a small export surplus. There is, however, a considerable import of cheese, 24,000 tons in 1938. The small average size of the farms has hindered the efficient development of the industry; about one-third of the milk supply is handled by co-operative dairies, which number approximately a thousand, but many of these are very small. Thus the milk supply is fluctuating, the milk and butter are of varying quality, and the return to the farmer is lower than it might be with effective organization. The production of beef is now sufficient for the home market, and in 1938 imports were only 1,270 tons for fresh beef and 10,500 tons for frozen meat.

Sheep

A marked feature in Belgian animal husbandry has been the continuous decline for more than a century in the number of sheep. This is accounted for partly by afforestation and the improvement of the heathland, particularly in the Kempenland. In 1840 there were well over 700,000 sheep, in 1938 187,000—42,000 in Hainaut and 31,000 in Oost-Vlaanderen.

Horses

Horses are important in Belgian farming, as the conditions are not in general suited to mechanization on a large scale. Those employed in agriculture numbered 264,650 in 1938, a slight increase in comparison with the years before 1914. Horse breeding has been an important adjunct to Belgian farming, particularly in Hainaut and Brabant. Before 1914 there was an annual export of 30,000 horses, chiefly to France, Germany and the Netherlands.

Pigs

The development of the dairy industry has been accompanied by a great increase in the number of pigs, particularly on the small

holdings. In 1895 there were three times as many as in 1846, but in recent years the increase has been slower. Since the war of 1914–18 the numbers have fluctuated around 1¼ millions, with a sharp fall in 1937 owing to foot-and-mouth disease. This is sufficient to meet the home demand for pork and bacon, and in most years there has been a small export surplus.

Poultry

Belgian farmers derive a considerable income from their poultry, and the export of eggs is an important item in the national balance sheet. The quantity, however, has fallen off very much in recent years, from the average of 38,160 metric tons in the years 1928–32 to 7,897 tons in 1938.

Summarizing the position of Belgian stock raising, it may be said that for every hundred hectares of farmland there were 96 cattle, 15 horses and 54 pigs. This represents a fairly high level of production if compared for example with the corresponding figures for Germany, 72 cattle, 12 horses, and 85 pigs.

Market Gardening and Orchards

Belgian methods of farming and the necessity of obtaining the greatest possible yield from small plots have favoured the growth of market gardening and horticulture. They have developed particularly around Gent, Bruxelles, Mechelen and Antwerpen. In 1929 there were about 35,120 ha. under vegetables, including cauliflowers, green peas, chicory, strawberries, tomatoes and asparagus. The production of green peas, chicory and strawberries was greatest in Brabant, of cauliflowers, tomatoes and asparagus in Antwerpen. Flowers grown in the open occupied 880 ha. Glasshouse cultivation is also extensively developed, there being 610 ha. under glass (Plate 23). Approximately half of this area was devoted to grapes, a quarter to vegetables, and the greater part of the balance to flowers. Mention should also be made of the nurseries, growing ornamental shrubs, forest and fruit trees. About 30,000 workers were employed on these plots. Despite this development, there is some import of early vegetables and flowers, especially from Brittany and southern France, but on the balance there is an export surplus; this amounted for fresh vegetables to 40 million francs, and for flowers and plants to 70 millions in 1936. The export of fruits amounted to 52 millions, but against this there was



Plate 20. The Brabant Plateau

Clumps of planted pines, as seen to the right, are frequently found on the stretches of sandy soil on the plateau, which is mostly under cultivation.



Plate 21. A farm near Ottignies on the Brabant Plateau

The buildings of the farms of central Belgium are generally grouped around a quadrangle; only the wealthier farmhouses have double storeys.



Plate 22. Mushroom growing in the Hesbaye

There are extensive limestone caves near the village of Folx-les-Caves, between Tienen (Tirlemont) and Namur; a number of them are being used for the large-scale cultivation of mushrooms.

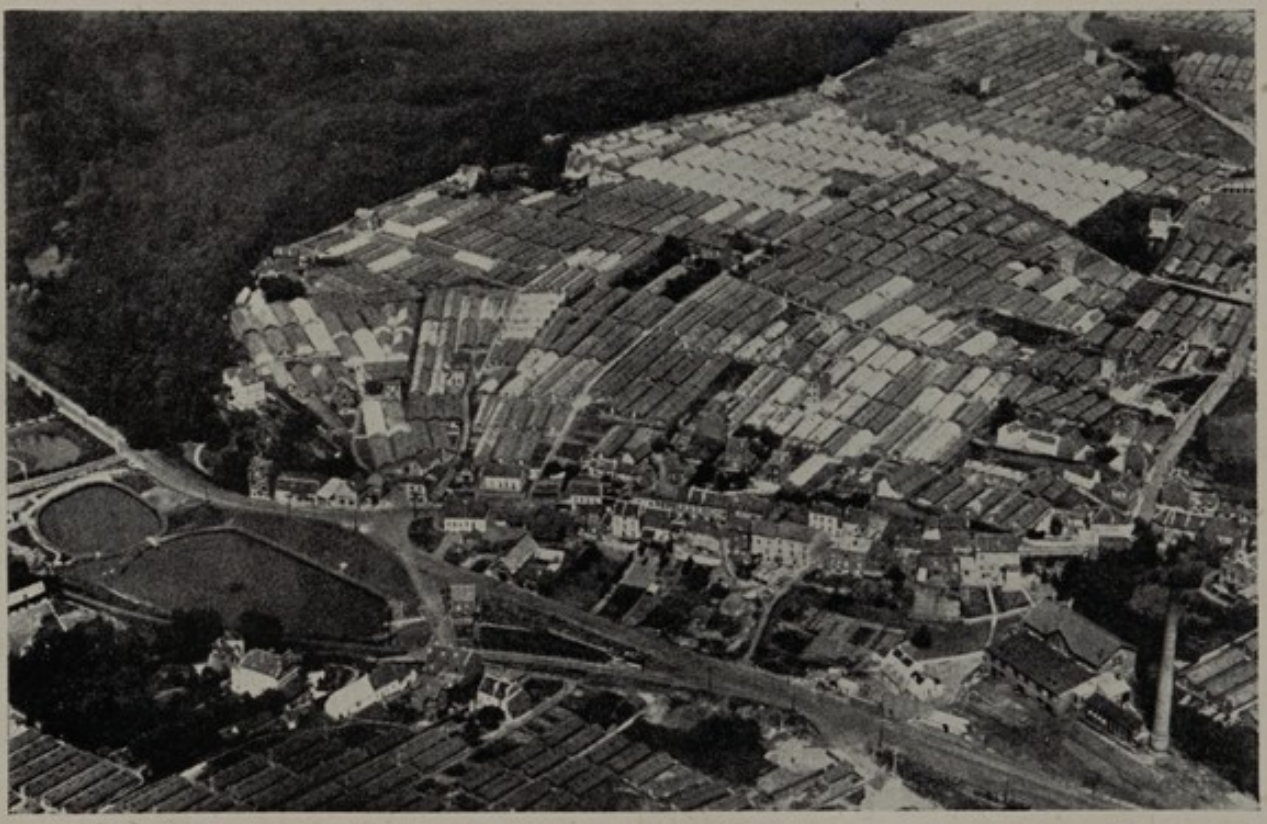


Plate 23. Glass-houses near Hoeilaart (Hoeylaert)

There are about 20,000 glasshouses around Hoeilaart, to the south-east of Bruxelles. Grape culture is the predominant occupation; the grapes, which are not used for wine-making, are marketed both in Belgium and abroad.

an import of 256 millions, though this would include oranges, bananas, and other exotic kinds. Most of these exports formerly went to Britain, Germany and the Netherlands, and the trade has suffered from foreign protective duties.

Working Population and Size of Holdings

The agricultural census of 1929 returned the number of those actively engaged in farming at 662,382 persons. Three features of the returns are significant: the large contribution made to the total by family labour, that is, by the working owners or tenants and the members of their families who assist them; the consequent relative unimportance of hired workers, one-tenth only of the total; and the large numbers of female workers, two-fifths of the total. In addition, there are a large number of part-time workers, the number of days worked by them in 1929, on the basis of 250 days to 1 full-time labourer, would be equivalent to another 165,000 workers. The total agricultural labour force is therefore probably around 800,000.

The agricultural population has undoubtedly declined in the last fifty years, but the extent of the decline is difficult to determine owing to changes in enumeration. The 1895 census gave the total number as 1,204,087, but that figure included many children under fourteen who were excluded from later censuses. The return for 1910 was 780,523. It is clear however that large numbers had left the land, but that between 1910 and 1930 the rate of the exodus had been checked. The reason for this check will appear later. The decline of the numbers of hired workers is even more striking. Taken in conjunction with the increase of holdings, it suggests that the labourers have largely become small-holders, dependent for additional help on members of their family. This has created a serious labour problem for the larger farmers.

Farm workers form 17 % only of all those gainfully occupied, a proportion lower than that of any other European country with the exception of Great Britain. The corresponding figures for 1880 and 1900 were 31 % and 21 %. However, owing to the high density of the total population and the relatively small proportion of the country in farmland, the ratio of labour to cultivated area is very high, though still much below what it was before the rural exodus. For each sq. km. of arable land there are 53 workers (against 98 in 1846), or 33 for each sq.km. of arable and pasture. Of the countries of western Europe, two only, the Netherlands, with 61 per sq.km.

and Switzerland with 80, have greater densities in relation to arable, and none have a greater density for farmland as a whole. This density naturally varies from region to region according to the character of the farming: it is highest in Oost-Vlaanderen, 45 per sq.km. of farmland, and lowest in the Ardenne region, Luxembourg 27, and Namur 20 (Fig. 70).

Migration of Labour

This intensity of labour points to a heavy pressure on the available land, and this has had two important results; a rural exodus and seasonal migration, particularly in the past; and a continuous diminution of the average size of holdings. During the nineteenth century the expansion of industry absorbed much of the surplus rural labour, and there was a secondary outlet through migration. In the period 1885–1913 about 30,000 agricultural workers left Antwerpen for destinations overseas, mainly in North America, and rather more migrated to neighbouring countries, principally to France. This loss was in part, however, counterbalanced by an inward movement. The shrinkage in later years of the demand for industrial labour, and the closing of most countries to immigrants, have checked this exodus and thus increased the demand for land again. There is also a considerable amount of internal seasonal migration, e.g. for work in the beet fields, fruit picking, and harvesting. This is undertaken partly by the very small farmers, and partly by labourers from the towns. Formerly thousands of labourers went from Oost-Vlaanderen to seasonal work in northern France.

Holdings

According to the census of 1929 there were as many as 1,131,000 agricultural holdings. Very many of these, however, cannot be considered as true farms. Three-quarters (838,883) of this total, for example, were under 1 ha. in extent, and only 25,000 workers were permanently employed upon them. The vast majority of this class, therefore, must be considered as part-time holdings, run by industrial workers. Of the balance, 12,000 are full-time market gardens, and about 40,000 are cultivated by very small farmers who work permanently for larger farmers, or supplement their incomes by seasonal labour.

In the next group of 1–5 ha., (194,914) there was an average of more than one permanent worker per holding, so that most of these should probably be considered as farms, about 30,000 of the holders depending upon incomes from other agricultural work.

The number of true farms is therefore under 300,000; a recent estimate places them at 270,000, a figure it may be noted which corresponds approximately with the number of ploughs in use. Of these farms about 100,000 are over 5 ha. in area, while only 464 exceed 100 ha. This figure for the total number of farms gives an average of slightly more than two full-time workers, including members of the family, per farm. On the larger farms of 50–100 ha., the average is seven full-time workers.

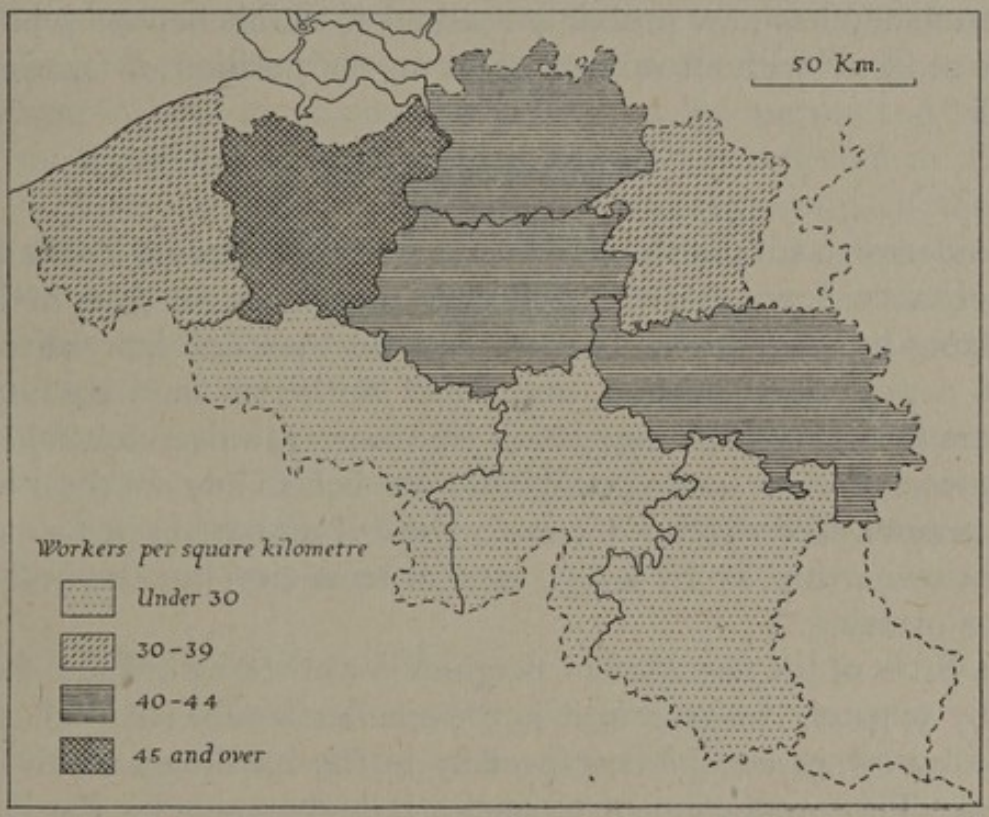


Fig. 70. Numbers of agricultural workers per sq. km. (by provinces), 1929
Based on *First World Agricultural Census* (1929), No. 14: *Belgium* (Rome, 1936).

A comparison of the number and size of holdings in the 1929 census with earlier returns shows the extent to which subdivision is proceeding owing to the competition for land. In this regard, the decline in the number of larger farms is probably more significant than the extraordinary increase in the very small holdings. Between 1880 and 1929 the number of farms over 50 ha. had declined by 56 %, and those between 20 and 50 ha. by 12 %. The only other category to decline was that of 1–5 ha. which suggests that the lower limit for an economic holding is about 5 ha. Subdivision had proceeded farthest in Oost-Vlaanderen, the bigger farms being found in the south-east.

The great increase in the number of very small holdings under 1 ha. is accounted for, apart from possible changes in enumeration, by the fact that cheap travel facilities allow those employed in cities or industrial areas to live in the country at a considerable distance from their work. They are thus able to tend small plots in their spare time, and during spells of unemployment to cultivate them more intensively. This, added to the effect of the laws of inheritance, and the widespread desire to be the possessor of a plot of land however small, contributes powerfully to the break up of the larger holdings. This tendency has now probably reached the limit beyond which it cannot progress without serious effect on the position of farming as a whole.

Land Tenure

The tendency to subdivision has been greatly accelerated by the laws of inheritance, for under the civil code properties must be divided on passing by succession. If there is more than one heir, all must receive a prescribed portion, and death duties on land passing to strangers are heavy. This restriction is, however, waived for holdings of very low value. It is also possible for one heir to buy out the others, but in general subdivision is the rule. Difficulties have been overcome by joint ownership, or by letting land or tenancies, but the problem remains pressing.

Two-fifths of the farmland of Belgium is worked by owners, three-fifths by tenants. In general it is the smaller family farms that are worked by owner occupiers, especially in the Kempenland and the Ardenne. The proportion of tenancies is highest among the larger farmers of the central high plains. Though tenants thus predominate, their position until recently has not been very secure, no doubt owing to the demand for land. Under legislation of 1929, however, it has improved; the minimum first tenancy for example was fixed at nine years, two years' notice from either side is required to terminate, and the tenant receives compensation for improvements.

The financial returns from farming have never been large, and in times of falling prices are totally inadequate for the small farmers. For reasons already indicated the price of land is high, and has tended to rise. The average is said to be equivalent to about £80 per acre, and in West-Vlaanderen it may be twice as much. Owing to the relatively lower rental value, averaging 35*s.* per acre, the return to the owner is not sufficient to encourage him to provide improvements or the tenant to buy his farm and join the class of owner occupiers.

The small average size of Belgian holdings, with the fact that a single holding may be split up into a large number of scattered parcels of land, militates against their effective working; time is wasted in moving from one field to another, and in working several small rather than one larger area under a single crop, and much additional manual labour is required for work that could be done more rapidly by machines. On the smaller holdings it is evident that most of the work is in fact performed by manual labour. On holdings of 1–5 ha., for example, there is one horse only for every four holdings. In the 40,000 farms of over 10 ha., however, the employment of machinery is considerable, and has increased recently. There were, for example, in 1929, 50,000 mowers and 22,000 reapers and binders. The small number of larger farms, however, is reflected in the fact that there were only 1,316 motor tractors and approximately the same number of lorries. The use of mechanical aids has perhaps made greatest progress within the farm buildings; 27,000 electrical power generators and 7,000 petrol motors were in use, and the number of cream separators amounted to 164,000.

Smallholdings also necessitate the purchase of uneconomical quantities of seed, fertilizers, cattle food, etc., and high overhead charges for distribution of produce, but these difficulties can be largely overcome by co-operation.

Organization and Co-operation

The extreme individualism of the Belgian farmer, the great number of small independent holdings and political differences have militated against the effective organization of agriculture as a whole, and the government has usually refrained from overmuch interference. There is a semi-official body representing local chambers of agriculture, with nominees of the Ministry of Agriculture, but it does not exercise effective control of the industry. The *Union des Professionnelles agricoles*, with about 125,000 members, is mainly a farmers' union, and has done little to foster co-operation. In one section of the community, however, co-operation has made striking progress, through the activities of the *Boerenbond*. Founded in 1890, this has primarily a religious and social basis, the parish forming the local unit, with the curé playing an important part. Its stronghold is the Catholic peasantry of the Flemish-speaking areas. The *Ligue Luxembourgeoise* performs similar functions in the Ardenne. The activities of the societies affiliated to the 'Boerenbond' are widespread, including the purchase of materials, co-operative dairying and marketing, and

credit societies on the Raiffeisen system. Control is highly centralized in the head office at Leuven, which also manufactures feeding stuffs and conducts an important insurance business. The following figures which apply mainly to the 'Boerenbond' and the 'Ligue', give some idea of the development of the co-operative movement. In 1934 there were 1,400 purchasing societies with a membership of 126,000; these dealt mainly in cattle foods and fertilizers, to the amount of 253·8 million francs. The co-operative dairies numbered 170, with 35,000 members, so that there is still room for considerable expansion. Their sales amounted to 218·2 million francs, of which butter accounted for 80 %. The 1,665 credit societies had a membership of nearly 100,000; deposit and loan capital amounted to 1,045 million francs, and during that year some 3,000 loans totalling 29 million francs were made. It does not, appear, however, that farmers rely to any considerable extent upon borrowed capital, and what they do use is drawn mainly from private sources. The growth of these societies and the amount of business done were checked by the economic depression, with the exception of the co-operative dairies.

Legislation

Until recent years the state has been content to promote technical efficiency in the farming community, and to leave the farmers on the whole to follow the policy they considered best in relation to the movements of world prices. Systematic education in agriculture to some degree or other has been received by about half the men engaged in farming, and there is also an extensive advisory service, working through three officials in each province. Encouragement is also given to the expansion of the cultivated area. Since 1919 individuals have been able to obtain subsidies for land reclamation, and approved drainage schemes can also receive state aid. In 1937 the renovation of farm buildings and the construction of silos also qualified for subsidies. Owing to the general direction in which farming has developed, the state has never adopted a far-reaching land settlement policy, but on a small scale measures have been taken to establish secondary holdings for industrial workers with large families. Probably on account of the immensity of the task, no attempt has been made to tackle the consolidation of strip farms.

Until the economic difficulties of the early thirties, the state afforded little direct assistance to agriculture through tariffs. The general policy was free trade in industrial materials with as much

protection to farmers as could be given without appreciably raising the cost of living to the city workers. The measures mostly benefited the stock raisers, and before 1914 there were complaints of the high cost of meat. From 1880 there were small duties on imported meat, butter and cheese, and later on oats and raw sugar. Since the crisis the state has given more aid to the farmers, though not on the scale common elsewhere. The arable farmers have been protected by moderate tariffs on imported grains, varied according to conditions, and by production bounties paid on an acreage basis. In the case of wheat the latter was approximately equivalent to 36*s*. an acre in 1934, and 15*s*. in 1935. Wheat growers, too, receive a guaranteed price paid through the millers, who were obliged to increase the proportion of home-grown flour in bread to 20%. Beet growers also receive a subsidy paid on a restricted annual quota. Protection by import duties and quotas were sufficient to enable stock farmers to retain the home market for meat. Dairy farmers obtained an import duty on butter, while an excise duty checked the rise in the consumption of margarine and measures were taken to hold butter in cold storage during periods of high production. A national office for milk was also set up in 1937 to increase the consumption of liquid milk, cheese making, and the use of powdered milk. As an observer remarks, however, ' in the main, farming has been expected to look after itself, to make its own adjustments to changing price levels'. It is difficult to judge what effect this policy has had on the prices paid by the consumers, but making allowances for differences in the general price level between England and Belgium, milk and potatoes have probably been really cheaper in Belgium, though some other commodities may have been dearer.

Forestry

Forests occupy about 550,000 ha. or 17·8% of the total land area of Belgium. They are distributed very unevenly over the country (Fig. 71), being virtually confined to sites unsuitable for agriculture. The largest areas are in the Ardenne and the Kempenland, the former too rugged and the latter too infertile for successful agriculture. All the forests are economically productive, since they are all sufficiently accessible for profitable exploitation, but they fall far short of satisfying the country's timber demands especially in softwoods. Of the 1·1 million cu.m. imported in 1938, over 98% was coniferous timber, about half of it from Finland.

Ownership and Revenue

Rather more than half the total area of forest is in private ownership, one-third is owned by the communes and the remainder by the state or public bodies. Forestry gives employment to about 5,400 persons. The average annual revenue from all forests amounted in the years 1927–9 to 162,000 francs.

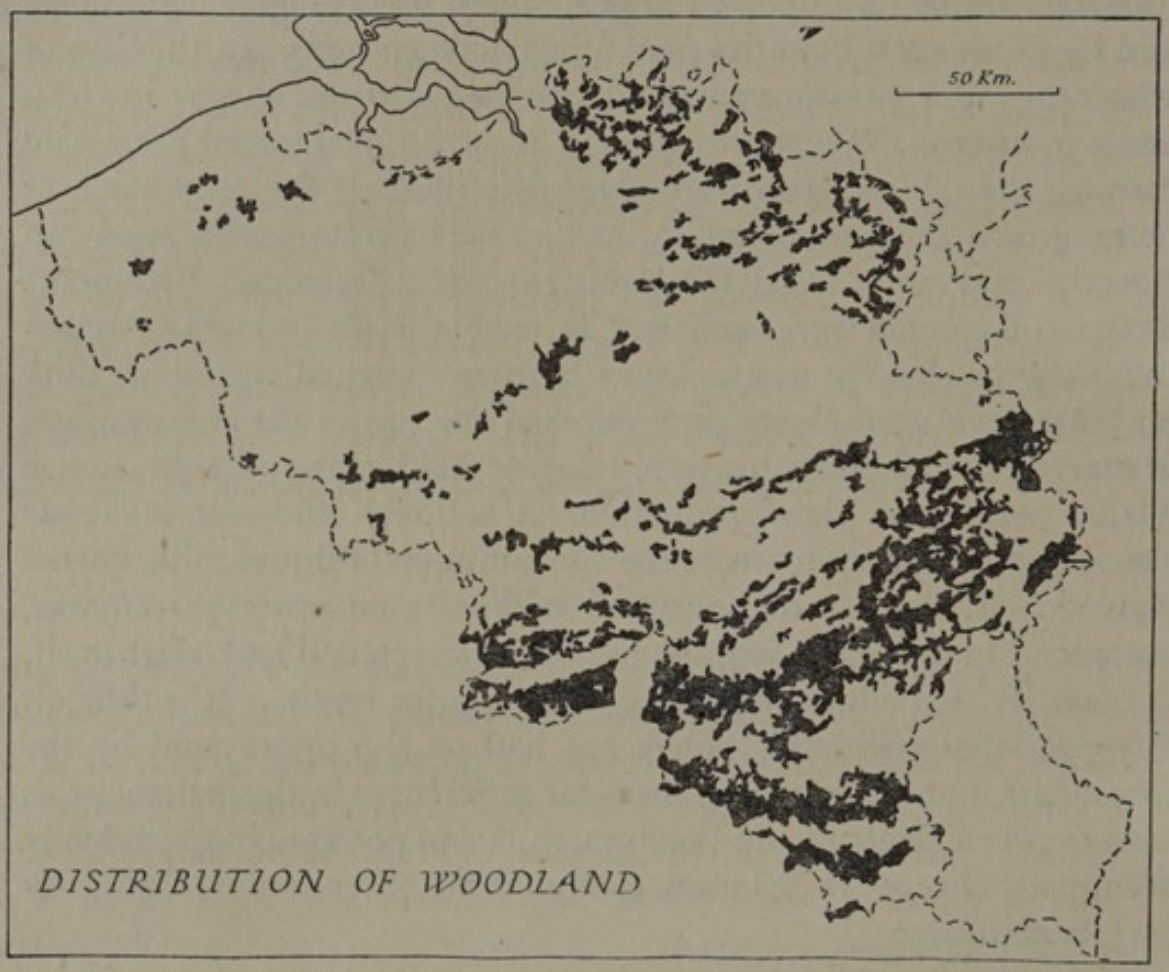


Fig. 71. Distribution of woodland in Belgium

Based on G.S.G.S. Series 2517, 1 : 380,160, Belgium and North-east France (1938).

Composition in Relation to Geology and Soil

There are no indigenous forest-forming conifers in Belgium, and the natural forests would all be of deciduous trees, chiefly of beech with oak and hornbeam as its principal associates. On the poor sands of the Kempenland, it is likely that oak and birch would be more prominent than beech, and alder would undoubtedly dominate in extensive areas of fen and marsh. The present composition of the forests is very different from this. No more than two-thirds are of hardwoods, the remainder consisting of plantations of softwoods,

chiefly of Scots pine and Norway spruce with small amounts of larch, Corsican pine and Maritime pine. Oak occupies a larger area than beech, usually in the form of oak standards over coppice of hazel or hornbeam. There is also a considerable though rapidly diminishing area of simple oak or hazel coppice without standards.

The agricultural regions recognized on p. 234 (Fig. 68), serve also for a regional treatment of Belgian forests.

There are no extensive forests on the coastal dunes nor on the polders, though here and there osier beds have been planted. In interior Flanders small areas of woodland are found on soils unfit for agriculture, such as the coarser sands. These are of oak, larch or Scots pine, with ground floras of bramble, or of *Molinia* and *Erica tetralix* in wetter places. It is of interest that the pine plantations often have an underwood of beech.

The poor sands and gravels of the Kempenland formerly carried unproductive heath, boggy in places. Considerable areas are now planted with Scots pine, and there is a little chestnut and birch. The ground flora is sparse and often consists only of mosses and lichens.

The central high plains carry little forest to-day. What does remain is chiefly of oak, but there is a good deal of beech high forest in the Forêt de Soignes, near Bruxelles, while Scots pine has been planted both there and elsewhere. There are magnificent stands of beech in the Forêt de Soignes, averaging 30 m. (100 ft.) in height and with some trees reaching 45 m. (150 ft.).

The pre-Ardenne region, with its mixture of calcareous and non-calcareous substrata, has plateau woods of Scots pine, birch and oak, usually with oak or hornbeam coppice. The limestone escarpments are more thickly wooded, with oak, beech, ash and sycamore over coppice of hornbeam, lime and hazel and with a rich ground flora. There are also plantations of spruce and Corsican pine, the latter chiefly on calcareous substrata.

The slates and quartzites of the Ardenne plateau carry the most beautiful and varied forests of the country. There is a good deal of beech which would undoubtedly form natural forests over most of the area, if undisturbed; and there is much oak-birchwood with coppice of oak and hornbeam, formerly exploited for tan-bark (see p. 341). Spruce and Scots pine have been extensively planted.

Finally, in Belgian Lorraine there are woods of birch and pine on the poorer sands, and of beech and oak over coppice on heavier soils.

Recent History and Present Tendencies

The present state of the Belgian forests is best understood in the light of their history. Until after 1850 the chief preoccupation of forest owners was the maintenance wherever possible of oak standards over coppice cut on a short rotation of six to eighteen years. This provided timber, poles, firewood, tan-bark and material for charcoal. The only exceptions to this were the famous Forêt de Soignes, maintained as an even-aged high forest of beech and regenerated chiefly by planting; and the forests at higher levels in the Ardenne, exploited by the system of 'futaie jardinée', a kind of simple uneven-aged high forest replenished by natural regeneration. Since 1850 great changes have been made and continue to be made. At the beginning of this period the *laissez-faire* policy of the government led to the deforestation of large areas which had become unproductive through the replacement of charcoal by coal and coke as the chief industrial fuels. This continued until the closing years of the century when it began to be realized that a valuable national asset was in danger of serious depletion. Restrictions were placed on deforestation, the planting of fast-growing conifers and especially of Scots pine was encouraged, and the afforestation of the heaths of the Kempenland was undertaken. This period of amelioration was interrupted by the war of 1914–18, when vast quantities of timber were removed; and by the post-war boom in softwood prices which caused over-cutting of the young conifer plantations. The Versailles Treaty gave Belgium 60,000 ha. of well-tended forests in the Eupen-Malmédy district and helped to restore the position. Since that time much has been done by instruction and propaganda to encourage the best sylvicultural methods, and the development of 'forest-mindedness' is well shown by the storm of opposition roused when it was proposed to use the Forêt de Soignes as a permanent area for army manœuvres. Hardwood coppice is no longer profitable with the passing of the demand for charcoal and tan-bark, but the demand for softwoods for pit-props and telegraph poles as well as for carpentry still far exceeds the supply. The recent tendencies have been to convert simple coppice into coppice-with-standards, and this into high forest; to replant instead of relying on natural regeneration; to use agricultural methods of soil improvement; and to increase still further the use of conifers on suitable sites. The state shares part of the cost of planting undertaken by the communes, and newly planted areas are exempt from taxation for ten years. Instead of birch, grown for

making the fast disappearing sabots, and alder, formerly used by bakers as firewood, poplars are being planted for match manufacture. Beech continues to provide the joiner as well as meeting most of the demands for firewood.

The pine plantations of the Kempenland form an interesting example of intensive forestry. After clear felling the tree stumps are completely removed and the ground is cultivated and treated with basic slag (1,000 kg. per ha.) and kainit (300 kg. per ha.), before re-planting with pine. The trees are felled at forty years and sold for pit-props.

Experimental plantings of numerous exotic conifers have been undertaken in recent decades. The most promising species seem to be Douglas fir, silver fir, and western red cedar (*Thuja plicata*).

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Chapter XI

FISHERIES

Introduction: Fishing Grounds: Main Fisheries and Fishing Tackle: The Fishing Fleet: Imports and Exports: Fishing Ports: Administration, Legislation and Research: Bibliographical Note

Introduction

Although Belgium borders one of the richest fishing seas of the world, the Belgian sea fisheries are not of great importance. In 1930, a total of 2,572 people were engaged in the fisheries industry, representing only 0·1 % of the employed population (see p. 188). Of these, 1,889 were employed in deep-sea fishing, 545 in coastal fishing, and only 138 in fresh-water fishing, fish farming and oyster culture.

The war of 1914–18 had a profound influence on the fishing industry, for a considerable number of Belgian fishermen operated from English harbours, especially Fleetwood and Milford Haven, where they fished grounds previously unknown to them and learned new methods of fishing. Shortly after the war conditions of labour were improved and wages were higher. The industry has since shown signs of considerable revival and expansion, particularly with the increased use of motor vessels. Until recent years, however, fishing crews were on the whole very difficult to obtain, although they were relatively more easily obtained for motor vessels than for steam trawlers. The number of sea fishermen is now increasing, particularly in Oostende. In 1938 a total of 39·1 million kg. of fish valued at 123·4 million francs were landed at Belgian ports, and the entire catch was landed by Belgian vessels. Comparative figures for previous years show how the value of the fisheries has increased:

	1931	1932	1933	1934	1935	1936	1937	1938
Quantities (1,000 metric tons	42·1	28·4	27·1	28·8	38·8	40·4	38·9	39·1
Value (million francs)	77·2	66·3	75·8	78·1	101·6	120·2	118·4	123·4

Source: *Annuaire statistique de la Belgique*, 1938, p. cii (Gand, 1939).

In some of these years small quantities of fish have been landed in Belgian fishing ports by foreign vessels.

In comparison with other northern and western European countries the Belgian catch of 1937 was small; it represented under one-half of the Danish catch, one-fifth of the Dutch catch, about one-tenth of the French catch, a twentieth and twenty-fifth respectively of the German and English catches and under one-thirtieth of the Norwegian catch. It is estimated that 606 metric tons (about 2%) of the 1937 catch was landed at foreign ports, almost exclusively in England and Scotland.

Fishing Grounds

The division of the Belgian catch in 1938 according to the grounds where the most important species were caught is shown in the table on p. 263. The largest quantity is caught off south Ireland, but the catch in the southern part of the North Sea is more valuable. Half the total catch by value comes from the North Sea, but it represents only 1·4% of the total catch by all countries in these waters. The relative importance of the Belgian catch is shown in the following table:

Share of different Countries in North Sea Landings (1,000 *metric tons*)

Country	1935	1936	1937
Belgium	24·5	21·9	18·6
Denmark	25·0	24·7	26·0
England	225·2	213·9	248·3
France	30·1	30·0	35·2
Germany	214·7	261·3	296·7
Netherlands*	118·9	160·3	185·3
Norway	440·3	476·6	299·4
Scotland	216·7	200·2	185·2
Sweden	13·4	11·4	10·6
Total for all countries	1312·9	1405·5	1312·3

* Includes certain other catches.

Source: *Bulletin statistique des Pêches maritimes*, 1937, p. ii (Copenhague, 1939).

The Belgian catches in the Irish Sea and Bristol Channel grounds, Iceland waters and the Bay of Biscay represent 15·1, 0·6 and 4·4% respectively of the total catches in these waters. The chief part of the catch from the northern North Sea, from the Fladen ground, from the Iceland, White Sea and Bear Island grounds and from off west Scotland, is landed by steam vessels at Oostende. The greater part (about 77%) of the landings of fish, however, is carried out by motor vessels, though proportionally this is considerably less owing to the

much smaller number and larger capacity of the steam trawlers; motor fishing craft operate exclusively in the nearer fishing grounds (see table on p. 269).

Main Fisheries and Fishing Tackle

Although the catch of herring is the largest by weight, its value is low and is exceeded by that of several other fish, especially sole, which is caught principally in the North Sea and off Spain, Portugal and Morocco. Certain species of fish such as bream, megrim and witch do not appear in the official statistics, since they are caught off the south coast of Ireland and landed exclusively in English ports. The most important species landed in these ports, however, are hake and skate.

The characteristic Belgian fisheries, those for shrimps, sprats and spent herring, are carried out in coastal and adjacent waters. Their yield fluctuates considerably owing to the variability of meteorological, hydrographical and biological conditions in the Straits of Dover and its approaches; the water of the North Sea is much less saline than that of the English Channel.

Shrimps

The shrimp fishery is the only branch of the industry which experienced an expansion up to the war of 1914–18, since shrimps were constantly in demand in the large towns and resorts. In 1938 the shrimp fishery was the most important in coastal waters, though the figure of 2,950 metric tons includes certain other species, but does not include catches taken by local fishermen and not sold in an auction market. The fishery is carried on within a few kilometres of the coast, chiefly by small open boats sometimes fitted with a low-power motor and by larger decked motor vessels. The former have a crew of two or three, and are mostly family concerns, while the larger cutters have a crew of three or four men. The tackle used is a fine-meshed shrimping beam trawl, but it is very destructive of small flat fish when they are developing. No mesh regulations exist in Belgium, though the destruction of young fish by the coastal fishery has been the subject of an inquiry. Over 50% of the catch is landed at Zeebrugge (see table on p. 273), for the Zeebrugge shrimping fleet has operated increasingly off the Dutch coast, while the Oostende fleet has been unable to reach these grounds easily. This latter fleet accounts for most of the remaining catch. Some fishermen from Koksijde still carry on shrimping with a large net drawn through shallow waters

Species	Coastal waters	North Sea			Iceland	Moray Firth	West Scotland	English Channel	Bristol Channel	South Ireland	Portugal, Morocco, Spain	North Sea, Fladen Ground	White Sea, Bear Island	Total	% total weight	% total value
		Southern	Central	Northern												
Sole	10	623	677	—	—	0·2	0·3	59	178	200	526	—	—	2,272	5·8	24·6
Cod	2	69	415	244	1,860	298	226	26	72	616	—	67	261	4,157	10·6	9·9
Plaice	90	1,177	1,505	13	11	5	0·1	83	65	112	0·2	0·2	4	3,065	7·8	7·4
Skate	22	682	75	9	2	6	13	262	512	806	1,049	—	—	3,438	8·8	6·5
Turbot	1	245	262	9	—	2	2	33	53	75	59	0·4	—	742	1·9	6·0
Whiting	24	1,053	593	75	215	37	114	135	284	510	3	115	—	3,159	8·1	4·0
Herring	755	977	226	4	—	—	—	10	311	66	—	3,535	—	5,883	15·0	3·9
Haddock	—	—	81	189	442	100	4	—	34	235	—	126	100	1,310	3·4	3·1
Hake	—	—	14	8	—	81	9	6	77	593	296	—	—	1,085	2·8	2·6
Coalfish	—	—	53	56	1,184	6	84	—	6	59	—	109	28	1,586	4·1	2·6
Scotch sole	—	0·3	2	36	93	7	3	29	126	499	1	0·6	0·5	789	2·0	2·0
Angler	—	—	2	16	9	13	0·7	35	102	192	41	1	—	412	1·1	1·5
Brill	2	70	82	2	—	0·5	0·5	9	13	18	22	—	—	218	0·6	1·4
'Flotte'	—	3	13	7	26	4	0·9	19	64	238	166	—	—	541	1·4	1·2
Blonde ray	—	4	—	0·2	—	—	—	34	99	447	207	—	—	448	1·1	1·1
Gurnard	3	158	16	5	—	5	23	101	148	447	126	—	—	1,032	2·6	1·1
Lemon sole	—	0·5	0·5	12	25	16	0·5	19	63	133	—	0·2	—	270	0·7	1·1
Sprat	1,160	—	—	—	—	—	—	—	—	—	—	—	—	1,160	3·0	1·0
Dab	16	189	106	2	9	0·8	0·6	10	12	30	—	0·4	—	377	1·0	1·0
Crustacea: Shrimps and species other than cuttle fish, whelks, crabs and lobsters	2,950	—	—	—	—	—	—	—	—	—	—	—	—	2,950	7·5	11·5
Other shellfish and other fish	11	381·2	219·5	83·8	94·9	26·5	23·4	190	359	955	844·8	239·2	51·5	4,241	10·7	6·5
Total	5,046	5,632	4,342	771	4,726	608	505	1,060	2,578	5,887	3,341	4,194	445	39,135	100	100
% from each ground	12·9	14·4	11·1	2·0	12·1	1·6	1·3	2·7	6·6	15·0	8·5	10·7	1·1	—	—	—
Total landed by motor vessels	5,046	5,632	4,091	179	519	357	147	1,060	2,546	5,707	3,341	1,231	206	30,062	—	—
Total landed by steam vessels	—	—	251	592	4,207	251	358	—	32	180	—	2,963	238	9,072	—	—

The figures are given to the nearest metric ton; quantities below 100 kg. are omitted and quantities between 100 and 1,000 kg. are given as decimals of a metric ton.

Source: *Bulletin de Statistique*, May, 1939, pp. 16–18 (Bruxelles, 1939).

by horses; they work on the coast between De Panne and Nieuwpoort, but this fishery is only a part-time occupation and supplements agricultural work.

Sprats

The sprat fishery is very variable, and although in 1938 it was the second most important in the coastal waters, in some years it has been disastrous to the smaller fishing-boat owners who rely on it for an important part of their income. In such years the shoals are too far out for the small craft, or the fish within reach may be either so few or so small that the catches are not worth landing. The fish are caught from October or November to February when they gather between the banks off the Belgian coast. Open boats and the small shrimp fishing vessels, using the *stroopnet*, are usually engaged in the sprat fishery. The net is anchored to the bottom with the opening towards the current; it has a length of 14 fathoms and its lower edge is leaded, while cork or glass floats hold the net open. Young herring are often associated with sprats and are caught with them. In 1938 the catch was landed exclusively at Nieuwpoort and Oostende, at both of which there are canneries. In years of poor catches foreign sprats, especially from the United Kingdom, have had to be imported to keep the Belgian sprat canneries working. Imports of fresh and frozen sprats in 1938 totalled 2,589 metric tons valued at 3·2 million francs. There was only a small export, though Germany was formerly the principal market for sprats.

Herring

Although the catch of herring was only third in importance by weight in coastal waters in 1938 and was exceeded in value by several other species, larger catches with a value three times as much have been recorded. Two distinct races of herring are found in the Straits of Dover and its approaches: the Channel herring which spawns in the late winter and spring, and the Bank or Down's herring, found in the southern North Sea, and which spawns from October to the end of January on the Thames and Flanders banks. After spawning, these spent herring migrate towards the coast between the Escaut and Cap Gris Nez. Here, from the middle of December to the end of February or the first days of March, there is usually an almost exclusive concentration of spent herring offshore, chiefly between the banks of Sandettie, Ruytingen and Dyck. These shoals, which are spending a period of rest without feeding, are never equal in size to those of



Plate 24. General view of the port of Ostend (Oostende), looking south-west
In the foreground is the northern end of the large wet dock for fishing vessels. The photograph shows the new lock under construction; to the left of it are the old lock and the north end of the large fish-auction hall. On the right are patent slips for repairing fishing vessels. In the right background there is the entrance to the old fishing harbour, a tidal basin still used by small fishing craft.



Plate 25. The fishing port at Zeebrugge
The fishing harbour is a tidal basin. All the decked vessels in the Zeebrugge fleet are motor driven, as well as fitted with sails. The vessels shown have a ketch rig and are typical of the motor cutters in the Belgian fishing fleet.

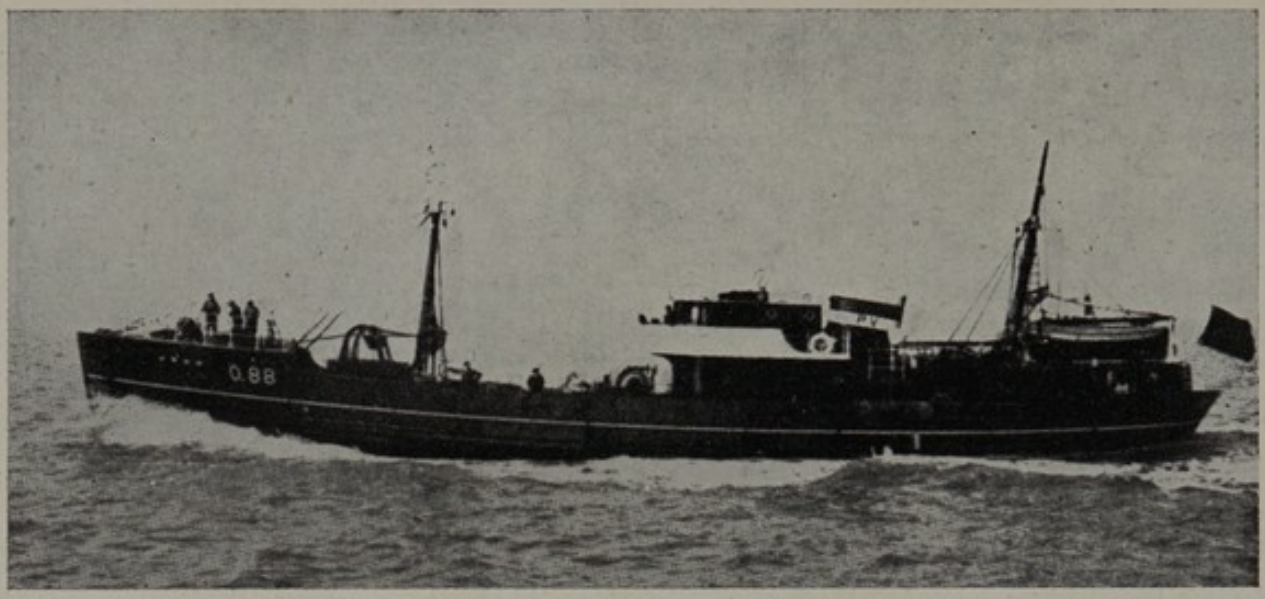


Plate 26. The motor trawler *John* (197 tons gross)

Large motor trawlers have mostly replaced steam trawlers in the Oostende fishing fleet. This trawler, owned by the *Pêcheries à Vapeur*, was built at Temsche (Tamise) and is driven by a Belgian-designed 500 h.p. *Carels* Diesel engine, constructed by the S.E.M. The vessel's loaded speed is 12 knots; it is fitted with an echo-sounding device, wireless telegraphy and telephony, and a direction finder. The crew can reach the bridge or chartroom from their quarters without going on deck.



Plate 27. Fishing vessels at Nieuport (Nieuwpoort)

The view looks upstream and shows a careening grid and bank, and dolphins on the left bank of the Yser.

the northern North Sea, but although spent herring are of inferior commercial value, they are the object of an important fishery at this season. After spawning the spent herring are subject even to slight changes in hydrological conditions and drift more or less with the water movements. Strong winds blowing eastwards from the Channel affect the water movement, and the spent herring are carried farther along the coast and shorten the time in which the Oostende fishermen may engage in the fishery, thus affecting the total yield for the season (Fig. 72). On such occasions, warm water of higher salinity than is normally found in the southern North Sea presses into the region; this water is unsuited to the Bank herring but the Channel herring thrives in it and frequently penetrates as far as the Sandettie and Dyck banks and the two types intermix. These fish, however, are at a different stage of development since they belong to a later breeding variety. In some years, owing probably to the small influx of Channel water into the North Sea, the spent herring shoals persist far to the west, and small motor boats operating from Oostende are unable to fish profitably owing to the cost of fuel. This is especially so in the case of small vessels using the *stroopnet*, but the larger vessels using the trawl may fish profitably farther west.

The age groups of spent herring have been the object of much research at Oostende in attempts both to enable forecasts of the yield to be made and to ascertain the method of fishing by which high yields may be obtained. The yields, however, vary greatly in quantity owing to the intensity and variability of tidal currents in the Straits of Dover, and to the variability of other physical factors consequent upon these changes.

Most of the small motor craft engage in the spent-herring fishery, but the larger motor cutters up to about 100 h.p. also work in deeper water. Since most boats are attracted to the more profitable herring fishery during January and February, there is usually a shortage of ordinary fish on the Belgian market. Up to 1929 the *stroopnet* was used for catching herring, but it has now been largely superseded by the trawl. The Danish *seine* net has been found impracticable in the southern part of the North Sea because of the strong currents. Beam trawls are still used by the fishermen of Blankenberge, Heist and Zeebrugge, and drift nets by some fishermen of De Panne, but the standard trawl is now the otter trawl, an improvement on the beam trawl; it is used by steam trawlers as well as by motor fishing vessels. The board of the otter trawl consists of wood, and its measurements vary according to the power of the vessel.

Almost the entire Belgian catch of herring is landed at Oostende. The total value of the seasonal landings of spent herring since 1930–1 has varied from three-quarters of a million to 13 million francs, the corresponding total weight varying from 807 to 18,360 metric tons (Fig. 72).

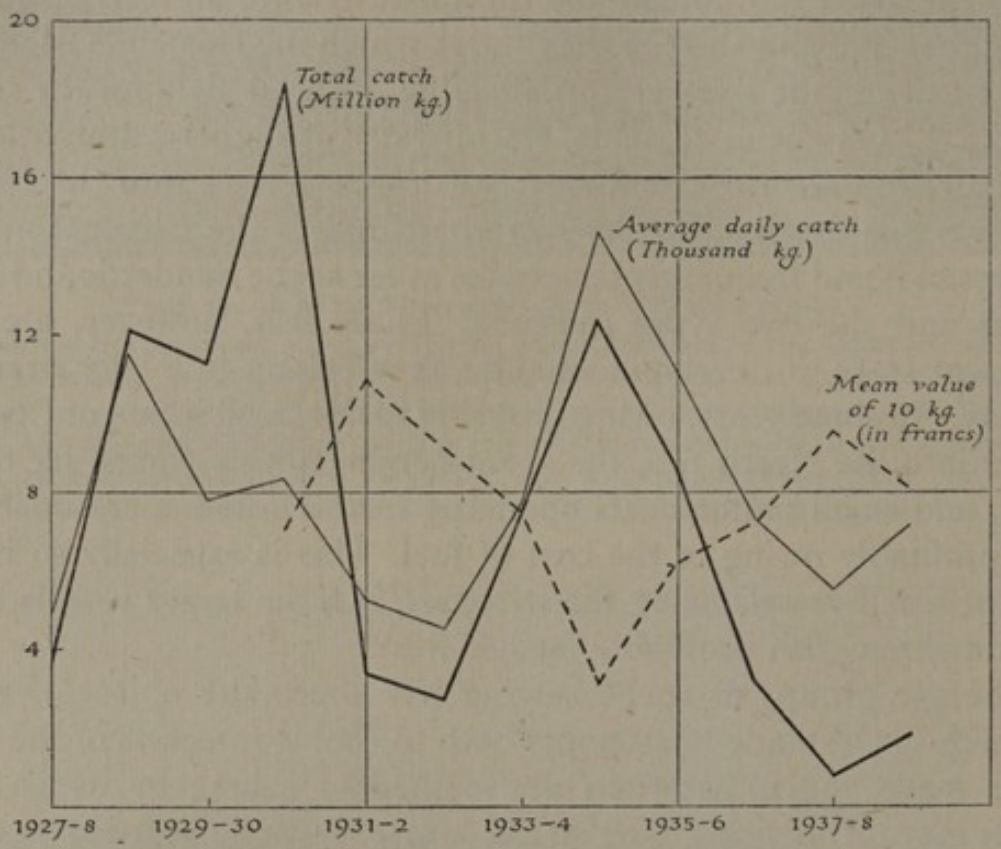


Fig. 72. Catch of spent herring landed by Oostende (Ostend) fishermen during each season, 1927–39

Based on *Rapports et Procès-Verbaux* ('Conseil permanent pour l'Exploration de la Mer'), vol. CIX, Appendices, pp. 84–5 (Copenhague, 1939).
The total catch is affected by the duration of stay of spent herring off the Belgian coast, and the average daily catch is influenced by the density of shoals. The value of the catch, however, varies inversely in proportion to the amount of the catch (see p. 264).

By far the most important single catch of herring in 1938 came from the Fladen ground in the northern North Sea; it also formed the most important catch of all species from that ground. The fish of the Fladen ground are mostly caught in the later summer and in the autumn months. The share of Belgium and other countries in landings of herrings from the North Sea in 1935–7 is shown in the table on p. 267 (percentages).

The maximum Belgian herring catch in 1937 occurred in January, when nearly 43% of all herring caught in the North Sea during that month was caught by Belgium.

	1935	1936	1937
Belgium	1·4	0·9	0·6
Denmark	0·1	0·2	0·1
England	13·3	12·3	17·5
France	1·6	1·9	2·3
Germany	19·6	21·9	27·7
Netherlands	7·3	9·4	12·9
Norway	43·4	42·0	28·3
Scotland	12·8	11·1	9·9
Total for all countries	100	100	100

Source: *Bulletin statistique des Pêches maritimes*, 1937, p. 2 (Copenhague, 1939).

The Fishing Fleet

The first steam fishing vessels in Belgium were introduced at Oostende in 1884, and their appearance accelerated the decline of the sailing fleet. This decline had been caused partly by fishermen hiring their services to visitors at the resorts of Blankenberge and Oostende and partly by the better wages offered on the state-operated cross-Channel service. The greatest change, however, did not occur until after the war of 1914–18 when sail was rapidly superseded by motors, both in large ships and in small shrimp fishing craft (Fig. 73). The increased use of motor vessels also threatened the existence of the steam fishing vessel because they were easier to handle, more economical to run and because they used cheaper and less bulky fuel. In addition, higher wages and the shorter absence from port meant that experienced crews were found more easily for motor vessels.

The number of fishing vessels on 1 January 1940 and their port of registration is shown in the table on p. 269. With the exception of fourteen steam trawlers, all built in England and the largest being 342 tons gross, the fleet is now almost entirely motor-driven. The steam trawlers carry a crew of seven or eight according to the size of the vessel, and they are still retained for the northern North Sea, west Scotland, Iceland and White Sea fisheries because steam is useful for heating purposes on board in winter; they are all equipped with wireless telegraphy, wireless telephony (see p. 578) and with echo-sounding apparatus.

With the exception of those based on Oostende, the motor cutters are practically all under 100 tons gross, and in many cases under 50 tons gross. The Oostende fleet is by far the largest, and includes many vessels over 100 tons gross, the largest being 320 tons gross. Nearly 90% of these vessels have been built in Belgium, the larger

ones at Oostende and at Temsche, and the smaller ones at Brugge, Zeebrugge, Heist, Blankenberge, Nieuwpoort and Oostduinkerke. About three-quarters of the motors are of German manufacture; most of the remainder are equipped with Dutch motors. In the larger elements of the Oostende fleet, Belgian-designed *Carels* Diesel engines have been used increasingly in recent years (Plate 26). Over

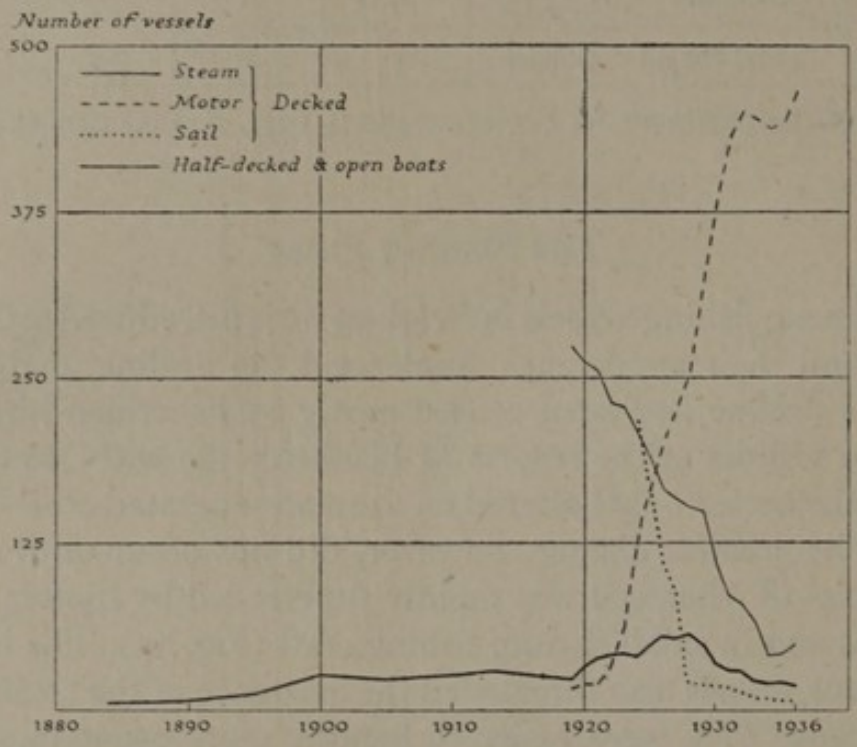


Fig. 73. Development of the fishing fleet—numbers of vessels

Based on: (i) *Handbuch der Seefischerei Nordeuropas*, vol. III, p. 25 (edited by H. Lübbert and E. Ehrenbaum, Stuttgart, 1932); (ii) *Annuaire statistique de la Belgique*, p. cii (Gand, 1939); (iii) *Liste des navires de mer et des bâtiments de pêche belges*, no. 22, January 1939, p. 78 (Bruxelles).
Owing to discrepancies in sources, information about half-decked and open boats and sail is only approximately correct.

half the Oostende motor fishing vessels as well as a small number of the Heist and Zeebrugge vessels are fitted with wireless telephony; arrangements can thus be made by means of the shore telephone system for the immediate disposal of catches when the vessel enters port. In addition, one-fifth of the Oostende vessels are equipped with echo-sounding apparatus, and a few of the large motor trawlers are also equipped with wireless telegraphy (see p. 578). Only motor vessels fish in coastal waters, in the southern North Sea and in the English Channel; they also form the majority of the vessels fishing in the Bristol Channel and in the grounds off southern Ireland. Long-distance motor trawlers also operate off Spain, Portugal and Morocco (see table on p. 269).

Fishing Fleet: Number of Vessels according to gross tonnage and Place of Registration—1940

Place of registration	Type of drive	1–25	25–50	50–100	100–200	200–300	300+	Total	Range in h.p.
Oostende	Steam	—	—	—	—	2	12	14	440–570
	Motor (15 open-boats with motor)	65	15	102	44	2	1	229	10–700
Heist	Motor (1 open-boat with motor)	34	29	16	—	—	—	79	20–180
Zeebrugge	Motor (1 open-boat with motor)	29	28	9	3	—	—	69	10–350
Blankenberge	Motor (2 open-boats with motor)	7	7	3	—	—	—	17	10–175
Nieuwpoort	Motor	33	17	4	—	—	—	54	10–200
Oostduinkerke	Motor	6	1	—	—	—	—	7	10–80
De Panne	Motor (10 open-boats with motor)	6	1	—	—	—	—	7	10–70
Antwerpen	Motor	2	—	—	—	—	—	2	8–20
Berendrecht	Motor	1	—	—	—	—	—	1	?
Kieldrecht	Motor	3	—	—	—	—	—	3	15–20
Zandvliet	Motor	3	—	—	—	—	—	3	10–20
Boechout	Motor (6 sailing vessels 5·77–12·45 net tons	6	1	—	—	—	—	7	18–80
Total		195	99	134	47	4	13	492	

Source: *Liste officielle des navires de mer*, no. 23, January 1940 (Bruxelles).

The owners of steam trawlers co-operate in many ways to decrease running costs. Thus, in 1922, an insurance company was founded by the steam-trawler owners to insure fishing vessels against all risk at a premium of about 3½%. The repair of vessels, the supply of ships' stores, the sale of fish and the disposal of waste are all carried out on a co-operative basis. The wages on steam trawlers are fixed; in addition, the crew share 2% of the gross sale proceeds of the catch.

Motor vessels are mainly in the hands of a large number of small owners who frequently sail as captains and who have acquired their vessels on the credit system. The large-scale granting of credits has mainly been responsible for the rapid expansion of the motor fishing fleet. Up to 90% of the value of the vessel is covered by credits allowed by banks, by special companies granting fisheries credits, by engine manufacturers and by shipbuilders; the interest charged by banks or credit companies is limited to 5%. As a rule, the outstanding credit must be repaid within five years. Nevertheless, an economic crisis such as the one of 1931–2 particularly affects the motor-vessel owners since their financial position is so insecure. The crews of motor vessels receive no fixed wages, but share the proceeds of the catch; although this share varies according to the agreement between the owner and crew, usually 25% is set aside for expenses, and of the remainder the master, the engineer and each of the three fishing hands receive proportional shares. On the small motor craft which are chiefly engaged in shrimp and sprat fishing, the proceeds are divided into five parts, the owner receiving two parts for running expenses, and the remainder usually being divided equally between the master and the two members of the crew.

Imports and Exports

During the last ten years the government has encouraged a greater home consumption of fish; for many years the consumption of fish had been very small, and even in the densely populated parts of West-Vlaanderen outside the coastal zone fish was rarely eaten. Government stimulus was indeed necessary to prevent over-production with its consequent slump in prices. The surplus could not be exported owing to the restriction of access to foreign markets since 1931, and Belgium had been depending particularly on markets in France, Germany and the United Kingdom. In 1932 quota restrictions were placed on the import of foreign fish, while in 1933 German-caught

fish completely disappeared from the Belgian market and the productive capacity of the Belgian fishing fleet thus became greater. In addition, a much larger proportion than formerly of the total catch of the Belgian fishing fleet is now landed in Belgium, because in return for the protection offered by the import quota, the fishermen are under an obligation to sell their catches in Belgium except when prevented from doing so by bad weather or by the need for repairs. Catches landed abroad were formerly considerable, especially in the case of vessels fishing off Ireland and Spain and which could put into British or French ports more conveniently.

The quantities of fish sold at the fish market of Bruxelles in 1931, 1934 and 1938 indicate the increased share of Belgian-caught fish:

Number of Baskets

Origin	1931	1934	1938
Belgium:			
Oostende	4,244	23,971	41,750
Blankenberge	1,756	—	—
Netherlands	47,523	6,679	4,521
England	478	4,071	866
Germany	21,558	6,062	250
France	89	150	217
Norway	735	4,464	2,447
Denmark	1,179	7,355	6,797
Sweden	—	1,037	27
Total	77,562	53,789	56,875

Source: *Bulletin de Statistique*, May 1939, p. 19 (Bruxelles, 1939).

The majority of the imports of fresh fish come from the Netherlands and consist chiefly of herring, mussels and various other shellfish, and shrimps. Although the total of shrimps imported in 1938 equalled only about one-sixth of the Belgian catch of shrimps, shrimp sales in previous years have suffered considerably from the competition of shrimps imported from the Netherlands. Of the exports of fresh fish in which the largest items were mussels and various shellfish and herring, France received most of the mussels, and although Germany imported three-quarters of the herring she was formerly a much more important market, especially for spent herrings. In addition, France bought practically the entire export of shrimps which amounted to about a quarter of the Belgian catch. France was also the principal buyer of unspecified species, but she bought chiefly the dearer fish like sole and turbot. The

Fish and fish products: imports and exports in metric tons, 1938

	Imports	Exports
Fish, shellfish, etc.:		
Fresh	35,303	8,864
Dried, smoked or salted	23,578	741
Other methods of preservation	15	19
Preserved in various ways and transported in boxes, tins and other containers	10,209	1,381
Fish oils and blubber (hydrogenated or similarly processed)—edible	3,869	3
Fish oils and blubber for industrial use	444	60
Other fish oils, etc.—edible (including whale and fish liver)	318	51
Other fish oils for industrial use	24,276	10,795
Fish meal and fish waste for cattle fodder and poultry food	4,668	1,287

Source: *Bulletin du Commerce de l'U.E.B.L.*, pp. 10–11, 15–16, 100–1, 121 (Bruxelles, 1940).

imports of dried, smoked and salted fish came mainly from the Netherlands and consisted largely of salted herrings and other kinds of herring; exports of salted herrings, sprats and cleaned shrimps went mainly to France. The chief suppliers of canned fish are Japan and Portugal, while Germany is the most important export market. Denmark is the main source for hydrogenated edible fish oils and Japan for such oils for industrial use; Norway is the chief source for fish liver for domestic use and the Netherlands for industrial fish oils, including over half the supply of whale oil. Norway and the Netherlands share most of the import of fish liver included in the total of oils for industrial use. The outstanding export in this category consists of whale oil for industrial use, and the export is mainly shared by Denmark and the United Kingdom.

Japan and Portugal are the main suppliers of fish meal, and France and the Netherlands are the chief markets for its export.

According to statistics published by the *Ministère de l'Intérieur* for 1938 only 75 tons of fish, of which 70 tons came from Nieuwpoort, were transported by rail to Belgian destinations, while 4,613 tons were sent by rail to Germany (mostly from Oostende) and Italy (all from Zeebrugge). Since rail transport has not been convenient for large-scale transport of fish within Belgium, motor transport has been increasingly used, and many fish merchants have their own lorries.

Quantities in metric tons of various Species landed at the different Belgian Fishing Ports

Species	Oostende	Blankenberge	Zeebrugge	Nieuwpoort
Sole	1,737	45	404	86
Cod	4,107	8	26	16
Plaice	2,036	157	505	367
Skate	2,869	44	346	179
Turbot	561	126	143	28
Whiting	2,343	126	567	122
Herring	5,701	0·4	—	182
Haddock	1,310	—	—	—
Hake	1,082	—	2	—
Coalfish	1,586	—	—	—
Scotch sole	793	—	5	—
Angler	409	—	4	—
Brill	166	10	26	16
'Flotte'	541	—	—	0·2
Blonde ray	448	—	—	—
Gurnard	905	10	86	30
Lemon sole	267	—	2	0·4
Sprat	535	—	—	625
Dab	113	22	177	65
Crustacea: shrimps and species other than cuttle fish, whelks, crabs and lobsters	1,000	43	1,663	244
Other shellfish and other fish	3,933	32·6	172	97·4
Total	32,442	507	4,128	2,058
Value (1,000 fr.)	94,921	2,080	20,552	5,826

These figures are given to the nearest metric ton; quantities below 100 kg. are omitted and quantities between 100 and 1,000 kg. are given as decimals of a metric ton.

Source: *Bulletin de Statistique*, May 1939, p. 18 (Bruxelles, 1939).

Fishing Ports

Oostende (Ostend)

Oostende handles about 82 % of the total landings of fish in Belgium (see table above). The construction of the new fishing harbour at Oostende, completed in 1934, was one of the first measures taken to aid the sea fisheries. The facilities include a tidal basin for small vessels and a large wet dock (see p. 399) for steam trawlers and motor cutters. This wet dock can accommodate the exceptional numbers of boats arriving simultaneously during the herring season. The new fish auction hall situated alongside the wet dock is one of the largest in Europe, and has been specially designed to expedite the handling and transport of fish after landing; thus a consignment will now reach any part of Belgium within 12 hr. at the most. There are 112 packing

rooms, and behind them are two railway tracks; a special room is laid aside for the sale of herrings and sprats. The condition of all fish offered for auction is previously examined by official experts. The municipal administration of Oostende levies an auction duty of 2¼% of the gross sale proceeds, and a proportion of this is paid to the fishermen's pension fund. Fish can be discharged directly from the vessels into railway trucks and other facilities include mechanically operated slipways for repairing boats. On the east side of the large wet dock are extensive industrial sites which the government is prepared to lease to firms starting concerns connected with the fishing industry. Oostende has ice factories and several fish canneries tinning sprats, herring and other fish; other manufactures are fish meal, fish guano, and fish oil, including cod-liver oil. South of the port are oyster pans, which are fed by purified sea water daily; the oysters are imported from Harwich and Colchester. The *Institut d'Etudes maritimes d'Ostende* is the Belgian fisheries research laboratory (Plate 24).

Zeebrugge

Zeebrugge is the second Belgian fishing port, and in 1938 the largest catch of shrimps was landed here. Shrimps are dried in the town for animal foodstuffs. A new auction market was completed in 1935, and there are improved docking and transport facilities for both road and rail (see p. 405; Plate 25).

Nieuwpoort (*Nieuport*)

In 1938 the larger part of the catch of sprats was landed at this port, with plaice and shrimps forming the other main species landed. After Oostende it is the only port where any important quantity of herring is landed. Sprat and herring canneries are situated in the town (see p. 396; Plate 27).

Blankenberge (pop. in 1938: 7,960)

Blankenberge has a small tidal fishing harbour and fish market; the principal species landed are plaice and whiting (see p. 273; Plates 28, 29).

Administration, Legislation and Research

The *Administration de la Marine*, a section of the Ministry of Communications, is responsible for fisheries administration and it is assisted by advisory councils; among these are the *Conseil supérieur de la Pêche maritime*, a consultative body of which the minister is



Plate 28. Aerial view of the fishing port of Blankenberge

The small rectangular tidal basin used by fishing vessels can be seen to the north of the triangular scouring basin. A branch canal from Brugge (Bruges) terminates near the latter on its south-western side. The entrance channel must be scoured once daily from this basin; the largest ships using the port, which has no unloading equipment, are coasters drawing 11 ft. The station is on the eastern side of the town.

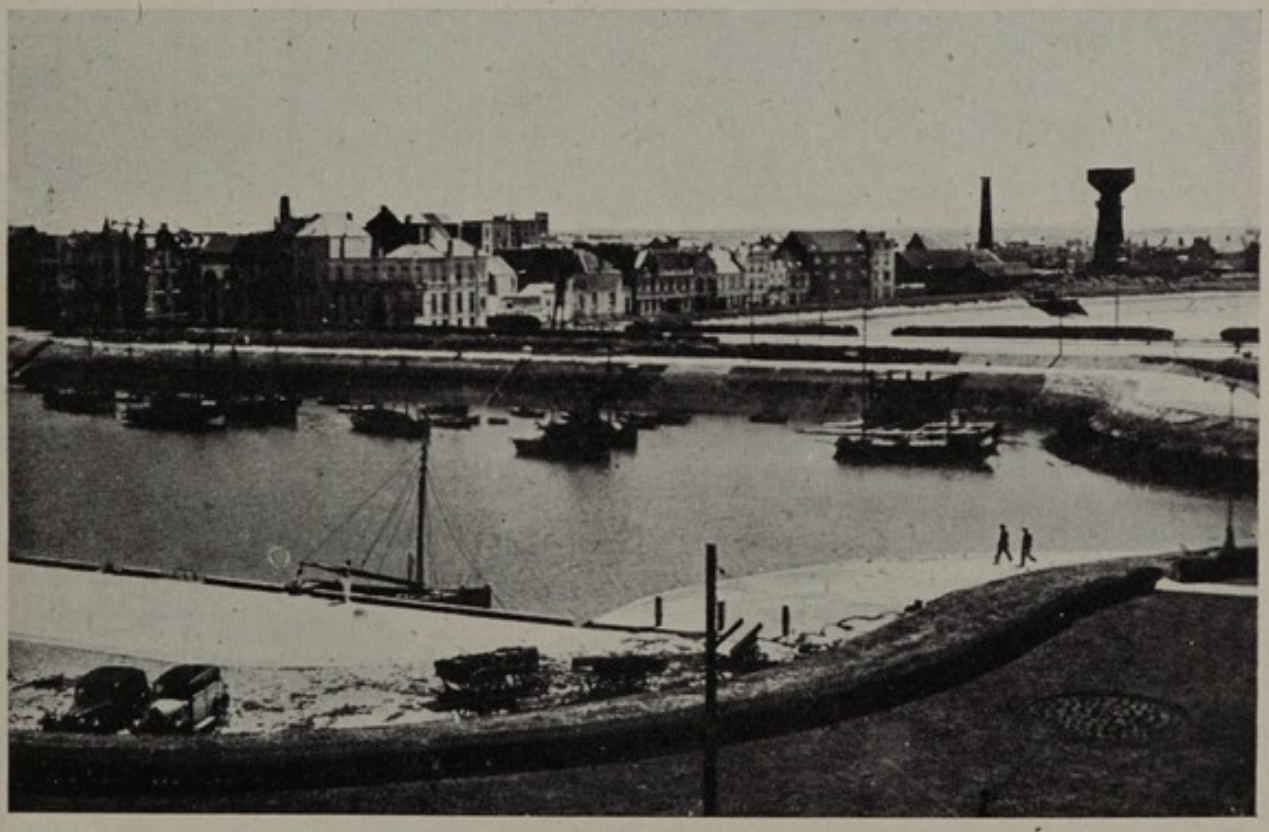


Plate 29. The fishing harbour at Blankenberge

The view looks south-east, with the entrance to the basin on the right. In front of the wooden jetty at the western end of the sloping south quay is a careening grid.



Plate 30. The *Cockerill* shipyard at Hoboken

The yard lies on the right bank of the Escaut (Scheldt) above Antwerpen. The photograph was taken in 1937 and the nearest vessel building on the slipways is the *Prins Albert*. A 120-ton hammerhead crane stands in the foreground on the pile structure, which together with the two flanking dolphins forms the fitting-out berth.

chairman and which recommends various measures, the *Commission de Mariculture et de Mytiliculture*, and the *Commission de Propagande pour le Poisson de Mer*, a semi-official organization established in 1929 to promote the home consumption of fish. The administration supervises the eight state-aided schools for the training of fishermen. Enlistment of crews for fishing vessels takes place every six months and lasts until Easter or October, and it is executed through an official register.

A fishing vessel may put to sea only if it is granted a certificate by a government inspector, stating that it is seaworthy and provided with all the equipment decreed by the authorities. The administration also conducts enquiries into accidents and damage caused to fishing vessels.

Important legislative measures have been taken since 1918. In 1929 the minimum sizes for certain species of fish landed were regulated, primarily to control the destruction of fish fry and eggs in the coastal fishery; these minimum lengths are sole, 15 cm., turbot, 25 cm. and brill, 25 cm. Nevertheless, there are no mesh-size regulations. Compensation for accidents to fishermen at work was regulated in 1930. The *Institut Gottschalck* at Oostende is maintained as a home for old fishermen and, occasionally, for their families. The outstanding and most pressing question, however, has been the scarcity of trained crews. The situation was partly alleviated in 1929 by the opening of the state training school for merchant seamen at Oostende. Hitherto the necessary personnel for the cross-Channel service had been drawn from the fishing fleet, although open boats operating in coastal waters had not been as seriously affected as the longer range decked vessels. Seldom had even the sons of fishermen been attracted to the industry and crews had to be sought in the interior of the country. The opening of the school at Oostende did much to remedy this situation by opening a fresh source of man-power for the cross-Channel service, and a law of 1930 which obliged owners of fishing vessels with a crew of more than three men to employ a ship's boy or an apprentice further helped recruitment.

Fisheries research in Belgium is carried out in co-operation with the *Conseil permanent international pour l'Exploration de la Mer* at Copenhagen. Regular hydrographical and plankton observations are made at the West-Hinder light vessel and also by the fisheries research vessel on a run from Oostende to Gravelines and Deal (see p. 384). The Oostende laboratory has made a special study of the life history of spent herring, and more recently of the sprat and shrimp fisheries.

BIBLIOGRAPHICAL NOTE

1. Details of the fishing fleet can be obtained from the official publication of the *Administration de la Marine*—the *Liste officielle des navires de mer et des bâtiments de pêche belges avec leurs lettres signalétiques*, no. 23, January 1940 (Bruxelles).

2. Statistics are published in the following works:

(i) *Bulletin statistique des Pêches maritimes des Pays du Nord et de l'Ouest de l'Europe*, vol. XXVII, 1937 (Copenhague, 1939). This gives comparative figures for other countries and is published by the *Conseil permanent international pour l'Exploration de la Mer*.

(ii) *Bulletin de Statistique*, May 1939 (Bruxelles, 1939), published by the *Office Central de Statistique, Ministère de l'Intérieur*.

(iii) *Annuaire statistique de la Belgique*, 1938 (Gand, 1939).

(iv) *Bulletin du Commerce de l'U.E.B.L.* (Bruxelles, 1940), which provides details of imports and exports of fish products.

3. The most comprehensive account of the fishing industry up to 1930, with details of its historical development, vessels, fishing methods and gear, fishing ports and fisheries legislation, and sketches and illustrations, is found in L. Verbrugghe, 'Die belgische Seefischerei', *Handbuch der Seefischerei Nordeuropas*, vol. VII, part 3 (Stuttgart, 1932).

4. The reports of Belgian fisheries research are published periodically in the *Rapports et Procès-Verbaux des Réunions* of the *Conseil permanent international pour l'Exploration de la Mer* (Copenhague).

Chapter XII

MINING AND INDUSTRY

Historical Background: Employment and Organization: Industrial Regions: Coal, Coke and Gas: Quarries: Iron and Steel Industry: Non-Ferrous Metals: Engineering Industries: Electricity: Chemical and Allied Industries: Glass: Pottery and Bricks: Textiles: Miscellaneous Industries: Bibliographical Note

Belgium is one of the most highly industrialized countries in the world; some 55 % of her gainfully employed population was engaged in industry in 1930, the year of the last Census. Industrial prosperity depends on the large-scale import of raw materials and on the export of manufactured goods. Assets include home supplies of coal, a closely integrated system of communications, ready access to the sea at the great port of Antwerpen, a century-old and world-wide industrial reputation, and a dense population with established traditions of industrial skill.

In 1937, 87 % of Belgium's imports by weight and 57 % by value consisted of raw materials, mainly iron ore, coal, coke, raw wool, cotton and jute, timber and pulp, raw chemicals, and a wide variety of less bulky but valuable items. Manufactured goods accounted for 49 % of the exports by value, and semi-manufactured materials for a further 44 %. Normally two-thirds of Belgian manufactures were sold abroad.

Historical Background

The Medieval Period

The economic prosperity of the eleventh and twelfth centuries was characterized in the Netherlands by the rise of towns and by the appearance of merchants and artisans. The guilds became the controlling factor in the industrial life of the country, and until the fifteenth century Flanders was the most important manufacturing area in north-western Europe (see pp. 86-7). During the fourteenth century Gent, Brugge and Ieper had grown rapidly and, with Douai and Lille, they were the chief centres of the European textile industry.

The competition of English cloth, however, was being increasingly felt. The Flemish production of fine woollens, in which England especially excelled, declined rapidly. The industry was saved from extinction by the concentration on cheap light fabrics, like worsteds and serges, and on specialized products, such as lace-making at Gent and tapestry weaving at Bruxelles, Tournai and Oudenaarde.

Other industries flourished in the fifteenth and sixteenth centuries. Coal pits were opened in the Ardenne and in the Meuse valley, where iron smelting also increased in importance. Again a variety of specialized industries arose, such as printing, diamond cutting and setting, and glass making. Under the influence of the artistic renaissance, craftsmanship flourished and manifested itself in building, metal work and jewellery.

The industrial prosperity of the Spanish Netherlands received a severe setback during the troubled times of Philip II and afterwards (see p. 96). The closing of the Escaut, following the establishment of the United Provinces adversely affected commerce and industry, while the numerous wars resulting from the policy of the Spanish Hapsburgs were ruinous. The migration of skilled workmen—refugees from religious persecution—to England and France helped to increase the competition of those countries. Thus, by the seventeenth century, the linen and lace industries alone prospered, the latter more especially at Mechelen, Gent, Bruxelles and Antwerpen.

The Eighteenth Century

When the Spanish Netherlands passed to the Austrian Hapsburgs in 1715, Belgium's economic position was weak in the extreme. During the reigns of Maria Theresa and Joseph II fairly successful efforts were made to remedy this situation by the development of communications and by the encouragement of industry. Cloth manufactures revived markedly, notably at Verviers, Tournai, Gent and Kortrijk, and the lace industry prospered in spite of English competition. Other expanding trades were the manufacture of carpets at Bruxelles and of hosiery at Namur.

The introduction of steam pumps for mine drainage resulted in an increase in mining in the Centre district, and by 1789 the Belgian mining industry was far ahead of other continental European countries in technical development. In that year mines were being worked near Mons at a depth of 200 m. Throughout the century other industries had benefited from the general economic improvement,

notably the manufacture of pottery and glass at Charleroi, Tournai and Gosselies, of cutlery at Namur and of pewter at Dinant.

During the seventeenth and eighteenth centuries, the independent position of Liége as an ecclesiastical principality was reflected in its flourishing trade and industry which contrasted strikingly with those of the Spanish Netherlands. Numerous collieries were opened, industrial suburbs arose, and the metallurgical industry gained a high reputation.

The Period of the Revolutionary and Napoleonic Wars

The occupation of Belgium by France during this period proved to be a great stimulus to Belgian industry. France itself was a very large market; the textile industry, for example, had to supply the French armies with uniforms. Further, Napoleon's fiscal system also protected the growing industries, while English competition in Europe virtually disappeared. The restrictions of the medieval guild regulations and town privileges were now finally removed.

More important, however, were the effects of the Industrial Revolution which began to be felt in the early years of the nineteenth century. In coal mines, steam-haulage engines were first used in 1805; as in England, however, technical advances were most rapid in the textile industry. An English mechanic, William Cockerill, who had been employed for some years in various parts of Europe, arrived in Verviers in 1798, and during the next few years introduced new textile machinery. The first spinning jenny was set up at Gent in 1801 and the first power-loom at Verviers in 1805. William Cockerill's son, John, founded in 1817 an iron works at Seraing near Liége; out of this grew the *S.A. John Cockerill*.

The United Netherlands Period

It seemed at first that the union of the Netherlands in 1815 would bring economic advantages, since the Dutch colonies provided both raw materials and a large market for Belgian manufactures. Several steps were taken to encourage industrial development; thus the *Société générale pour favoriser l'Industrie nationale* was founded in 1822 to advance capital to manufacturers. There was a general improvement in communications, particularly in waterways. The introduction of new machinery continued, and English capital and mechanical skill were intensively used; Watt pumping engines were substituted for Newcomen in 1819, coke was used for smelting, and

the first blast furnace in Europe to use coke was erected at Liége in 1824.

Numerous difficulties, however, soon appeared. For one thing the Netherlands was primarily a commercial country and strongly favoured free trade. Belgium's interests, on the other hand, being agricultural and industrial, preferred protection. To encourage commerce, the government reduced protective tariffs, with the result that Belgian industries had to meet strong foreign competition (see p. 111).

After Belgian Independence

One of the consequences of the attainment of Belgian independence was the loss of markets in the Netherlands and in the Dutch colonies; textiles no longer went to the East Indies, and the Netherlands no longer bought Belgian coal. Although most European countries were closed by tariffs to Belgian manufactures, there was a rapidly expanding internal market, and new markets were being discovered in the territory of the German *Zollverein*. Again, the development of the railway system stimulated the iron industry, and the number of coke-using blast furnaces had increased to eight by 1838. In that year the Cockerill works had four coal mines, two furnaces, and rolling mills with over 2,000 men employed. Mining gradually attained first place among industries, and in 1835 over 300 pits were producing coal.

The transition to the large-scale mechanization of industry was inevitably accompanied by periods of economic crisis. The development of machinery resulted in an output which far exceeded the available foreign markets, and thus caused widespread unemployment (see p. 117). The great misery that prevailed was further aggravated between 1846 and 1848 by bad harvests. Flanders was considerably depopulated by migration to the southern coalfield and to France. Successive governments introduced various remedial measures, granted loans to employers, and undertook public works to absorb labour (see p. 118).

In 1848, only 7 % of the population of Belgium were engaged in industry, as compared with 25 % in agriculture. In 1849, however, the first measures were instituted to reduce export duties and prohibitions, measures which led during the next ten years to unrestricted free trade. The stimulating effects of these measures on industry were far reaching, and for the first time since the Middle Ages Belgium again became a manufacturing-exporting country. The

difficult period which followed the setting up of the Belgian kingdom was slowly passing; between 1850 and 1880 Belgium became England's most formidable industrial rival.

Coal was the basis of Belgium's industrial development during the nineteenth century. The output in 1840 was 3·9 million tons, in 1860 it was 9·6 millions, and in 1880 16·8 millions. The use of steam power increased from 40,000 h.p. in 1846 to 430,000 h.p. in 1896. In the same period the number of industrial workers increased from 660,000 to 1,100,000.

The closing decades of the nineteenth century saw a great increase in the number of large capitalized concerns; enterprises employing over 500 workmen increased from 133 in 1896 to 1,844 in 1901. The tendency was especially marked in the mining and metallurgical industries, where allied undertakings voluntarily associated for their mutual benefit; only by this means could they meet the competition of German 'dumped' goods. Foreign capital, especially from Germany, was heavily invested in the iron and steel industry. Nevertheless, many domestic and small-scale industries—notably the manufacture of linen, weapons, clothing, lace and jewellery—maintained themselves, their high-quality products competing successfully against the output of the factories.

The War of 1914–18

The territory of Belgium was almost completely occupied in 1914–18, and her economic life was brought almost to a standstill (see p. 543). The Germans systematically pillaged the industrial resources. A series of decrees empowered the compulsory purchase or outright requisition and seizure of a wide range of commodities; non-ferrous metals, all types of machinery and machine tools, mineral oil, textiles, rubber, chemicals, locomotives and rolling stock were all included in the requisition list. The plant and machinery at the Cockerill and Ougrée-Marihaye works were completely dismantled and removed to Germany. The general economic life of the country was crippled by a tax of 40 million Belgian francs a month (later raised to 50 million) to support the army of occupation and German administration, by the general dislocation of commerce and finance, and by the wholesale requisitioning of road, rail and water transport. Some 115,000 workers, whose ages ranged from 18–70, were deported either to Germany or to *Zivil Arbeiterbataillonien* at the front. Industrial production consequently ceased almost entirely, except in factories either working directly for Germany or supplying the

barest minimum of civilian needs. The output of coke fell from 3·5 million tons in 1913 to 0·5 million ton in 1918; that of pig-iron from 2·5 million tons to nil, and that of raw steel from 2·5 million tons to 10,000 tons. The mining industry with the aid of government subsidies maintained an annual production of some 15 million tons, compared with the 1913 figure of 23 millions.

Reconstruction and Prosperity

After the armistice of 1918, Belgium was faced with a reduced industrial population and with an immense programme of immediate reconstruction. Her pre-war markets had disappeared, while many of the other Allied nations, notably Britain and the U.S.A., had intensified production and developed new industries during the war. Helped partly by German reparations, both in gold and in kind (coal, coke, chemicals and industrial equipment), partly by foreign loans but chiefly through her own determined efforts (it was estimated that two-thirds of the total costs of recovery were obtained from the country's own resources), the rapidity of her economic recovery was most striking.

A major step in the economic recovery of Belgium was made in July 1921, when a convention, to come into force in May 1922, was formulated for a monetary and customs union between Belgium and the Grand Duchy of Luxembourg. Before 1914, the Grand Duchy had been included in the German customs union, and unsuccessful attempts had been made after the cessation of hostilities in 1918 for an arrangement between it and France. One of the chief results of the union with Belgium was that the iron of the Grand Duchy was now brought into close association with the Belgian heavy industry.

Industrial recovery proceeded parallel with the co-ordination of efforts for the reconstruction of ports, means of communication, public utilities and houses. Large loans were advanced to factory owners by the *Société nationale de Credit à l'Industrie* and the *Fédération des Co-opératives pour Dommages de Guerre*. The speed of recovery is shown by the fact that the number of active blast furnaces in December 1922 was thirty-three, compared with fourteen in the previous year.

By 1925, the great work of reconstruction was almost completed. The widespread installation of modern plant enabled Belgium to take a leading place among the manufacturing nations of the world. Side by side with the old-established industries of the southern coalfield and of the Flanders towns there grew up new industrial areas,

especially along the lower Escaut, in the neighbourhood of Bruxelles, and in the Kempenland. The rapidly increasing output of the new Kempen coalfield was one of the main features of industrial development after 1918. The Belgian Congo was intensively exploited, and proved to be a valuable source of such raw materials as copper, tin, diamonds, pitchblende, gold, and vegetable oils.

The financial and monetary problems of 1925–6 temporarily checked the increasing prosperity of Belgium (see pp. 346-7). There was an increasing tendency, especially during 1927–30, towards combination and amalgamation; cartels and groups were formed in most of the major industries, either for more efficient production or to accelerate sales.

The World Economic Depression and after

As one of the major manufacturing-exporting countries of the world, Belgium found her export trade severely curtailed by a restricted world market, and by the foreign customs barriers and monetary restrictions which were among the results of the widespread economic depression of 1929 onwards. In 1931, Belgian exports were adversely affected by Britain's abandonment of the gold standard, with the resultant depreciation of sterling and a diminution in its external purchasing power; conversely, the lower value of sterling led Belgian importers to place large orders in England. In addition, the Runciman import duties were placed on goods of which Belgium normally supplied 10% of the British imports. Her trade with other countries was similarly adversely affected. The textile industry in particular suffered from Japanese and Indian competition. The normal dependence on export markets hit Belgian manufacturers, and scarcely any branch escaped depression. Unemployment and strikes increased apace (see p. 348). During 1934, the government showed an increasing concern for the economic life of the country. In July of that year the government, which had hitherto been chary of interference in the economic and financial spheres, was given wide powers.

At the beginning of 1935, Belgium was in many ways the least adversely affected of all the great industrial countries, largely because of the varied and specialized nature of her manufactures and because of the strength of her home market. Nevertheless, the country was far from prosperous, as evidenced by an alarming deficit in the budget of 1934. A series of monetary decrees designed to stabilize the financial position culminated in March 1935 with devaluation of the

franc, followed by a strict programme of price control. Largely as a result of these measures the activity of nearly all branches of industry improved markedly.

An important factor in the economic recovery was the Bruxelles Exhibition of April–November 1935. Apart from its immediate effect on retail trade, the accompanying tourist traffic produced an increased circulation of money, while as a business enterprise the exhibition was a great success, bringing a considerable volume of foreign orders. The devalued currency helped to attract over 10 million visitors from other countries. The Commercial Fair of April 1936 was intended to promote sales of manufactures on the home market, while an industrial train toured Europe for four months. Industrial unrest, however, severely counteracted the results of these efforts. In 1936 there broke out a strike among the dockers of Antwerpen, and it subsequently involved 417,000 workers for two months and affected 1,700 firms. Minor stoppages and disputes also were frequent during the year. The government was forced to introduce legislation to deal with such industrial trouble and social disorder (see p. 350). In September 1936 it set up the *Commission d'Orientation industrielle*, a body of economists, to advise upon industrial legislation.

Industrial output and the volume of exports increased steadily from 1934 to 1937, and in the latter year figures equal to those of 1929 were attained by many commodities. In 1938, however, as a result of the deterioration in international relations, output dropped below that of the depression years of 1932–3. A rough index of Belgian industrial prosperity between 1922 and 1938 is afforded by the graphs of the output of her basic industries (Fig. 74).

Employment and Organization

Industrial Workers

According to the occupational distribution of the population compiled after the Census of 1930, 2,047,905 persons were listed under the category of 'Mining and Industry' (see p. 188). This total represents some 55% of the effective working population, compared with 17% in agriculture and 15% in commerce; the contrast with the figures for France (industry, 27%; agriculture, 40%; commerce, 15%) is striking.

A further census of persons actively engaged in industry at the time was made in December 1930, and it showed that 1,590,404 were

thus gainfully employed. Of this total over 40% lived in the provinces of Hainaut and Brabant, while only 8% were in Limburg, Luxembourg and Namur. The geographical distribution of the industrial population by province was as follows:

Antwerpen	209,844	Liége	250,855
Brabant	326,963	Limburg	48,211
West-Vlaanderen	130,305	Luxembourg	20,870
Oost-Vlaanderen	215,483	Namur	59,961
Hainaut	327,912		

Source: *Annuaire statistique de la Belgique*, p. 196 (Gand, 1939).

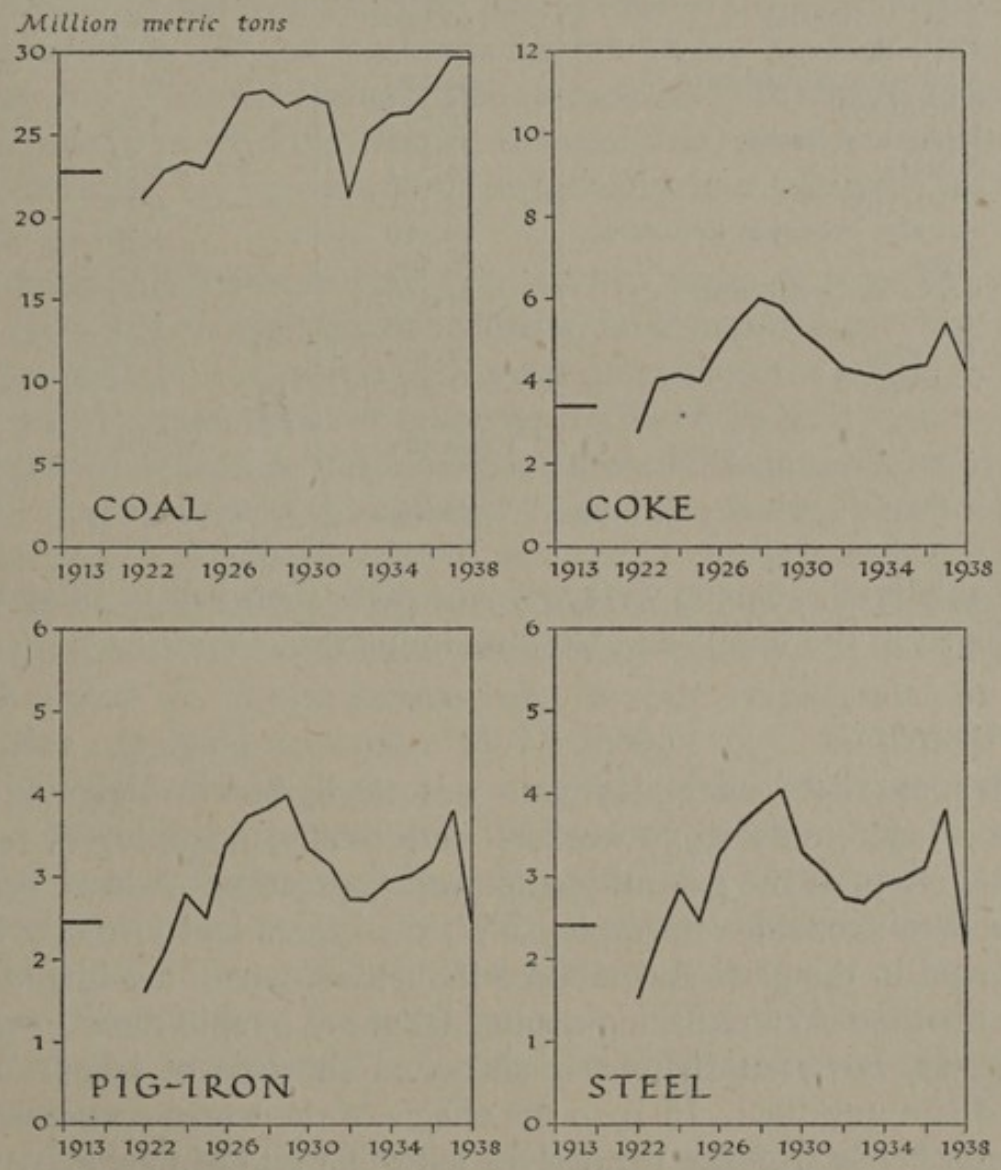


Fig. 74. Graphs showing the output of coal, coke, pig-iron and steel, 1913, 1922–8

Based on statistics in successive volumes of the *Annuaire statistique de la Belgique* (Gand).

The graphs form a rough index of Belgian industrial prosperity; they show the recovery, interrupted by the financial and monetary problems of 1925, to a peak in 1929, then the depression years with the partial recovery therefrom, and finally the depression of 1938.

The following table summarizes the number of workers employed in the various industries, and gives an indication of their relative importance.

Industry	Number employed	Percentage of industrial population
Metallurgy	259,094	16·29
Transport	202,729	12·75
Textiles	187,323	11·78
Mining	175,057	11·01
Building	136,985	8·61
Food industries	109,900	6·91
Clothing	100,993	6·35
Timber and furniture	98,122	6·17
Chemicals	79,233	4·98
Hides and leather	53,558	3·37
Pottery	36,244	2·28
Quarrying	35,141	2·21
Art and precision industries	30,596	1·92
Glass	28,505	1·79
Books and printing	24,316	1·53
Paper	17,748	1·11
Tobacco	13,303	0·84
Fishing	1,557	0·10
Total	1,590,404	100·00

Source: *Annuaire statistique de la Belgique*, p. 196 (Gand, 1939).

Of this total, 294,569 were women; more than half of them were employed in the textile and clothing industries.

Unemployment

Prior to 1930, unemployment was negligible in Belgium. In October 1928, only 3,957 workers were totally unemployed, representing 0·6% of the gainfully employed population. A large part of these were probably 'unemployable', the others had formerly been employed in the glass and tobacco industries, where machinery had for some time been replacing manual labour at a rapid rate. In many industries, however, there was an actual shortage of labour, both skilled and unskilled. In 1930 the effects of the world economic depression began to make themselves felt. The rate of unemployment began to rise alarmingly. The maximum unemployment figure was attained in December 1934, when 213,000 workers, or 27·2% of those gainfully employed, were totally inactive. These statistics refer only to insured unemployed, and would be substantially increased by the inclusion of the uninsured workers. Unemployment was highest in the 'art and precision' group of industries; it was

estimated that over two-thirds of this category were out of work. Pottery, furniture, textile and general metallurgical trades also suffered severely.

Unemployment, together with the reduction of wages forced upon employers by the conditions of world trade, caused considerable social unrest. The Belgian working class had greatly improved its standard of living during the period of prosperity prior to 1929, and it was reluctant to lower this standard. A number of strikes occurred in 1931, but the first really serious one was that of July 1932. A coal strike began in the Mons district and spread to the other coalfields, finally involving 130,000 miners; a further 36,000 workers came out in sympathy. The strike lasted three months, and the serious shortage of coal gravely affected the nation's economic life. Another large-scale strike brought the Verviers woollen industry to a standstill for five months in 1934.

As trade and industry gradually showed signs of recovery after 1935, there was an appreciable reduction in unemployment (Fig. 84). The government, too, proposed a great programme of public works, involving an expenditure of some 3·5 milliard Belgian francs, and the *Office de Redressement économique* was established to supervise the execution of these schemes. Roads, railways and waterways were to be modernized, the distribution of water was to be improved and new plans for housing were to be put in commission. It was estimated in 1936 that these works would give direct employment to 85,000 people, and that they would also substantially increase employment in the industries supplying materials. By December 1936, the totally unemployed figure stood at 131,565 or 14·4% of the working population; further, it was estimated that some 40,000 of these were seasonally unemployed, as the percentage fell to 7 in August, and that another 42,000 were over 50 years of age, many of them indeed being unemployable. By April 1937, the total had decreased to 101,000 and, for the first time for seven years, a lack of skilled labour was experienced in a number of industries—mainly mining, metallurgical and textiles.

In 1936, the government also made determined efforts to deal with the social problems arising out of industrial conditions. To obtain a resumption of work after the widespread strike of 1936, various government measures were drafted; these included provisions for a minimum daily wage for adult workers, a maximum number of weekly working hours, and holidays with pay. The last of these measures was put into effect in July 1936, and in January 1937 the

weekly hours of underground workers were limited to 45. Conciliation boards were set up in various industries to deal with wages and hours of work.

Organization of Industry

In 1930, there were 206,533 active enterprises. Of these, however, 135,702 did not employ any paid labour and were purely family concerns. The remaining 70,831 employed about 1·2 million paid work-people. The following table analyses the industrial enterprises by their number of work-people:

No. of workers employed in each enterprise	No. of enterprises	Total employed
1	22,838	22,838
2–4	24,826	66,303
5–9	9,351	60,064
10–19	5,726	75,943
20–49	4,292	129,123
50–99	1,767	121,442
100–199	1,044	143,248
200–499	710	220,547
500–999	217	150,884
1,000–1,999	42	64,311
2,000 and over	18	133,655

Source: *Annuaire statistique de la Belgique*, p. 195 (Gand, 1939).

Of the eighteen concerns employing over 2,000 workers, five were engaged in mining, five in metallurgical work, three in chemicals, two in textiles and one each in glass manufacture, transport, and art and precision.

The great majority of industrial workers were employed in small or medium-sized concerns, mainly as a result of the extremely varied and highly specialized nature of Belgian industry. The classification into enterprises, however, tends to conceal the increasing tendency of many firms towards integration into large capitalized concerns. The constituent subsidiaries have frequently retained their identity, and are thus still counted as enterprises, but their policies have been subordinated to that of the combine. This feature has been especially marked in the metallurgical and chemical industries. The two largest Belgian firms, the *S.A. d'Ougrée-Marihaye* and the *S.A. John Cockerill*, in addition to their collieries, coke-ovens, furnaces and steel works near Liége, exercise direct or indirect control over a wide range of Belgian and foreign industrial concerns.

This tendency towards centralization has been further exhibited when firms with the same interests voluntarily formed a number of *unions*, *associations*, *groupements*, and *fédérations*. Their primary function is to market the output of the members and so avoid competitive selling, especially in the export field: examples are the *Fédération des Industries chimiques de Belgique* and the *Groupement des Hauts Fourneaux et Aciéries Belges*. Other associations have been set up within the large concerns to guard local interests; examples include the *Union patronale de l'Industrie textile du Courtraisis* and the *Union des Fabricants d'Armes de Liége*.

The interests of Belgian industry as a whole are looked after by the *Comité central industriel de Belgique*, established in 1895. In 1939, this federation comprised some 11,000 establishments, representing the major part of Belgium's industrial life. Acting in close co-operation with the government, it deals with all industrial problems—organization of labour, industrial agreements, taxation, social problems, the export market, customs tariffs, etc.—and it has representatives in most of the world's chief cities. More recently, the *Vlaamsche Economische Verbond* has been set up to represent certain groups in the Flemish areas.

Finally, there were numerous international cartels, which allocated production and export quotas to their members in an attempt to avoid world-overproduction. The most important cartel was the *Entente Internationale d'Acier*, or International Steel Cartel (see p. 314).

Domestic Industry

In 1930, 52,157 people were employed in *industries à domicile*. These domestic workers might be either independent artisans who produce and sell a complete article, or, more usually, artisans employed on a 'piece-work' basis. The numbers have fallen markedly from about 200,000 in 1910, and this decline has occurred in all categories except in the making of clothing, which, as in other countries, employed many tailors and dressmakers in their own homes. The most striking decline was in the production of hand-made lace; this was due to changes in fashion and to the increase in cheaper machine-made varieties. Lace makers still formed the largest individual group, although the total had decreased from 80,000 in 1910 to 9,800 in 1930.

The following table summarizes the returns for the numbers engaged in domestic industries in 1930:

Industry	Men	Women	Total
Metallurgy	1,467	48	1,515
Textiles	1,366	14,004	15,370
Clothing	6,970	13,676	20,646
Timber and furniture	2,119	689	2,808
Leather	2,557	3,004	5,561
Art and precision	4,026	1,076	5,102
Others	415	740	1,155
Total	18,920	33,237	52,157

Source: *Annuaire statistique de la Belgique*, p. 188 (Gand, 1939).

The main groups of domestic workers were found scattered throughout the provinces of Oost- and West-Vlaanderen.

Industrial Regions

Belgian industries are widely dispersed, though with several major regions of concentration; a study of the location factors thus provides some interesting examples.

The earliest industry was located in two main areas: in Flanders, where the textile industries grew up, based partly on local flax growing and partly on the need of an agricultural population for some form of industrial occupation; and in the central belt, where abundant charcoal from the forests, local iron, lead and zinc ores at the surface, water power and Ardenne sheep led to metal and woollen industries, especially the former. Woollen and later silk and cotton industries were attracted to the Flanders region by the body of skilled domestic labour which there accumulated.

The first great change came with the 'Industrial Revolution'—the introduction of the steam engine and the use of coke in iron smelting, both of which placed a very strong emphasis on coalfield location. These developments did not, however, as in Britain, bring about vast changes in industrial location and population distribution. The industries of the centre, it is true, became more concentrated on the Sambre-Meuse trough, with its accessible Coal Measures and ample water supply, but there was no migration of the Flanders textile industries. Mechanization of the latter was slow in developing, and the reservoir of labour—still largely tied to the soil—prevented any serious shift of industry; moreover, since an increasing proportion of the raw materials, especially cotton and wool, had to be imported, the near-coastal situation of the Flanders towns was, if anything, an advantage which helped to offset the distance from coal supplies.

Belgium is thus more evenly industrialized than a brief glance at a geological map would lead one to suspect. The great development of water transport has undoubtedly aided the spread of industry, and the close network of towns in Flanders has attracted a large variety of industries which depend for the most part on imported raw materials. Nearly every large factory is situated on or near a waterway; the only exceptions are found in a few Flemish towns (Mouscron, Ronse, Sint-Niklaas and Zele), at Verviers and in some of the mining towns north of Charleroi (e.g. at Jumet and Lodelinsart). The localization of factories near rivers and canals was conditioned in the first place by the fact that waterways were for a long time the only means of distribution for bulky commodities. The building of a dense railway network did not, as in Britain, deprive the waterways of their importance; water traffic, in fact, increased almost continuously from the 1880's to 1913, and showed a rapid rise once again after the war of 1914–18. The establishment of an increasing number of factories alongside the waterways is at once the cause and the effect of this. Water transport rates are lower than those of the railways, and industrial water supply, as well as a transport medium, is provided by the canals.

The basic industries remain tied to the coalfield, largely by inertia, for all the iron ore must now be imported from Lorraine or from overseas, and most of the non-ferrous concentrates and metal come from abroad. In their turn, however, these heavy industries localize a large number of dependent manufactures, and the concentration of population thus assures a ready market for a host of lighter industries.

On the basis of location factors and types of industry, it is possible to distinguish several industrial regions:

(1) The iron and steel industry, together with a group of 'heavy engineering' and a wide range of lighter metallurgical and chemical industries, is located on the coalfields along the Sambre-Meuse valley from Mons to Liége. A small outlier occurs in the extreme south-east of the country, on the edge of Lorraine, near Halanzy and Athus (Fig. 75). The great industrial towns of Liége (Fig. 76), Charleroi and Mons are each surrounded by numerous satellites, forming sprawling urban areas interspersed with collieries, coke ovens, blast furnaces and foundries (Fig. 77).

(2) The Flanders plain, particularly in the neighbourhood of the rivers Lys, Escaut, Dendre and their tributaries, is the great textile manufacturing region. As a result of increasing mechanization, the

industry has become concentrated within a number of towns, particularly in Gent and to a less extent in Kortrijk, Roeselare, Tournai, Ronse and Aalst (Fig. 83).

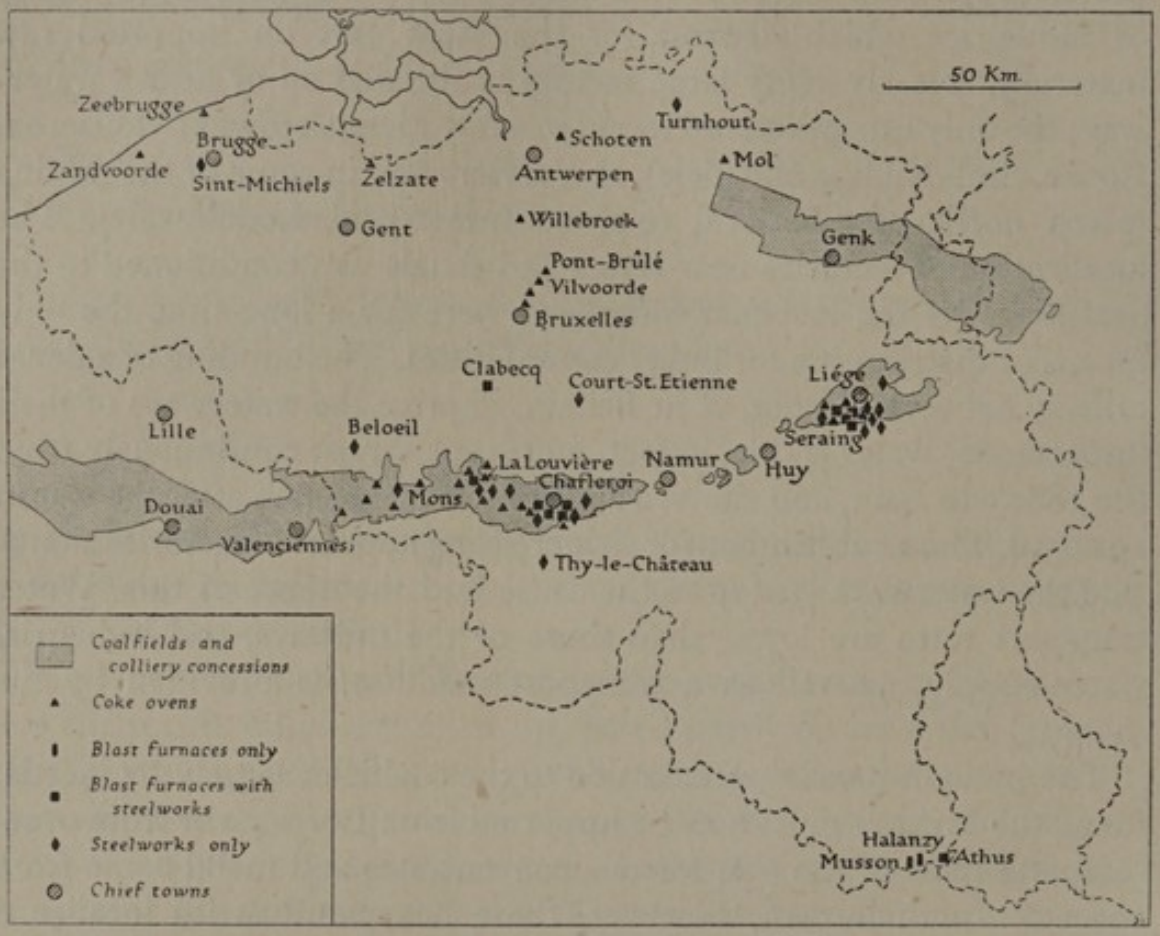


Fig. 75. The Belgian iron and steel industry

Based on the *Carte du Bassin Houiller Belge et des Voies Navigables* (Anvers, n.d.), which shows the boundaries of the southern coalfields, and on the *Annuaire officiel de la Chambre de Commerce d'Anvers*, 1938–9, p. 98 (Anvers, n.d.), which marks the boundaries of concessions in the Kempen coalfield. The locations of the metallurgical establishments were plotted from various sources.
The majority of the blast furnaces and steelworks are in the Sambre-Meuse valley. The two main concentrations are in the Liége and Charleroi areas; the former extends upstream from Liége to Flémalle, and the latter from Châtelet to Monceau. In these two areas blast furnaces, steelworks and foundries succeed one another at close intervals. Outlying smelting centres are in Luxembourg, at Athus, Halanzy and Musson; and at Clabecq, on the Bruxelles-Charleroi Canal, an interesting survival which even antedates the canal. These various districts produce the whole of the pig-iron, 98 % of the raw steel and 96 % of the semi-finished and finished steel. There are several independent steelworks, mostly small and specialized, outside the main areas, as at Mons, Thy-le-Château, Court-St Etienne, Turnhout, Schoten and St-Michiels.

(3) In recent years these two great groups of industries, mining-metallurgical and textile, have been supplemented by new installations along navigable waterways. The lower Escaut, especially in the Antwerpen area, the Rupel, the Willebroek and the Gent-Terneuzen

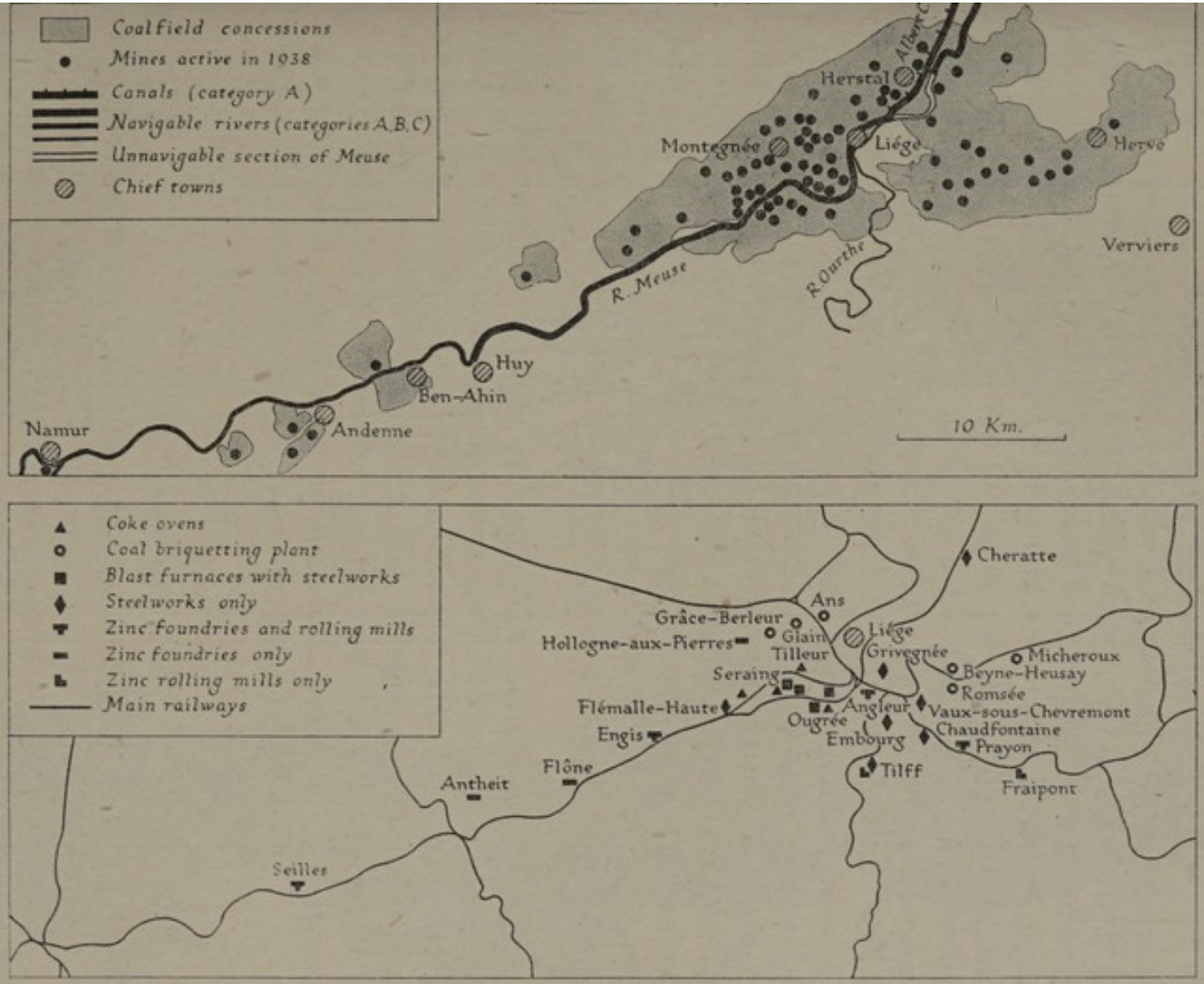


Fig. 76. The Liége industrial region

Based on the *Carte du Bassin Houiller Belge et des Voies Navigables* (Anvers, n.d.), with details of collieries and industrial establishments revised to 1939. The categories of waterways refer to the classification on p. 514.

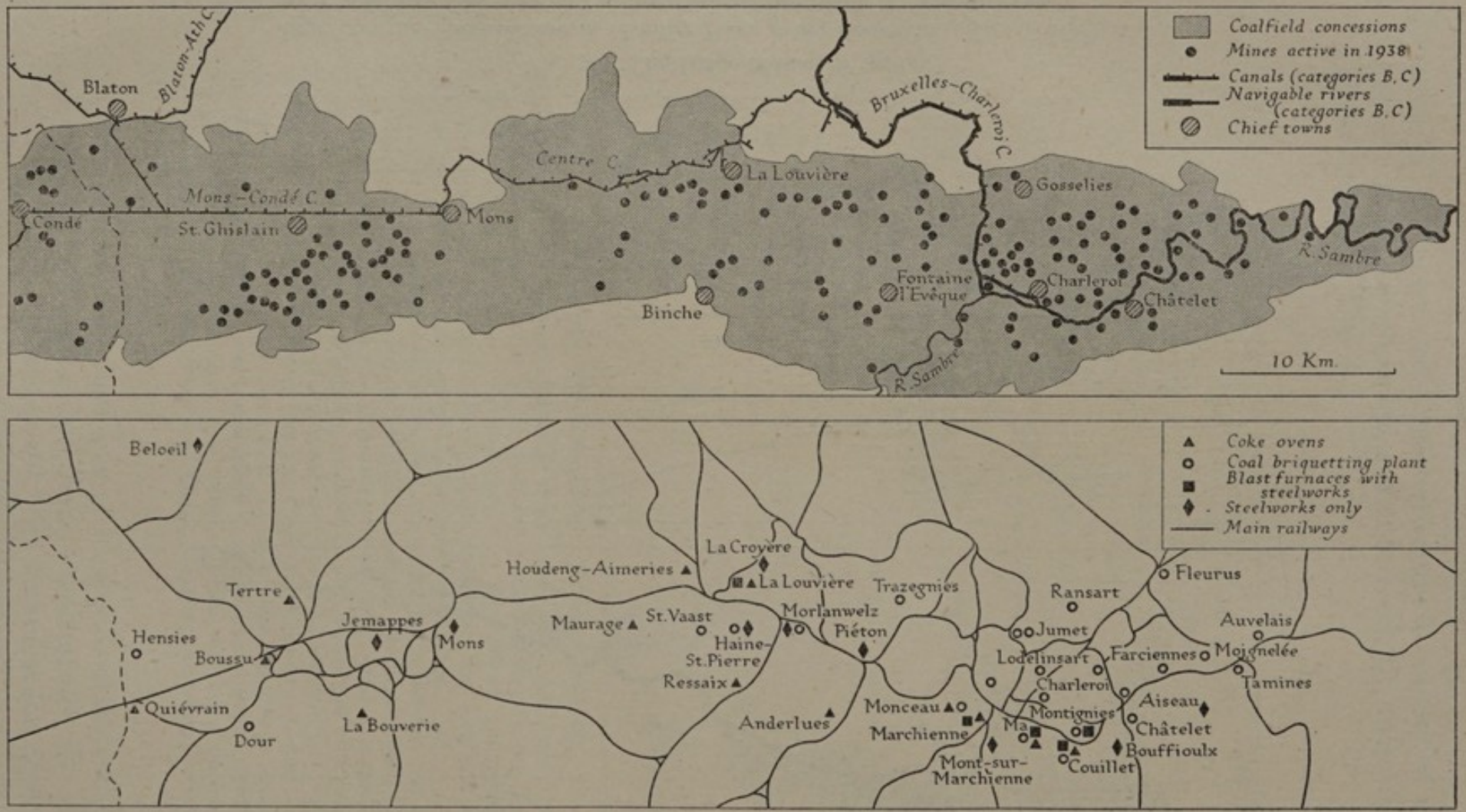


Fig. 77. The Mons-Centre-Charleroi industrial region

Based on the *Carte du Bassin Houiller Belge et des Voies Navigables* (Anvers, n.d.), with details of collieries and industrial establishments revised to 1939.
The categories of waterways refer to the classification on p. 514.

Canals, are lined with industrial establishments such as chemical works, sugar refineries, shipyards, brick works, and glass works. In addition, eleven coke-oven plants, using foreign coal, and producing 31% of the Belgian coke output, are situated in this area (Fig. 75). The Leuven-Dyle Canal, serving a predominantly agricultural region, has flour mills, chemical-fertilizer factories, breweries, etc.

(4) Since the war of 1914–18, the Kempenland has become an important industrial area. Previously there were a few towns with factories such as Turnhout (paper and printing), Herentals (tanneries), Geel and Mol (blankets and cigars), and a few brick works. Numerous factors have played a part in the development of this new industrial region; they include the profitable exploitation of a great coalfield, which since 1917 has helped to eke out the diminishing coal resources of the Sambre-Meuse region, the working of local supplies of clay and quartz sand, and the cheapness of land for new factory sites. The Albert Canal, linking Antwerpen and Liége across the Kempenland, will in due course no doubt be lined with factories. Places such as Oolen, Mol, Gompel, Balen, Lommel, Overpelt, and Kwaadmechelen have developed glass and pottery works, cement works, zinc foundries and rolling mills, and chemical works. New colliery 'towns,' such as those in the commune of Genk, have grown rapidly during the last thirty years (Fig. 78).

(5) Bruxelles is the greatest individual manufacturing centre in Belgium, with a variety of industries such as furniture making, food production, paper and printing, clothing, and light metallurgical industries. Like other large cities, its population provides both labour supply and a great local market (see pp. 592-3). Antwerpen also has many industries, particularly shipbuilding, chemicals, oil refining, flour milling and sugar refining (see pp. 451-3).

Coal, Coke and Gas

In 1938, Belgium produced 29·6 million tons of coal, slightly more than the average of 27 millions for the years 1932–8 (Fig. 74), and it was the eighth world producer. The following figures (in million tons) for 1937 illustrate the relative positions of the chief coal-producing countries:

U.S.A.	448·4	Japan	46·0 (estimated)
Great Britain	244·3	France	44·3
Germany	184·5	Poland	36·2
U.S.S.R.	122·6	Belgium	29·9

World total 1,307·4

Source: *Statistical Year Book of the League of Nations*, 1938–9, p. 141 (Geneva, 1939).

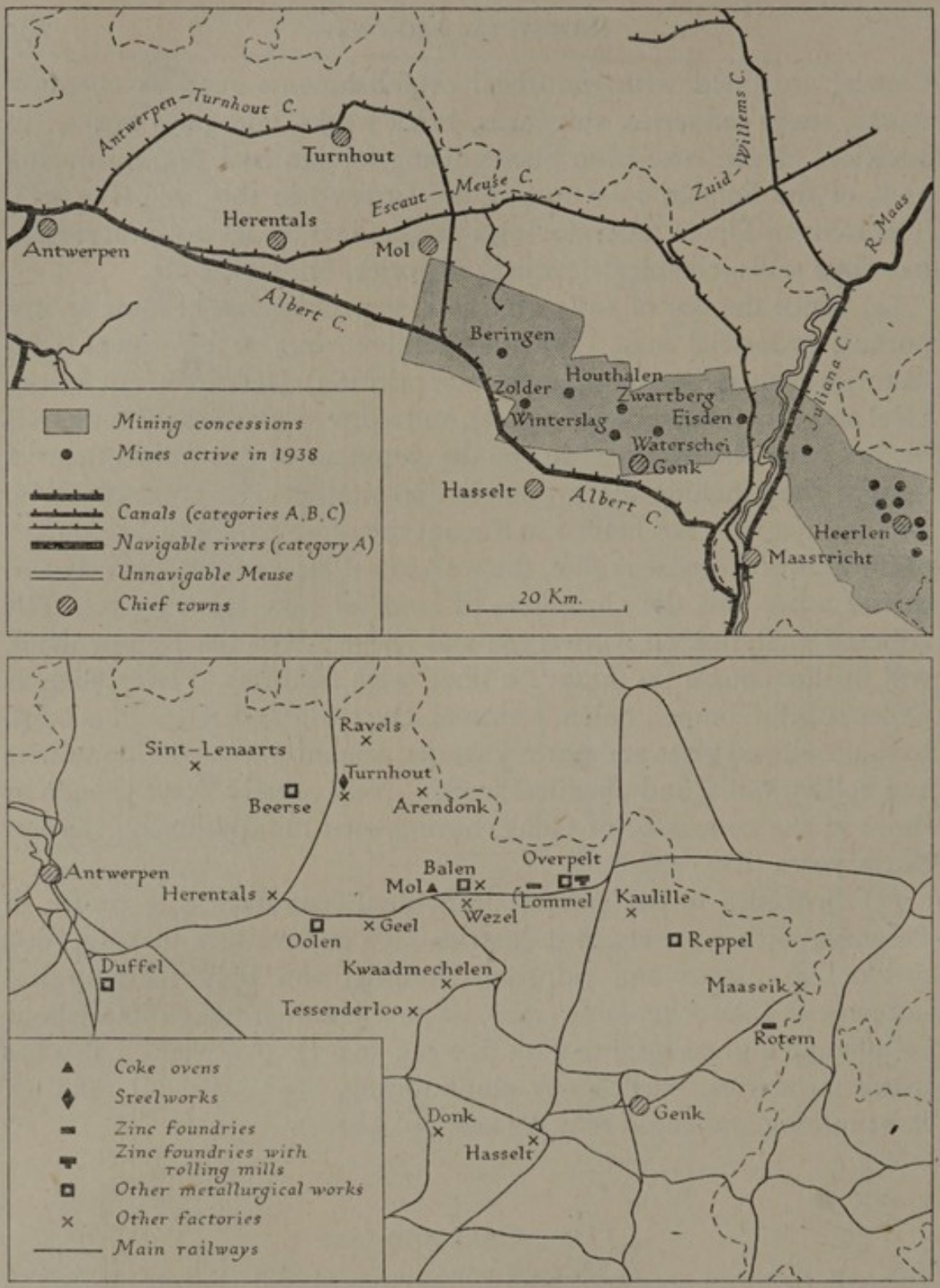


Fig. 78. The Kempenland (Campine) industrial region

Based on G.S.G.S. Series 4183, 1 : 300,000, Railways and waterways of Holland (1942), which gives the details of rivers, canals, railways, etc., and on the *Annuaire officiel de la Chambre de Commerce d'Anvers*, 1938–9, p. 98 (Anvers, n.d.), which marks the coalfield boundaries.

The categories of waterways refer to the classification on p. 514.

The construction of the Albert Canal has made the Kempenland part of the industrial hinterland of Antwerpen; before its completion, the local canals were unable to compete with the Juliana Canal and the canalized Maas, and the region therefore threatened to become part of the hinterland of Rotterdam.

It has been estimated that the coal reserves of Belgium amount to about 11 milliard tons and should enable the 1938 production rate to be maintained for about 350 years.

Although Belgium produces more coal than her actual total consumption considerable amounts are both imported and exported. This trade is due to the fact that a considerable tonnage of steam and domestic coal is produced for which there is no market within the frontiers of Belgium. At the same time, there is a serious shortage of gas and coking coals and of long-flame coals of high volatile content for use in forges. The following table (in thousand tons) summarizes the position in 1937–8 in terms of equivalent tons of coal:*

	Production	Consumption	Imports	Exports
1937	29,654	33,878	10,455	6,698
1938	29,553	28,167	7,098	6,905

Source: C. Demeure, 'L'Industrie charbonnière belge en 1938', in *Bulletin de l'Institut de Recherches économiques*, vol. X, p. 150 (Louvain, 1939).

The imports into Belgium and Luxembourg were mainly from Germany, the exports mainly to France, as shown in the following tables, which give detailed figures for each of the three main classes of fuel:

Imports in Thousand tons

Country	Coal		Agglomerates		Coke	
	1938	1939	1938	1939	1938	1939
Germany	2,428	1,749	46	37	1,544	1,552
Netherlands	797	604	45	52	379	424
Great Britain	667	736	—	—	—	2
France	342	347	2	3	14	6
Poland	249	91	—	—	—	4
Others	11	12	—	—	—	—
Total	4,494	3,539	93	92	1,937	1,988

* It should be especially noted that since Belgium and the Grand Duchy form a customs union, it is often impossible to separate the foreign trade returns for each country. This does not perhaps seriously affect the discussion covering the majority of industries, but in respect of coal and coke, iron ore and iron and steel it does matter a great deal and it is highly important to bear it in mind. Thus, in the above table, the *imports* of coal presumably concern both countries but *exports* really concern Belgium alone.

Exports in Thousand tons

Country	Coal		Agglomerates		Coke	
	1938	1939	1938	1939	1938	1939
France	3,545	2,941	529	215	616	1,019
Netherlands	519	911	27	36	41	52
Others	610	1,236	99	251	547	561
Total	4,674	5,088	655	502	1,204	1,632

Source: C. Demeure, 'L'Industrie charbonnière belge en 1938', in *Bulletin de l'Institut de Recherches économiques*, vol. x, p. 158 (Louvain, 1939).

Imports have decreased considerably since 1929, when 11·4 million tons of coal and 3·4 million tons of coke were imported. Following an exceptionally prosperous year in 1929, depression set in, largely the result of unfavourable conditions in the heavy industries. Stocks quickly accumulated in Belgium and reached a figure of over 3 million tons in 1931. In that year France imposed a quota system on her own coal imports, and this led to increased competition in the Belgian market from cheap German and Polish coal. The Belgian government therefore decided to restrict the import of foreign fuel, and introduced a quota system based on 1930 imports. In 1932 this quota fell to 47% of the 1930 figure. The government retained control over the domestic and foreign trade, and the quota system has safeguarded the interests of Belgian producers. In 1935 was created the *Office national des Charbons*, which possessed the monopoly of the export sale of all coal and patent fuel, and acted as agent for the sale and distribution of coal to domestic, industrial and utility consumers. Similarly, the sale of coke was controlled by the *Office belge des Cokes*.

The production of Belgian coal has remained relatively stable (Fig. 74). In recent years there has been an increase due to the highly industrialized state of the country and to the necessity of maintaining a large export market. Nevertheless, since 1929 the industry has passed through a series of depressions; between 1930 and 1934 the collieries as a whole worked at a loss and many mines closed down, particularly in the Mons region. Since 1934, there has been a credit balance, but this average profit conceals the fact that the industry as a whole has been carrying nearly thirty uneconomical collieries. Indeed, the Belgian mining industry would have presented a very depressing picture but for the rapidly increasing Kempenland output,

where, despite high installation expense, production costs are lower than in the south. The government has sought to help the industry by rail reductions, by direct subsidies, by rigid import and price control, and by setting up several commissions. Nevertheless, in 1939, the Flénu colliery near Mons, one of the largest and most famous in Belgium, was obliged to close down owing to the high costs of production.

The numbers employed in the coal industry fell from 175,000 in 1930 to 131,000 in 1938. In the latter year these workers were distributed as follows:

Coalfield	No. employed
Mons	23,571
Centre	18,381
Charleroi	37,491
Namur	1,847
Liége	28,889
Kempenland	21,330
Total	131,509

Source: *Annales des Mines*, 1938, vol. XL, p. 305 (Bruxelles, 1939).

Of this number there were 25,042 foreigners; Poles, who numbered over 10,000, formed the largest individual nationality (see p. 227).

There are two distinct coal basins, the Sambre-Meuse coalfield (*Bassin Sud*) and the Kempenland coalfield (*Bassin Nord*); the former produces about three-quarters of the Belgian total.

The Sambre-Meuse Coalfield (Fig. 77)

This coalfield is the Belgian portion of an almost continuous series of Coal Measures which stretch westwards from the German frontier near Eupen, along the valleys of the Meuse, Sambre and Haine, and across the French frontier into the departments of Nord and Pas-de-Calais (Fig. 2). Its presence has been proved in the Boulonnais, and it continues into Kent, the Bristol area and South Wales. The coal-bearing strata in Belgium lie in a narrow trough between the Ardenne plateau and the plateau of Hesbaye and Brabant (see p. 2). The total length is about 190 km., the width varies from about 5 to 15 km. While the Coal Measures are relatively continuous, being interrupted only for a short distance east of Namur, five distinct workable areas may be distinguished, namely, Mons or Borinage, Centre, Charleroi, Namur and Basse-Sambre, and Liége (Figs. 76 and 77). The details of the activities of these districts for 1938 are as follows:

District	No. of active collieries	No. of mines	No. of men employed (1,000)	Output (1,000 tons)
Mons	11	38	27·4	4,898·9
Centre	9	26	21·4	4,255·8
Charleroi	27	71	42·4	7,977·1
Namur	5	6	2·2	393·7
Liége	25	52	32·2	5,523·2
Total	77	193	125·6	23,048·7

Source: *Annales des Mines*, 1938, vol. XL, pp. 1051–2 (Bruxelles, 1939).

The strata have been very much disturbed by faulting and overthrusting, especially in the southern part of the field where the older Devonian rocks have been forced over the Coal Measures. At Mons, for example, the same seam is passed through six times by a single shaft in a vertical distance of 340 m. Most seams dip at a high angle. Sometimes the coal is so crushed that it has to be briquetted (see p. 303) or used in thermal-electric generators (see p. 322).

The workable seams are thin, averaging about 0·7 m., but they are numerous. In the Mons area there are 157 seams, of which 120 are between only 0·3 and 0·7 m. thick, and a few over 1·0 m. At Charleroi about fifty seams are worked, the thickest of which is 1·2 m. It is usual in Belgium to work from six to twelve seams simultaneously, in contrast to the working of one or two in Great Britain. The depth at which the workable seams occur varies considerably, but it is generally greater in the west. In the areas around Liége the seams reach the surface, but farther west, near Mons, they are covered by Cretaceous and Tertiary rocks; the mines reach a depth of over 1,000 m. and they are the deepest in the world. There is a certain amount of mechanization, but it is hindered by the thin broken seams; pneumatic picks rather than coal-cutters are used. Again, firedamp is a problem more serious than in any other country. Under all these conditions, then, mining is difficult and expensive.

The number of active pits has declined in recent years following the closing of the less economic pits. The following table illustrates this decline:

Number of pits

	1913	1927	1930	1935	1936	1937	1938
Exploited	271	240	227	171	168	169	168
In reserve	18	19	13	32	30	29	25
Under construction	16	8	5	1	1	—	—
Total	305	267	245	204	199	198	193

Source: *Annales des Mines*, 1938, vol. XL, p. 1049 (Bruxelles, 1939).

The type and quality of coal vary considerably in different parts of the field and even in the same district. Generally speaking, the percentage of volatile matter is higher in the upper strata and on the southern side of the field. Four main varieties of coal are to be distinguished in Belgium:

(i) Short-flame coal and semi-anthracite, with under 11% volatile matter. Known in Belgium as *maigre*, it is used in brick- and lime-kilns, for reducing zinc ore, and for briquetting. This *maigre* coal forms nearly all the deposits of the Namur field.

(ii) Semi-bituminous coal, or *demi-gras*, with about 11–16% volatile matter; this is used chiefly for the production of hard metallurgical coke.

(iii) Bituminous coal, or *gras*, with 16–25% volatile matter; it is used for gas works, for domestic purposes and for steam production.

(iv) Long-flame coals, or *Flénu*, with over 25% volatile matter; they are used in gas works and puddling furnaces, and are found only in the upper strata of the Mons district. Coke ovens are attached to most of the collieries in this area.

The percentage production of the main types of coal in the different mining regions in 1938 was as follows:

Type	Mons	Centre	Charleroi	Namur	Liége
Flénu and *gras*	74·9	50·0	8·5	0	5·5
Demi-gras and *maigre*	25·1	50·0	91·5	100	94·5

Source: *Annales des Mines*, 1938, vol. XL, p. 1053 (Bruxelles, 1939).

The various types of coal are not restricted to any single area. The Mons field has three longitudinal zones; in the south the chief variety is *gras*, in the centre *Flénu* coals extend eastwards into the Centre field; here there is considerable *demi-gras* of excellent quality. The Charleroi field has three zones running from north-west to south-east, with *gras* in the north-west, *demi-gras* in the centre and *maigre* in the south-east. The Namur field is nearly all *maigre*. The collieries near Liége in the Meuse valley produce *gras* from the upper seams, and *demi-gras* from the lower at great depths. On the Plateau d'Ans, in the Herstal basin and on the Herve plateau the coals are *maigre*.

The Kempen Coalfield (Fig. 78)

The Kempen coalfield has been proved westwards for about 80 km. from Dutch Limburg to the neighbourhood of Antwerpen;

about 50 km. of it are in Belgian territory. The coal-bearing strata dip northwards towards the Dutch frontier and are covered by thick deposits of Tertiary and Quaternary series consisting for the most part of waterlogged sands and clays. The field has a proven width of about 30 km. and probably extends much farther at great depths. Twelve collieries were in operation in Dutch Limburg; one was in the Meuse valley, the other eleven on the plateau of Heerlen.

In the Belgian portion of the field, three of the main colliery districts are in the commune of Genk, at Winterslag, Waterschei and Zwartberg. In the east of the basin, overlooking the Meuse valley, is the Limburg-Meuse colliery, near the village of Eisden. In the west is the Beringen colliery, and farther north, near Voort, there are the Helchteren-Zolder colliery and a number of trial bores, at Houthalen, Asch and Zutendaal (Plate 32).

The existence of a valuable coalfield was first suggested in 1867, but it was not until 1901 that the actual presence of coal was proved by a boring near Asch, and workable coal was reached at a depth of 531 m. By 1906, eight concessions covering a total area of 31,000 ha. had been granted to a number of Belgian companies, while the state reserved a further 20,000 ha. The chief problem to be overcome in the early stages was the sinking of deep shafts through waterlogged sediments. The method of shaft-freezing was invented in 1913. The two shafts at Voort were frozen in seven months by a single current of refrigerating fluid, while sinking and lining took a further twenty-four months. The cost of making the shafts averaged about £250 per foot. At Winterslag, freezing began at a depth of 400 m. and went on at a rate of 1 m. a day, while at Houthalen two shafts 5 m. in diameter were sunk through 600 m. of waterlogged strata. At the present time the depth of the shafts in the seven collieries varies between 750 and 1000 m.

The first coal was not raised until 1917. In 1922, 428,000 tons, or 2% of the Belgian total, were obtained; the output had increased to over 3 million tons and 17% in 1932, and to 6·5 million tons and 22·9% in 1938. In 1939 there were nine concessions, covering a total area of 35,000 ha. Seven of these were active, and six were producing coal. The average production of over 900,000 tons per active concession compares very favourably with an average of under 300,000 tons in the southern coalfield.

The coal varies considerably in quality, varying from semi-anthracite to a long-flame coal with more than 40% volatile matter. The latter is well adapted for the pottery and glass industries, and



Plate 31. Mining village near Lodelinsart

Gohissart, between Fleurus and Charleroi, is one of the many mining-villages in the Centre coal basin; it provides an example of the close interweaving of industry and domestic agriculture which is prevalent in Belgium.



Plate 32. The André Dumont colliery at Waterschei, near Genk

The photograph shows one of the new collieries in the Kempen (Campine) coal-field, with pit-head, power station, coal washery, sidings, dump of pit-props and, in the foreground, some of the workers' dwellings which form part of the *cité ouvrière*.

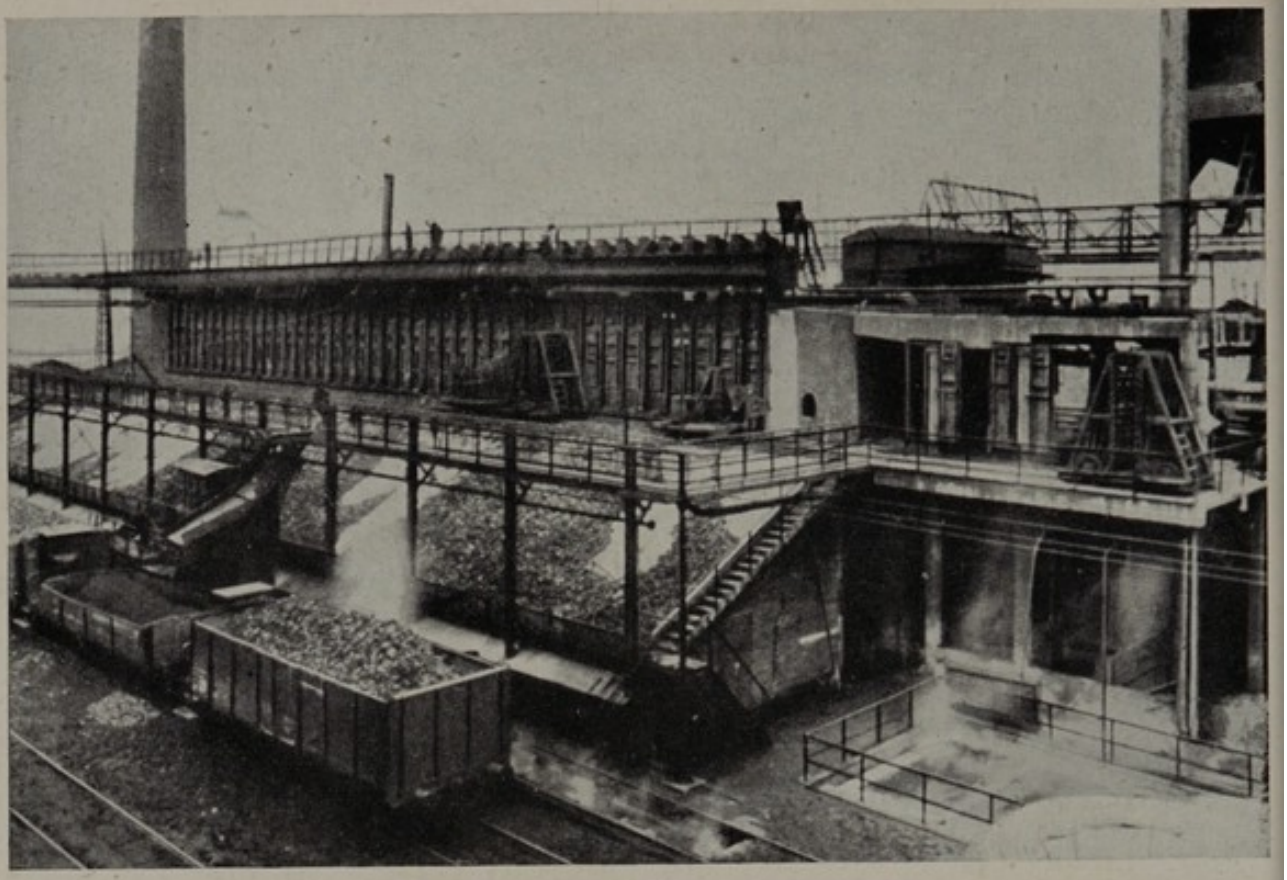


Plate 33. The Kuhlmann coke ovens at Zelzate (Selzaete)

Crushed coal is fired in a battery of 40 closed ovens; when the coking process is complete, the doors of the ovens are opened and the contents are pushed out by a ram and immediately quenched with water. After cooling, the coke is ready to be shot into the waiting wagons.



Plate 34. Quarries at Lessines

Near Lessines, small outcrops of igneous rock are quarried for paving stone, road metal, etc.

for coking. Its use for coking purposes is especially valuable, since coking-coal is scarce in Belgium.

The exploitation of the field has been facilitated by improvements in transport facilities. New railways and sidings have been made by the *S.N.C.F.B.* and by the colliery owners, while the road system also has been extensively improved. The further development of the coalfield was one of the main arguments brought forward in support of the construction of the Albert Canal. The four colliery companies at Winterslag, Zwartberg, Waterschei and Houthalen jointly built the Genk coal-port on the canal above the Genk locks, with branch railways between the port and the collieries; the port has three coal loading bridges and can handle 600 tons a day. At Zolder and Beringen are two small basins, each with a loading bridge. The Eisden colliery has a quay and loading bridge on the Maastricht-'s Hertogenbosch Canal, and in 1939 sent over 6,000 tons of coal by water (see p. 535).

Briquettes and Patent Fuel

The manufacture of patent fuels provides an economic method of using up coal-dust and the small coal which frequently forms a large part of the output from crushed and faulted seams. Modern methods of washing and screening, designed to produce even grades of coal, recover large amounts of this small coal and dust. These are mixed with pitch derived from the distillation of tar, and made either into large briquettes used in thermal-electric generators, in locomotives and in ships, or into 'ovoids', small egg-shaped pieces for domestic stoves.

In 1939, forty-two plants with 111 presses produced 1·7 million tons. Over half of this output came from the Charleroi district at Jumet, Erquelinnes, Marcinelle and Châtelineau; about one-fifth from the Liége district at Ans, Micheroux, Grâce-Berleur and Glain; about one-eighth from the Centre field at Trazegnies, St Vaast and Strépy, and a smaller amount from the Mons field (Figs. 76, 77). Nearly every briquetting plant is situated in the coalfield areas; the chief exception is the plant of the *S.A. Agglomérés du Brabant* at Bruxelles.

Coke (Plate 33)

A large proportion of the coke used in Belgian blast furnaces is produced within the country, but nearly one-third of the coking-coal used is imported. Nearly the whole of the output is metallurgical coke produced in batteries of ovens. Gas-coke is a by-product of the

manufacture of coal gas in retorts at gas works. Except for a small number of municipal undertakings, most Belgian gas is produced in ovens (see p. 305), and consequently the output of gas-coke is small.

In 1938, 2,345,480 tons of coke were consumed in Belgium out of a total of 4,398,520 tons manufactured there from 6,692,910 tons of coal, 71 % of which was Belgian. The imports of coke into the Customs Union totalled 1,937,000 tons, mainly from Germany, while 1,204,000 tons were exported, nearly all to France. The total amount of coke manufactured in Belgium and of imported coke thus came to 6·3 million tons, while the amount consumed in the country and the amount exported totalled 3·5 million tons; the difference of 2·8 million tons gives some indication of the Luxembourg consumption.

Coke is produced at coking plant situated at the pitheads, at plant situated away from the mining areas, usually on waterways, and at metallurgical works. In 1938, twenty-nine individual plants, with nearly 2,000 ovens, were in operation (Fig. 75). The following table summarizes the output by regions:

	Mons district	Centre—Charleroi district	Liége district	Non-mining districts	Total
No. of plants in operation	4	11	4	10	29
No. of ovens	266	662	398	612	1,938
Consumption of coal (1,000 tons)	922	2,023	1,485	2,264	6,694
Output of coke (1,000 tons)	627	1,374	986	1,412	4,399
Output of small coke (1,000 tons)	19	130	100	248	497

Source: *Annales des Mines*, 1938, vol. XL, Table VI (Bruxelles, 1939).

The northern cokeries use about 90% imported coal; the Liége area works on 70% imported coal and the Charleroi area on about 40%. Production in the Mons area is all pithead, while in the Liége area it is all iron works; in the Centre and Charleroi district, about one-seventh is pithead production and the remainder iron works.

The biggest individual plants are at Tertre on the Mons coalfield, owned by the *S.A. Carbonisation Centrale*, with an annual capacity of 1,170,000 tons of coke; at Seraing, owned by *S.A. John Cockerill*, with a capacity of 570,000 tons; and at Ougrée, owned by *S.A. d'Ougrée-Marihaye*, with a capacity of 550,000 tons.

The coke ovens produce large quantities of coal gas, crude and distilled benzol, ammonium sulphate, and other by-products (see p. 326).

Coal gas

The manufacture and distribution of coal gas is centralized in Belgium as in no other country. The gas is produced chiefly by large coking plants, and, as in France, relatively little coal gas comes from retorts at gas works. In 1930, seventy individual concerns supplied gas for domestic consumption, but most of the old gas works have ceased coking on their own account during the last ten years; they purchase the gas for distribution from coking plant. Only 440 communes out of a total of 2,670 have domestic gas supplies, but this number includes nearly all the large cities.

In 1938, the total output of gas was 904 million cu.m., produced regionally as follows:

Region	Output in million cu.m.
Mons coalfield	134·5
Centre-Charleroi coalfield	209·5
Liége coalfield	118·9
Non-mining region	440·9
Total	903·8

Source: *Annales des Mines*, 1938, vol. XL, Table VI (Bruxelles, 1939)

Of this total, 200 million cu.m. were produced and consumed by industrial concerns in their own works. The remaining 700 million cu.m. were used for domestic purposes.

About 100 million cu.m. of the domestic supply were sold directly by the industrial concerns to consumers in the neighbourhood. A further 70 million cu.m. were produced in municipal gas works, such as the *Régie du Gaz de la Ville de Bruxelles* or the *Régie du Gaz de la Ville de Gand*. These two, together with nineteen other small municipal producers, distribute gas by low-pressure mains.

The remainder of the domestic supply, totalling about 530 million cu.m., was distributed by three major companies and a number of smaller concerns. These purchased the gas on contract from various coking plants, and distributed it by high-pressure pipe-lines. *Savgaz* (*S.A. pour l'Achat, la Vente et la Distribution de Gaz*), established in 1931, bought some 65 million cu.m. of gas from industrial concerns near Liége and distributed it in that district. More than a hundred communes, chiefly in West-Vlaanderen with Roeselare as the centre, are supplied by the *Compagnie générale de Gaz et d'Electricité*, with gas produced from the Zandvoorde plant near Oostende. The

Compagnie régionale de Transport d'Energie owns a system of pipelines running from the coke ovens at Zeebrugge via Brugge and Kortrijk to the French frontier at Mouscron.

By far the most important distributor is *Distrigaz* (*Société de Distribution du Gaz*), which operates an extensive high-pressure gas

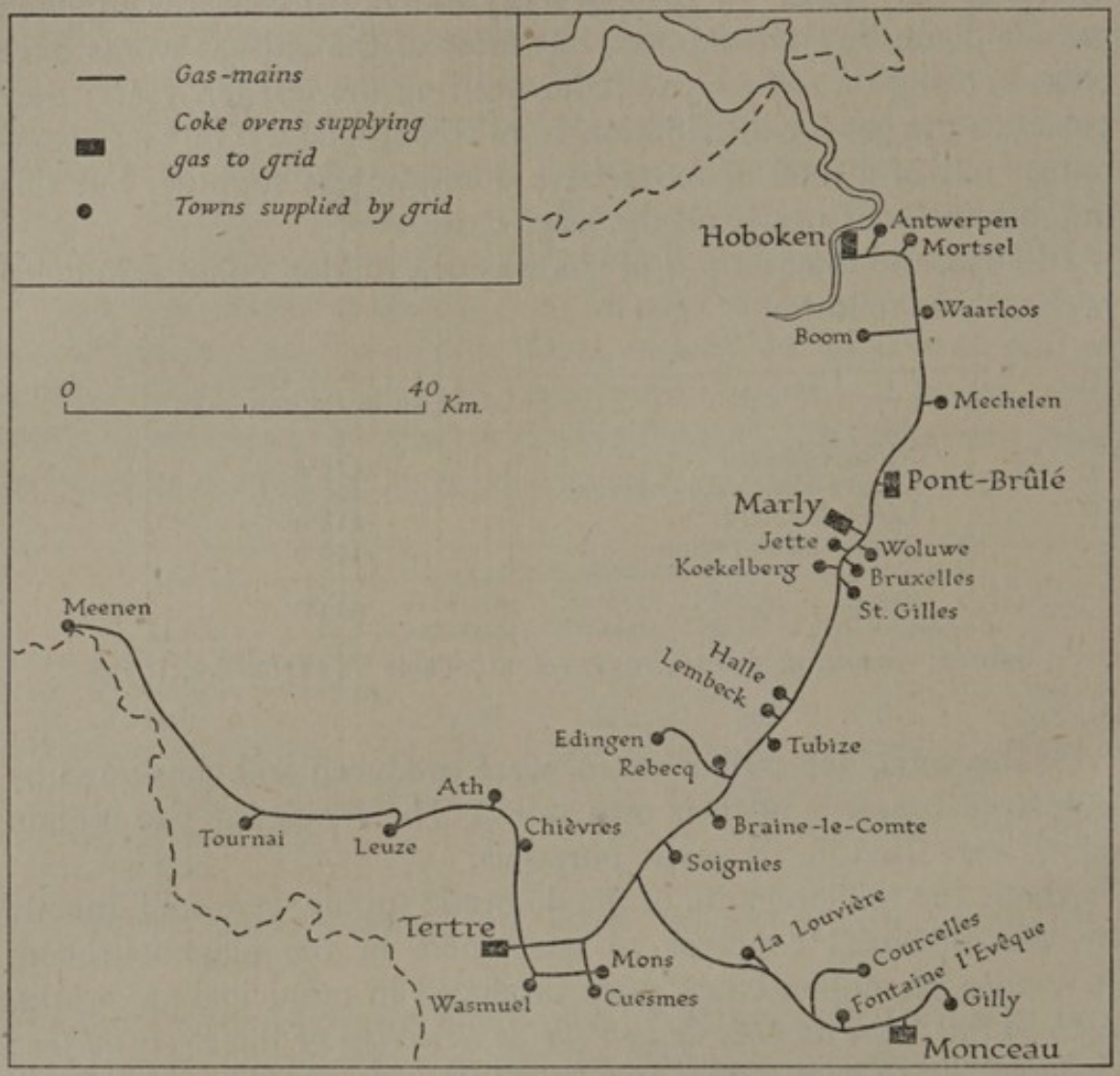


Fig. 79. The Belgian gas grid

Based on a map in *Journal of the Institute of Fuel*, vol. VII, p. 247 (London, 1933–4). The map shows the grid operated in central Belgium by *Distrigaz* together with the coke ovens supplying gas.

grid and distributes nearly half the gas consumed for domestic purposes in Belgium. The only other extensive gas grids in Europe are in the northern coalfield of France and in the Ruhr; the latter deals with only about one-eighth of the amount distributed by *Distrigaz*. The 400 km. length of 500 mm. main built in 1931 together with the coke ovens supplying the gas and the districts supplied by the grid, are shown on Fig. 79. A further length of 250 mm. pipe has been constructed from Tertre via Ath to Tournai and Meenen.

The gas is delivered into the *Distrigaz* grid by five coke-oven works; four of these, situated at Tertre, Monceau, Marly and Hoboken respectively, have been built primarily for the production of metallurgical coke, with gas as a by-product. Nearly three-quarters of the total gas put into the grid is produced by the *Cokeries du Brabant* at Pont-Brûlé, which function primarily as a gas works. Coke and various by-products are also produced here.

Throughout the area supplied by the grid, the price of gas has naturally been affected by the conditions regulating the sale of coke to industrial undertakings and to domestic consumers.

Quarries

As a result of the varied geological structure of Belgium, a wide range of materials can be quarried. On the northern edge of the Sambre-Meuse valley there are extensive outcrops of soft Cretaceous limestones, while along the sides of the valley there are the interbedded sandstones, shales and slates of the Coal Measure series. The northern part of the Ardenne consists of massive hard limestones, the southern part of slates. These old hard rocks are covered in the north and west of the country by unconsolidated sands, clays and gravels, or by soft friable sandstones, but occasionally they crop out along valleys which have been cut down through the newer overlying rocks.

In 1938, there were 918 quarries in operation varying from large slate mines to shallow surface excavations. They were distributed as follows:

Province	No. of quarries
Brabant	33
Hainaut	296
Liége	228
Limbourg	42
Luxembourg	50
Namur	269
Total	918

Source: *Annales des Mines*, 1938, vol. LX, Table V (Bruxelles, 1939).

The province of Hainaut produced more than half of the total value of quarry products.

Slaty rocks outcrop over much of the Ardenne, but purple roofing slate of high quality is found in a few localities, notably in the neighbourhood of Vielsalm and Oignies. Some 20 million pieces of roofing slate were produced in 1938.

Hard massive limestones and marbles, mainly of Devonian and

Carboniferous age, occur widely along the Sambre-Meuse valley, particularly near Dinant, and in the Ardenne, and more locally along the upper valleys of the Dendre, Senne and Dyle. At Ecaussinnes and Soignies limestone is worked in huge quarries, where it is known as 'petit granit'. Limestone forms the chief Belgian source of cut building stone, while the ornamental marbles have a European reputation. The quarry waste is used for the manufacture of lime and cement, and for ballast and road material.

Porphyritic rocks occur as isolated dikes and masses in the upper valleys of the Senne (there are large granite quarries at Quenast) and of the Dyle, and in the Sambre valley near Namur. These hard rocks are used primarily as setts for road making, and to a limited extent as building stone (Plate 34).

Dolomitic limestones occur in the Carboniferous and Devonian series, mainly in the neighbourhood of Namur. They are quarried for the manufacture of bricks used in the lining of basic steel furnaces.

Phosphatic limestones, used in the chemical industry for the manufacture of fertilizers (see p. 327) and as a flux in blast furnaces, are found along the Meuse valley between Liége and Namur and along the Haine and Senne valleys.

Sandstones of Upper Carboniferous and Devonian ages occur along the Sambre-Meuse valley and also in the Ourthe and Amblève valleys. These consolidated sandstones form a useful source of building material. Tertiary sandstones are also used locally as building stone although they are not usually sufficiently consolidated.

Clay for brick and tile making (see p. 333) is found widespread in the coastal plain, along the river valleys and in the Kempenland. The most important area is that near the Rupel-Escaut confluence, especially near Boom, where clay is mechanically excavated in great open workings. Clay is also used in the manufacture of Portland cement (see p. 330).

Other quarry products include kaolin near Namur and Dinant, refractory clays used for fire-bricks near Namur and Mons (see p. 333), glass-sands north of Charleroi (see p. 331), and moulding sands in the Haine and Senne valleys for use at the furnaces.

Iron and Steel Industry

The iron and steel industry in Belgium has a long history, with documentary evidence from the thirteenth century. The general distribution has shown a remarkable stability for many centuries, though the

location factors and the actual siting of the industry have changed in detail; the two areas concerned are the central Sambre-Meuse belt of country, and the Lorraine scarplands of the south. Both locations were based on local ore and on the abundant forest wealth—especially beech, which makes the best charcoal. In the south, mainly in what is now the Grand Duchy of Luxembourg, bog iron ores, dug in the main river valleys, were used. In the centre, bedded haematites occurred in the Middle and Upper Devonian series near the outer edges of the belt of intense folding, i.e. north of the Namur syncline and in the Chimay region; limonite in veins occurred widely in the Devonian and Carboniferous Limestones of the Dinant synclinorium. Early furnaces were located on hill-sides, to get the benefit of wind-blast; the use of water-driven bellows and hammers led the industry to the valley bottoms, especially those which crossed or followed outcrops of iron ore, such as the upper Sambre, the Eau d'Heure, the Ourthe, the Beaumont and many others. Transport difficulties kept the furnaces tied to the ore deposits, but forges, using coal fires and water power, developed on the coalfields of the Sambre-Meuse valley, and Liége, for example, was one of the most important armament centres in Europe.

A new localizing factor was introduced in 1827 when, nearly seventy years after their introduction in Britain, the first coke-burning blast furnaces were erected at Seraing (Liége) and Hauchies (Charleroi). Their success was immediate, and there was a rapid concentration of the smelting industry in the Liége and Charleroi areas of the coalfield, mainly on river banks where water supply and transport were available. The concentration was not wholly advantageous, for ore was now more difficult to obtain, and very few of the coal seams yielded good coke; but the coming of the railway soon alleviated these troubles, and the stimulation provided by the railways as a market for iron products sent output leaping upwards. The older smelting areas, however, did not immediately fade out; on the one hand, charcoal smelting continued until 1851 (it had virtually ceased by 1800 in Britain), and on the other hand, coke-using furnaces were set up on old charcoal furnace sites. But the coalfield concentration was complete by the fifties.

The next trouble was the approaching exhaustion of the Belgian ores. A maximum output of about 850,000 tons a year was reached in the sixties, but the decline was rapid after 1880, and it was just at this period, too, that economic difficulties due to the substitution of steel for wrought iron began to be felt.

Meanwhile, in Luxembourg, both charcoal and ore supplies had practically given out by the middle of the century when the discovery of the 'minette' ores in the Jurassic rocks of the scarplands opened up vast new possibilities. The first coke-using furnace to smelt these ores was erected at Esch-sur-Alzette (in the Grand Duchy) in 1870, and numerous others followed, both in the Grand Duchy and in the adjacent part of Belgium, during the next thirty years. All lay within or on the edge of the orefield, and were served by railway lines—an absolute necessity by reason of the need for importing Ruhr or Saar coal and coke.

Thus the early years of the twentieth century witnessed a Belgian iron and steel industry in the Sambre-Meuse region, deprived of its basis of local ore, having to import much of its coke also, and thus depending for its continued existence simply on the momentum created by the existing plant and labour supply, and on rail transport which provided it with its raw material and exported its finished products.

The war of 1914–18 brought the industry to a standstill and destroyed most of its plant; but this was perhaps a blessing in disguise, for it enabled the industry to rebuild completely, aided by reparations in cash and kind, on the most modern lines, and so gave it a great competitive power in world trade. Thus Belgium became one of the world's chief exporters of iron and steel, sending abroad over two-thirds of its raw and semi-finished steel output and even higher percentages of certain finished products such as nails and wire.

The following table indicates Belgium's relative position in world iron and steel production in 1937 (in million tons):

Country	Iron ore, estimated iron content	Pig-iron and ferro-alloys	Steel ingots and castings
Belgium	0·1	3·8	3·9
Luxembourg	2·2	2·5	2·5
France	11·5	7·9	7·9
Germany	2·7	16·0	19·4
Great Britain	4·3	8·6	13·2
U.S.A.	37·3	37·1	51·4
U.S.S.R.	—*	14·5	17·8
World	98·0	104·0	135·0

Source: *Statistical Year Book of the League of Nations*, 1938–9, pp. 145–7 (Geneva, 1939).

* Statistics not available.

The present distribution of the iron and steel industry is shown in Fig. 75. The 'iron and steel industry', as generally understood, involves

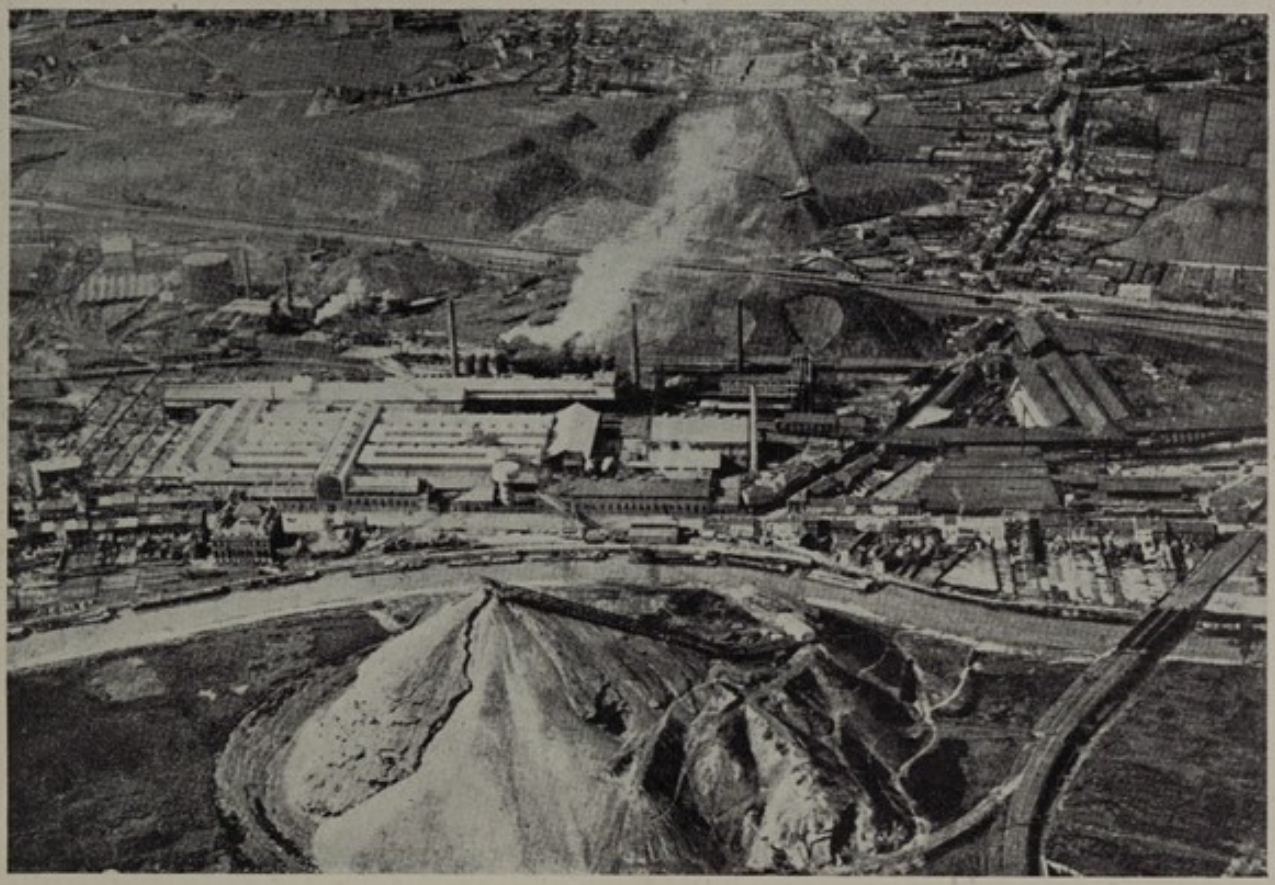


Plate 35. The *Providence* iron and steelworks at Marchienne-au-Pont
These works enjoy both rail and water transport; the blast furnaces with their attendant steelworks are placed alongside the canalized Sambre. The slag heap, fed by an aerial ropeway across the canal, is a conspicuous feature in the foreground.

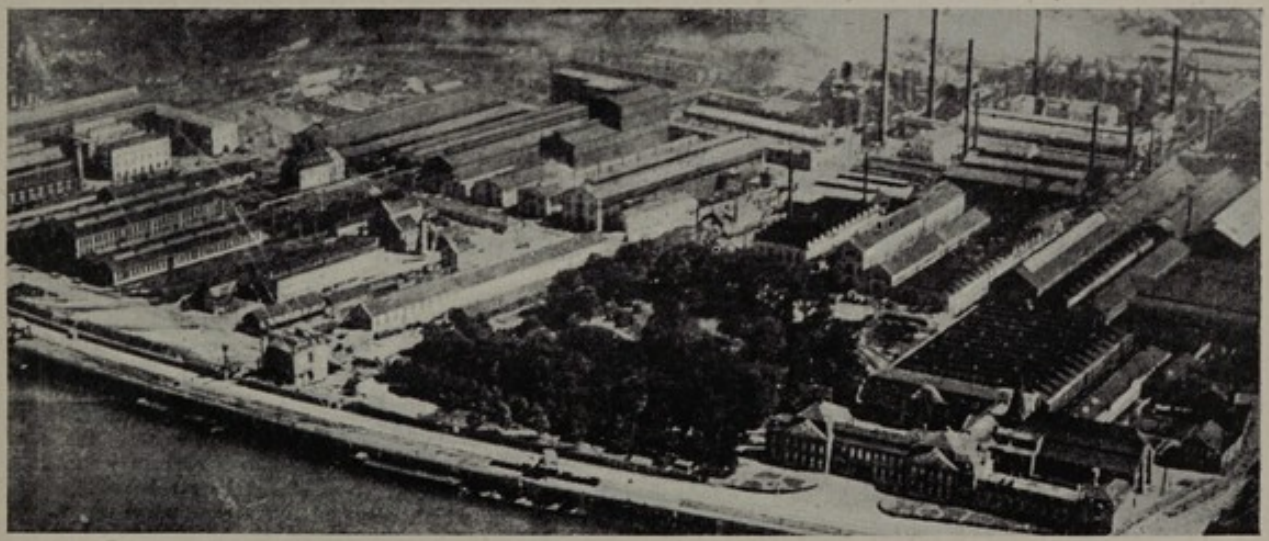


Plate 36. The *Cockerill* works at Seraing
The metallurgical and engineering works of John Cockerill cover an extensive area on the right bank of the Meuse, south-west of Liége.



Plate 37. The *Fabrique Nationale* at Herstal

The *Fabrique Nationale d'Armes de Guerre* is situated at Herstal, north-east of Liége.



Plate 38. The *Interescaut* power station

This large power station is situated on the banks of the Escaut (Scheldt), near Rupelmonde, and supplies power to the Antwerpen area.

four related groups of industries: (i) iron-ore mining or quarrying; (ii) the smelting of ore in blast furnaces to produce either pig-iron or molten iron for transfer to steelworks; (iii) the manufacture of raw steel in converters, in open-hearth furnaces or by other special means, from molten iron, pig-iron and scrap; (iv) the working up of iron and steel into finished products, processes known collectively as 'engineering' and including a number of special branches such as shipbuilding, marine engineering, locomotive and rolling stock building, aircraft manufacture, etc. These are described on pp. 317-20.

Iron Ore

The production of iron ore in Belgium is small. The limonites and haematites of the central belt are either exhausted or economically unworkable. A little iron is obtained from the bog-ore, or *minerai de prairies*, of the Kempenland. There the decomposition of ferruginous sands has produced a thin horizontal layer of ore, containing some 30% of iron. A very small part of the great 'minette' field, which contains the most important bedded ironstone deposits in Europe and on which depends the steel industry of Lorraine, Westphalia and the Grand Duchy, extends into Belgium in the extreme south. The Belgian part, which gave rise to the furnaces and steel works at Musson, Halanzy and Athus, is now almost exhausted. All these minor sources produced only about 176,000 tons of ore in 1938, a very small proportion of the Belgian consumption of 6·2 million tons.

The greatest part of the amount of iron ore imported into Belgium consists of phosphoric ores, brought chiefly from France. Haematite is imported from Sweden and Algeria, while a small amount of magnetite comes from north-western France. In addition, Belgium has to import all the manganese ore required for use in steel production.

Pig-iron

The output of Belgian pig-iron during the last two decades is shown on Fig. 74.

With one exception, situated on the Bruxelles-Charleroi Canal at Clabecq, the blast furnaces are situated on the Sambre-Meuse coalfield (Fig. 75). Fifty-one furnaces, owned by fourteen concerns, were in existence in 1938. Twenty-eight furnaces in the Charleroi district produced 1·3 million tons, while fifteen near Liége had a total of 0·5 million tons and the seven furnaces in Luxembourg province produced 0·3 million tons. The only furnaces which exist independently

of steelworks are those at Halanzy and Musson in Luxembourg; most of their pig-iron output is bought by the *S.A. d'Angleur-Athus* at Athus. The Charleroi and Liége works for the most part do not actually produce pig-iron at all, for the iron from the blast furnaces is transferred to the steel works while still in a molten condition.

Only a very small proportion of the raw-iron output is transformed into cast iron and wrought iron. Less than 50,000 tons of wrought iron were produced in 1938, mainly at Clabecq, Marchienne-au-Pont and Haine-St Pierre; the iron castings output was about twice this amount.

Steel (Plate 35)

The steel output approximates closely to that of pig-iron, being usually very slightly greater (Fig. 74). In this Belgium resembles France and Luxembourg, the two other countries which mainly use Lorraine ore, and differs from Germany and Britain, where the technique of the industry is different. In the two latter countries the open-hearth (Siemens-Martin) furnace, fired by producer gas and employing large quantities of scrap, dominates the steel industry, so that the steel output is substantially greater than that of pig-iron. In Belgium and her neighbours, however, the basic Bessemer or 'Thomas converter' is employed almost exclusively. Furnaces lined with basic material—usually dolomite—are necessary because of the phosphoric character of the Lorraine ore, and the converter is a quicker method of producing steel and withal less expensive in fuel, for it consumes almost none. It is perhaps surprising that a coalfield smelting region with an abundant source of scrap in the engineering industries should continue to use the Thomas converter; but conservatism based on many decades of use (since the 1880's) and the poor quality of much of the coal doubtless form part of the explanation. It must be remembered, too, that smelting costs are high owing to the necessity of importing all the ore and much of the coke, so that steel-making costs must be reduced to a minimum. Thomas steel is less easy to control in quality than Martin steel and is generally of a mild character; accordingly it finds its employment—largely outside Belgium—in 'crude' steelwork such as plates, girders and tubes. There is a substantial import—approaching half a million tons every year—of raw and semi-finished iron and steel products into Belgium, no doubt of different and finer qualities.

The bulk of the 'composite' works (that is, combined iron and steel plants) of the Liége and Charleroi areas produce Thomas steel,

though there are some open hearths at Liége. The greater part of the output of the independent steel works, e.g. Bois d'Haine and Marchienne-au-Pont, is from open hearths, for these works depend not on Lorraine ore, but on imported iron and scrap. There is a small output, mainly at Liége, of electric steel, chiefly high-grade tool and alloy steel; while the independent steel foundries produce small quantities of special steels in small converters.

The distribution by provinces of the various types of steel-producing units attached to blast furnaces together with the output of raw steel in 1938 was as follows:

Province	Active mills	Thomas converters	Open-hearth furnaces	Electric furnaces	Ingots (1,000 tons)	Castings (1,000 tons)
Hainaut and Brabant	7	28	5	3	1,103·8	8·6
Liége and Luxembourg	5	20	14	5	1,008·2	9·9
Total	12	48	19	8	2,112·0	18·5

Source: *Annales des Mines*, 1938, vol. XL, Table IX (Bruxelles, 1939).

A further 100,000 tons of steel ingots are produced at the four independent steelworks.

The working of raw steel into 'semi-finished' or 'finished' forms is carried on at mills, nearly all of which are owned by the large combines, and are situated adjacent to the coke ovens, furnaces, and steelworks, as at Seraing, Ougrée, Montignies-sur-Sambre, Marchienne-au-Pont and Clabecq. Twenty-two mills are not attached to steelworks, and purchase ingots elsewhere. Most of them are situated in the Hainaut-Liége industrial area, but one notable firm, the *S.A. des Laminoirs d'Anvers*, has its rolling mills at Schoten.

Organization of the Iron and Steel Industry

The iron and steel industry of Belgium is dominated by a small number of great industrial organizations, the ramifications of which extend throughout the whole industrial sphere. Where smaller companies exist, they are usually subsidiaries of larger combines. In fact, three-quarters of the Belgian steel output in 1938 was produced by five organizations.

An example of this type of vertical combine is the *S.A. d'Ougrée-Marihaye* (Fig. 80) which has coal mines at Marihaye, and coke ovens,

furnaces and steelworks at Ougrée. The *S.A. John Cockerill* of Seraing (Fig. 80) owns collieries, coke ovens, seven blast furnaces, steelworks with five Thomas converters, four Siemens-Martin open-hearth furnaces, three electric furnaces, and nine rolling mills (Plate 36). Other great concerns include the *S.A. Métallurgique de Sambre-et-Moselle* at Montignies-sur-Sambre and Châtelineau, the *S.A. d'Angleur-Athus* at Sclessin, Grivegnée and Athus, and the *S.A. Métallurgique d'Espérance-Longdoz* near Liége.

The organization of the iron and steel industry on almost monopolistic lines has made it possible for great sales organizations to control the national market. The most important of these is the *Comptoir de Vente de la Sidérurgie belge* (*Cosibel*) formed in 1933. Its purpose is to allot orders to Belgian producers, both for internal sales and for export through the International Steel Cartel, of which Belgium has been a member since its foundation in 1926.

Non-Ferrous Metals

Except for small deposits of lead and zinc ores, Belgium is very poor in non-ferrous metal ores. The Belgian Congo, however, supplies considerable amounts of copper, especially from the Katanga region. There is a large import of other ores and, although the outstanding item is zinc, a wide range of base, precious and rare metals is refined. Part of this output of non-ferrous metals is used by the home electro-metallurgical and chemical industries, by the engineering industry, and for the production of high-grade steels. A considerable proportion of the output is exported; for example, Belgium is the main supplier of the international zinc market.

Zinc

Belgium in 1938 ranked next to the United States of America in the production of spelter (raw zinc metal); the output was 201,000 tons, about half that of the U.S.A. and one-seventh of the world total. Up to 1935, Belgium was the leading member of the *Entente Internationale des Producteurs de Zinc*. This cartel, however, did not include the U.S.A., the U.S.S.R., and Japan, and in December 1934 the agreement was denounced by the members. Belgium especially was satisfied with regaining liberty of action, and her financial interests in zinc-mining in other countries remain widespread. Thus, the *S.A. Mines et Fonderies de Zinc de la Vieille-Montagne* owns a number of zinc mines in Sweden, Great Britain, Sardinia and North Africa.

Up to 1875, the zinc industry had been dependent on deposits of ore found near Liége. In recent years most of the ore has come from near the German frontier between Verviers and Aachen. The chief mines are located at Moresnet, Montzen, Lontzen, Welkenraedt and Bleyberg; some mining was carried on in 1938, but only about 25,000 tons of the total consumption of 376,000 tons were home produced. Formerly a string of small mines was worked along the Meuse valley from Sclaigneaux to Angleur, and in 1938 there were zinc works still active near some of these old mines. In 1938 Belgium imported 537,200 tons of zinc concentrates chiefly from Mexico, Scandinavia, Jugoslavia, Canada, and Australia.

There are two main groups of zinc-smelting foundries. The first is situated in the Liége district (Fig. 76); the second and more recent in the Kempenland and on the Rupel (Fig. 78). The foundries of the second group were erected where land was cheap and where poisonous fumes would be least harmful; ore can be easily imported through Antwerpen and distributed by waterway.

In 1938, the Liége area produced considerably more than half the total zinc production as shown in the following table:

	Liége group	Kempen and Antwerpen areas	Total
No. of active plants	7	4	11
No. of ovens	94	34	128
Spelter production (tons)	129,220	72,510	201,730

Source: *Annales des Mines*, 1938, vol. XL, Table XII (Bruxelles, 1939).

The rolling mills for the production of sheet zinc, with the exception of one at Overpelt in the Kempenland, have remained in the Liége area. In 1938 nine active plants produced more than 50,000 tons of sheet zinc.

Other Metals

The following table summarizes Belgian production of other non-ferrous metals in 1938; it is not possible to differentiate between individual metals in the last two items:

Copper—black	81,460 tons
Copper—refined	125,450 tons
Lead—'worked'	6,150 tons
Lead—'merchantable'	88,020 tons
Silver	369,500 kg.
Fine gold, platinum and palladium	18,150 kg
Nickel, tin, antimony and cadmium	12,510 tons

Source: *Annales des Mines*, 1938, vol. XL, Table XII (Bruxelles, 1939).

As in the case of zinc, and for the same reasons, the various smelting and refining works are situated in the neighbourhood of Liége, in the Kempenland or near the estuary of the lower Escaut. The industry is controlled by a small number of firms, most of which are primarily zinc producers. Thus the *S.A. Mines et Fonderies de Zinc de la Vieille-Montagne* has factories at Balen producing refined lead, silver arsenic, copper and cadmium. The *Société générale métallurgique* produces copper, silver, gold, platinum and palladium at its refineries at Hoboken, Oolen and Reppel; at Hoboken there is also an electrolytic copper refining plant in operation.

Using matte (smelted but not refined metal) from the Belgian Congo, produced by the *Union minière du Haut Katanga*, the plants at Hoboken, Hemiksen, Beerse and Oolen increased their output of refined copper from 9,000 tons in 1927 to 125,000 tons in 1938. Lead is produced by most of the zinc firms; 107,000 tons of lead ore were imported in 1938 from many different sources, including Jugoslavia and Bolivia. An outstanding item was radium refined from Congo pitchblende at Oolen; a by-product was uranium oxide used in high-grade steel production. Although no official figures are published, it is estimated that the annual output of radium from Oolen varies between 50 and 60 gr. Belgium is the world's second producer of cadmium, worked chiefly at Balen. Other important metals are nickel, refined at Duffel, antimony at Beerse and tin at Hoboken.

Engineering Industries

A considerable number of Belgian establishments, using raw and semi-finished steel as well as many non-ferrous metals and diverse raw materials, are concerned with the manufacture of a wide range of finished metallurgical products; this is known collectively as the 'light and heavy engineering' industry. The output includes steel castings, boilers, girders, bridges, locomotives and rolling stock, machinery of all kinds, steam, electric and Diesel engines, armaments, aircraft, machine tools, electrical apparatus, nails and screws, nuts and bolts, and many other items, large and small. For many years Belgian firms have done pioneer work in many branches of the engineering industry.

In general, the heavier industries are located in the Centre, adjacent to supplies of raw steel and fuel. The lighter industries, which require less raw material, have spread in recent years from the central coalfields to the neighbourhood of Antwerpen and the Escaut

estuary, to Bruxelles and to the Kempenland. For example, for many centuries the whole Belgian output of wire and nails came from Fontaine-l'Evêque and Anderlues near Charleroi, but in recent years new factories have been established at Hemiksem, Gentbrugge and Vilvoorde.

Very few of the larger towns are without one or more of these light engineering industries. The most important are the satellite towns in the neighbourhood of Charleroi and Liége, and Antwerpen and Bruxelles; the last two have become increasingly important in the past twenty years for the electrical and radio industries.

Locomotives and Rolling Stock

The first Belgian railway locomotive was built in the Cockerill works at Seraing in 1835 (see p. 474); since that date the locomotive and rolling stock builders of Belgium have achieved a considerable international reputation, and the country has produced a number of well-known engineers. Walschaert in 1844 invented the valve gear which bears his name and which is in wide use throughout the world. Belpaire, confronted with the problem of using the fine dusty coal, which is so characteristic a product of the Belgian coalfields, in locomotives which had to negotiate the switchback Luxembourg line, was led in the 1870's to invent the flat-crown firebox, a device now in almost general use on many railway systems. More recently, the engineer Flamme has been a pioneer in the use of the superheater and a protagonist of simple as against compound engines. During the past twenty years Belgium has exported half her total output of locomotives and rolling stock, representing about a tenth of those entering world markets. In 1939, there were nine firms engaged in the construction of main-line locomotives, with a total annual capacity of about 300, and ten other firms were engaged in the building of smaller types. The largest modern types are built by the *S.A. John Cockerill* at Seraing and by the *S.A. Usines métallurgiques du Hainaut* at Couillet. There are other works at Tubize and Haine-St Pierre.

Eight concerns make electric locomotives and railcars. Only a small length of the Belgian main-line railway net is electrified (see p. 487); most of the output was for export or for the use of the local railways (*S.N.C.F.V.*). The largest individual firm is the *Ateliers de Constructions électriques de Charleroi*, but there are other works at Couillet, Tubize, Haine-St Pierre, Sclessin, La Croyère and Marcinelle. Most of these works also make small Diesel locomotives;

Tienen, in addition, has important works. The chief maker of rail-cars is the *Société d'Electricité et de Mécanique* at Gent.

In 1939, there were about thirty wagon and carriage makers with an annual output of about 40,000–50,000 units, including passenger coaches, and many types of freight wagon. The largest factories, each producing over 5,000 units a year, are situated, with a single exception, at St Michiels, in the heavy industrial area, at La Croyère, Nivelles, Tubize, Haine-St Pierre and Famillereux. Smaller concerns are scattered in the Centre with a few others in widely separated places, such as Leuven, Lot, Mechelen and Sint-Niklaas.

Shipbuilding and Marine Engineering

The Belgian shipbuilding industry is only of limited importance. The tonnage of launchings reached its peak in 1938, when twenty-one vessels (each of more than 100 tons gross), totalling 30,197 tons gross, were launched. This figure, however, represented only about 1% of the world's total output of some 3 million tons gross. Nevertheless, this peak production, which was largely the result of a government subsidy granted in 1936, represents a considerable advance on that for 1934, when only four river craft of 831 tons were launched.

Twenty-seven of the vessels in the Belgian merchant fleet were built in home yards. This figure represents only about a quarter of the total fleet, although it includes most of the newest acquisitions, including the largest and fastest motor vessels.

The M.V. *Baudouinville* (*C.M.B.*) of 13,517 tons gross, completed in 1939, is the largest ship built in Belgium. The *Prince Baudouin* (3,049 tons gross) and the *Prins Albert* (2,938 tons gross) were completed in 1934 and in 1937 respectively for the Dover-Oostende packet service. These are the fastest motor merchant vessels in the world. Another vessel of this class, the *Prince Philippe*, was launched in 1939. In addition, forty-four vessels of 95,811 tons gross (reckoning only those over 500 tons gross) in the merchant navies of other countries were built in Belgian yards (Plates 43, 44).

Only a few Belgian shipyards are of sufficient capacity to build sea-going vessels, other than sea-going barges. The most important yards are situated on the lower Escaut near Antwerpen; the others were at Oostende and Temsche (Tamise). The principal yard and the only one able to build vessels over 1,000 tons gross is that of the *S.A. John Cockerill* at Hoboken; the yard was opened in 1824, and up to 1938 it had built 682 self-propelled and 800 other vessels. Its importance

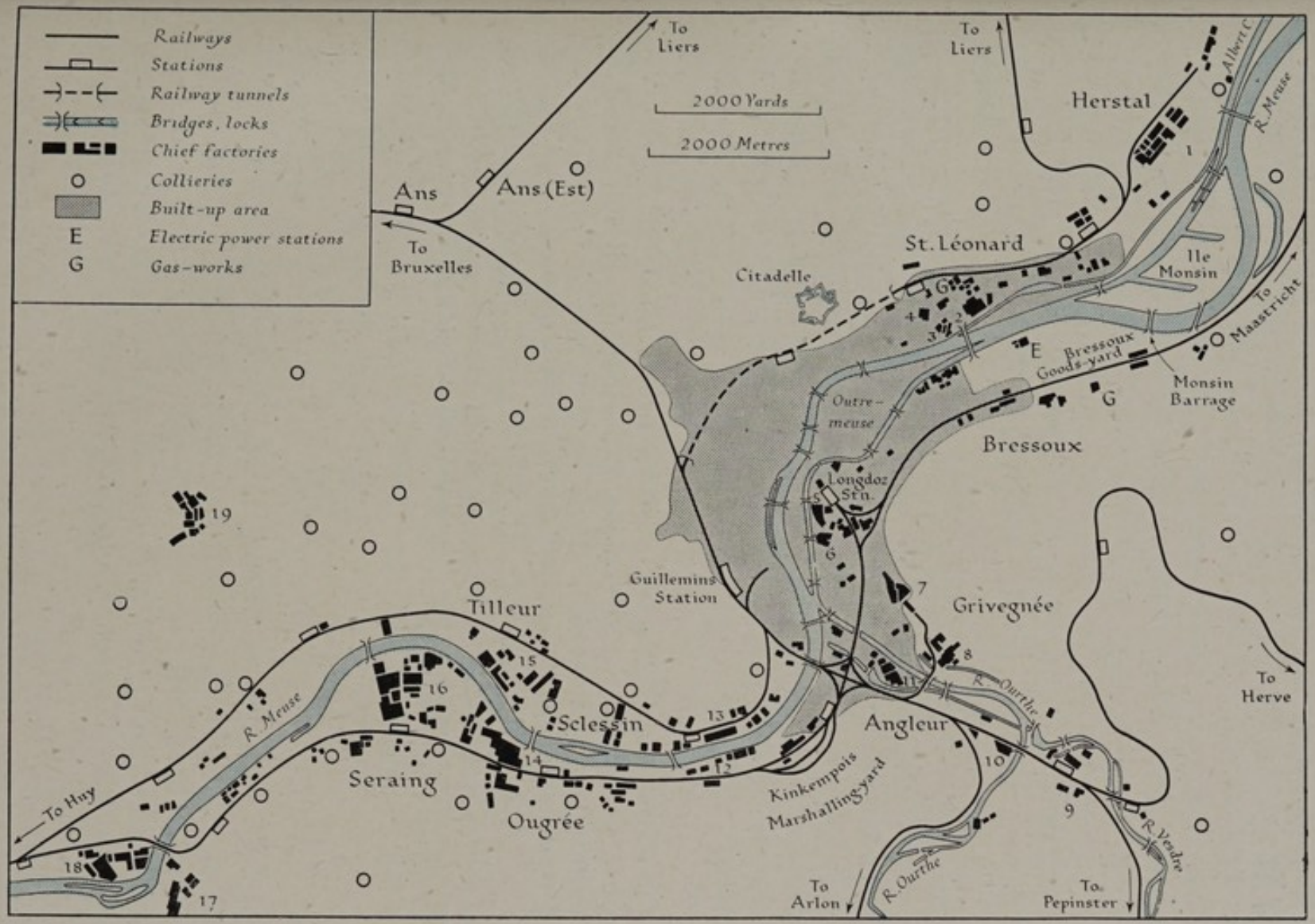


Fig. 80. Liége—industries and communications

Based on: (i) G.S.G.S. Series 4041, 1 : 25,000, sheets 69/NE, NW, SW, SE (1939); (ii) *Carte du Bassin Houiller Belge et des Voies Navigables* (Anvers, n.d.); (iii) *Plan de Liége*, 1 : 10,000 (Bruxelles, n.d.).
The chief suburbs in the Liége agglomeration are named (see pp. 217, 602).

The chief factories are listed in numerical order as follows: (1) *Fabrique Nationale d'Armes de Guerre*; (2) *Construction Electrique de Belgique*; (3) *Fonderie Royale de Canons*; (4) *Manufacture d'Armes de l'Etat*; (5) *Espérance-Longdoz* metallurgical works; (6) *Pneu Englebert* rubber factory; (7) *Usines à Cuivre et à Zinc de Liége*—Grivegnée works; (8) *Angleur-Athus*—Grivegnée metallurgical works; (9) *Usines à Cuivre et à Zinc de Liége*—Chênée works; (10) *Vieille Montagne*—Angleur zinc foundries; (11) *Conduites d'Eau* engineering works; (12) *Angleur-Athus*—Angleur steel works; (13) *Ateliers de Construction de la Meuse* mechanical engineering works; (14) *Ougrée-Marihay* metallurgical and engineering works; (15) *Angleur-Athus*—Tilleur steel works; (16) *John Cockerill* metallurgical and engineering works; (17) *Val-Saint-Lambert* glass factory; (18) *Usines à Tubes de la Meuse*—Flémalle-Haute; (19) *Vieille Montagne*—Hollogne-aux-Pierres zinc works.

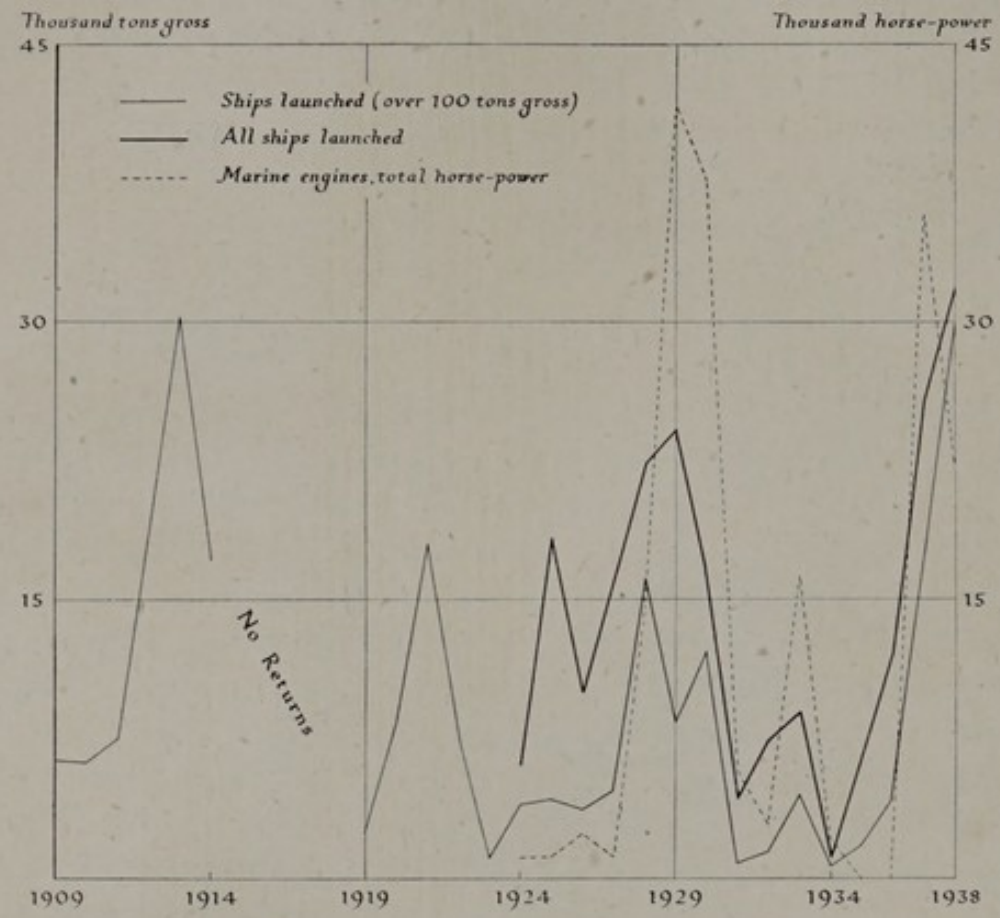


Fig. 81. Shipbuilding and marine engine output, 1909–38

Based on: (i) *Lloyd's Register*, vol. III, Statistical Tables (London, 1939); (ii) *Glasgow Herald Trade Reviews* (Glasgow, 1924–38).

The difference between the two graphs of ship launchings between 1924 and 1938 is accounted for by the number of small craft under 100 tons gross. The high marine engine output for 1929 and 1930 resulted from the fitting of exceptionally high-powered engines in two cross-Channel packets in each of these years. In 1930, also, engines totalling over 4,000 h.p. were exported. In other years marine engines were imported for hulls built in Belgium.

is shown by the fact that a gross tonnage of 27,883 out of the Belgian total of 31,892 was built here. The facilities at the yard include three slipways and three construction dry docks. Recent launchings include the large motor vessels already mentioned and a variety of smaller craft such as trawlers, barges, tugs, and shallow-draught vessels for river traffic in the Belgian Congo (Plate 30).

The other important shipyards are those of the *S.A. Chantiers navals Jos. Boëls et Fils* at Temsche and the *S.A. Ateliers de Réparations et Chantiers Béliard, Crighton et Cie* at Oostende. In 1937, the Temsche yard launched twenty-eight vessels of 7,835 tons gross, and in 1938 three vessels of 1,484 tons gross. Vessels up to 800 tons have been built, including coasters, long-distance trawlers, pilot cutters, and Congo river craft. The Oostende yard launched seven vessels of 2,565 tons gross in 1937, and four vessels of 890 tons gross in 1938. It specializes in the construction of trawlers, both for Belgian and foreign owners, and in the last few years it has also built motor coasters.

Some thirty smaller yards build vessels designed for use on the inland waterways. In 1938, a total of 142 vessels was constructed, including six tugs, 107 motor-driven barges, and twenty-nine motorless vessels, mainly dumb-barges. In 1930, over 300 such vessels were built, the highest total on record. Most of these barges were of steel, a few of wood. The yards are situated along the inland waterways, the most important being at Boom, Hemiksem, Ledeberg, Nivelles, Péronnes-lez-Antoing, Schoten and Vilvoorde.

Marine engines are built by some of the large metallurgical firms. Recent peak years were 1929 (total output 41,615 h.p.), 1930 (37,599 h.p.) and 1937 (35,718 h.p.). The *S.A. John Cockerill* at Seraing was by far the most important firm, as it produced 25,338 h.p. of the 1937 total, and 18,218 h.p. of the Belgian total of 22,186 h.p. in 1938. The latter consisted almost wholly of Diesel engines. The only other firm of any size is the *Société d'Electricité et de Mécanique* (*S.E.M.*) at Gent, which in 1937 and 1938 produced 10,380 and 2,135 h.p. respectively (Fig. 81).

Aircraft

The manufacture of aircraft is of small importance in Belgium. Three firms, of which the largest is *Sabca* (*S.A. belge de Constructions aéronautiques*), with works at Evere near Bruxelles, makes and repairs aircraft. The *S.A. des Avions Fairey* at Gosselies makes military aircraft under licence from the Fairey Company of Great Britain, and

the *Fabrique nationale d'Armes de Guerre* (*F.N.*) at Herstal makes aero-engines. A few other firms in Liége and Bruxelles make engine parts.

Motor Vehicles and Cycles

The Belgian output of motor cars and of coachwork has been so small as to be negligible. The only firm of note, *Minerva*, went into liquidation in 1934. There is a considerable manufacture of chassis and of various parts for export. The assembling of foreign-made parts is fairly extensive; thus some 64% of the cars on Belgian roads, though of American origin, were mostly assembled in the country. The largest assembling plant is that of *General Motors* at Antwerpen, with an output of about 150 vehicles a day. The *Chrysler* Company also has an assembling plant at Antwerpen. The location of these works has clearly been influenced by the port at which the components are imported.

The motor-vehicle industry is mainly concerned with the manufacture of lorries, trucks and omnibuses, both to meet the demands of the country's heavy road traffic and for export. The main companies include *Ford*, *General Motors* and *Willems Motors*, all of Antwerpen, and the *S.A. Fabrique nationale d'Armes de Guerre*. There are smaller factories at Bruxelles, Merksem, Mons and Buizingen.

The manufacture of motor cycles and pedal cycles is concentrated at Liége, where the skill of fitters formerly employed in the small-arms industry is utilized. The Belgian manufacturers of motor cycles have obtained an international reputation, and over four-fifths of the output is exported. Although the Liége area, especially Herstal, remains important, other factories have grown up since 1920, at Antwerpen, Kortrijk, Vilvoorde and Bruxelles. The output is about 35,000 machines a year.

The last twenty years have seen a great increase in the number of pedal cycles on Belgian roads (see p. 467). In 1939, over twenty firms produced complete machines, and over fifty made cycle parts, notably at Herstal, Bruxelles, Kortrijk and Hasselt.

Fire-arms (Plate 37)

The manufacture of fire-arms was established at Liége in the fourteenth century, and since that date the town has maintained its European reputation. Until the end of the last century, the various parts were made by highly skilled domestic craftsmen, but the numbers so employed fell from nearly 8,000 in 1896 to 1,100 in 1930.

In recent years the factories at Herstal, where the chief firm was the *S.A. Fabrique nationale d'Armes de Guerre*, have been the leading producers, but several of the large firms, such as *Cockerill* and *Ougrée-Marihaye*, were also important. Belgian firms have specialized in sporting rifles and shot-guns, carbines, revolvers, and pistols—nearly 375,000 weapons were officially tested in 1937, and about 90% were exported. The industry has striven to maintain its high reputation and a weapon bearing the Liége testing mark (*banc d'épreuve des armes à feu*) is generally recognized as being a first-class weapon. Most of the firms are members of the *Union des Fabricants d'Armes de Liége*.

Electrical Industries

Although the first industrial dynamo was invented by a Belgian, Zénobe Gramme, in 1869, it was not until 1900 that the electrical industry began to develop on any considerable scale. The first workshops for the construction of heavy electrical apparatus were established at Charleroi and Liége; these towns, together with Bruxelles, have remained the chief centres. The heavy electrical industry has been mainly under the control of a few large firms; the *S.A. Ateliers de Constructions électriques de Charleroi* (*A.C.E.C.*) and its subsidiaries, for example, have works at Charleroi, Marcinelle and Ruisbroek near Bruxelles, and manufacture almost every kind of electrical equipment, including generators, electric motors, transformers, electric locomotives, electro-magnets, electric furnace equipment, and insulated cable.

The light electrical industry, which includes electrical accessories, domestic articles, lighting material, accumulators, etc., is widespread, but is noticeably concentrated in the urban agglomerations of Liége, Bruxelles and Antwerpen.

Belgium was the first European country to develop the construction of telephone and telegraph apparatus, and later of radio equipment. While a large number of small firms produce component parts, especially in the Bruxelles and Antwerpen districts, two firms are outstanding: the *Bell Telephone Manufacturing Company* at Antwerpen and Hoboken, and the *Société belge Radio-Electrique* (*S.B.R.*) at Ruisbroek.

Electricity

The supply of electric current is widely distributed throughout Belgium, and in 1939 only ten communes were not supplied, although in some rural areas the number of consumers was low. Thermal generation is employed almost entirely, and of the total installed capacity of 2·6 million kW. in 1938, comprising 361 individual producers, only 30,000 kW. was hydro-electricity. Thermal generation usually employs coal, but about one-fifth is produced from blast furnace, coke-oven and cement-furnace gases in the central industrial area.

The following table summarizes the regional output of electricity in 1939:

Province	No. of plants	Capacity 1,000 kW.	Output million kW.h.
Antwerpen	34	340	840
Brabant	52	397	796
West-Vlaanderen	21	148	220
Oost-Vlaanderen	31	255	461
Hainaut	117	726	1,686
Liége	58	518	1,105
Limburg	11	126	341
Luxembourg	12	21	54
Namur	25	105	89
Total	361	2,636	5,592

Based on official sources.

Of these 361 units, 315 were owned by industrial concerns, thirty-three by private companies, and thirteen by municipalities.

The industrial producers are situated mainly in the mining and industrial areas of Hainaut and Liége, and in 1939 they produced rather more than half of the total power supply, primarily for their own needs, as nearly all modern factory equipment is now electrically driven. Coke-oven and blast-furnace gas is generally used, thus effecting considerable fuel economy, as in the case of the 32,000 kW. plant at the Cockerill works. Considerable amounts of power were sold to the distributing companies for domestic consumption.

The thirty-three privately owned stations produced amounts of power nearly as great as the more numerous but smaller industrial producers. Nearly all the units are situated on waterways, and are thus able to obtain coal cheaply by water. The more important stations are shown on Fig. 82.

The thirteen municipal stations produced in 1939 about 250 million kW.h., or one-twentieth of the total. The largest plants are situated at Bruxelles, Gent and Liége. The Bruxelles station at Laeken has a capacity of 90,000 kW.

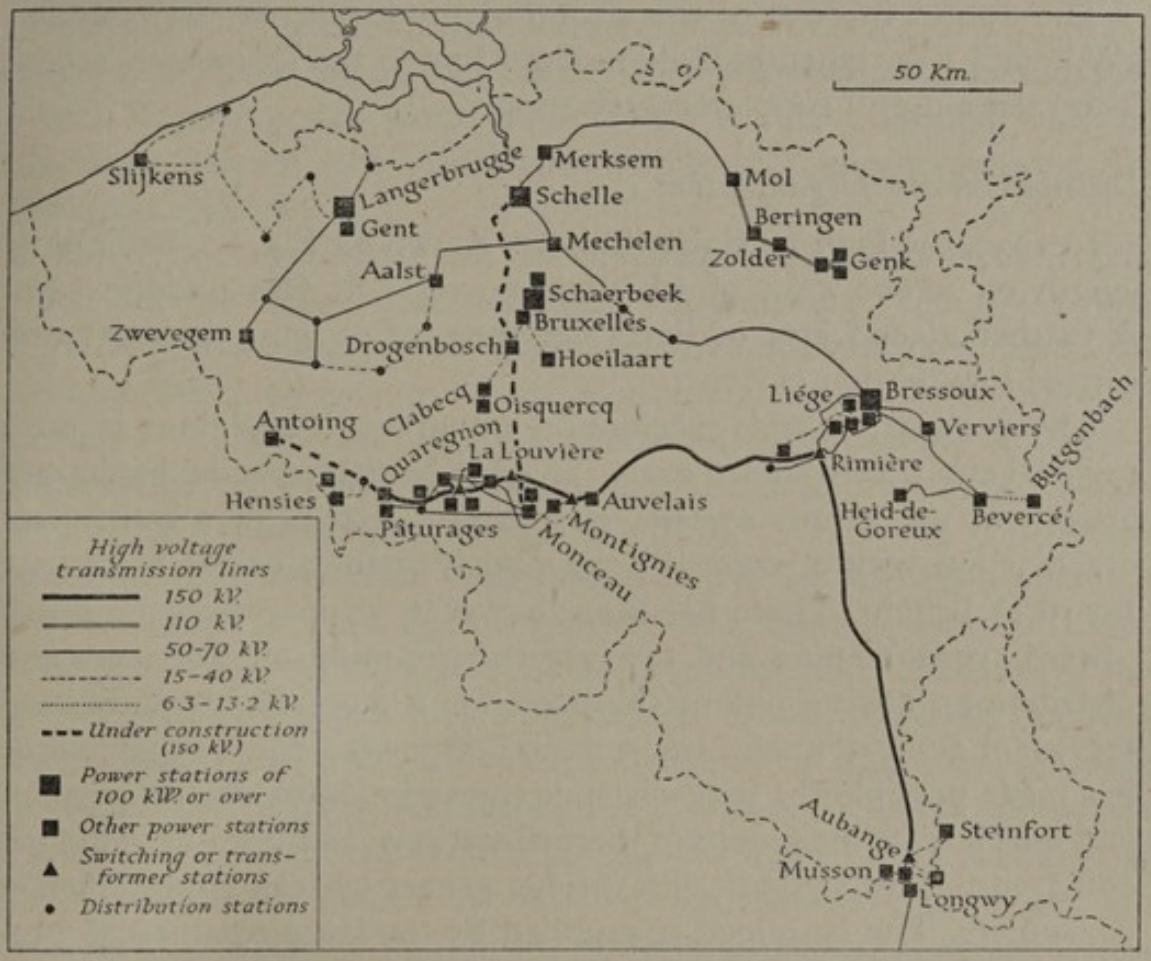


Fig. 82. The inter-regional distribution of electricity

Based on a map in *Energie*, January, 1939, p. 18 (Bruxelles, 1939).
Only the more important plants and power-lines are shown in the Liége and Charleroi areas, where there are numerous industrial producers and a complex ramification of power-lines.

Hydro-electricity

The opportunities for the development of hydro-electric power in Belgium are small, since although rivers are numerous, gradients are usually gentle. The natural heads of water found, for example, in the French Alps, in the Pyrenees and in the Central Massif, are absent in Belgium. Only in the Ardenne tributaries of the Meuse are there any possibilities. Thus, the river Warche, a tributary of the Amblève, descends through a steep narrow gorge after leaving the Elsenborn plateau, and about 2 km. from Malmédy a dam has been built across the river at Robertville to form a storage reservoir, with a supplementary reservoir near Butgenbach. A power station was erected at

Bevercé and a smaller one at Butgenbach; their installed capacity totals 13,600 kW. There is another station at Heid-de-Goreux on the river Amblève, with an installed capacity of 8,000 kW.; an underground canal leads to the power station from the regulating barrage at Lorcé.

The output in 1939 of this group of producers was 65·7 million kW.h. and was transmitted by a power line to the Liége area, where it formed a useful supplementary supply.

Distribution and Organization

In 1939, the high-tension grid lines, shown on Fig. 82, had a total length of 20,000 km., of which just over half was underground. A further 46,000 km. of line, including 5,000 km. underground, carried low-tension current.

The production and distribution of power in Belgium is on a regional and decentralized basis. This has been due to the haphazard growth of the supply system, and to the absence of a controlling organization with a planned policy, such as the Central Electricity Board in Britain. There has been, however, an increasing tendency towards consolidation and towards the grouping of producers and distributors, arising out of the need for a more highly integrated service of generation and transmission of power. Modern technique has made possible the long-distance transmission of electric current, and thus linking the groups of thermal stations; by means of switching and transformer stations, the various generators can supply distant consumers. The base load is supplied by the large commercial producers, supplemented when needed by the surplus of units producing primarily for industrial use, and peak loads can therefore be accommodated at any time or place.

The state of the 'Grid' in 1939 is shown on Fig. 82. There is no single system covering the country, but rather a number of groups or 'blocs', including both power-plant unions and distributing companies. A 'bloc' consists of a number of power plants operated by a single financial group, and although the subsidiaries retain their identity they supply electricity according to centralized schemes. Prominent 'blocs' are *Interbrabant* and *Interescaut*; the former owns the station at Schaerbeek and distributes power from Drogenbosch, Oisquercq and other producing units in the Bruxelles area, while the latter distribute power from Schelle and Merksem to the Antwerpen district (Plate 38). The main groups in the south are the *Union générale belge d'Electricité* (*U.G.B.E.*), and the *Union des Centrales électriques* (*U.C.E.*). These two have co-ordinated their policies and

have become *de facto* a single organization including most of the industrial producers in the region between Liége and Mons. The chief artery is the 130 km. power line of 150 kV. running from Rimière to Quaregnon; another of similar voltage runs from Rimière to the group of industrial producers in southern Luxembourg. In the Kempenland the main 'bloc' is the *S.A. d'Electricité de la Campine* which owns a power plant at Mol; this is interconnected with the Merksem station near Antwerpen and with the generators of five Kempen collieries.

In 1937, a further stage in the centralization process was reached. Nine of the main producing and distributing 'blocs'—*Sofina*, *Electrobel*, *Electrorail*, *Interbrabant*, *Interescaut*, *Traction et Electricité*, *Dendre*, the *Compagnie-auxiliaire d'Electricité* (*C.A.E.*)—and the two unions (*U.G.B.E.* and *U.C.E.*), which had now become a 'bloc'—joined together to form the *Société pour la coordination de la Production et du Transport de l'Energie* (*C.P.T.E.*). While the constituent concerns still retain their individual identity, the distribution for the whole of Belgium has been organized on a more economical basis. The programme of the *C.P.T.E.* envisages the interconnexion of the power plants which constitute the various 'blocs', and the creation of main 'inter-bloc' arteries for the exchange of current. The operating programmes for 1939 were run by the *U.G.B.E.* for all the companies concerned. The central regulating unit for the whole concern is the *U.G.B.E.*'s load-dispatching station at La Louvière; it advises the various 'blocs' of the state of the network and of possible loads, and generally regulates the volume of power exchanged on the main lines and on the inter-bloc links.

It was hoped that in due course a grid covering the whole country would be operated by the *C.P.T.E.* Although *Interescaut*, *Interbrabant* and others had joined the *C.P.T.E.* they had not been linked up by 1939. For this purpose, a new north-south interconnecting artery of 150 kV. capacity between Schelle and Monceau was under construction in 1939, to link the Antwerpen-Bruxelles producing units. A westerly extension of the main east-west line to Tournai was also under construction (Fig. 82).

Chemical and Allied Industries

Chemical Industry

The very highly developed Belgian chemical industry has three main locations: (1) in the industrialized areas of the Sambre-Meuse

valley; (2) in the Kempenland near inland waterways; (3) at large towns such as Antwerpen, Bruxelles, Gent, Brugge and Leuven. The 'heavy chemical' industry is located in the first two areas; this industry includes coal-distillation products, by-products of the iron, zinc and glass industries, and the large-scale manufacture of acids and salts (mainly fertilizers). The 'light chemical' industry, comprising the manufacture of pharmaceutical chemicals and drugs, rarer salts, photographic materials, disinfectants, vegetable oils, soap, paint and varnish, etc., is much more widely spread.

While a considerable number of individual firms manufacture chemicals, a few major combines dominate the industry. The largest by far is the *S.A. Union Chimique Belge* (*U.C.B.*), formed by the amalgamation of a dozen companies, with a capital of 200 million francs. It is organized into four divisions dealing respectively with (*a*) coke ovens and the production of synthetic ammonia; (*b*) chemical products; (*c*) pharmaceutical products; (*d*) photographic materials (*Fotobel*). The combine has its own coke ovens at St Ghislain and factories at Zandvoorde, Havré, Schoonaarde, Gent, Wondelgem, Hemiksem, Burcht, Drogenbosch, Mornimont and in various suburbs of Bruxelles. Other important companies are the *S.A. de l'Azote et Produits chimiques du Marly* at Ougrée and the *S.A. Etablissements Kuhlmann*. In addition to its five factories in France, the latter owns works at Rieme and Zelzate, where it has its own docks on the Gent-Terneuzen Canal. Most of the large iron and steel firms have their own by-product installations.

Coal-distillation Products. During the last fifty years, the chemical industry has profited from the discovery of a wide range of uses for the waste products of coke ovens and retorts. The regional production (in tons) in 1938 of the three primary products, coal-tar, benzol and ammonium sulphate, was as follows:

	Mons district	Centre and Charleroi district	Liége district	Others	Total
Coal-tar	25,670	46,790	36,400	61,200	170,060
Raw benzol	1,060	8,810	6,220	9,750	25,840
Refined benzol	5,670	3,850	8,950	11,320	29,790
Ammonium sulphate	1,100	21,219	16,590	23,430	62,330

Source: *Annales des Mines*, 1938, vol. XL, Table VI (Bruxelles, 1939).

In addition to home-produced coal-tar, a considerable amount is imported for further distillation. Distillation plants are therefore found not only at the chief mining towns but also on waterways near

the coast; the largest single plant is at Zelzate on the Gent-Terneuzen Canal, producing over a quarter of the tar distilled in Belgium.

A proportion of the coal-tar output is partially distilled for road surfacing; the pitch derived from this process is used for the manufacture of patent fuels (p. 329). Further distillation produces naphtha, creosote, benzine and naphthaline; from the last of these are derived aniline dyes, perfumes and explosives.

Chemical fertilizers. About one-third of the total value of chemical products consists of fertilizers, produced both for the country's own intensive agricultural needs and for export. The output of ammonium sulphate, one of the chief nitrogenous fertilizers, has already been mentioned. Prior to 1914, Belgium imported all her nitrogenous fertilizers, mainly in the form of sodium nitrate from Chile. The home manufacture of synthetic fertilizers reduced these imports from 327,895 tons in 1913 to 15,000 tons in 1932. Other fertilizers of this group now produced in Belgium include nitrate of lime and cyanamide of lime.

In 1936, nearly a million tons of basic slag were produced; this fertilizer, containing some 16–20% of phosphate, is a waste product of the blast furnaces. Superphosphates are produced by treating natural rock phosphate with sulphuric acid. The industry was originally based on local phosphates obtained from quarries near Liége, Baudour and Mons; some 75,000 tons of phosphatic chalk were quarried in 1938. In recent years, however, the greater part of the phosphate rock has been imported; 329,000 tons, mainly from north Africa, were imported in 1938. Potash salts imported from Alsace and Germany are also used for fertilizer production.

Acids and Salts. Some thirty Belgian factories, with an annual capacity of a million tons, are engaged in the manufacture of sulphuric acid. About a third of the output is exported, and the rest used in various industries. The industry has grown in close association with zinc smelting in the Liége district, as zincblende is one of the raw materials. Thus the *S.A. Mines et Fonderies de Zinc de la Vieille-Montagne* has large acid works at Chênée. In addition to the factories at Liége, the other main works are at Bruxelles, Antwerpen and Gent. Some 259,000 tons of iron pyrites and 13,000 tons of sulphur were imported in 1938.

Nitric acid, produced by the oxidation of ammonia, is manufactured in the same areas as sulphuric acid; it is used not only for the production of sulphuric acid but also for the manufacture of nitrocellulose and nitro-glycerine. Various other acids are made by the

large firms, many of them specializing in one branch. For example, 50% of the world's output of citric acid is made at Tienen, formic acid is manufactured at Leuven, picric acid at Mons, phosphoric acid at Zelzate, Engis and Burcht, and hydrofluoric acid at Hemiksem.

The manufacture of salts such as sodium, sodium carbonate, sodium sulphate for the glass industry, caustic soda for the soap and rayon industries, chloride of lime, etc., is widespread. Belgium is the world's leading producer of copper sulphate (used mainly for vine spraying), based on copper imported from the Katanga mines in the Congo, and on locally produced sulphuric acid. In 1938, six factories at Bruxelles, Gent, Hemiksem, Wondelgem, and Chênée produced 35,000 tons of copper sulphate, of which 25,000 tons were exported, about one-third going to France.

Explosives. A wide range of explosives, for use in mines and quarries, for cartridges and for shell-filling, are made both for home use and for export. Production is confined to a few firms in Liége and Bruxelles; the most important are the *Poudreries réunies de Belgique* and its subsidiaries with factories at Ben-Ahin, Matagne, Balen, Casteau and Herentals, and *Coopal et Cie* (*Poudrerie royale de Wetteren*), which has establishments at Kaulille, Havré and Wetteren.

Glue and Gelatine. Belgium supplied in 1938 about one-third of the world market in these commodities. The chief factories are at Antwerpen, with its facilities for importing raw material, and at Bruxelles, Tournai and Vilvoorde, which made considerable use of abattoir waste.

Paint and Varnish. This industry is widespread, and produces an extensive range of paints, vegetable and aniline pigments, cellulose enamels and varnishes. Outstanding special items are zincwhite (zinc oxide), lithopone (a mixture of barium sulphate and zinc sulphide), and cobalt oxide. Most of the factories are either owned or controlled by chemical firms and metal refiners.

Photographic Materials. The manufacture of photographic materials is among the activities of many large chemical firms, especially *Fotobel*, a division of the *Union Chimique Belge* at Evere. The *Usines Gevaert* at Oud-God near Antwerpen specialize in plates and films.

Allied Industries

Mineral-oil Refining. In 1939, there were a few oil refineries in Belgium, but a large proportion of the petroleum products consumed in the country was imported in a refined state. Six refineries were in operation, with a total capacity of about half a million tons of crude

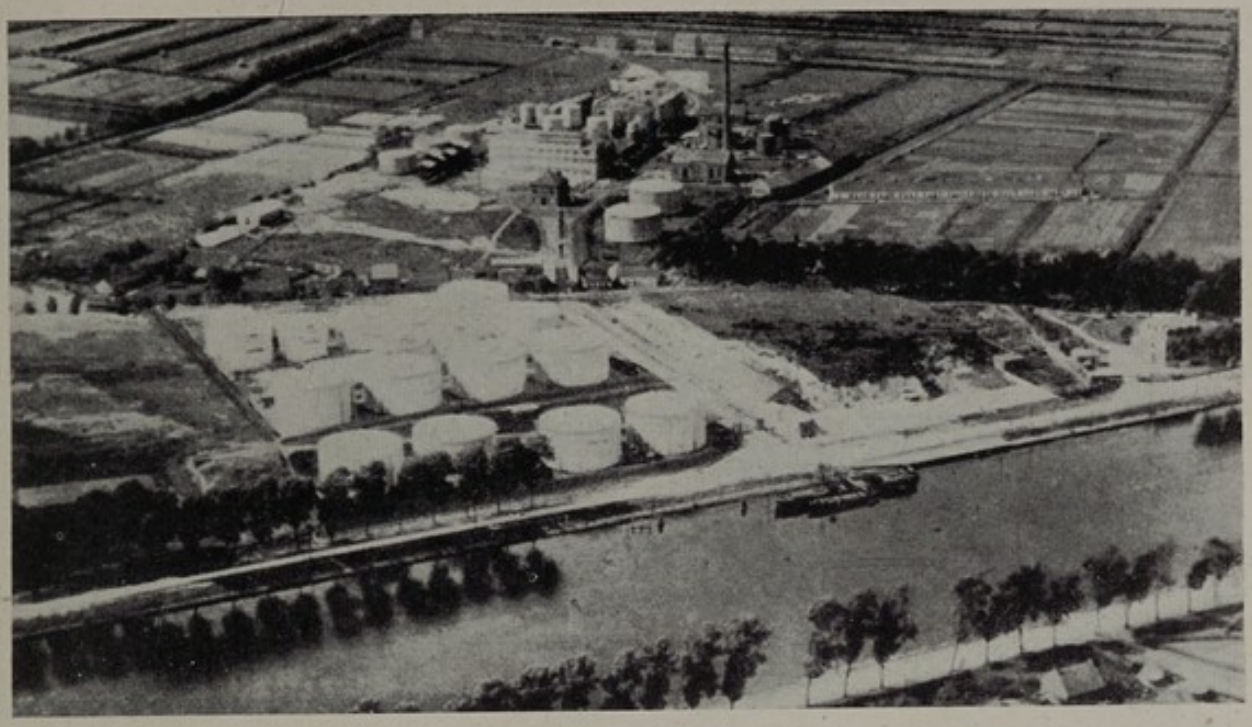


Plate 39. Oil refinery near Ertvelde

This refinery, situated on the bank of the Gent-Terneuzen Canal, provides another example of the intimate interweaving of industry and agriculture.

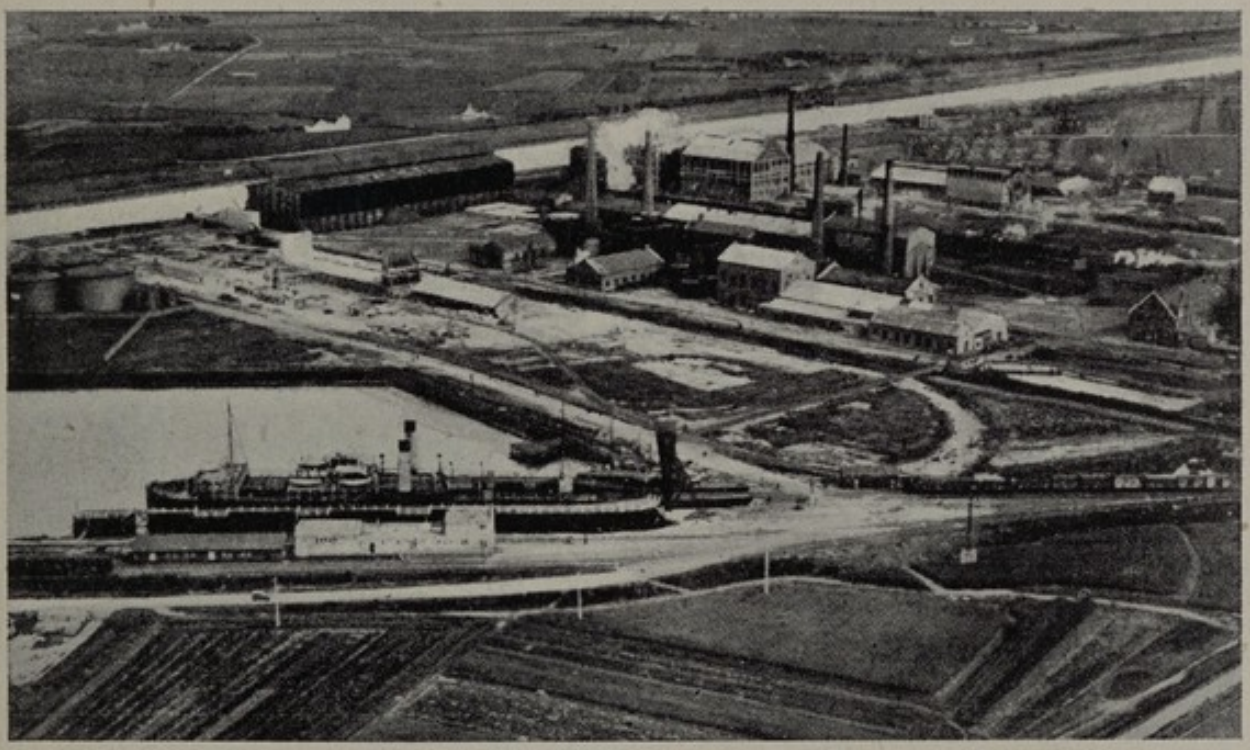


Plate 40. Industrial establishments at Zeebrugge

In the foreground can be seen the west basin with the Harwich-Zeebrugge train-ferry berth. Most of the buildings situated between the dock and the Zeebrugge-Brugge Canal in the background belong to the *Société des Fours à Coke* and consist of coal stores, gas holders, boiler houses and power station. Immediately behind them are the buildings of the *S.A. Union des Verreries Mécaniques Belges*.

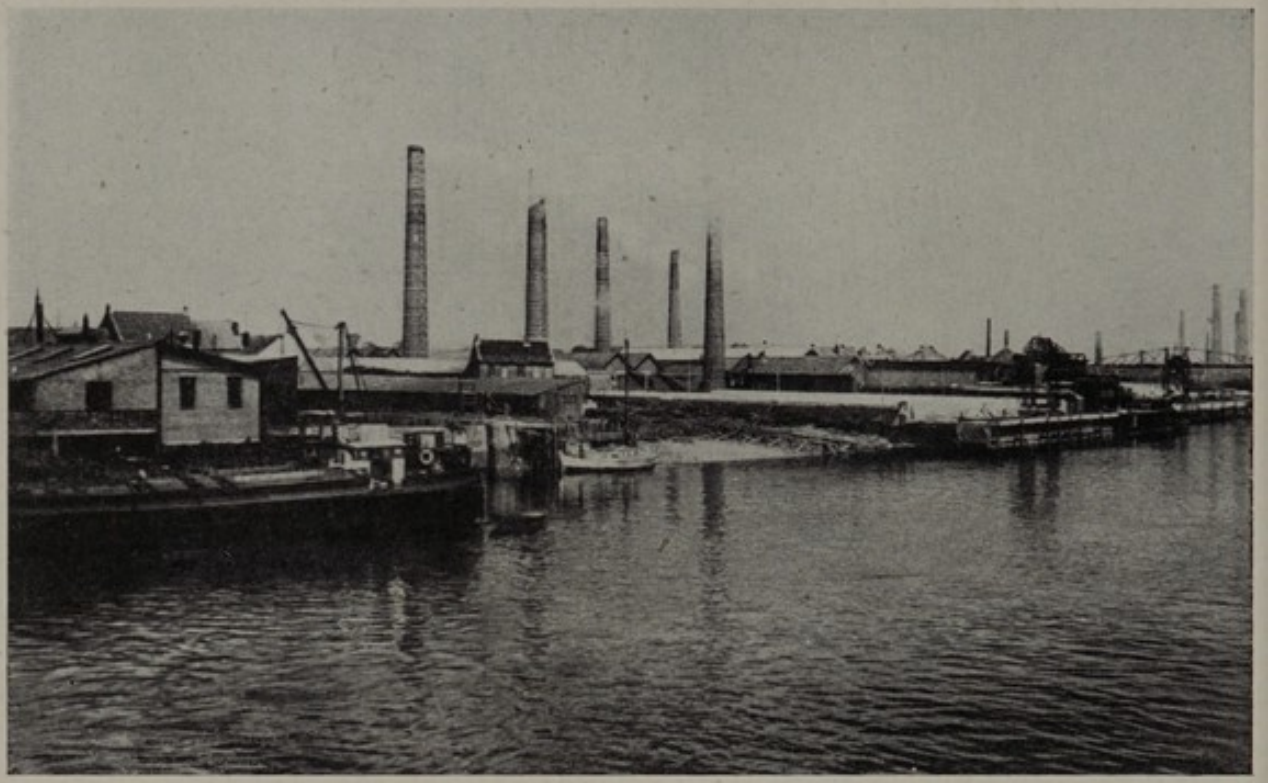


Plate 41. Brickworks at Boom

Boom is the centre of the most important brick-making district in Belgium; its extensive brickworks use the clays worked along the Escaut (Scheldt), Rupel and Nèthe.



Plate 42. Weaving sheds near Gent

Numerous textile mills are situated within Gent and in the neighbourhood. These weaving mills, owned by Hanus, are at Laarne, 7 miles south-east of Gent.

oil, which compares very unfavourably with the French annual capacity of about 9 million tons. Three of these refineries, including the plant owned by the *Raffinerie belge de Pétroles* and the *S.A. Redeventza*, are situated near Antwerpen. The other refineries are in the Gent neighbourhood (Plate 39).

The depots which handle the imports of refined petroleum products are situated mainly in the neighbourhood of Antwerpen, where twelve companies own tanks, but there are other installations at Gent, Brugge and Zeebrugge. Inland distribution is made through depots usually situated on inland waterways, served by tank lighters. The main depots are at Haren on the Willebroek Canal, at Sclessin on the Meuse, and at Leuven on the Leuven-Dyle Canal.

There is an 'Elektrion' plant at Gent, one of two such plants in Europe which electrically produce a blend of mineral and vegetable oil. The high-grade lubricants thus manufactured compete with special quality American oils.

Vegetable-oil Refining. The crushing of various oilseeds and the extraction and refining of the oil form an industry that has been chiefly associated with the neighbourhood of Antwerpen and with some of the large Flanders towns. About sixty factories producing some 100,000 tons of oil were in operation in 1938.

The most important single item is linseed oil, derived from flax. Oil mills are situated at Izegem, Steenbrugge, Kortrijk, Oudegem and Avelgem in Flanders as well as at Merksem near Antwerpen. In addition, most of these mills refine colza oil.

A wide variety of tropical oilseeds is used including cotton seed, copra, palm kernels, soya beans, and castor seeds. Some of the factories refining these oils are owned by colonial development firms. The main factories are at Antwerpen, Bruxelles, Leuven, Boom and Vilvoorde; their location has been determined by their facilities for importing oilseeds along the inland waterways.

Associated with the refining of vegetable oil is its treatment, together with animal fats, soda, etc., in the manufacture of soap, candles and margarine. Most of the factories are in Bruxelles and Antwerpen, with others at Ensival, Ath, Mons, Auderghem and Tournai. The manufacture of oilcake for cattle food from crushed oilseed residue is a subsidiary industry carried on mainly in the Antwerpen area, and at agricultural centres such as Leuven.

Paper Making. The first Belgian paper mills were erected in the fourteenth century at Gastuche and La Hulpe on the banks of small tributaries of the Senne where power and a supply of pure water

could be obtained. The chief factors in locating the modern industry were an abundant supply of clean water, preferably with a high degree of hardness, a clean atmosphere and the accessibility of raw materials.

The bulky raw materials—wood pulp, rags, straw and esparto grass—are nearly all imported, although considerable amounts of rags are collected from large centres of population. While most of the pulp is imported, largely from Sweden, a considerable amount of imported timber is pulped at the Langerbrugge mills, on the Gent-Terneuzen Canal.

In 1939, over fifty mills, in addition to a large number of paper-using firms, were producing bulk paper. Most of the mills are situated in Brabant, where the industry was originally located, in the upper basins of the Senne and Dyle, at Gastuche, La Hulpe and especially at Nivelles. A second group of mills is situated along the waterways of central Belgium at Bruxelles, Willebroek, Zaventem and Duffel. A third smaller group has arisen in the Ardenne, at Huy, Andenne, St Servais and Malmédy. A small amount of local pulp is obtained from the Ardenne forests.

The annual output of paper has varied in recent years between 200,000 and 275,000 tons, of which 75,000–80,000 tons were exported. Except for those producing newsprint on a large scale, most factories make a considerable variety of paper. A curious example of specialization is provided by the eight factories in Turnhout which turn out playing cards.

Cement. The distribution of the Belgian cement industry has been determined largely by the location of the main outcrops of chalk and limestone; the occurrence of the other raw material, clay, was widespread. The chalk beds of the Artois region extend into Belgium in the neighbourhood of Mons, and reappear farther east in the Hesbaye and Herve regions. Extensive outcrops of limestone occur in the Upper Devonian series, mainly in the area between the Sambre and upper Meuse, while Carboniferous Limestone occurs along the Sambre-Meuse valley (see pp. 2, 22). In 1938, 2·6 million tons of chalk and marl, and 1·8 million tons of limestone were quarried; part of the former is used for the manufacture of fertilizers, paper, etc., and part of the latter in the iron and glass industries. Most of the output is handled by the *Groupement des Producteurs belges de Chaux grasse.*

Although the cement works are widespread, a few concentrations are noticeable. The centres are at Tournai, Antoing and Mons in the Hainaut area, at Beerse and Turnhout in the Kempenland, and at Visé

and Haccourt near Liége. The largest individual concern, the *S.A. Cimenteries et Briqueteries réunies*, produces about 60% of the annual Belgian total of 2·0 million tons.

Most of these cement works produce natural, Portland and hydraulic cements. Special varieties include quick-setting cements of high strength made from bauxite clay at Ben-Ahin, slag cements at Huy and Liége, refractory cements at Baudour, Andenne and Marcinelle, and blast-furnace cements resistant to high temperatures in the Charleroi and Liége areas; some of the last are made by iron and steel firms.

Rubber. About forty firms were engaged in 1939 in the manufacture of various types of rubber articles. The largest concern is the *Société pour le Commerce et l'Industrie du Caoutchouc* (*Sacic*), which has factories at Aalst, Anderlecht, Denderhouten and Hérent. *Englebert et Cie* of Liége specialize in tyres, and supply some 90% of Belgium's needs. The location of this industry at Liége is an obvious result of the concentration of the cycle industry in the city. There are factories belonging to *Michelin* at Bruxelles and to *Bergougnan* at Gent.

A synthetic rubber plant, owned by the *S.A. Ethanite* at Wondelgem, began operation in 1932. It produced about 200 tons in 1938.

Glass

The Belgian glass industry originated in the fourteenth century, when Venetian glass-blowers settled near Charleroi. In the eighteenth century, the increased use of window glass in buildings helped the growth of the industry. After the founding of the great factory at Val-St-Lambert near Seraing in 1825, Belgium held almost a world monopoly of window glass, bottles and high-grade crystal ware until about 1880. Up to the last twenty years, the industry was carried on almost entirely north of Charleroi, notably at Dampremy, Lodelinsart, and Jumet. Sands were obtained at Oreye near Liége, at Naninne near Namur, at Tilly near Charleroi, as well as at Havré and Binche near Mons. For high-quality ware, however, fine white sands were imported from Fontainebleau in France. The Hainaut and Liége glass industry was located almost exclusively near supplies of coal, and a highly skilled labour force grew up in connexion with it.

After 1920, the mouth-blowing technique gradually disappeared and it was replaced by the Fourcault mechanical process. This eliminated the main difficulty of establishing the industry in a new

district where highly skilled labour was not available. Again, the Kempen collieries began to supply long-flame coals very suitable for glass furnaces, and silver sands little inferior to those of Fontainebleau were discovered in the Kempenland, especially near Mol. Thus new large-scale glass works developed at Mol and Lommel, at Boom on the Rupel, at Bruxelles and at Zeebrugge. The raw materials include coal and sand, sodium salts, limestone, manganese, antimony and arsenic; they can easily be assembled by waterway. Firms long established on the southern coalfield have installed new factories in the Kempenland; thus the *Cie des Verreries du Pays de Liége* have their chief works at Mol.

In 1938, the glass industry employed some 10,000 workers and a wide variety of glass-ware was produced. The total output forms about a quarter of the world production and about 90% of it is exported. The output includes high-quality cut-glass and crystal-ware, cheap-moulded glass-ware, optical glass, unsplinterable safety glass, stained glass, mirrors, laboratory glass-ware, etc., as well as a vast quantity of window glass, bottles and cheap table glass.

While there are numerous small firms, the glass industry has been controlled by a few large companies with subsidiaries. The works of the *Cristalleries du Val-St-Lambert* near Seraing is one of the largest in Europe, and has an international reputation for crystal glass. The company also has factories at Herbatte, Jambes and Jemeppe, and employs some 5,000 workmen. The normal annual output of the *Cristalleries* has been estimated at 50 million pieces.

The headquarters of the International Plate Glass Syndicate is at Bruxelles, and Belgium is the chief supplier of the world market in sheet glass.

Pottery and Bricks

The industries which use clay as their main raw material include pottery, porcelain, bricks and tiles, terra-cotta, special fireproof ware and vitrified materials among their manufactures. Most of the clay used is found within Belgium, although some kaolin is imported from St Yrieix near Limoges in France. The Belgian clays include the extensive belt of *limon hesbayen* in central Belgium, the polder clays near the Flanders coast and the finer clays or *terre glaise*. The last occurs scattered in small deposits, as at Baudour near Mons, in the neighbourhood of the Escaut and Rupel estuaries, near Boom and in the northern Kempenland. Other raw materials include sand and various

substances obtained from local chemical works for colouring and glazing.

The various branches of the industry are situated near deposits of clay either on a coalfield, or on a waterway by which the long-flame coals or bituminous briquettes can be easily transported. The main centres are therefore grouped along the Sambre-Meuse valley, near the Kempen canals, near the Escaut-Rupel confluence and around Bruxelles and Gent.

While there has been a considerable degree of specialization, a number of firms have a wide variety of manufactures. Thus the *S.A. belge de Céramique* (*Cérabel*) has factories at Baudour which make fine domestic pottery, insulators, industrial refractory products, etc., while its other establishments at Bruxelles make bricks. The *S.A. des Pavillons* makes refractory ware at Baudour, sanitary ware at Houdeng-Goegnies, and it also has glass factories at Manage and Ham-sur-Her.

Bruxelles and Baudour are the main centres of porcelain manufacture. The chief items include household and sanitary ware, insulators, and chemical apparatus. Bouffioulx, situated to the south-east of Charleroi, has twelve firms producing vitrified and domestic stone-ware. Fireproof-ware is made in numerous factories, notably at Charleroi, Moustier, Andenne, Gent and Mons. Much of the output is exported, but a considerable part is bought by the Belgian iron and steel firms, some of whom actually produce their own fireproof-ware. Glazed tiles are made by firms at Hemiksem, Hasselt and La Louvière. Other associated industries include the manufacture of terra-cotta at Châtelet, Tubize, Kortrijk and Brugge, a widespread production of drainage pipes and flower pots, the manufacture of art pottery at Brugge, Kortrijk and other Flanders towns, and of religious plaques and statuettes at Brugge.

The centres of the Belgian brick-making industry are at Boom, and in neighbouring towns such as Rumst. This area normally produces more than half of Belgium's output of bricks. Almost all the firms in the Boom district are affiliated members of either the *Union des Fabricants de Briques mécaniques*, or the *Syndicat des Briqueteries mécaniques de Boom et environs*; these two associations handle the sale of almost the whole output of the Boom brickyards (Plate 41).

Other brickworks are found around Liége, at Baudour, in the Kempenland at Ravels, Turnhout, St Léonard and Rijkevorsel, and at certain places in Flanders, notably Nieuwpoort and Brugge. Ornamental and glazed bricks are made at Antoing, Tournai and Kortrijk.

Tiles are made at most of the brickworks, notably those at Beerse, Antoing and Kortrijk. One of the largest concerns is the *Comptoir tuilier de Courtrai*, which with its subsidiaries normally produces over 100 million bricks and tiles a year.

Textiles

The Flanders plain, especially the region between Gent, Ieper, Arras and Cambrai, has been, since the Middle Ages, one of the world's chief textile manufacturing areas. While a few towns—notably Gent (Plate 42), Kortrijk and Ronse—have dominated the cotton and linen industries, the various branches of the industry have been situated in widely scattered places (Fig. 83). One important exception to the general location of textiles in Flanders is that of the woollen industry in the Vesdre valley, with the chief centre at Verviers and its ring of satellite towns.

In 1930, there were 10,020 active separate textile-manufacturing concerns, of which 5,396 were in West-Vlaanderen and 2,611 in Oost-Vlaanderen. Nearly 190,000 people were employed in textile manufacturing and a further 100,000 in the clothing industry. Included in this total were 15,370 domestic textile workers and 20,646 domestic workers employed in the clothing industry (see p. 290).

A very large proportion of the textile manufactures is exported; thus 60% of the cotton cloth output, 70% of linen, 60% of carded wool and 80% of carpets are usually sent abroad. In recent years, countries where cheap labour is allied to mass production, particularly Japan and India, have become formidable competitors and they have severely affected the Belgian cotton industry in particular.

Woollen Industry

The Flemish woollen industry which flourished in the twelfth and thirteenth centuries was largely dependent on imports of English raw wool, but it later suffered from the competition of English manufactures (see p. 87). Verviers was already important in the fifteenth century, and soon afterwards it became the chief centre in the Low Countries, a position which it still held in 1938. It formerly obtained its raw material from the sheep of the Ardenne or from Upper Silesia, while the soft water of the river Vesdre was suitable for washing wool. The first wool-carding and spinning machines in



Fig. 83. Distribution of the Belgian textile industry

Based on official sources.
The size of the symbols gives some indication of the relative importance of the various branches of the textile industry; they are based roughly on the numbers of firms, workers, spindles and looms at several centres. The concentration of textile manufacturing in Flanders, with the exception of the wooilen industry around Verviers, is clearly shown.

Europe were erected at Verviers by William Cockerill at the beginning of the nineteenth century. The woollen industry then expanded to adjacent small towns, such as Ensival, Dison, Theux and Renoupré, and even farther afield to Pepinster and to outlying towns like Eupen. Within recent years the Verviers factories have received their supply of steam from a central plant; some 1,000–3,000 tons of steam a day are piped to the mills through 10·8 km. of mains and 2 km. of branches.

Verviers and district is outstanding in all branches of the woollen industry. There were over thirty wool-washing, carding and combing plants in Belgium in 1938; the only ones established outside the Verviers area were those at Gent, Hoboken, Péruwelz, and Hergenrath. There is a considerable export of carded and washed wools, and of carding room waste. Belgium has some 300,000 spindles, or 3·2% of the world total. Apart from the Verviers area, spinning mills are situated at Leupegem, Eekloo, Anderlecht and a few other towns in Flanders. A wide variety of woollen and worsted cloths is made, with a total of 7,500 looms. While Verviers and district are again outstanding for most woollen and worsted products, Bruxelles, Ronse, Gent and Kortrijk are also important. Small specialized establishments are widespread throughout Flanders; thus baize and frieze cloths are made at Kortrijk and Gent, flannel at Braine l'Alleud, Eine and Mol.

Cotton Industry

The first cotton hand-looms were in operation in Gent in the seventeenth century, but the rapid growth of the industry dates from the introduction of English machinery into that city in 1798. During the nineteenth century, the industry spread first to satellite towns near Gent, such as Ledeberg, Gentbrugge and Wetteren, then along the Escaut valley to Oudenaarde, Ruien-Avelgem and Ronse, and along the Dendre valley to Dendermonde, Aalst, Ninove, Geeraardsbergen and Ath. The availability of skilled labour has been one of the dominant factors in the locating of the industry.

In 1938, Belgium possessed over two million spindles, grouped in sixty mills. Over four-fifths of this total are in Oost-Vlaanderen, and about half are found in Gent. In the same year there were about 50,000 looms. The industry lost ground rapidly during the world economic depression, chiefly because of the competition of Japan and India, and the following table shows the decline (in tons) between 1929 and 1938:

	1929	1938
Imports of raw cotton	100,596	84,507
Production of yarn	68,800	57,389
Production of cloth	60,278	42,583
Exports of yarn	7,645	12,818
Exports of cloth	44,333	26,985

Source: S. Capelle, 'L'Industrie textile belge en 1938', in *Bulletin de l'Institut de Recherches économiques*, vol. x, p. 145 (Louvain, 1939).

There is a considerable number of small firms, and as a rule the spinning and weaving concerns, although often situated in the same town, are quite distinct. All branches of the industry are handled by a few large combines, such as *Usines textiles réunies de Belgique* (*Uterbel*) at Ronse or the *Union cotonnière* at Gent. Many of the smaller companies have combined into groups for marketing their wares. Thus *La Textile* (*Association cotonnière belge*) handles the output of yarn of twenty-two firms, while over fifty weaving mills belong to the *Association belge de Tissage*.

An extremely wide variety of thread and fabric is produced. One of the chief items is the making of cotton blankets, and Belgium is the world's leading producer of these. The blankets are made from cotton of shorter staple than that used for fine spinning; they are manufactured at fifteen factories in Dendermonde, Aalst and Gent. While inferior to woollen blankets, they are much cheaper and have a ready market in tropical latitudes, especially in the Belgian Congo. An important side-line is the manufacture at Bruxelles and Gent of cotton wool, both for surgical and industrial purposes.

Linen Industry

Linen cloth has been made in Flanders since early times, and for many centuries it has enjoyed a world-wide reputation. The industry was dependent both on local flax grown on the Flanders plain and on the retting qualities of the lime-free water of the Lys, and a considerable domestic labour force grew up around these resources.

In the nineteenth century most of the flax was home produced, and nearly 60,000 ha. were grown, chiefly in West-Vlaanderen. Sowing and cultivation were performed by the agricultural population, but pulling and retting were undertaken on a commercial scale by firms which sold the fibre both to the large mills and to the domestic workers; many of the latter found seasonal employment in the growing and retting of the flax. After the war of 1914–18, the area under cultivation increased rapidly. During the economic depression, there

was inevitably a serious slump in production, partly because of the competition of other textiles, especially of rayon, and partly because of the importing of cheaper Russian fibre. The area under flax fell from nearly 60,000 ha. in 1929 to 10,800 ha. in 1933, while it was estimated in 1932 that 25,000 of the 30,000 workers normally employed in growing and retting were unemployed. The recovery dates from 1934–5; the harvest of 1934 was the best since 1928, both quantitatively and qualitatively, while the devaluation of the franc (see p. 348) resulted in a greatly increased export of fibre, and quotas reduced the imports. There has been some increase in the area grown, and in 1938 there were 31,000 ha. under flax, yielding about 350,000 quintals of fibre. This home-produced fibre amounted to only about one-fifth of the demand, and much was imported from France and the Netherlands.

Formerly nearly all the flax was retted in the river Lys, and navigation was suspended during the late summer. In recent years, however, the amounts retted in the river have diminished to about a quarter of the total, and more convenient retting pits have been made. The quality of the fibre was decidedly poorer when artesian water was used, and in 1938 there was a project to distribute Lys water by high-pressure pumping to the Flanders villages. In the Kortrijk district much of the fibre is retted by a hot-water system.

Most of the spinning and weaving mills are situated at Gent, Kortrijk and Roeselare. Others are found along the Lys valley at Wevelgem and Harlebeke, along the Mandel valley at Izegem and Ingelmunster, and east of Gent at Dendermonde, Lokeren and Aalst. There is an outlying area in the upper Dyle basin at Court-St Etienne and Mélin. In 1938, there were 240,000 spindles, or about 8% of the world total. Many mills work exclusively for export, selling abroad all varieties from the finest linen thread to tow. The linen cloth produced varies from cambrics, lawns and damasks to coarse sail-cloth, tent fabric and tarpaulin canvas.

The relative prosperity of the linen spinning and weaving industry has followed closely that of flax-growing. During the depression, the demand for finer linens practically disappeared since their production depended almost entirely on export, chiefly to the U.S.A. Most of the mills either worked on short time or with part of their machinery idle, and unemployment was widespread. A *Commission du Lin* was set up by the government in 1935 to study not only the problems affecting the production and treatment of flax but also trade questions. Among the Commission's recommendations were easier access to raw

materials, the granting of bounties to flax growers, strict control of the seed trade, state support of research work and encouragement of greater consumption of linen woven with yarn made of Belgian-grown material. The latter recommendation was strongly supported by the Belgian Weavers' Association and one of the first results was the placing of large orders for linen for Army sheets. Recovery, however, has been slow ,although the export of piece goods increased from 1,693 tons in 1931 to 3,462 tons in 1936; but there was a slight decline again to 3,177 tons in 1938.

Jute

The spinning and weaving of jute have been established on the banks of the Durme, notably at Lokeren and Hamme; there are outlying centres at Zele, Eekloo, Temsche and at a number of the Flanders towns. In 1938, there were twenty-one spinning mills with about 72,000 spindles, and twenty-one weaving mills with 3,000 looms. The greater part of the fibre is imported from India. As a rule, the spinning and weaving processes are carried out by separate concerns, but there are four large dual-purpose mills. There is a considerable production of yarns of various qualities, and of woven fabrics, including sacking, hessian, tents, tarpaulins and linoleum backing.

Silk

The Belgian natural silk industry is only of small importance, and it is carried on by firms whose major interests lie in the manufacture of other textiles or by small concerns producing for the clothing industry. Various silk fabrics, crêpe-de-chine and satins are produced from imported silk yarn, chiefly at Bruxelles, Deinze, Ronse and Gent. The yarn is obtained from France, Japan and Italy, usually already dyed. Until 1924, woven goods were sent to Lyons for finishing, but after that year the number of Belgian finishing factories increased until by 1929 they handled all the output of the weavers. The silk fabrics are produced almost entirely for the home clothing industry, and normally they supply from one-third to one-half of its requirements.

Rayon

In 1938, Belgium produced only about 5,000 tons of rayon yarn (mainly viscose) out of a European total of nearly 220,000 tons. The *Union des Fabriques belges de Textiles artificiels* (*Fabelta*), a Bruxelles firm with factories at Aalst, Tubize, Obourg, Ninove, Ecaussines,

Schoten, Anderlecht and Zwijnaarde, has an almost complete monopoly of the viscose variety of rayon, made from imported wood pulp. Acetate rayon, made from cotton linters, that is, waste from the cotton-carding machines, is produced at Tubize by a subsidiary of *Fabelta*, and by a smaller concern at Dottignies. These firms supply yarn to a number of weaving mills, at Bruxelles, Ronse and Gent, and to other textile firms for the manufacture of 'mixtures' such as rayon cotton.

The industry suffered severely during its early years from Italian, German and Japanese competition. As a measure of protection the Belgian government imposed a quota on imported rayon fibre in 1933. The industry made considerable progress during the period of sanctions imposed on Italy, for that country furnished the largest part of the allowed quota, and by 1938 rayon manufacture was probably the most prosperous branch of the textile industry.

Associated Textile Industries

Many products using various yarns or cloths as their raw materials are manufactured in Belgium, and a map plotting these associated manufacturers would include almost every town in western and central Belgium. Only a few items and main centres, however, can be mentioned in this survey.

Bruxelles is the centre of the clothing trade, Tournai specializes in hosiery, Vilvoorde in ribbons, Lier in embroidery. Nearly 10,000 domestic workers still make lace by hand, chiefly in the Brugge and Bruxelles regions, but this is merely the remnant of a flourishing industry of international reputation which in 1910 employed 79,000 people. A dozen factories in Bruxelles, Vilvoorde and Lier produce machine-made lace.

The manufacture of carpets is of particular importance, because Belgian carpets have been famous since the fourteenth century, and in 1938 over four-fifths of the output was exported. The invention of the Jacquard loom at the end of the eighteenth century enabled the old hand-woven Tournai or Bruxelles carpets to be imitated mechanically. A great variety of carpets is now produced, including 'moquette' or Wilton types and 'Axminster' types. A special line is the manufacture of matting carpets made of coco, sisal and jute fibres. The main centres for carpet manufacture are Bruxelles and Tournai, while other towns with a considerable production include Roeselare, Mechelen, Sint-Niklaas, Westerloo, Kortrijk, Mouscron and Hamme.

Miscellaneous Industries

Leather

The tanning of leather is an old-established Belgian industry; tanning pits dating back to Roman times have been discovered in the Ardenne. The industry has for a long time been located in a few main districts, at Tournai, at Malmédy and Stavelot, at Soignies and Verviers and at Zaventem; this distribution was doubtless influenced by the plentiful supply of skins from local cattle, and by the accessibility of bark in the oak forests. New tanneries have been built nearer the sea, at Sint-Amand and Dendermonde, importing both hides and tanning extract.

The leather-using industries are widely scattered throughout Belgium and employ some 50,000 people; they use both home and foreign tanned leather, and the outstanding centres are Bruxelles, Tournai and Verviers. A wide variety of leather articles is manufactured, but there is also a certain degree of specialization. Thus Tournai is the chief centre of grained leather and Bruxelles of morocco leather. Industrial leather, chiefly machine belting, is made principally at Verviers, and also at Gent and Antwerpen.

As late as 1913, most of the boot- and shoe-making industry was carried on by hand. After 1920, factories equipped on modern lines increased in number in the Bruxelles area, and also at Gent, Tournai and Verviers (specializing in heavy military boots). By 1929, the export of footwear totalled over 7 million pairs, valued at 220 million francs. During the depression years, this export trade declined enormously and in 1936 the value totalled only 15 million francs.

The Belgian leather glove industry owes its reputation to the Flemish domestic craftsmen, and machine-made gloves have failed to oust the high-quality products of Aalst, Oudenaarde and Ninove. The cutting out of the materials is done in Bruxelles, the sewing carried out by women home workers in these three Flemish towns and their adjacent villages.

The preparation of rabbit and hare skins is a specialized branch of the leather industry. The annual Belgian production of skins was about 50 millions, while an average of 10,000 tons of raw skins were imported, mainly from France. The industry is shared by about twenty factories, mostly near Gent. The average annual export of raw rabbit and hare skins is 2,400 tons, chiefly to the U.S.A., and the export of dressed skins averages 460 tons. In addition, about 1,700 tons of rabbit fur are exported annually.

Furniture and Timber Industries

The skill of Belgian cabinet makers has been renowned for centuries, and the museums of western Europe are rich in specimens of their work. The manufacture of high-class furniture has survived, especially at Bruxelles, Mechelen, Kortrijk and Tournai. Ordinary plain wood furniture is widely made, particularly at Antwerpen, using imported timber. Tournai specializes in ply-wood furniture, Ath in bent-wood furniture.

In the Ardenne, a number of small industries exist, dependent on local timber; they include the making of casks, tubs, and clogs (especially at Philippeville and Couvin) and of toys. Some timber is imported from Latvia.

Belgium is one of the world's leading match producers, and the average annual production is over 1,500 million boxes a year. More than half of the output is exported, principally to Great Britain. The outstanding firm is the *Union Allumettière* of Bruxelles. Other towns with large factories are Ninove, Godarville, Overboelare and Deurne.

Diamonds

The diamond industry (that is, the cutting, polishing and setting of rough stones) in Europe is confined mainly to Antwerpen and Amsterdam. The rough stones are imported from South Africa through London, from Brazil through Paris, and from the Belgian Congo. The chief market is the U.S.A., although London and Paris are large customers.

The world depression hit the diamond industry, although not as hard as might have been expected, since the intrinsic investment value of the stones helped to keep the industry alive. Nevertheless, under 5,000 of the 13,000 skilled workers and 17,000 other workers of Antwerpen's forty firms were in employment during the years of depression. In 1934, the industry began to recover, and 1935 was a year of steady prosperity. A diamond exhibition was held at Antwerpen in 1936, and it attracted much interest. Activity in the trade steadily increased after 1936, because world unrest encouraged many people to purchase diamonds as a portable and easily realizable investment.

An important subsidiary is the preparation of diamonds for industrial use, chiefly for boring and drilling tools but also for glass cutting and polishing. A number of firms, such as the *Cie belge du Diamant industriel* in Bruxelles and the *Etablissement technique*

diamantaire in Antwerpen, buy small or imperfect stones and waste from the diamond cutters.

Food Industries

Although less striking perhaps than the metallurgical, chemical and textile industries, the manufacture or preparation of food and drink is widespread and of great importance. The following table summarizes the production of the main commodities in 1937:

Commodity	No. of factories	Output
Alcohol	19	*394,846 hectolitres
Beer	1,223	14,227,647 hectolitres
Sparkling wines	52	10,926 hectolitres
Fruit juices, cordials, etc.	29	8,447 hectolitres
Glucose	6	31,281 tons
Sugar	36 factories	86,586 tons coarse sugar
		136,033 tons refined sugar
	9 refineries	41,133 tons refined sugar (castor)
		152,337 tons refined sugar (other)
		1,176 tons syrup
Margarine and prepared fats	27	55,347 tons

* Of this, 205,294 hectolitres were used industrially.

Source: *Annuaire statistique de la Belgique*, p. 211 (Gand, 1939).

Large-scale flour milling is concentrated at the ports, chiefly at Antwerpen, Gent and Bruxelles, where imported grain is milled, and at agricultural market towns such as Leuven, Tienen and Roeselare. Among a wide variety of food industries may be mentioned a number specially important for their exports; these include biscuits, tinned vegetables, condensed and powdered milk, cattle food, including oil-cake (see p. 329), kiln-dried sugar-beet pulp, and roasted chicory. These industries are widespread, but many of the factories are, of course, situated in the large population centres of Bruxelles, Antwerpen and Gent, or at agricultural centres and market towns, notably Leuven.

Sugar is refined mainly at Tienen, Antwerpen and Bruxelles, but there are many factories and refineries in other parts of the country, including Verviers, Hasselt, Oreye, Gent, Merksem, Veurne, etc. The largest single concern is the *Raffinerie tirlemontoise* at Tienen, whose output of 200,000 tons is almost half the Belgian total. The industry is based almost entirely on home-grown beet. An important

branch of the sugar industry is the making of sweets and chocolate; the raw material for the latter is obtained from cacao plantations in the Congo.

Tobacco

Between 4,500 and 5,000 tons of tobacco leaf are produced annually, but the manufacturing industry is mainly supplied by imported leaf. The output of manufactured tobacco in 1938 was 6,628 tons. Tobacco for cigars comes from the Dutch East Indies, Brazil, Mexico and Cuba; for cigarettes, from Bulgaria, Turkey, Greece and the U.S.A. The leading factories are nearly all in Bruxelles, with a few others at Antwerpen, Geeraardsbergen, Gent and Liége. There is no state monopoly, consequently there is a considerable export, particularly of cigars.

BIBLIOGRAPHICAL NOTE

(1) Statistics, used both in the tables and in the text, have been obtained from the following publications:

(*a*) *Annuaire statistique de la Belgique* (Gand).

(*b*) *Annales des Mines* (Bruxelles); this quarterly journal is published by the *Administration des Mines*; it contains useful articles, notes, surveys, etc., on various aspects of the mining industry, and a detailed annual statistical appendix entitled *Statistique des Industries extractives et métallurgiques.*

(*c*) *Recensement économique et social au 27 Février*, 1937 (Bruxelles), published by the *Office centrale de Statistique*, contains a detailed census of the industrial population of Belgium. So far, however, the volumes for only seven provinces have been published.

(2) The annual industrial and commercial directories and trade reviews contain lists of firms and useful details of their activities. The most important are as follows:

(*a*) *Indicateur des Produits belges* (Bruxelles), published by the *Fédération nationale de Chambres de Commerce et d'Industrie de Belgique.*

(*b*) *Comité central industriel de Belgique: Liste des Etablissements industriels affiliés* (Bruxelles).

(*c*) *Official Directory of Belgian Exporting Manufacturers* (Bruxelles), published by the Foreign Trade Department of the Ministry of Foreign Affairs and Foreign Trade.

(*d*) *Annuaire du Commerce et de l'Industrie de Belgique*, 2 vols. (Bruxelles). Vol. I deals with Bruxelles and district, vol. II with the provinces.

(*e*) *Le Recueil Financier*, 3 vols. (Bruxelles). This gives details of nearly all the industrial and commercial concerns in Belgium.

(3) A number of articles by Belgian geographers on various aspects of industry are contained in *Bulletin de la Société belge d'Etudes géographiques* (Bruxelles, published annually since 1931).

(4) The *Bulletin de l'Institut de Recherches économiques* (Louvain, quarterly) contains a number of general and historical articles, together with statistical appendices and occasional retrospective tables.

(5) Details of the Belgian and international iron and steel industry are contained in the following:

(*a*) F. Benham, *The iron and steel industry of Germany, France, Belgium, Luxembourg and the Saar* (London, 1934).

(*b*) *Statistics of the Iron and Steel Industries* (London, 1937). Published by the British Iron and Steel Federation.

(6) The reports on *Economic Conditions in Belgium* issued by the Department of Overseas Trade contain valuable information on Belgian industrial developments. The latest is dated June 1937 (London, 1937).

Chapter XIII

COMMERCE AND FINANCE

General Economic Situation: Commercial Policy: Foreign Trade: Finance: Bibliographical Note

General Economic Situation

Between 1919 and 1939 three major crises affected the economic life of Belgium. The first of these culminated in the attempts to stabilize the franc between October 1925 and March 1926, and it was caused and aggravated by financial and social factors arising out of the nation's effort to rehabilitate herself after the losses incurred in the war of 1914–18. The second crisis coincided with the world economic depression of 1929–33 and was accompanied by unemployment, declining trade and the flight of capital. The third crisis of 1935–6 was also largely a reflexion of world economic problems, but it had, in addition, certain features which made it peculiar to Belgium and led to the devaluation of the franc.

Post-War Recovery, 1919–26

On its return from exile (in 1918), at the end of military occupation by the Germans, the Belgian government set itself to the task of reconstruction. Two major decisions were taken: (i) To withdraw the large volume of German currency introduced by the invaders; this was done by means of a direct exchange, at the pre-war rate, of National Bank of Belgium franc notes for marks, thus placing a premium of nearly 50% on marks and encouraging the profitable smuggling of marks into the country, with the consequent swelling of circulating media. (ii) To assume responsibility for the entire cost of reconstruction; this consisted not only of repairing railways, state enterprises and public buildings but of making good both communal and private losses. The latter decision was made on the reasonable assumption that German reparations would compensate the government. Transactions over German payments, however, were protracted and long delayed, and the sums obtained were far from being full payment. Budgets at home became unbalanced and the national debt rapidly increased. Public confidence began to waver; the nominal

cost of reconstruction grew as a result of rising prices—rehabilitation subsidies rose to 19 milliard francs; nearly two-thirds of this amount came from loans, from increased taxation and from 'printing-press money'. With the failure of the Franco-Belgian occupation of the Ruhr, the French franc fell first in value, and in the train of economic and political factors the Belgian franc followed the depreciation of the French franc.

Two attempts were made in 1926 to stem the tide of inflation; the first, made by Janssen, failed, while that of his successor, Francqui, brought stabilization. The king and his ministers were granted full powers to carry out a programme of monetary reform: as a result of these measures, there followed the 'industrialization' of the railways, which were taken over by a private company (see p. 480); a foreign loan amounting to 10 million dollars was raised; the rate of stabilization was fixed at 175 francs to the pound sterling and a new international unit, the *belga*, was created—a simple multiple of the franc, on the basis of five francs for a belga. The creation of the belga was primarily intended as a signal to the trading world that the Belgian unit had broken away, both financially and psychologically, from the French franc. The belga, however, did not become a popular unit of account in Belgium.

The chief results of the stabilization of 1926 were a growth of optimism in business circles and a general easing of money. There was an export premium on Belgian manufactures, accompanied by low costs and high profits, which in certain industries resulted in expansion of plant and rationalization. Commercial lending proceeded apace, stock-market prices rose, there were budget surpluses and a gradual decrease in the public debt. The coal strike in Britain during 1926 favoured Belgian coal and metallurgical industries; the comparatively high rate of stabilization of the French franc gave Belgian producers for a short time competitive advantage in their most important market, while the general expansion of world trade gave a further fillip to Belgian commerce.

Depression and Recovery, 1929–36

As Belgium had shared in the general prosperity of the late nineteen-twenties, so too did she feel the grave effects of the depression. Thus the index of industrial shares fell from 104 in September 1929 (January 1928 = 100) to 77 in December, and industrial production fell from an index of 101 in 1929 to 89 in 1930. Textile production also declined from 95 to 78. In 1930, there was a decrease in value of

15% from the 1929 level in the total of Belgium's foreign trade and the budget showed its first deficit since 1926. Labour costs rose, the cost of living increased, followed by wages, while wholesale prices tended to decline.

Since the economic life of Belgium is largely dependent on foreign trade, the effects of the suspension of the gold standard by Great Britain in 1931, and the subsequent depreciation of the dollar, were quickly felt. Successive governments evolved different plans to control the situation: an easy-money policy, trade agreements for the reduction of tariff duties, mutual trade concessions (see p. 355)—these were some of the measures which were adopted. The most important step, however, was the entry of Belgium in 1933 into the 'Gold Bloc' with France, Italy, the Netherlands, Switzerland and Poland, declaring that 'the free functioning of the gold standard in their respective countries should be maintained at the existing gold parities and within the framework of existing monetary laws'. Despite all these measures, the foreign trade of Belgium contracted at an alarming rate: by 1934, exports had fallen in value from 2,649 million francs in 1929 to 1,124 million francs; similarly, imports had fallen in value from 2,961 million francs to 1,145 million francs. During the five years of 1929–34, the adverse balances of trade totalled 3,341 million francs. It was inevitable, therefore, that unemployment should mount rapidly; by the end of 1934, the number of totally unemployed was 213,000, or 27·2% of registered employees, with an additional 166,229 partially unemployed. Government expenditure increased reciprocally (see p. 283): 3·5 milliard francs had to be voted for public works, the whole of the reduction in the national debt since 1926 was offset, and the amount of the debt exceeded the record of 1926.

The depression in Belgium became deeper in 1935. In February, industrial production was only 67% of the 1928 level, and the value of exports in that month was lower than it had been in the same month of any other of the depression years. The number of totally unemployed rose to more than 220,000 (Fig. 84). A new government was formed in March to cope with the country's serious economic condition. M. van Zeeland, a vice-governor of the National Bank, became prime minister and he immediately asked for parliamentary authority to deal drastically with monetary, banking and industrial problems. The belga was devalued to a level 28% below the gold standard established in 1926; reforms were introduced into the banking system (see p. 377); export licences were established; retail prices were controlled; the rates of certain taxes and import duties

were reduced; and nearly half of the outstanding national debt was compulsorily converted at considerable saving in charges of interest.

The *Comité pour l'Office de Redressement économique* (O.R.E.C.) was set up as a co-ordinating committee for recovery. Its function was to prepare, co-ordinate and supervise the execution of measures taken by the government to promote the economic recovery of the

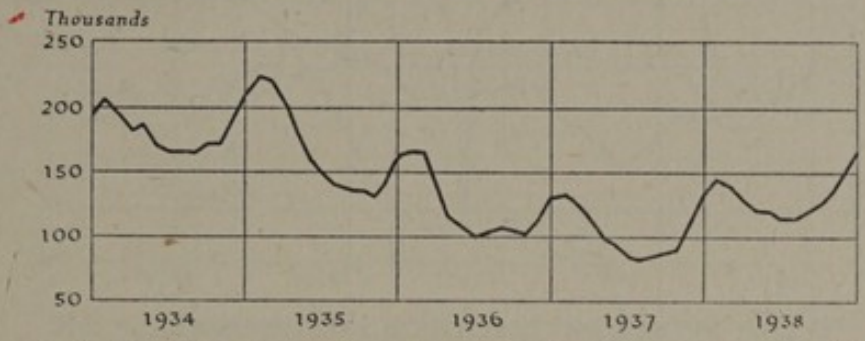


Fig. 84. Numbers of totally unemployed persons, 1934–8
Based on *L'Expérience van Zeeland en Belgique*, p. 387 (Lausanne, 1940).

country. In its first year, O.R.E.C. put into effect the financial and commercial decrees of the government and appointed two commissions to inquire into the situation of the depressed area of the Borinage and the French frontier district. The office was given a special grant of 3,872 million francs out of the 'profits' accruing from the revaluation of the National Bank's gold reserves.

After Devaluation, 1936–8

The first popular reaction to devaluation was one of bitterness, but most of the opposition soon disappeared as the financial and economic

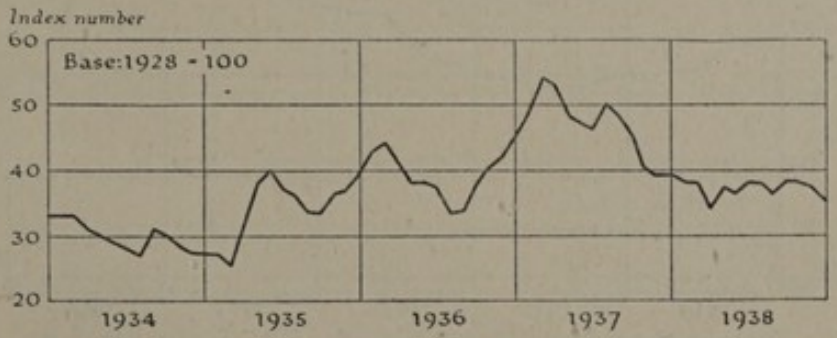


Fig. 85. Index of non-fixed interest-bearing securities in the Bruxelles Stock Exchange, 1934–8
Based on *L'Expérience van Zeeland en Belgique*, p. 387 (Lausanne, 1940).

position of Belgium improved. Capital rapidly returned to the country, there was a boom in the stock-market (Fig. 85), and unemployment showed a considerable decrease (Fig. 84). In 1936,

however, uneasiness again appeared, manifesting itself primarily in a number of strikes (see p. 284). The government introduced legislation providing for complete liberty of association for workers, establishing a 40 hr. week in certain industries and instituting an annual

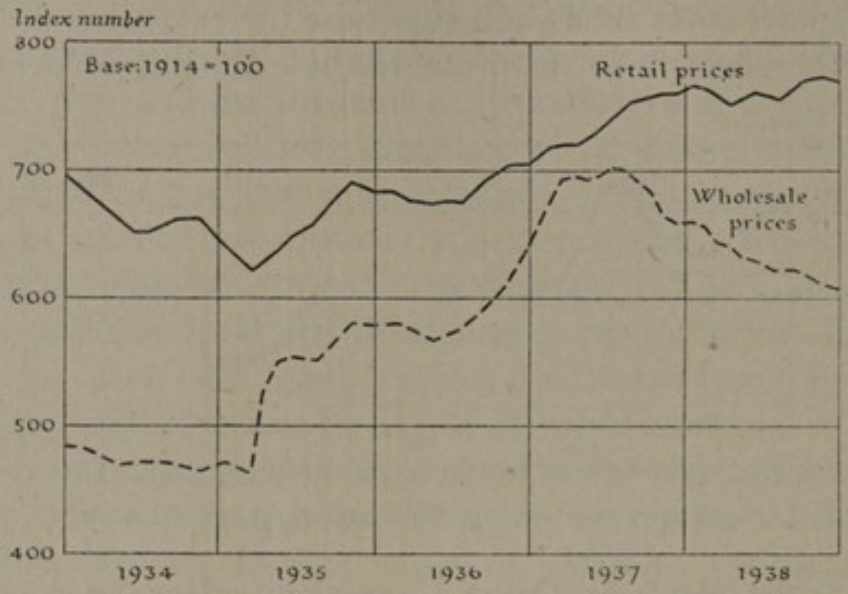


Fig. 86. Indices of wholesale and retail prices, 1934–8

Source: *L'Expérience van Zeeland en Belgique*, p. 386 (Lausanne, 1940).

holiday of six days on full pay in all industries (see p. 77). At first it was feared that the financial implications of the government's concessions would raise the price of Belgian goods and make competition in world markets more difficult for Belgium. This danger was

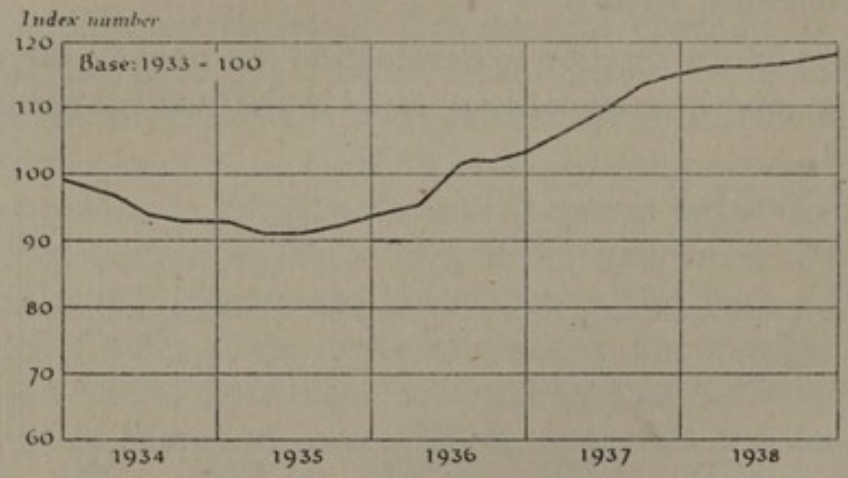


Fig. 87. Index of time wages, 1934–8

Based on *L'Expérience van Zeeland en Belgique*, p. 387 (Lausanne, 1940).

counteracted by factors affecting the economy of other countries. For example, France had effected much more drastic social legislation, and the subsequent rise in labour costs there had impaired her competitive power. Again, the higher cost of raw materials not only

affected all competing countries but tended to reduce the proportion of costs represented by wage increases or by the shortening of hours of work. Within Belgium there was continued abundance of cheap

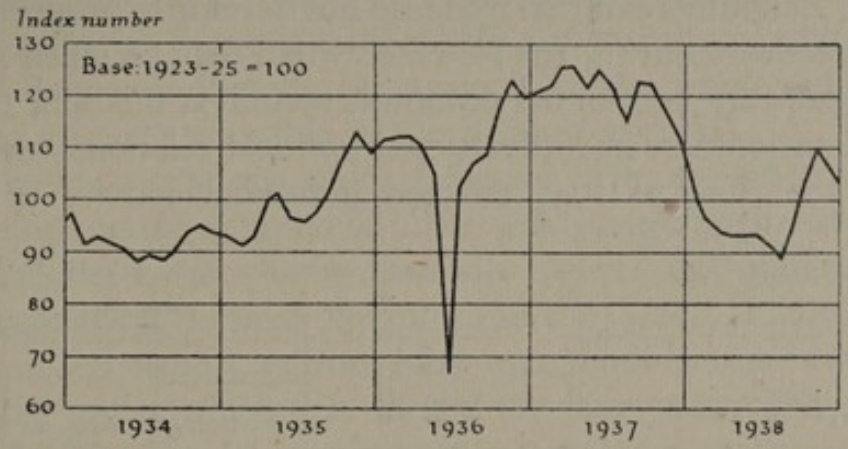


Fig. 88. General index of industrial production, 1934–8
Based on *L'Expérience van Zeeland en Belgique*, p. 385 (Lausanne, 1940).

money and a renewal of long-term industrial loans, together with a constant reduction in taxation. The devaluation of the 'Gold Bloc' currencies in September 1936 had little effect on Belgian trade and

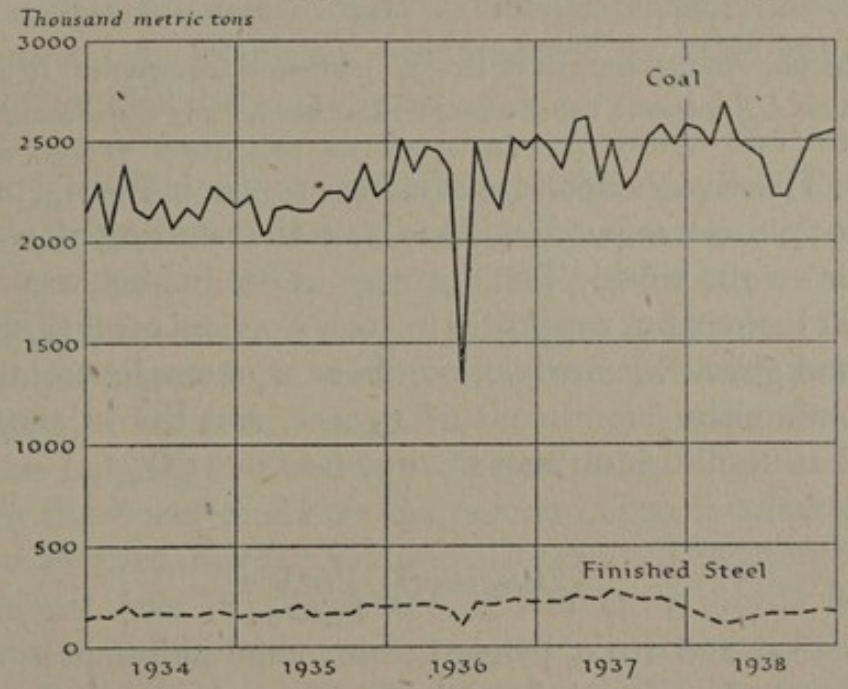


Fig. 89. Production of coal and finished steel, 1934–8
Based on *L'Expérience van Zeeland en Belgique*, p. 385 (Lausanne, 1940).

finance; indeed, the position of the Belgian franc was improved slightly during the readjustment of the neighbouring currencies. Between March 1936 and March 1937, indices of wholesale and retail prices showed that the former had risen nearly 20% while the latter

showed an increase of only 6% (Fig. 86); the margin of profit to industry was thus raised without an accompanying serious rise in the cost of living although the year had witnessed an increase in wages (Fig. 87). Belgium's external trade did not develop in proportion to her internal recovery during 1936—a fact which may be taken as a proof of the hidden strength of her economic system at this time (Fig 90).

The deterioration in international political relations which set in towards the close of 1937 affected industrial activity in Belgium

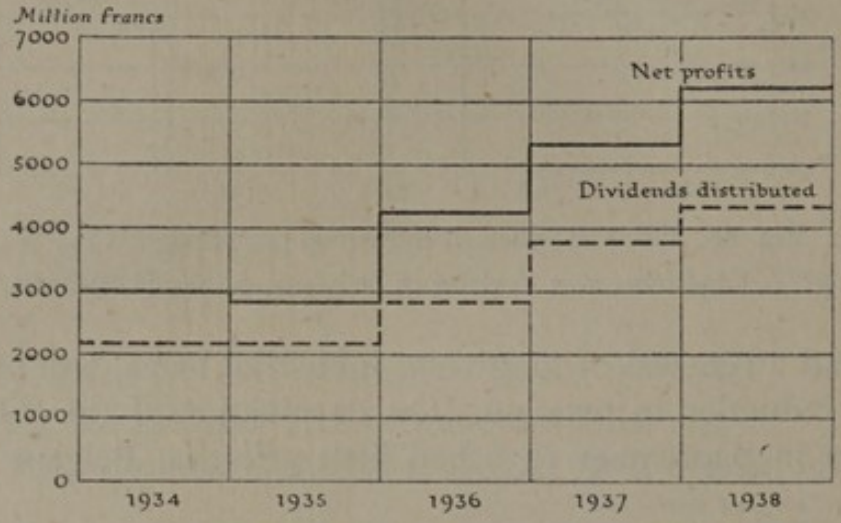


Fig. 90. Annual returns of Belgian joint-stock companies, 1934–8
Based on *L'Expérience van Zeeland en Belgique*, p. 385 (Lausanne, 1940).

(Fig. 88). There was a decrease of about 30% in industrial production during 1937–8 as compared with 20% in the 'sterling bloc' countries and 15% for the world. The decrease in production was noticeable in most industries but especially in coal, iron and steel (Figs. 74, 89), textiles and glass. Meanwhile, numbers of unemployed increased to a level ominously reminiscent of 1934–5, and the balance of trade showed less equilibrium than in 1937 (see p. 358).

Commercial Policy

Between 1831 and 1914, Belgian commercial policy passed through four main stages. From 1831 to 1834 there was a brief spell of free trade followed, between 1834 and 1847, by a movement for protective tariffs, first in favour of home agriculture, later to be extended to industry. Free trade came back into favour between 1847 and 1881 as the Liberal party gradually regained power; a number of commercial treaties, beginning with France, were concluded, all being based on the principle of free trade. From 1881 to 1914, commercial

policy was based on industrial free trade and agricultural protection. The Catholic party, which came into power in 1884, took up the cause of agricultural protection but did not abandon the Liberal policy as it affected industry. This ambiguity of policy had a two-fold effect: industrial free trade effectively assisted the vigorous development of Belgian industries, but agriculture as a whole did not benefit from the rise of prices due to the protective tariffs.

In the new conditions which followed 1919, an important stage in the development of commercial policy was reached by the establishment of the Belgian-Luxembourg Customs Union. In July 1921, an economic agreement between Belgium and the Grand Duchy of Luxembourg was signed and, as from May 1922, both countries entered into a customs union which was to last for fifty years. Farmers in the Grand Duchy were to receive an indemnity if the price of home-grown corn fell below a certain figure as a result of competition by Belgian farmers. A loan of 175 million francs was advanced by Belgium at 2%, Belgium paying the difference between this rate of interest and the rate of issue, 4%; Luxembourg currency was replaced by Belgian currency. A commission was set up to safeguard the interests of the Belgian and Luxembourg metallurgical industries, and a system of arbitration was arranged to settle any difficulties which might arise between them.

While many countries in the post-war world had made several changes in their commercial policies, Belgium strove to maintain a moderate industrial tariff policy and not to increase her agricultural tariffs. The strength of opinion in favour of free trade was reflected in the resignation of the Theunis ministry in 1924, when the Chamber of Deputies rejected the Franco-Belgian economic convention because Belgian interests demanded free trade, while the convention would tie Belgium too closely to 'protectionist' France.

When the world economic depression began to affect commercial relations in 1929, markets became disorganized and contracted, with concomitant falls in prices and reduction in purchasing power. Industrial countries endeavoured to concentrate on the development of agriculture and introduced protective tariffs, quotas and various import restrictions. Belgium, however, was loath to abandon her free-trade policy, although it was becoming increasingly difficult to resist the demand for protection (Fig. 91). The moderate agrarian tariff policy was rearranged, especially with regard to livestock, meat, butter and sugar. The following table shows the effects of the change on some important agrarian commodities between 1913–31:

Duties on Important Agrarian Commodities in Belgium, 1913–31
(*as a percentage of prices*)

Commodities	1913	1927	1931
Wheat, rye, barley, maize	Duty free	Duty free	Duty free
Wheat flour	7·1	2·0	3·6
Fresh pork	Duty free	Duty free	14·0
Raw sugar	79·0	29·0	100·0
Raw tobacco	38·0	24·0–47·5	69·0–128·0

Source: H. Liepmann, *Tariff Levels and the Economic Unity of Europe*, p. 76 (London, 1938).

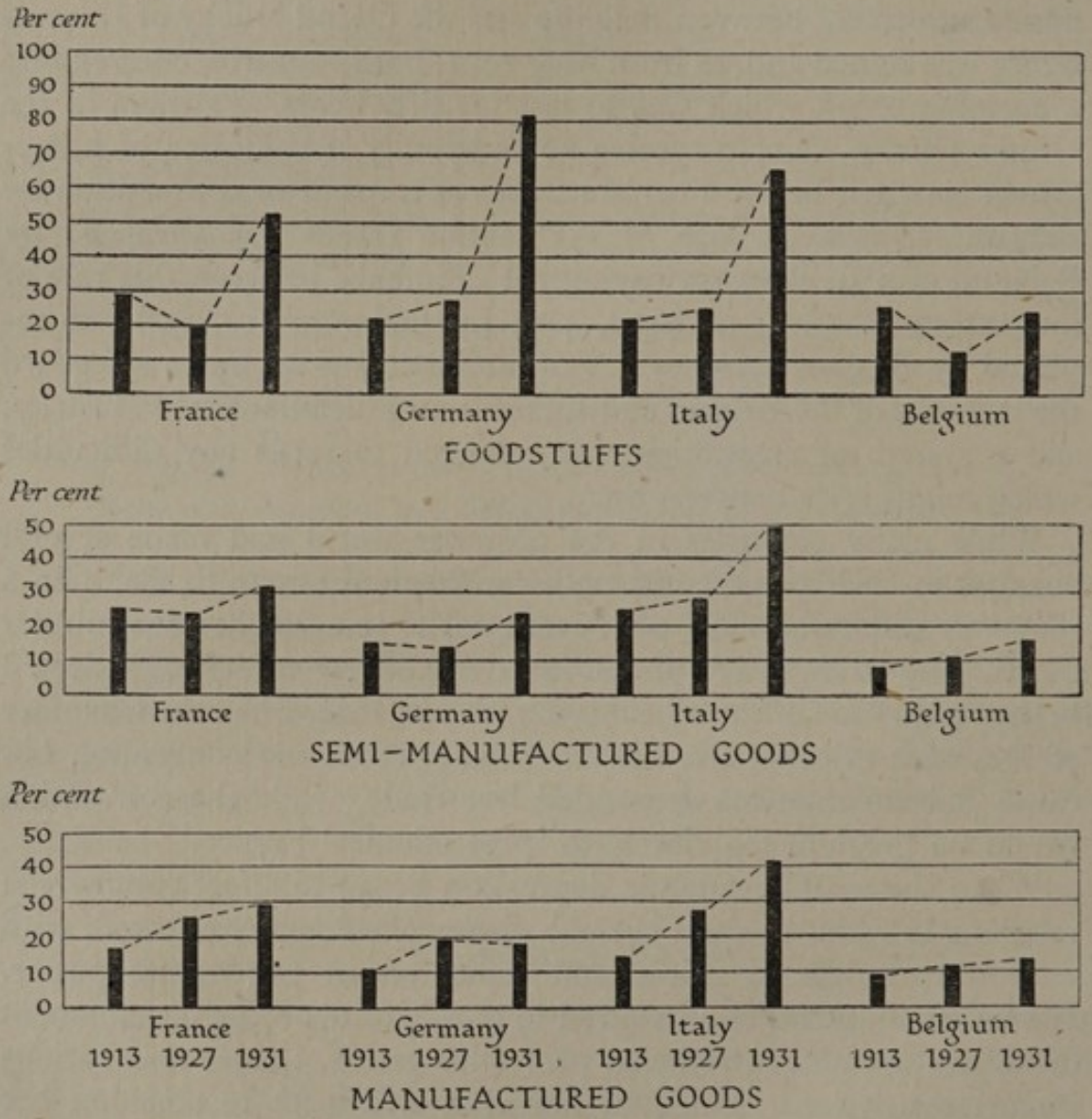


Fig. 91. Variations in the height of tariffs, 1913–31, in Belgium and in neighbouring countries

Based on H. Liepmann, *Tariff Levels and the Economic Unity of Europe*, p. 415 (London, 1938).
These graphs indicate 'potential tariff' levels, i.e. representative tariff levels, derived by taking averages of the normal prices of commodities constituting the principal imports of each of fifteen countries in Europe from all other countries in Europe.

Between 1919 and 1927, Belgium had been imposing moderate tariffs on semi-finished and finished industrial goods. By 1931, although additions had been made to the tariff list, there were several reductions. The main changes between 1913 and 1931 are set out in the following table:

Duties on Important Semi-finished and Finished Industrial Goods in Belgium, 1913–31 (*as a percentage of prices*)

	1913	1927	1931
A. Semi-finished goods:			
Raw cotton yarn, up to no. 50	1·2–4·8	0·7–3·0	0·6–2·2
Raw artificial silk yarn	Duty free	15·0–18·0	18·8–22·5
Cotton tissues	9·4–40·0	6·9–20·0	9·0–26·0
Pig-iron	2·4	1·0–1·5	1·2–1·7
Sulphate of ammonia	Duty free	60·0	110·0
B. Finished goods:			
Leather shoes	10·0	5·5–21·0	7·7–31·0
Cotton hosiery	15·0	18·0–30·0	16·0–27·0
Rayon stockings	15·0	25·0	25·0
Motors	1·4–8·4	4·0–32·0	3·5–24·5
Dynamos	0·8–4·8	5·3–24·7	5·1–24·0
Private motor cars	3·3–8·8	7·8–17·4	12·8–28·4

Source: H. Liepmann, *op. cit.* pp. 135–6.

In 1930, Belgium concluded the Oslo convention with Denmark, Norway, Sweden, Finland and the Netherlands in an endeavour to check economic nationalism and to reduce tariffs. The signatories to the convention agreed to give notice of any proposed imposition or increases in tariffs, so that they could take steps to safeguard their respective interests. Realization that restrictions on imports would not solve her economic difficulties led Belgium, together with Luxembourg, to conclude the Ouchy-Lausanne convention with the Netherlands in 1932; this provided for the progressive reduction of tariff barriers between the signatories and was open to the adhesion of all countries.

In 1933, the Belgian government set up a committee to consider the future course of commercial policy. In its report, which was subsequently approved by the government, the committee laid down two major considerations for the shaping of Belgian commercial policy: (i) to defend the internal market against dumped and abnormal imports; (ii) to practise an enlightened opportunism abroad; to improve the trade balance on those markets where exports had declined through customs or currency measures; to make use of Belgium's

purchasing power over raw materials and cereals as a bargaining instrument; to consolidate the country's position on her goods markets; and lastly, to strengthen relations with those countries whose currencies remained stable. In putting into practice the first recommendation of the committee, Belgium found it extremely difficult not to impose quotas and customs restrictions, and in some instances trade with the United Kingdom was most adversely affected. Throughout 1934, the policy of protection of the home market was continued and there was a further extension of the quota system. At the same time efforts were made to render effective a policy of enlightened reciprocity as envisaged in the second recommendation. Clearing agreements were established whereby importers in Belgium were compelled to make their payments to a central office which then met the claims of exporters to the same country. A number of general commercial agreements were concluded, the most important of these being two conventions concerning industrial goods and agricultural products between France and Belgium-Luxembourg. There were further agreements regarding quotas; for example, with Australia for the admission of a fixed quota of glass against the admission of Australian frozen meat into Belgium.

The programme of the van Zeeland government in 1935 did not involve a reorientation of Belgian commercial policy but rather a renewed effort to increase foreign outlets for Belgian manufactures. After the devaluation of the franc, the government instructed the chief export industries not to lower the price in foreign currency of their goods and not to export abnormal quantities. Export licences also were introduced. These measures, however, did not place Belgian exporters at a disadvantage, for they often sold at a loss before devaluation, and now they were enabled to sell at a profit, with an increase in income, although the volume of exports was not correspondingly increased.

Between 1936 and 1938, further attempts were made to promote the export trade of the country. These attempts mainly took the form of bilateral trade and payments agreements with a number of countries. In May 1937, the signatories to the Oslo convention of 1930 met at The Hague and concluded a further agreement; Belgium-Luxembourg and the Netherlands undertook to abolish quotas for specified commodities from the other subscribing countries and not to increase tariffs and duties on these goods, while the other signatories agreed not to introduce quotas or increase tariffs on specified commodities. The Belgian government later undertook to extend the

same concessions to the United Kingdom. The Hague agreement expired in 1938 and was not renewed.

Successive Belgian governments since 1930 have instituted several protective measures for agriculture. In 1938, imports of a large variety of agricultural products were subject to import duties, quotas and licences. Thus meat was either subject to quota or to licence; so, too, were several varieties of fruit, milk products and dairy produce (with the exception of cheese), some vegetables, rye and rye flour. This policy of restriction, though long established in Belgian commercial policy, placed the government in the difficult position of having to reconcile the insistent demands of farmers for protection on the one hand, and on the other the equally insistent calls of industrial workers for reduction in the cost of living. Among the plans evolved for solving this problem were the granting of export premiums for agricultural produce and subsidies for the home manufacture of cheese.

Foreign Trade*

Among European countries in 1938, Belgium ranked fourth in order of importance judged by total value of imports and exports. The value of trade per head of population in 1937 was higher than in any European country.

Per capita value of Imports and Exports Combined in 1937
(*in old U.S.A. gold dollars*)

Belgium-Luxembourg	122	Netherlands	102	Finland	66
Denmark	112	Sweden	99	Germany	40
Norway	106	United Kingdom	91	France	37

Source: *Statistical Yearbook of the League of Nations*, 1938–9, p. 219 (Geneva, 1939).

Belgium, being a highly industrialized country, is obviously dependent on foreign trade. Between 75 and 80% of her imports consist of raw materials and foodstuffs. Of the exports, manufactures amount to two-thirds of the total.

* (i) Throughout the following account trade statistics for Belgium are those published for the Belgium-Luxembourg Customs Union; there are no separate returns for the two countries. (ii) According to Belgian usage, commerce is divided into *commerce général* and *commerce spécial*; the former consists, in the case of exports, of goods produced in the country, and in the case of imports, of goods consumed in the country; the latter consists of goods in transit and is dealt with separately in this account.

Balance of Trade

In 1938, the total value of Belgian imports was 23,069 million francs, against an export value of 21,670 million francs, thus showing a visible adverse balance of trade amounting to 1,399 million francs. The following table shows the relation in value between imports and exports since 1932:

Value in thousands of francs

Year	Imports	Exports	Excess of imports over exports
1932	16,342,964	15,123,765	1,219,199
1933	15,242,863	14,288,246	954,617
1934	14,021,997	13,794,794	227,203
1935	17,445,761	16,125,953	1,319,808
1936	21,707,531	19,745,228	1,962,303
1937	27,892,782	25,516,225	2,376,557
1938	23,069,160	21,670,448	1,398,712

Source: *Annuaire statistique de la Belgique*, p. ciii (Gand, 1939).

Compared with 1937, imports in 1938 showed a decrease of 4,823 million francs (about 17%), and the decrease in exports was 3,845 million francs (about 15%). There was thus a small adverse balance (less than in 1937) in the ordinary balance of trade, but it should be noted that the actual tendency to lose gold, which thus arose, was less than might appear from the total figures since a considerable proportion of the adverse balance derived from trade with the Belgian Congo, a territory within the Belgian currency system, and thus did not necessitate the acquisition of foreign currencies.

Balance of Payments

The visible adverse balance of Belgium is not strikingly different from the trading position of any other advanced country with investments and business dealings abroad. A truer appreciation of the Belgian position is obtained from a study of the balance of payments for 1935 and 1936 which are the latest available.

The following table clearly illustrates that Belgium is normally a capital exporting country, since she does not import gold to the amount of her credit balances—2·7 milliard francs in 1935 and 3·1 milliard francs in 1936. The table includes the trade of the Belgian Congo with other countries as well as with the home country.

Balance of Payments, in milliard francs

	1935			1936		
	Credit	Debit	Balance	Credit	Debit	Balance
Trade	17·3	17·5	−0·2	21·3	21·5	−0·2
Services:						
Shipping	0·2	—	+0·2	0·3	—	+0·3
Transit trade	0·5	—	+0·5	0·6	—	+0·6
Tourists	1·2	0·1	+1·1	1·0	0·2	+0·8
Frontier travellers	0·3	—	+0·3	0·4	—	+0·4
Miscellaneous (commissions, insurances, licences, etc.)	0·1	0·1	—	0·1	0·1	—
Interest, etc.	1·6	0·8	+0·8	2·0	0·8	+1·2
Total (excluding capital movements)	21·2	18·5	+2·7	25·7	22·6	+3·1
Capital movements (balance)	—	—	−2·7	—	—	−3·1

Compiled from official statistics.

Transit Trade

Belgium's geographical position and her possession of Antwerpen and Gent make her an important medium for transit trade, that is, traffic between foreign countries passing through her territory (see pp. 418, 439). This trade has assumed considerable proportions: in 1938 it amounted in value to 22,700 million francs compared with 31,539 million francs in 1937 and 15,842 million francs in 1936. The chief commodities in transit are vegetable produce, minerals, machinery, livestock, textiles and metals. Of total traffic inwards, about 81% is from European countries with about 10–12% from America. Of total traffic outwards, 77% is for European countries and 6% for America.

Import Trade

Belgium is not self-sufficient in food supplies for her population, either human or animal (Fig. 92), and she is also deficient in almost every raw material essential to the manufacture of goods on which her export trade depends. The following table shows the relative importance in value of the main groups of commodities which form Belgium's import trade.

In 1938, 48% of Belgium's imports came from other highly

Main Import Commodity Groups
(values in milliards of francs)

Group	1937		1938	
	Value	Percentage of total value	Value	Percentage of total value
Mineral ores, metals and metal goods	4·5	16·3	3·4	14·8
Food, drink and tobacco	5·9	21·4	5·2	22·6
Textiles (mainly raw materials)	4·7	16·6	3·5	15·3
Precious metals and stones	1·2	4·4	1·2	5·2
Chemicals	1·2	4·4	1·2	5·2
Fuels	2·3	8·3	2·0	8·7
Machinery	2·2	8·0	2·0	8·7
Non-metallic minerals	0·6	2·1	0·4	1·7
Hides, skins, leather	1·0	3·6	0·7	3·0
Wood and cork	0·9	3·2	0·8	3·5
Fats and waxes	0·8	2·9	0·6	2·6
Paper	0·5	1·9	0·4	1·7
Clothing	0·3	1·1	0·2	0·9
Rubber	0·3	1·1	0·2	0·9
Miscellaneous	1·0	3·2	0·8	3·5
Gold and bullion	0·4	1·5	0·4	1·7
Total	27·8	100·0	23·0	100·0

Source: *Bulletin Mensuel du Commerce . . . de l'U.E.B.L.*, 1939 (Bruxelles, 1940).

industrialized European countries, 6% from the rest of Europe (excluding the U.S.S.R.), 21% from the British Dominions, India and other European overseas territories, and 25% from the rest of the world. Of the imports coming from continents other than Europe, 19% came from the Belgian Congo, 28% from the overseas territories and dominions of other European countries, and 53% from other overseas countries. The following seven groups comprised the most important commodities:

Mineral Ores, Metals and Metal Goods. Almost all the ores and metals necessary for Belgian industry, amounting annually to from 12 to 15 million tons, have to be imported, since Belgian production is almost negligible (see p. 314). The following were the most important by value in 1938: iron ore (469·1 million francs, chiefly from France); tin ore (211·2 million francs, chiefly from the Belgian Congo); zinc ore (196·5 million francs, chiefly from Mexico); lead ore (132·4 million francs, mainly from Bolivia and Jugoslavia); pyrites (29·4 million francs, with Spain as the leading supplier); copper (901 million francs, mostly from the Belgian Congo).

Food, Drink and Tobacco. There is an annual deficit of every commodity in this group with the exception of eggs, cereal preparations

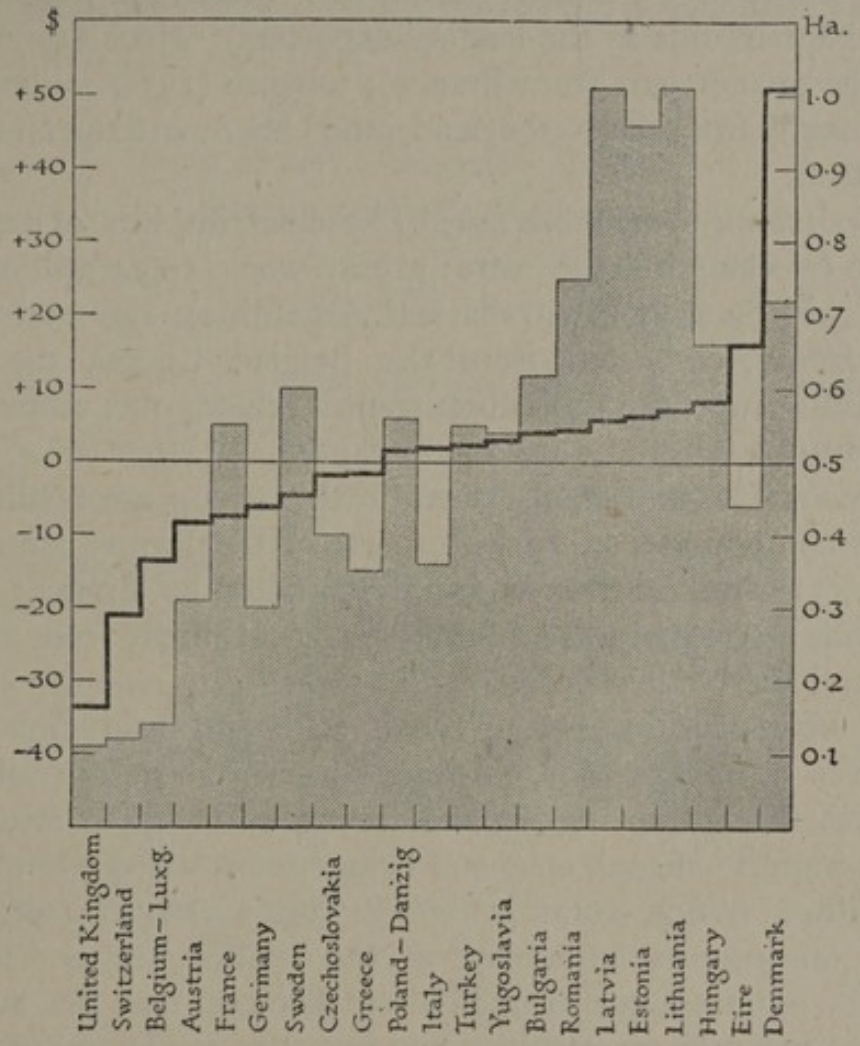


Fig. 92. Trade in foodstuffs and cultivated area per head of population, 1936

Based on *Europe's Trade*, p. 14 (League of Nations, Geneva, 1941).

The figure shows the value of net imports or exports of foodstuffs and the cultivated land per head of population in twenty-one European countries. The countries are arranged in order of magnitude of their balance of trade in foodstuffs. The majority of the industrial countries are largely dependent on imports of foodstuffs, but owing to their industries and their considerable foreign trade, their populations, though denser, were better supplied with foodstuffs, especially high-priced animal products, than were those of many agricultural countries.

The thick line, with scale on the left, indicates net imports or exports of foodstuffs and live animals per head of population; the shaded portion, with scale on the right, represents the cultivated area per head of population.

and sugar. The chief imports by value in 1938 were: wheat (1,163 million francs, chiefly from the U.S.A., Canada, the U.S.S.R. and Argentina); maize (543·8 million francs, with Argentina and the U.S.A. as leading providers); barley (370·6 million francs, mainly

from Poland, the U.S.A. and the U.S.S.R.); vegetables (341 million francs); fruit (414 million francs, supplied mainly by France and the U.S.A.); coffee (233·5 million francs, with Brazil, the Belgian Congo and the Netherlands as the leading exporters); wines (166·6 million francs, the greater part from France); tobacco (137·4 million francs, bought mainly from the Netherlands, the U.S.A. and the Netherlands East Indies).

Textiles (*mainly raw materials*). The chief imports of textile raw materials by value in 1938 were: greasy wool (1,434 million francs, exported chiefly from Australia and Argentina); raw cotton (775·2 million francs, imported from the Belgian Congo, the U.S.A., British India); flax (199·9 million francs—chiefly flax straw for processing, from France and the Netherlands).

Chemicals. The two chief classes in this group are fertilizers and chemical compounds; in 1938, imports of the former amounted in value to 531·6 million francs, mainly supplied by France; chemical compounds amounted to 411·6 million francs, chiefly from Germany, France and the Netherlands.

Fuel. Belgium's imports of coal, coke and briquettes amount annually to 7 million tons, forming three-fifths of the value of all imports in this group, the balance being made up of mineral oils. In 1938, imports of coal, coke and briquettes reached a total value of 1,242 million francs, coming chiefly from Germany (see p. 297). Mineral oil imports amounted to 719 million francs. Belgium's petroleum requirements average about 800,000 tons per annum, of which 400,000 tons are gasoline, 200,000 tons gas/Diesel oil, 120,000 tons fuel oil, 70,000 tons lubricants and 20,000 tons kerosine. The main sources of supply are the U.S.A. (33%) and the Netherlands East Indies (12%), with smaller quantities coming from Mexico, Iran, Venezuela, Iraq and the U.S.S.R. About 308,000 tons were imported in 1938 as crude oil and refined in Belgian refineries.

Machinery. In 1938, electrical machines and apparatus amounted in value to 398·3 million francs, supplied chiefly by Germany, the Netherlands and the U.S.A.; motor vehicles amounted to 614 million francs (see p. 320); machine tools, accessories and appliances reached a total value of 863 million francs, again mainly from Germany and the U.S.A.

Precious Metals and Stones. Imports in 1938 amounted to 1,128 million francs; the most important among them were rough diamonds obtained from the Union of South Africa, the Belgian Congo and Angola.

Export Trade

The following table lists the main groups of commodities exported from Belgium in 1937 and 1938:

Main Export Commodity Groups
(values in milliards of francs)

Group	1937		1938	
	Value	Percentage of total value	Value	Percentage of total value
Mineral ores, metals and metal goods	7·7	30·0	5·8	26·8
Food, drink and tobacco	1·3	5·5	1·1	5·2
Textiles	5·4	21·0	4·3	19·9
Precious metals and stones	1·9	7·4	1·6	7·4
Chemicals	1·7	7·0	1·7	7·8
Fuels	1·6	6·2	1·6	7·4
Machinery	1·6	6·2	1·6	7·4
Non-metallic minerals	1·3	5·0	1·1	5·2
Hides, skins, leather	0·7	2·7	0·6	2·8
Wood and cork	0·2	0·8	0·1	0·4
Fats and waxes	0·2	0·8	0·2	0·9
Paper	0·2	0·8	0·2	0·9
Clothing	0·3	1·2	0·3	1·4
Rubber	0·2	0·8	0·2	0·9
Miscellaneous	1·0	3·8	1·1	5·2
Gold and bullion	0·2	0·8	0·1	0·4
Total	25·5	100·0	21·6	100·0

Source: *Bulletin Mensuel du Commerce . . . de l'U.E.B.L.*, 1939 (Bruxelles, 1940).

In 1938, 61% of Belgium's export trade was with the highly industrialized European countries, 9% with the rest of Europe (excluding the U.S.S.R.), 11% with the British Dominions, India and European overseas territories, and 19% with the rest of the world. Overseas trade was mainly with the United Kingdom, the U.S.A., Argentina and the Belgian Congo. The major part of Belgium's exports consisted of the following commodity groups:

Mineral Ores, Metals and Metal Goods. Total exports of ores, metals and metal goods average about 6 million tons; about 2·6 million tons of ore (mainly from Luxembourg) are exported. Exports of iron and steel amounted to 2·8 million tons; the combined exports of iron and steel products reached a value of 3,473 million francs and were sent to all parts of the world. Exports of lead amounted to 155 million francs and of lead manufactures to 20 million francs—chiefly

to the Netherlands, France and Germany; exports of zinc and zinc manufactures totalled 303 and 114 million francs respectively—the bulk being taken by the United Kingdom, Germany and France; exports of copper and copper manufactures came to 876 and 146 million francs respectively, with France and Germany as the leading buyers.

Foodstuffs. Until 1937 the chief exports in foodstuffs had been eggs, totalling in value to 1 milliard francs, mainly to the United Kingdom, and cereal preparations, averaging 200 million francs, but these had begun to show a considerable decline in 1938. On the other hand, exports of home-grown beet-sugar balanced imports of cane sugar in 1938.

Textiles. In 1938, exports of wool and woollen manufactures totalled 1,551 million francs, of which yarns and tissues accounted for only about 500,000 francs. Re-exports of wool totalled 1,026 million francs, mainly to France. Exports of flax fibre and yarns were increasing slowly during the years preceding 1938; exports of piece goods were bought chiefly by the U.S.A., Switzerland and Argentina. Combined flax and hemp exports amounted in value to 600 million francs. Exports of cotton and cotton goods amounted to 1,119 million francs; they went chiefly to the U.S.A., Argentina and the United Kingdom—for the greater part they consisted of piece goods; yarns and thread were mainly taken by Germany, the Netherlands and the Union of South Africa. There was also a re-export trade for raw cotton, almost exclusively for Dutch and German account.

Precious Metals and Stones. Exports in 1938 amounted to 1,591 million francs; the leading customers were the United Kingdom, British India, Canada, France, the U.S.A., Germany and the Netherlands.

Chemicals. (*a*) Exports of fertilizers totalled 831·5 million francs in 1938 and went mainly to the United Kingdom, France, Germany and the Netherlands (the latter two absorbing 80% of the total Belgian export of ground basic slag, about 1,200,000 tons). (*b*) Exports of chemical compounds amounted to 685·3 million francs; Germany and the Netherlands were the largest buyers of sulphuric acid, the Netherlands and France of hydrochloric acid, the United States, Finland and Sweden of sodium sulphate, France, the Netherlands and the U.S.A. of copper sulphate.

Fuel. To balance her imports of coal, coke and briquettes, Belgium was able to export a similar quantity of other coals, mostly of the low volatile variety (see p. 298). In 1938 these amounted to 6·6 million tons with a value of 1,221 million francs; France and the Netherlands were the chief consumers. Exports of mineral oil products reached

a value of 229 million francs, with the Netherlands as the main customer.

Machinery. Exports of electrical machinery and apparatus amounted to 458 million francs; other machinery, machine tools and accessories totalled 630 million francs, while exports of motor vehicles amounted to 301 million francs. Exports of arms and ammunitions in 1938 were valued at 353 million francs. Exports in this group were spread evenly over a number of countries.

Non-metallic Minerals. Cement and glass are the outstanding commodities in this group. Exports of cement in 1938 amounted to 188 million francs, with the Netherlands, the United Kingdom and the U.S.A. as chief customers. About 80–90% of Belgium's glass and glassware output is exported; in 1938 this amounted to 489 million francs, with the United Kingdom as the best customer for sheet glass.

Hides, Skins, Leather. In 1938 exports of dressed hides and skins amounted to 249 million francs. Rabbit and hare skins were an important feature in this group: about 2,430 tons of raw rabbit and hare skins were sold abroad, chiefly to the U.S.A., while 465 tons of dressed skin and 1,705 tons of rabbit fur were also exported, Germany being the largest customer for fur.

Foreign Trade by Countries

The following table shows the value of Belgian imports and exports (in millions of francs) by countries in 1937 and 1938:

Countries	Imports from		Exports to	
	1937	1938	1937	1938
France	3,442·8	3,310·2	4,401·4	3,324·1
United Kingdom	2,307·0	1,833·1	3,454·4	2,972·7
U.S.A.	2,367·7	2,488·6	1,908·8	1,442·7
Netherlands	2,274·9	2,074·9	2,818·3	2,609·8
Germany	3,174·8	2,599·1	2,779·0	2,648·4
Argentina	1,766·1	951·1	946·8	686·7
Belgian Congo	2,285·0	1,993·8	388·0	409·5
Italy	203·8	217·1	313·0	250·8
U.S.S.R.	748·3	783·4	448·9	444·2
Switzerland	305·7	276·3	620·0	588·3
British India	966·3	596·8	428·4	356·7
Poland	367·5	283·8	301·5	293·9
Others	7,682·9	5,661·0	6,707·9	5,642·7
Total for all countries	27,892·8	23,069·2	25,516·3	21,670·5

Sources: *Annuaire Statistique de la Belgique*, p. cvi (Gand, 1939), and *Bulletin Mensuel du Commerce...de l'U.E.B.L.*, 1939 (Bruxelles, 1940).

Trade with France

In 1938, France was the largest supplier of Belgian imports and the largest importer of Belgian goods. Imports from France represented 14·3% of Belgium's total import trade by value. Belgian exports to France represented 15·5% of her total export trade by value and she was France's fourth largest supplier.

Imports from France cover a wide range of commodities. In 1938, mineral products amounted to 641 million francs, with iron ore leading in value among them, followed by potash. Live animals and animal products were valued at 551 million francs, with hides and skins outstanding. Chemical products amounted to 328 million francs; textile products came to 322 million francs; metals and metal goods, consisting chiefly of iron and steel, aluminium, pig-iron, copper and ferro-alloys, to 304 million francs. Foodstuffs were valued at 190 million francs, with wines as the predominant feature.

Of Belgian exports to France, mineral products came first at 1,078 million francs; of these, coal accounted for about a quarter of the total value of all exports. Metals amounted to 559 million francs and consisted mainly of copper, lead, zinc and nickel. Vegetable products were valued at 458 million francs and comprised textile raw materials. Animal products (400 million francs and consisting mainly of wool), chemical products (151 million francs) and machinery (140 million francs) were the other important commodity groups.

Trade with the United Kingdom

In 1938, the United Kingdom ranked sixth as supplier of Belgian imports—British imports representing 7·9% of Belgium's total import trade by value. In the same year the United Kingdom stood second as receiver of Belgian exports—this trade representing 13·7% of Belgium's total export trade by value. In the value of imports and exports combined, the United Kingdom ranked third.

Imports from the United Kingdom consisted of mineral products (619 million francs in value: coal at 102 million francs, and uncut precious stones at 430 million francs, were outstanding), animal products (385 million francs, with wool accounting for 136 million francs), textile products (148 million francs, comprising cotton piece-goods, cotton yarns and woollen piece-goods), metals and metal goods (159 million francs) and machinery (151 million francs).

Exports from Belgium were metal and metal goods (698 million francs, with iron and steel outstanding), vegetable products (487

million francs, consisting for the most part of scutched flax), textiles (319 million francs, with cotton piece-goods leading), glass (162 million francs), stone and stonework (156 million francs). Cement and paper were also exported in considerable quantities; exports of uncut precious stones amounted to 197 million francs and of cut stones to 108 million francs.

Trade with the U.S.A.

In 1938, the U.S.A. ranked third as supplier of Belgian imports and accounted for 11% of Belgium's total import trade by value. In the same year the U.S.A. stood fifth as receiver of Belgian exports, a trade which represented 6·6% of Belgium's total export trade by value. In value of imports and exports combined, the U.S.A. ranked fifth.

Imports from the U.S.A. were headed by vegetable products amounting in value to 982 million francs. The leading commodities in this group were: wheat (430 million francs), maize (100 million francs), barley (49 million francs) and raw cotton (225 million francs). Mineral products followed at 440 million francs and consisted almost entirely of mineral oils (see p. 362). Imports of vehicles were valued at 413 million francs and mainly comprised automobile parts. The other important commodities were foodstuffs (207 million francs—mainly linseed oil-cake, lard and tobacco) and machinery (138 million francs).

Exports from Belgium of stone and stone-work consisted in large measure of precious stones, amounting to 408 million francs, textile products (251 million francs, with cotton carpets, cotton fabrics and bleached linen as special features), chemical products (190 million francs, with fertilizers outstanding), mineral products (154 million francs, with cement and coal-tar distillates as the leading commodities) and animal products (109 million francs, with skins a predominant feature).

Trade with the Netherlands

In 1938, the Netherlands stood fourth as supplier of Belgian imports and accounted for 9% of Belgium's total import trade by value. As receiver of Belgium's exports, the Netherlands again ranked fourth, accounting for 12% of Belgium's total export trade by value.

The Netherlands supplied the following commodity groups: vegetable products, amounting in value to 679 million francs (consisting mainly of flax, flax straw and refined vegetable-oil products); mineral products (513 million francs, chiefly uncut precious stones,

with coal and coke following); animal products (311 million francs, with cheese accounting for about half); foodstuffs (135 million francs, comprising dried milk, cocoa and chocolate).

Belgium's chief exports to the Netherlands were: metals and metal products (602 million francs, with iron and steel, spelter and rolled zinc the most important); mineral products (353 million francs, consisting of cement, coal and rough diamonds); textile products (347 million francs, chiefly fabrics and yarns); chemical products (189 million francs, with basic slag, nitric acid, hydrochloric acid and sulphuric acid as outstanding commodities); machinery (180 million francs); vehicles (160 million francs); animal products (156 million francs, with hides and skins predominant); vegetable products (150 million francs, including raw cotton to the value of 60 million francs).

Trade with Germany

In 1938, Germany ranked second as supplier of imports to Belgium, and these represented 11·2% of the total Belgian import trade by value. Her rank as receiver of Belgian exports was third, exports from Belgium to Germany representing 12·2% of the total Belgian export trade by value. In value of imports and exports combined, Germany ranked second.

The most important commodity groups imported from Germany in 1938 stood in the following order: minerals and mineral products (847 million francs, with imports of coal and coke amounting to 450 million francs); machinery (508 million francs); metals and metal products (275 million francs, chiefly iron and steel); chemical products (231 million francs); vehicles (126 million francs, being commercial vehicles, motor cycles and accessories); paper (103 million francs).

Exports from Belgium consisted of metals and metal goods (822 million francs); animal products (405 million francs, especially hides, skins and wool); mineral products (380 million francs, chiefly ores, coke and coal-tar distillates); vegetable products (262 million francs, mainly textile raw materials and vegetable extracts); textile products (235 million francs); chemical products (168 million francs, especially basic slag and sulphuric acid).

Trade with Argentina

In 1938, Argentina came seventh as supplier of Belgian imports, and trade with her amounted to 4·1% of Belgium's total import trade by value. As receiver of Belgian exports she ranked sixth, and

exports to Argentina represented 3·1% of Belgium's total export trade by value. In value of imports and exports combined, Argentina stood seventh.

Vegetable products accounted for 668 million francs out of the total value of 951 million francs; these consisted of wheat (131 million francs), maize (326 million francs), oats (30 million francs) and barley (19 million francs). The other important commodity group comprised animal products, amounting in value to 222 million francs, and consisting of wool, refrigerated meat, lard, and hides and skins.

Exports from Belgium were made up of metals and metal products (336 million francs, almost entirely iron and steel goods with small quantities of copper and zinc goods) and textile products (131 million francs). Sales of machinery amounted to 90 million francs.

Trade with the U.S.S.R.

In 1938, Soviet Russia was eighth among suppliers of Belgian imports, accounting for 3·4% of Belgium's total import trade by value. As receiver of Belgian goods she stood ninth, and sales to the U.S.S.R. represented 2% of Belgium's total export trade by value. In value of imports and exports combined, Soviet Russia ranked eighth.

Supplies to Belgium consisted chiefly of vegetable products (467 million francs, with wheat, barley and rye predominant) and timber (179 million francs, mainly pit-props and constructional timber). Mineral products, comprising phosphate of chalk, fuel oils and lubricating oils, amounted to 89 million francs.

Exports from Belgium were almost entirely made up of metals and metal goods (383 million francs, more than half of which were on account of copper and a fifth for tin).

Trade with the Belgian Congo

In 1938 the Belgian Congo ranked fifth as supplier of Belgian imports, accounting for 8·3% of Belgium's total import trade by value. As receiver of Belgian goods, the Congo came eleventh and exports represented 1·9% of the total Belgian export trade by value. In value of imports and exports combined, the Congo stood sixth. Exports from Belgium to the Congo in 1938 amounted to about 40% of the total import trade of 985 million francs.

Imports from the Congo into Belgium consisted primarily of metals (1,057 million francs, with copper accounting for about 50%

and gold for about 42%). Vegetable products amounted to 466 million francs, more than half of which were accounted for by cotton, the remainder being shared between vegetable oils, resin and rubber. Imports of minerals totalled 360 million francs (including 143 million francs for precious stones and 202 million francs for tin).

Supplies from Belgium to the Congo mainly comprised metal goods (108 million francs) and machinery (105 million francs). The remainder were distributed between vehicles, foodstuffs, leather and textile goods.

Trade with certain other countries

Australia. In 1938, Belgium's imports from Australia reached a total value of 650 million francs, thus placing Australia ninth among Belgium's suppliers. Animal products were valued at 590 million francs, with wool accounting for 584 million francs. Exports from Belgium amounted to 122 million francs, with textile products, glass and vehicles as the leading commodity groups.

Poland. Belgian imports from Poland in 1938 were valued at 283 million francs, thus placing Poland fourteenth among Belgium's suppliers. They consisted chiefly of vegetable products (167 million francs, with barley accounting for 114 million francs). Imports of timber were valued at 50 million francs, and minerals (wholly coal) at 33 million francs. Exports from Belgium totalled 294 million francs and consisted of animal products (118 million francs, chiefly hides, skins and wool), vegetable products (40 million francs, chiefly cotton), metals and metal goods (38 million francs), chemical products (26 million francs) and textile products (22 million francs).

Sweden. In 1938, Sweden ranked eleventh among Belgium's suppliers, and the value of imports was 460 million francs. The chief purchases from Sweden were minerals (150 million francs, with iron ore accounting for 107 million francs), paper (97 million francs, with pulp amounting to 57 million francs), machinery (60 million francs), timber (54 million francs).

Exports from Belgium amounted to 576 million francs and placed Sweden eighth among buyers of Belgian goods. Metals and metal goods were valued at 198 million francs, minerals (mainly coke) at 88 million francs, textile goods at 82 million francs, and chemical products at 64 million francs. Armaments were exported to the value of 15 million francs.

Switzerland. With imports valued in 1938 at 276 million francs, Switzerland stood fifteenth among Belgium's suppliers. Exports, on

the other hand, at 588 million francs, placed Switzerland seventh among consumers of Belgian goods. In value of imports and exports combined, she ranked eleventh among countries trading with Belgium.

Imports from Switzerland consisted of machinery (87 million francs), metal goods (35 million francs), textile products (35 million francs), chemical products (31 million francs) and clocks, instruments, etc. (29 million francs).

Belgium supplied Switzerland with metals and metal goods (160 million francs), vegetable products (76 million francs, consisting of raw textile materials, vegetable oils and vegetable extracts), animal products (70 million francs, with wool amounting to 50 million francs), minerals (45 million francs, chiefly coal and coke), textile goods (43 million francs), foodstuffs (37 million francs) and vehicles (36 million francs).

Finance

Currency

The unit of currency in Belgium is the franc, containing 0·0301264 gm. of fine gold, and it is the basis of the monetary system. The belga, equivalent to five francs and containing 0·150632 gm. of fine gold (see p. 347), is the authorized medium in all foreign exchange transactions. There are in circulation notes of the Bank of Belgium for 1,000, 500, 100 and 50 francs.

There have been considerable fluctuations in the value of the franc during the past twenty years. The following table shows the variations in relation to sterling since 1929:

Par: 175.00

1929	174·42	1934	115·97
1930	174·43	1935	105·12
1931	173·82	1936	146·20
1932	121·87	1937	145·63
1933	120·46	1938	147·32

The franc was stabilized in 1926 at 0·04184 gm. of fine gold or 175.00 francs to the pound sterling. After the economic crises of 1930–5, the franc was devalued in March 1935 (see p. 348), and exchange control was introduced for a short period. Despite the devaluation of other gold-bloc currencies in 1936, the Belgian unit was able to maintain its position.

The Budget

The following table gives the budgetary position (in thousands of francs) in Belgium for the six years 1932–7:

Year	Revenue	Expenditure	Excess of revenue over expenditure
1932	9,001,998	11,739,700	−2,737,702
1933	10,377,764	11,190,104	− 812,340
1934	9,984,414	11,383,688	−1,399,274
1935	14,292,234	13,568,651	+ 723,583
1936	11,359,479	13,920,302	−2,560,823
1937	11,361,364	15,311,987	−3,950,623

Source: *Annuaire statistique de la Belgique*, p. lxxvii (Gand, 1939).

The budget estimates for 1937 were as follows:

Revenue

	Thousands of francs
A. Ordinary Receipts	
Direct taxation	2,823,502
Customs and excise	3,017,266
Registration	3,651,449
Tolls	498,894
Capital and income	304,477
Reimbursements	528,427
	10,824,015
B. Exceptional receipts	116
C. Extraordinary receipts	224,962
D. Reparation receipts	54,214
E. Compensatory receipts	258,057
Total revenue	11,361,364

Note. Loans were estimated to bring 3,052,501 thousand francs, thus bringing the grand total of revenue to 14,413,865,000 francs.

Expenditure

A. Ordinary expenditure	
Public debt	2,414,437
Pensions	2,462,040
Endowments	46,835
Ministries:	
Justice	298,602
Foreign Affairs and Overseas Trade	86,343
Interior	64,774
Public Health	53,421
Education	1,143,655
Public Works	283,486
Agriculture	52,502

Ministries:	
Economic Affairs	38,913
Labour and Social Welfare	778,684
Colonies	90,898
National Defence	999,108
Gendarmerie	143,000
Finance	423,668
Communications	194,028
Posts, Telegraphs, Telephones	374,115
Non-values and reimbursements	1,124,026
	11,072,535
B. Extraordinary budget	2,618,557
C. Credits recommended by the O.R.E.C.	1,620,895
Total expenditure	15,311,987

Source: *Annuaire statistique de la Belgique*, pp. lxx, 146 (Gand, 1939).

Sources of Revenue

Direct taxation brings in about 25% of the revenue of Belgium. Of the direct taxes, income tax is the most productive, and in 1937 it was estimated to yield 1,769·7 million francs. It is levied on two bases: first there are the *impôts cédulaires*, or scheduled taxes, consisting of the *contribution foncière*, levied on income from land, the *taxe mobilière*, levied on income from moveable assets, and the *taxe professionnelle* on earned income; secondly, there is the *impôt personnel complémentaire*, which is imposed on the net income of an individual as returned in the various schedules. Between 1933 and 1938 a National Crisis Tax (*Contribution national de Crise*) was imposed as a super-tax on incomes, with rates varying according to the source of income. Other taxes are less productive and consist of taxes on hunting, fishing and grazing rights, on motor cars, on entertainments and gambling, on premises retailing wines, etc. In 1937, the *taxe mobilière* accounted for about 31% of the revenue derived from direct taxation and the *taxe professionnelle* for about 26%, with the *contribution foncière* bringing in about 12·5%, the *impôt personnel complémentaire* about 10%.

Slightly more than half of the revenue from customs and excise (which account for about 27% of the total revenue) is derived from duties on foreign wines. About 22% is yielded by the duties on sugar, glucose, tobacco and beer, with about 7% from the tax on the consumption of spirits and liquor. The other productive duties are those on fermented beverages, margarine, matches, mineral waters and liquid fuels.

Registration and transfer duties, which yield about 35% of the revenue, consist of stamp and similar duties, death duties, registration

fees, registrars' fees, mortgage duties, fines, naturalization fees and taxes on non-profit-making institutions.

The remainder of the revenue is derived from miscellaneous sources comprising river, canal, port and harbour dues, income from state forests and domains, licences for private radio transmitters, repayments of advances to provincial councils, post office profits and post office contributions to the national debt.

National Debt

The Belgian national debt in recent years has stood as follows (in millions of francs):

	1936	1937	1938
Consolidated debt			
Internal debt	23,105·8	25,745·1	26,525·2
Indirect debt	9,260·2	9,105·7	9,065·4
External debt	19,830·8	19,406·6	18,960·0
	52,196·8	54,257·4	54,550·6
Medium-term, floating debt			
Internal debt	1,713·6	1,504·6	2,051·3
External debt	774·9	—	732·5
	2,488·5	1,504·6	2,783·8
Total	54,685·3	55,762·0	57,334·4

Source: *Annuaire statistique de la Belgique*, p. lxxix (Gand, 1939).

The relative importance of the consolidated and floating debts and of the interior and external debts can be set out as follows:

	1936	1937	1938
Consolidated debt	95·45	97·12	95·14
Floating debt	4·55	2·88	4·86
	100·00	100·00	100·00
Internal debt	62·32	65·20	65·65
External debt	37·68	34·80	34·35
	100·00	100·00	100·00

Source: *Annuaire statistique de la Belgique*, p. lxxx (Gand, 1939).

In 1938, the distribution of the public debt per inhabitant was 6,836 francs, made up of 4,488 francs in respect of the internal debt and 2,348 francs for the external debt.

Communal Finance

Communes derive their revenue from a variety of sources. Chief among these are the *centimes additionnels* which consist of supplements to the ordinary national taxation, the supplementary amount being subject to government approval. There are several special taxes levied by individual communes; they include a *per capita* tax on firms employing a specific number of employees, percentage taxes on coal raised from mines, clothing taxes and window taxes. Several communes obtain revenue from their own public utilities (see p. 156). Government subsidies are often granted to communes when extensive schemes of improvement are undertaken, but an outstanding feature of local government finance in Belgium is the *Crédit Communal*, which was established in 1860 to advance loans to communes when local utility schemes could not be financed out of ordinary communal revenue. The stockholders of the *Crédit Communal* are exclusively the provinces and the communes, and the registered shares are not fully paid up. When a commune receives a public loan from the corporation, it undertakes to repay the loan in annual instalments. The *Crédit* is directed by a board consisting of communal or provincial councillors, but the government has the power of veto over any operations which infringe the law or the general interest of local authorities and the state.

Banking and Credit

The National Bank of Belgium. The central bank in Belgium is the *Banque Nationale de Belgique* which is also the bank of issue; it was founded in 1850 and has branches in most of the large towns. Up till recent years, the National Bank was a formidable competitor of the commercial banks, but it now undertakes the normal duties of a modern central bank. The capital of the bank is 200 million francs; its charter is established by legislation; its governor is appointed by the king for five years, and its provincial agents, as fiscal agents of the state, are also appointed by the king.

As in France, the Belgian population favours the banknote rather than the cheque for ordinary payments. Considerable quantities of cash are therefore needed by the various banks. Credits from the central bank are usually required, and until 1937 the only method of obtaining these was by rediscounting bills. In this way the National Bank attained a dominant position in the money market, and it has become the chief supplier of the cash requirements of the commercial banks.

The following table shows the note circulation (in millions of francs) on various dates in the month of December for the years 1932–8:

29 December 1932	18,134	30 December 1936	22,702
28 December 1933	17,093	29 December 1937	21,541
27 December 1934	17,650	29 December 1938	21,989
26 December 1935	20,582		

Source: *Bulletin hebdomadaire d'Information et de Documentation, Banque Nationale de Belgique* (Bruxelles, 1932–9).

The rise from 1934 onwards reflects the tendency to withdraw from the banks for hoarding.

The movements of the gold reserve of the National Bank between 1933 and 1938 were as follows:

Value in million old U.S.A. gold dollars

December 1933	380	December 1936	373
December 1934	348	December 1937	448
December 1935	346	December 1938	430

Compiled from official sources.

Value has been expressed in terms of old U.S.A. gold dollars of 1·50463 gm. of fine gold because the devaluation of 1935 and the fluctuations in the value of the franc would otherwise make it difficult to give a true assessment of the bank's holdings. The decrease in the reserve during 1934 is yet another indication of Belgium's difficulties before devaluation. The drain on gold reserves was checked after devaluation and was followed by an increase until 1937, when there was a net loss of 1·8 milliard francs of gold, 40% of which was accounted for by repayment of external debt, while the remainder represented withdrawal of foreign capital, repayment of private debts and some export of Belgian capital. This loss does not become apparent in the table because the bank declared a secret reserve of 5 milliard francs (gold ingots) in 1937, and the figure was subsequently included in the published reserve.

Commercial Banks. Up to 1914, one of the main characteristics of Belgian banking was the absence of concentration and the 'individualism' of the local banks. Among the major consequences of the inflationary period after 1919 was the growth in banking concentration. Since then four groups have dominated commercial banking in Belgium: the *Société Générale* (founded in 1822), the *Banque de Bruxelles*, the *Crédit Général* and the *Crédit Anversois*.

An outstanding feature of Belgian banking has been its relation to industry. In addition to discounting bills, the banks granted liberal current account credits. In the immediate post-war years, many

Belgian banks actually participated in the formation of industrial companies by subscribing to their securities and also sharing in increases of capital and bond issues. Representation on industrial boards became increasingly frequent and by the time of the depression there was scarcely any large industrial company completely independent of the banks. In 1934, however, several large banks ceased payment. Hitherto there had been no state intervention in the banking system but events forced the government to introduce legislation affecting the system. A law was passed fixing a minimum capital for banks, making obligatory the monthly publication of a standard balance sheet and—the most decisive step of all—forbidding joint-stock banks to participate in any way in the affairs of any company other than a banking company. This latter ruling, however, caused a further reorganization of the banking system. Most of the larger banks established holding companies to take over their industrial interests and these companies, which maintain the closest contact with the banks, are usually their chief debtors and occasionally the largest shareholders.

Another law of 1935 empowered the *Société Nationale de Crédit à l'Industrie*, a semi-official organization, to take over from the commercial banks a sum up to the value of 2 milliard francs of frozen credits which had been granted mainly to industry, and to give in exchange 3% five-year bonds guaranteed by the state, to be rediscounted with the National Bank. Another decree was promulgated in the same year, establishing for a period of five years the Rediscount and Guarantee Office (*Institut de Réescompte et de Garantie*), with the object of aiding banks, industrial, commercial and agricultural enterprises by mobilizing their security assets and satisfying their special credit needs. The office, which has an authorized capital of 200 million francs, purchases, discounts, rediscounts and accepts all types of paper relating to the operations of industrial, commercial and agricultural enterprises.

There has been a considerable decline in total deposits in Belgian commercial joint-stock banks since 1930. The closing down of several banks during the monetary reforms accounted for the sharp decrease between 1933 and 1935. The following table sets out the fluctuations of total deposits in joint-stock banks (in millions of francs), 1930–8:

December 1930	33,152	December 1935	19,103
December 1931	29,863	December 1936	20,612
December 1932	25,367	December 1937	19,631
December 1933	25,254	September 1938	14,610

Note: No statistics were published for 1934.

The Boerenbond (see p. 253).

Savings Banks

The general postal savings bank was created by law in 1865 and the *Caisse de Retraite* (retiring fund bank) was later joined to it. Since then the Belgian savings bank system has been fully centralized in the *Caisse générale d'Epargne et de Retraite*, an autonomous organization subject to state supervision and state guarantees. Its accounts are published in *Le Moniteur Belge* and are audited by the central accounting bureau. There are few independent local savings banks. Up to 1934 the *Caisse* shared in the general practice of granting long-term credits directly to industrial enterprises. This was brought to an end by the banking reforms, but the *Caisse* has continued to participate in various semi-official credit organizations.

Belgium is a country of small savers, and the *Caisse* differs from the joint-stock banks both in the amount of its deposits and in their stability, as shown in the following table (milliard francs):

31 December 1932	9·8	31 December 1936	11·5
31 December 1933	10·0	31 December 1937	12·5
31 December 1934	10·5	31 December 1938	12·7
31 December 1935	10·6		

The Postal Cheque System

The postal cheque primarily corresponds to the British postal order, but it also possesses many of the characteristics of the ordinary bank cheque. The system was introduced in 1913, and the *Office de Chèques Postales* is a division of the Ministry of Posts, Telegraphs and Telephones (see pp. 574-6). An account can be opened on demand by making a deposit. Cheques can be drawn on this account and transfers can be made from the account of one person to that of another. The deposits do not yield interest and there are no overdraft facilities. On the other hand, no charges are made, and the holder of an account can draw a postal cheque without any revenue stamp, transmit it by post without charge, and payment is then made to the creditor with notification being sent to the account holder of every transaction. Although there was a constant increase in deposits from 1·6 milliard francs in 1929 to 3·9 milliard francs in 1938, the total deposits were not large in comparison with either commercial or savings bank deposits.

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1. The authoritative collection of statistics on French trade is the *Bulletin mensuel du Commerce avec les Pays Etrangers de l'Union Economique Belgo-Luxembourgeoise*, 1939 (Bruxelles, 1940), which deals with trade by countries and by commodities, both by weight and value. The *Annuaire statistique de la Belgique et du Congo Belge* (Gand, 1939) contains convenient summaries of many of the tables. There is a wealth of statistical material in the *Statistical Yearbook*, 1938–9, of the League of Nations, Economic Section (Geneva, 1939).

2. The various reports on *Economic Conditions in Belgium*, published by the Department of Overseas Trade, provide extremely useful accounts both of financial and commercial affairs. The last published report is dated June 1937 (London, 1937). A valuable introduction to the international background of Belgian commerce is given in *Europe's Trade*, published by the Economic Intelligence Service of the League of Nations (Geneva, 1941).

3. In addition to the works listed on p. 344, the following books contain useful accounts of various aspects of Belgian commerce and finance: H. V. Hodson, *Slump and Recovery, 1929–1937: a survey of world economic affairs* (Oxford, 1938); L. Lecocq, 'La situation économique et financière de la Belgique', *Sciences Politiques*, New Series, no. 15, pp. 343–74 (Paris, 1939); H. Liepmann, *Tariff Levels and the Economic Unity of Europe* (London, 1938); E. Mahaim (editor), *La Belgique Restaurée* (Bruxelles, 1926); H. L. Shepherd, *The Monetary Experience of Belgium, 1914–1936* (Princeton, 1936); C. de Strycker, *Les fonctions et les opérations de la Banque Nationale de Belgique, 1914–38* (Bruxelles, 1939); H. Parker Willis and B. H. Beckhart (editors), *Foreign Banking Systems*, pp. 175–288 (London, 1929).

An anonymous work, *L'Expérience van Zeeland en Belgique* with a preface by M. van Zeeland (Lausanne, 1940), contains an account of economic conditions in Belgium both before and after the van Zeeland programme was put into effect.

Chapter XIV

MERCANTILE MARINE

Introduction: State of the Mercantile Marine: Personnel: Note on Belgian Tonnage Measurement: Bibliographical Note.

Introduction

Belgium, unlike most other countries bordering the North Sea, has not a strong maritime tradition. Thus, since Antwerpen is a convenient port of call for foreign-owned vessels leaving ports in Scandinavia, Germany, the Netherlands and the eastern United Kingdom, the majority of Belgian exports to non-European destinations have been carried by these vessels. Liner freight rates before 1930 were very low on certain routes, and since Belgian lines loaded cargo almost exclusively originating in Belgium, they were not able to compete successfully with the many foreign-owned lines serving the country. While there was, therefore, no incentive to create a Belgian fleet, the desire for self-sufficiency, on the other hand, induced Belgium to remedy the position. Considerable progress has been made in enlarging and modernizing the Belgian merchant fleet to enable it to compete successfully with the foreign fleets, some heavily subsidized, engaged on the trade routes serving Belgian ports.

State of the Mercantile Marine

World Rank in 1939

In 1939, Belgium ranked eighteenth, by gross tonnage of steamers and motor vessels above 100 tons gross, in the world's merchant fleets, about 0·6% of which were Belgian owned. Comparative figures for other countries are shown in the table on the following page.

According to the official figures published by the *Administration de la Marine*, which are based on the returns of vessels having signal code letters, the number of cargo-carrying merchant vessels on 1 January 1940 was only eighty-eight, amounting to 353,997 tons gross. In addition there were thirty-six state-owned vessels of 31,087 tons gross, eighteen tugs of 398 tons net and twenty dredgers of 11,642 tons gross.

	No. of vessels	Gross tons	Steamers gross tons	Motor vessels gross tons	Gross tons per 1,000 inhabitants
Belgium	200	408,418	250,401	158,017	48
Netherlands	1,523	2,969,578	1,619,233	1,350,345	340
Germany	2,459	4,482,662	3,306,778	1,175,884	66
Denmark	705	1,174,944	561,234	613,710	310
Norway	1,987	4,833,813	1,824,289	3,009,524	1,655
United Kingdom	6,722	17,891,134	13,294,286	4,596,848	377

Sources: (1) *Lloyd's Register* 1939–40, vol. III, Statistical Tables (London, 1939); (2) the 1938 population estimates are taken from the *Statistical Yearbook of the League of Nations*, 1938–9, p. 18 (Geneva, 1939).

Shipping Traffic

With such a small amount of merchant tonnage, the Belgian flag cannot figure prominently in entrances and clearances at Belgian ports, and in 1938 it accounted for only 9·6% of the entrances and clearances. The British and German flags were more important, as shown in the following table:

Flag	Entered Loaded and in ballast		Cleared Loaded and in ballast	
	No. of vessels	Net tons	No. of vessels	Net tons
British	4,605	7,057,463	4,675	7,122,345
German	2,406	6,363,656	2,406	6,337,399
Belgian	2,137	2,876,414	2,124	2,863,920
French	868	2,369,001	877	2,380,574
Norwegian	1,373	2,334,833	1,370	2,315,311
Dutch	2,725	2,032,195	2,753	2,045,183
Total for all flags	17,815	29,963,052	17,927	30,025,660

Source: *Bulletin du Commerce de l'U.E.B.L.*, 1939, pp. 635, 637 (Bruxelles, 1940).

By far the greatest number of entrances and clearances of Belgian vessels are from and for European countries; of these the United Kingdom is the most important, with over half the total entrances and clearances of Belgian ships.

The trade with the United Kingdom is also the most important for all ships entering and clearing Belgian ports. On few routes do the movements of Belgian ships exceed one-tenth of the total net tonnage for all countries, but Belgian vessels form about 24% of the total net tonnage trading with the United Kingdom. The Belgian flag, however, has the largest share in the Belgian Congo trade, with 94% of the net tonnage entering from and clearing for the Congo. Although

Movements of Belgian Vessels in 1937

Country	Entrances from (in ballast and laden)		Clearances for (in ballast and laden)	
	No. of vessels	Net tons	No. of vessels	Net tons
United Kingdom	1,816	1,782,289	1,840	1,794,559
Belgian Congo	66	274,329	66	264,583
U.S.A.	57	224,934	49	200,205
Argentine	35	135,309	37	138,204
France	89	52,570	67	40,904
Germany	39	41,096	34	30,806
Brazil	29	88,845	15	38,908
Curaçao	8	47,147	8	48,997
Egypt	25	49,000	17	35,248
Total for all countries	2,252	2,887,270	2,255	2,887,401

Source: *Annuaire statistique de la Belgique*, pp. 229–30 (Gand, 1939).

no statistics are available for the share of the national merchant fleet in the foreign trade of Belgium, about 10 and 8% respectively of cargo entering and clearing from Antwerpen and Gent in 1938 were carried in Belgian vessels. Since these two ports together handle about 80% of Belgium's shipping traffic these figures may be taken as representative of Belgian ports as a whole, and it can therefore be assumed that the percentage of foreign trade handled by the Belgian fleet is small.

During the economic depression of 1932–3 as much as 50% or more of the Belgian fleet, especially the larger vessels, was from time to time laid up. The protection of Belgian industry by import quotas and tariffs had serious effects on Belgian shipping; the coastal fleet was hard hit both by the coal import restrictions within Belgium, and by United Kingdom tariff increases. It was estimated in 1933 that if the entire fleet were active, between 3 and 4 thousand million francs would be earned for the national income as 'invisible exports', or the export of shipping services. Although 29% of Belgian shipping, almost equal to three times the world average, was still laid up at the beginning of 1935, almost every vessel was in commission in 1939.

Classification

Of the eighty-eight vessels classified in 1940 as forming the merchant fleet, fifty-seven of 217,221 tons gross are steamers and thirty-one of 136,776 tons gross are motor vessels. There are four vessels above 10,000 tons gross, but most of the fleet is between 1,000 and 6,000 tons gross, while twenty-two vessels are below 1,000 tons gross.

Thirteen of the thirty-one motor vessels are between 1,000 and 8,000 tons gross, and nine under 1,000 tons gross.

Tanker Fleet

In 1940 Belgium owned a modern fleet of nine tankers totalling 65,012 tons gross. They are all motor vessels built since 1924 in foreign yards, and they range in size between 4,919 and 10,529 tons gross, six vessels falling between 6,000 and 9,000 tons gross. The tanker fleet is owned by four companies, the principal two being the *Belgian Gulf Oil Co.* and the *Standard American Petroleum Co.*

In addition to the tankers there are five vessels of 32,400 tons gross fitted to carry cargoes of vegetable oil in deep or peak tanks. All are owned by the *Compagnie Maritime Belge* (*C.M.B.*) and they carry palm oil from the Belgian Congo.

Refrigerated Vessels

The *C.M.B.* also owned all the vessels with refrigerated cargo capacity; these fourteen vessels have a total insulated capacity of 350,415 cu. ft. The M.V. *Copacabana* (7,246 tons gross) has the largest refrigerated capacity—47,019 cu. ft., and the liner *Baudouinville* has a capacity of 37,358 cu. ft.

Age of the Merchant Fleet in 1940

Nearly half the merchant fleet (forty-one vessels) is over 20 years old and with one exception is steam driven. There are ten ships between 15 and 20 years old, thirteen between 10 and 15 years old, three between 5 and 10 years old and twenty-one under 5 years old. The vessels under 10 years old are all motor vessels, mostly built in Belgium.

Country of Building

Twenty-four vessels have been built in Belgium, and fifteen of the twenty-one vessels under 5 years old have been commissioned from home yards, including ten from the Hoboken yard of the *S.A. John Cockerill.* Of the remaining vessels twenty-four are German built, twenty-four British built, twelve Dutch built and the rest French, Danish and Swedish built. A considerable number of the oldest vessels are British and German built. Many of the former were constructed during the war of 1914–18 and were bought after the war. Most of the German-built vessels were acquired under the reparations agreements, for Belgium had lost 24·4% of her merchant fleet of 270,000 tons gross during the war.

Early in 1935 the Belgian government imposed a ban which virtually prohibited the sale of Belgian vessels to foreigners, the chief exceptions being made for replacements by new tonnage. This ban was lifted in 1938 and fifteen vessels of 40,138 tons gross were sold abroad during 1938–9, including one small vessel for breaking up. Two vessels of 9,675 tons gross were also sold to Belgian shipbreakers. In the same period four vessels were purchased from foreign countries.

State-owned Vessels (Plate 44)

In 1940 the state owned eight cross-Channel vessels, all built and engined by the *S.A. John Cockerill*, and ranging in size from the *Princesse Marie-José* (1,821 tons gross) to the 25¼-knot motor vessel *Prince Baudouin* (3,049 tons gross), and including the *London-Istanbul* (1,849 tons gross), a car ferry. These vessels made 1,121 entrances into Oostende from Dover in 1938. The school-ship *Mercator*, a three-masted schooner with an auxiliary Diesel motor, is managed for the state by a private non-profit-making company, the *Association Maritime Belge*. Built in 1932, the *Mercator* was specially designed for the training of mercantile marine officers. Unlike its predecessor *L'Avenir*, a sailing ship, it does not carry cargo, for in spite of the value of experience in cargo-handling on the older ship, the ship's itineraries were restricted to certain routes by the cargoes offering, and it was considered, in view of the time lost in loading and discharging in port, that the practical education of the cadets was restricted. Other vessels engaged on various services include the *Zinnia* (932 tons gross), a fishery protection and research vessel; the *Zeehond* (370 tons gross), a lightship tender and survey ship; a Congo river vessel and fourteen pilot vessels based on Oostende.

The *Administration de la Marine*, a department of the *Ministère des Communications*, operates these ships and it is also responsible for the pilotage and lightship services. The administration controls North Sea, Escaut and local port pilots. The North Sea pilots, by agreement with the Dutch government, are based at Flushing (Vlissingen) as well as Oostende.

Shipping Companies and Services in 1939

Belgian shipping is officially classified into deep-sea shipping and coastwise shipping (*cabotage*). All shipping to the United Kingdom and between Copenhagen or Kiel and Cape Finisterre trades as *petit cabotage*, while the term *grand cabotage* covers all shipping trading to Morocco, to the Mediterranean as far as Istanbul and in the Baltic.

Practically the whole Belgian merchant fleet is engaged in the liner trade and it is owned by eighteen companies. Belgian lines have for a long time run only to home ports and there are none trading exclusively between foreign ports. There are no exclusively tramp owners and very few vessels participate in the tramp trade, nor is there any purely coastwise shipping. Since Belgian liner services seldom compete at foreign ports, the cargoes offering at home ports restrict them to a few well-tried routes. The main service is that with the Belgian Congo, while the services to the east coasts of North and South America are also relatively important. Most of the remaining services are run to European destinations, particularly to adjacent countries and to the Mediterranean.

The principal ship-owning company in Belgium is the *S.A. Compagnie Maritime Belge* (*Lloyd Royal*), which on 1 January 1940 had a fleet of twenty-six vessels totalling 168,626 tons gross, including eight motor ships of 54,816 tons gross, all of which have been built since 1937. The company was formed in 1929 by the amalgamation of the *S.A. Cie Belge Maritime du Congo*, the *S.A. Lloyd Royal Belge* and the *Cie Africaine de Navigation*. The Congo line started as a Belgian associate of the British *Elder Dempster Lines*, but joint services are no longer run.

*Principal Ships of the Compagnie Maritime Belge**

	Tons gross	Year built	Speed knots	No. of passengers	Notes
Elizabethville	8,300	1921	13	278	
Thysville	8,300	1922	13	278	
Léopoldville	11,439	1929	17	361	Modernized and lengthened 1936–7. 2 knots added to speed
Albertville	10,629	1928	17	352	
Baudouinville (M.V.)	13,517	1939	17	395	
Moanda (M.V.)†	4,511	1937	12	—	Cargo only. Three similar vessels: *Moero* and *Mokambo* 45,000 cu. ft. refrigerated capacity each; *Mobeka* not refrigerated.
Copacabana (M.V.)	7,246	1938	14	136	Two sister-ships also

* All on the Congo run except the *Copacabana* class which trades with South America.

† Not refrigerated.

The main service operated by the *C.M.B.* in 1939 was the fortnightly mail, passenger and cargo service between Antwerpen and the Belgian Congo, calling at Teneriffe, Lobito (Angola) and Banana, Boma and Matadi in the Belgian Congo. The size and draught of the

ships on this route, especially the *Baudouinville*, were limited by the special requirements of river navigation on the 80-mile trip up the Congo to Matadi. A fast service, running to Brazil and the Plate, provided the most important route for emigrants leaving from Antwerpen. The service was originally maintained by cargo vessels accommodating emigrants in the poop. Except for vessels on the New York service, the remaining ships of the fleet were employed on intermediate runs to the Congo and to the Plate, mostly carrying cargo only. Two or three ships were held in reserve for the main lines,

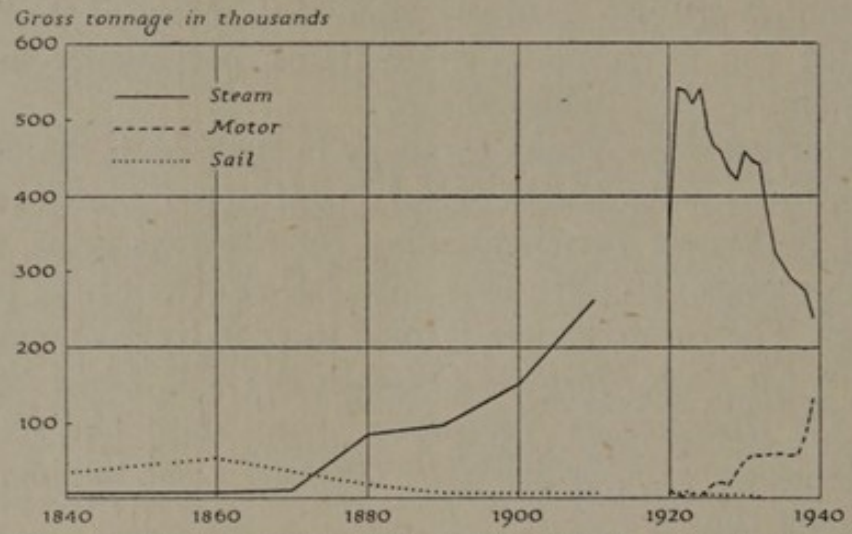


Fig. 93. Development of the merchant fleet—gross tonnage

Based on *Liste des navires de mer et des bâtiments de pêche belges*, no. 22, January 1939, p. 28 (Bruxelles).

and were laid up for short periods up to five months, but to keep them running they were frequently employed in the grain trade from Bahia Blanca or North American ports as tramps, making the outward voyage in ballast. The main features of the company's services, together with those of other Belgian companies, are shown in the table opposite.

The remaining shipping companies had small fleets engaged in the coastal trade, particularly to the United Kingdom.

State Aid to Shipping

From time to time since the war of 1914–18 various proposals have been made for government assistance in the building up of a strong merchant fleet. As early as 1926 Belgian exporters were encouraged to support Belgian lines to a greater extent, for the mercantile marine had not grown in proportion to the country's export trade. The amalgamation of three lines in 1929 to form the *Cie Maritime Belge* was, however, a symptom of the serious decline of the mercantile marine during the post-war years (Fig. 93). In 1930, 40% of the

Belgian Shipping Services

Company	Vessels and tonnage	Services in 1939*	Notes on cargoes, etc.
C.M.B.	5 ships 52,185 tons gross	Congo	Mail, passenger and cargo—*Léopoldville* fitted with deep tank forward for carrying palm oil
	4 ships 21,001 tons gross	Congo	Express cargo service. Vessels carry palm oil in deep tanks; this has steadily become the most important return cargo. Two with refrigerated capacity for transport of bananas which successfully encouraged creation of Congo banana plantations. Important cargoes: palm kernels, cotton, copper; others—coffee, copal, rice and sugar
	3 ships 21,738 tons gross	Brazilian ports and River Plate	Passenger and cargo. Holds have forced ventilation to prevent sweating of coffee during shipment from Brazil. Grain and meat return cargoes from Argentina
	4 ships 23,118 tons gross	New York	Passenger and cargo. Occasional calls at U.K.
Armement Deppe	29 ships 90,855 tons gross	Hamburg, Baltic ports, West Africa, Mediterranean, Brazil, and Plate, east coast U.S., West Indies. *Grand cabotage* — Bordeaux and also Tangiers and Casablanca	Cargo services. Three motor vessels—remainder medium-sized steamers over 20 years old; mostly second-hand purchases
Dens-Océan	2 ships 4,960 tons gross	U.K. ports to Greece, Palestine, Italy, Sicily	Cargo and passenger. Engaged in dried fruit trade
John Cockerill	5 ships 3,581 tons gross	Tilbury	Express cargo service nightly from Oostende for perishable goods (early vegetables and fresh fruits) in time to reach early morning London market. General cargo service—one or two sailings weekly
Armement René Geurts	2 ships 998 tons gross	Bristol Channel ports	Regular cargo service of short sea traders, mostly with chartered tonnage. Two coasters with low bridge structures and hinged masts to permit passage under bridges on Albert Canal

* All from Antwerpen except *Cockerill* express service from Oostende.

ships were over 20 years of age, and normal scrapping and necessary renewals were impossible owing partly to the financial loss which would be incurred and partly to the world economic depression.

Operating Subsidies

In 1930 the Belgian cabinet approved a credit scheme which had as object all operations favouring the maintenance, renewal and the extension of the merchant fleet. Long-term loans were to be granted to the owners of Belgian sea-going vessels on regular services, but in spite of the continued decline of the fleet no assistance was authorized until 1934. In that year, to encourage the commissioning of laid-up shipping, a long-term loan of 50 centimes per ton per day was granted free of interest and resulted in the recommissioning of 16% of the Belgian merchant fleet. In 1936, 75 million francs were allotted for the continuance of this operating subsidy, which was still in operation in 1940.

Shipbuilding Subsidies

Arrangements were made in 1934 to subsidize the building of vessels for the Belgian flag. The scheme did not become effective until 1936 with the granting of a shipbuilding subsidy of 160 million francs for private owners; in practice this was a long-term loan at a very low rate of interest. A further 106 million francs were allocated for state ship construction. Both subsidies were expressly designed to encourage the placing of orders in home yards and were granted only for building in Belgium with Belgian material. The replacement of old ships with government aid occurred in Belgium long after other countries and only when the preservation of its competitive value made imperative the modernization of the fleet. The *C.M.B.* embarked in 1936 on an extensive building programme, and by 1939 nine motor vessels had been completed, five of them in Belgium.

Between the outbreak of war in September 1939 and the end of March 1940, Belgium had lost through belligerent activities ships totalling 12,772 tons gross. The British blockade hit the Belgian mercantile marine seriously in 1939–40 by the delays which were caused in the 'Downs'. It became increasingly difficult for Belgium to obtain the use of sufficient foreign shipping for her needs, and the government was once again compelled to sponsor the building of several vessels in Belgian yards. To provide additional vessels before these could be completed, the *Société Maritime Anversoise* was formed in 1940, 46% of the capital being supplied by the *Agence Maritime*

Belge (the managers of *C.M.B.*) and 32% by the *United States Lines*. This new company took over eight vessels of 66,227 tons gross, with a total of 275,000 cu. ft. refrigerated capacity, of the *United States Lines* fleet, which continued on their pre-war run between Antwerpen, the United Kingdom and New York.

Mail Subsidies

The *C.M.B.* held in 1939 the government mail contracts, and it also agreed to carry materials for the government at fixed rates.

Personnel

Ships' Officers

A *brevet de matelotage* must be held by all officers of the mercantile marine, including engineer officers. Some officers are trained in the training ship *Mercator* (see p. 384), but this is not compulsory and an apprenticeship can be served on a sea-going vessel. State schools of navigation are established at Antwerpen and Oostende for the training of both bridge and engine-room officers; the latter must also serve an apprenticeship on land at Antwerpen, Gent or Oostende, where they may have experience in shipyards. A special school for the training of seamen and petty officers is situated at Oostende.

Colonial Crews

Congolese native seamen are employed on Belgian vessels, mostly as stokers, trimmers, cabin and deck boys and petty officers, but as they are not of Belgian nationality they have their own protected articles. These are signed for the return voyage from the Congo to Belgium, and Congolese labour may not be employed on any other trade. These seamen receive lower rates of pay than Belgian seamen. Firemen and trimmers receive about two-thirds, and cabin boys one-half, of Belgian seamen's pay.

Rates of Pay

Mercantile marine articles and the scale of wages vary as between deep-sea shipping and *petit* and *grand cabotage* (see p. 384). Wages are regulated by a law of 1928 and are adjusted as the necessity arises by a collective agreement between the owners and the men, under state supervision. The basic pay of officers increases with the tonnage of the ship. Further increments are given to officers holding a master's or a chief engineer's certificate; to officers with more than a certain number of years service; to officers on oil tankers and passenger ships

and to engineer officers only on motor vessels. The chief engineer is in all cases the highest paid rank on board.

Safety regulations and rules relating to passenger and crew accommodation of the *Inspection Maritime Belge* are very similar to those formulated by the British Board of Trade, and incorporate the recommendations of the International Convention for the Safety of Life at Sea ratified at Geneva in 1929.

Compensation for accidents to seamen occurring during working hours was introduced in 1930, and special legislation was instituted in 1931 for social insurance covering all ranks of sea-faring men in the merchant service.

Note on Belgian Tonnage Measurement

Belgian gross and under-deck tonnages are the same as the British, except that peak tanks are exempted from the gross tonnage. Net tonnage differs from British net tonnage, due to the method of measuring the propelling power allowance. The actual machinery space and bunkers are deducted in accordance with the old 'German rule', instead of using the British percentage method. Belgian net tonnage may thus be up to 15% in excess of comparative statistics for other countries. The tonnage figures used by Lloyd's underwriters, however, coincide with the figures issued for each vessel published by the *Administration de la Marine*. The Belgian net register ton is usually known as the *Moorsom* ton.

BIBLIOGRAPHICAL NOTE

1. A full list of the vessels forming the Belgian merchant fleet, together with details of year and country of construction, etc., is given in the *Liste officielle des navires de mer et des bâtiments de pêche belges avec leurs lettres signalétiques*, no. 23, January 1940 (Bruxelles), published by the *Administration de la Marine*.

2. There are no works dealing with the mercantile marine as a whole, but useful information is contained in A. C. Hardy, 'Rebuilding the Belgian mercantile marine with motorships', *Motorshipping in* 1937, pp. 119–22 (Liverpool, 1938).

3. Statistics of Belgian shipping traffic are given in the *Bulletin Mensuel du Commerce de l'U.E.B.L.*, 1939 (Bruxelles), and also in the *Annuaire statistique de la Belgique*, 1938 (Gand, 1939).

4. The rates of pay are based on the *Barema van Gages*, 1 April 1940, circulated to shipowners. Seamen's articles are laid down in the *Arbeidsovereenkomst wegens Scheepsdienst* of the 'Aanwervingsbureel der vereenigde Belgische Reeders voor Zeelieden' (Antwerpen, 1940).

5. A summary of the tonnage regulations of various foreign countries is given in E. W. Blocksidge, *Hints on the Register Tonnage of Merchant Ships* (Liverpool, 1942).

6. Useful additional information is available in *Lloyd's Register*, 1939–40, 3 vols. (London, 1939).

Chapter XV

PORTS

Introduction: Nieuport: Ostend: Zeebrugge: Bruges and the Bruges Ship Canal: The Ghent-Terneuzen Ship Canal: Ghent: Antwerp: Antwerp and the Projected Rhine Canals: Antwerp, Ghent and the Scheldt: The Wielingen Channel: Brussels: Bibliographical Note

Introduction

Navigation is difficult off the Belgian coast and in neighbouring waters. The shores are low and seldom visible for more than about 12 miles, even in clear weather. The numerous and widespread banks and shoals, the strong tidal streams, and the prevalence of fog and mist at certain seasons, are the principal physical factors which complicate navigation. Furthermore, in the southern part of the North Sea there is a concentration of shipping traffic unequalled in any other sea: it is crossed by shipping lanes which lead to four of the largest ports in the world and to a multitude of others, while the shallow waters are the scene of constant operations by the fishing fleets of half a dozen nations. As a result of the natural difficulties in the way of navigation and of the heavy traffic, many wrecks occur annually.

Off the Belgian coast lie numerous banks and shoals, long and narrow in shape, nearly parallel to the coast and to the direction of the tidal streams. As a whole they converge towards Dover Strait. The shallowest parts of these shoals may be touched upon by ships of almost any draught. They are steep-to inshore, to the south-east, and slope gradually to the north-west. The principal group, the Dunkirk shoals, lies off the coast near to and west of the Franco-Belgian frontier. Normally vessels bound for Belgian ports pass to the northward unless approaching from the south-west through Dunkirk Road and the difficult Zuydecot Pass. From more northerly approaches ships avoid the distant shoals of Fairy, West Hinder, North Hinder and Bligh Banks (Fig. 94).

Inshore, off the Belgian coast proper, the alternation of shoal and deep is less complicated than off the French coast, but the width of shallow water inshore increases to the north-east, and where the entrance to the Scheldt begins, for example, water deeper than

6 fathoms is at least 11 miles out. Around Nieuport and Ostend the principal shoals are the Kwint, Nieuport and Ostend Banks. Off Nieuport, the West Deep provides an extensive area of water deeper than 6 fathoms, but the Ostend outer roadstead has only $5\frac{1}{2}$ fathoms and the inner roadstead $3\frac{3}{4}$. In the vicinity of Zeebrugge there is no water deeper than 6 fathoms. East of Zeebrugge lies the entrance to the Wester Schelde estuary and the deeper water—5 fathoms maximum (M.L.W.S.)—of the Wielingen Channel, one of the two main entrances. Some miles farther to the east, off Flushing, the estuary proper begins, and the northernmost channel, the Oostgat, approaches the deep water of the Wielingen to form the Honte, the first or outermost reach of the Wester Schelde estuary.

The average range of the tide off the Belgian coast decreases eastwards from about 13 ft. at Nieuport to 10 ft. in the mouth of the Scheldt; the spring rise (M.H.W.S.) is about 15 ft. all along the coast. High water along the shore of the Flemish Bight occurs successively later eastwards. The differences in range and in time of high water are related to the amphidronic point in the narrow southern part of the North Sea, roughly halfway between Ijmuiden and Lowestoft. Tidal differences of level are liable to be complicated by meteorological conditions, and persistent strong westerly winds raise the level of the sea off the Belgian coast, while with strong east winds the depths may be reduced.

The Ports

Belgian official statistics distinguish separately only eight seaports (*ports maritimes*, *zeehavens*), compared with fifteen in the Netherlands. The difference is not surprising, for Belgium possesses only 42 miles of coastline. Three of the chief commercial ports lie far from the open sea, and can be reached only through Dutch territory. The coast ports are mainly packet stations, and there is no port which is primarily a naval base.

Shipping at Belgian Ports, 1938: Entered and Cleared

	No. of ships	Thousand net tons		No. of ships	Thousand net tons
Antwerp	25,229	41,503	Bruges	317	192
Ghent	3,636	3,296	Selzaete	116	83
Ostend	3,848	3,447	Nieuport	407	57
(of which packets)	2,238	2,597	Other ports	16	2
Zeebrugge	2,758	3,130			
Brussels	753	350	Total	37,070	52,050

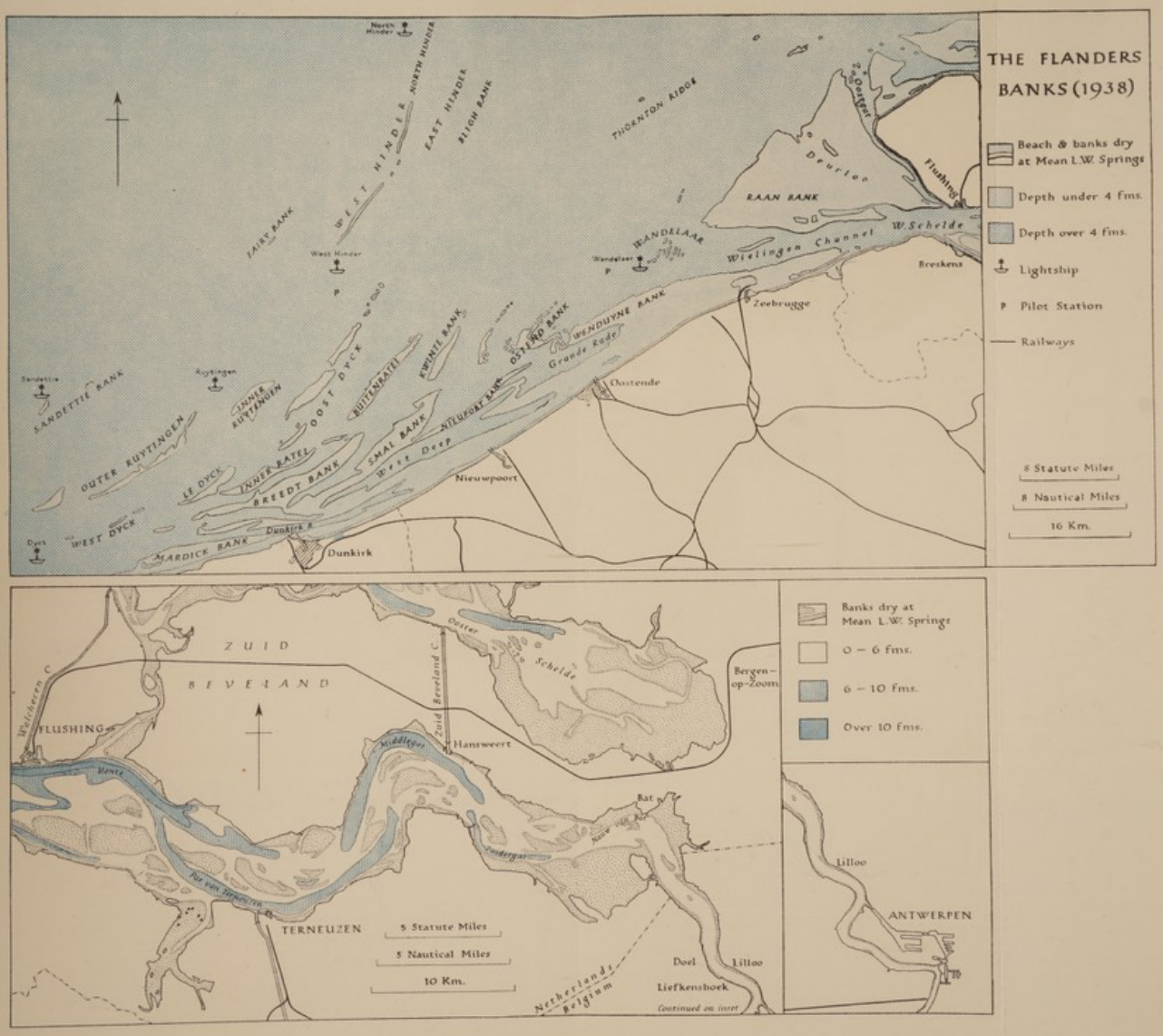


Fig. 94. The approaches to the Belgian ports

In both maps the submarine contours are approximate. The map of the Flanders Banks is based upon the chart *Mer du Nord, Bancs des Flandres* 1938; *Noordzee: Vlaamsche Banken* 1938, produced by M. J. Lauwers, under the authority of the Belgian *Ministère des Communications*, 'Administration de la Marine'. The map of the estuary of the Wester Schelde is based upon British Admiralty charts.

Cargo passing through Customs at Belgian Ports, 1938, *thousands of tons*

Port	Seaborne			Inland			
				Unloadings		Loadings	
	Imports	Exports	Total	Water-way	Rail direct	Water-way	Rail direct
Antwerp	11,873	11,706	23,579	4,589	1,792	4,412	380
Ghent	2,287	1,045	3,332	2,036	198	1,256	380
Zeebrugge	264	303	567	16	43	18	127
Ostend	125	245	370	90	35	2	8
Brussels	196	167	363	751	339	377	45
Bruges	176	11	187	136	9	8	4
Nieuport	7	57	65	7	1	0	0
Selzaete	37	26	63	30	110	38	10
Other places	107	527	634	3,973	—	6,833	—

Source: *Bulletin Mensuel du Commerce avec les Pays Etrangers de l'Union Economique Belgo-Luxembourgeoise*, 1939, p. 639, 'Navigation Maritime International'; pp. 642–3, 'Ports Maritimes' (Bruxelles, 1940).

(1) The first table shows entries and clearances of all ships by port of loading and unloading, including those ships which called at more than one Belgian port on one voyage. (2) The figures of shipping tonnage represent the Moorsom tons of the original table reduced by 15 % to conform with the internationally accepted figures. In the following account Belgian measurement figures, when used, are indicated as B.M. (3) The cargo shown is entered under the place of entry into or departure from the customs. Some of the cargo shown under each seaport may have been discharged or loaded at another, and almost all of the 634,000 tons handled by 'other places' was discharged or loaded at the eight seaports named and thence moved to or from the 'other places'. The cargo movement at the seaports, both in the above table and in the separate tables which follow, is short by nearly 634,000 tons of the true amount. (4) Rail movements referred to as *direct* (see, for example, p. 403) are entered in the Belgian official trade returns under *chemin de fer*. They are too small to represent total movement by rail, but are thought to show the tonnage of goods directly transferred from truck to ship (or barge) or from ship (or barge) to truck, and thus neglect all goods which lie on shore for a time before despatch inland (imports) or loading on board ship (exports). Though incomplete, however, the rail figures are given for what they are worth. (5) In this and other tables, some of the totals will be found to differ slightly from the sum of the components owing to the rounding of figures.

The other ports comprise Louvain (Leuven), Malines (Mechelen), Termonde (Dendermonde), which are little more than river ports, although they are occasionally visited by ships of 100 or 200 tons in the foreign trade.

Belgium, like the Netherlands, carries on a maritime traffic which is enormous in relation to the size of the country. As with the Dutch ports, much of this traffic is in transit for neighbouring countries. Antwerp, however, holds a more dominating position among the

Belgian ports than Rotterdam among the Dutch, handling 80% of the total shipping tonnage and of the sea-borne cargo moving through all the ports.

Shipping, Entered and Cleared in Foreign Trade, with Cargo and in Ballast

	Million tons net	
	1937	1938
United Kingdom	186·4	184·0
France	111·7	—
Germany	65·7	—
Netherlands	58·5	63·7
Belgium	53·7	51·0

Source: *Statistisk Årsbok for Sverige*, 1941, p. 392 (Stockholm, 1941). The figures for Belgium have been reduced by 15%.

No port in Belgium is truly a deep-water port and none can accommodate ships of much over 30,000 gross tons. Nor is there any roadstead offering deep water capable of accommodating large liners, like Cowes or Villefranche. The ports on the Flanders coast suffer from rapid silting, and from difficult approaches. Ostend and Antwerp employ wet docks for handling cargo ships, and at Zeebrugge, Bruges, Ghent, and Brussels the canal basins are virtually wet docks. An interesting development in the future will be the attempt by the authorities at Liége to create a seaport there, capable of receiving by way of Antwerp and the Albert Canal specially designed sea-going vessels up to 1,200 tons (Fig. 122).

The ports are administered by the municipal authorities, except Zeebrugge and the new docks at Bruges, which are administered by the *Maatschappij der Brugsche Zeevaart Inrichtingen*. The port of Brussels is under the authority of a *Conseil d'Administration* of the city. The administration of the port of Antwerp is subdivided: the north maritime installations (the docks) are municipal property, and were built, with the exception of the old docks, at municipal expense; the river quays and the south barge docks have been constructed by the state, but are operated and managed by the city.

Nieuport (Nieuwpoort) (Plates 27, 45, 46)

Nieuport (pop. 5,400) is a small port, the most westerly in Belgium, standing nearly 2 miles from the sea on the river Yser.

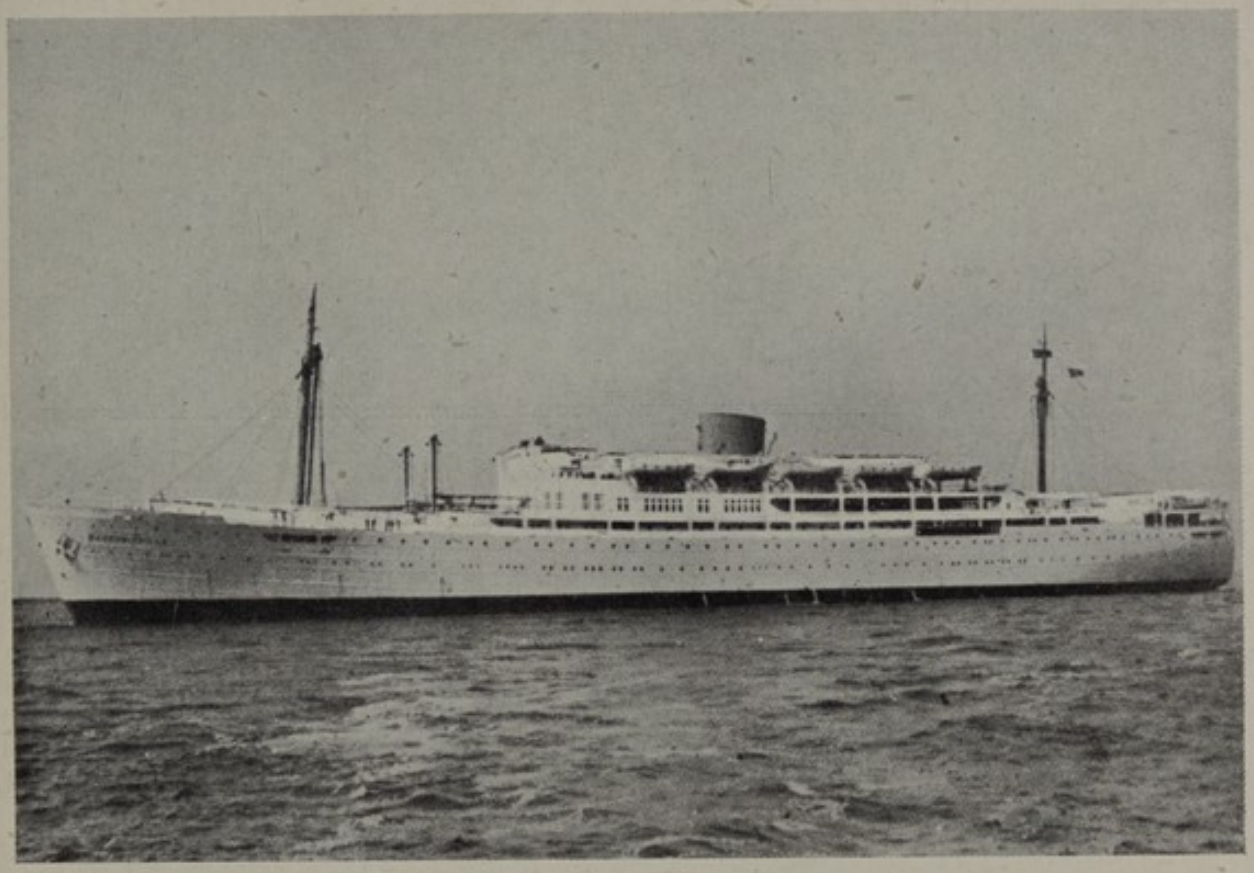


Plate 43. The motor liner *Baudouinville* (13,517 tons gross)
This vessel, owned by the C.M.B., is the largest built in Belgium. The hull was constructed in dry dock at *Cockerill's* Hoboken yard and the same firm built the B. and W. type Diesel propelling machinery. The liner is fitted with the latest navigational equipment, including an echo-sounding device.

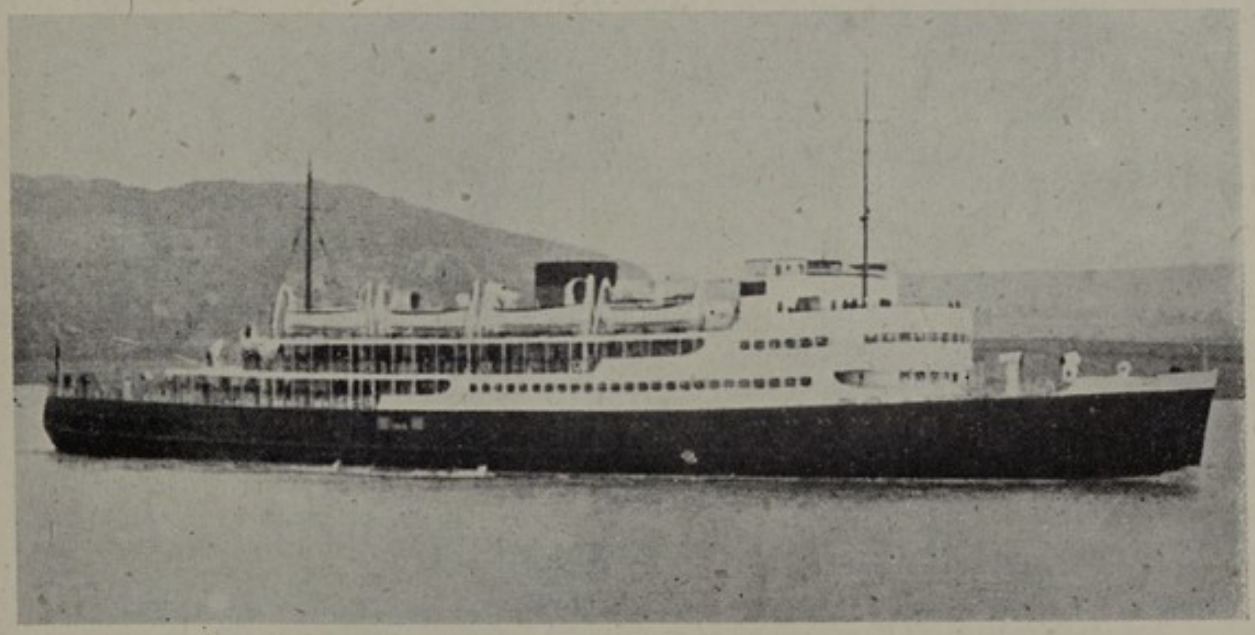


Plate 44. The cross-Channel motor vessel *Prince Baudouin* (3,049 tons gross)
This is the fastest motor vessel in the world. It was built at Hoboken, but the Sulzer type Diesel engines were built at Seraing by *Cockerill*. There is a rudder forward as well as aft, since the vessel enters port stern first.



Plate 45. Nieuport (Nieuwpoort): an aerial view

The town lies in the extreme south; east of the Yser are the sluices controlling the water level of the canals and the Yser. West of the bridge lies the wide, curving Nieuport quay on the left bank, ending to the north in a small tidal basin. Beyond this basin, on the same bank, lies the large but little used wet dock, entered from downstream by a long cut. The shore is backed by extensive sand dunes.

Approach and Access

The roadstead is the safest on the Belgian coast. Four channels lead from the shoal-encumbered sea into Nieuport Road. The western approach is through Dunkirk Road and the difficult Zuydecot Pass, and thence through the West Deep, with a least depth of 2 fathoms in the Zuydecot Pass. The northward approach lies through the North Channel with a least depth of 20 ft. over the flat between Smal Bank and the south-western end of Nieuport Bank. From the north-east the approach is through the North-East Channel over a depth of 3 fathoms; a second approach from the north-east is through Ostend Inner Road (Petite Rade) over a least depth of 17 ft. In Nieuport Road there are depths of from 3 to 5 fathoms; south-west of the entrance the water under 3 fathoms extends a considerable distance from the shore, while to the north-east deeper water comes closer inshore. The spring rise (M.H.W.S.) is 16 ft., the neap rise (M.H.W.N.) 13 ft.

Detailed Description

The port is not used by vessels of more than a few hundred tons gross. The harbour is entered over a bar with least depths of 1–3 ft.; the entrance continues thence between two pile piers, 420 ft. apart at the heads; at high tide the harbour has a width of 312 ft. In the channel between the piers and in the harbour, least depths are 1–4 ft. About 1 mile inland from the pier heads, on the west bank, lies a wet dock, covering 4 acres, and entered through timber gates 32½ ft. high and 44 ft. wide. Only the west side is used, where there are four short moles and a quay, behind which lie industrial buildings and the railway. Farther upstream, by the town, at the tidal harbour on the west bank is a wide quay equipped with sheds and used by fishing boats. The total length of quayage in the port is 2,278 ft., equipped with three steam cranes of 2–5 tons capacity and one 5-ton electric crane.

Above the bridge at the head of navigation is a widened portion of the Yser, forming the outlet of three barge and two drainage canals and a manœuvring area for barges.

There is no equipment for repairs in the port (although *The Shipping World Yearbook*, 1941, gives a slip 80 ft. long and a floating dock).

The Town

Nieuport stands on the flat coastal plain of Flanders, at a break in the dunes, where the shore has extended seawards in historic time. For centuries its buildings were impressive for a small town, but

they were demolished by heavy bombardment during the war of 1914–18. Among the most interesting features of Nieuport are six elaborate sluices which regulate the levels of the Veurne and Plaschendale Canals and the disposal of the waters of the Yser. Nieuport is the chief town of a canton and the seat of an episcopal college and of a school of navigation.

History

Although a settlement had existed at Nieuport for centuries, a new town was founded in 1163 by Philip of Alsace. Lying near the busy trade routes of Flanders and the southern North Sea, Nieuport was well fitted to grow steadily in commercial importance, but it suffered from a position which exposed it to almost every advance of armies from the east and from the west, as well as of fleets from the sea, hence progress was hampered by the effects of warfare. In the five and a half centuries between 1213 and 1793 it suffered ten sieges. The nineteenth century was a period of peace when the town pursued its fishing and mercantile activities unhindered, but with the war of 1914–18 came further disturbances. In 1914 the Belgian armies retreated on Nieuport and opened the six sluices of the Yser and the canals controlling the drainage of the whole region, in order to flood the surrounding country (Fig. 21). After 4 days and nights the depth of water was 11½ ft. at the coast and 4 in. to 1 ft. over most of the low-lying ground as far as Diksmuide. The Germans, however, captured Diksmuide, and it became necessary to wreck the other sluices above this place near Knokke and Driegrachten. The depth of the water increased by 1¾ ft. and Nieuport remained in Allied hands despite violent fighting nearby. As a result of repeated bombardments the town was completely destroyed. In 1940 it was the scene of stiff engagements during the retreat of the British Expeditionary Force and Belgian units to the Dunkirk perimeter defences.

Trade and Industry

In 1938, 7,000 tons of cargo were discharged in the port and 57,000 tons loaded. Imports comprise coal, iron and steel scrap, and feeding stuffs; exports comprise bricks, tiles, cement, lime, pitch, iron and steel, and mussels. In the same year 6,000 tons of merchandise came into the port by canal although the amount leaving it was very small. Direct rail exchanges amounted to only a few hundred tons each way. Nieuport is a fishing port of some importance especially in the cod and herring fisheries (see p. 274).

The only two factories of any size are both engaged in metal working; one manufactures locks, bolts and similar hardware, and the other constructs ventilating machinery. There is also a large chemical plant south of the town.

Communications

From Nieuport the Plasschendale-Nieuport Canal (275–450 ton barges) leads eastwards to the Ostend-Bruges Canal, reaching it near Ostend, and the Nieuport-Furnes (Veurne) Canal leads westwards to Furnes (275–450 ton barges). The only railway connexion is provided by a single-track line which runs from the harbour entrance through the town south-eastwards to Diksmuide. For rail and road routes see Fig. 97.

OSTEND (OOSTENDE) (Figs. 95, 97; Plates 24, 47, 48, 49)

Ostend (pop. 50,263) is the chief Belgian fishing port, being responsible for 80% of the total catch, an important packet station, and the principal seaside resort of the country. By tonnage of shipping, including packet-boat tonnage, it was the second largest port in Belgium in 1938, but in amount of cargo handled it was inferior to Zeebrugge and little above Brussels.

Approach and Access

The approach to Ostend is beset by shoals. About 5 cables (1,000 yd.) seawards the long and narrow Stroom Bank runs parallel to the shore, joining the shore bank to the east of the harbour entrance. Seawards, between this bank and the Ostend Bank to the north-west and Wenduyne Bank to the north-east, lies the Grande Rade or Outer Roadstead of Ostend, where depths of 28–33 ft. M.L.W.S. may be found. This is not a safe anchorage during westerly or northerly gales. Landwards, between the Stroom Bank and the shelving beach, lies the Petite Rade or Inner Road, where, for the most part, depths reach 20–24 ft. M.L.W.S. The greater part of this roadstead lies to the south-west of the harbour entrance; it is only a temporary anchorage. Two channels dredged through the banks give access to the harbour entrance. The Direct Pass over the Stroombank lies north-west of the entrance and has a depth of 17–18 ft. M.L.W.S. The East Pass over the shore bank, to the north-east, has a depth of 14 ft. M.L.W.S. The spring rise is 15 ft., the neap rise 11¾ ft.

Detailed Description

The port is used normally only by packet boats and small traders. It consists of a long narrow waterway running in a south-easterly direction, with various tidal basins and wet docks opening off on either side. The lay-out of the docks and basins may be described under four headings (for details see tables on p. 400).

(1) *The Outermost Section, mainly for Fishing Craft.* On the west side of the avant-port a narrow entrance leads into the old tidal harbour (*Bassin pour Bateaux Pêcheurs*), a small basin for fishing boats. On the east side lies the new fishing harbour, completed in 1932, comprising the new tidal harbour (*Bassin à Marée*) and careening basin, and the new fishing harbour (wet dock). The new tidal harbour is very small; intended for fishing boats, it has a stepped quay wall on one side. It leads into a careening basin, with bottom at 3¼ ft. above M.L.W., provided with five greenheart grids at 5½ ft. above M.L.W.

Near the entrance to this new tidal basin is the lock leading into the new fishing harbour. The first lock completed started to collapse, so the construction of a new lock was undertaken. The dock is the largest in the port, with an area of 12½ acres; it is dredged to 13 ft. below M.L.W. Fishing vessels in it are berthed at an angle to the quay, permitting concentrated use of quay length. At the north end near the lock there are a turning space and a patent slip for the repair of fishing vessels. On the western quay is a reinforced concrete building, 1,100 ft long and 367 ft. wide, for handling and storing fish (see p. 273).

On the same side of the avant-port as the new fishing harbour is the small naval basin (*Bassin de la Marine*), which is equipped with a 40-ton crane.

(2) *The Old Commercial Basins.* These lie on the west side of the avant-port, and are approached through the Old Lock. There were originally three of these basins, but the innermost one is being filled in, and the filling in of the other two will follow. They are small, shallow and equipped with few lifting applicances. The Ostend town station lies on the south side of No. 1 Bassin and No. 2 Bassin (*Premier Bassin, Deuxième Bassin*).

(3) *The Commercial Quays of the Tidal Harbour.* These form roughly the centre of the port. On the west side of the avant-port, at its innermost end, is the *Quai des Paquebots* or cross-channel berth, with a dredged depth of 14 ft. below M.L.W. The marine station stands nearby, on the area known as *Ostende Quai.*



Plate 46. Nieuport (Nieuwpoort) Quay, looking upstream
This view, taken at high water, shows the Yser bridge in the background.



Plate 47. Ostend (Oostende): the Avant Port, looking seawards
This photograph shows the south side, *Quai des Paquebots*, behind which lie the *Ostende Quai* and the marine station. The *Prinses Josephine Charlotte*, seen alongside, draws 12 ft.



Plate 48. Ostend (Oostende): the Avant Port, looking seawards
The photograph shows the north side, the *Quai de Stationnement*.



Plate 49. Ostend (Oostende): *Bassin à Flot*, looking southwards
from the Mey lock
A tug and lightship are in the lock. On the extreme right can be seen part of the *Vindictive* memorial.

The south-eastern part of the avant-port opens into the Nouvel Avant-Port or New Tidal Harbour, about 140 yd. wide. Along the south-west side is the New Deep Water Quay for merchant vessels, 2,800 ft. long and with 14 ft. alongside at low water.

On the eastern side is the *Quai de Stationnement*, a spare berth for government cross-channel steamers. Eastwards the Nouvel Avant-Port leads through sluices under a fixed bridge to the large sluicing basin (*Nouveau Bassin de Chasse*), and under another fixed bridge to Arrière-Port (Inner Harbour), which is not used by sea-going ships. Small craft drawing not more than 5 ft. and not higher than 12½ ft. above the waterline can pass under the bridge to Slykens Lock. This lock makes a connexion with the Ostend-Bruges Canal (see p. 517).

(4) *The Inner Commercial Wet Docks.* From the south end of the avant-port the 15 ft. channel leads to the Mey or New Lock which admits to these inner wet docks. The first and largest is the *Bassin à Flot* (New Dock), in which are found most of the cranes in the port. A passage leads southwards to the *Bassin au Bois* (New Timber Dock), which is well equipped with covered storage space; it opens at the end to form the *Bassin d'Evolution* (Swinging Dock), on the south side of which are situated the dry dock and shipyard. The *Bassin Sas* provides a connexion between this system of docks and the Ostend-Bruges Canal.

The depth in the canal as far as Zandvoorde, 2 miles to the south-east, is 21 ft., and beyond Zandvoorde 12½ ft. At the Mey (New) Lock vessels over 440 ft. in length can be admitted by being locked through at H.W.L. with open gates. The passage joining the two old basins is the same width as the entrance lock—38 ft. The entrance lock to the Fishing Harbour (Wet Dock) is equipped with two pairs of greenheart gates at each end, pointing in opposite directions, to enable the water level in the dock to be maintained at a constant level irrespective of the tide level. The outer gates also act as wave screens.

Port Facilities

There is one dry dock at Ostend, situated in the *Bassin d'Evolution*. It has a length of 334 ft., a breadth of 34 ft., and a depth on sill of 15 ft. There is a patent slip in the Fishing Harbour (Wet Dock), with two cradles of 1,000 and 500 tons capacity respectively. Of the larger cradle the length over the keel blocks is 164 ft. and the draught on the blocks at M.H.W.S. is 10½ ft. forward and 19¾ ft. aft; of the smaller cradle the length over blocks is 131 ft. and the draught 9½ ft. forward

Dimensions of Basins, Wet Docks and Quays

Basin, dock or quay	Length ft.	Breadth ft.	Depth alongside ft.	Length quayage ft.	Quay cranes
1. Outer section mainly fishing harbour:					
Bassin pour Bateaux Pêcheurs (Old Tidal Harbour)	885	285	—	2,033	—
Bassin à Marée (New Tidal Harbour)	984	197 (N) 99 (S)	shallow	—	—
Fishing Harbour (Wet Dock)	2,790 (E) 2,465 (W)	410	(16 low) (30 high)	—	—
2. Old Commercial Basins:					
No. 1 Bassin (Premier Bassin)	918	197	18 in dock	2,164	1
No. 2 Bassin (Deuxième Bassin)	557	328	15 in dock	1,574	—
3. Avant-Port and Nouvel Avant-Port (Tidal Harbour):					
Quai des Paquebots (Cross-Channel Quay)	—	—	14 M.L.W.	—	2
Quai de Stationnement (State Packet-Boat Quay)	—	—	—	1,967	1 (50 ton)
New Deep Water Quay for merchant vessels	2,800	—	14 L.W. 27 H.W.	2,800	2 (40 ton) 6
4. Inner Commercial Wet Docks:					
Bassin à Flot (New Dock)	2,500	300	26 in dock	5,000	13
Bassin au Bois (New Timber Dock)	1,050	300	24	4,500	—
Bassin d'Evolution (Swinging Dock)	722	656	26	—	—

Dimensions of Locks

Locks	Useful length ft.	Breadth ft.	Depth on sill ft.
Fishing Harbour (Wet Dock) Entrance	295	52½	16 M.L.W.
Mey Lock (New Lock)	440	60	17 M.L.W. 32 M.H.W.
Old Lock	180	38	15 O.N.T. 18 O.S.T.

and 14¾ ft. aft. There is room at this slip for two more cradles. A patent slip owned by *Béliard, Crichton et Cie* has a lifting capacity of 200 tons, and a cradle 78½ ft. long.

The Town

Ostend lies at a mean altitude of 20 ft. Apart from the large church of SS. Peter and Paul, the most prominent buildings are the Kursaal on the sea front and the marine station. The old town forms a compact square west of the harbour, with a rectangular street pattern. The commune has a population of 50,263 (1938). The water supply is derived from the large system of the *Cie Intercommunale des Flandres*, and passes through the reservoir and pumping station to the south of the town station. Gas is supplied by the coke-oven plant at Zandvoorde (see p. 305), electricity by the power station near the head of the docks at Slykens.

Ostend is the chief town of an administrative arrondissement and the seat of a court of a justice of the peace. It maintains an episcopal college, while the economic life of the community is served by a fishery school and an *Ecole industrielle et professionnelle*.

History

Ostend was for long only a fishing village, but was elevated to the rank of a *ville* in 1272. Encroachments by the sea made necessary later the building of a new church farther inland, and again in 1438. Around this latest church the *nouvelle ville* grew up. By this time a packet service to London was in operation.

During the revolt of the Netherlands, Ostend was fortified in 1583 by William the Silent, and withstood a siege by the duke of Parma. The last foothold of the Northern Provinces in the south, Ostend was besieged for more than three years before it fell to Spinola in 1604, having been devastated by 161,000 rounds of cannon fire. The Dutch lost 50,000 men and the Spaniards 80,000. In 1648, the French made an unsuccessful attempt to capture it by a landing, and during the wars of Louis XIV it suffered further sieges. It was taken again by the French in 1745.

The eighteenth century saw two short periods of commercial prosperity. After a Breton adventurer, the Chevalier Gollet de la Merveille of St Malo, had unloaded some East Indian produce at Ostend, the trade developed rapidly and the Ostend Company for eastern trade was formed, with directors from Antwerp and Ghent. In 1722 the Emperor Charles VI granted letters patent. England, France, the Netherlands and Prussia, however, were jealous of the new rival, and forced Charles VI to suspend it in 1731, in return for their agreement to the Pragmatic Sanction. Joseph II attempted to

revive the commerce of Ostend, and in 1781 made it a free port. Beginning with the Anglo-Dutch war of 1780–3, it achieved a remarkable but short-lived prosperity before the occupation by the French revolutionary armies. Trade fell to a minimum in 1830, but thereafter showed a steady rise: in that year entries of shipping reached 40,000 tons, and by 1900 the figure was 1,083,312 tons (net tons, B.M.). Ostend became the leading resort in Belgium, and the development of long-distance railway connexions to Berlin, etc., established it as one of the chief ferry ports. Progressive improvements in the dock installations were made.

In the war of 1914–18, Ostend was early occupied by the Germans and heavily fortified. Lying at the seaward end of the Ostend-Bruges Canal it became one of the two outlets for submarines from the German base at Bruges. On the night of 22–23 April 1918, as part of the Zeebrugge-Ostend combined operation, English forces made an attempt to block the canal outlet. Both the block ships, however, ran ashore $\frac{3}{4}$ mile to the east, because the Germans had moved the marker buoy at the harbour entrance, while the smoke screen which had been put down blew back over the attackers. A second attempt was made on the night of 9–10 May, when the *Vindictive*, which had taken part in the Zeebrugge operation, was successfully sunk in the harbour entrance, partially blocking it.

In 1932, the new fishing port was completed. Work on an elaborate plan of improvements was started later. The old town station long having been insufficient, most of the traffic has been diverted to the marine station, which is not large enough to handle all the summer traffic. To provide space for station improvements the three old commercial basins will be filled in.

Trade

The mail service to Dover involves about 1,000 sailings and 300,000 passengers each way annually. The cargo traffic is not very great, although it shows an excess of exports arising from 141,000 tons of bunkers and provisions supplied to ships. Of imports and exports proper there is an inward excess of about 20%. Imports include nitrates, coal, timber and pit-props; exports include cement, bricks and tiles, coal and coke, sulphate of ammonia and other chemicals, macadam and general cargo.

Of the sea-borne imports, most are supplied by the Baltic countries and the United Kingdom. Two-thirds of the exports, about 100,000 tons (not including bunkers), were destined for the United Kingdom,

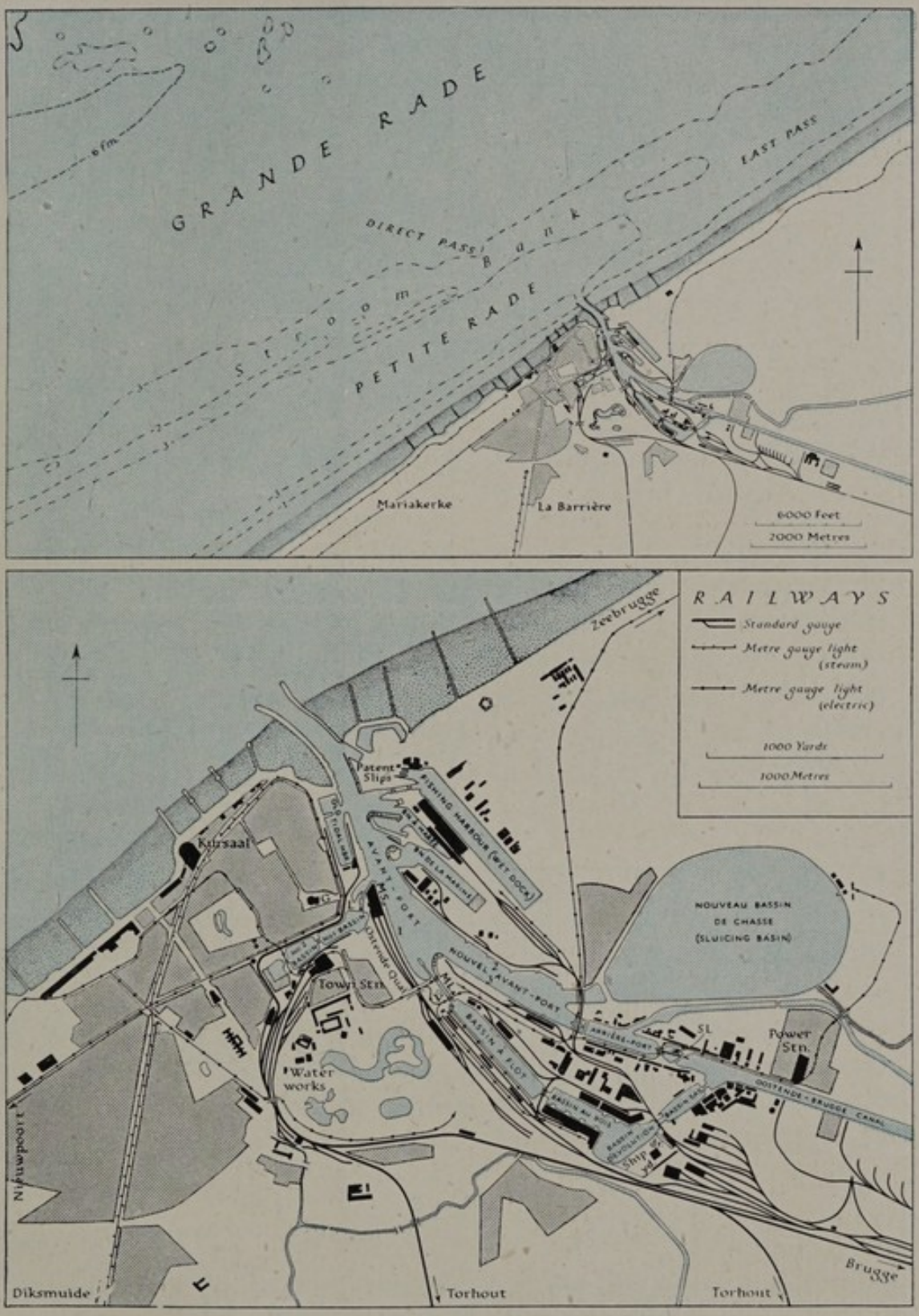


Fig. 95. Ostend (Oostende): the port and its approaches

The shaded area at the southern end of the *Bassin de la Marine* represents a part of the dock which has been converted into a submarine shelter.

1, *Quai des Paquebots*; 2, *Quai de Stationnement*; 3, New Deep Water Quay for merchant vessels; *L.* Old Lock; *ML.* Mey (New) Lock; *SL.* Slykens Lock; *dr.* dry dock; *MS.* marine station; *G.* church of SS. Peter and Paul; *V. Vindictive* Memorial.

The black stipple represents the built up area (as in the succeeding figures, except Figs. 96, 102).

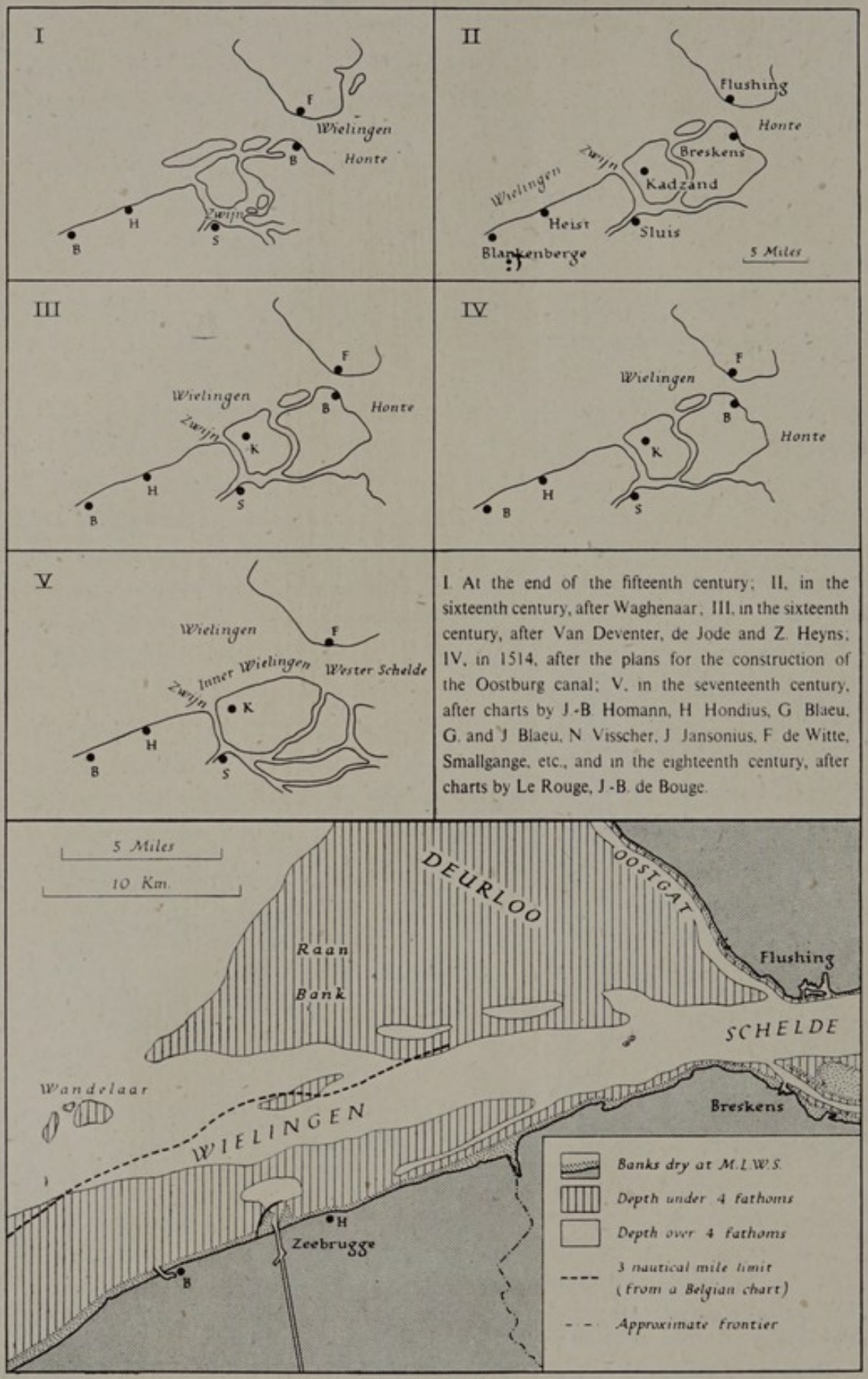


Fig. 96. The Wielingen Channel showing the position of the channel at the present day and the varying position of the named channel in the past

Historical data from C. de Visscher and F. L. Ganshof, 'Le Différend des Wielingen', *Revue de Droit international et de Législation comparée*, vol. I, nos. 3–4, p. 307 (Paris, 1920).

Trade of Ostend, 1938, in thousands of tons

Sea-borne				Inland traffic			
Imports		Exports		Unloadings		Loadings	
Minerals	56·6	Minerals	187·0	By canal (mostly minerals)	89·5	By canal	2·0
Timber	52·4	Worked stone	18·5	By direct rail (largely minerals)	35·0	By direct rail	7·6
Worked stone	4·8	Textiles	5·3				
Others	11·0	Vehicles	4·3				
		Chemicals	3·4				
		Others	26·6				
Total	124·8	Total	245·1				

Source: *Bulletin Mensuel du Commerce... U.E.B.L.*, 1939, pp. 677–80 (Bruxelles, 1940).

including manufactures and vegetables, and nearly all the rest for Norway, Sweden and France. In 1938 waterway arrivals were mainly from Germany and the Netherlands, representing largely bunker coal; rail arrivals came from more widespread origins, but mainly from Germany (17,000 tons), Italy (5,500) and Hungary (5,000). Of the small outward loadings, over 1,000 tons went to France by waterway, and 3,300 tons to Germany by rail and 2,800 tons to France.

Industries

The *Béliard-Crichton* shipyard specializes in the construction of smaller ships such as dredgers and fishing boats, but also constructs buoys, caissons and miscellaneous gear, and undertakes marine refrigerating equipment. Other industries in or near the town include fish-canning, and the manufacture of fish meal and soap. At Zandvoorde, 2 miles to the south-east on the Ostend-Bruges Canal, stands the important coking plant of the *Union Chimique Belge*, from which gas is piped to Roeselare (Roulers), whence it is widely distributed (see p. 305).

Communications

From Ostend the Ostend-Bruges Canal (for 600–1,350 ton barges) runs eastwards to Bruges; at Plasschendale, 4 miles to the east, the Plasschendale-Nieuport Canal (for 275–450 ton barges) branches off to the west. Railway lines serve most of the quays in the port. For road and rail connexions see Fig. 97.

ZEEBRUGGE (Figs. 97, 98, Plates 20, 40, 50, 51)

Zeebrugge is the most easterly of the few coast ports of Belgium, lying only 7½ miles from the Dutch frontier. It is an artificial deep-water port, provided with special facilities for the reception of fast liners. It also derives some importance from its position at the entrance to the Bruges Ship Canal.

Approach and Access

The approach to Zeebrugge lies across the western part of the Wielingen Channel. There is no roadstead in the usual sense of the term, shelter being provided by the enormous breakwater mole. Extending over a full quadrant, this structure protects the canal entrance from north and west winds and has deep water along its inner side. Problems of approach consist mainly in rounding the eastern end of the breakwater mole. A pilot is necessary, for silting is abnormally rapid, and in the deepest part of the harbour, where it is most rapid, amounts to 2 ft. per month. Owing to the replacement of the pile viaduct leading to the mole by a solid structure after 1919, tidal scour has been impeded. In the approach to the end of the breakwater the least depth was, in 1939, 17 ft. Thence channels lead to the deep-water berths alongside the mole or to the fairway opening into the canal entrance. This fairway had a least depth of over 13 ft. Apart from these two channels, the area between the breakwater mole and the shore, covering about 220 acres, is dry or shallow at low tide. The spring rise is 14¾ ft. (M.H.W.S.), the neap rise 11¾ ft. (M.H.W.N.).

Detailed Description

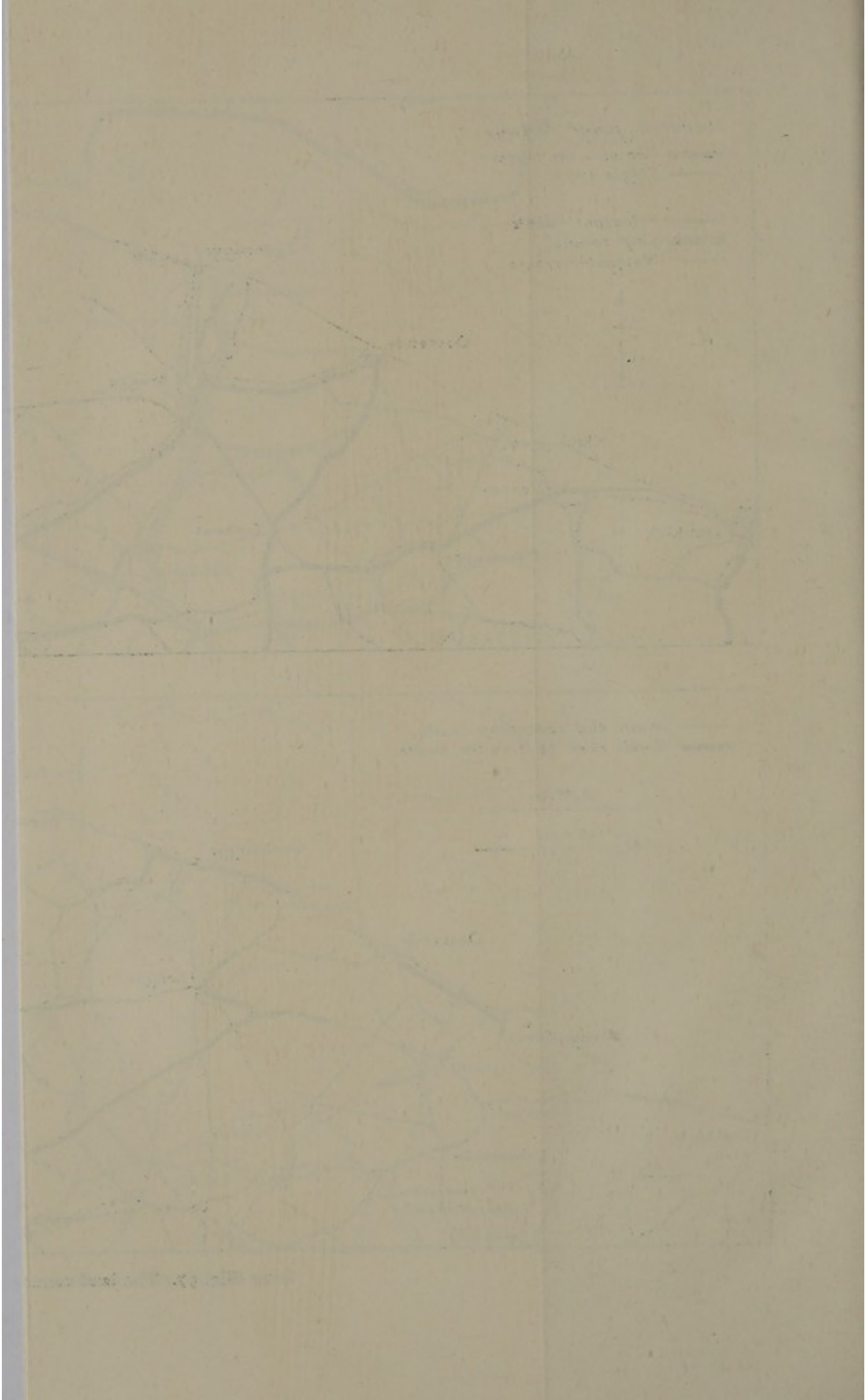
The Breakwater Mole. This structure carries a road and a railway and is 8,151 ft. long. The first 720 ft. runs across the foreshore; the succeeding section of 900 ft. of stone replaces the former pile viaduct; then for 5,154 ft. the whole structure is of concrete, with a solid platform 242 ft. wide, inside the breakwater proper. By the marine station the breakwater carries a high parapet to provide shelter for ships. The remaining 750 ft. is breakwater only, and at the end stands a lighthouse. The quayage along the mole has the following depths:

1,478 ft., depth at low tide 36 ft. (at seaward end).
1,230 ft., depth at low tide 29½ ft.
2,446 ft., depth at low tide 26¼ ft.

The railway from the shore passes through a marine station at the south end, and three tracks run along the mole. Nearer the seaward



Fig. 97. The land communications of the Belgian ports



end there are two large quay sheds, while lifting equipment is provided by ten electric travelling cranes of 2½–8 tons capacity and one steam travelling crane of 1 ton. Oil tanks and bunker coal stores lie at the seaward end of the mole.

Inner Port. The fairway across the roadstead turns at the entrance jetties to the canal and becomes a channel of 19¾ ft. depth at low tide, with a width of 348 ft. at high-water level and 164 ft. at the bottom. Immediately inside, on the east bank, is a tidal basin, with depths up to 11 ft. below chart datum, for fishing boats.

The lock leading to the canal proper has a width of 65¾ ft., a depth on sill at low water of 18 ft., and a length between the roller gates at each end of 840 ft. The central part of the lock, for about 525 ft., has a width of 110 ft. A swing bridge at each end carries railway lines. The gates and bridges are electrically operated. Inside the lock is the head of the Bruges Ship Canal, here called the *Port Intérieur*. The depth is 26¼ ft., the water level width is 316 ft. and the bottom width 164 ft. The sides are not quayed, although on the longer west side there are four small jetties or landing stages for shallow-draft vessels. On the east side is a triangular-shaped turning basin (*Bassin d'Evolution*), intended primarily as a sanitary station. In it lie two small projecting wharves, each 65½ ft. long.

On the west side, opposite the turning basin, is the Darse; the construction of two more docks is planned. This dock is 1,449 ft. long, 478 ft. wide at water-level, and 334 ft. wide at the bottom, with a depth of 26¼ ft. On the south-western bank is the terminus of the Harwich-Zeebrugge train-ferry service; on the eastern side are two small wharves, the first of which is provided for oil tankers, which discharge their cargo into the oil-storage tanks close by.

Port Facilities. There are no repair facilities beyond the careening bank in the tidal basin near the entrance. A 50-ton steam floating sheers is kept in the *Port Intérieur*.

History

Zeebrugge is part of the commune of Bruges. Most of the houses lie to the east of the canal and most of the factories and commercial premises to the west, south of the Darse.

With the nineteenth-century revival of Bruges came the need for a deep-water port on the coast. Work on the installations was begun in 1895 and completed in 1907. Besides serving Bruges, the port came to occupy an important place as a packet station following the development of rail transport in Great Britain and central Europe.

During the war of 1914–18 Zeebrugge, as the principal sea outlet for the submarine base at Bruges, suffered bombardment by British naval craft. On the night of 22–23 May 1918, a British combined operations raid successfully destroyed its value for this purpose. The landing party from the *Vindictive* demolished port installations, the submarine C3 ran under the viaduct connecting the breakwater mole with the shore and blew it up, while the *Thetis*, *Iphigenia* and *Intrepid* were sunk as block ships in the canal entrance. The wreck of the *Thetis* still lies in the mud off the entrance.

Trade

The Harwich-Zeebrugge train-ferry service deals to a considerable extent in valuable cargoes, such as fruit from countries as far as Hungary and Italy. In 1936, for example, 50,000 tons of such merchandise were shipped from Zeebrugge and 21,000 from Harwich. The commercial movements for the port as a whole in 1938 were as follows:

Trade of Zeebrugge, 1938, *in thousands of tons*

Sea-borne				Inland traffic			
Imports		Exports		Unloadings		Loadings	
Minerals	224·6	Minerals	245·5	By canal	16·0	By canal	18·8
Foodstuffs	31·0	Vegetable products	18·7	(Minerals	14·0)	(Minerals	17·0)
Worked stone	2·6	Animals	11·6	By direct rail	43·0	By direct rail	126·7
Timber	1·5	Worked stone	5·4	(Vegetable products)	16·0	(Minerals	120·6)
Machinery	1·2	Glass	4·7				
Others	3·4	Metals and machinery	7·0				
		Others	9·7				
Total	264·3	Total	302·6				

Source: *Bulletin Mensuel du Commerce... U.E.B.L.*, 1939, pp. 681–4 (Bruxelles, 1940).

As at Ostend, there is a considerable quantity of bunkers and provisions for ships which appear under exports—201,000 tons. Exports proper thus amount only to about 100,000 tons, giving an inward excess of over 150%. Of the imports, coal is the leading item, followed by nitrates and metals. Among the exports, apart from bunker coal, some Belgian products figure prominently—coke, cement, chemicals, macadam and manufactures. Traffic to the port by rail and canal, and away from it by canal, is comparatively small; direct loadings on rail, however, are considerable and comprise almost entirely coal and metals—120,600 tons.



Plate 50. Zeebrugge: the mole, looking seawards

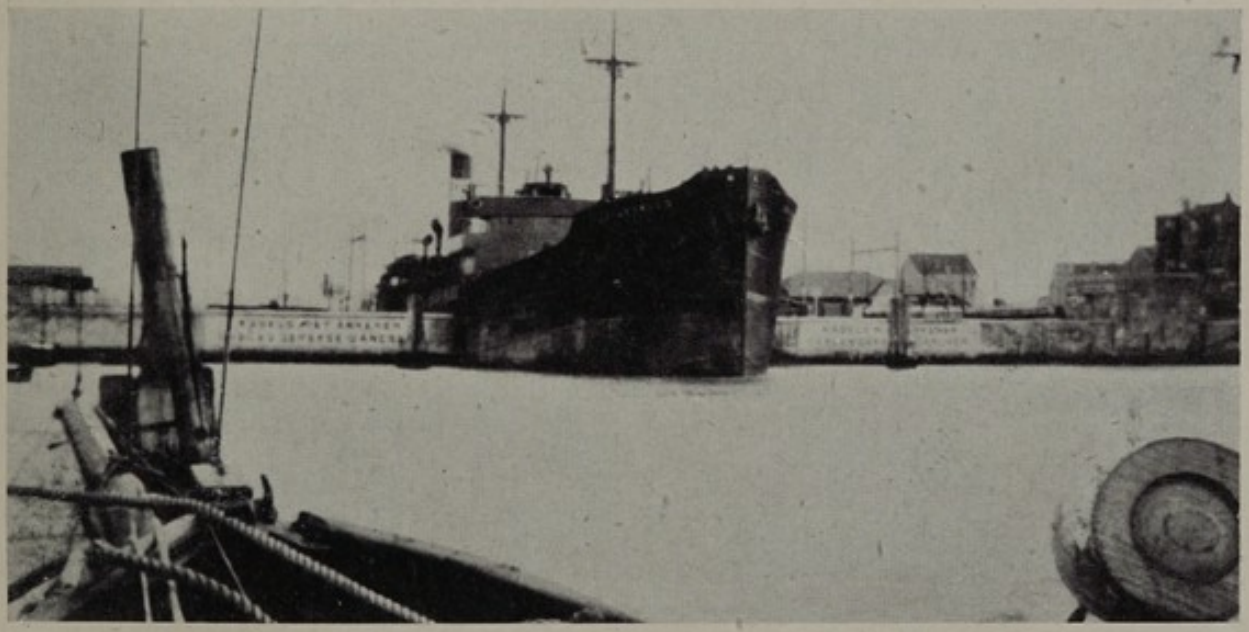


Plate 51. Zeebrugge: the lock

The vessel passing through the lock is the *Bushwood*, 2,300 tons gross, 18 ft. 10 in. draught.



Plate 52. The Ghent-Terneuzen Ship Canal



Plate 53. Ghent (Gent): *Grand Bassin*, looking northwards

The chief supplier of imports is Great Britain (131,000 tons), with Poland accounting for most of the rest; coal provides much of the cargo from these countries. The canal imports are mostly of coal from Germany and the Netherlands. Suppliers of rail imports reflect the long-distance traffic for the ferry—Italy 15,000 tons; Germany 8,000 tons; Hungary 7,000 tons; Jugoslavia 4,000 tons; France 1,600 tons. Exports are taken mainly by Great Britain (77,000 tons) and Sweden (11,000 tons); rail outward movements are almost entirely to France —France 120,000 tons, Italy 3,400 tons, Germany 1,700 tons. Outward canal cargoes are destined for France and the Netherlands.

Industries

The growth of relatively large-scale industry followed the development of facilities for the easy importation of fuel and raw materials. Near the Darse, the Solvay chemical works cover a large area and have a considerable output of heavy chemicals. There is a coke-oven plant with a large output of gas, benzol, tar and by-products of distillation, as well as its production of coke. Of fairly recent origin are a mechanical window-glass factory and an aircraft factory (*Société des Ateliers de Constructions aéronautiques de Zeebrugge*).

Communications

By means of the ship canal to Bruges the port is in communication with the inland waterway system of Belgium. Rail connexions consist only of the single-track line from the breakwater mole, through the factory quarter near the *Port Intérieur*, towards Bruges. For rail and road connexions see Fig. 97.

Bruges (Brugge) and the Bruges Ship Canal

(Figs. 97, 98; Plates 91, 92, 93)

The Bruges Ship Canal, which is entered from the sea at Zeebrugge, provides the deepest approach to Bruges. It was constructed near the end of the last century. It is 6¼ miles long, and has a surface width of 230 ft., a bottom width of 72 ft. and a depth of 26¼ ft. The limits on the size of ships entering imposed by the lock at Zeebrugge are: width 65¾ ft., length 840 ft.; depth on sill 18 ft. at low water. Apart from the bridges at Zeebrugge the only other crossing is the road swing bridge at Dudzeele. Near the seaward end, on the western bank, are situated 1,410 ft. of private quayage with a depth alongside

of 26 ft., for the use of industrial concerns established on neighbouring sites, and fitted with up-to-date appliances for the discharge of colliers.

At the south end of the canal lie the maritime docks of Bruges. They are not so imposing as their appearance on the plan suggests, because so much of the waterside length is taken up not by quays proper, but by sloping walls. In the port there are about 6,500 ft. of quayage with depths alongside varying from 14 ft. to 26 ft. Two basins, not in commercial use, open off diagonally westwards near the end of the canal—*Darse Nord* and *Darse Sud*. At the end of the canal there are three basins—*Bassin Nord* (or Manœuvring Dock), *Bassin Est* and *Bassin Ouest*. The details of these three docks are as follows:

	Length ft.	Width ft.	Depth of water ft.	Quayage ft.
Bassin Nord	794 (average)	750 (at water level)	26¼	395
Bassin Est	682½	295	26¼	2,035
Bassin Ouest	1,772	295 (at water level) 206 (bottom)	360 ft. at 26¼ remainder at 21¼	2,025

On the east side of *Bassin Ouest*, at the north end, two small jetties project into the dock; at the south end there is a jetty or landing stage, parallel to the bank, connected with it transversely. Lifting appliances comprise twenty-seven electric travelling cranes of 2½–7 tons capacity, thirteen lying in *Bassin Ouest* and twelve in *Bassin Est*. There appear to be no repair facilities in use, although two floating docks are shown in the plan.

At the south end of *Bassin Ouest* a lock leads to the old docks and thence to the Ostend Canal and other inland waterways. This lock has an entrance width of 39¼ ft., a sill depth of 15½ ft. and a length between the gates of 319½ ft. The Old Dock (Canal Outer Port) has a length of 820 ft., a width of 393 ft. and depth of 14 ft., with 1,213 ft. of quayage. The water level in the old docks appears to be the same as in the maritime port.

The Town ; History (see p. 594) *; Trade*

The sea-borne trade of Bruges is extremely ill-balanced. In 1938 imports amounted to 175,000 tons, of which minerals accounted for 117,000 tons and timber 26,000. Coal is imported from the United Kingdom and Poland, petroleum from Curaçao, timber from U.S.S.R., stone from Norway, and general cargo from the United Kingdom. Exports amounted to only 11,000 tons and comprised mainly patent

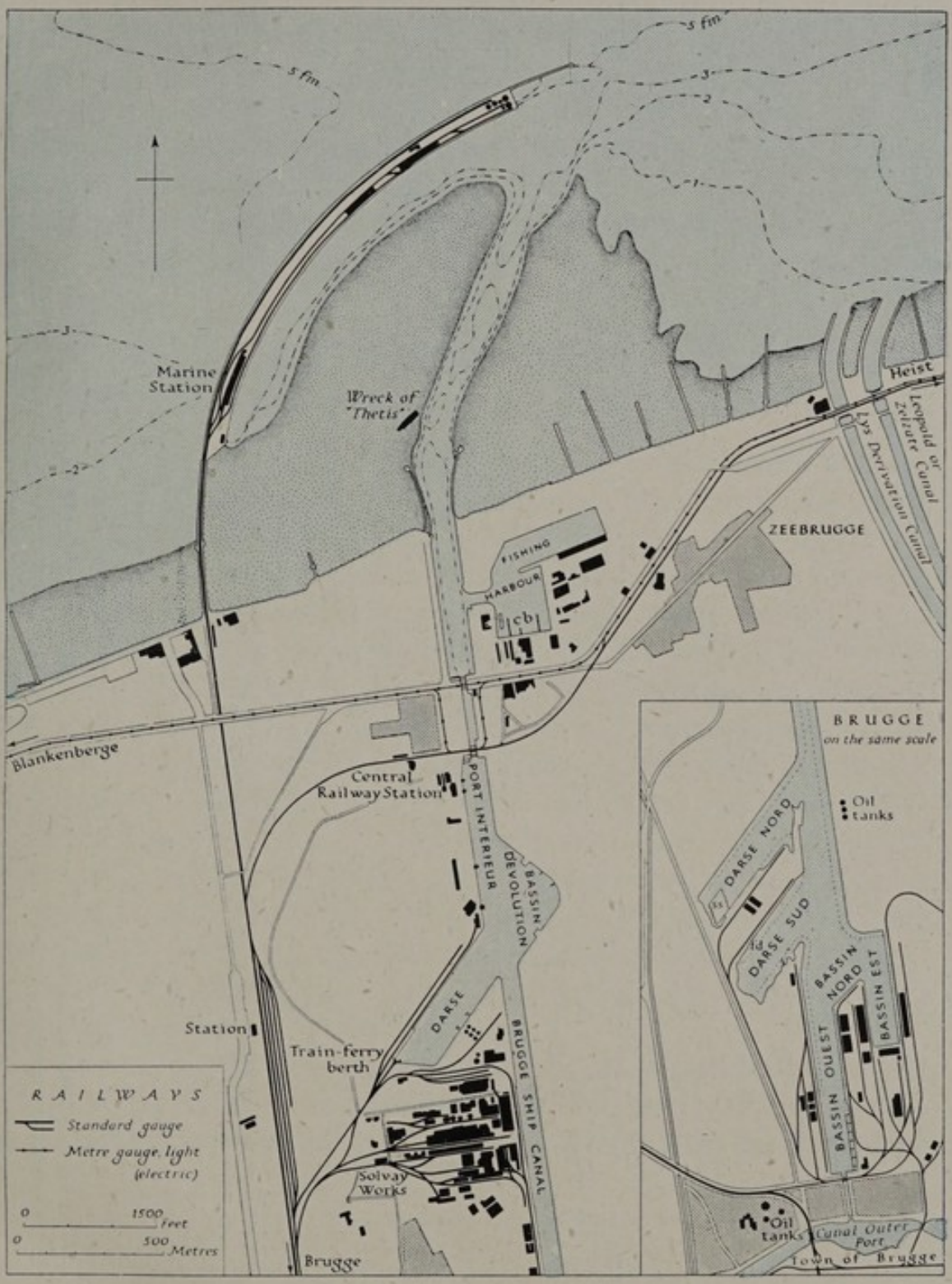


Fig. 98. Zeebrugge and Bruges (Brugge)

cb. careening bank; *fd.* position of floating dock; *ss.* submarine shelters constructed during the war of 1914–18.

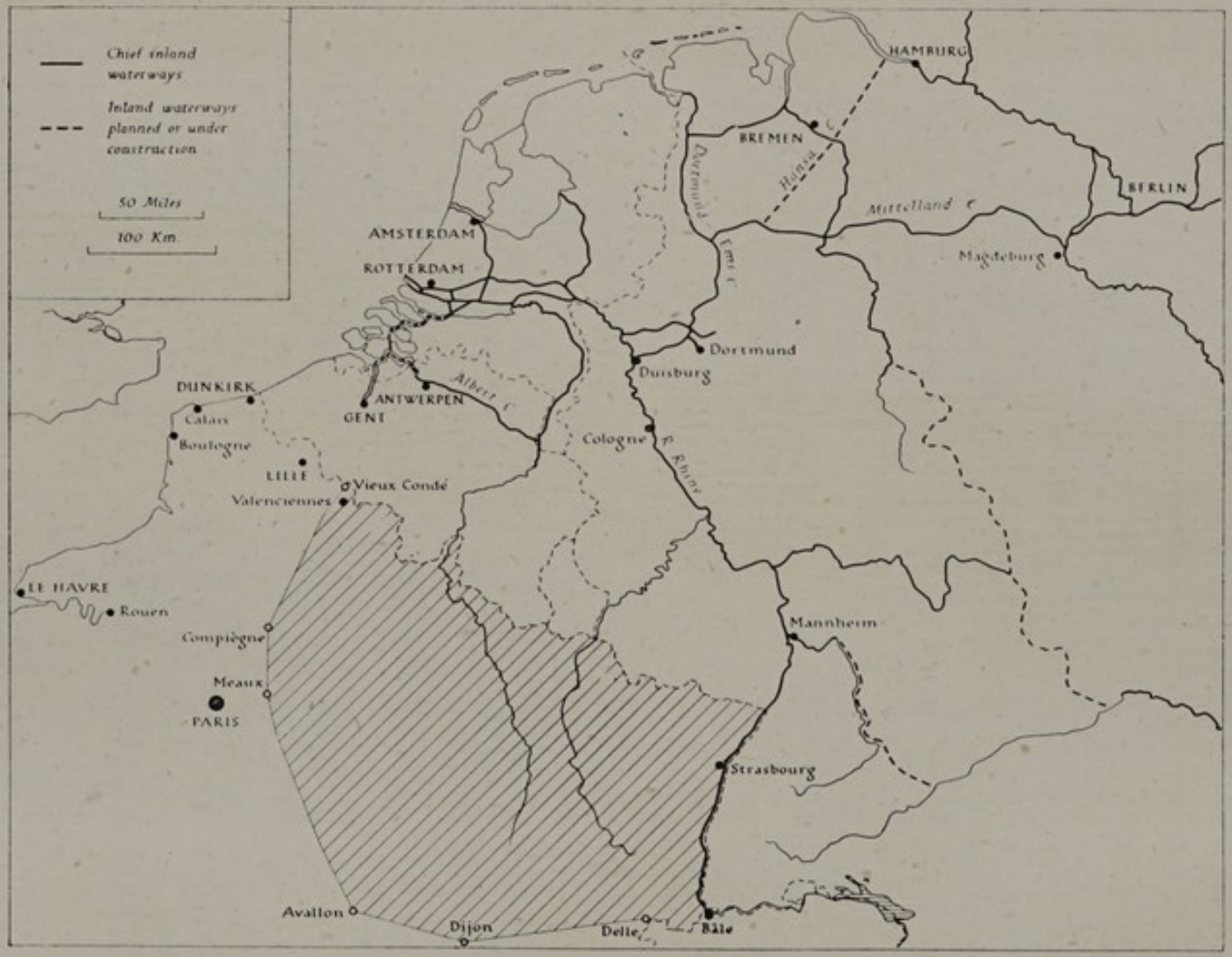


Fig. 99. Antwerp (Antwerpen) and its hinterland

The shaded area indicates the area in north-east France within which rail despatches to Antwerp are normally cheaper than to French ports. This area is bounded by the stations of Vieux-Condé, Compiègne, Meaux, Avallon, Dijon and Delle. The map also shows the chief European waterways with which the fortunes of Antwerp, and of Rotterdam, are bound up.

fuel, coke, macadam and fuel oil. Of the unloadings by canal, 82,000 tons came from the Netherlands, 43,000 tons from Germany, and 8,000 tons from France; minerals accounted for 121,000 tons in a total of 136,000 tons. These countries were also the chief suppliers of the small weight of rail-borne goods discharged directly. Loadings by canal were destined mainly for France and the Netherlands, loadings by rail for France and Germany; both were quantities of a few thousand tons.

Industry and Communications (see pp. 595-6)

The Ghent-Terneuzen Ship Canal (Fig. 100; Plate 52)

The Ghent-Terneuzen Canal is entered from the Wester Schelde (see p. 457) at Terneuzen in Dutch territory. It is 20 miles long, and affords access to Ghent for ships of 10,000 gross tons, 459 ft. in length, 56 ft. beam and 26 ft. draught in fresh water. The probable maximum limits are similar length and draught, but a beam of 57½ ft. The depth of the canal is 28½ ft. In the Dutch section the bottom width is 78¾ ft., in the Belgian section 164 ft., the surface width in both being about twice the bottom width. Although there is an interior lock at Sas-van-Gent, in the Dutch section near the frontier, the depth of water is the same on either side of the lock. The surface is 14½ ft. above zero (i.e. 4·45 m. above the Belgian State datum or 2·13 m. above N.A.P.—Nieuw Amsterdamsch Peil); the bottom is 14 ft. below zero. In Belgium the canal runs through sandy soil, the land surface being either just above water level or reaching a height of 6 ft.; in the Dutch section the polders are all about the same level as the water surface.

From the Wester Schelde at Terneuzen sea-going ships enter the canal by the West Lock, the largest of the three. The maximum dimensions of vessels allowed to pass through the locks are as follows:

	Length ft.	Beam ft.	Draught ft.
West Lock	459	56–57½	26
Middle Lock	295	36	19
East Lock	197	24½	19

The locks are open from 3 to 3½ hr. before high water to 3–3½ hr. after. It is this West Lock which imposes a limit on the size of vessels using the canal and, therefore, the port of Ghent, for the interior lock

at Sas-van-Gent, has a width of 85¼ ft., and permits a draught of 30 ft., while all the six bridges before Ghent have a similar clearance width. At Sas-van-Gent, the Dutch port at the interior lock, vessels drawing 22 ft. can discharge. The lock, sometimes called a safety lock, was constructed to ensure against any eventuality, such as an unfavourable tide in the Scheldt estuary, heavy traffic, or any flooding of the polders in Dutch territory.

The canal plays an important part in the removal of flood water from the upper basin of the Scheldt and Lys, for in the event of very high floods the normal disposal channels—the tidal Scheldt, the Lys Derivation Canal which reaches the sea at Heist, and the Ghent-Ostend Canal—are insufficient. The *Ponts et Chaussées* authorities are obliged to run off part of this flood water via the Terneuzen Canal, although at Terneuzen there is no special installation for dealing with it.

Selzaete (*Zelzate*)

A short distance inside the Belgian frontier, to the south of the Sas-van-Gent lock, stands the port of Selzaete (Fig. 100), which is developing a trade related to the heavy industries carried on nearby (see p. 420). About 1½ miles farther along the canal from the port of Selzaete itself the Kuhlmann company owns private quays, which can accommodate ships up to 7,000 tons. The trade of Selzaete in 1938 was the smallest of all Belgian ports, amounting to 63,000 tons sea-borne, 68,000 by canal, and 21,000 by rail (direct). Imports by sea were rather greater than exports, outward canal movements were greater than inward, and direct rail movements each way were equal. The commodities consist almost entirely of coal, coke, distillation products and fertilizers (Plate 33).

The *Société Chimique de Selzaete*, in which British interests hold a majority control, has an annual distillation of 40,000 tons of tar out of 150,000 for the whole country.

Ghent (Gent) (Figs. 97, 100–2; Plates 53, 54, 90)

Ghent (pop. 213,844) is the third largest city of Belgium, and second commercial port, though far behind Antwerp. With its suburbs it forms one of the most important industrial centres of the country, and is the commercial metropolis of Flanders. As a port it trades primarily with the countries of northern Europe and handles large shipments of industrial products. The maximum dimensions of vessels

admitted to the port are governed by the size of the Ghent-Terneuzen Canal (see p. 409). Vessels up to 10,000 tons gross can reach the docks.

Detailed Description

The port falls into two parts—the old docks and the new docks. The old docks number four; all are restricted in size and three are very narrow. The newer port consists of the dock system formed by three extensive darses branching diagonally from the enormous *Grand Bassin*, together with the partly completed *Bassin Canal*. The water level is constant throughout all the docks and there are no intermediate locks or gates.

	Length ft.	Width ft.	Depth alongside ft.	Quayage ft.	No. of quay cranes under 10 tons	No. of rail tracks
Old docks:						
Avant-Port	3,606	295	22	3,606	15	5
Bassin du Tolhuis	1,311	393	19½	—	—	—
Bassin au Bois (Timber Dock)	754	354	17½	—	1	21
Bassin du Commerce	—	360 (entrance 54)	17½	3,106 (left)	3	5
				3,560 (right)	11	5
New docks:						
Grand Bassin (*Nouveau Bassin*, New Dock)	6,967	606	26	6,860 (left)	33	—
				3,825 (right)	22	—
Darse Nord	1,640	820	26	3,656	19	6
Darse Centrale	1,640	951	26	4,300	16	2
Darse Sud	1,640	820	26	4,189	18	—
Bassin Canal	—	656	28	1,853	—	—

There are two 8-ton floating cranes in the *Grand Bassin*, three elevators in the *Bassin du Commerce*, two 5-ton transporters in the *Darse Nord* and two 10-ton transporters in the *Darse Centrale* as well as a 40-ton crane in the *Bassin Canal*. The *Bassin du Commerce* is used by small ships, and the *Bassin au Bois* is used for the unloading of timber. The avant-port is used by other Baltic traders and by most of the regular lines to English ports. The *Grand Bassin* and the darses handle the greater part of the trade of the port, bulk cargoes of coal, ore, etc., being handled by the transporters of the darses *Nord* and *Centrale*. The two moles which lie between the three darses carry railway tracks near each quayside as well as a group of about six tracks running along the centre of each mole.

Port Facilities

There are two dry docks, opening off the west side of the avant-port. Their dimensions are as follows:

	Available length ft.	Breadth entrance ft.	Depth on sill ft.
Large	393¾	42¾	17¼
Small	220	36	14

At Langerbrugge there is a patent slip 223 ft. long, 14½ ft. wide on blocks forward, with a lifting power of 1,020 tons.

The Town

Ghent is situated on the Flanders plain, at an altitude varying from 4 to 28 m. (15–90 ft.). Only the densely populated *quartier* of St Pierre stands at any elevation above the plain. Lying at the confluence of the Scheldt and the Lys, the city is intersected by numerous branches of these rivers and is thus irregular in plan, with over 200 bridges crossing the rivers, canals and docks. The city is one of the most famous in Belgium for its buildings—the great *Hôtel de Ville*, the Cloth Hall, the *Château des Comtes* (*Gravensteen*), the Belfry, the Cathedral of St Bavon and fifty-five other churches, of which the oldest is St Nicolas.

The water supply of Ghent is derived from the extensive system of the *Cie Intercommunale des Flandres*. Gas is supplied by the municipal works situated on the south side of the *Canal de Raccordement*. Electricity is derived from two generating stations: the municipal station in the docks, and the Langerbrugge station on the left bank of the Terneuzen Canal.

The commune of Ghent extends along both banks of the Terneuzen Canal as far as Selzaete. The population of the commune, although the area has expanded, has declined to 163,000 since reaching a maximum of 166,000 in 1910. The agglomeration, however, consisting of Ghent together with the eastern suburbs of Ledeberg, Sint Amandsberg and Gentbrugge, had a population of 213,844 in 1938, while many of the inhabitants of nearby communes, such as Destelbergen, Evergem, Ertvelde and Mariakerke, are economically dependent upon the city. Ghent is the chief town of the province of Oost-Vlaanderen, the centre of an administrative arrondissement and the see of a bishop. It is the seat of courts of appeal, of first instance and of



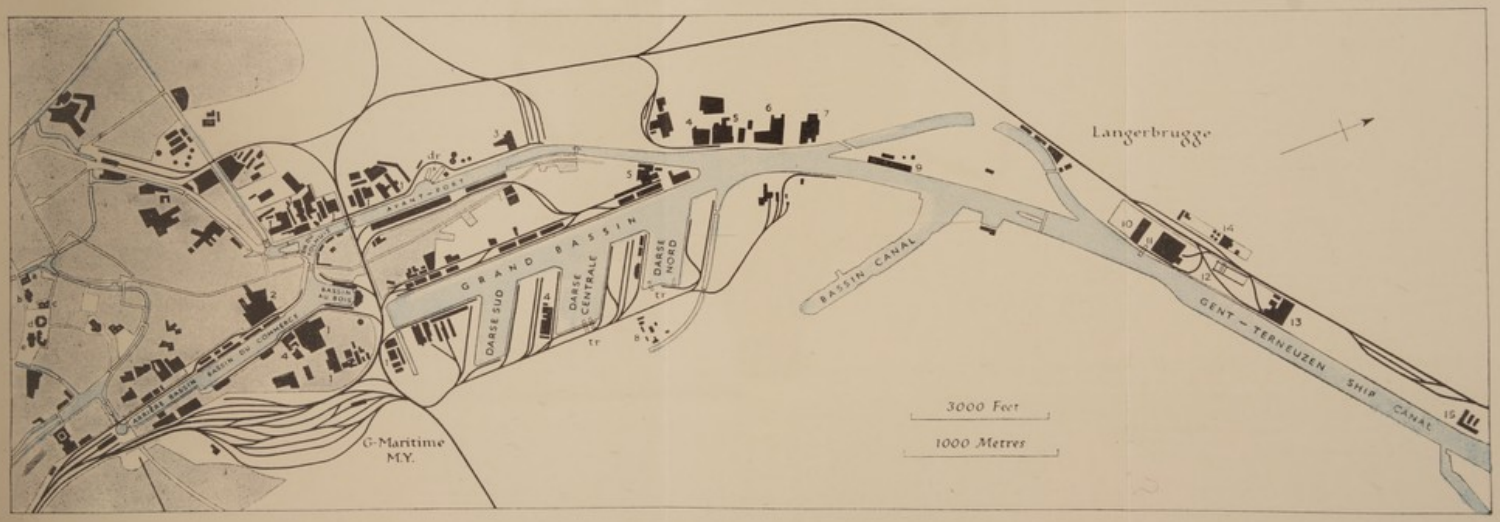


Fig. 100. The port of Ghent (Gent); Ghent-Terneuzen Ship Canal

dr. Dry docks; *tr.* Transporters; *a.* Post and Telegraph Office; *b.* St Nicolas' church; *c.* *Hôtel de Ville*; *d.* Belfry; *e.* Cathedral.

Mills and factories: 1. Textile mills; 2. S.E.M. electrical engineering works (*Etabls. Carel* and *Van den Kerckhove*); 3. Soap; 4. Superphosphates; 5. Chemicals (*Union Chimique Belge*); 6. Belgian Shell refinery; 7. Galvanizing works; 8. Coke ovens; 9. *Papeteries de Belgique*; 10. Power Station (*Centrales électriques de Flandres et du Brabant*); 11. *Air Liquide*; 12. Coal depot; 13. Electro-chemical works; 14. Belgian Cracking Co., oil refinery and tar distillation plant; 15. Gasoline depot; 16. Lubricating oil depot; 17. Belgo-Petroleum refinery; 18. *Purfina* gasoline depot; 19. Fertilizers (Kuhlmann); 20. Coke ovens; 21. Synthetic nitrogen and ammonia works; 22. Coke ovens.

justices of the peace; the state university was founded there in 1816 (see pp. 112, 134).

History

The problem of access to the sea arose early, for in the tenth century a small canal was dug to reach the Wester Schelde by a northerly course through Ertvelde. By the thirteenth century Ghent had developed the long-famous cloth industry, and the growth of trade led to the construction of the Liéve Canal, beginning in 1251, to the Zwin Channel at Damme below Bruges. The canal remained in use for nearly 200 years. With the rise of industry came fierce struggles, at times breaking out into open warfare, between the patrician element and the artisans under the Arteveldes in the fourteenth century. James van Artevelde allied the city with Edward III of England during his expeditions in France, an alliance largely commercial in origin, for England was both a principal source of wool and a market for finished cloth. John, the fourth son of Edward III, was born at Ghent in 1340 and afterwards became known as John of Gaunt. Under the dukes of Burgundy discontent at financial impositions broke out into an unsuccessful war, and after the battle of Gavre in 1453 the city lost its independence. By about 1450 the Liéve Canal had silted up, like the Zwin Channel into which it opened (see p. 88). Some trade passed to Antwerp, but Ghent retained a considerable importance as the staple centre for the distribution of French wheat imports. The woollen manufacture was decaying through the rise of English competition, but the manufacture of tapestry was growing.

In 1492 Flanders passed into the possession of the Hapsburgs, and it was at Ghent that the Emperor Charles V was born in 1500. At this time the accumulated wealth of the cloth industry and the commercial importance of the city made Ghent one of the leading cities in Europe, with a population numbering 100,000. A better outlet to the sea was needed, and a second connexion with the Wester Schelde was achieved when, in 1563, the municipality completed the Sasschevaart Canal to the estuary at the Braakman inlet with locks at Sas-van-Gent. At this time the Braakman was much larger than it is to-day.

With the outbreak of religious strife in the Netherlands the fortunes of the city suffered a decline. In 1576 the leaders of the opposition to Spanish rule met in the city to sign the solemn agreement to resist, which became known as the Pacification of Ghent (see p. 98). The intolerance of the Protestants, however, led the southern

provinces to incline towards Spanish rule again, while in 1584 the city was forced by hunger to surrender to Parma.

Like Antwerp, Ghent was now cut off from the sea, but in 1613 the Bruges-Ghent Canal was authorized, and in 1653 its connexion with the Ostend Canal was decided on. After the damage to the canals resulting from the French wars—the French captured the city in 1698, 1708, and 1745—a recovery was effected, and the period of Austrian rule in the southern Netherlands was one of comparative prosperity. Ghent merchants in the East Indian trade operated from Ostend, and on the formation of the Ostend Company, 1722–3, four became directors.

With the French conquest of the Netherlands navigation on the Scheldt became free. The same years saw the revival of Ghent as a manufacturing centre. In 1800 Liévin Bauwens established the first cotton-spinning mill, and in 1805 an engineer secretly brought from England a model of a steam engine. What remained of the woollen industry migrated to Verviers, but the cotton industry grew rapidly. The linen manufacture, formerly widespread in the Flemish countryside, was eventually to become concentrated in the towns, especially at Ghent, owing to the development of English machine methods. Under the French empire, Ghent was second only to Lyons and Rouen as a textile centre, while it benefited also from its connexion with the Dutch market (1814–30). In 1814 the city secured a momentary international importance when the treaty of peace between Great Britain and the U.S.A. was signed there.

Napoleon had been unable to carry out his intention to restore the Sasschevaart Canal, now little more than a sandy channel. The construction of a 14½ ft. ship canal to the Wester Schelde was begun in 1824 and completed in 1827, and in the same year the *Bassin du Commerce* was opened in the city. Enlargement of the canal became necessary in 1879 and 1894, and the *Bassin au Bois* was inaugurated in 1881. The docks so far constructed lay at the terminus of the canal in the city. In 1900 came a plan for a new dock system to the north of the existing system. The excavation of the *Grand Bassin* and the three darses was completed in 1914, although not all the dock sides were quayed. In 1910 a new lock was constructed on the canal.

During the German occupation of 1914–18 Ghent could not be used as a naval port because its seaward approaches lie in what was then neutral territory. Trade was reduced to a very low figure. In 1918 the retreating Germans carried out an impressive programme of destruction in the port. The canal was blocked by the remains of the

locks, together with four sunken torpedo boats. In the docks sixty-five ships and barges, besides machinery, had been sunk. Four bridges were destroyed, and the Germans had blown up the sixty cranes which they had not been able to remove. Most of the quays were unusable. Reconstruction was rapid, however; in March 1919 the first sea-going ship was able to discharge a cargo, and in 1921 the work was complete.

Trade expanded, and in 1922 it was greater than in 1913. By 1930 the branch dock quays had been completed. The excavation is in progress of a large new dock, 8,860 ft. long and 656 ft. wide, opening off the canal to the north of the main dock system; the greater part of the length has been attained. This dock, Bassin Canal, is to be renamed *Bassin Echevin Siffer*. Plans envisage the widening of the canal to 656 ft. along the Langerbrugge section, and its eventual deepening to 32¾ ft. The city is continually pressing for the enlargement of the lock at Terneuzen, a work requiring the assent of the Netherlands government, but is unable to pay for it. A considerable body of opinion holds that the expense would never be justified and that owners of vessels now too large to enter the lock would not look with favour on the port. The Belgian government fails to take action, and it is believed by some at Ghent that Antwerp is opposed to any radical improvement.

Trade

Trade of Ghent 1938, *thousands of tons*

Sea-borne imports		Unloadings: Waterways	Unloadings: Rail (direct)	Sea-borne exports		Loadings: Waterways	Loadings: Rail (direct)
Minerals	1,932·6	1,771·9		Minerals	474·0	1,327·1	
Timber	243·6	14·0		Metals and metal goods	405·3	82·7	
Vegetable products	38·7	37·1		Chemical products	103·2	93·1	
Worked stone	23·6	5·3		Vegetable products	38·1	2·1	
Chemical products	17·8	85·8		Textiles	6·9	5·7	
Paper	16·2	0·2		Machinery	3·5	0·3	
Metals and metal goods	4·8	103·8		Glass	1·8	—	
Others	9·8	17·7		Others	11·8	15·1	
Total	2,287·1	2,035·8	197·9	Total	1,044·6	1,526·1	380·1

Source: *Bulletin Mensuel du Commerce... U.E.B.L.*, 1939, pp. 671–2 (Bruxelles, 1940).

The most prominent feature of the sea-borne freight movement was the fact that outward cargoes represented only 46% of inward cargoes, in contrast to the almost equal balance at Antwerp, and in 1938 over 1 million net tons of shipping sailed outwards in ballast compared with 400,000 tons inwards (Fig. 102). Heavy raw materials predominate in the import trade, and raw materials and semi-manufactures in the export trade, with a very small proportion of foodstuffs or tropical produce. Ghent is often referred to as an industrial port, because its activities are concerned primarily with the industries of the city and of the nearby Belgian and French industrial regions, and but little with the marketing of commodities from distant sources; in the nature of its trade it closely resembles Dunkirk. Among the imports, ores, coal, pit-props, pulp and paper, petroleum and petroleum products, and fertilizers are predominant. Among exports, coal destined for France, coke and manufactured fertilizers make up the bulk of the mineral exports, while metals and metal goods, mainly iron and steel, provide the second greatest weight. Much of the iron and steel is shipped to the United Kingdom, largely in mixed cargoes. The countries of north-west Europe, the Baltic and the U.S.S.R. have a leading place in commercial connexions; indeed, outside Europe and North Africa, the only outstanding imports are petroleum and cotton from the U.S.A.

In the maritime trade of the port the British flag accounts for about one-third of the total. The German, Swedish, Norwegian and Soviet flags maintain a high secondary place; the French share has fluctuated. The great majority of British vessels trading to Ghent are small short-sea traders of under 1,000 tons, and except for the Dutch vessels, they are the smallest of any of the principal trading nations. British ships carried 594,000 tons of the total imports of 2,287,000 tons, German ships 311,000 tons, Norwegian ships 298,000 tons, and Swedish, Soviet, Danish, Greek and Italian ships over 100,000 tons each.

Much of the sea-borne trade of the port is carried on through liner services, though the heavy raw materials call for considerable tramp shipping as well. Thirty-nine lines operate from Ghent, of which seventeen serve the British Isles, eleven the Baltic, Scandinavia and Russia, seven North and Central America, two the Black Sea and one Spain and Portugal.

The distribution of imports and exports by the principal countries of origin and destination and by mode of transport may be summarized as follows:

Trade in 1938, *thousands of tons*

Country	Sea-borne imports from	Unloadings		Sea-borne exports to	Loadings	
		Water-way	Rail (direct)		Water-way	Rail (direct)
United Kingdom	449·6	—	—	375·8	—	—
U.S.S.R.	341·1	—	—	23·5	—	—
Spain	256·2	—	—	—	—	—
Sweden	236·6	—	—	125·6	—	—
Poland-Danzig	234·6	—	—	30·4	2·5	—
Algeria, Tunisia, Morocco	145·0	—	—	—	—	—
Norway	96·7	—	—	54·8	—	—
Romania	62·4	—	—	—	—	—
U.S.A.	60·8	—	—	—	—	—
France	59·6	253·2	137·1	235·6	576·8	361·3
Finland	50·1	—	—	17·2	—	—
Venezuela	45·7	—	—	—	—	—
Iran	38·2	—	—	—	—	—
Netherlands	8·1	854·9	12·5	—	191·8	6·9
Germany	4·2	887·9	46·4	66·4	722·3	8·4
Switzerland	—	—	—	—	2·5	2·2
Czecho-Slovakia	2·5	—	—	6·3	23·7	—
Other countries	195·7	—	1·9	65·1	6·5	1·3
Ships' stores	—	39·8	—	43·9	—	—
Total	2,287·1	2,035·8	197·9	1,044·6	1,526·1	380·1

Source: *Bulletin Mensuel du Commerce... U.E.B.L.*, 1939, pp. 674–5 (Bruxelles, 1940).

This table demonstrates the great part in the trade of Ghent which is played by the waterways in handling cargo arising from the maritime traffic of the port, from waterway transit, and from the industries of the city. In 1938 the total weight of waterway freight exceeded the maritime freight—3·5 million tons against 3·3; incoming freight was nearly as great as sea-borne imports, and outgoing freight amounted to half as much again as sea-borne exports. Waterway freight has a considerable inward excess balance, though not as much as occurs with sea-borne freight. Waterway unloadings from Germany, largely coal, were not much greater than loadings for Germany, largely ores; unloadings from the Netherlands, however, were over four times the loadings, and reflected mainly the movement of Dutch and German coal. In contrast, unloadings from France amounted to less than half the loadings, which comprised mainly German and English coal in transit, as well as some ores. The waterway traffic with the Rhine has been expanding in recent years, and in 1932 Ghent overtook Amsterdam, to become the third largest port for handling Rhine traffic below the German frontier.

Transit Trade. The transit trade of Ghent, though not separately specified, is considerable. It consists mainly of the import of special iron ores and of coal for the industrial region of northern France. In 1936, for example, 63,000 tons of English coal and 190,000 tons of German coal entered France by way of Ghent and the canals. There is also a declining long-distance transit traffic with Alsace and Lorraine by rail; the inward movement has now practically stopped, although it amounted to 115,000 tons in 1930. The outward movement by rail is more considerable, comprising iron and steel in various forms. Rail transit traffic to Basle comprises mixed goods, and has remained constant in recent years at about 2,000 tons annually.

For transit traffic the port benefits from its special equipment and experience in the handling of bulky shipments, and by some it is held that of all ports between the Seine and the Elbe, Ghent can most rapidly handle heavy cargoes. Partly for this reason it has been extensively used in the past as a collecting point for Soviet imports.

Industries

Ghent is the principal centre of the Belgian textile industry. It is dominant in the spinning of cotton and contains over one-third of all Belgian spindles; it has also an important place in the spinning of flax and jute. It is less important in the weaving of cotton and of the various mixed fabrics, and in the bleaching, dyeing and finishing of all fabrics. Nevertheless, it is the organizing centre of the cotton industry and for most of the remaining textile industries other than wool, and contains the central offices of many trade organizations (see pp. 336-8). There are smaller manufactures of silk, rayon goods, wool and made-up goods. *Royal Axminster* carpets are woven and dyed at Ghent from yarns spun at Verviers.

Only one-half of the working population of Ghent, however, is employed in the textile industry. The remaining industries of the city are so varied as to give it a certain metropolitan air. Saw milling, flour milling, and the preparation of industrial oils and greases arise from its function as a port. It is the chief centre in Belgium of chemical dyeing, and a number of manufacturers produce both fine and heavy chemicals. Fertilizer manufacture, coal distillation and metallurgical-chemical industries are also important. At Wetteren, 11 km. (18 miles) to the south-east, lie the large explosive works of *Coopal et Cie* (see p. 328).

Among a great variety of metal industries textile machinery is important, although Ghent is not the chief centre for this industry.

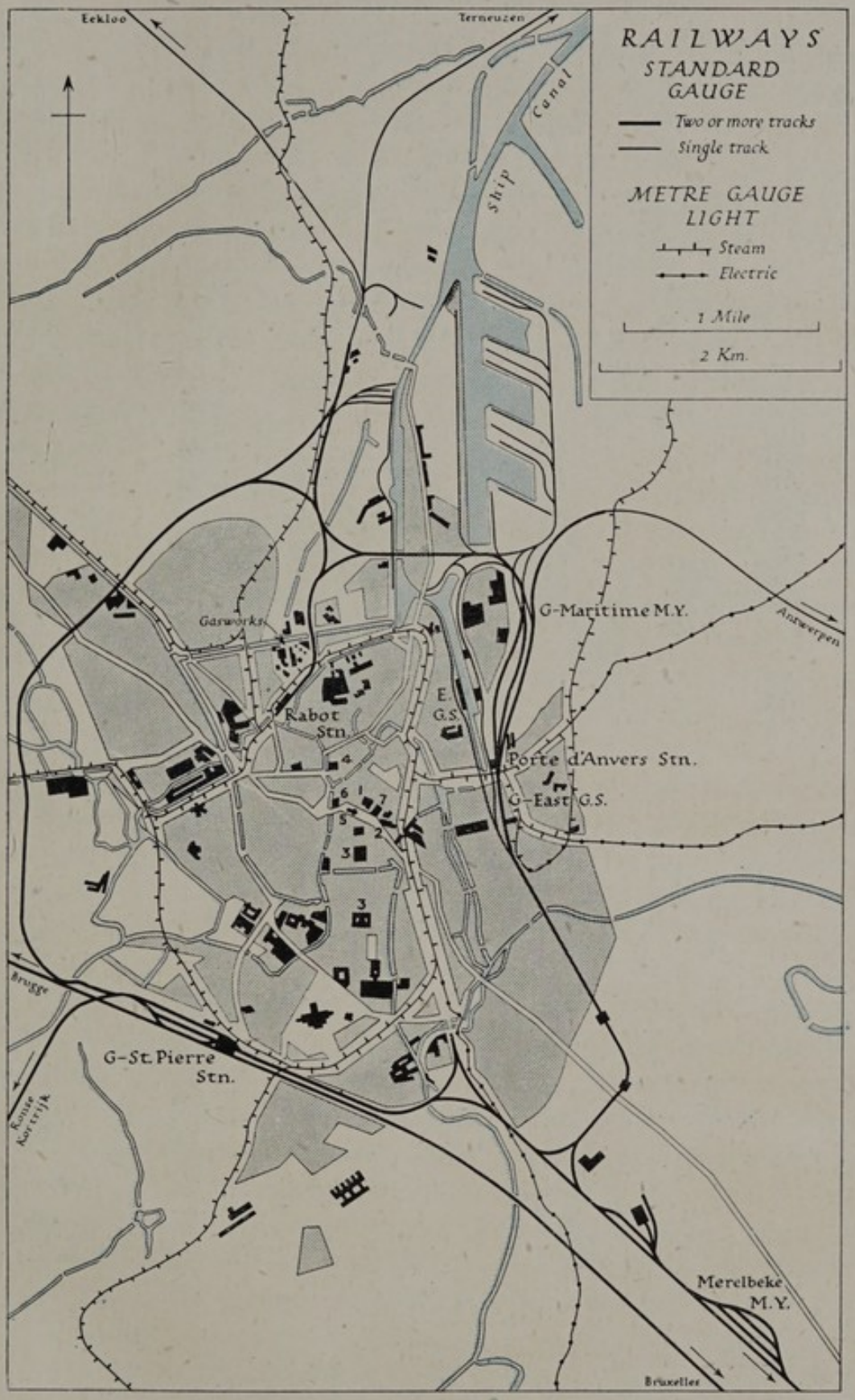


Fig. 101. Ghent (Gent): the city

E.G.S. Entrepôt Goods Station; *G-East G.S.* Ghent-East Goods Station; *MY.* Marshalling yard; 1, Hôtel de Ville; 2, Cathedral; 3, University; 4, Gravensteen (*Château des Comtes*); 5, Church of St Nicolas; 6, Post and Telegraph Office; 7, Belfry.

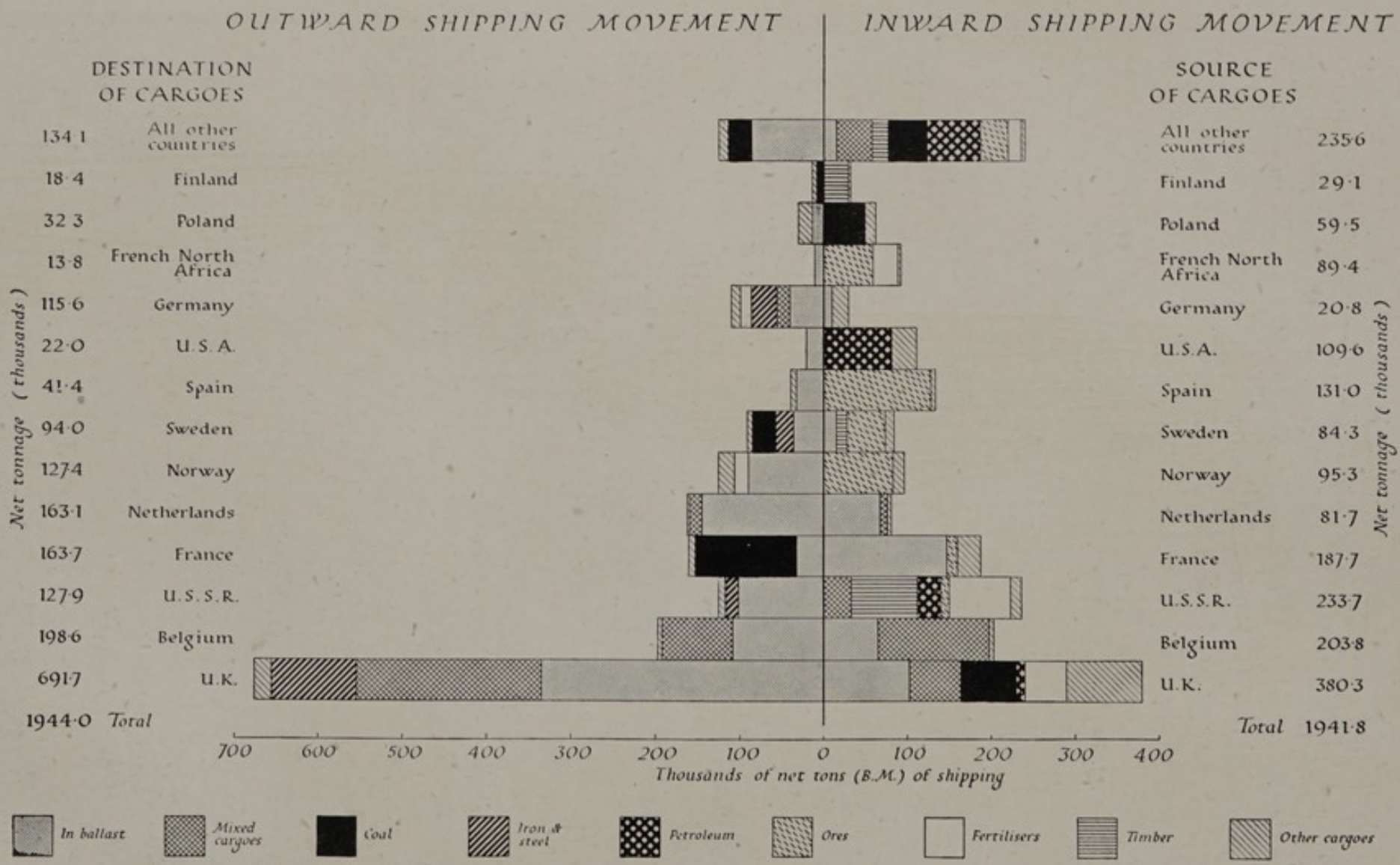


Fig. 102. The trade of Ghent, showing the amount of net tonnage devoted to each main type of cargo (in Belgian measurement of tonnage, see p. 393)

Based on *Rapport Annuel* 1938, Association des Intérêts maritimes de Gand, pp. 40–1, 44–5 (Gand, 1939).

There are two engineering companies which build marine Diesel engines, the *Anglo-Belgian Company* and the *S.E.M. Company*. The latter has international affiliations and also constructs generating sets, turbines, Diesel-electric locomotives and electric motors (see p. 319). The construction of gearings, turbines, pumps and electrical accessories, the manufacture of wire, nails and bolts, together with galvanizing and metal drawing complete the list of metal industries. The remaining industries include the manufacture of rubber and of belting. Besides some glass manufacture, of specialized types, there is the *S.A. Belge d'Optique et d'Industrie de Précision*, one of the leading producers in Belgium of optical glass for binoculars, periscopes, survey equipment, etc. A gramophone company, *Decca Edison Bell*, is the only one in the country which manufactures disks.

As in many other ports which lie some distance from the sea, and in contrast to Antwerp, industry has expanded seawards. Factories along the canal gain the obvious advantages of proximity to a navigable waterway and of connexions with the inland waterway system and with the railway from Ghent to Terneuzen, which runs close to the west bank of the canal. Sites are also cheaper than those near the city. Developments are likely to continue, for the port authorities offer manufacturers rates designed to meet only the capital charges of the necessary port works. The *ARBED* steel company of Luxembourg has reserved a 740-acre site on the east bank for the future construction of a complete steel plant using imported Brazilian ore, and designed to meet conditions when the Luxembourg ores approach exhaustion.

From the city northwards to the Dutch frontier lie over twenty factories and refineries. The *Belgian Shell* oil refinery treats 10,000 tons of crude oil annually. At Langerbrugge on the west bank nearest the city are the electro-chemical works of *S.A. Belge-Electrochimie* and the fertilizer works of *Union Chimique Belge*. On the island of Langerbrugge lies the paper mill of *Papeteries de Belgique*, which produces more than half of the newsprint consumed in Belgium. Farther north lies the *Centrale Electrique de Flandres*. This power station, which has a capacity of 100,000 kW., has been described as the most extraordinary power station in the world. Constructed in 1914, it was converted in 1925 to operate with steam at a pressure of 3,187 lb. per sq.in., although it now operates at a pressure of 1,662–2,840 lb. per sq.in. It has become part of an integrated group of factories. A low-temperature carbonization plant supplies the power station with fuel in the form of semi-coke, and provides the *Belgian*

Cracking Company with tar for distillation and the manufacture of phenol, etc. The proximity of cheap current permits in other plants the production of carbide, abrasives, colloids, ferro-alloys and other electro-chemical products. The demands for current from all these undertakings have allowed an improvement in the load diagram for the power station.

Northward succeed two more chemical works, gasoline storage depots, and two petroleum refineries. *The Belgian Cracking Company's* refinery has a capacity of 10,000 cu.m. of motor fuel annually, and farther seawards, at Terdonk, the *Belgo Petroleum S.A.* refinery can treat 68,000 tons of crude oil annually. (These refineries were not in production in 1940.) At the farthest limit are more heavy chemical industries. At Selzaete there are a branch of the French Kuhlmann combine, a forty-oven coking plant and a fertilizer works. In Netherlands territory just beyond the frontier, at Sas-van-Gent, is the *St Gobain* chemical works, while at Sluiskill, halfway between the frontier and Terneuzen, there are a coke-oven plant and a synthetic ammonia plant.

Communications

Inland Waterways. Five waterways radiate from Ghent, giving it admirable connexions with Belgian and foreign systems. (1) The Ghent-Terneuzen Ship Canal offers the shortest way to the Wester Schelde and thence via the Hansweert Canal to the Ooster Schelde and the Rhine; there is no limit on the size of barge traversing it. (2) The lower course of the Scheldt, capable of taking barges of 600–1,350 tons, leads to Antwerp (and thence to the Rhine or to the Albert Canal and Liége) and to the Bruxelles Ship Canal. (3) The Lys and the Upper Scheldt lead separately to Tournai, Courtrai (Kortrijk) and Lille and the French canal system; these rivers can accommodate barges of 275–450 tons. (4) The Ghent-Ostend Canal leads westwards to Bruges, and thence Zeebrugge and Ostend; it accommodates barges of 600–1,350 tons (see p. 521).

Railways. The port is served by 100 miles of track, and two main freight stations near the waterside: (1) Ghent-Entrepôt on the west side of the *Bassin du Commerce*, an annexe of the Est goods station, and (2) Ghent-Maritime, the principal marshalling yard for the port with over 50 miles of track, a handling capacity of 1,500 wagons per day and a storage capacity of over 2,000. The number of loaded wagons handled in the port in recent years was as follows (in thousands):

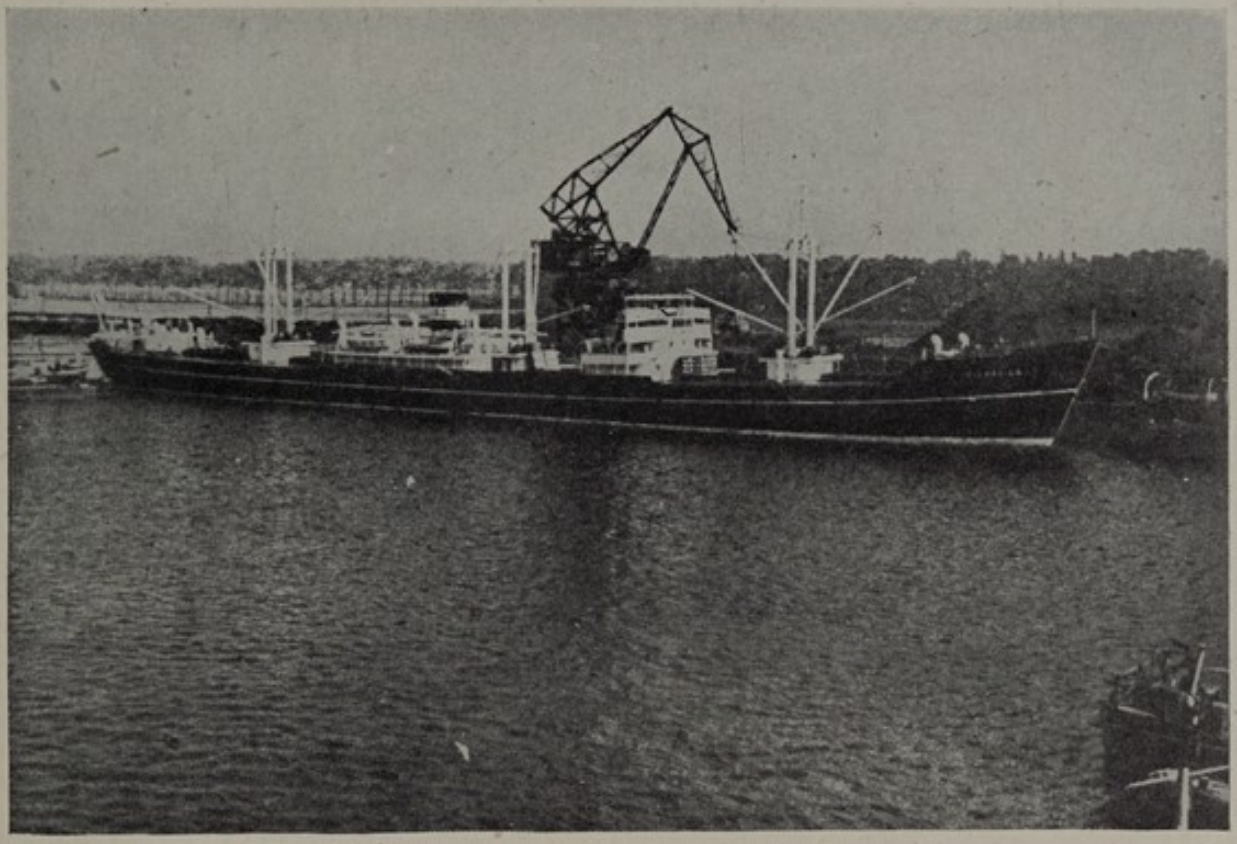


Plate 54. Ghent (Gent): *Sud Darse*
The vessel alongside is the *Pierre L.D.*, 5,800 tons gross, 438 ft. long, 57 ft. beam, 25 ft. draught.

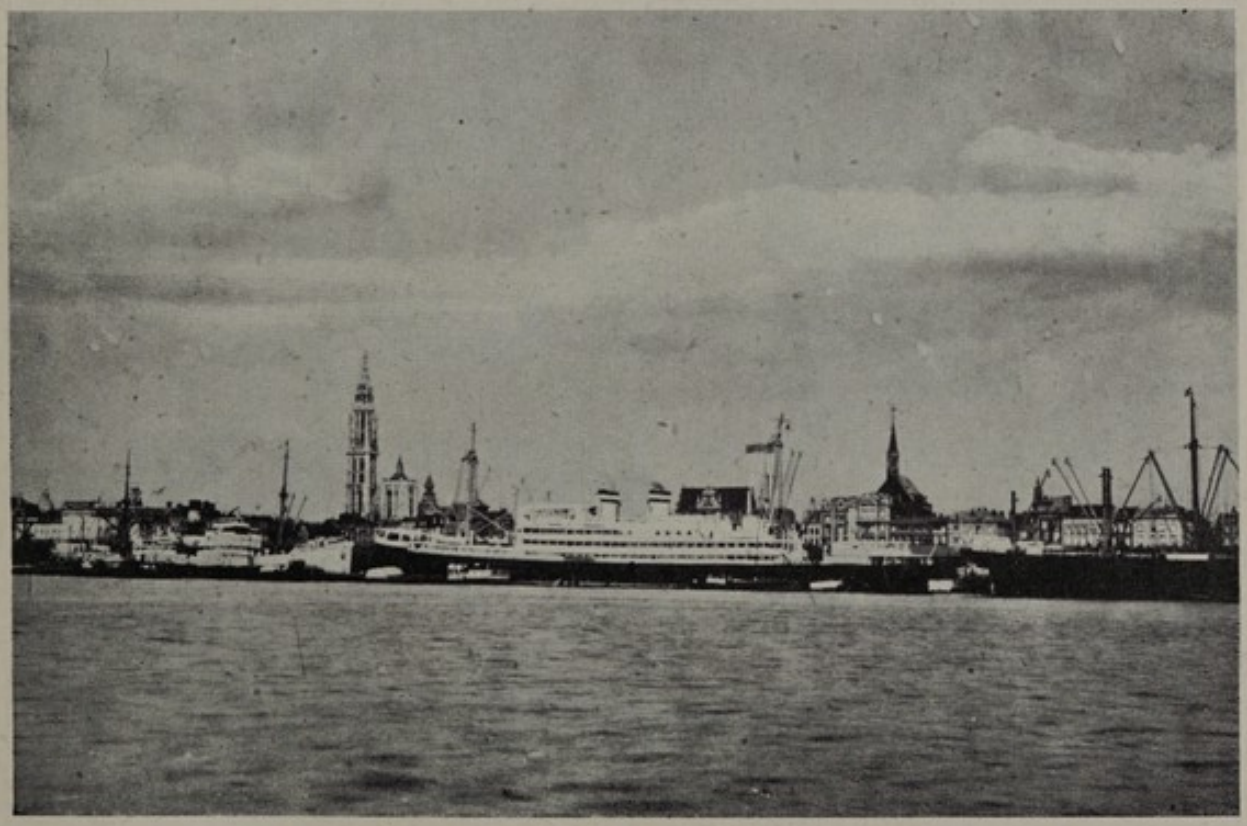


Plate 55. Antwerp (Antwerpen), looking east from across the Scheldt
The tower of the 'Cathedral' can be seen and also, behind the mainmast of the liner, the *Torengebouw*, or skyscraper.

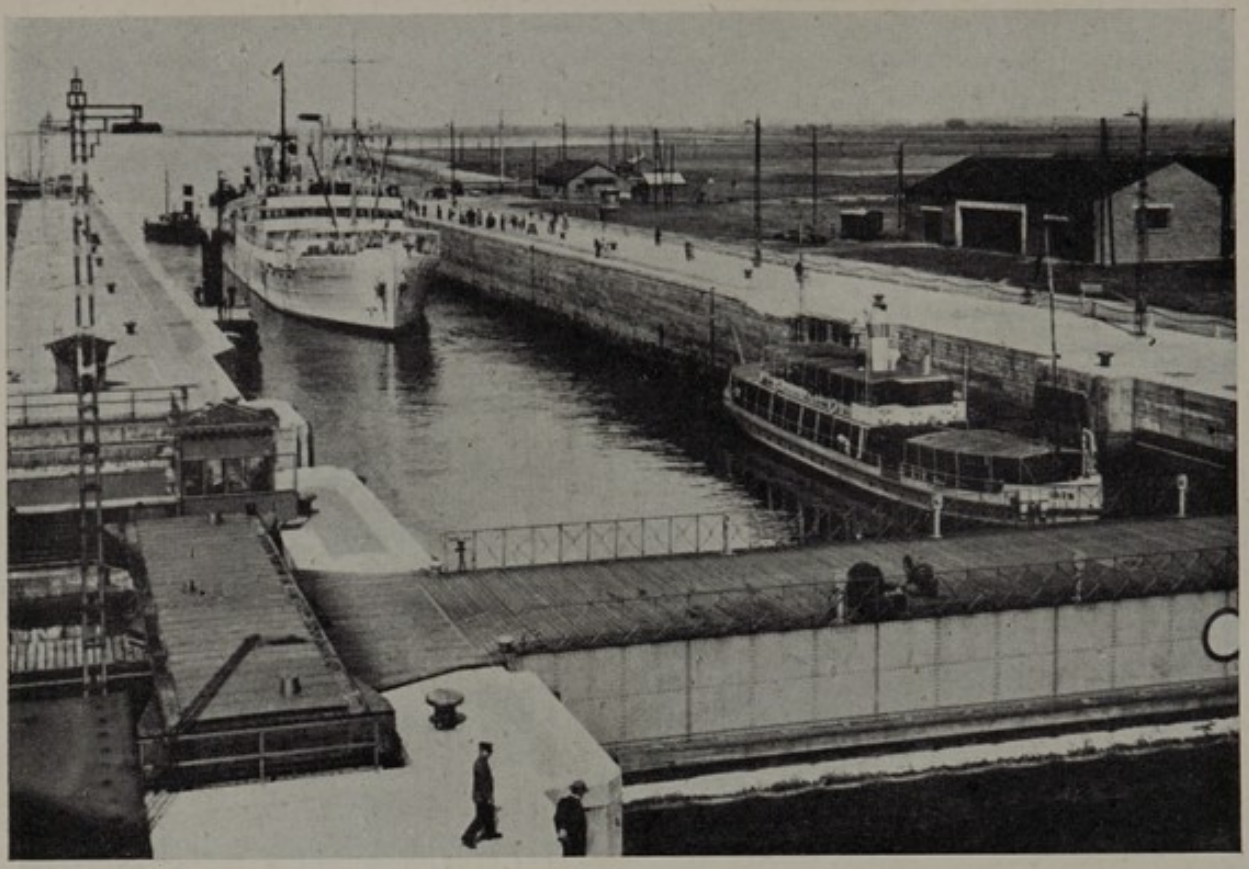


Plate 56. Antwerp (Antwerpen): the Kruisschans lock, looking north-westwards towards the estuary

The vessel in the lock is the C.M.B. *Joséphine Charlotte*, 3,400 tons gross.

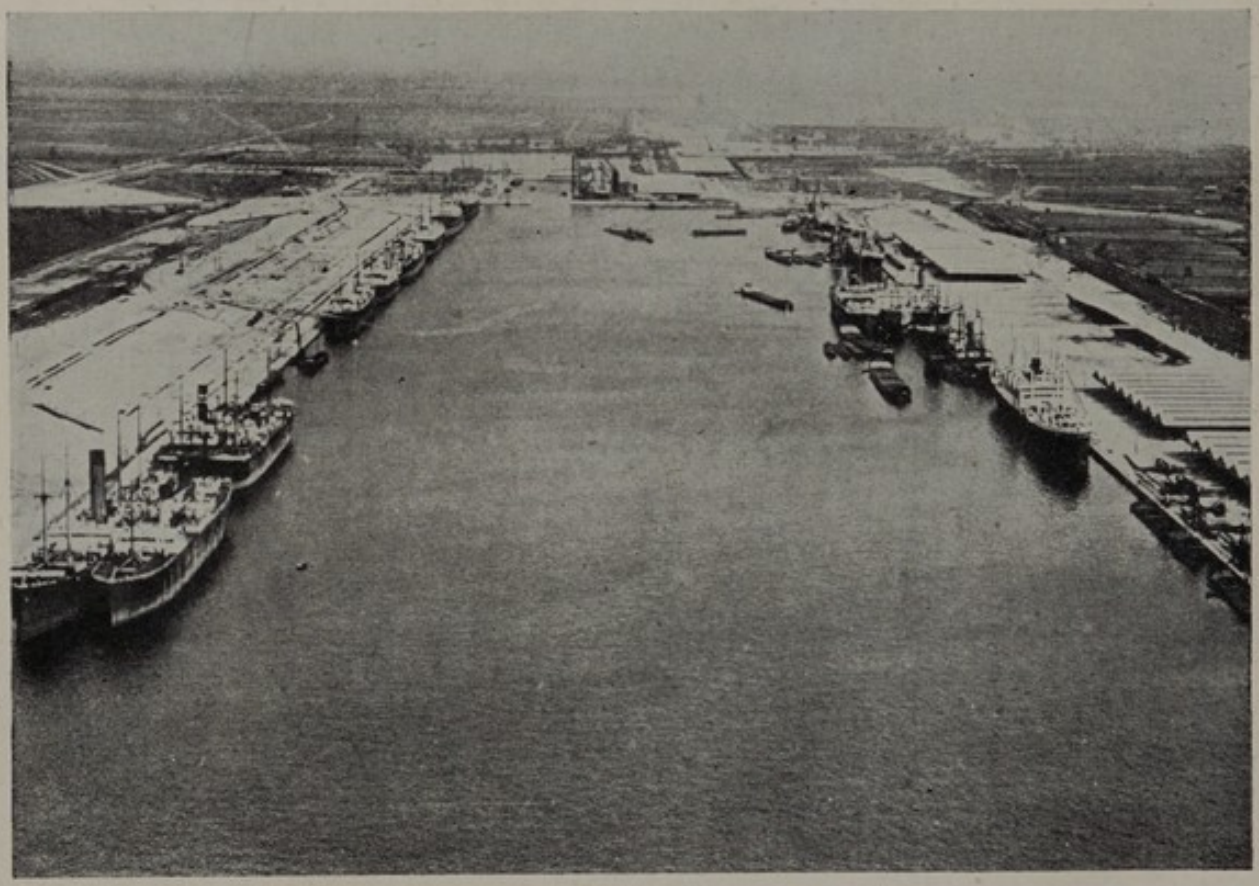


Plate 57. Antwerp (Antwerpen): the Leopold Dock (Bassin Canal B, Canal Dock B), looking eastwards

Nearly 20 ships are shown berthed; the space remaining is an indication of the size of this enormous dock. At the end may be seen the Junction Dock leading into the Albert Dock, which continues away to the right.

	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Inward	214	186	124	87	85	71	70	73	113	82
Outward	92	100	80	54	35	47	48	60	65	47

Source: *Rapport Annuel*, 1938: *Association des Intérêts Maritimes de Gand*, p. 51 (Gand, 1939).

These two goods stations stand on the *ceinture* line, within which there is only one branch, leading to Ghent-Rabot station, in the north centre of the city. The chief passenger station is Ghent-St Pierre, on the south side; the former station of Ghent-Sud, within the ceinture, was removed some years ago. A short distance to the south-east, on the Brussels line, stands the Merelbeke marshalling yard, which has a capacity similar to that of Ghent-Maritime. The construction is proposed of a road and railway from the Darse Nord to Selzaete, 440 yd. distant from the right bank of the canal, giving that bank a more favourable situation than is now enjoyed by the left bank. For rail and road connexions see Fig. 97.

Antwerp (Antwerpen)

(Figs. 94, 96, 97, 99, 103–7; Plates 55-61, 68, 74)

Antwerp (pop. 493,000) is the second city of Belgium and the port through which passes 80% of the sea-borne trade of the country. It is one of the largest ports in the world and one for which the description 'world port' is most appropriate. Its fortunes depend upon the estuary of the Scheldt, of which a proverb says, 'Antwerp owes the Scheldt to God, and everything else to the Scheldt'.

Approach and Access

Antwerp lies 58 miles from Flushing by the deep channels; 34½ miles of this approach lie in Dutch territory. Pilotage from the sea to Antwerp is compulsory for all vessels except naval craft and merchant vessels in ballast and drawing less than 6¼ ft.

There are four channels leading to the Wester Schelde from the Flemish Bight. The Deurloo and Spleet Channels are now of little importance; the Deurloo has a least depth of only 17¾ ft., while the Spleet channel is now unmarked. The Oostgat is the northernmost channel and is used by smaller vessels from north European ports. It lies close to the shore of Walcheren and has a minimum depth of 23 ft.; the southern part off Flushing, known as the Galpegut, is only 200 yd. wide. The most important entry is the Wielingen Channel which lies to the south, off the Belgian and Dutch coasts. The named

channel begins at the Wielingen buoy 2¾ miles north of Zeebrugge, but the channel really extends 8 miles farther west of Zeebrugge to a point near the Wandelaar lightship. It has a least depth of 28 ft. The fairway continues eastwards from the south shore of the estuary at Nieuw Sluis and approaches the north shore beyond Flushing, merging with the Oostgat.

In the Scheldt the depths are liable to change, but as a rule the least depth in the centre of the buoyed channel is nowhere less than 24 ft. as far as Antwerp. A vessel drawing 32 ft. has been taken up to Antwerp and secured alongside 3 hr. before high water, and the limit of size admitted when the channel is kept clear is probably represented by a tanker drawing 33¾ ft. which was berthed at Hemiksem just above Antwerp. The maintenance of such a length of channel in the hydrological conditions which obtain off these shores is a task of considerable magnitude, and the depths would radically change following any disturbance to the regular programme of dredging. Off Flushing the fairway has a width of 3,800 yd.; it narrows as the estuary is ascended, more especially above Terneuzen, swinging from side to side in wide curves, to reach a width of 150–220 yd. in the Bath Narrow, where the estuary turns from a general east and west to a north and south direction. In front of Antwerp the river has a width of 550 yd. The marking of the channel requires about 140 buoys.

Detailed Description

The neap range is 12¾ ft., the spring range 16 ft.; the neap rise is 14½ ft. and the spring rise 17 ft. The controlling depth at low water of the channel of the Scheldt at the entrance to the port is 26¼ ft. Ships drawing 23 ft. can moor alongside the river quays at any time; those drawing up to 33 ft., at high water. There is no danger if a ship should touch bottom for a short time as it is composed of soft mud. For the dock system, which is entered by four locks, the maximum limits on vessels admitted are those imposed by the Kruisschans Lock, of which the dimensions are: length 885¾ ft.; width 114¾ ft.; depth at mean high water 47½ ft.; minimum depth at high water 42½ ft.

The port at Antwerp comprises two principal sections, the river quays and the dock system. There are also two groups of barge docks, one connected with the river quays and one with the dock system. The port provides 29¼ miles of berthing space—3½ miles along the river quays and 25¾ miles of dock frontage. The newest part of the docks (the section nearest the Kruisschans Lock) can accommodate vessels of deeper draught than any other section of the port.

Length of Berths available

Dock system	No. of berths	Length of berth, ft.	Low water depth at berths, ft.
Old docks	200	260	21
Intermediate docks		400	30
Newest docks		500	38
River quays	37	500	20–32

Of the dockside berths about forty lie along newly completed quay-sides without shore installations.

The River Quays. These quays are used by the largest vessels which frequent the port, although the newer docks have deeper water. All the river berths are taken up by lines, more especially by those which work with a quick turn round.

Quay	Length ft.	Low-water depth ft.	No. of quay cranes
Quai du Rhin	2,132	25¾	6
Quai van Meteren	443	25¾	11
Quai Ortelius	410	25¾	
Quai Jordaens	804	27½	
Quai Van Dyck	1,542	29	16
Quai Plantin	1,476	30¾	
Quai St Michel	1,181	32	
Quai Cockerill	771	34	10
Quai de la Station	984	29	12
Quai Ledeganck	1,886	25¾	15
Quai d'Herbouville	5,577	27¼	60

Additional lifting equipment is provided by a 50-ton crane on the *Quai Ledeganck.*

The Locks. The dock system is entered from the Scheldt by means of four locks:

Lock	Time of admission	Gates			Dimensions of lock, ft.		
		No.	Type	Power	Length	Width	Draught at mean high water
Bonaparte	Opened 2½ hr. before H.T.; closed at H.T.	3 pairs	Wooden gate	Hydraulic	—	59	23
Kattendijk	—	4 pairs	Steel gate	Hydraulic	360¾	81¼	26
Royers	Any state of tide	3	Steel sliding caisson	Electric	590½	72	37¼
Kruisschans	Any state of tide	2 pairs	Steel sliding caisson	Electric	885¾	114¾	47½

The passage of barges through the Royers Lock is infrequent, but frequent through the other three.

The Docks. There are sixteen docks for sea-going ships, together with two small junction docks (Fig. 103 and table below). The water area is 981 acres, compared with an area of 648 acres at Liverpool and Birkenhead, and 686 at London. The north-western end of the Hansa Dock leading to the lock is narrower than the main part of the dock, and has sloping sides. Comparatively little of the Hansa and Darse No. 4 docks have been equipped with shore installations.

There are no lock gates in the junction docks, save at the Sas and Bonaparte entrances, where there is a pair of lock gates at the inner end. These are not normally used, however, and the water level is constant throughout the system.

Name of dock	Date of completion	Length ft.	Breadth ft.	Depth ft.	Usable ground space 1,000 sq. yd.	Quayage ft.	No. of quay cranes
Bonaparte	1811	493	558	21½*	11	2,133	7
Willem	1813	1,247	493	21*	18	3,314	26
Kattendijk	1881	3,149	460	22¼*	67	6,496	38
Junction	1869	280	164	23¾*	3	557	4
Junction (Suez)	—	377	104	23½*	—	558	5
Timber (*Aux Bois*, Mexico)	1864	1,738	451	23½*	90	4,331	14
Kempen (*de la Campine*)	1873	1,127	527	26*	47	2,822	8
Asia (*du Canal*)	1873	2,223	336	26¼*	95	5,102	21
Lefebvre (Africa)	1887	1,903	459	30*	100	5,807	10
America	1887	1,394	601	29¾*	88	5,009	25
Albert (Canal A)	1906	5,430	984	37¼	1,182	10,728	60
Darse No. 1	1906	1,772	591	29¾	240	4,035	35
Lighter Basin (*pour allèges*)	—	—	—	10½	—	—	—
Darse No. 2	1914	2,428	656	33¾	414	5,512	46
Darse No. 3	1914	3,150	656	36¾	516	6,955	53
Junction	—	1,148	328	38½	315	2,722	15
Leopold (Canal B)	1928	14,104	984	38½	1,323	16,967	57
Hansa (Canal C)	}						
Darse No. 4	1932	—	990	38½	—	15,922	—
Dock Recess	—	726	247	13·2	—	1,699	—

* Over sill.

Additional lifting equipment comprises twenty-four floating pneumatic grain elevators, with a capacity of 200 tons per hour, normally kept in the America Dock; fifteen floating cranes normally kept in the Albert Dock (one 150-ton, two 40-ton, six 10-ton, four 3-ton, two 8-ton); six 15-ton electric transporters of the Stocatra company, in the western end of the Leopold Dock, used for handling ores and



Fig. 103. The port of Antwerp (Antwerpen)

dr. Dry docks; *tr.* Transporters; *E.* Entrepôt Royal; *F.* Ford works; *GM.* General Motor works; *P.* Potash warehouses; *s.* Grain Silo; *St.* Steen; *GS.* Goods Station; *MY.* Marshalling yard.

Quais: 1. du Rhin; 2. van Meteren; 3. Ortelius; 4. Jordaens; 5. Van Dyck; 6. Plantin; 7. St. Michel; 8. Cockerill; 9. de la Station; 10. Ledeganck; 11. d'Herbouville.

coal, as well as two 8-ton transporters; and a 30-ton electric crane in Darse No. 1.

The three barge docks behind the river quays have 17½ ft. of water over sills; the water level is ¾ ft. below the level in the Maritime docks. They are entered by a lock 246 ft. long, 42½ ft. wide and with a depth of 17½ ft. over the sill. They have 6,000 ft. of quayage equipped with seven cranes. The barge docks opening off the maritime docks and connected with the Albert Canal have the same water level as the maritime docks. The Strasbourg Dock has a depth of 9¾ ft.; in the Loobroek Dock the depth is 8½ ft., and there are 3,000 ft. of quayage.

Bridges. Limitations on the size of ships passing from one dock to another imposed by the bridges which cross the connecting passages are as follows:

Bridges	Dimensions of vessels which may pass at ordinary water levels	
	Breadth, ft.	Draught, ft.
Bridges over Junction Channel (Suez) between Kattendijk and Lefebvre Docks	52⅓	20
	52⅔	18
	53	16⅓
	53⅓	13
	54	12
America Dock Bridge	52	26
Timber, Asia and Kempen Dock bridges	47⅓	18
	47	21
Bridges over Junction Channel between Willem and Kattendijk Docks	49½	20

Source: *Agenda*, 1939, p. 119 (Information Service of the port, Antwerp).

Petroleum Discharging Facilities

The total oil-storage capacity of Antwerp is just under 1 million tons, the greater part being at Hoboken. Here there is a pier, about 1,000 ft. long, parallel to the shore and connected with it by a foot-bridge. The depth alongside the centre of the pier is 30 ft. and at either end 24½ ft. A second installation lies at Hemiksem, 6 miles upstream from Antwerp, and a third lies in Darse No. 4 of the new docks on quay No. 283. At all these installations ships of up to 18,000 tons can berth.

Port Facilities

There are sixteen dry docks at Antwerp and Hoboken, of which twelve are situated within the dock system. The majority lie in the Kattendijk Dock; these, however, which belong to the city, are

ill-provided with gear. In this respect the larger private ones are much better equipped.

Situation of dry docks	Number	Dimensions of dock or of largest dock in the group (ft.)		
		Length on bottom	Entrance breadth	Depth on sill, M.H.W.S.
City owned:				
Lefebvre Dock	1	656	85¼	28½
Kattendijk Dock	9	459	81¼	20¾
	—	480	65½	—
Privately owned:				
Hansa Dock	2	502	69½	21½
Hoboken (River)	3	682	85	27
Cruybeke (River)	1	341	45¾	8¼

At Cruybeke there is also a patent slip 180 ft. long, and upstream at Schelle there is an electric slipway with a lifting capacity of 150 tons. There is a fairly complete establishment of salvage vessels and salvage gear, as well as thirty-five tugs for the work of the port.

Two of the dry docks specified were in use in 1938 as building berths—the longest of all and one other, both at Hoboken. Antwerp is the chief, almost the only centre for the construction of large ships in Belgium. At Hoboken, on the east bank, the Cockerill yard has three building slips; the largest ship hitherto built is of 12,000 tons dead-wt. Nearby are situated the shipyards of the *Antwerp Engineering Company* with five slips, the longest of which can take a 450 ft. ship. This latter firm owns the dry docks in the Hansa Dock. Both companies can undertake most classes of marine engine and ship repair work.

The Town

Antwerp lies on a plain at a mean altitude of 8 m. (about 26 ft.). About 1 km. (about five-eights of a mile) downstream, near Austruweel, lies the lowest point in Belgium, at a level of 1 m. (3 ft.) below mean sea level at Ostend. Most of the land on either side of the river is protected from inundation at high tide by dykes. There is little urban development on the left bank, although it is now connected with the city by two tunnels. The vehicular tunnel, the more northerly, is 1⅓ miles long. The foot-passenger tunnel is 660 yd. long; access at each end is by lifts or stairs 106 ft. deep. There are no bridges at Antwerp; the lowest road bridge on the Scheldt being at Termonde (Dendermonde) to the south-east, and on the Rupel, at Boom, to the south.

The medieval city grew up on a defensive site on the right bank, on the riverward ends of two low ridges around the *Steen* or citadel. All the older buildings of the city are found within the walls of 1259, which were replaced in 1859 by the prominent line of inner boulevards. The thinly peopled area to the north came to be an asset in recent times, facilitating the construction of docks and marshalling yards. The skyline of Antwerp is dominated by the tower of the 'cathedral' of *Notre Dame*, one of the largest churches in Christendom; the tower attains a height of 403½ ft., and is thus the sixth highest on the continent. Another prominent building is the 'Skyscraper', or *Torengebouw*, of the *Kredietbank*, 285 ft. high.

The water supply of Antwerp is delivered by the *Antwerpsche Waterwerken Maatschappij*. Water drawn from the river Nèthe is filtered in three basins at Notmeir and pumped for further filtering at Waethem; at times the standard of purity is inadequate. Gas for Antwerp and sixty-nine neighbouring communes is distributed by a private system receiving supplies from *Distrigaz* by a connexion at Beveren-Waes (see p. 306). Electricity is supplied by two power stations: the principal is at Schelle, upstream beyond Hemiksem, and the smaller is at Merksem on the Albert Canal.

Antwerp is not as large a centre of population as the great rival ports of Rotterdam (800,000) and Hamburg (1,200,000). In 1938, the population of the commune numbered 273,317, having declined by 28,000 since 1910. The population of the agglomeration, that is, Antwerp together with the five adjoining communes of Berchem, Borgerhout, Deurne, Hoboken and Merksem, was 492,654. Nine other contiguous communes, however (Boechout, Borsbeek, Ekeren, Edegem, Hemiksem, Mortsel, Schelle, Schoten, Wilrijk), have a total population of 105,000; the population of the entire group therefore amounts to 598,000. Antwerp has expanded but little on to the west or opposite bank of the Scheldt. It was the opinion of Napoleon, however, that the left bank was destined to see extensive development, and in 1922 the commune annexed an area of 1,205 ha. there. Urban expansion on this bank should be encouraged by the opening of the two tunnels in 1933, and various planning schemes have been drawn up, but little real development has hitherto taken place. Most of the Antwerp dockers live on the left bank, but their homes lie farther west at Beveren-Waes and even St Niklaas and Lokeren.

Antwerp is the chief town of the province of Antwerpen and centre of an administrative arrondissement; it is the seat of courts of first instance and of justices of the peace. Educational institutions include

the *Institut supérieur de Commerce*, the *Académie Royal* of fine arts, the *Musée Royal* of fine arts, the *Conservatoire Royal Flamand*, and the Colonial University (see p. 71). The economic life of the city is reflected in the Schools of Navigation, and of Engineering and Naval Architecture, and in a professional school of diamond working, jewellery, and clock making.

Antwerp lies in the Flemish-speaking part of Belgium. Although French is employed as a second language in the work of the port, only the Flemish version of all port regulations is admitted in courts of law.

History

The Great Age of Antwerp. The growth of Antwerp was slow during the earlier Middle Ages; 1259 saw the first of many expansions beyond the original walls. In 1333 the city became a fief of the king of England, Edward III, who established his quarters there during 1338–40, while he was engaged on expeditions in France; in 1340 English warships destroyed the French warships off Sluys, which then commanded the mouth of the Scheldt.

In the Renaissance period Antwerp achieved a leadership in economic activity probably attained by no other city before or since. Bruges had long been the chief centre of the trade between the northern countries and the Mediterranean, and of international dealings in bills and money. The silting up of the Zwin, however, weakened Bruges at a time when the natural deepening of the Honte channel had improved access to Antwerp. The most important medieval waterway opening into the Scheldt mouths was the Bornisse, a channel which has since silted up, and passages through the many islands to the north; before 1400 the Wester Schelde had no deep connexion with the sea. The route from the Bornisse lay across the Ooster Schelde either to the west to Veere, or else to the east, around Zuid-Beveland to the Wester Schelde.

These changes, together with the civil disturbances in Flanders after 1482, and the policy of the dukes of Burgundy in favouring Antwerp, resulted in a progressive migration of foreign merchants and financiers from Bruges to the newer centre, beginning in 1442. Other factors were of added weight: the English merchants progressively extended their cloth trade in Antwerp; following the discovery of the sea route to the Indies, the king of Portugal introduced the spice trade, while the Spanish-American silver was increasingly drawn to Antwerp. Portuguese, Spaniards, south Germans and Italians came to settle there, and the Hanseatic merchants established a

headquarters, the Hanseatic House, in 1564. During its heyday native merchants played little part in business conducted in Antwerp.

A variety of other factors contributed to its supremacy. Merchants were attracted to Antwerp because, unlike most trading centres of the time, ruler and city government alike imposed little restriction on the employment of capital; the municipality also bought out the toll rights of landowners on the Scheldt. Commercial progress favoured the city too: the trade of Europe could now support a large regular market instead of the periodic fairs of the Middle Ages, and more commodities could now be bought and sold in standard types or samples. In 1460 the authorities established a Bourse, which was rebuilt in 1531, the first true international bourse. Only the English in Antwerp had a separate exchange.

Syndicates of merchants controlled the greater part of the trade in such commodities as English cloth, south German fustian, Hungarian copper, and alum, so as to keep up prices, and in the East Indian spice trade the king of Portugal sold whole cargoes to syndicates. An English writer a little later described how 'The Portingall—like a good simple man, he sailed every yeare full hungerly about 3 parts of the earth almost for spices; when he had brought them home, the great rich purses of the Antwerpians, subjects of the King of Spain, ingrossed them all into their own hands.'

The fluctuations of prices of commodities like pepper or copper led to a rapid growth of speculation. The trade in commodities was followed by a corresponding trade in bills of exchange and means of payment, which, in turn, produced liquid money capital, and by 1530 Antwerp was becoming established as a financial centre. Such dealings, or 'arbitrage', became especially well established after 1540. The transactions of the skilled financiers of Antwerp very often consisted of borrowing money at a low rate of interest in one centre and lending it out at a higher rate at another. An elaborate news and post service was in operation with the lesser financial centres of Europe—Lyons, Amsterdam, Hamburg, Augsburg and Venice. There were sometimes attempts to create artificial scarcity or ease of money for borrowing. An interesting result of the speculation in commodities, loans and marine insurance was a great interest in wagers and chances, and later statistical investigations of chance and probability owed much to the operations carried on at Antwerp.

The many wars and threats of wars in sixteenth-century Europe led to enormous demands for credit, and the city became the chief centre for the arrangement of loans to governments; bonds of all the

principal states were quoted on the bourse. As the most important centre of English foreign trade, Antwerp became the chief source of loans raised by the English crown. In 1552 Thomas Gresham became the financial agent of the crown and continued in this important post under Mary and Elizabeth. Probably the leading financial expert in Europe, he secured much lower rates for English borrowings, and by improving credit raised the exchange value of sterling. His extensive news service kept the English government better informed in European news than any other. When the revolt of the Netherlands made it no longer possible to use Antwerp as a financial centre, Gresham was able to establish government borrowings with English merchants, and to make the state largely independent of foreign financial sources.

The Decline of Antwerp. Calvinism had early established itself in Antwerp, and in 1566 there came an outbreak of iconoclasm. Thousands of citizens emigrated, many silk weavers crossing to England. In 1576 occurred the Spanish Fury, when the mutinous Spanish troops in the citadel overcame the city garrison and sacked the city, doing enormous damage and killing 7,000 people. From 1578 to 1583 Antwerp acted as the headquarters of the revolt against Spain, thus regaining her connexion with the sea which had been closed in 1572 when the rebels in the northern provinces captured Flushing. In 1583 came a further disturbance known as the French Fury, when the duke of Anjou, who had been offered the sovereignty of the Netherlands by the States-General, attempted a *coup d'état*, without success.

To complete the reconquest of the southern provinces, the duke of Parma now besieged Antwerp with 80,000 men. The wealthiest city in the Netherlands, with natural advantages of river approach and easily flooded polders, it was considered impregnable, and the issue of the revolt in the southern provinces turned upon its fate. The assassination of William the Silent in 1584, however, had deprived the Protestants of their wisest head. In spite of the efforts of the Burgomaster, Marnix de St Aldegonde, the defenders were handicapped by the strife of private interests, and failed to cut the Kouwenstein and Blauwgaren Scheldt dykes to the north, so as to hinder the besiegers and to facilitate the bringing in of supplies by the Dutch from Zealand. Parma seized the dykes and built a strong bridge just below Kalloo. The defenders cut the dykes and sent down a fireship which broke through the bridge, but the Spaniards repaired both, and at length the city capitulated in 1585 after 14 months of siege. Thousands of citizens migrated to Holland and Zealand. The Dutch,

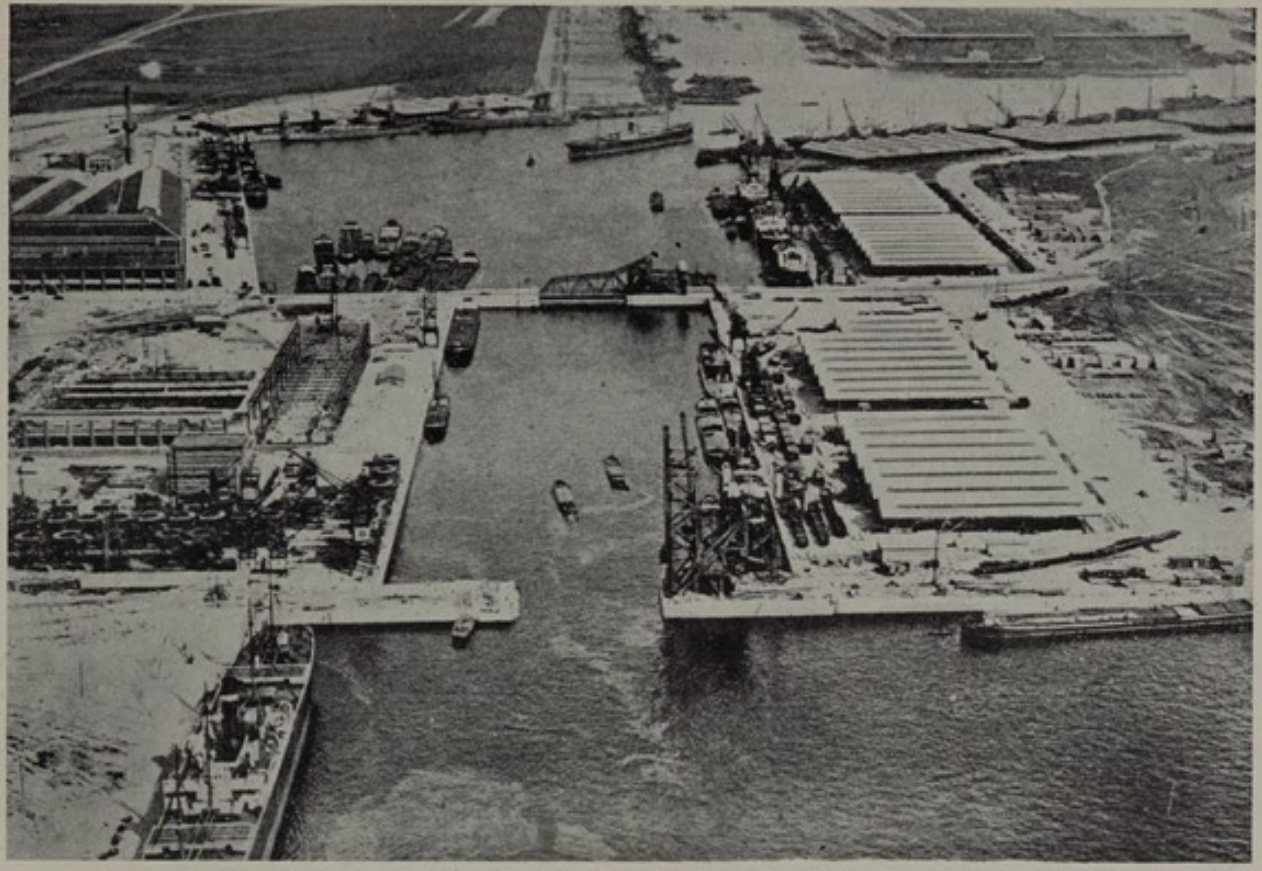


Plate 58. Antwerp (Antwerpen): Junction Dock and Albert Dock, looking eastwards
In the foreground is the eastern end of the Leopold Dock, leading into the Junction Dock, on the left of which can be seen the *Ford* works in course of erection. This dock opens into the north end of the Albert Dock, on the left of which lies the *General Motors* works. From the main part of the Albert Dock, continuing to the right, Darse No. 3 and Darse No. 2 open off.



Plate 59. Antwerp (Antwerpen): the heart of the docks, looking northwards
In the immediate foreground is the northern end of the Kattendijk Dock, leading by a small junction dock, through which barges are passing, into the Lefebvre Dock. Most of this dock lies to the left of the picture; to the right lies the Strasbourg Dock, opening into the Albert Canal. Behind it, through the junction channel, lies the Albert Dock with Darse No. 1 on the right.



Plate 60. Antwerp (Antwerpen): the Kattendijk Dock, looking north-westwards, and the city dry docks Behind may be seen the Royers lock; the Kattendijk lock lies immediately to the left of the photograph.

who continued to hold Flushing, now built forts below Antwerp where the Scheldt turns westwards between the islands of Zealand and Zealand Flanders.

For two hundred years a period of stagnation followed, although the city experienced the brilliant achievement of Rubens (1577–1640) and his school. The population of the city fell from 150,000 to 50,000 and grass is said to have grown in the streets. In the Treaty of Münster (1648) the Dutch obtained the insertion of the fourteenth article which ensured that the mouths of the Scheldt should be closed for ever. The original motive of the northern province had lain in the necessity of preventing Antwerp, in the hands of Spain, from becoming a base for military operations against Zealand. The motive now equally important was the desire to stifle any incipient competition against Amsterdam. Nevertheless, most accounts of the utter stagnation of Antwerp have been exaggerated. Its diamond, glass, silk, glove, and tapestry industries flourished, and when the Ostend Company was floated in 1722, capital was easily subscribed in the city. The cession of the southern provinces to the emperor Charles VI in 1713 made little difference to its fortunes. In 1781, Joseph II of Austria attempted to break the closure of the Scheldt by sending a vessel to Antwerp, but the Dutch forts fired on the ship, and at the Treaty of Fontainebleau (1785) Joseph gave up his design.

Revival of Antwerp. In 1792, the revolutionary armies of France overran the Austrian Netherlands; by a decree of the Convention, and later by the Treaty of the Hague, the Scheldt was opened to navigation, and in 1805, for example, 2,400 ships of 135,000 tons entered. The strategic value of Antwerp was as clear to the French and English as it had been to the Dutch, and Napoleon said: 'It is a loaded pistol that I hold against England's throat.' In 1803 he decreed the construction of two basins (later called the Bonaparte and Willem Docks) to hold fifty-two ships of the line, and set out to make it the greatest naval base in the French Empire. By 1807 ten ships of the line were on the stocks and by 1813 thirty were afloat. In 1809, while Napoleon was operating against Austria, the British attempted a diversion at the mouth of the Scheldt, aiming at the destruction of the shipping in the port, but the expedition was wasted on the island of Walcheren.

By the third secret article of the Treaty of Paris (1814) and by the Congress of Vienna freedom of navigation in the Scheldt was sanctioned, and when Belgium was united to Holland in 1815 the Powers stipulated that Antwerp was never to be made into a naval

base. In 1815–18 twenty-two fortresses around the city were constructed under the supervision of the duke of Wellington. During the short period of union with Holland considerable benefits accrued to the commerce of the port. On the signing of the treaty of 1839 the Dutch were at length persuaded to agree to the maintenance of navigation in the Scheldt, subject to tolls levied by them amounting to 1½ florins per measurement ton; the coast of Dutch Flanders, which forms the south bank of the Wester Schelde, remained in Dutch possession, however, to the great disappointment of the Belgians.

It was not until after 1850, when the port traffic reached only 240,000 tons, that Antwerp came to approach the importance of its chief rivals. In 1863 the burdensome Scheldt tolls were bought out for 32,276,566 francs, of which 12,000,000 were found by Belgium and the remainder by the principal maritime nations. Expanding trade was now free to concentrate in Antwerp, the most convenient port for much of western and central Europe. The industrial expansion of Belgium, which was the most important single factor, did not become effective until after about 1850, when Belgian industry had recovered from the crisis resulting from separation from the Dutch market in 1839. By this time improved canals, like the Meuse-Scheldt Junction Canal, and the Charleroi Canal, gave access to the industrial regions, and railway connexions had been established with Mons (1841), Liége (1842), and Lille (1842). The value to Antwerp of the expanding European railway network was clear, for the Cologne railway (1843) was described as 'another arm of the Rhine'. The Franco-Prussian war gave a further impetus, but more important factors were the development of the Rhineland after 1880 and the growth in production of the French steel industry in Lorraine after 1890.

At the outbreak of war in 1914 the importance of Antwerp as a fortified place on the flank of the advancing German armies and as the chief base of the Belgian army was clear enough. Under the terms of the treaty of 1839, however, it could not be reinforced by sea, and the British government would not consider infringing Dutch neutrality. Nevertheless, the city was thought to be invulnerable, being defended by a semicircle of twenty-one outer forts on the east, 4–8 km. (3–5 miles) distant, and by a chain of inner forts on the outskirts. In fact, none of the forts had been properly completed, while the defenders were quite unprepared for the weight of the German siege guns. The bombardment began on 28 September, and succeeded in progressively

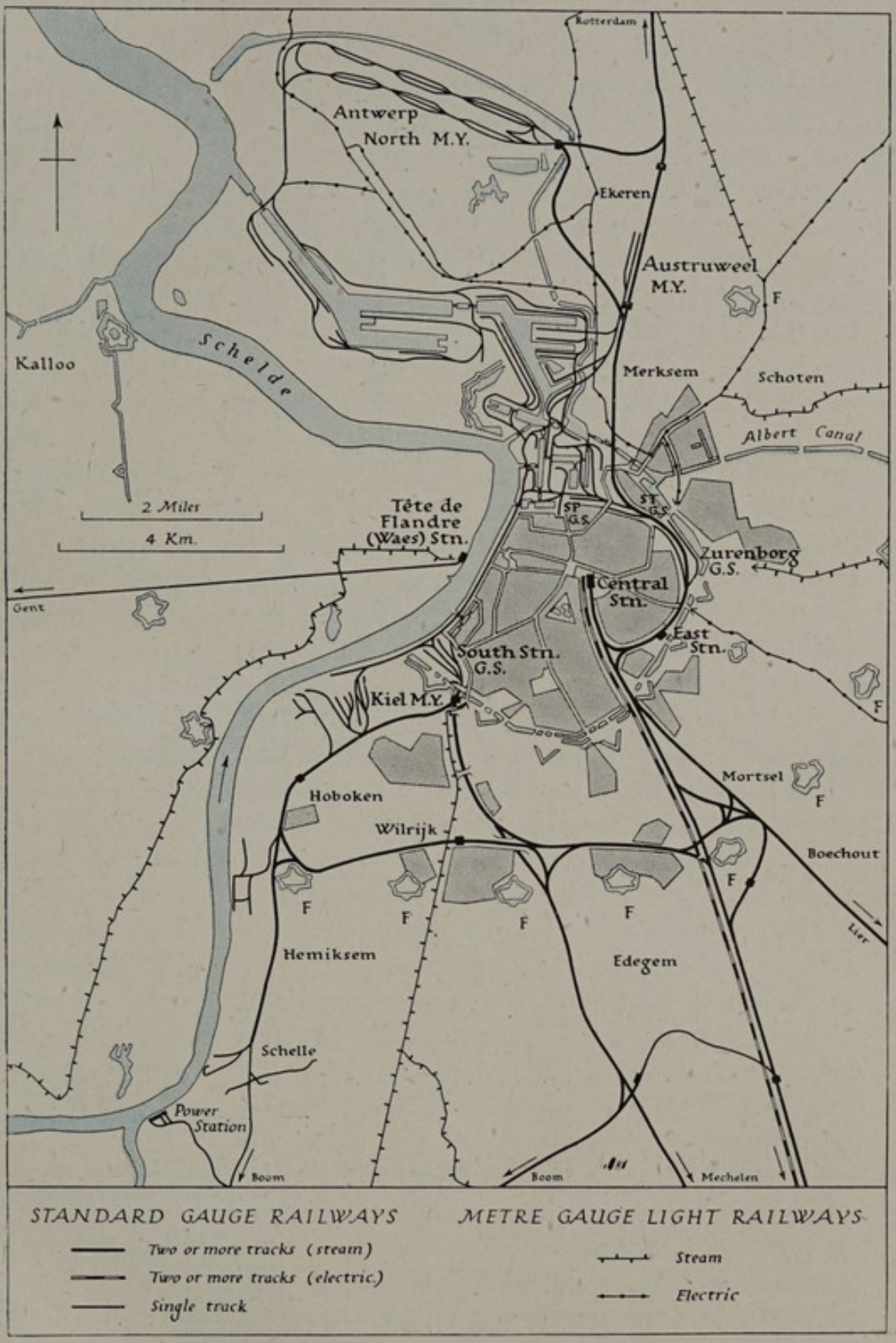


Fig. 104. Antwerp (Antwerpen): the city

FF. forts of inner ring; *MY.* marshalling yard; *GS.* goods station; *SP. Station Principale*; *ST.* Stuyvenberg.

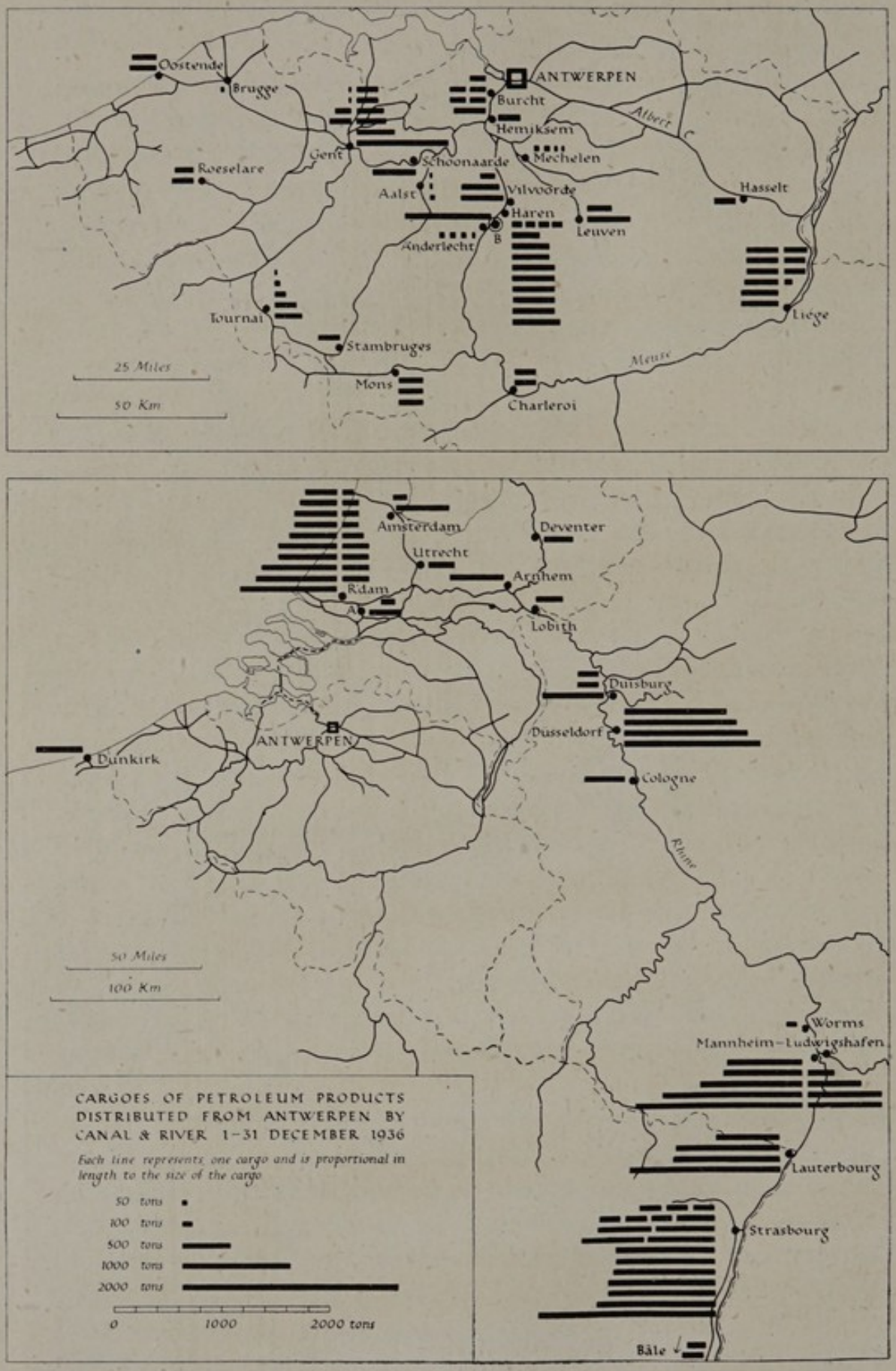


Fig. 105. The distribution of petroleum products from Antwerp during the month of December, 1936

Based on *Revue Pétrolifère*, no. 664, p. 23; no. 665, p. 55; no. 666, p. 87 (Paris, 1936).

The great majority of the cargoes were bulk cargoes, and comprised mainly gasoline and gas oil. *A.* Alblasserdam.

smashing six of the outer forts to the south-east. On 3 October, a brigade of 2,000 men of the British Royal Naval Division arrived via the coast ports and was later brought up to 10,000. On 6 and 7 October the Belgian army was withdrawn across the river; the bombardment of the inner forts began on 7 October and of the city itself on the following day, starting many fires. On 9 October Antwerp surrendered. More than three-quarters of the population had escaped into Holland; 1,000 of the naval brigade were taken prisoner and 1,500 crossed the Dutch frontier. In the Scheldt thirty-eight steamships, which could not be removed in time, lay with their engines wrecked.

During the war of 1914–18 the port stagnated with its trade cut off by the Allied blockade. It could not be used by the Germans for naval purposes as the approach lay through neutral Dutch territory. After the war the tonnage of shipping using Antwerp increased rapidly, and in 1922 it exceeded the previous maximum of 1913. After the inevitable fall during the world economic depression, the tonnage recovered to reach a maximum in 1937, although Antwerp has failed to outpace its rivals.

Dock Development. The expansion of the dock system came only in the second half of the nineteenth century, for until 1860 the two small Bonaparte and Willem Docks, together with the river quays, sufficed for traffic. The principal stages in the expansion of the facilities were: (1) the opening of the Kattendijk Dock and Lock in 1860 and of the Timber Dock in 1864; (2) the opening of the Kempen and Asia Docks in 1873; (3) the opening of the Lefebvre and America Docks in 1886; (4) the completion of the Albert Dock and Darse No. 1 in 1907 and of the Royers Lock in 1908; (5) the completion of the Leopold Dock and Darses No. 2 and 3 in 1913; (6) the completion of the Hansa Dock and Junction Canal, and of the Kruisschans Lock in 1932.

Although not all the length of the Hansa and Leopold Docks is yet in use, further enlargements are contemplated, involving four extensive darses for large ships, a series of small timber docks, and an enormous barge dock to the north of Kruisschans Lock providing for connexion with the Moerdijk Canal to the Rhine, if ever this canal be completed (Fig. 122). Entrance to this enlarged dock system will be improved by the construction of two further maritime locks, one 700 yd. upstream from the Kruisschans, and one nearer the city at Austruweel. Between this second lock and the existing Royers Lock over 2,000 yd. of the right bank of the river will be taken back and

quayed. The tendency over several years for Rotterdam to compete more successfully with Antwerp is likely, however, to cause the port authorities to concentrate for the time on the improvement of facilities and the reduction of charges.

Trade

Shipping. In tonnage of shipping entered in foreign trade Antwerp ranks with London, Rotterdam, Hamburg and New York (although

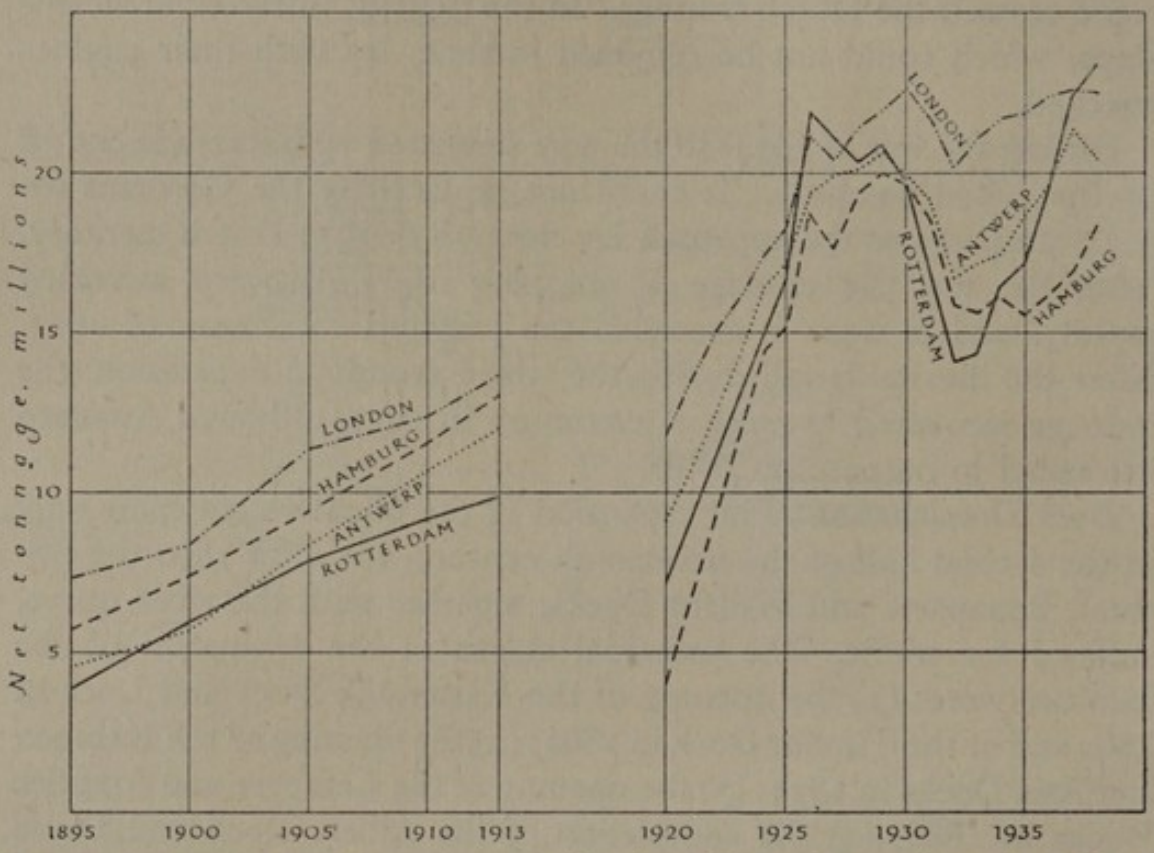


Fig. 106. Growth of traffic at Antwerp, Hamburg, Rotterdam and London, 1895–1938 (net tonnage of arrivals in foreign trade).
The official Antwerp figures have been reduced by 15 % to conform with the internationally accepted figures. Since 1924 the figures have been plotted at yearly intervals, before that date at five-yearly intervals.

Based on: (1) *Annuaire officiel de la Chambre de Commerce d'Anvers*, 1938–9, p. 210 (Anvers, n.d.). (2) *Annuaire statistique de la France*, 1922, pp. 327–32 (Paris, 1923). (3) *Statistisches Jahrbuch für das Deutsches Reich*, 1929–38, Internationale übersichten (Berlin, annually). (4) *Handel und Schiffahrt des Hafens Hamburg im Jahre* 1938, pp. 2–5 (Hamburg, 1939). (5) *Rotterdam; Statistiek van Handel, Nijverheid en Verkehr*, 1938, I–IV, p. 5 (Rotterdam, n.d.). (6) *Statistical Abstract for the United Kingdom*, 1913 *and* 1917–30, pp. 298–9, 304–5 (London, 1931); ibid. 1924–38, pp. 350–1, 352–3 (London, 1939).

London and New York have a considerable coasting trade as well). Tonnage in 1937 exceeded that in 1913 by 70%; tonnage at Rotterdam, however, exceeded the 1913 figure by 80 % (Fig. 106).

The average size of vessels using the port is just under 2,000 tons net, and has increased very little since 1913. Of the 11,762 ships which entered in 1938, 7,607 did not exceed 2,000 tons, 782 were of 2,000–3,000 tons, 3,287 of 3,000–8,000 tons, and only 86 over 8,000 tons. A great part of the traffic is composed of small vessels in the short sea trades which make many voyages in the course of a year. Of the 11,762 vessels, 9,316 had made their last port of call in the British Isles, Europe, Mediterranean and Black Sea.

Only a small proportion of the shipping using the port is under the national flag, a feature distinguishing Antwerp from all other big European ports. The British flag is first in number of ships, and until 1935 was the first in tonnage, when it was overtaken by the German flag, a reflexion of the fact that a very great number of outward-bound German liners call there. In the general cargo or merchandise trade (i.e. excluding bulk cargoes) British vessels carry the highest percentage, but for all outward cargo the German flag is in the lead, and outward cargo consists to a greater extent than inward of the more profitable merchandise traffic. Furthermore, the German outward cargo is largely to distant ports, the British to home ports.

Cargo carried, by flag, 1938

Flag	Arrivals			Sailings			Percentage of merchandise traffic inward and outward
	No. of vessels	Net tonnage in thousands	All cargo unloaded in thousands of tons	No. of vessels in ballast	No. of vessels with cargo	All cargo loaded in thousands of tons	
British	3,131	5,759	2,271	288	2,843	2,420	19·9
German	2,128	6,123	1,820	202	1,934	2,507	19·1
Dutch	1,709	1,785	672	246	1,465	799	6·4
Norwegian	910	1,835	1,136	163	731	797	7·7
French	740	2,126	767	59	687	1,249	8·0
Swedish	641	903	693	118	528	603	5·8
Danish	558	866	448	128	426	505	3·9
Belgian	553	1,155	1,365	67	482	971	10·1
Others	1,392	3,593	2,701	337	1,053	1,855	15·7
Total	11,762	24,145	11,873	1,608	10,149	11,706	100·0

Source: Official statistics; tonnage in B.M.

Of the other flags, the American was responsible for the largest cargo tonnage (443,000 tons inwards, 225,000 tons outwards).

The number of lines serving the port in 1938 was as follows:

Areas served	No. of lines	No. of ships	No. of voyages
British Isles	23	221	2,164
North Sea, Baltic	27	356	1,691
France, Spain (Atlantic) Portugal	7	78	430
Mediterranean and Black Sea	24	276	748
North America (Atlantic)	5	35	237
South and Central America (Atlantic)	21	286	825
North, South and Central America (Pacific)	7	82	311
Africa (except Mediterranean)	17	200	591
Asia	22	329	803
Australia	5	61	135
Total	158	1,924	7,935

Source: *Annuaire officiel de la Chambre de Commerce d'Anvers*, 1938–9, p. 243 (Anvers, n.d.).

The cargo liner traffic accounts for 60–70% of the total trade, and has developed to a greater extent than in many ports. Shipowners are attracted by the greater likelihood of securing a consignment to complete a cargo. In turn, the greater number and frequency of advertised sailings from the port attract to it dispatches from many distant as well as near sources, and thus the establishment of lines is further encouraged. For example, in the period of one month beginning 27 December 1938, 200 ships carrying cargo were advertised to sail to all destinations excluding the North Sea, Baltic and British Isles, taking cargo for 328 ports and making a total of 1,042 calls, while there were only twenty-one cargo sailings to similar destinations advertised from Dunkirk, 100 from Rotterdam, 120 from London, and 140 from Hamburg (Fig. 107).

The attractiveness of the port to the trader is increased by the resulting competition and reduction of freights. The enormous steel export from Antwerp is a principal advantage, for it provides a whole or part cargo for many destinations and, comprising all forms of steel, allows of every possible cargo combination. The export of this steel and of a great variety of packed goods (general merchandise) makes Antwerp a port which is pre-eminent for expert quay handling and skilled loading—much more so than Rotterdam; while Antwerp employs 19,000 dockers, Rotterdam employs only 6,000. The frequency of dispatches is aided by the highly organized handling equipment, and also permits forwarders easily to arrange their groupings. It is important to bear in mind, however, that Rotterdam is making efforts

to attract the trade in packed goods (*Stukgoederen*), and by 1936 250,000 tons of this trade had been gained from Antwerp in a few years.

There are large movements of bulk goods, more particularly inwards, and the arrival of great quantities of tramp tonnage, in the trade in timber, ores, coal and grain, leads to competition for outward

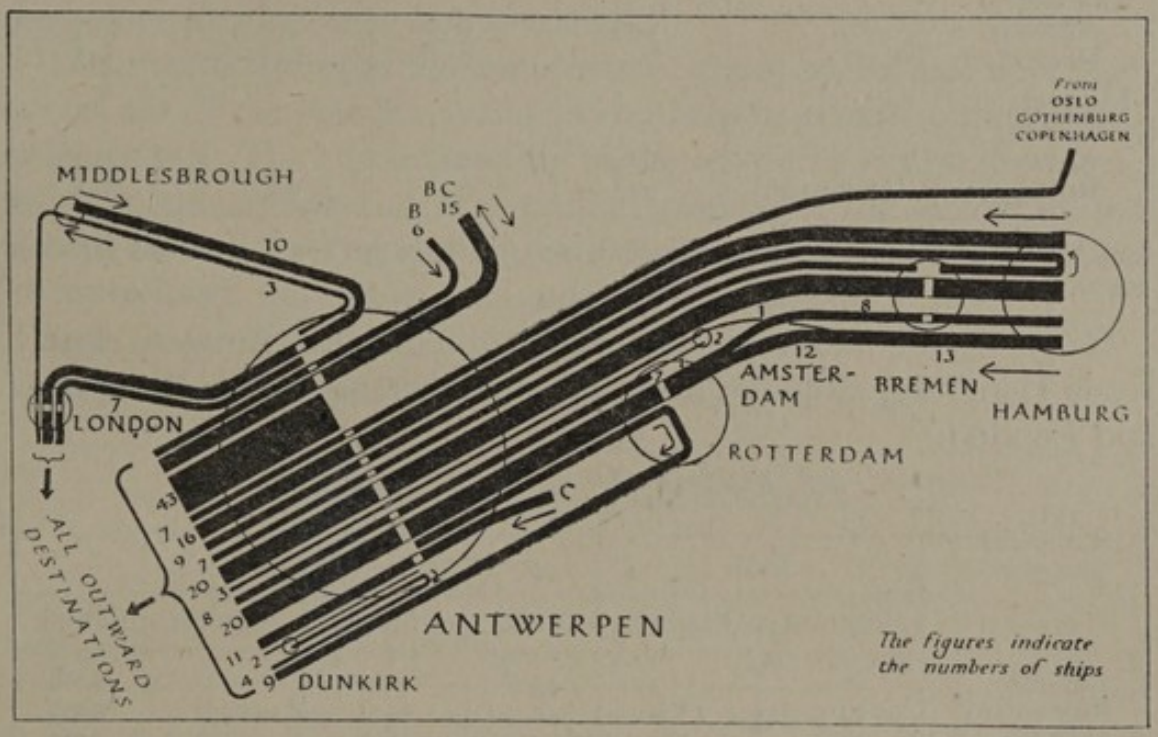


Fig. 107. Advertised cargo liner sailings from Antwerp, in the four weeks following 26 December, 1938

The lines indicate groupings of advertised sailings to all foreign destinations west of Dunkirk, excluding the British Isles. Of the 200 ships advertised to sail, only 64 began their voyages at Antwerp, and many of these called at London or Rotterdam; 136 began at ports east of Antwerp or in England.

B. ships from other British ports calling at Antwerp; *BC.* ships from British ports calling at Antwerp and at other continental ports; *C.* other ships calling at Antwerp and continental ports, e.g. Rotterdam-Antwerp-Bremen outwards. A few ships called at Havre or Southampton.
Based on *Lloyd's Loading Lists*, December–January, 1938–9 (London).

tramp cargoes, such as cement and fertilizers. Among inward cargoes, Antwerp enjoyed an advantage in coal freights for several years until 1939. In the import of ores Antwerp was not favoured compared with Rotterdam, and with bulk cargoes from distant sources, like grain, seeds, rice, and sugar, the rate usually quoted applied equally to Antwerp or to Rotterdam.

Average Freight Rates, pence per ton

	1936	1937	1938	1939
Coal:				
Tyne/Blyth/Dunston to:				
Antwerp	46¼	55½	—	164¼
Rotterdam	55½	60	51	75
Elbe Ports	49¼	71	49¼	59
Swansea to:				
Antwerp	55¼	63½	47½	66¼
Rotterdam	65	77¼	61¼	54¾
Minerals:				
Bona to:				
Antwerp	62¼	104½	80	119¾
Rotterdam (Vlaardingen)	65¾	99¾	78	74½

Source: *Daily Freight Register, Annual Review for* 1939, pp. 4–5 (London, 3 January 1940).

Cargo. In the volume of sea-borne freight handled, Antwerp closely rivals Hamburg, although it stands some distance below Rotterdam and London.

Sea-borne Cargo, millions of tons

	1938			1937		
	Imports	Exports	Total	Imports	Exports	Total
London	—	—	42·7	—	—	44·8
Rotterdam*	24·5	17·9	42·4	22·4	19·9	42·3
Hamburg	18·2	7·5	25·7	16·7	8·6	25·3
Antwerp	11·9	11·5	23·4	14·3	14·1	28·4
New York*	13·6	7·9	21·5	—	—	—
Dunkirk*	—	—	4·2	3·0	1·0	4·0

* Foreign trade only. Antwerp carries on very little coastwise trade; in 1938 the coastwise trade of New York amounted to 34·8 million tons of imports and 7·2 of exports.

The imports and exports of Antwerp consist to a very large extent of goods which are handled on account of foreign countries nearby. In the following description imports for Belgian-Luxembourg consumption and exports of Belgian-Luxembourg produce will be referred to as 'special' trade, and trade on foreign account as 'transit'.

1938 *Sea-borne Cargo, thousands of tons*

	Imports	%	Exports	%	Total	%
Special	7,999	67·4	6,160	52·7	14,158	60·1
Transit	3,874	32·6	5,546	47·3	9,420	39·9
Total	11,873	100·0	11,706	100·0	23,578	100·0

The transit trade applies more to exports than to imports. Of the total trade of Antwerp 60% is on home account, at Rotterdam only about 30% (34% of imports, 20% of exports). Since the formation of the Belgian-Luxembourg Customs Union the apparent importance of the transit trade at Antwerp has been reduced, since the imports and exports of Luxembourg are not counted as foreign goods in transit. About 6% of the total trade is on Luxembourg account, and might properly be regarded as transit.

The *general* figures of the movement of goods by rail and waterway in and out of the port are available and help to complete the picture of its activity. They do not add up to the sea-borne figures, however, owing to the omission of road-traffic movements, the import by sea of coal and oil for bunkering, consumption and production within Antwerp itself, movement into and out of stock, etc.

All Cargo Movements 1938, *thousands of tons*

	Sea-borne imports	Loadings (outward from Antwerp)				
		Waterway	%	Rail	%	Waterway and rail
Special	7,999	1,322	30	2,406	80	3,728
Transit	3,874	3,090	70	561	20	3,651
Total	11,873	4,412	100	2,967	100	7,379
	Sea-borne exports	Unloadings (inward to Antwerp)				
		Waterway	%	Rail	%	Waterway and rail
Special	6,160	1,229	27	3,725	58	4,954
Transit	5,546	3,360	73	2,722	42	6,082
Total	11,706	4,589	100	6,447	100	11,036
Both ways	23,579	9,001		9,414		18,415

The combined movement by barge and rail was thus 5,164,000 tons less than the total sea-borne movement.

In 1938, the tonnage carried by rail exceeded the tonnage carried by barge by 413,000 tons or 4%, and in other recent years the rail movement has exceeded the canal movement by small quantities, except in 1936.

The statement commonly made that Antwerp is primarily a railway port is therefore inaccurate. It is true that the railways play a much

Rail and Waterway Movements, 1935–8, *thousands of tons*

	1935	1936	1937	1938
Rail: Loadings	2,912	3,174	3,779	2,968
Unloadings	5,901	6,718	7,315	6,447
Total	8,813	9,892	11,094	9,415
Waterway: Loadings	3,347	3,687	5,064	4,412
Unloadings	5,044	4,797	5,623	4,589
Total	8,391	8,484	10,687	9,001

greater part than at Rotterdam, but Antwerp has a vital interest in waterway traffic and development. The railways carry the bulk of the valuable freight, but have no monopoly of packed goods; in 1936, for example, 36% of the freight passing on the Rhine between Germany and Antwerp consisted of packed merchandise.

The waterways carried an approximately equal amount in each direction in 1937 and 1938, and in 1935 and 1936 not a great deal more into Antwerp than out of it. The railways, on the other hand, have carried twice as much into the port as out of it in each of the four years. For shipments from Antwerp to the hinterland water tends to have a growing advantage over rail.

Commodities: Origin and Destination. Certain limitations of the published returns of trade must be borne in mind. (1) It is not possible to analyse methodically the transit trade to show how much of each commodity passes to and from each country concerned, nor is it possible to show how much of each commodity in the special trade of Belgium-Luxembourg passes to and from each foreign country. (ii) The trade statistics of the port are not all compiled with equal accuracy: the maritime trade returns are most accurate, being derived from customs declarations; the waterway returns are derived from statements made by the barge masters. The railway returns are in detail regrettably incomplete: the figures given above are totals and cover all railway traffic of the port; but the figures given on p. 441 applying to each commodity, are thought to cover only the direct transhipment of goods from ships (or barge) to truck or from truck to ship (or barge) (see p. 393).

In detail the nature and direction of the trade of Antwerp may be discovered from the tables; certain points of interest may be mentioned.

(1) The approximate balance between the weight of imports and

Trade of Antwerp, 1938, in thousands of tons

Commodity	Transit trade						Special trade						Total sea-borne trade	
	Unloadings			Loadings			Unloadings			Loadings				
	By sea	Water-way	Rail (direct)	By sea	Water-way	Rail (direct)	By sea	Water-way	Rail (direct)	By sea	Water-way	Rail (direct)	Imports	Exports
Foodstuffs:	*1,267*	*121*	*15*	*399*	*937*	*28*	*2,725*	*198*	*18*	*378*	*88*	*3*	*3,992*	*777*
Cereals, maize	953	13	—	192	814	—	2,073	54	—	144	61	1	3,226	336
Fruit and vegetables	64	15	4	43	25	11	212	26	10	67	3	1	276	110
Coffee and cacao	20	3	—	10	8	4	50	14	—	2	—	—	70	12
Sugar	124	7	1	28	55	—	100	10	—	103	6	—	224	131
Other foodstuffs	106	83	10	125	35	13	90	94	8	62	18	1	196	187
Raw materials and simple manufactures:	*2,448*	*2,344*	*677*	*3,370*	*2,115*	*204*	*5,058*	*951*	*310*	*3,506*	*1,169*	*92*	*7,506*	*6,876*
Seeds	124	2	—	12	114	—	169	35	—	2	1	—	293	14
Timber	128	9	1	27	102	45	547	18	3	14	15	—	675	41
Woodpulp	98	1	—	10	83	9	111	1	—	—	1	2	209	10
Textile raw materials	117	1	4	54	40	13	226	5	—	28	13	27	343	82
Fertilizers	40	203	2	232	16	—	47	307	237	797	32	2	87	1,029
Iron and manganese ores	631	2	—	8	632	13	788	1	1	5	394	—	1,419	12
Other ores	320	8	—	19	324	26	779	5	—	37	15	7	1,099	56
Iron and steel	55	68	178	218	77	11	25	14	1	121	105	—	80	339
Other metals	80	9	6	32	52	20	223	12	—	182	37	2	318	194
Cement	1	232	1	262	—	—	—	—	—	548	11	—	1	810
Mineral oils	180	52	1	72	261	31	953	58	—	148	129	21	1,133	220
Coal	163	1,650	461	2,239	33	—	268	148	61	1,072	157	2	431	3,311
Other raw materials	511	106	22	184	391	47	912	347	7	552	79	29	1,423	737
Manufactures:	*157*	*895*	*752*	*1,773*	*38*	*36*	*211*	*81*	*16*	*2,276*	*64*	*16*	*368*	*4,049*
Chemical products	27	86	26	163	12	6	36	44	1	239	18	—	63	402
Iron, steel and works thereof	24	668	631	1,320	12	6	23	11	2	1,447	24	1	47	2,797
Machinery, tools	14	50	27	68	—	5	10	—	2	59	1	1	24	127
Rolling stock	1	10	2	12	—	—	—	—	—	40	—	—	1	52
Motor vehicles	36	4	4	20	—	—	31	—	5	2	—	8	67	22
Glass	2	13	11	25	—	—	—	—	—	140	—	—	2	165
Textile yarns and tissues	2	2	4	11	1	3	3	—	—	59	3	—	12	70
All other manufactures	44	62	47	154	13	14	109	26	6	290	18	6	153	544
Total	*3,872*	*3,360*	*1,444*	*5,542*	*3,090*	*268*	*7,994*	*1,230*	*344*	*6,160*	*1,321*	*111*	*11,866*	*11,702*

Source: *Annuaire officiel de la Chambre de Commerce d'Anvers*, 1938–39, pp. 227–30, 231–4 (Anvers, n.d.).

exports: this equilibrium, unusual in most European ports, is remarkably constant.

Balance of Cargo Movements (*thousands of tons*)

	1929	1930	1932	1935	1936	1937	1938
Imports	12,442	10,349	9,325	11,061	12,480	14,312	11,873
Exports	13,624	11,611	8,058	12,110	12,772	14,119	11,706
Total	26,067	21,960	17,383	23,172	25,252	28,431	23,578
Exports: % of total	52·27	52·88	46·94	52·27	50·58	49·73	47·43
Do. Hamburg	—	—	—	—	—	34·0	30·1
Do. Rotterdam	—	—	—	—	—	47·01	42·2

This ample export freight arises from three main factors: (i) the availability of export coal and bunker coal (3,311,000 tons) from Belgian coalfields and from transit; (ii) from the export of iron and steel in enormous quantities from France and Germany as well as from Belgium-Luxembourg; (iii) from the proximity of the chief industrial regions in Europe, providing a great number of other commodities for export—regions, furthermore, which exchange with each other an enormous variety of manufactures and semi-manufactures.

(2) In most trades Antwerp is not dominant—in food imports, it is exceeded by London, in ore imports by Rotterdam, in timber by Ghent, in petroleum by Havre; in coal exports it is exceeded by Rotterdam or Cardiff, in textiles by Liverpool. Yet it holds a considerable place in all these trades, and is easily foremost in the export of iron and steel.

(3) Certain peculiarities include the relatively small imports of textile raw materials, tropical produce, rubber, oilseeds and fruit; in fruit imports Belgium is served mainly by Rotterdam. Two important exports are cement and fertilizers, which provide valuable return freights. Of the million tons of fertilizers exported, only one-quarter was Alsatian potash in transit by way of the Rhine; of the remainder a certain amount was potash which had been concentrated in Belgium into potassium sulphate, although the greater part comprised the products and by-products of Belgian heavy industry—nitrate, sulphate and phosphate of ammonia, superphosphate of chalk and phosphatic slag.

The port handled over 5,000,000 tons of fuels in 1938, mainly coal. Both coal and liquid fuels move inwards and outwards. Of liquid fuels 180,000 tons were imported in transit and 72,000 tons were exported, while in the special trade 953,000 tons were imported and

148,000 tons exported. Bunkering consumes 120,000 tons of exports. Refined products form the bulk of the trade.

In the coal traffic the quantity in the special trade moving by sea was only half the quantity in transit. The Belgian export amounted to over 1,000,000 tons. Belgian imports by sea and by canal are comparatively small. Of the 1,500,000 tons required for bunkering, hardly one-quarter was Belgian coal on account of the high cost of transport. Coal in transit arriving by sea amounted to 163,000 tons: the trade in this direction is declining in favour of transit arrivals by rail and canal for export by sea (largely for bunkers)—this transit export in 1938 amounted to 2,239,000 tons. The coal traffic includes both imports from and exports to the Netherlands, coal from England and Poland for bunkers, small quantities of English coal in transit to Switzerland and of Polish coal in transit to France, and a movement of nearly 2,000,000 tons of German coal, of which over half is for bunkering, especially German ships, and the rest is for export. Small quantities of German coal arrive by rail from the Ruhr, the Saar and the Aachen coalfields, including some *en route* for Ghent, but the bulk—over 1,000,000 tons—moves by the Rhine. There is also an export of blast-furnace coke which serves as a useful return cargo to the U.S.A., Canada and Sweden.

In manufactures the import trade is relatively small in bulk; the export amounted to 4,049,000 tons, of which iron and steel accounted for 3,106,000 tons—1,568,000 tons from Belgium-Luxembourg and 1,538,000 tons in transit. The Belgian, Luxembourg and French steel arrives mainly by rail, the German largely by waterway. The share of Belgium-Luxembourg in the total export varies from 50 to 60%; the amount in transit is about equally shared by France and Germany. Antwerp exports more steel than any other port in the world, and more than all the ports of north-west continental Europe put together.

Exports of Iron and Steel, thousands of tons

Port	1938	1937	1936	1935	1930
Antwerp	3,106	4,620	3,910	4,130	4,600
Rotterdam	309	280	350	—	—
Hamburg	—	633	553	—	—
Ghent	400	554	634	452	—
Dunkirk	300	—	292	—	—
Other French ports	50	—	—	—	—

In the remaining manufactures there is a heavy outward balance in all classes, in both special and transit trade, except in motor vehicles,

with an import of 31,000 tons in the former and 36,000 in the latter. Among Belgian manufactures chemical products take first place, followed by glass of all kinds; in foreign exports chemicals are followed by machinery and tools. In textile yarns and unmade-up tissues the Belgian export from Antwerp exceeded that from any single French port in 1938; the export in transit was comparatively small.

Direction of Trade of Antwerp, 1938
(*in thousands of tons*)

	Imports from, sea-borne	Unloadings from		Exports to, sea-borne	Loadings to	
		Water-way	Rail (direct)		Water-way	Rail (direct)
United Kingdom and Éire	578	7	—	1,667	1	—
Germany	110	2,985	575	245	2,476	63
France	207	526	1,084	688	683	167
Netherlands	2	824	103	17	673	74
Switzerland	—	29	18	1	560	62
Sweden	1,242	—	—	551	—	1
Norway and Denmark	264	—	—	394	—	—
Finland, Baltic States, Poland and Danzig	785	3	1	378	2	—
Czecho-Slovakia and Austria	35	1	3	5	3	5
U.S.S.R.	860	5	—	71	—	—
South-east Europe	377	5	2	316	—	2
Italy	61	1	4	454	—	4
Spain and Portugal	168	2	—	474	—	—
	4,689	*4,388*	*1,790*	*5,261*	*4,398*	*378*
French North Africa	327	—	—	283	—	—
South Africa and Rhodesias	113	4	—	288	—	—
Belgian Congo	415	2	—	147	—	—
Near East	423	5	—	505	—	—
India, Burma and Ceylon	596	9	—	261	—	—
Malaya, north-east and south-east Asia	151	68	—	248	—	—
China, Japan, etc.	52	23	—	253	—	—
U.S.A.	1,817	35	—	692	—	—
Canada and Newfoundland	409	6	—	135	—	—
Central and South America and West Indies	2,412	33	—	1,370	2	—
Australia and New Zealand	218	1	—	92	—	—
	6,933	*186*	—	*4,274*	*2*	—
Supplies to ships	—	—	—	1,869	3	—
All other countries	251	15	2	302	—	2
Total	11,873	4,589	1,792	11,706	4,412	380

Source: *Bulletin Mensuel... U.E.B.L.*, pp. 650–3, 658–61 (Bruxelles, 1940).

The port statistics show the origin and destination of all imports and exports, without distinguishing between special and transit trade. European countries supplied 40% of all imports and took 55% of all exports by sea. The largest European supplier was Sweden, with timber, pulp, and ores; the largest European receiver was the British Isles, which took nearly one-third of all sea-borne exports to Europe, steel accounting for much of this tonnage. Of non-European countries the U.S.A. took most exports, while it supplied more imports than any other country in the world. Mexico and South America took very considerable quantities of exports and supplied a very great tonnage of imports—ores, metals, petroleum, grain, and wool.

The Hinterland: France. Of all the great European ports only Rotterdam depends to a greater extent on the handling of foreign goods (see p. 439). The fact that a great part of the hinterland of the port lies outside Belgium makes it extremely sensitive to the commercial policies of neighbouring countries.

Antwerp carries on a small traffic—up to 20,000 tons per annum—with the northern railway stations of Paris, and competes to some extent with Boulogne and Calais, but the territory in France which is of vital interest to Antwerp is the north and the east. (1) The Nord and Pas de Calais departments as far as Valenciennes lie within the 'natural' hinterland of Dunkirk, but Antwerp competes fiercely owing to its ability to offer better facilities—good marketing, frequency and regularity of sailings. Ghent competes, also, on a smaller scale. (2) Much of eastern France is nearer Antwerp than Dunkirk.

Distances in km.

	Antwerp	Dunkirk
Lille	130 (80 miles)	85 (53 miles)
Valenciennes	140 (87 miles)	133 (82 miles)
Thionville	301 (187 miles)	406 (252 miles)
Briey	311 (193 miles)	394 (245 miles)
Mulhouse	579 (360 miles)	673 (418 miles)
Nancy	592 (368 miles)	652 (405 miles)

Within the region shown in Fig. 99 rail dispatches are normally cheaper to Belgian than to French ports. In 1938, for example, the dispatch of 20 tons of steel rails from Thionville cost 59·65 Belgian francs to Antwerp but 81·65 to Dunkirk. Thus the steel of Lorraine is exported by way of Antwerp, reaching it mainly by rail. The waterway traffic of Strasbourg is competed for by Antwerp and Rotterdam.

A variety of measures have been tried in France since 1892 to deflect as much traffic as possible to Dunkirk, Rouen and Havre, and with the return of Alsace and Lorraine in 1919 further measures were effected, such as rail rebates, *surtaxes d'entrepôt* and *surtaxes d'origine*. In 1934, the maximum raising of *surtaxes d'entrepôt* succeeded in reducing rail movements of imports into France via Belgian ports from 479,000 tons of the previous year to 293,000 tons. Eventually, however, an agreement to apportion traffic was arrived at, by which 550,000 tons of commodities like iron, manganese, spelter, pyrites, pitch and phosphates were to be added to the traffic of Dunkirk, beginning in 1938, in return for which Antwerp secured the handling of some coal imports for the French railways and of the export of Norman iron ore to the Ruhr, as well as a 10-year monopoly of the export of Alsatian potash.

Two points should be borne in mind concerning this competition. First, the cities of Lille, Roubaix and Tourcoing will not admit the trade of the coalfield to be a preserve of Dunkirk. The Chamber of Commerce of Dunkirk makes its own approaches to the French government for aid in reducing the impact of Belgian competition. Secondly, the development of Strasbourg as a river port can only favour Antwerp and Rotterdam and not any French port, for the Rhine is the inevitable outlet for waterway traffic. The canal connexions from Alsace westwards to Paris, the Seine, and thence to Rouen and Havre, do not permit of any competition with the efficient Rhine service. Owing to the agreement reached between France and Belgium on the abolition of *surtaxes d'entrepôt*, the percentage of exports from Strasbourg passing through Antwerp has risen from 25 in 1913 to 88 in 1936, and the share of Rotterdam has shown a corresponding fall.

In April 1939, France, Belgium and the Netherlands concluded an agreement which provided for a regulation of the competition between the two latter countries. In accordance with this agreement, goods arriving at Strasbourg via the Rhine from Dutch ports were to enjoy the same exemptions from French supplementary duties as goods arriving thither from Belgian ports. The exemption from these duties conceded to Belgium shortly after 1918 had greatly irked the Dutch. The agreement of 1939 also bound Belgium not to increase her subsidies to her Rhine traffic for ten years. Furthermore, it provided that a joint Belgian-Dutch commission was to be established, to consider the possibility of fixing, by common consent, the taxes and dues chargeable in the ports of Antwerp, Ghent,

Rotterdam and Amsterdam. This agreement had not completely come into operation in May 1940.

The Hinterland: Germany. In western Germany, the areas served by rail and by waterway from Antwerp do not, broadly speaking, differ very greatly. West of the Rhine, including the Saar, the Belgian port is able to compete effectively in railway traffic with Hamburg and Bremen. Up to 50 km. (30 miles) east of the river its competitive power is considerable, at 100 km. (60 miles) it is very small. For many years measures have been taken in Germany to turn traffic away from Dutch and Belgian ports, and after the formation of the *Deutsche Reichsbahn Gesellschaft* in 1924 these efforts proceeded regardless of cost. The last 20 years have seen a steady retreat of the Antwerp hinterland in Germany westwards towards the Rhine under the influence of special railway rates. The effective distance of Munich from Hamburg has been reduced from 810 to 522 km. (i.e. from 500 to 325 miles), less than the distance to Antwerp or Rotterdam. It is a fundamental defect in the railway situation of Antwerp that the lines serving it from the east are mostly not under Belgian control. Nevertheless, for all western Germany, as even for Bavaria, Würtemburg and Saxony, Antwerp serves as a port of despatch at which export goods can catch an outward-bound vessel which has already left Hamburg or Bremen.

The railway traffic passing in both directions between Germany and Antwerp may be gauged from the following statement of traffic between Germany and Belgian seaports on German account.

Trade with Germany by German Railways (*direct transhipment*, 1937, *in tons at Belgian seaports*)

To Germany		From Germany	
Tropical and other fruit	1,968	Coal (not lignite)	343,665
Iron and manganese ores	2,395	Coal briquettes	46,185
Iron dross	35,131	Coke	62,018
Petroleum derivatives	4,520	Chemicals	16,847
Liquid coal derivatives	1,516	Paper and board	3,558
Textile raw materials	1,659	Stone, glassware, etc.	20,749
Sawn wood	1,556	Iron and steel sheets, plates, tubes; cast and wrought, etc.	56,241
Raw iron and ferro-alloys	4,083		
Non-ferrous metals and alloys	2,146		
Miscellaneous	5,082	Machinery, etc.	4,658
		Non-ferrous metals and alloys	1,236
		Miscellaneous	23,721
Total	60,056	Total	578,878

Source: *Die Güterbewegung auf deutschen Eisenbahnen im Jahre* 1937, vol. 1, pp. 273–5 (Berlin, 1938).

The Rhine and Ruhr waterways, which are now more important for transport connexions with Antwerp than the railways, have not been altogether amenable to German diversionary designs. They were not under the direct control of the state, and were therefore less subject to government efforts to direct their traffic. The waterways leading to the Scheldt are subject to special measures taken by the Belgian authorities to cheapen freights, and to reduce the normal advantage which Rotterdam is bound to possess owing to its position on a short and direct Rhine route. The waterway freight difference in favour of Rotterdam over Antwerp-Ghent is 25% from the Rhine-Herne Canal and 30% from Rhein- and Ruhr-Hafen. Following the breakdown of the negotiations with the Netherlands for the Moerdijk Canal part of the accumulated funds have been used to subsidize all departures for the Rhine from Antwerp or Terneuzen and some arrivals, so as to equalize freight differences. In recent years, ores bound for the Rhine have benefited by 3 fr. per ton and metallurgical products from the Rhine by 2 fr. per ton. Of the Rhine traffic at Lobith, the share of Antwerp rose from 10% in 1929 to 14% in 1936, and the share of Rotterdam fell from 60 to 55%, though a decline in the Antwerp traffic followed, for Rotterdam replied by reducing quay and pilotage tolls. It should be remembered that Ghent also has a considerable interest in transit traffic with Germany by way of the Rhine.

German Rhine Traffic and Belgian Ports: quantities in millions of tons

	Upstream			Downstream			Both ways		
	1927	1932	1937	1927	1932	1937	1927	1932	1937
Total	24·7	13·3	25·7	29·9	19·4	33·2	54·6	32·7	59·0
To all Belgian ports	3·2	3·0	5·3	7·1	5·4	9·2	10·3	8·4	14·6
Percentage of total	*12·9*	*22·3*	*20·7*	*23·8*	*27·9*	*27·7*	*18·9*	*25·6*	*24·7*
To Antwerp	2·2	2·2	3·9	3·5	2·1	4·2	5·7	4·3	8·2
Percentage of total	*9·1*	*16·7*	*15·3*	*11·6*	*10·6*	*12·8*	*10·5*	*13·1*	*13·8*

Source: *Deutsche Bergwerks-Zeitung*, no. 61, p. 21 (Düsseldorf, 13 April 1938).

The waterway traffic between Germany and Antwerp—2,985,000 tons discharged from and 2,476,000 tons loaded for Germany in 1938 (special trade and transit)—involved the greatest quantities which the port handled in connexion with any single country. The outward

traffic is varied, comprising several foodstuffs and raw materials, especially ores and petroleum products; the inward traffic is dominated by coal, and iron and steel; trade in general mechandise, however, is not insignificant. The chief origin of this traffic is the Ruhr, and clearly the future of Ruhr waterway traffic is very much a concern of Antwerp and Ghent (and of Rotterdam even more so). A principal aim of German canal developments is the diversion of German trade to German ports, a process which started with the Dortmund-Ems Canal. The completion of the Mittelland Canal will carry this diversion farther, and the Hansa Canal, by providing a direct water connexion between the Ruhr and Hamburg, will be the most serious threat of all. Nevertheless, the degree to which these efforts succeed will depend upon the degree to which the canal rates can be manipulated; for the Rhine outlet is undoubtedly the most 'economic', and the extension of the canals eastwards could theoretically extend the hinterland of Antwerp and Rotterdam eastwards also. Whatever the future of the German canal traffic, it is essential for Antwerp to improve its connexions with the Rhine (see p. 455).

The Hinterland: Netherlands. Although the railway exchanges were small, the total waterway traffic amounted in 1938 to nearly 1,500,000 tons. The traffic consists largely of movements in both directions of petroleum, etc., according to week to week demands, and of coal of various qualities as well as of potash from Antwerp and of ores from Rotterdam. There is an appreciable inward movement to Antwerp of foreign imports transhipped at Dutch ports, and accounted for in the trade returns under the 186,000 tons imported in 1938 by waterway from countries outside Europe.

The Hinterland: Switzerland. Antwerp competes with Rotterdam, Hamburg, Rouen, Marseilles and Genoa as a port for Switzerland. In 1938 there was an upstream traffic of 560,000 tons, mainly foodstuffs and raw materials, to which must be added an indeterminate quantity of the river-borne movement to Strasbourg which is transhipped there into smaller barges or forwarded by rail. The downstream traffic amounted to only 18,000 tons. Coal moving to Basle by water is mainly from mines near a waterway; other coal travels all-rail in order to avoid transhipment damage.

In rail traffic Antwerp is much better placed, for it is the nearest great port to Basle, save Genoa. Rail charges southwards from Basle over the Swiss and Italian lines are higher than those over the northern lines and port charges are higher at Genoa than at Antwerp.

Distances from Basle by Rail

	Km.	Miles		Km.	Miles
Genoa	538	334	Marseilles:		
Antwerp:			Via Genoa	713	443
Via Strasbourg and Sterpenich*	613	381	Via French lines	728	452
Via Cologne and Montzen*	711	442	Rotterdam	745	463
Rouen	656	407	Bremen	788	489
Dunkirk	694	431	Hamburg	853	530

* Charges over the two routes to Antwerp are equalized.

German competition is serious owing to the special tariffs applied; in 1928, for example, it cost slightly less to send a ton of paper from a point east of Basle to Bremen than to Mannheim. By 1936, the German railways had succeeded in deflecting about 50,000 tons of Swiss traffic. The traffic from Antwerp to Switzerland, which amounted to 62,000 tons in 1938, was considerably greater than traffic in the opposite direction. Antwerp is better placed for intercepting Swiss traffic bound for England than for America, for the latter is more easily diverted to Hamburg or Bremen. In the future more competition seems likely from Genoa and Marseilles.

Present position of Antwerp. The year 1938 represented a decline in the trade of the port. It failed to share with Rotterdam to any great extent in the increase of transit trade arising from German rearmament, and it suffered from further diversion of French traffic to French ports, a movement accelerated by the fall of the French franc. Some trade in metallurgical goods was captured by Ghent, a success which must be attributed to greater efficiency, for wages were higher there than at Antwerp. In the last few years the port has failed to maintain its place for cheapness. The establishment of a 7 hr. day in 1937 led to an increase in cargo-handling charges. The preference on tramp grain freights over Rotterdam of 3*d.* per ton, which had prevailed since 1933, was abolished in 1938. Above all, port dues were too high: a tramp paid at the rate of 3.50 fr. at Antwerp and the equivalent of 2.07 at Rotterdam. The high rate of exchange of the Belgian franc resulted in port charges being high in terms of sterling. Rotterdam, a transit port in a country with a high cost of living, adapted itself to the international price level by an elasticity in charges. Antwerp had attained prosperity partly by traditionally low costs, and when these no longer obtained, its tariff was at many points

too high. In some respects, too, port equipment was inadequate for competition. To deal with the various obstacles to international trade the port authorities in 1938 were considering the creation of a free port or a free zone.

Industries

Industries Directly Connected with the Port. The dockers number 19,000, and in addition there are many employees of the shipping agents, brokers, underwriters and warehousemen, as well as of the commodity markets. Antwerp is a 'principal' market for copal, cotton, ivory, iron, rubber, timber, tobacco and wheat; a market of 'average importance' for coal, coffee, diamonds and hides; and a terminal market for grain, hides, rubber and wool.

Ship repairing is engaged in by twenty-three firms, five of which construct marine machinery and boilers, and two construct propellers, although the leading constructors of propelling machinery are at inland centres. In recent years, the authorities have expanded the dry docking facilities, for previously Antwerp was losing trade to other ports. The small Belgian shipbuilding industry is concentrated in the Antwerp district. The Cockerill yards at Hoboken are the largest in the country, and the company has taken over two other idle yards. Five smaller firms build motor boats and canal barges.

Refining Industries. Like many great ports, Antwerp is the seat of industries which refine bulky imported raw materials. Besides twelve petroleum storage firms, there are three refining companies: *S.A. Raffinerie belge de Pétroles*, with an annual capacity of 200,000 tons of crude oil, *S.A. Redeventza* (150,000 tons), and *Tankage and Transport* (Davidis group, capacity not known). The total refining capacity is much greater than that of the refineries of Ghent.

Antwerp takes a leading place in the vegetable-oil industry as a whole, but is not dominant in the fats-glycerine-stearine-candles-soap group. There are a number of sugar refineries and flour mills, several tobacco factories (including one formerly operated by the *British-American Tobacco Company*) and chocolate factories. Other industries of the refining type include alcohol and vinegar, asbestos and rubber, starch and glucose, and paints and colours.

Chemicals, etc. The chemical industry is represented by sulphur refining and the manufacture of fertilizers and heavy chemicals. Five chemical works lie near the right bank of the Scheldt as far as Schelle, of which three belong to the *Union Chimique Belge*. Two factories making explosives and ammunition are at Hemiksem, and one at the

Zwijndrecht Fort. At Oud-God to the south-east, the Gevaert works is the largest producer of photographic materials in Belgium. There is a large glass works at Merksem, and a ceramics and faience factory, while cement and brick works lie along the Scheldt near Hoboken and on the left bank at Burcht.

Metal Industries. Apart from marine engineering, electro-chemical metallurgy and engineering are very important groups. At Hoboken there are six metallurgical works, including the extensive plant of the *Soc. Gén. Métallurgique de Hoboken*, for the electrolytic refining of copper, lead, cobalt, silver, gold, platinum and aluminium. Another plant of this company treats tin. At Merksem zinc, lead, arsenic and cadmium are refined. At Burcht there is an aluminium works, and a number of small factories in the city produce nickel and chromium plate, bronze castings, worked aluminium, etc. There is a steel-rolling mill at Schoten, to the north-east; besides miscellaneous iron and steel foundry work, and tube manufacture, there are four wire-drawing works (Hemiksem).

Several large companies, mainly at Merksem and Hoboken, construct cranes, bridges, dredgers and public works contractors' machinery, as well as Diesel engines. In lighter engineering, a variety of machinery is produced, but it is in the motor-car and telephone manufactures that Antwerp takes a leading place in Belgium. In the docks, near the Junction Dock between the Albert and Leopold Docks, lie the chassis-assembling plants of the *General Motors* and *Ford* companies. The former normally employed 1,800 people and had a daily output of 150 cars; it is the chief centre of this firm for supplying continental Europe; the plant also assembled the German *Opel* car. The Ford works employed 700 and had an annual output of 600 cars; a few years ago it was transferred from the original site at Hoboken. Heavy lorries and tractors are produced by two small firms; the *Minerva* motor-car works, comprising six separate plants, are maintained, although the company went into liquidation in 1934. It has recently developed the manufacture of aero-engines. Besides the *Erla* aero-engine works there is also a small aircraft factory.

There are two American subsidiaries which manufacture telephone equipment. The larger of the two, the *Bell Telephone Company*, employs up to 8,000 people in two factories, one in Antwerp and one in Hoboken. All types of telephone equipment are manufactured, and supplied to many countries in Europe.

The Diamond Industry. The famous diamond industry of Antwerp is a peculiar example of an industry independent in its location of any

obvious geographical factors. Employing up to 15,000 people, it surpasses the Amsterdam industry, although it dates only from the foundation of the independent kingdom of Belgium—the Dutch industry employs 3,000 workers. Most of the stones come from South African mines, and are imported through London; Brazilian stones are chiefly bought in Paris. While Amsterdam specializes in small brilliants, Antwerp specializes in large stones.

Industry in Neighbouring Regions. If Antwerp is less important as a centre of industry than Hamburg and Rotterdam, there has been a remarkable development of factories to the east in recent decades. Between the city and Maeseyck (Maaseik) on the Maas, 95 km. (60 miles) distant, there are about twenty brick and cement works, and over twenty important plants producing glass, chemicals, explosives and refined non-ferrous metals. The establishment of these factories, as of those along the Ghent-Terneuzen Canal, reflects the tendency of Belgian industry to move northwards. Many of them were established before the exploitation of the Campine (Kempen) coalfield began, for the advantages of the situation were considerable from the beginning—cheap land, more tractable labour, and proximity to Antwerp for the import of ores and of English coal.

There are no industries below the city, beyond two sugar factories on the right bank, at Lilloo and Beirendrecht—in part owing to the nature of the terrain, in part owing to the proximity of the Dutch frontier.

Communications

Waterways. Antwerp is the focal point of the inland waterways of Belgium: from the interior three streams of traffic converge—from the western Scheldt (Escaut) basin, from the eastern Scheldt basin, and from the Albert and Campine (Kempen) canals—and meet the traffic from Germany and the Netherlands moving via the Hansweert Canal and the maritime Scheldt. There are five principal waterway routes: (1) The Scheldt as far as Schelle, the Rupel, and the Brussels Canal as far as the capital, capable of accommodating barges of 1,350–2,000 tons; (2) The Scheldt from Schelle to Ghent, for barges of 600–1,350 tons; (3) the Albert Canal to Liége, for barges of 1,350–2,000 tons; (4) the Campine (Kempen) Canal, for barges of 600–1,350 tons; (5) the lower Scheldt and Hansweert Canal leading to the Dutch waterways and the Rhine, for barges of 2,000 tons.

Railways. Antwerp is not a centre of any great importance for through lines. It stands on the Rotterdam-Brussels main line from

north and south, but east and west lines for through traffic pass through Malines (Mechelen) to the south. All the lines entering the city have two or more tracks. Their relation to the Belgian network can be seen in Figs. 97 and 115, and to the passenger and goods stations of the city and port in Fig. 104. The chief passenger station is Antwerp-Central. The number of loaded railway wagons handled by the port was: inward, 512,000 (1938), 575,000 (1937); outward, 302,000 (1938), 367,000 (1937). The port is served by 500 miles of track and by the following goods stations:

Station or Yard	Service	Track length miles	Area acres	Capacity trucks
Antwerp-South	River quays to north (passengers also)	30	91	6,000
Antwerp-Kiel	River quays to south	27	150	
Station Principal	General traffic for older docks			
S.P. Subsidiaries: (i) Antwerp-Stuyvenberg	Forming station and express goods	62	425	8,000
(ii) Zurenborg (*Gare des Mille Wagons*)	Trains for Netherlands			(1,000)
Austruweel	North docks	25	75	4,000
Borgerhout	Belgian traffic only	—	—	—
Antwerp-North	New docks to Kruisschans Lock	150	—	—

The new Antwerp-North marshalling yard consists of two parallel sets of sidings, each set comprising three yards connected by two humps. Of these one set is nearly complete and the other is partly complete.

On the left bank lies the small *Tête-de-Flandre* station serving the single track line from Ghent.

Roads. For road connexions see Fig. 97.

Antwerp and the Projected Rhine Canals

The Treaty of 1839 (Article 12) gave Belgium the right to build a canal towards the Rhine, with Dutch help where the canal crossed Dutch territory, but this right was renounced when Belgium secured the privilege of building a railway, partly across Dutch territory, to Gladbach. At that time the railway seemed likely to become a vastly more important means of transport than the river or canal.

Barge navigation to the Rhine passed through the channel which lay between the mainland and the island of Zuid Beveland. When this passage was closed by the Dutch in 1866 through the construction of the Flushing railway, they were bound by the treaty to provide an equivalent, and opened the Hansweert Wemeldinge Canal leading northward to Dordrecht through the Hellegat, Volkerak and Hollandsch Diep. With the development of heavy barge traffic from the Rhine, carrying especially the Westphalian coal which provides a return freight for sea-going ships at Antwerp, the drawbacks of the Hansweert route have become serious—shallowness in the Hellegat, difficulty of handling barges in the lock at Hansweert, and the navigational problems of an enormous barge traffic in the crowded tidal estuary.

Proposals for an improved waterway to the Dutch Rhine at Moerdijk near the coast of Brabant came to be made, as well as projects for an alternative canal eastwards to the Rhine near Ruhrort in Westphalia. The latter had the advantage of appearing to be related to a problem which first became evident in 1910—the probability that the Dutch would improve the Maas so as to draw towards Rotterdam the traffic of the Liége district. Article 316 of the Treaty of Versailles imposed on Germany an obligation to complete the eastern half of the proposed Antwerp-Rhine Canal if Belgium undertook the western half, a result regarded at the time as a triumph for Antwerp. Dutch assent to this plan, as far as it involved Dutch territory, was not forthcoming, however, and Belgian interest turned again to the Moerdijk project, which has received most favour since 1919 (Fig. 122). The canal would make barge movements largely independent of tidal waters, and by permitting navigation at night, when the Rhine navigation is carried out mainly by day, would in effect reduce the advantage enjoyed by Rotterdam of a short connexion with Westphalia. The Dutch, however, remained opposed to this project, and would not ratify the draft agreement of 1925. As a result, the Antwerp-Rhine plan is now more in evidence, and many projected routes have been examined, some envisaging a more southerly course so as to avoid the passage of Dutch territory. The development of the German waterways will cause Antwerp further to aim at improving its connexions with the Rhine, and the completion of the Albert Canal shows that the construction of large inland waterways is still considered desirable.

Antwerp, Ghent and the Scheldt

Two of the principal problems of Belgian-Dutch relations are those which concern the chief seaports: (1) the status of the Scheldt estuary, and (2) the sovereignty of the Wielingen Channel.

In spite of the gradual reduction of the Dutch claims of 1609 and 1648 over the Scheldt—in 1793, 1815, 1839 and 1863—there are many in Belgium who hope still to see the abolition of Dutch control over the estuary. The military aspect of the problem is bound up with the neutral status of both countries. The Belgians claimed that the defence of Antwerp in 1914 suffered because it could not be reinforced by sea; that Belgian troops were denied exit by sea and thus suffered internment in the Netherlands; that if Belgium were at peace and the Netherlands were at war the river would be closed to Belgian trade. The Dutch claimed that during the war of 1914–18 their neutrality prevented the use of the river by the Germans for naval purposes. It is probable that through the neutrality of the Netherlands the Belgians gained, on balance, as much as they lost.

They attempted to bring the Scheldt question before the Versailles Conference as much for the commercial as for the strategic issues. The crux of the matter is that the final authority which controls the Scheldt and is responsible for its maintenance is another power, within the territory of which exist powerful interests in direct competition with the Belgian ports. Rotterdam is as important to the Netherlands as Antwerp is to Belgium. The matter is complicated by the fact that the Dutch claim the sovereignty also of the Wielingen Channel at the entrance of the estuary, even within Belgian territorial waters. The pilotage in the estuary and the buoying and conservation of the channels are, according to the Treaty of 1839, subject to a joint superintendence exercised by an equal number of commissioners from each country. Moderate pilotage dues are fixed by agreement; it was prescribed by the treaty that the pilotage dues in the Wester Schelde were never to exceed those in force on the Maas from the sea to Rotterdam *in proportion to the distance*, so that pilotage dues for Antwerp are in fact greater than those for Rotterdam.

The conservation of the channels is a task of considerable difficulty. The Dutch have always applied a strict interpretation of the treaty, taking care only of the maintenance and proper marking of the channels, and in the past even contended that they were bound to maintain only such facilities for navigation as existed in 1839, although in practise they adopted a more reasonable attitude and



Plate 61. Antwerp (Antwerpen): the old docks, looking eastwards
In the foreground is the Scheldt and the Bonaparte lock, with the Pilotage building on the right. The first dock is the Bonaparte, the second is the Willem, connected by a passage with the Kattendijk Dock. Behind the Willem Dock are the buildings of the *Entrepôt Royal*, and behind to the left is the *Station Principale* goods depot.



Plate 62. Brussels (Bruxelles): the *Bassin Vergote*, the principal part of the port



Plate 63. Brussels (Bruxelles): aerial view of the port
The *Bassin Vergote* lies to the right, and the barge docks to the left; to the north-west is the *Gare aux Marchandises*.



Plate 64. Brussels (Bruxelles): aerial view of the Avant Port
The docks in the city lie some distance to the left. Close to the Avant Port is the Schaerbeek marshalling yard, the largest in Belgium.

refused no important request. The Belgians claim, however, that the commission should take cognizance of the other matters in which the extent and security of the channels depend—dyking and drainage of adjoining land, encroachment on the river and its accessory waters, etc. In other words, the Scheldt should be treated as a single hydrographic problem. They allege that serious difficulties of drainage occur in Belgian Flanders through the raising of the level of the Dutch territory which separates it from the estuary. Belgium pays the entire cost of improvements, but the consent of the Netherlands government is necessary. The commission has no authority to make recommendations and no neutral chairman with a casting vote.

Closely bound up with the Scheldt problem is the fact that the Ghent-Terneuzen Ship Canal, giving access to Ghent, lies in Dutch territory at its seaward end (see p. 409). The maintenance and improvement of the canal in Belgian territory are largely dependent upon Dutch agreement to the execution of works in Dutch territory. The canal was built by Dutch engineers at Belgian expense, and the Dutch part does not correspond with the Belgian part. As the designs were made in accordance with the views of Belgian experts, it can be argued that any prejudice which Ghent may have received as a port can hardly be ascribed to the Netherlands.

Development since 1919. When the Belgians brought their claims for a revision of the Scheldt status before the Versailles Conference, the Powers appointed a commission to report. The terms of reference, however, represented a triumph for the Dutch: it could examine only 'proposals involving neither transfer of territorial sovereignty nor the creation of international servitudes'. Such proposals could do little to satisfy either those demands of the Belgians which were legitimate, or those, like the demand for Dutch Flanders, which perhaps took their origin in the heated atmosphere immediately following the German occupation. By 1920, however, more reasonable counsels prevailed and a new treaty, settling most of the questions at issue, was ready for agreement, when a fresh dispute arose over the sovereignty of the Wielingen Channel. By 1925 proposals were again put forward in a draft treaty—proposals which did not meet the main Belgian claims but which provided many concessions. It dealt also with the Terneuzen Canal, and the projected Rhine and Moerdijk Canals. In 1927 the treaty was accepted by the Belgian parliament and by the Second Chamber of the Netherlands, but was rejected by the First Chamber, partly through the powerful pressure exercised by Rotterdam interests, for two main reasons. The First Chamber held that the

plans were too far-reaching, and it would not give its assent to the proposed agreement on a separate issue which had been included in the general treaty, namely, Dutch consent to the construction of the Antwerp-Moerdijk and Antwerp-Ruhrort Canals (see p. 508).

The proposals of 1925–7 concerning the Scheldt itself represented a considerable degree of agreement, and included provision for arbitration, extension of the competency of the Scheldt Commission, and a stipulation that pilotage dues below Antwerp should not be higher than those below Rotterdam. From 1928 to 1931 fresh conversations were opened but no results have ensued, and the Scheldt regime is still able to cause discontent in Belgium.

The Wielingen Channel

This channel, the most important entry to the Wester Schelde, runs from Flushing westwards, at first along the shore of Dutch Flanders, but later diverges from the coast at the Belgo-Dutch frontier. It extends westwards beyond Zeebrugge to the Wielingen Buoy, $2\frac{1}{2}$ sea miles north of Zeebrugge, and off this port lies partly within the 3-mile limit from the Belgian coast. The Dutch claim the sovereignty of the entire channel, on the ground of historic rights dating from 1323, and on the ground that if the Scheldt estuary is within their jurisdiction the outlet must be also. The Dutch attitude was summed up by the foreign minister in 1920 when he said: 'Who strikes at the Wielingen, strikes at the Scheldt. Who makes an attempt on the Scheldt, threatens Zealand, who threatens Zealand aims a blow at the whole of the Netherlands.'

The Belgian case rests upon three main arguments: (i) In international law the channel west of the frontier is open sea outside the 3-mile limit and *Belgian* territorial waters within it. If the claim of the Dutch were admitted they would not only control the Scheldt but would also have a theoretical right to hinder the use in peace or war of Zeebrugge, a principal Belgian coast port. (ii) During the war of 1914–18 the Netherlands government admitted that the channel beyond the frontier was not Dutch, explicitly in a note to the British Admiralty in 1916 and tacitly in 1917, when it declared that its neutrality had not been violated by the seizure of a Belgian fishing boat by the Germans, west of the frontier in what were Belgian territorial waters. (iii) The historical claims are attacked on the grounds that at different times since 1323 the term *Wielingen* has applied to several different stretches of water (Figs. 94, 96).

As with the Scheldt question as a whole, the issue is undecided and the sovereignty of the Wielingen is still in dispute.

Brussels (Bruxelles) (Plates 62, 63, 64, 80)

Brussels is approached first by the Scheldt, then by the Rupel as far as Wintham, and thence by the Willebroek Canal, 18½ miles long. Ships up to 347 ft. length, 47 ft. beam, and 19 ft. draught may be admitted to the port. It is believed that the largest vessel ever to visit the port was the *Prince Baudouin*, in 1934, of 3,049 tons gross, beam 46 ft., length 370 ft., and draught 11¼ ft.

The canal has a maximum depth of 21¼ ft. with a breadth at the waterline varying from 131 to 196 ft. for the most part, and from 230 to 328 ft. in the approaches. The entrance lock for sea-going vessels is at Wintham, with a length of 374 ft., a width of 52½ ft., and a depth of 21¼ ft. The other lock at Petit-Willebroek has a depth of only 13½ ft. and is used by barges. Two intermediate locks in the canal, at Capelle-au-Bois and Willebroek, of the same dimensions as the Wintham lock, allow passage to the higher water level obtaining at Brussels. Owing to the locks and to the numerous bridges the passage to Brussels takes 5 hr. Some of the vessels regularly using the port are fitted with specially designed masts and funnels to facilitate their passage of the canal.

The different sections of the port follow successively southwards along the canal. There are two which are used by sea-going craft, first the avant-port, which is simply a widened section of the canal, then the Vergote Basin, a mile farther on.

	Length ft.	Width ft.	Entrance width ft.	Depth ft.	No. of quay cranes
Avant-port	5,900	370–460	Canal	19	10
Vergote Basin	3,200	393	59	21¼	19
Beco Basin (Junction)	2,390	139	39	11¾	8
Aug. Gobert (Batelage)	2,040	114½	41	9¾	2

In addition, each of the two deep-water basins is equipped with a 10-ton electric crane and with four 4-ton cranes with automatic grabs. The principal quay of the Vergote Basin, *Quai des Steamers*, lies on the west side; it is 246 ft. wide and has three sheds. *Quai des Armateurs* lies on the east side.

Opening from the inner end of the Vergote Basin, and approached by entrances 40 ft. in width, are two basins fitted for barges, the Beco

(Junction) Basin, and the Aug. Gobert (Batelage) Basin. The Beco basin is also equipped with a 20-ton electric crane. There are no repair facilities.

The quays of the three inner basins are connected by rail with the large goods station, *Gare aux Marchandises*. The avant-port has no railways, but 300 yd. to the east lies the station and shunting yard of Schaerbeek.

The City; History; Industries; Communications: see pp. 585-93.

Trade

The trade of the port of Brussels by sea is comparatively well balanced. Of the 196,000 tons of imports in 1938, 101,000 tons were minerals and 42,000 tons timber; of 166,000 tons of exports, minerals accounted for 64,000 tons, metals 61,000, chemicals 19,000 and glass 9,000. The sea-borne import is derived almost entirely from the countries of north-western and Baltic Europe: the United Kingdom supplies more than half of the imports (105,000 tons) and the Baltic countries most of the rest. These figures demonstrate the importance of imports of coal, timber, paper, flax, etc. The exports were destined mainly for neighbouring countries—United Kingdom and Poland each one-fifth (33,000 tons), Sweden 27,000 tons, Germany 26,000 tons, and France 21,000 tons—all mainly manufactures.

The inland movements by canal and rail arise principally from the interior trade of the country and from its exchanges with nearby states. There is a great excess of traffic inwards. Of the 750,000 tons of canal unloadings 670,000 tons were minerals; of the 377,000 tons of loadings 206,000 tons were metals and 123,000 tons minerals. Germany and the Netherlands each supplied over one-third of the canal arrivals, and were the destination for the bulk of the loadings. The Netherlands was the principal source of direct rail unloadings, followed by Germany. Of the direct rail unloadings 181,000 tons were minerals; the Netherlands and France were the chief sources.

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Chapter XVI

ROADS

Historical Background: Road Construction: The Road Network: Road Transport: Bibliographical Note

Belgium possessed in 1938 a network of major roads totalling 10,580 km. (about 6,575 miles), of which 9,000 km. were *routes de l'Etat*, 1,576 km. were *routes provinciales* and 4 km. *routes concédées* or private roads, while there was a further 35,000 km. (about 21,750 miles) of local roads. This total of over 45,000 km. is approximately twice the length of the country's railway system and six times the length of its navigable waterways. There are about 1·5 km. of road to every square kilometre of area, or alternatively 1 km. to 0·67 sq.km. By comparison, Great Britain has 1 km. to 0·85 sq.km., France 1 km. to 0·87 sq.km., Italy 1 km. to 1·29 sq.km., Germany 1 km. to 2·75 sq.km., and Spain 1 km. to 5·01 sq.km.

Major roads comprise the *routes de l'Etat*, for which the state is financially responsible, and the *routes provinciales*, maintained by the provinces; both are ultimately under the control of the 'Ministère des Travaux Publics' (or 'Ministerie van Openbare Werken'). The local roads, or *chemins vicinaux*, are controlled by the 'Administration de la Voirie communale', a department under the 'Ministère des Travaux Publics'.

Historical Background

The Romans established a road system in Belgic Gaul after their conquest of the country in the first century B.C. The main route centres were Bavai (Bagacum) in northern France, and Arlon (Orolaunum). From the former a road ran north-east via Tongeren (Advatuca Tungrorum) and Maastricht (Pons Mosae) to Cologne (Colonia Agrippina), while it was continued west via Arras (Nemetacus) to the coast near Boulogne (Bononia). Other roads ran north to the edge of the coastal marshes. From Arlon one road ran north-west through Dinant (Dionantum) to Bavai, while another went through Bastogne (Bastonacum) and Marche (? Marca) to Tongeren (Fig. 29).

In spite of the great flow of trade between northern and southern Europe in the thirteenth and fourteenth centuries, road building did not show any marked development, although the important commercial highway between Brugge and Cologne carried much traffic. In Flanders, the chief reason for this neglect was the abundance of natural waterways, while the marshy terrain was unsuitable for road making.

At the end of the seventeenth century, two categories of roads, *grands chemins* and *chaussées* (or *steenwegen*), were distinguished. The former were survivals of earlier roads; they joined the main towns and waterways, but were usually tortuous and narrow, while their surfaces were in such a poor state of repair that they were unusable for a large part of the year. The road from Kortrijk to Tourcoing is an example of a *grand chemin*.

The *chaussées* consisted of local roads converging from the country districts upon a market town. From Antwerpen, for example, *chaussées* radiated to Burcht (completed 1524), Luythaegen (1540), Deurne (1563), Merksem (1567), Kontich (1663) and Oud-God (1649). Some of these local roads gradually extended towards other large towns; thus originated the *grandes chaussées*, examples of which are those between Bruxelles-Antwerpen and Bruxelles-Namur. Some *grandes chaussées* followed the Roman roads; the Bavai-Cologne highway was used by trains of wagons from the Mons coalfield.

In spite of Belgium's weak economic position at the beginning of the eighteenth century, there was some improvement in the road system under the Austrian Hapsburgs. During the reign of Maria Theresa, a number of highroads were constructed, notably between Leuven-Liége-Herve-Aachen, Meenen-Kortrijk-Brugge, Geeraardsbergen-Gent, and Nivelles-Namur-Leuven. Because the towns were served by adequate waterways, no road joined either Brugge and Gent or Gent and Antwerpen until 1785.

The *grande chaussée* consisted of a heavily cambered central strip, which varied from 3 to 5 m. in width, paved with small setts, and flanked on each side by an earthen track (*chemin de terre*) and by a drainage ditch. The roads were but rarely built by the central government, and then they were constructed almost exclusively between the residences of princes and their domains. Such a road was that from Bruxelles through the Forêt de Soignes. Provinces and towns usually undertook the construction of roads for their own benefit.

During the Napoleonic period, when Belgium was incorporated

into France, there was naturally a considerable increase in the 'strategic' road network of northern France and Belgium. The roads converging on Antwerpen received special attention, for Napoleon hoped to use the port as an invasion base against England. Under the United Netherlands, the main roads were divided into those built and maintained by the state (*routes de l'Etat*), and those built by the provinces (*routes provinciales*), while there were also a few privately owned *routes concédées*; the miscellaneous local and secondary roads were known as *chemins vicinaux*. This classification was still in force in 1939. When Belgium attained independence in 1830, the length of main roads in each province was as follows:

Province	*Routes de l'Etat* km.	*Routes provinciales* km.	*Routes concédées* km.	Total km.
Antwerpen	109	75	—	184
Brabant	403	158	—	561
West-Vlaanderen	412	166	—	578
Oost-Vlaanderen	352	36	58	446
Hainaut	453	48	4	505
Liége	239	18	72	329
Limburg	149	—	—	149
Luxembourg	208	—	—	208
Namur	268	13	—	281
Total	2,593	514	134	3,241

Source: *Annuaire statistique de la Belgique*, p. 272 (Gand, 1870).

Although the construction of roads continued throughout the nineteenth century, they were primarily regarded as supplements or 'feeders' to the rapidly growing network of railways and to the waterways; indeed, up to 1884, the road surfaces were to a large extent poor and markedly inferior to those of the French *routes nationales*. Between 1884 and 1913, however, Belgium's general material progress considerably affected the road system of the country. Most of the roads belonging to private individuals or companies were purchased by the state during this period, and toll-bars were abolished. The state roads were paved or macadamized to a width of 3–5 m., and were in many cases bordered by avenues of trees, while more than fifty road bridges were built. By 1913, the length of state roads had risen to 8,327 km. and that of provincial roads to 1,553 km. During this period the length of local roads increased considerably, but their surface was generally poor and variable. Roads were constructed and maintained by the local

authorities with the assistance of grants from the state, from the provinces, and occasionally from private individuals.

During the war of 1914–18, the German army of occupation improved a considerable length of roads to take military traffic. In the post-war years, Belgium faced a great problem of reconstruction; at first roads received less attention than did railways and waterways. Since 1926, however, there has been considerable progress in the improvement of road widths and surfaces, in the realinement of existing roads, in the segregation of fast and slow traffic by lanes, in the further separation of cyclists and pedestrians, and more recently in the construction of new trunk highways or *autostrades*. One major scheme included the construction of the road tunnel under the river Escaut at Antwerpen; this was opened in 1933 (Plate 68). The local roads have been improved, and in many areas they have reached the standards of the main roads. It is significant that in 1936, 96 million francs were spent on local road improvements, the state's contribution being 45 millions. This was a striking contrast to 1906–10, when the average annual expenditure was only 1·8 million francs, and to 1921 when it was only 1 million francs.

Road Construction

Main Roads (Plates 65, 66).

The main roads of Belgium at present comprise the *routes de l'Etat* and *routes provinciales*, totalling 10,580 km.; these two categories will, however, be of secondary importance when the system of 'national highways' is completed. Since 1926, the roads have been considerably improved. A large proportion of the total length has been increased in width from 3–5 to 6–10·5 m., with an overall width (sometimes including side-walks, a tramway or light railway, a *piste* or cycle track, and grass verges) of 12–15 m. Some stretches, especially in the Flanders plain, run along low embankments, flanked by drainage ditches. It is estimated that about 10% of the roads are tree-lined in the coastal plain, about 30% in the Bruxelles district, and about 90% near Namur.

The surfaces of the main roads vary considerably. In 1936, about 44% of the total length was sett-paved, while 28% had a surface of waterbound macadam, 16% of cement concrete, 7% of asphaltic concrete, 1·5% of tarmac, and 3·5% of brick, cobbles, wood, sand or was unsurfaced. These figures do not include the newly constructed concrete *autostrades*. Even so, Belgium's total length of

concrete roads is fourth in Europe, while in proportion to the total of all roads Belgium is first. Macadamized roads are found almost entirely in the south-eastern provinces of Liége, Namur and Luxembourg and in eastern Hainaut, where there are ample local supplies of Carboniferous Limestone suitable for waterbound macadam. In the central and western provinces, on the other hand, the roads are sett-paved except where they have been replaced by concrete; the stone setts are usually imported from France and Sweden. In Oost-Vlaanderen, for example, 1,087 km. of the total 1,090 km. of main road are paved.

Local Roads (Plate 67)

The *chemins vicinaux* or *voiries vicinaux* vary from muddy cart tracks to paved or macadamized roads as good as many of the *routes de l'Etat*. They are rarely more than 3 m. wide. Of the total 35,000 km. in 1936, about 13,500 km. were paved, while the rest had surfaces of macadam, brick, and cobble, or were unsurfaced. The paved surfaces are again found mainly in the west and centre (Brabant had 4,365 km. of *pavé* and 380 km. of metal), while the metalled roads are in the south-east (Liége had 4,390 km. of metalled road and 302 km. of *pavé*, while the respective figures for Luxembourg were 5,002 km. and 16 km., and for Namur 4,319 km. and 175 km.).

'*National Highways*' (*Autostrades*)

The construction of arterial highways has been a striking feature in Germany (*Autobahnen*) and Italy (*autostrada*). The provision of a similar system in Belgium has been under discussion since 1926, but progress with the execution of the scheme has been made only since 1936. There was considerable dispute over technical methods, while, as in France, a considerable body of opinion held that effective improvement of existing roads would make a new system unnecessary. The necessity of *autostrades* was accepted finally at the 'Troisième Congrès Belge de la Route' at Antwerpen in 1933; this was followed in February 1935 by a royal decree allowing the compulsory purchase of private land over which the new roads were to pass. In October, 1935, a 'Commission consultative de la Circulation routière' was set up in Bruxelles to act in an advisory capacity to the government.

The national highways plan envisaged the following roads: (1) Oostende-Jabbeke-Aalter-Bruxelles; (2) Antwerpen-Maldegem-Knokke-aan-Zee (known as the 'Anvers à la Mer' route); (3) Liége-St Truiden-Aarschot-Antwerpen; (4) Bruxelles-Mons;



Plate 65. Road south-west of Gent (Ghent)

This stretch of *pavé*, between Vosselare and St. Martens-Leerne, shows the surface of small stone setts, the concrete *piste* or cycle track on the right, and the light railway line, with its overhead cables, on the left.



Plate 66. Motor road on the plateau of Brabant

In recent years, new concrete-surfaced motor roads have replaced many sett-paved and water-macadamized roads.



Plate 67. A country road in the Ardenne

The road system of the Ardenne mainly consists of long, straight tree-lined avenues of water-bound macadam.



Plate 68. The Escaut (Scheldt) road tunnel at Antwerpen

The photograph shows the east bank entrance to the road tunnel under the Escaut. The tunnel was constructed during 1931–3; it is 6,431 ft. long, with 1,204 ft. under the bed of the river, and the roadway is 22 ft. 2 in. wide.

(5) Bruxelles-Charleroi; (6) Bruxelles-Kortrijk; and (7) Bruxelles-Namur-Arlon. These roads were to have an overall width of 30 m., with two concrete carriage-ways, each with two traffic lanes, separated by a grass strip 3 m. wide, macadamized or paved cycle tracks, and pedestrian side-walks. The roads were generally to be raised on low embankments, flanked by drainage ditches. Other features included 'fly-over junctions' and an effective system of flood-lighting.

Budget allotments for *autostrade* construction totalled 21, 78 and 60 million francs for 1936–7–8 respectively. Progress has been slow; the average cost up to 1940 averaged 8 million francs per km. By the end of 1939 the Jabbeke-Aalter section of the Oostende-Bruxelles route had been completed, while the Oostende-Jabbeke section was in its final stages. Other short completed stretches included the Knokke-Eekloo section of the 'Anvers à la Mer' route, and the St Truiden by-pass on the Antwerpen-Liége road.

Cycle Tracks

The total number of pedal cycles in Belgium increased from 1·95 millions in 1932 to 2·82 millions in 1938 (that is, on an average, 1 for every 2·5 of the population). They are catered for by some 2,600 km. of cycle tracks (*pistes*), which flank about 25% of the main roads, a proportion which rises to 72% in the province of Brabant and 69% in Antwerpen. The tracks are usually 1·5 m. wide and are paved with thick concrete slabs.

The Road Network

The network of the main roads is shown on Fig. 108. The most striking feature is the evenness of the net, and this is emphasized in the following table which includes the average length of main road per 10 sq.km. of area in each province.

This evenness of the main road-net is due to the regular distribution of Belgian towns. The necessity of providing straight routes across the country to by-pass the towns instead of linking them was one of the main arguments put forward in favour of *autostrades*. In the west and centre of Belgium numerous centres of communications may be distinguished (Bruxelles, Antwerpen, Gent, Brugge, Ieper and Mons); the central or focal position of Bruxelles is striking but it is not as marked as that of Paris, for example. In the provinces of Liége, Luxembourg and Namur, the country is covered with a network of road rectangles and triangles, and there are no outstanding centres.

Province	Major roads		Local roads		Total	
	Length km.	Average length per 10 sq. km. km.	Length km.	Average length per 10 sq. km. km.	Length km.	Average length per 10 sq. km. km.
Antwerpen	967·5	3·6	1,727	6·0	2,694·5	9·4
Brabant	1,112·1	3·4	4,806	14·7	5,918·1	18·0
West-Vlaanderen	1,234·6	3·8	3,694	11·4	4,928·6	15·3
Oost-Vlaanderen	1,089·6	3·7	3,642	12·3	4,731·6	15·9
Hainaut	1,148·4	3·0	5,716	19·2	6,864·4	18·5
Liége	1,446·0	3·9	4,783	12·1	6,229·0	15·8
Limburg	850·6	3·5	1,446	6·0	2,296·6	9·5
Luxembourg	1,349·5	3·0	5,016	11·4	6,365·5	14·4
Namur	1,381·8	3·8	4,501	12·3	5,882·8	16·3
Total	10,580·0	3·5	35,333	11·5	45,913·0	15·0

Source: *Annuaire statistique de la Belgique*, p. 252 (Gand, 1939).

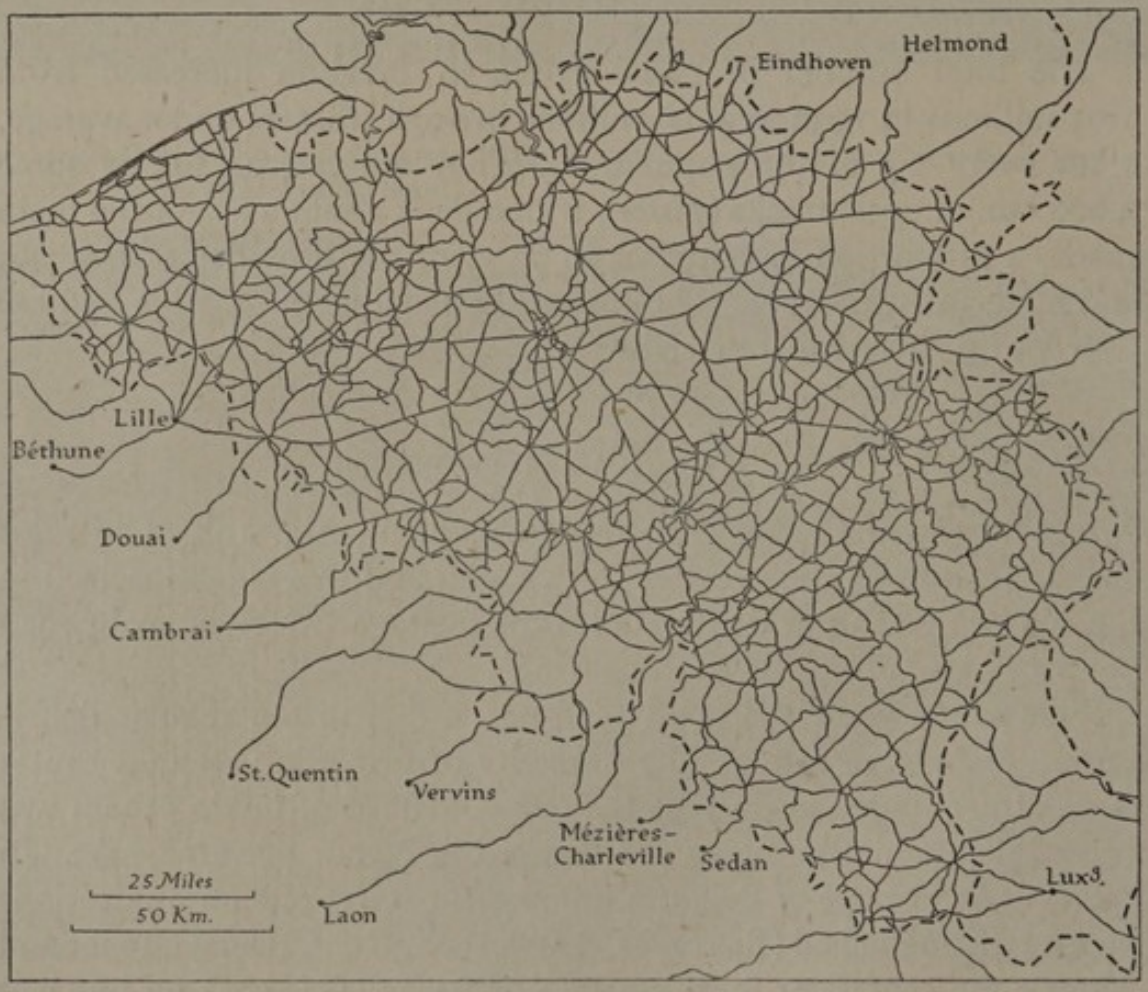


Fig. 108. The network of Belgian roads

Based on G.S.G.S. Series 2517, 1:380,160. Belgium and North-east France. This network consists of *routes de l'Etat* and *routes provinciales*. Local roads, or *chemins vicinaux*, are not shown.

This impression of even density is modified somewhat when the complete road system is considered. The average length of local road per 10 sq.km. is given in the table on p. 468; it presents a striking contrast to the average length of main roads in each province.

The density of the network of local roads obviously depends directly on the agricultural and industrial possibilities offered by each district (Fig. 109). The outstanding areas of high density, apart from the immediate vicinity of large towns, are in the densely populated agricultural regions of Flanders, Brabant and Hesbaye, and in the industrial and mining areas of Hainaut and Liége. Areas of markedly low density are the scantily populated Kempenland plateau, the wooded hilly regions of the Ardenne, and the more marshy parts of the Flanders plain.

Road Transport

Since 1918, there has been a very marked increase in road transport. While it is difficult to assess accurately figures of road transport, unlike railways and waterways, the following figures give some indication of this increase. The number of private motor cars in Belgium increased from 20,700 in 1921 to 146,500 in 1938, while that of motor cycles increased from 13,000 to 67,200 during the same period. In addition, in 1938 there were 7,700 hire cars, and about 2,000 buses and trams. There were 509 public road services operating over a route distance of nearly 10,000 km., and a further 3,476 km. of autobus routes run by the *S.N.C.F.V.* The latter distance had risen from 129 km. in 1925, an increase mainly the result of a law of 1924 which gave the company a preferential right to run omnibuses along existing or projected routes to avoid unfair competition for the light railways from other companies. There were also 486 km. of tramway other than light railways, of which 225 km. were in the Bruxelles area, and 60 km. of trolley-bus route, most of which was in Liége.

The competition between road and rail for both freight and passenger transport has gradually become more acute since the war of 1914–18. The small area of the country, however, has been especially favourable to motor transport. Thus, it has been calculated, after continuous observation at over 1,000 points during three traffic censuses, that the average daily traffic load on the main roads was the equivalent of 173 tons (1908), 564 tons (1926) and 850 tons (1933). The number of registered light lorries rose from 33,000 in 1928 to 62,000 in 1938,

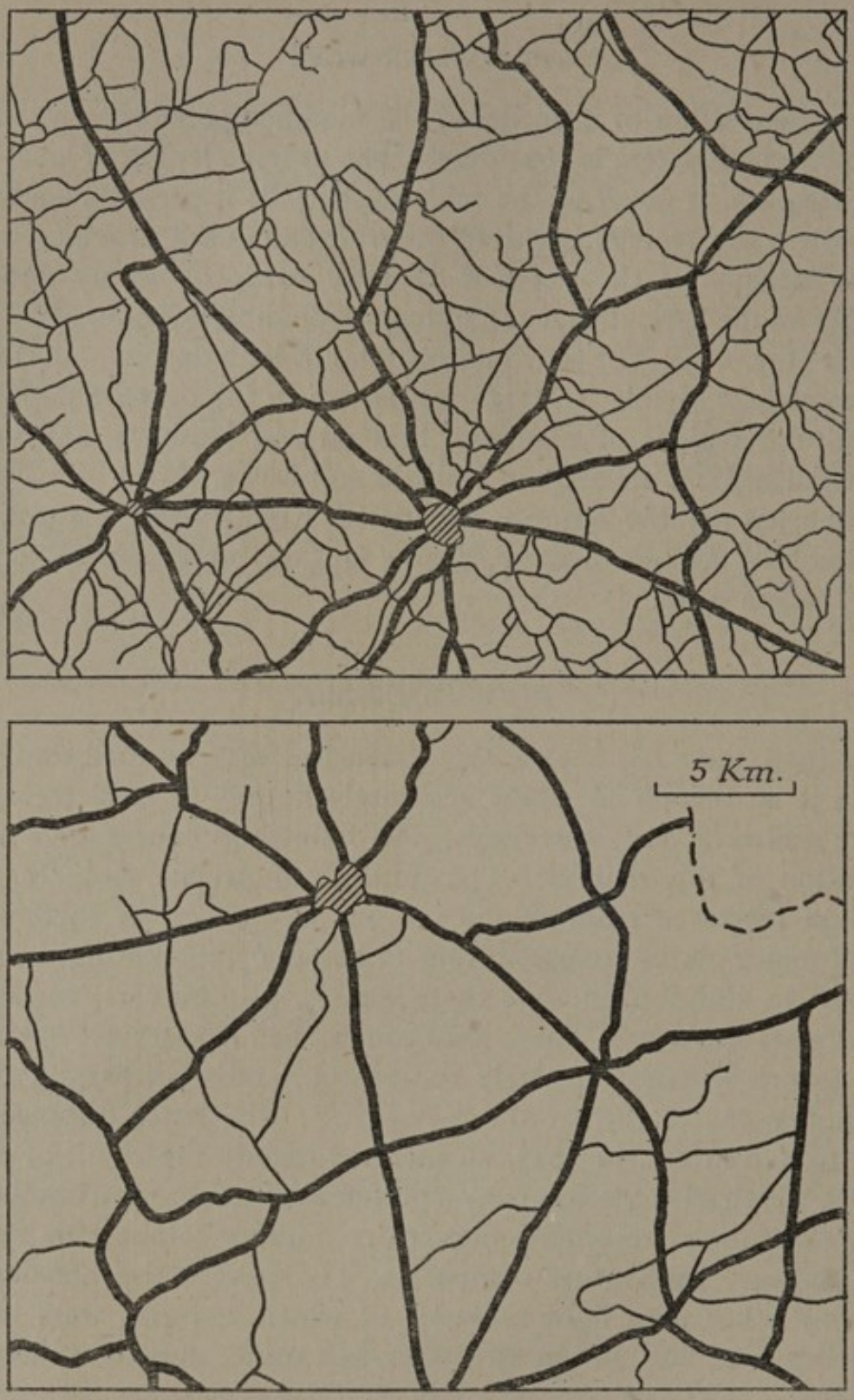


Fig. 109. The road pattern in the neighbourhood of Ieper (Ypres) and of Turnhout (below)

Based on G.S.G.S. Series 4040, 1:50,000. Belgium and North-east France, Sheets 41, 52 (Ypres) and 25 (Turnhout).

These two specimen patterns of the detailed road network are drawn on the same scale for comparison. The upper map of the Ieper district shows the convergence of main roads on the market town of Ieper and, less strikingly, on Poperinge. The dense net of local roads serves the agricultural countryside, except for blank spaces in the north-west which are the result of marshes in the valleys of the Yser and Poperinge rivers. The blank spaces in the north-east mark the situation of the woodland and heath surrounding Houthulst. While the lower map shows a rather similar density of main roads converging on Turnhout, the paucity of local roads reflects the sparsely populated nature of the Kempen heathland and forest, and also to a smaller extent the alternative forms of communication offered by the *chemins de fer vicinaux* and by the canals.

and heavy lorries increased from 7,000 to over 15,000. The *S.N.C.F.B.* calculated in 1930 that road haulage had deprived the railways of 21% of their goods traffic receipts in the past five years, and the *S.N.C.F.V.* similarly calculated that it had lost 5·5% of its goods and 10·3 of its passenger receipts. The railways were even more adversely affected during the succeeding ten years.

While a law of March 1932 (still in operation in 1939) laid down the principles covering the authorization of road transport services, it was obviously impracticable to control all types of traffic, and large numbers of irregular services deliberately undercut the railways. In 1932, the *Conseil supérieur des Transports* formed a Road-rail Sub-committee, which produced in the following year a report surveying the problems of road-rail competition, together with proposed solutions. Various methods of increased taxation on road vehicles have been introduced, while the railways have tried to fight competition by favourable tariffs for certain types of freight, by an increased number of light trains and railcars, by electrification of local lines and by a reduction of running costs, but owing to the unsatisfactory financial position the *S.N.C.F.B.* has been obliged to increase its passenger tariffs, with corresponding loss to the road passenger services.

Bibliographical Note

(i) An account of the development of the Belgian road network is given by L. Genicot, 'Etudes sur la construction des routes en Belgique', *Bulletin de l'Institut de Recherches économiques, Ecole des Sciences politiques et sociales*, vol. x, pp. 421–51 (Louvain, 1939).

(ii) Statistics relating to roads and road transport are compiled by the Ministry of Transport and published in the *Annuaire statistique de la Belgique et du Congo Belge* (Gand).

(iii) An annual summary of road works in progress, especially work on the *autostrades*, is given in the *Bulletin de l'Association permanente des Congrès belges de la Route* (Bruxelles).

(iv) Articles dealing with special aspects of road construction and transport are published in many technical journals. Particular reference can be made to the following: *Transport* (London), *Modern Transport* (London), *Roads and Road Construction* (London), *Annales des Ponts et Chaussées* (Paris) and *Strassenbau* (Halle).

Chapter XVII

RAILWAYS

Introduction: Historical Background: Technical Features of the Main-line Network: Electrification and Railcars: Traffic: The Railways of Bruxelles: Geographical Description of Certain Main Lines: Bibliographical Note

Introduction

The railway network of Belgium is of greater density than that of any other European country—an obvious response to the high degree of industrialization and to the density of population. Yet the railways are not merely an essential part of the internal economy of the country; the function of many of the lines is international as well as national, and this results from the geographical position of Belgium at the seaward end of the Great European Plain and between three other countries, France, Germany and the Netherlands, each of which also has a dense population and a well-developed railway system. East-west traffic from England to Germany via the Belgian ports is crossed at Bruxelles or at Mechelen (Malines) by north-south traffic between the Netherlands and France, and the focal position of the capital city of Bruxelles is further emphasized by the meeting there of other lines from the Channel ports and industrial area of northern France (Calais and Lille) and from Switzerland and Lorraine via Luxembourg.

In 1939, the total length of main-line railway routes in Belgium was 5,134 km. (3,188 miles). This represents 1 km. of line for every 5·9 sq.km. of area (compare Great Britain 7·4, Germany 9·5, Netherlands 9·9, and France 12·9 sq.km. per km. of route). This figure, however, refers only to main-line railways; there is, in addition, an interwoven network of 'local railways' (*chemins de fer vicinaux*), which in 1939 totalled 5,254 km. (3,265 miles), comprising by far the most extensive system of its type in the world.* The entire rail network thus totals 10,388 km. (6,453 miles), or 1 km. of line for each 2·9 sq.km. of territory. An even greater density than this must exist in the central and northern parts of the country, for the region of the Ardenne is less well served by both main-line and local railways.

* The 'local railways' are shown on Fig. 116. The figures in the rest of this chapter relate to the main-line railways only.

The intensity of utilization of this dense network, in response to the density of population and to the high productivity of agriculture, mining, and manufacturing industry, is considerable, comparing very favourably with that of the neighbouring countries, as the following table (relating to the year 1938) shows:

	Belgium	Nether-lands	Germany	France	Great Britain
No. of passengers (millions)	210	81	2,042	540	1,244
No. of passenger-km. per km. of line (millions)	1·25	1·03	0·99	0·52	1·05
Freight (million tons)	81	—	547	132	351
Freight, ton-km. per km. of line (millions)	1·12	—	1·52	0·63	0·86

Source: *Statistique Internationale des Chemins de Fer*, 1938 (Paris, 1939).

Passenger traffic, as measured by the relation between the length of line operated and the number of passenger-kilometres travelled, is at a higher level than in any country of Europe, whilst the intensity of freight traffic on a similar basis of calculation is exceeded only by that of the German railways. It is estimated that in 1938 the Belgian railways carried 64% of all the freight traffic of the country, the remaining 36% being carried by inland waterway (31%) and by road (5%).

The greater part of the main-line railway system of Belgium is operated by the state-controlled *Société Nationale des Chemins de Fer Belges* (S.N.C.F.B.), the board of directors of which is appointed by the Chamber of Representatives. In addition to the state lines, however, there were in 1939 certain sections of main line leased to and operated by three private companies, the only survivors of a considerable number which were established during the middle of the last century. The chief of these was the *Nord-Belge*, a system comprising 170 km. of route, operated on lease by the French *Compagnie des Chemins de Fer du Nord* (incorporated after 1937 in the French National Railways, S.N.C.F.), and serving a section of the coalfield industrial area. The passenger and freight traffic on this line was considerable, and it was in fact one of the most intensively utilized stretches of railway in the whole of Europe. The other two independent lines were the Chimay and the Malines-Terneuzen; the latter had been virtually incorporated into the S.N.C.F.B. in 1930.

The 'light railways' are controlled by the *Société Nationale des Chemins de Fer vicinaux*.

Historical Background

The establishment of the independent kingdom of Belgium in 1831 came at a time when, with the success of the Stockton and Darlington and of the Liverpool and Manchester lines being more or less assured, the minds of many people, both in Britain and on the Continent, were beginning to turn to the railway and the locomotive as means of transport to supplement or replace canals and roads. At this period the chief means of communication in Belgium, at any rate for freight traffic, were the rivers and canals, but the new frontier with the Netherlands cut off the lower Meuse and thus threw more emphasis on the development of Antwerpen and Oostende. If independence, economic as well as political, was to be secured, if Belgium was to hold its own against the Netherlands, if Antwerpen was to be able to compete with Rotterdam, it was urgent that the great traffic route from the Rhine and the German frontier through Liége and Bruxelles to the Scheldt and the North Sea should be under Belgian control. A railway must be built, but if built by private capital, that capital would most certainly be Dutch. Accordingly, in 1834, the Belgian parliament resolved that the railway should be built and worked by the government.

1834–1843. *The Earliest Phase of State Construction*

The law of 1834 set forth a plan for a railway system centring on Mechelen, from which lines were to radiate northwards to Antwerpen, westwards to Oostende, southwards to Bruxelles, Mons and the French frontier, and eastwards to Liége and the Prussian frontier. The first completed section was that from Bruxelles to Mechelen, opened in May 1835; this was the first public railway on the Continent to use steam locomotives. George Stephenson acted as adviser on engineering matters, and the firm of Robert Stephenson and Co. built the first locomotives. Other sections of line followed rapidly, and in nine years the whole plan, including branches to Namur and to Tournai, was carried out; the Franco-Belgian coalfield was linked to Bruxelles and the ports, and Antwerpen had rail connexion with Cologne (Fig. 110).

1844–1870. *The Period of Private Enterprise*

The early railways, simply by reason of their novelty, attracted more passenger than goods traffic, but the latter began to be created by the low rates which were necessary in order to compete with the waterways.

These low rates, however, yielded a poor financial return on the heavy capital expenditure, and in consequence the government was obliged to depart from its policy of state ownership and throw railway building and operation open to private enterprise. The first concession was granted in 1844, for a line from Gent to the left bank of the

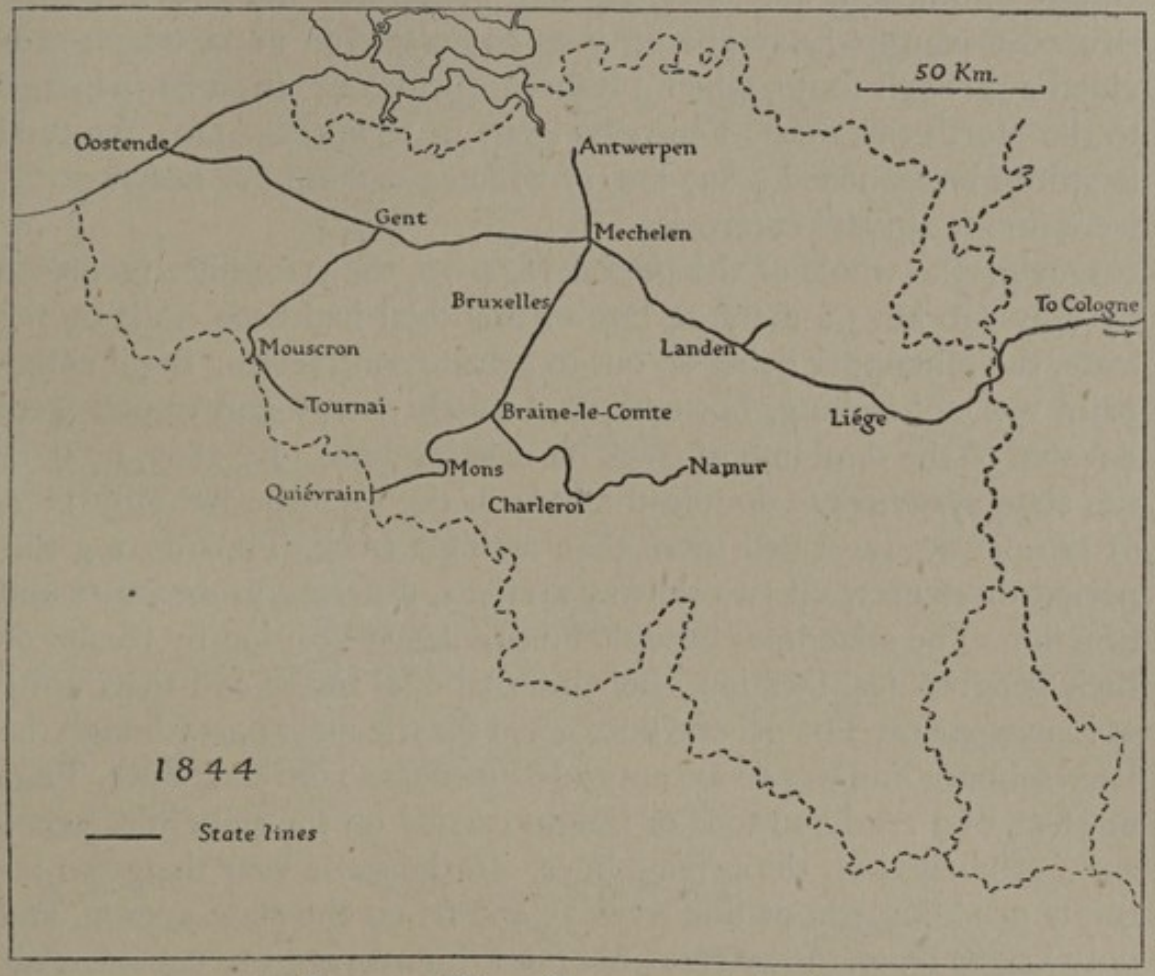


Fig. 110. The railway network in 1844

This and subsequent historical maps (Figs. 111, 112 and 114) are based on L. Avakian, 'Le rythme de développement des voies ferrées en Belgique de 1835 à 1935", *Bulletin de l'Institut de Recherches économiques*, vol. VII (Louvain, 1935–6).

Escaut opposite Antwerpen, the 'Pays de Waes' line, opened in 1847 with the curious gauge of 1,151 mm.

In 1845–6 permission was sought for the construction of lines from Namur to Liége, from Charleroi to the French frontier, from Antwerpen to the Dutch frontier, and for lines in the provinces of West-Vlaanderen and Luxembourg. Some 770 km. were conceded to British builders, the most important section being the Namur-Liége line which subsequently became part of the Nord-Belge system. On the whole, however, British enterprise was not very successful, and most of the lines, in an unfinished condition, were bought up by

Belgian capitalists in 1852. In general the new lines were both constructed and operated by the private companies, though in a few cases the state undertook the operation. By 1860 (Fig. 111), a network of fair density had been developed, especially in the central part of the country and in the coalfield region. The north-east was still almost untouched, and only one line penetrated the Ardenne—the Bruxelles-Namur-Luxembourg line, completed in 1859, which provided a through route, albeit a rather difficult one, from Switzerland to the North Sea coast. Ten years later, in 1870 (Fig. 112), the total length of line reached 2,897 km. of which 2,028 km., or nearly 70%, were due to private enterprise.

During the whole of the period 1844–70, the state lines increased by only 330 km.; a mere 24 km. of this total had been built by the state, the remainder being let out to private contractors. State enterprise was not lacking, however, and much energy and capital were devoted to the doubling of track on existing lines. By 1862, 97% of the state system was double-tracked; in the same period only 15% of the private lines had more than a single track. Thus during this period there grew up two railway systems, differing in structure and function. The state lines occupied a privileged position by reason of their geographical location, their international traffic and their unity of management. The private lines acted for the most part (though the Luxembourg line was an exception) as feeders to the state lines. Thus in 1858, of 3·2 million tons of freight carried on the state lines, some 20% originated on the private lines. In the same year the gross receipts per kilometre of line were 35,470 fr. on the state system, and only 14,760 fr. on the private lines (and this average was considerably increased by the very high figure of 36,450 fr. for the Nord-Belge line which served a prosperous industrial district).

This period of private enterprise ended in 1870. It ended for two reasons: in the first place, the government became alarmed at the rapid increase in the amount of foreign capital—largely French and German—invested in Belgian railways, and secondly, the private enterprise, not firmly controlled by the state, had produced an uncoordinated network of lines, some directly competitive and others quite unremunerative, which was in need of unification. The unification was in fact beginning to take place by the amalgamation of groups of private lines—such as the *Société du Grand Central Belge* formed in the early sixties—and the prospect of competition between large private groups and state lines provided an additional incentive to greater nationalization.



Fig. 111. The railway network in 1860

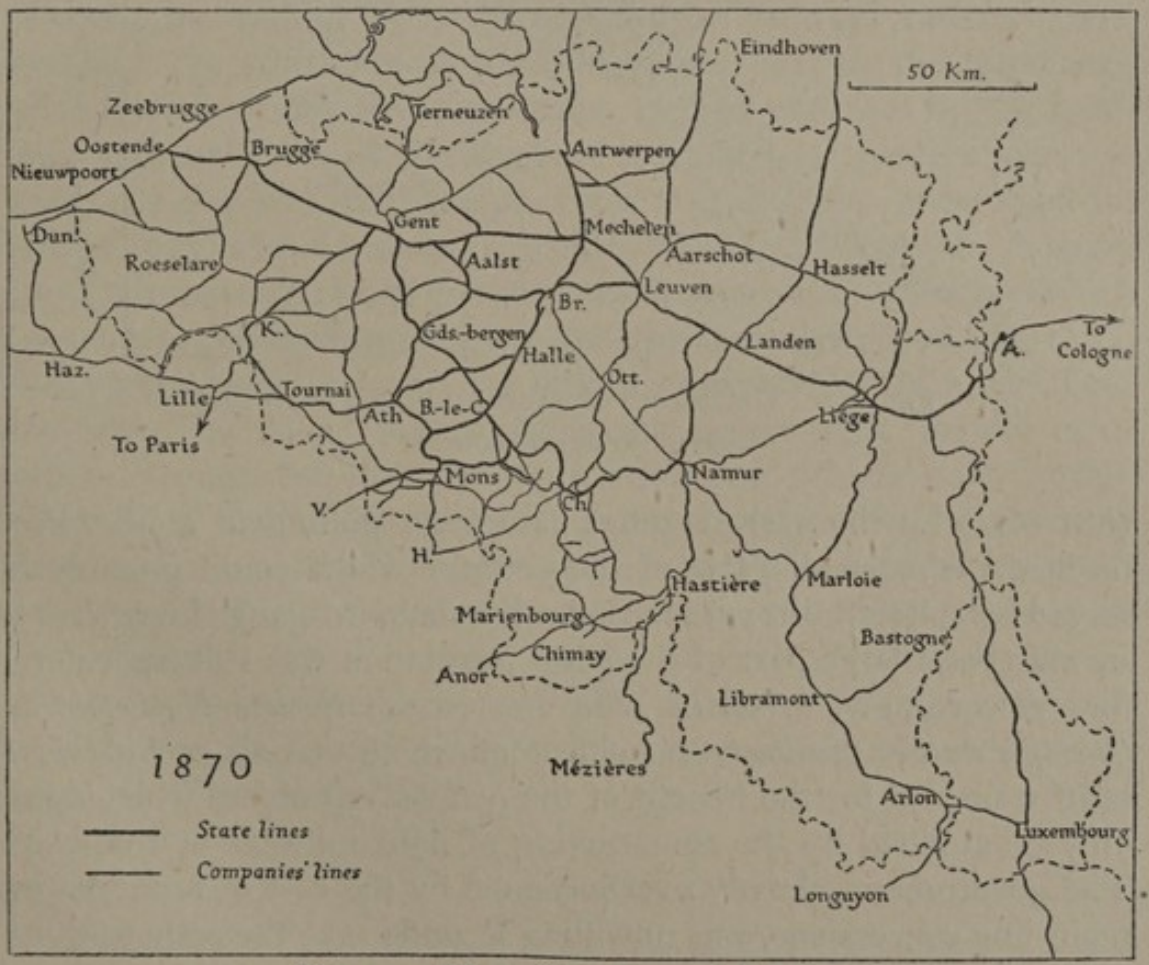


Fig. 112. The railway network in 1870

1871–1914. *State Acquisition and the Growth of the Local Network*

In 1871, therefore, the state began a policy of repurchasing the concessions, and during the next decade nearly 1,000 km. of private lines were thus acquired (Fig. 113). New construction also proceeded apace—a thousand km. of new lines were opened between 1871 and

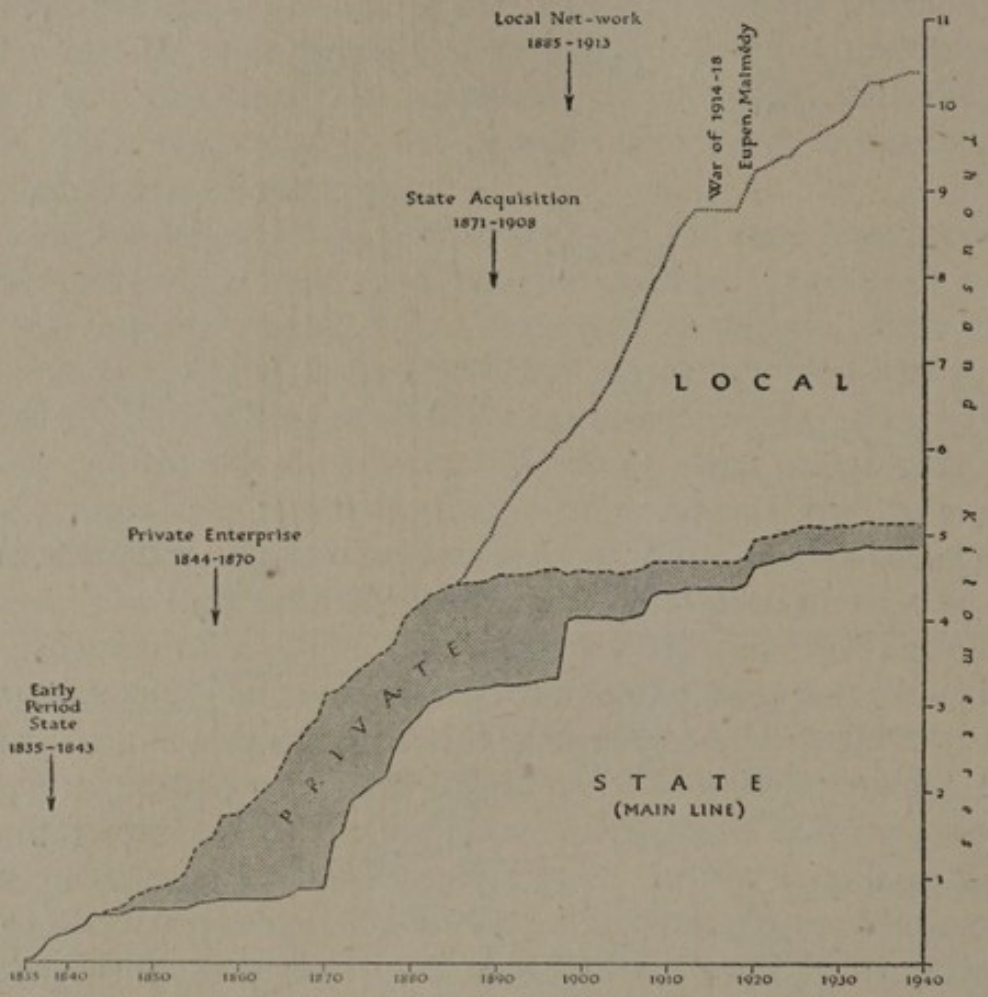


Fig. 113. The growth of railway mileage, 1835–1940
Based on official sources.

1881—but by the early eighties saturation point had almost been reached. Almost all parts of the country which could possibly be served by solidly built yet remunerative standard-gauge lines were so served; yet a large part of the rural population was still not catered for. Accordingly, a law of 1884 created the *Société Nationale des Chemins de Fer vicinaux*, the object of which was to provide low-tariff transport for the benefit of the people—an object which could only be attained by the construction of light railways or tramways. The government, already overburdened by the cost of repurchasing main-line concessions, was unwilling to undertake the responsibility,

and so the communes and provinces combined with the state to provide the necessary finance. Thus a large number of separate organizations came into being—by 1908 there were thirty-seven separate companies operating 138 different lines, totalling 2,845 km. in length. The S.N.C.F.V. was the executive and advisory body; it controlled the issue of contracts, gave expert advice, and generally supervised the working of each line in addition to providing the rolling stock.

Between 1885 and 1914 only 266 km. of line were added to the main-line network, and at the end of this period only six concessions, representing under 10% of the total mileage, remained in private hands; some 2,500 km. had by this time been repurchased by the state. The same period witnessed the construction of no less than 4,111 km. of local lines. The utilization of the main-line network, however, became more intensive. Freight traffic expanded from 43 million tons in 1890 to 80 million tons in 1910, and this necessitated the doubling of track on some of the former private lines, and the provision of a much greater length of siding accommodation. Over 1,700 km. of sidings were laid down between 1900 and 1913.

1914–1925. *War and Reconstruction*

During the war of 1914–18, the Belgian railways suffered considerably. The main-line network was taken over by the Germans, and the needs of the civil population were in part met by the local lines. Although in 1918 the length of local lines in operation was reduced to 1,865 km., the receipts from freight traffic were equal to those of 1913, whilst passenger receipts had almost doubled. A large part of the main-line track, perhaps nearly one-third, was demolished or removed, 350 bridges and 359 stations were destroyed, the chief sidings were blown up, and the rolling stock was left in a very bad condition. The Allied armies did much repair work, mainly of a temporary character; even so, some tracks and bridges built by the British Royal Engineers were still in use in 1930. Post-war reconstruction was hampered by shortage of materials and the high cost of labour, and it was not until 1931 that all the evil effects of the war were overcome. The acquisition of the Eupen and Malmédy territories in 1919–20 added only 174 km. of line to the state network, including the Herbesthal-Kalterherberg line which crosses and recrosses the German frontier.

1926–1939. *The S.N.C.F.B.: Boom and Depression*

The difficulties of reconstruction and the need for more commercial enterprise than was possible under the direct and tedious political control of the state led to an arrangement in 1926 whereby

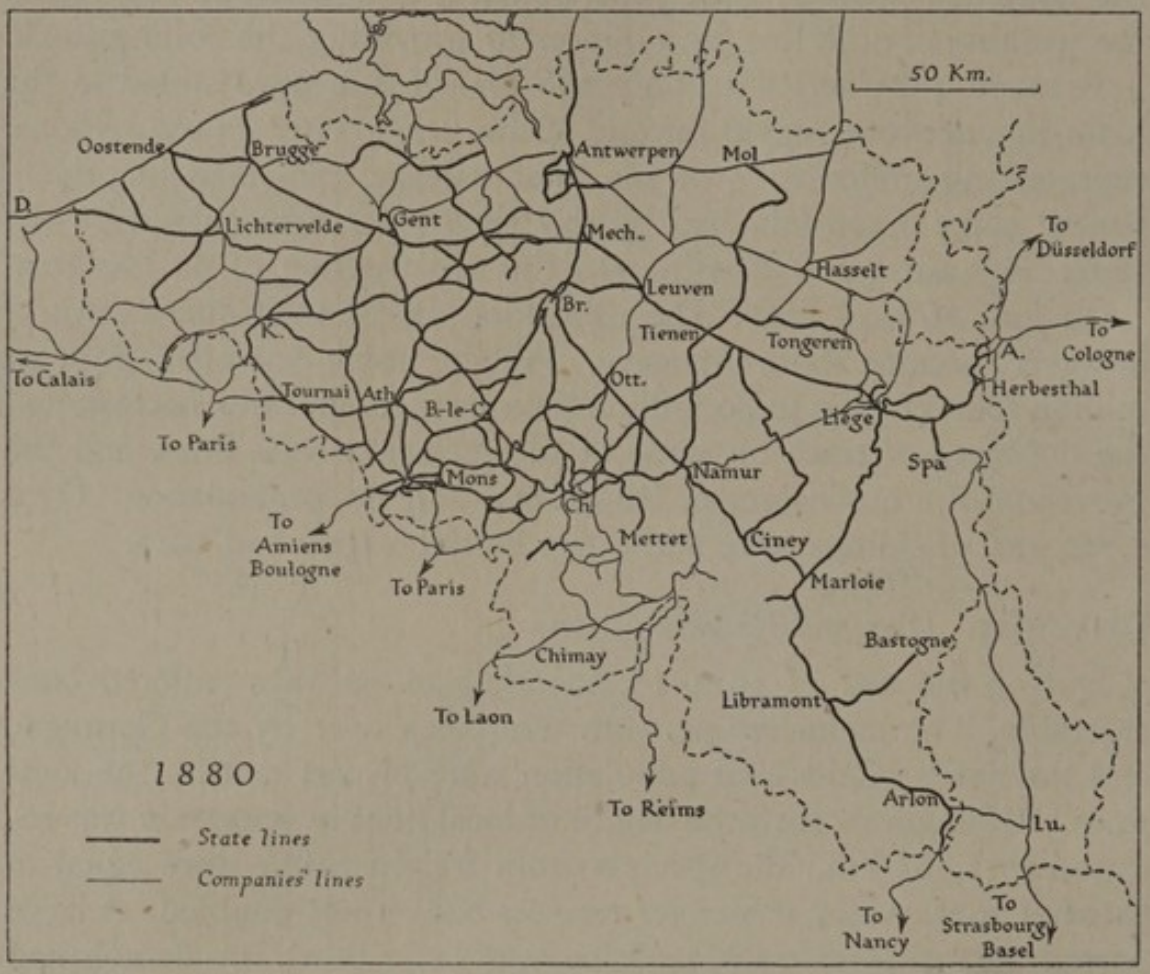


Fig. 114. The railway network in 1880

the state transferred the right to work the railways for a period of 75 years to the *Société Nationale des Chemins de Fer Belges*. This company issued an original share capital of 11 milliard francs to the state, together with a number of guaranteed preference shares to the public. The Board of Directors was appointed by the government, with the Minister of Transport as *ex-officio* chairman.

The economic prosperity of the late twenties was reflected in a considerable increase in the facilities provided by the railways and in their traffic. The tonnage of freight carried reached the record total of 113 million tons in 1928. The depression of the early thirties, however, produced annual deficits and introduced new problems. Freight traffic and international passenger traffic declined, and local traffic

met with severe competition from waterways and roads. On the main-line network, railcars and Diesel-engined trains began to supersede ordinary steam trains for local traffic and for some fast provincial and international services, whilst on the local network electrification and the substitution of railcars for steam trains developed rapidly.

Technical Features of the Main-line Network

Permanent Way

Almost 60% of the main-line network in Belgium is double track. On the main routes double track is almost always present, but the few places where this is not so offer potential traffic bottle-necks and are in consequence worth recording. They are as follows:

(i) Dunkirk-Adinkerke and Lichtervelde-Tielt on the Dunkirk-Bruxelles route;

(ii) The cross-connexions between the Liége-Luxembourg line and the German Cologne-Trier line;

(iii) An 8 km. section between Neerpelt and Hamont on the Antwerpen-Roermond-Weyberg (Germany) line;

(iv) An 8 km. section between Gouvy and Troisvierges on the Liége-Luxembourg line.

The last three lines, double-track before 1914, were destroyed during the war, and were reconstructed after 1918 with only single tracks.

Whereas the length of route amounted in 1938 to 5,134 km., the length of track was 14,127 km., including 6,096 km. of sidings and station lines. The last figure represents a very generous lay-out at stations, junctions and marshalling yards.

Gradients

For a country which is so largely flat, Belgium has a surprisingly small proportion of its railway mileage on the level. Only 20% is horizontally laid; even Switzerland has 26% of its track on the level. This is in part, of course, due to the existence of considerable relief in the southern and south-eastern parts of the country, but it must also be ascribed to the early date and relatively inexpensive construction of the greater part of the network, notably the Luxembourg, Lille and Charleroi lines. Only 17%, however, is on gradients steeper than 10‰ (1 in 100), and most of this is in the Ardenne region. The Luxembourg line (Fig. 121) is almost a switchback, with many gradients

of 16‰ (1 in 62). The steepest bank is at Ans (Fig. 119), where the Bruxelles-Liége line descends to the Meuse valley on a gradient of 32‰ (1 in 32). This section, 6 km. in length, opened in 1842, was originally worked as two cable-operated inclines, with an engine house half-way up, at Haut-Pré. In 1866, locomotive haulage was adopted for passenger trains, and in 1871 for goods traffic as well. There is a speed reduction of 50 km./hr. (30 m.p.h.) on trains descending this bank, and ascending trains are assisted in the rear by one or two specially constructed 0-10-0 tank locomotives.

Axle Loads

Belgian permanent way, partly owing to post-1918 reconstruction and partly in order to accommodate the heavy freight traffic, is of uniformly high quality compared with some other parts of Europe. Rails weighing 50 kg./m. (100 lb./yd.) are standard, laid on creosoted wooden sleepers, but upwards of 1,000 km. of track are laid with steel sleepers. This substantial permanent way, combined with adequate bridge strengths, permits an axle-load of 18 metric tons over the whole network. On certain lines in the coalfield area (Liége-Namur-Maubeuge, Mons-Feignies and Namur-Chimay-Hirson) an axle-load of 20 metric tons is allowed. These figures compare with 22½ tons for British railways and 16–20 metric tons for the French main lines.

Speeds

Speeds up to 120 km./hr. (76 m.p.h.) are permitted on open track on a number of main lines, including those radiating from Bruxelles to Oostende, Mons, Tournai, Antwerpen, and Liége, but the density of the rail network, with frequent junctions and large stations, makes such speeds impossible over long distances. Again, the early date of construction is partly responsible for the sharp curves, frequently changing gradients and badly situated stations which hinder sustained fast running. The existence of so many swing bridges over waterways is also a contributory factor. The maximum permissible speed for freight trains is 70 km./hr. (44 m.p.h.).

Rolling Stock

The Belgian railways were abundantly supplied with rolling stock, as is shown in the following tables, which relate to 1938–9.

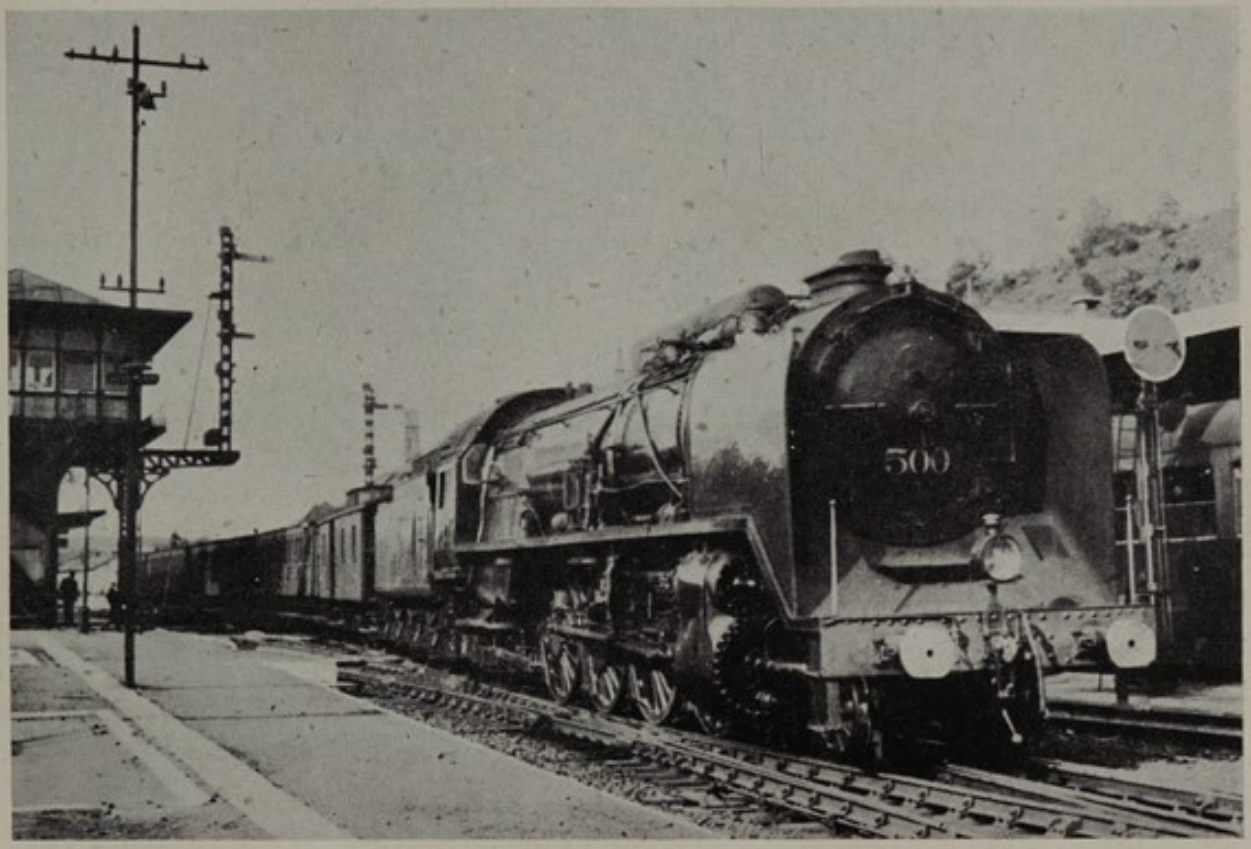


Plate 69. Motive power on the Luxembourg line
The photograph shows a local passenger train, at Jemelle, hauled by one of the 2–8–2's specially built for traffic over this heavily-graded line.



Plate 70. The 'Edelweiss Pullman' at Arlon
The photograph shows the Amsterdam-Zürich express hauled by a 'super-Pacific' (4–6–2) locomotive.



Plate 71. Local railways at Leerbeek

Leerbeek is about 17 km. (10½ miles) south-west of Bruxelles and is a junction of lines leading to Bruxelles, Halle, Ninove and Edingen (Enghien). The photograph shows a diminutive steam locomotive and an electric tramcar with trailer.



Plate 72. Local railways, near Oostende (Ostend)

This electrified line, very popular with English and other holiday-makers during the season, runs almost the whole length of the Belgian coast, following the main roads and usually within sight of the sea. The equipment is typical of the electrified local lines—a motor coach, deriving current from overhead wires, and two trailers.

Rolling Stock on Belgian Railways

Company	Locomotives			Vehicles	
	Tender	Tank	Total	Passenger coaches	Goods wagons
S.N.C.F.B.	2,388	1,008	3,396	6,929	108,750
Nord-Belge	87	69	156	244	5,998
Chimay	—*	—*	14	14	196
Malines-Terneuzen	—*	—*	26	68	1,429

* Details not available.

Comparative Table of Rolling Stock per km. of Line

	Locomotives	Passenger coaches	Goods wagons
S.N.C.F.B.	0·70	1·43	20·4
Nord-Belge	0·91	1·43	32·5
France	0·43	0·74	11·3
Germany	0·39	1·25	10·4
Netherlands	0·32	0·74	8·2
Great Britain	0·67	1·39	41·9

Source: *Statistique Internationale des Chemins de Fer*, 1938 (Paris, 1939).

The locomotive stock includes a very varied collection of types, partly as a result of the war of 1914–18; many hundreds of engines were handed over as reparations by Germany. Belgium possesses a flourishing locomotive-building industry (see pp. 317-18), which is more than adequate for the needs of the country, and it is not surprising therefore that the quality and standard of maintenance of the rolling stock is high. Outstanding examples of locomotive building in recent years are the heavy 2-8-2 express engines built in 1930 for the steeply graded Luxembourg line, and the 4-6-2's, of almost British simplicity of outward appearance, built in 1935 (Plates 69 and 70).

Locomotive Running Sheds and Repair Shops

The location of all but the smallest locomotive sheds is indicated on Fig. 115. The largest depots, naturally, are situated at focal points of the network, particularly Bruxelles (Fig. 118), Liége, Antwerpen, Namur, Charleroi, Gent, Kortrijk and Arlon. The intensity of traffic, however, and the abundance of the locomotive stock, result in there being few major junctions without an engine house of some kind. In contrast with the usual French practice of employing semicircular

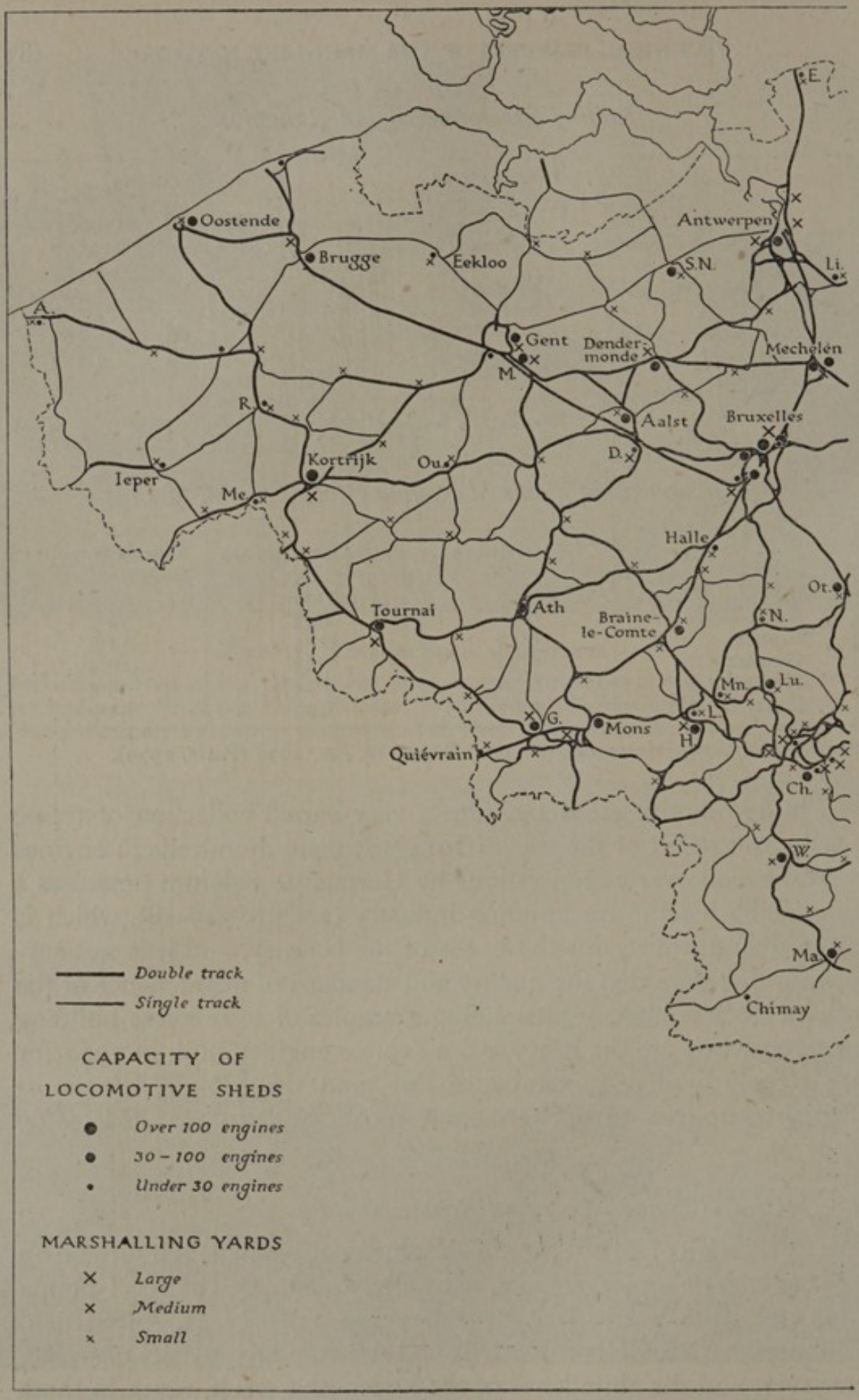
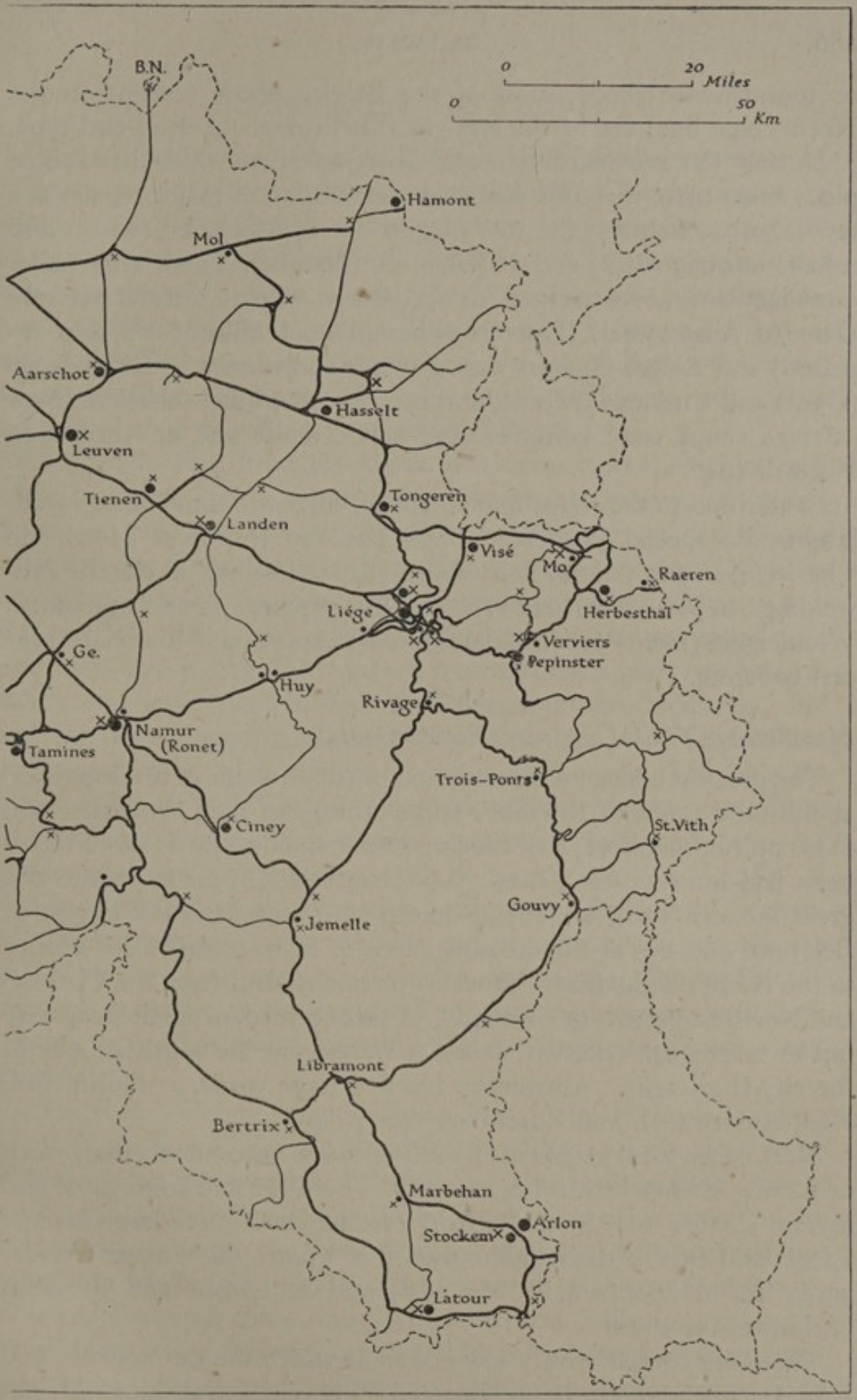


Fig. 115. The main-line network showing the location of engine-sheds and marshalling yards

Based on official sources.



Abbreviations :

A. Adinkerke; BN. Baarle-Nassau; D. Denderleeuw; E. Esschen; G. St Ghislain; Ge. Gembloux; H. Haine-St-Pierre; L. La Louvière; Li. Lier; Lu. Luttre; M. Merelbeke; Ma. Marienbourg; Me. Meenen; Mn. Manage; Mo. Montzen; N. Nivelles; O. Ottignies; Ou. Oudenaarde; R. Roeselare; SN. Sint-Niklaas; W. Walcourt.

or round-house sheds, most of the Belgian sheds (except on the Nord-Belge line) are of the straight run-through or dead-end type.

During the reconstruction and reorganization which have taken place since 1919, there has been a concentration of major repairs at a few large workshops; the two biggest are at Mechelen (which also repairs electric stock) and at Salzinnes (Namur). There are smaller establishments at Antwerpen (in 1940 this was being transferred from Dam to Austruweel), Leuven (where Diesel railcars are also repaired) and Liége. Special wagon repair shops exist at Gentbrugge (Gent) and Cuesmes (Mons), and carriage shops at Mechelen. New carriage shops were being erected at Oostende and at Antwerpen Nord in 1940.

In addition to the shops named above, there are some other installations for special purposes. Thus Bascoup (between Mons and Charleroi) makes points, Schaerbeek (Bruxelles) has an electric rail-welding depot, Etterbeek (Bruxelles) repairs signal apparatus, Wondelgem (Gent) produces creosoted sleepers, and Roeselare pre-cast concrete.

Marshalling Yards (Fig. 115; Plates 73, 74)

The greatest concentrations of freight traffic occur at two localities, at the focal point of Bruxelles and at the great port of Antwerpen. It is natural, therefore, that the largest marshalling yards should have been laid out at these places. At Schaerbeek (Bruxelles) there is a great modern yard, employing hump shunting; it is the largest in Belgium, and lies at the crossing place of main routes from France to the Netherlands, from France to Germany, and from the Channel and North Sea coasts to Germany. A second yard, of smaller capacity but of recent construction, exists at Forest, on the southern side of the city (Fig. 118). Antwerpen has five large yards, at Nord, Sud, Kiel, Austruweel, and Zurenborg (see p. 454).

Most other focal points of the rail network have marshalling yards or sorting sidings of varying capacity. There are five large yards and several smaller ones in the vicinity of Charleroi, three large ones at Liége, and two in the neighbourhood of Gent. The largest frontier yards are at Montzen, in the east, and at Latour and Stockem (Arlon) in the south.

There are comparatively few points at which the rail network and inland waterways are interconnected. The chief transhipment stations are at Bruxelles (see p. 523), Hasselt (p. 535), Visé (p. 526), Veurne (p. 515), and Roeselare (p. 519).

Electrification and Railcars

The abundant supplies of coal in Belgium have largely prevented the rise of a policy of electrification such as that which has characterized certain parts of the French railway system, for example, within the last twenty years. At the outbreak of war in 1939, the only electrified main line was the 44 km. double-track stretch between Bruxelles (Nord) and Antwerpen (Central). There were, it is true, 1,617 km. of electrified local lines, but most of these are more akin to the urban and inter-urban tramways of some parts of Britain (e.g. south Lancashire) than to ordinary railways (Plates 71, 72).

S.N.C.F.B. The Bruxelles-Antwerpen line was completed in 1935. Before that time, some twenty steam trains, carrying 9,500–12,000 passengers, ran daily in each direction, but this service had become inadequate for the traffic. The electrified line can accommodate fifty-seven trains in each direction, with a carrying capacity of 19,950 passengers. Two of the existing four tracks between the two cities were electrified, and a large amount of reconstruction was needed, including two large steel bridges at Schaerbeek and Mechelen, and involving the elimination of twenty level crossings. Overhead collection is employed, with current at 1,500 V. d.c. supplied by sub-stations at Haren and Mortsel. These respectively derive power from the *Interbrabant* generating station near Schaerbeek and from the Schelle plant of the *Interescaut* south of Antwerpen (see p. 328).

Projects for future electrification include the Bruxelles-Charleroi line, the Antwerpen-Dordrecht line, and the Bruxelles-Luxembourg line; whilst another popular plan, known as the 'Petite Etoile', visualizes Bruxelles as the centre of an electrified system with lines radiating to Charleroi, Leuven, Aalst, Braine-le-Comte, and Ottignies.

S.N.C.F.V. Electric traction was first installed on a 13 km. section of the S.N.C.F.V. in Bruxelles in 1894, and by 1913 some 348 km. of line was electrified. After the war conversion to electric traction proceeded slowly, but the economic incentive provided by the great depression of the thirties caused the length of electrified line to rise from 729 km. in 1930 to 1,463 km. in 1939. Current at 600 V. d.c. is employed on these lines, with overhead collection; power is derived from many different sources. The rolling stock in 1939 comprised 1,029 tramcars and 817 trailers. Although the electrified lines represent only about one-quarter of the total operated length, they provided in 1938 nearly 70% of the gross receipts of the S.N.C.F.V.

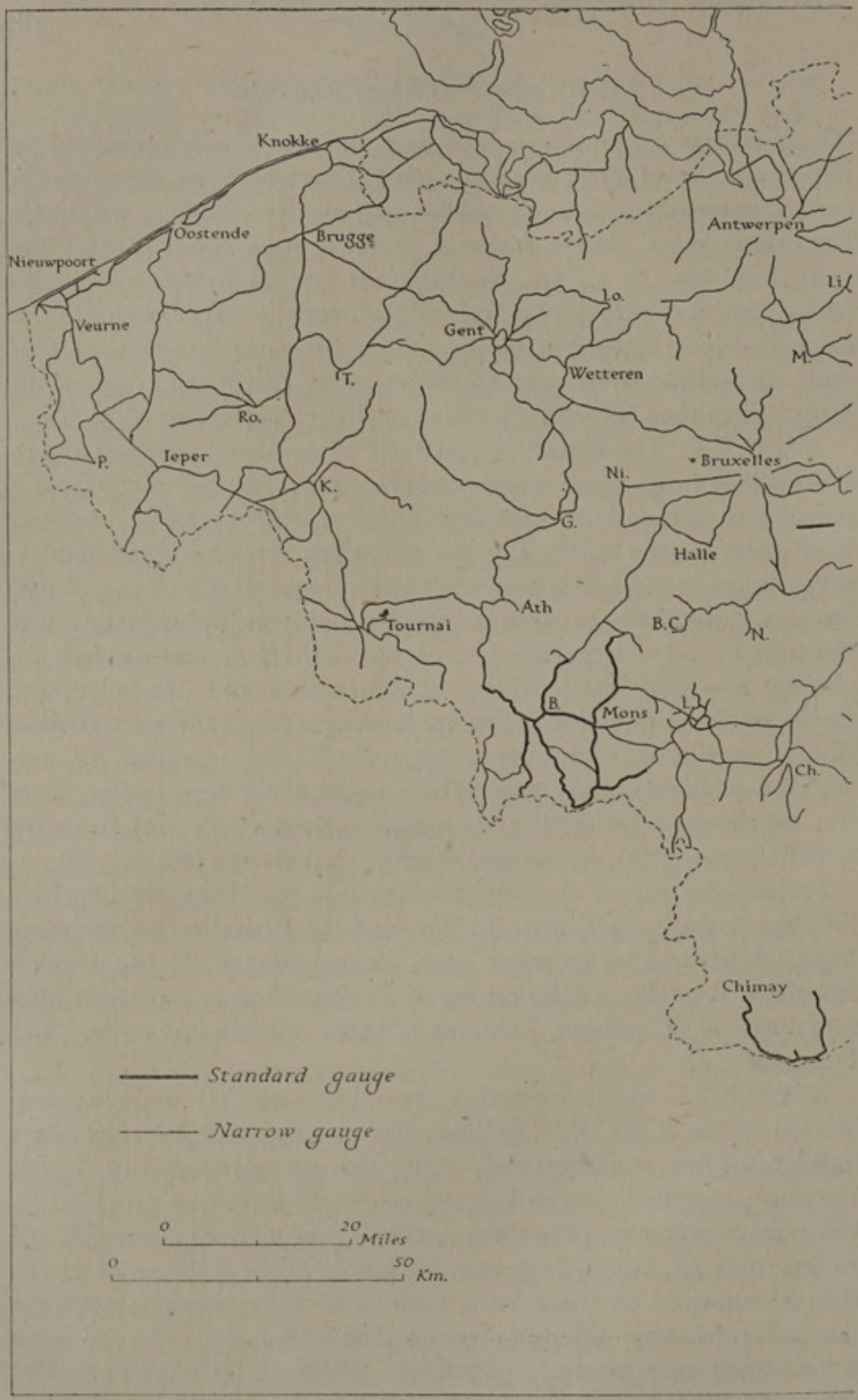
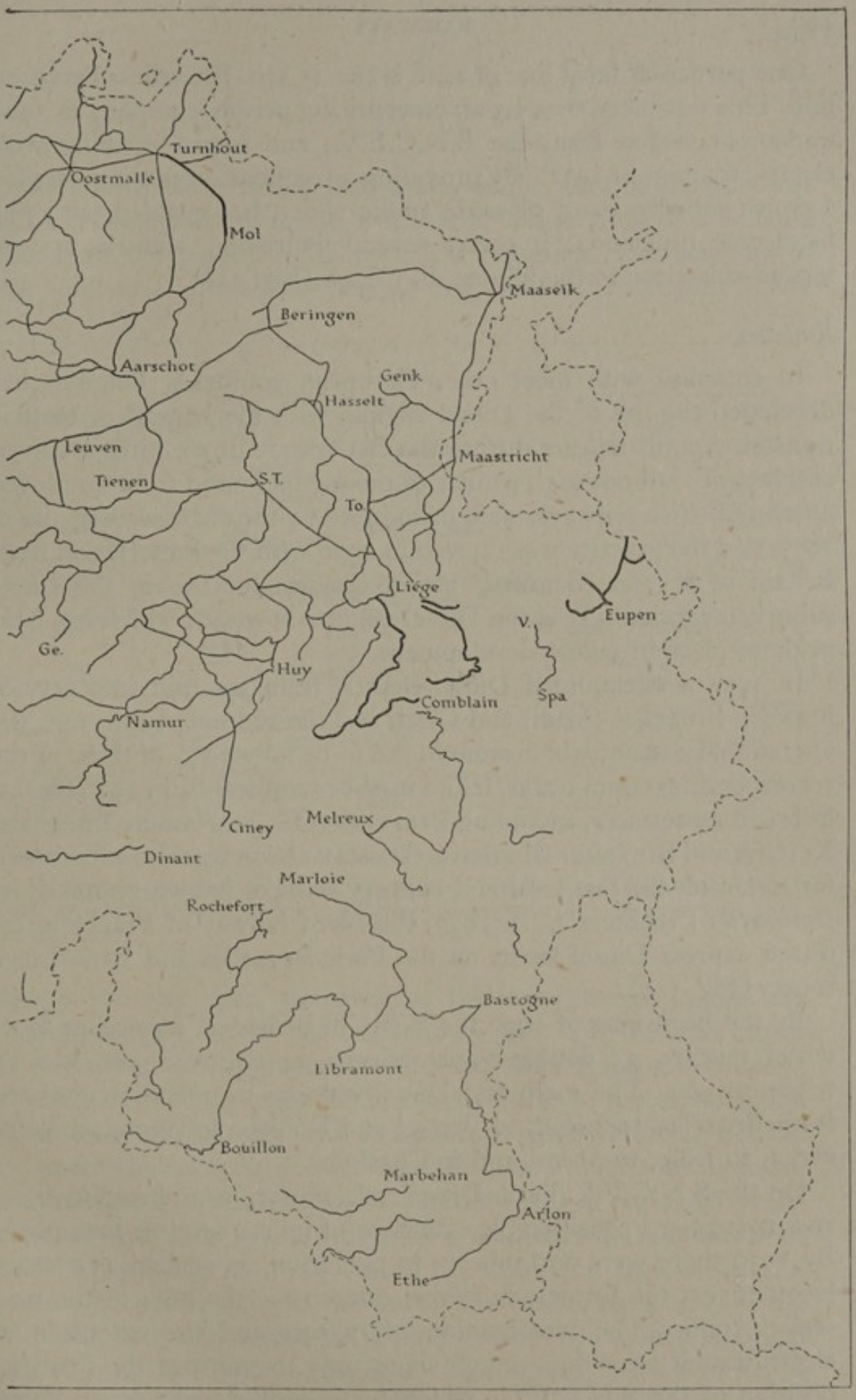


Fig. 116. The lines of the S.N.C.F.V.
Based on official sources.



Abbreviations:

B. Baudour; BC. Braine-le-Comte; Ch. Charleroi; G. Geeraardsbergen; K. Kortrijk; L. La Louvière; Li. Lier; Lo. Lokeren; M. Mechelen; N Nivelles; Ni. Ninove; P. Poperinge; Ro. Roeselare; T. Tielt; To. Tongeren; ST. Sint-Truiden; V. Verviers.

One particular local line of note is the 15 km. Bruxelles-Tervuren line. This was taken over by an enterprising private company in 1929 under concession from the S.N.C.F.V., and began working with electric traction in 1931. By providing a frequent service it caters for a dense suburban and pleasure traffic which has enabled it to pay handsome dividends; it serves several flourishing suburbs and its terminus is close to the Musée du Congo (Fig. 118).

Railcars

In common with most other European countries, Belgium has developed the use of the Diesel engine, with mechanical or electric transmission, in railcars during the last decade or so. Steam-driven coaches, or 'rail motors', similar to those which used to be employed on some British railways, were introduced by the engineer Belpaire in 1877, and the practice was revived in 1930 with the importation from Britain of several 'Sentinel' steam coaches for use in the Liége suburban services. It is the Diesel engine, however, which has held pride of place in railcar development.

In 1934 a streamlined Diesel-electric train was put into service between Bruxelles (Midi) and Gent, and the success of this unit, the operational costs of which were found to be only 60% of those of the corresponding steam trains, led to further acquisitions in 1936 for fast inter-urban services, including Bruxelles (Q.L.)—Namur, Bruxelles-Kortrijk and Bruxelles-Charleroi. Diesel traction was also substituted for steam on the fast local and country services known popularly as *trottinettes* ('scooters'). In 1937, the Nord railway of France introduced express Diesel trains on the Paris-Bruxelles and Paris-Liége routes (Fig. 117).

By the beginning of 1939 the S.N.C.F.B. had in service 12 four-wheel railcars, 35 double-bogie railcars, 14 twin-car sets, and 13 triple-car sets. The main fast Diesel services in operation radiated from Bruxelles to Liége, to Brugge and Knokke, to Gent and Adinkerke, to Lille, to Mons, and to Charleroi.

On the S.N.C.F.V. lines, Diesel railcars were introduced in 1929, and in 1935–6 a considerable extension of railcar services took place. By 1939 there were 279 railcars in operation, as against 454 steam locomotives; the former, however, catered for the bulk of the passenger traffic. The introduction of railcars and the extension of electrification have done much since 1935 to improve the financial position of the S.N.C.F.V., which for a decade had been running almost continuously at a loss.

Traffic

Passenger

In the absence of statistical data which would permit a geographical analysis of the passenger traffic over the various sections of the main-line network, only summary figures can be presented, with some notes on the international traffic of the pre-1940 period. In 1938, the last

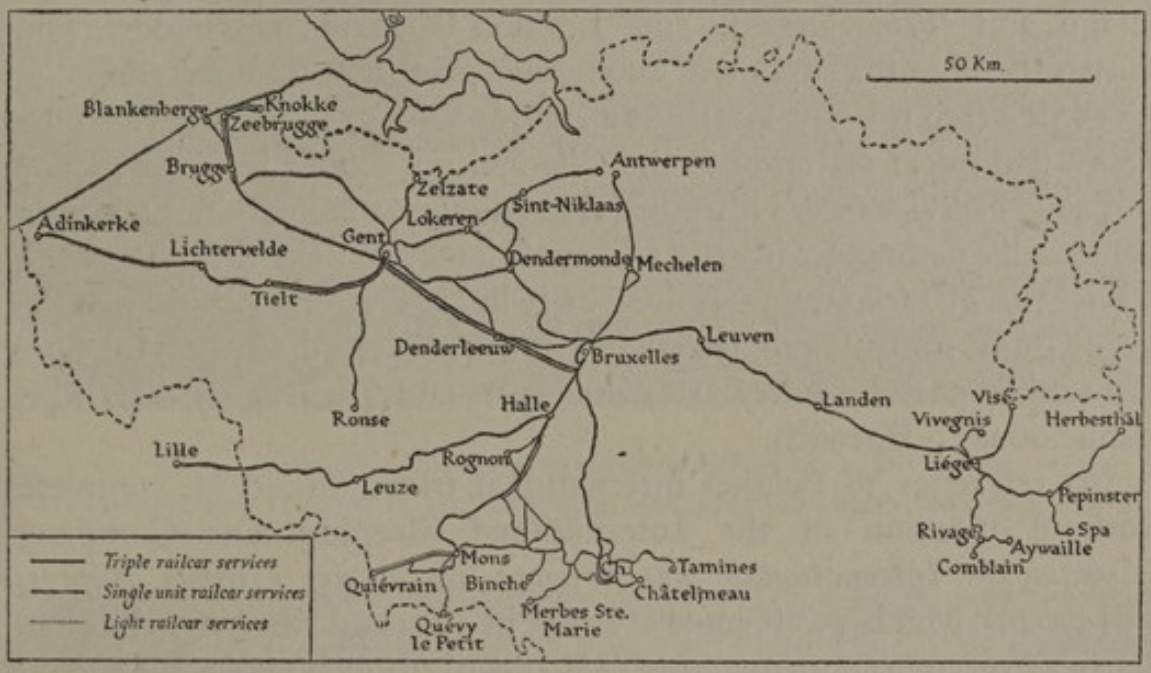


Fig. 117. Main line railcar service in 1939

Based on a map appended to 'Diesel Traction on the Belgian National Railways', *Railway Gazette* (*Diesel Railway Traction Supplement*). 1 September, 1939, p. 141 (London).

complete pre-war year, the Belgian railways carried nearly 210 million passengers, and it has been shown on p. 473 that this represents a traffic intensity greater than in any other European country. This considerable passenger traffic is largely due to the urbanization of so much of the country, and to a characteristic feature of Belgian life, namely, the rural farmer who also works in a neighbouring town. The movement of industrial workers in the coalfield region also contributes to the high figure—there is a considerable movement of workers to and fro, not only within the industrial region but also across the French frontier in the textile and coal-mining areas of the Lille-Mons belt, and across the French and Luxembourg frontiers on the edge of the Lorraine ironfield. Finally, Belgium's position as focus and terminus of international routes gave rise to considerable and remunerative transit traffic. It has, indeed, been well said that

the Belgian main lines are all international lines, adapted to local conditions owing to the density of the population.

The main international routes fall into two groups, those which pass through Bruxelles and those which do not. Bruxelles has routes radiating to Oostende (for Dover), Lille (for Calais), Mons (for Paris), Luxembourg (for Basle), Aachen (for Cologne), and Antwerpen (for Amsterdam). Routes avoiding the capital city are Paris-Cologne (via Jeumont and Liége), Amsterdam-Luxembourg and Basle (via Visé, Liége and Troisvierges), and London-Oostende-Düsseldorf (via Antwerpen and Hamont). The chief port for English traffic is Oostende (see pp. 397–403). As a result of the 1914–18 war, this port lost a good deal of traffic to the Channel ports, and in consequence improved services were introduced in an effort to regain it. Oostende can hardly compete with the Channel ports for British traffic to the Riviera, Switzerland and Italy, but it holds a strong position as regards traffic for Cologne, Berlin and central and south-eastern Europe. The other ports of entry are Antwerpen and Zeebrugge, each with connexions to Harwich.

No reference to Belgian international traffic would be complete without mention of the International Sleeping Car Company (*Compagnie Internationale des Wagons-lits et des Grands Express Européens*), which was formed at Liége in 1873 and since 1876 has had its headquarters at Bruxelles. This organization has played a great part in spreading comfortable travel to almost all parts of Europe. Its first service plied between Oostende and Cologne, and in 1894 the Oostende-Vienna express commenced to run, extended soon afterwards to Karlsbad (Karlovy Vary) and Constantinople (Istanbul). In 1895 the Oostende-Trieste express provided connexion with steamers for Alexandria; in 1896 the Nord Express commenced to run between Oostende, Berlin and Russia; and in 1901 the Suisse Express was introduced on the Oostende-Lucerne run. Saloon carriages—the forerunners of 'Pullmans'—were introduced in the early years of this century, and Pullman trains—*trains de luxe*—began to run in the late twenties. Those running over Belgian lines in 1939 included the Oostende-Basle, Oostende-Cologne and Oostende-Vienna expresses, and the named trains 'Etoile du Nord' (Amsterdam-Paris), 'Oiseau Bleu' (Antwerpen-Paris), 'Nord Express' (Paris-Berlin-Warsaw and Riga), and 'Edelweiss' (Amsterdam-Zürich). For the benefit of those who dislike the sea journeys from England to Oostende or Antwerpen, Calais-Bruxelles portions of most of these trains were run.

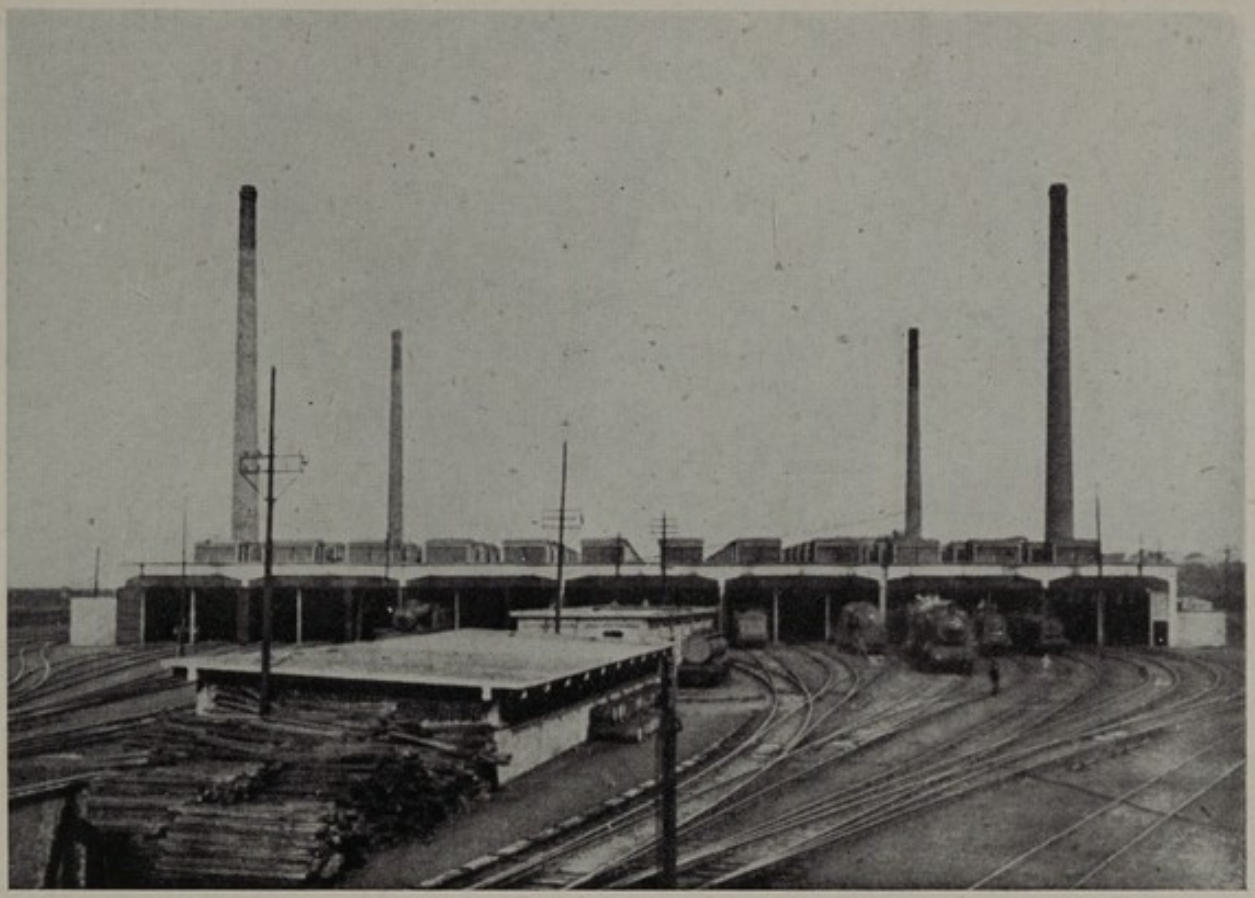


Plate 73. Locomotive sheds at Schaerbeek, Bruxelles
This important depot is the largest in Belgium and offers accommodation for some 250 locomotives.



Plate 74. Antwerpen: the *Gare de Sud*
The view shows the marshalling yard and goods sheds, with the river Escaut (Scheldt) and its quayside warehouses in the background.

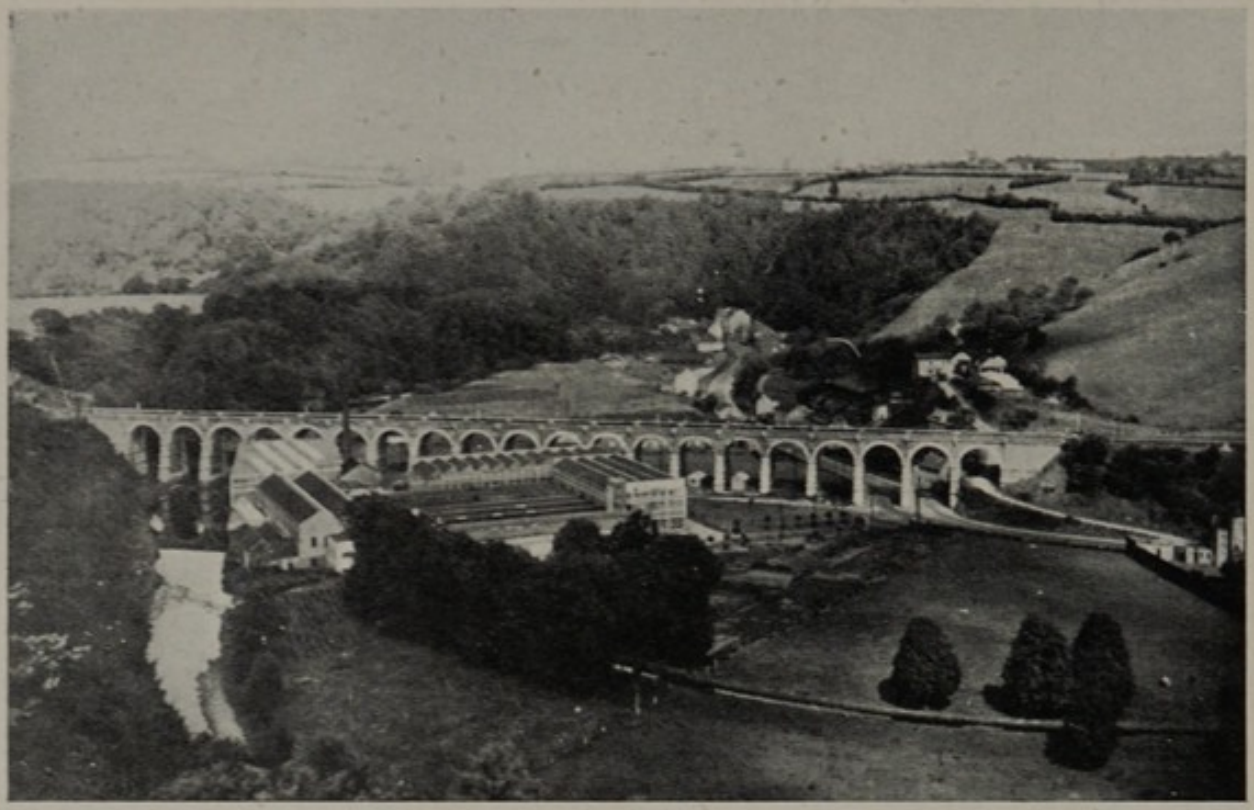


Plate 75. The Liége-Aachen line near Verviers

The river Vesdre is incised into the level surface of the plateau. The railway crosses and recrosses the winding valley on viaducts such as this one at Limbourg. In the foreground is a large textile mill.

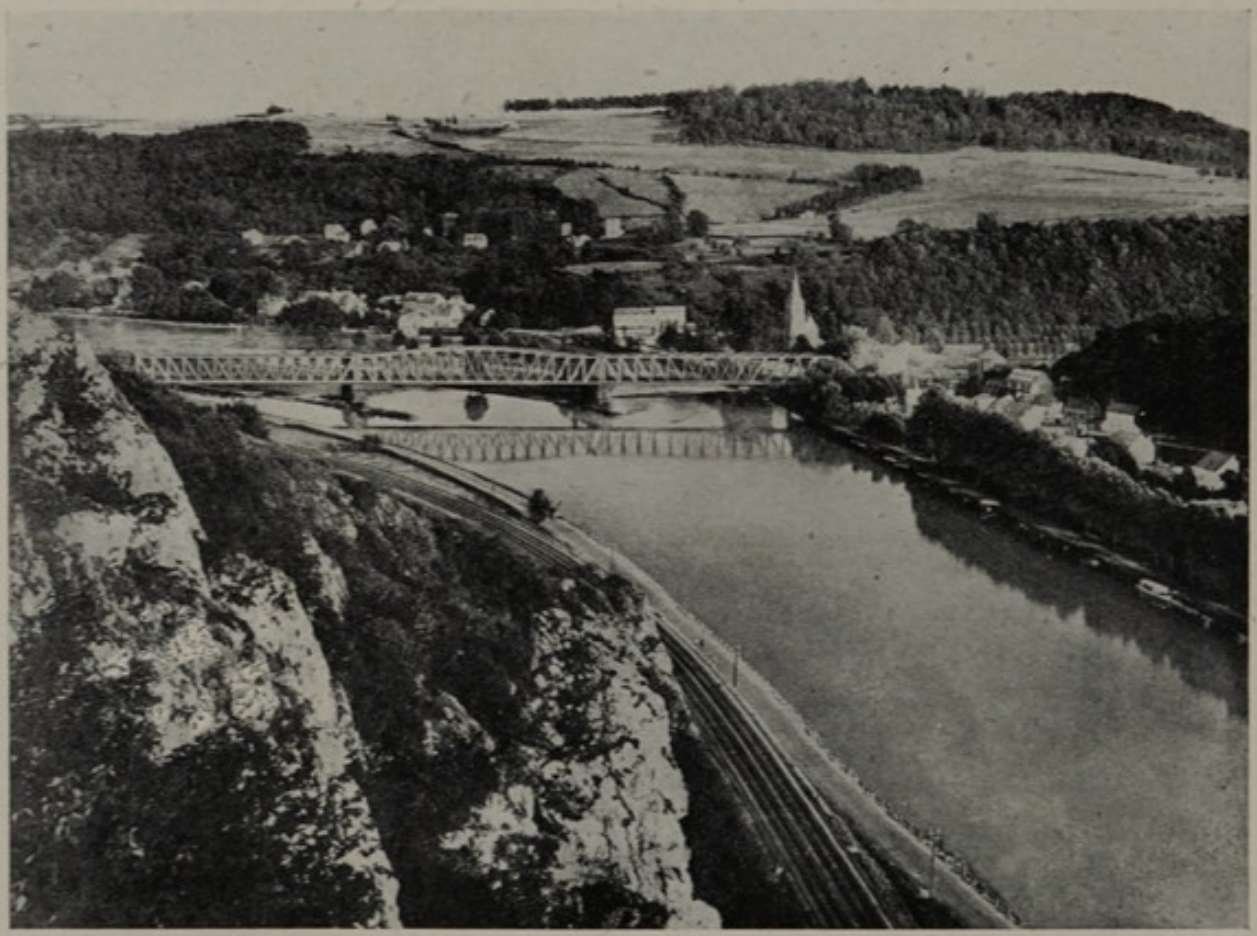


Plate 76. Railways in the Meuse valley at Anseremme

In the valley bottom, sandwiched between the river and the limestone cliff, is the Dinant-Givet line. The girder bridge carries the main Namur-Luxembourg line.

Freight

Detailed statistics of goods traffic are likewise lacking. The following table shows only the total traffic for a single recent year divided into a number of broad commodity groups.

Freight Traffic, 1937

Commodity group	Thousand tons	%	Million ton-km.	%
Agricultural and food products	4,543	6·2	360	5·8
Coal and coke	29,206	40·0	2,205	35·4
Ores	6,869	9·4	766	12·3
Metals	7,838	10·7	1,134	18·2
Building materials	6,669	9·1	530	8·5
Stone, sand, etc.	9,323	12·7	525	8·4
Textiles	778	1·1	72	1·1
Chemicals	2,425	3·3	209	3·4
Oils	990	1·4	86	1·4
Others	4,438	6·1	343	5·5
Total	73,079	100	6,230	100

Source: *Bulletin de l'Institut de Recherches économiques*, vol. x, p. 190 (Louvain, 1938).

Outstanding, of course, and a natural reflexion of the mineral wealth and heavy industry of the country, is the prominent part played by the traffic in coal, coke, mineral ores and metals. If the percentage figures for actual tonnage and for ton-km. (i.e. the product of tonnage and distance travelled) are compared, it is clear that the coal movement is on the whole short-distance traffic, as might be expected from the concentration of industry on the coalfield and the central position of the coalfield within the country. Ores and metals, however, move on an average over greater distances—the ores from Lorraine or from Antwerpen and the metals either to the ports or across the French, German or Dutch frontiers. Stone, sand and gravel move over relatively short distances, since they are mainly for local use. The comparatively small amount of agricultural produce moving by rail is perhaps at first sight surprising, but it must be remembered that much of the local farm produce is consumed on the spot, and the remainder moves largely by road or waterway.

The freight traffic may be classified also, by the nature of its movement, into three sections: 'interior' (i.e. wholly within Belgium), 'international' (i.e. originating or terminating in Belgium and moving to and from a neighbouring country), and 'transit' (i.e. moving through Belgium from one foreign country to another). On this basis

the 1938 traffic of almost 63 million tons was divided as follows: (i) interior, 39 millions; (ii) international, 18 millions; (iii) transit, 6 millions. The international and transit traffic rarely proceeds in regular international goods trains—though the weekly 'banana train' from Rotterdam to Switzerland was a notable exception. In general, considerable sorting, checking and remarshalling is done at the frontier yards, e.g. Montzen (see p. 486). The bulk of the English traffic utilized the Harwich-Zeebrugge train-ferry (see p. 406).

Over and above the traffic of the S.N.C.F.B., there is that of the private lines, of which the outstanding one is the *Nord-Belge*, with 17 million tons in 1938. For a line totalling only 170 km. this is traffic of a very high intensity; between one-third and one-half probably consisted of coal, coke and metals passing between France and Belgium.

The Railways of Bruxelles

The railway plan of most capital cities involves a series of radial lines diverging to the provinces from more or less centrally placed passenger termini, and a girdle or belt line providing intercommunication between these radials; together with terminal or other near-terminal goods stations, and suburban marshalling yards located at the places where the radial and belt lines cross.* The physical situation of Bruxelles has given a somewhat asymmetrical aspect to the railway pattern, but the general principles of the plan are apparent (Fig. 118). The evolution of the plan, however, has been rather slow; the last decade has witnessed some marked improvements, and the most striking advance of all was interrupted by the war in 1940.

The main and obvious line of movement is the Senne valley, which runs from south-south-west to north-north-east. In the early railway period—actually from 1841 to 1855—there was a through line along this valley, connecting the Allée Verte (Groendreef) and Bogarden stations; it ran along the streets. Increasing road traffic in the port area led to its abandonment, however, and the main passenger stations became terminals, and were shifted away from the river. Allée Verte (now only a goods station) gave way to the Nord terminus, and Bogarden was demolished in favour of the new Midi terminus. The need for a link between the two was eventually satisfied in 1871, by the building of what is now the western section of the belt line, from the Midi station, through Bruxelles-Ouest (on the western side of the Senne valley in the suburb of Koekelberg) to Laeken, on the Oostende line.

The main line to Antwerpen, which carries electric as well as steam trains (see p. 487), follows the river Senne downstream from the Nord station. Not far from this station—at Schaerbeek—the Oostende line diverges westwards, crossing the Senne and following the Molenbeek valley through Laeken. From the Midi station the main line to Mons (and Paris) follows the river upstream; a short distance from the terminus—at Forest-Midi—the recently built (1933) direct line to Gent also forks to the west and crosses the river.

The exits and belt connexion on the eastern side of the city are less easy. About 300 m. from the right bank of the river the ground rises quite sharply (at about 1 : 10) to the hill which gave Bruxelles its original commanding site. This low plateau drops northwards, and the Liége line, diverging from the Antwerpen line beyond

* For a detailed analysis of the function of such a pattern see N.I.D. Handbook on *France*, vol. IV, pp. 320–8, which refers to Paris.

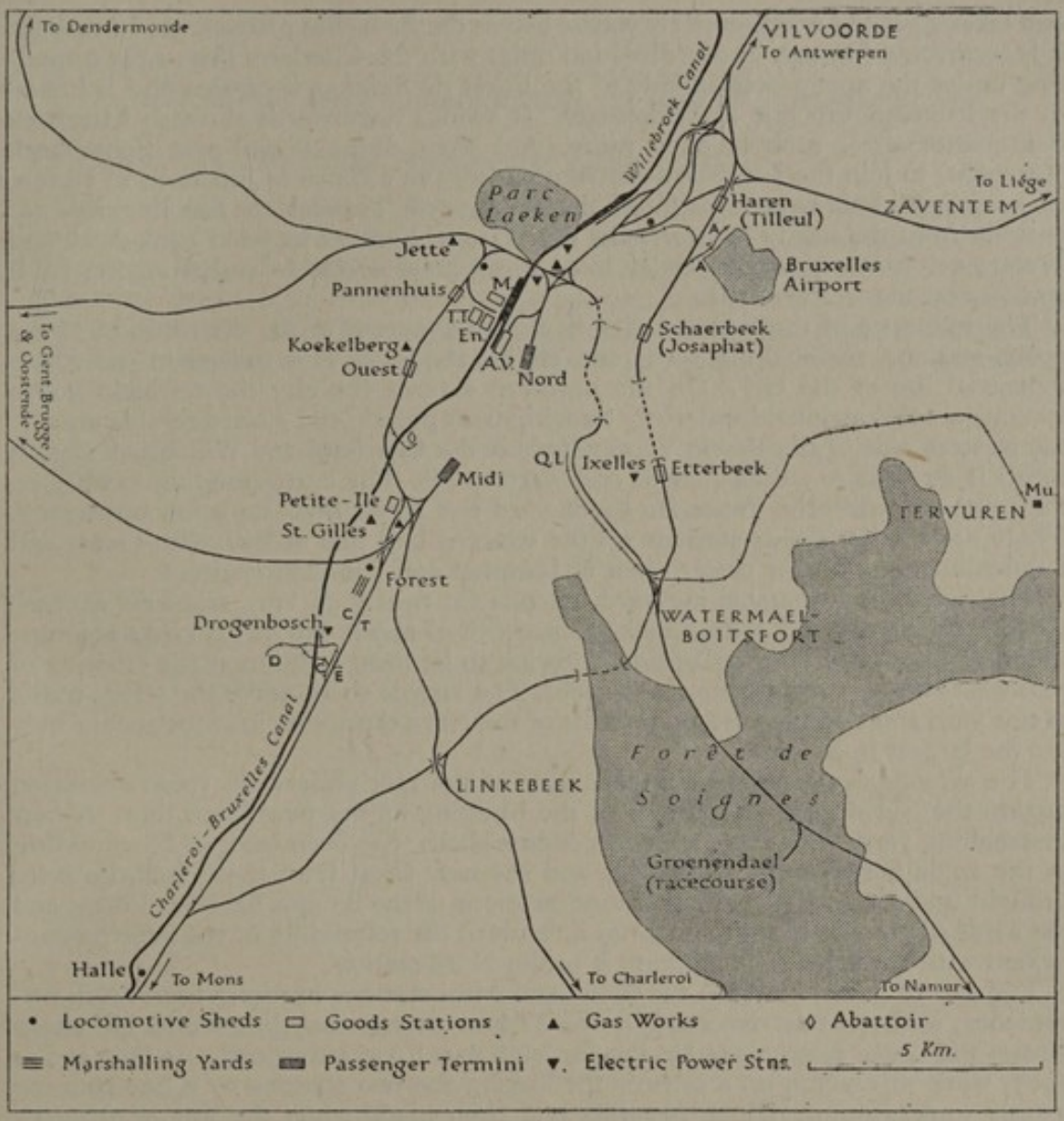


Fig. 118. The railways of Bruxelles, 1939

Based on official sources.

The location of locomotive sheds, marshalling yards, power stations and gas works, and certain rail-connected factories are shown. The Schaerbeek marshalling yards, which are the largest in Belgium, are represented by the network of lines in the north of the map, between Haren and the Willebroek Canal.

Key to abbreviations: AV. Allée Verte; En. Entrepôt; TT. Tour et Taxis; M. Marchandise; QL. Quartier-Léopold; Mu. Musée du Congo. Factories are shown by letters as follows: A. Aircraft; C. Chemicals; D. Distillery; E. Engineering; T. Textiles.

Schaerbeek, has a comparatively easy passage eastwards through Zaventem; but the Charleroi line from the Midi station has to climb steeply southwards through Linkebeek. The last main line, to Namur and Luxembourg, diverges at Schaerbeek and curves sharply southwards, climbing steeply (at 1 : 100) through tunnels to the Quartier-Léopold station and thence curving south-eastwards through the Forêt de Soignes.

The belt line on the eastern side of the city is much longer and of more recent date (1930) than its western counterpart. It commences at Halle, on the Mons line,

and takes a general north-easterly course across the Bruxelles plateau. At Linkebeek it is connected (though in one direction only) with the Charleroi line; after tunnelling under the north-western side of the Forêt de Soignes it crosses and is linked to the Luxembourg line at Watermael. It swings northwards through Etterbeek (Cinquantenaire), tunnels once more, and then drops down past Schaerbeek (Josaphat) to join the Liége and Antwerpen lines in a series of junctions at Haren, also sending a loop westwards into Schaerbeek yard. This eastern belt line does not entirely fulfil the need for interradial connexion. Further loops at Linkebeek and Watermael are necessary in order to give adequate access to and from the Midi station and the western belt.

The influence of the Senne valley is clearly apparent in the distribution of the goods stations, marshalling yards and engine sheds, as it is indeed in the whole industrial life of the city. On the northern side of the city the terminal goods stations act also as inland waterway transhipment points, and a considerable area on the western side of the Bassin Vergote (where the Charleroi and Willebroek Canals meet) is devoted to sidings, sheds and warehouses. The corresponding locality on the southern side—the Petite-Ile goods yard and sheds—has no water connexion. There are smaller goods stations on the western belt line at Bruxelles-Ouest and Pannenhuis, and on the eastern belt at Josaphat and Cinquantenaire.

The Schaerbeek marshalling yard extends for nearly 3½ km., from Schaerbeek station to Haren-Nord, with a maximum width of about 750 m.; it ranks amongst the most important on the Continent, owing to its focal position at the crossing of east-west and north-south routes (p. 486). The engine sheds serve the goods traffic of this yard and also the passenger traffic of the Nord terminus; in consequence they are the largest in Belgium.

The arrangements on the southern side of the city underwent some alteration during the last decade as a result of the building of the new Gent line. A new marshalling yard, with accompanying engine sheds, has been built at Forest-Midi, in the angle between the Mons line and the new Gent line; these facilities were brought into use in 1938. Further modifications of the lay-out between Forest and the Midi station are likely to occur as a result of the rebuilding of the latter in connexion with the scheme for linking it to the Nord station.

The gap of 3 km. between the Nord and Midi stations has long been an inconvenience, inadequately remedied by the 11 km. western belt line which has sharp curves and speed restrictions (40 km./hr.—28 m.p.h.) at either end. As long ago as 1903, work was begun on a scheme for linking the two stations by a line running mainly underground. Much progress had been made when the war of 1914–18 caused an abrupt cessation. More urgent post-war reconstruction and the economic depression delayed the resumption until 1935. The proposed six-track line will not be quite straight as such a course would lie in the unconsolidated alluvium of the Senne valley; a slight detour eastwards, tunnelling underneath the foot of the hill, is thus made. Both Nord and Midi stations are to be raised in level, the Nord by 8 m. and the Midi by 6 m. Gradients of only 1 : 200 will lead from these new viaducts to the tunnel, where a new Central Station is to be built underground. The whole of the new line is to be equipped with electric trolley apparatus, in anticipation of future electrification schemes (see p. 487). The works extend from Forest-Midi to Schaerbeek, a distance of 10 km., only 3·1 km. of which is represented by the new line. The work was well advanced in 1940, and was due for completion in 1942. Among its many advantages the new line will allow a much easier passage across the city for Paris-Antwerpen trains, and will permit the direct Gent line to fulfil its proper function as the main Oostende-Bruxelles route, for international traffic, which the inconvenience of using the Midi station and the western loop has hitherto prevented.

Geographical Description of Certain Main Lines

(1) *Oostende-Bruxelles-Hergenrath* (Fig. 119).

The original route from Oostende to the German frontier, built between 1837 and 1843 and thus one of the earliest trunk lines in Europe, ran through Mechelen. The slight detour via Bruxelles (Nord), involving only 3 km. extra distance, comprises the Schellebelle-Bruxelles section opened in 1856 and the Bruxelles-Leuven section opened in 1866. There is also a direct Gent-Bruxelles (Midi) line, which cuts 5·5 km. from the total distance, but this is not generally used by international expresses.

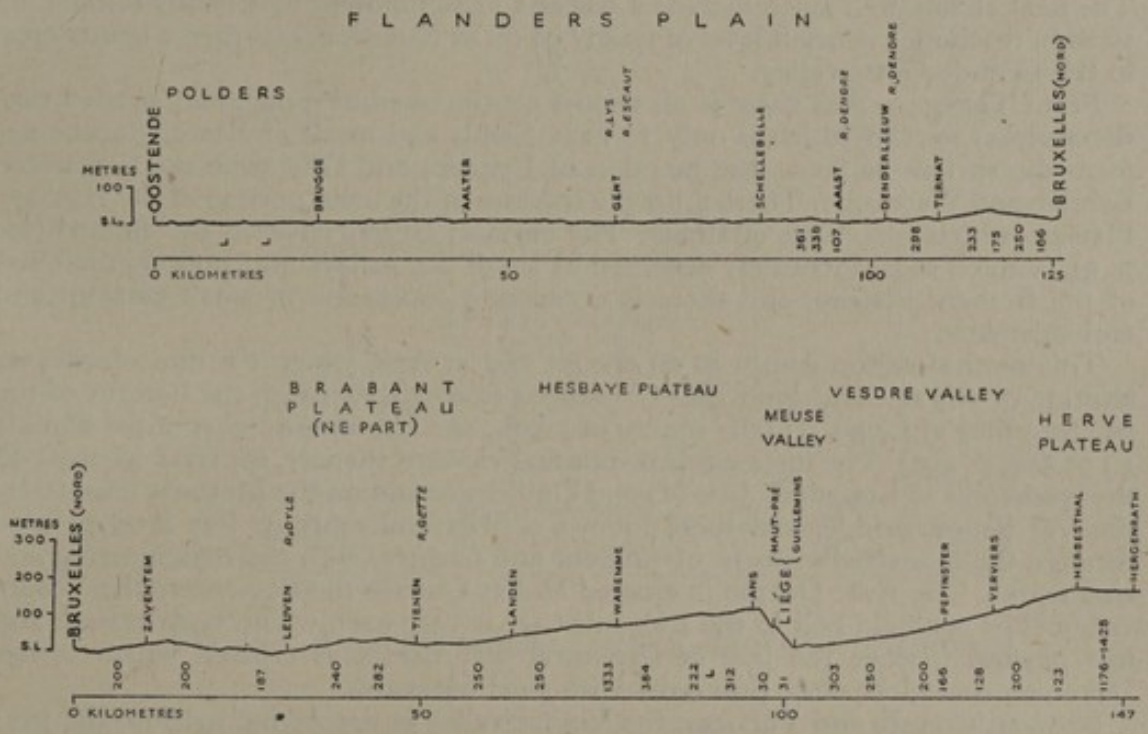


Fig. 119. Gradient profile: Oostende—Bruxelles—Hergenrath

In this and Figs 120, 121, the vertical scale is exaggerated fifty times; specimen gradients are given at intervals; L—level.

The Oostende-Bruxelles section, across the Flanders Plain, has scarcely a gradient worth mentioning for over 100 km. For the first 15 km. the line runs eastwards across the dead flat belt of polders. 'Solid' ground is reached just before Brugge, and for the remaining 110 km. to Bruxelles the railway is continuously on the outcrop of the Middle Eocene sands and clays of the Flanders Plain. The landscape is almost entirely one of arable farming; as far as Aalst there is no perceptible relief and, beyond, the surface is but mildly undulating. The Lys Derivation Canal is crossed at Landegem, and the rivers Lys and Escaut at Gent. Shortly afterwards, beyond Merelbeke marshalling yard, the Escaut is followed for about 10 km. until at Schellebelle junction, where the Antwerpen line diverges, the line bends southeastwards to strike the Dendre valley at Aalst. The Dendre is followed upstream, southwards, to Denderleeuw, where the direct Gent-Bruxelles track, running on an embankment across the valley, is twice crossed. The line then bends eastwards through Ternat. Between Ternat and Bruxelles occur the only appreciable gradients on the whole line, as the Dendre-Senne watershed, actually an outlying portion of the Brabant plateau, is crossed at 50 m. above sea level. The maximum on the rise to Dilbeek is 1 : 227, followed by 1 : 175, 1 : 250 and 1 : 166 down the shallow

Molenbeek valley to Laeken. TheWillebroek Canal and river Senne are crossed, and the line swings southwards past the Schaerbeek junctions and the huge gas and electricity works, into Bruxelles-Nord terminus.

The Bruxelles-Hergenrath section falls physically into two parts. As far as Ans the steepest gradient is 1 : 187, but the Meuse-Vesdre valley section which follows is steeper and more tortuous. Emerging from Bruxelles-Nord, the line immediately leaves the Senne valley, curves eastwards past Schaerbeek yard, rises at 1 : 200 through Zaventem and then falls, with minor undulations, to the Dyle valley just before Leuven. The Leuven-Dyle Canal and the river Dyle are here crossed, the former by a swing bridge which carries a speed restriction of 40 km./hr. Leuven station, marshalling yard and repair shops lie on the eastern edge of the town. The line now enters the undulating terrain of the north-eastern part of the Brabant Plateau, composed of Eocene sands and clays with cappings of Oligocene sands. The next 18 km. to Tienen include a rise at 1 : 240 followed by a gently undulating stretch, reaching a summit level of nearly 90 m. at Kumtich, and then a gentle drop to the Grande Gette valley.

From Tienen to Ans there is an almost continuous but moderately graded rise, the steepest part of which is only 1 : 222. Sands and marls of Lower Eocene age form the surface as far as the junction of Landen, and Oligocene sands between Landen and Waremme. There follows a traverse of the main portion of the Hesbaye Plateau, which is formed of Chalk. The surface, largely covered by 'limon' (see p. 5), is much more intricately dissected by small dry valleys and hollows than that of the Brabant Plateau, and there is a constant succession of small cuttings and embankments.

This natural region comes to an abrupt end at Ans, where the line reaches an altitude of 180 m., and immediately plunges steeply down into the bottom of the Meuse valley at Liége. It falls 100 m. in 5 km., and the steepest part of the bank is 1 : 30 (see p. 497). The incline commands fine views of the city, the river Meuse and the steelworks of Longdoz. Just beyond Guillemins station the Meuse is crossed by the Val Benoit bridge, and there follows a brief and more or less level passage through the industrial suburbs of Angleur and Chênée, with their engineering and zinc works. The river Ourthe is crossed and at Chênée the line enters the Vesdre valley. The coalfield belt in the Liége district is very narrow and compressed, and just beyond Chênée the line of structural disturbance is crossed which brings Devonian rocks into close proximity with Coal Measures.

Between Chênée and Verviers, the Vesdre valley is deeply incised into the pre-Ardenne plateau. It is a picturesque valley, narrow, sinuous and of varying form, as various rock-types in the Devonian series are crossed—limestone gorges alternate with gentler slate slopes. Metal, quarrying and textile industries are frequent, the last especially between Pepinster and Verviers. The line swings from side to side, crossing the river several times and cutting off meanders in tunnels. There are actually twenty tunnels between Liége and the German frontier. The ascent is continuous, and the maximum gradient is 1 : 125. For westbound (i.e. downgrade) trains there is a speed restriction of 90 km./hr. (56 m.p.h.) owing to the frequent curves (Plate 75).

Beyond Verviers the line leaves the Vesdre valley at Dolhain and, passing through several limestone tunnels, climbs to the Herve plateau. For several km. the gradient averages 1 : 123. Herbesthal, at the summit, is the customs station, and the line, now nearly level at about 270 m. above sea level, crosses the German frontier just beyond Hergenrath, running almost at once into the great junction of Aachen.

(2) *The Amsterdam-Paris Line: Esschen-Bruxelles-Quévy* (Fig. 120)

The 74 km. line from the Dutch frontier at Esschen through Antwerpen to Bruxelles is one of the flattest lines in Belgium. The plain across which it runs is largely covered by superficial deposits of sand, gravel, and silt and is underlain by almost horizontally disposed Tertiary rocks, the age of which increases southwards.

The Esschen-Antwerpen section, 25 km. in length, was opened in 1854. Rising slightly from the fertile polder land on the Dutch frontier, it crosses an area strewn with Kempen sands, covered with heath and woodland, and a similar almost imperceptible descent (at 1 : 500) leads down to the great junctions of Antwerpen. International trains do not enter the Central terminal station, but follow the girdle line round the eastern side of the city, calling at the Est station.

From Antwerpen to Bruxelles—the earliest main line in Europe, opened in 1835–6—there are four tracks, two of which are reserved for the electric trains. The line proceeds southwards across the plain from Antwerpen to Mechelen, crossing the Nèthe river and then the Dyle. Mechelen station lies on the south-east side of the town and the great railway workshops are adjacent to it. Immediately beyond the station the Leuven-Dyle Canal is crossed, and then the river Senne is followed to

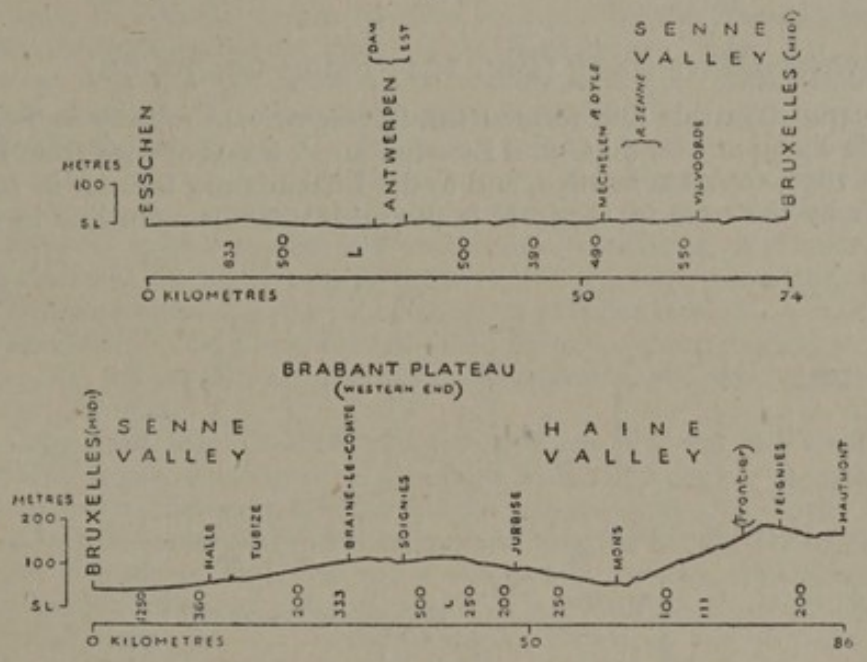


Fig. 120. Gradient profile: Esschen—Bruxelles—Hautmont

Bruxelles, a large meander being crossed twice between Mechelen and Vilvoorde International trains do not enter Bruxelles-Nord terminus, but proceed via the western girdle, calling at the Ouest station and joining the Mons line at Forest

The Bruxelles-Mons line, opened in 1840–2, consists of a gradual rise up the Senne valley, a crossing of the western end of the Brabant plateau, and a fairly easy descent to the Haine valley. As far as Halle, the Senne valley has an alluvial floor and gently sloping sides, the eastern being steeper than the western; factories occur at intervals, alongside the railway or the Charleroi Canal. Beyond Halle, though the valley slopes continue to be formed of Eocene clays and sands, the floor has been cut down to the southward dipping Lower Palaeozoic rocks, here consisting of Cambrian slates. At the small industrial centre of Tubize, junction of branch lines which serve the Quenast granite quarries and the Clabecq steelworks, the Senne valley is left, and a small tributary, the Coercq, is ascended. At the head of this valley the line passes through a tunnel in Middle Eocene sands to Braine-le-Comte. This tunnel, at about 100 m. above sea level, consists of two single-track bores, the northbound at a higher level than the southbound. Beyond Braine-le-Comte, the line descends slightly to the upper Senne again at Soignies, where the valley bottom is excavated in Carboniferous Limestone, which is much quarried. After crossing a further short stretch of Eocene clay plateau, the headwaters of the Dendre—also excavated in Carboniferous Limestone—are crossed at Jurbise, and then the line descends gently and in a sweeping curve through the Bois de Ghlin, to the bottom of the Haine valley at Mons. This valley is deeply underlain by Coal Measures, but it coincides

with a downfold in the overlying strata, and its sides are of Chalk, with a fringe of Eocene beds on either side of the river alluvium. The Centre Canal and the river Haine are crossed just before Mons station, which lies at 30 m. above sea level, at the north-western foot of the sandy hill which gave the town its site.

The next 15 km. from Mons to the frontier are part of the Nord-Belge railway. The Hautmont line diverges from the Quiévrain line in the bottom of the Haine valley, 2 km. beyond Mons, and turning sharply south, immediately climbs steeply, on gradients varying between 1 : 83 and 1 : 111, passing several collieries which are sunk through the Chalk to the underlying Coal Measures. The summit, on the Haine-Sambre watershed at 157 m., is reached just before the frontier, and the line descends more gently (at 1 : 200) to the industrialized Sambre valley at Hautmont (135 m. above sea level).

(3) *Bruxelles-Luxembourg* (Fig. 121; Plates 69, 70, 76)

In its early days this line formed the largest private railway in Belgium—the 'Société de chemin de fer du Grand Luxembourg'; it was opened from Bruxelles to Namur in 1856, to Arlon in 1858, and to the Luxembourg frontier in 1859. It was taken over by the state in 1873. It is the most difficult main line in Belgium to

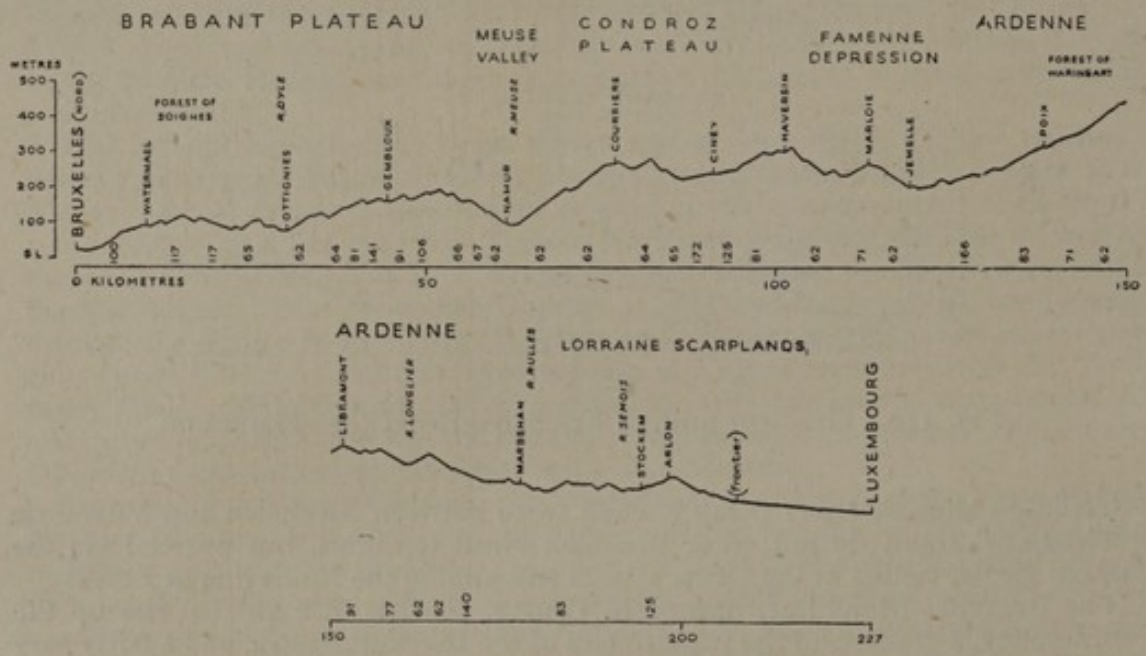


Fig. 121. Gradient profile: Bruxelles—Luxembourg

operate; it has long gradients of 1 : 62 in each direction, and is a series of sharply-curved switchbacks with frequent speed restrictions and a general limit of 100 km./hr. (62 m.p.h.). The line is divisible into five main sections, the Brabant plateau, the Meuse valley, the southern low plateau of Condroz, the Ardenne proper and the Lorraine scarplands.

From Bruxelles-Nord, 20 m. above sea level, the line curves sharply south (see p. 495), ascending at 1 : 100 to the Quartier-Léopold station, crossing the eastern girdle line at Watermael, and continuing to rise at 1 : 117 through the Forêt de Soignes, an extensive woodland developed on Upper Eocene and Lower Oligocene sands. After reaching a summit level in the forest of 110 m., a series of sharp undulations across a surface of Eocene clays and sands carries the line across the Lasne valley and down to the upper Dyle, floored by Cambrian slates, at Ottignies. The next 22 km. with but a few short exceptions are on rising gradients, as the main portion of the Brabant plateau, still floored by Eocene sands and clays, is traversed.

There is at first a sharp rise at 1 : 62 out of the Dyle valley, which at Ottignies is some 40 m. deep; after dropping slightly to the Orne tributary, the steep rise is renewed at 1 : 64 and 1 : 81, to cross the watershed, at about 160 m. between tributaries of the Escaut and those of the Sambre. Another slight pause at Gembloux is followed by the final rise to Beuzet (190 m.) where the Eocene cover of the Brabant plateau is left behind and the line enters the Palaeozoic terrain of the great Namur downfold; crossing in turn Silurian slates, Devonian and Carboniferous limestones and finally Coal Measures in the Sambre-Meuse trough at Namur. The 10 km. descent to Namur is steep, for the most part between 1 : 62 and 1 : 87. Limestone cuttings are passed through, and the line emerges on the side of the sinuous and deeply incised Houyoux valley before finally dropping to the Sambre opposite the industrial suburb of Salzinnes, with its railway works, on the western side of Namur (87 m.). In Namur station the line is joined by the Nord-Belge railway which follows the Sambre-Meuse valley from Charleroi to Liége.

From Namur onwards the curvature of the line increases considerably, while steep gradients continue. The River Meuse is crossed on leaving Namur, and the line immediately climbs steeply for 15 km. at 1 : 62, across the Condroz plateau, quickly leaving the narrow belt of unproductive Coal Measures for the strongly folded Lower Palaeozoic terrain on the southern side of the Namur downfold. The grain of the country is here south-west—north-east, consisting of alternating belts of Devonian slate and Carboniferous Limestone, and the line crosses the ridges and valleys by a series of sweeping curves, cuttings and embankments. A summit level of 275 m. is attained beyond Courrière, and then there is a sharp descent at 1 : 62–65 to the Bocq valley, followed by a slight rise to the junction of Ciney, where there are large limestone quarries.

Between Ciney and Marloie there is another sharp rise and fall across an extensively wooded region developed on Devonian slates and shales. A summit level of 335 m. is reached at Haversin, and the line then descends at 1 : 62 to the Famenne depression, a belt of softer and lower country developed on Devonian shales and limestone. An altitude of only 198 m. is reached at Jemelle, and then the line plunges into more accidented country, and the last long climb of 30 km. to the summit of the Ardenne plateau, is commenced. The deep and sinuous Homme valley is followed through the St Hubert forest, and with the gradient steepening to 1 : 62 a small tributary leads through the forest of Warinsart to the summit at Libramont, 490 m. above sea level. The whole of the Ardenne plateau is made of Lower Devonian slates and sandstones, but the southern side, between Libramont and Marbehan, is more open and less forested. The descent is shorter and more interrupted, notably by a sharp rise at 1 : 62 after crossing the Longlier valley; the last part leads down the narrow Mellier valley through the forest of Neufchâteau to Marbehan, where the Ardenne ends almost abruptly, at an altitude of about 375 m.

From Marbehan to Luxembourg the line changes its general direction to east-south-east, thus crossing the northern part of the Lorraine scarplands obliquely. For a few km. the Rulles valley, occupying a narrow belt of Triassic rocks which intervenes between the Ardenne and the scarplands, is followed, as far as Habay, and then an undulating landscape of arable and meadows, developed on Lower Lias marls, is traversed to the crossing of the Semois valley, just before Stockem, which lies at the foot of the wooded Liassic sandstone escarpment. Gradients of 1 : 125 and 1 : 65 lead up to the crossing of this escarpment at Arlon (400 m.), and the line then descends to Autelbas, where the important line leading to Athus and Longwy diverges southwards. The descent continues eastwards across the Grand Duchy frontier, and the lines of the Guillaume-Luxembourg railway fall by easy stages to the town of Luxembourg.

BIBLIOGRAPHICAL NOTE

(1) *History*

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(2) *Statistics*

Summary statistics for the Belgian railways and comparative figures for other European countries are given in *Statistique Internationale des Chemins de Fer* (annually, latest edition 1938, Paris 1939). For annual summaries of more detailed statistics see *Annuaire statistique de la Belgique* (Bruxelles). Detailed descriptions of each year's working are contained in two annual publications of the S.N.C.F.B. The *Rapport sur l'Exploitation* (Bruxelles, latest edition 1938) contains detailed statistics, short summary reports on various aspects of the activities, a wealth of graphical illustration, and photographs of new works and equipment. The *Rapport présenté par le Conseil d'Administration* (Bruxelles, latest edition 1938) is mainly financial.

(3) *General*

The following article contains more than its title suggests: L. Wiener, 'Train speeds and services in different countries: part IV, Belgium', in the *Bulletin of the International Railway Congress Association*, vol. XVII, pp. 141–221 (English edition, Brussels, 1935). Useful articles appear from time to time in the following London periodicals: *Railway Magazine* (monthly), *Railway Gazette* (weekly) and *Modern Transport* (weekly).

Chapter XVIII

WATERWAYS

Introduction: Historical Outline: Freight: Frontier Traffic: Types of Vessels: Geographical Description of the Waterways: The Flanders Coast: The Western Escaut Basin: The Eastern Escaut Basin: The Meuse Basin: The Kempenland: Conditions since the German Occupation: Bibliographical Note

Introduction

Belgium is situated in close proximity to the triple delta of the Escaut (Scheldt), the Meuse and the Rhine. Although it controls the actual mouth of none of these rivers, its role in the economic and political history of Europe has been far out of proportion to its size.

Waterways have long been vital arteries of Belgian commerce, and even now, although there is a very detailed rail-net, nearly one-third of all inland freight moves by water. The lengthy natural waterways and the numerous supplementary canals which were easily constructed on the Flanders plain comprise a navigable network which totalled 1,610 km. (about 1,000 miles) in 1936.* This length represents on an average 1 km. for about 19 sq.km. of territory; it is interesting to compare the corresponding figure for France, which is 1 km. for about 48 sq.km. The relative proportions of the lengths of Belgian waterways, railways and roads were 1 : 3 : 6 respectively; similar figures for France were 1 : 4 : 60.

The system of inland navigation consists essentially of the waterways of the Escaut basin, flanked on the west by a series of short waterways running to the North Sea, and on the east by the long curve of the rivers Sambre-Meuse. The outlet of the last is through the Dutch plain to the Hollandsch Diep; thus before the inadequacies of the canals linking the Meuse and the Escaut were remedied by the construction of the Albert Canal, the Sambre-Meuse valley was in effect part of the great hinterland of Rotterdam. The Albert Canal has emphasized more strongly the position of Antwerpen as the centre of the whole waterway system, in spite of the fact that its outlet to the sea, the Wester Schelde, is in Dutch territory.

* The total for 1936, the last year for which complete traffic statistics are available, does not include the whole 129 km. of the Albert Canal finally completed in 1940. Parts of existing waterways were incorporated in it, and the actual length of new waterway was 82 km. This gives a total figure for 1939 of 1,680 km.

Almost all Belgian industrial establishments are situated near waterways. Originally placed there because of easy access to bulky raw materials, they have also benefited from the competitive rates of the roads and railways which often run parallel to the waterways. The Ardenne coalfield lies along the Sambre and the Meuse, and the heavy iron and steel industry is situated along the valleys of those rivers from Charleroi to Liége. The new Kempen field, with its great reserves of high-quality bituminous coal, is divided into two parts by the Meuse; its output on the Belgian side is sent to Antwerpen and to Liége by the Albert Canal. The main linen towns are situated along the river Lys, the cotton-manufacturing areas are in the neighbourhood of Gent and along the Escaut and Dendre, while hemp and jute factories lie along the Escaut and Durme. Brick works, cement works, and ceramic factories are found along the Kempenland canals. The new industries which have developed in the last fifty years (electrical, chemical, oil-refining, engineering, etc.), have spread along the lower Escaut between Antwerpen and Gent, along the lower courses of the Escaut confluents (notably the Rupel), and along the Gent-Terneuzen Ship Canal.

Historical Outline

During the fifteenth and sixteenth centuries, the commerce and industry of Flanders developed considerably (see p. 87). Antwerpen, benefiting from the deepening of the Honte, became an international market, especially for cloth, while Gent became a great corn market, largely as a result of the improvements to the lower Escaut. These two cities also derived great benefit from the Willebroek Canal, opened in 1561, and from the first Gent-Terneuzen Canal, completed in 1561. Other sixteenth-century waterways included the Nieuwpoort-Veurne and the Loo Canals, while the Yser and its tributaries were canalized. The Gent-Brugge Canal was begun in 1614, while in 1640 the Nieuwpoort-Plasschendale Canal was completed. During the sixteenth and seventeenth centuries, most of the Belgian rivers were regulated. In 1675, an agreement was concluded between France and the Spanish Netherlands, which allowed freedom of navigation on the Meuse for all traffic but munitions of war.

Antwerpen was almost ruined as a result of the acquisition by the United Provinces of the southern coast of the Scheldt at the Treaty of Münster in 1648, and the estuary was closed to shipping until 1792 (see p. 431). However, although Belgian commercial activity

declined considerably during this period, there was some improvement in the inland waterways; the Brugge-Oostende Canal was completed in 1666, and the rivers Meuse-Sambre were used increasingly as the iron industry developed. In the eighteenth century, the last section of the Gent-Oostende Canal was completed (1753), and the Leuven-Dyle Canal was constructed between 1750 and 1753.

During the French Revolutionary wars, the Scheldt was opened to the ships of France and to those of friendly nations. Napoleon realized the advantages of the position of Antwerpen, and in 1808 he began a canal to link the city with the Meuse. He also planned an ambitious network of waterways to link the chief towns with each other and with the coast, and some of these were started. At the Congress of Vienna (1815), the Escaut and Meuse (together with the Rhine, Main, Neckar and Moselle) were given the status of international rivers, and were placed under the jurisdiction of a Committee of Navigation appointed by the Congress. Riparian states were compelled to maintain safe navigation, and the withdrawal of water in such amounts as to endanger navigation was prohibited.

Under the regime of the United Netherlands (1815–31), several new canals were completed, notably a ship canal from Gent to Terneuzen, the Maastricht-'s Hertogenbosch Canal, which incorporated the completed portion of Napoleon's Escaut-Meuse Canal, and the Bruxelles-Charleroi Canal. After the declaration of Belgian independence, Belgium found that several of her waterways had their outlets in the Netherlands. The Escaut-Meuse Junction Canal was begun in 1844 and completed in 1859, the rivers Nèthe and Rupel were regularized in 1846, the Liége-Maastricht Canal was completed by 1850, the Beverloo Branch by 1857, the Hasselt Branch by 1858, and the Turnhout Branch by 1866. Numerous disputes occurred between Belgium and the Netherlands over problems of waterways, notably in the case of the Meuse. Between 1833 and 1885, there were no less than sixteen international conventions and treaties concerned with the Meuse navigation. The most significant of these was the Treaty of The Hague in 1863. As a result of a dispute between the two countries concerning the withdrawal of water by Belgium for the Escaut-Meuse Junction Canal, the treaty fixed the exact amounts of water which might be taken at any season from the Meuse by either country; it was modified by a supplementary agreement at Bruxelles in 1873, which contained detailed technical formulae.

In the latter half of the nineteenth century, great developments took place in industry, paralleled by the more efficient regularization of

the rivers and the construction of new canals. The official total of navigable waterway increased from 866 km. in 1878 to 1,641 km. in 1892.

Since the war of 1914–18, Belgium has been occupied with the problem of a more effective link between Antwerpen and Liége, a problem intimately related to the international navigation of the Meuse. In 1912, a joint Belgian-Dutch commission had reported upon possible methods of improving the Meuse and its associated waterways, but the war of 1914–18 prevented any joint action. At the Treaty of Versailles, the Great Powers in effect left the two countries concerned to arrive at a common scheme. In 1925, a Belgian-Dutch treaty was drawn up, in which the Netherlands agreed to improve the Maastricht-'s Hertogenbosch Canal, to construct a new junction canal from Neeroeten to Maasbracht, and to construct a canal, for which Belgium would pay, from Antwerpen to Moerdijk on the Hollandsch Diep. The Dutch Chamber refused to ratify the treaty. Then the Netherlands took independent action; the Meuse was canalized from Mook to Maasbracht to take 2,000-ton vessels, the connexions between the Meuse and the Rhine were improved by the Mook-Nijmegen Canal, and the frontier section between Maastricht and Maasbracht was 'by-passed' by the Juliana Canal along the right bank (Fig. 122). Belgium's effective reply to this threat to her interests was to put forward a scheme for a major canal from Liége to Antwerpen. The Netherlands claimed that the necessary large-scale withdrawal of water from the Meuse was contrary to the treaties of 1863 and 1873, especially as water was being taken from one river basin to another; the construction of the Juliana Canal was defended on the grounds that the necessary water was returned to the river at Maasbracht. The Belgian reply contended that as the level of the Meuse was being raised by barrages above Liége, the withdrawal of an estimated amount of 5 cu. m. per sec. would in no way affect the navigability of the Dutch section of the river; furthermore, it was claimed that there was as much justification for diverting water from the river at a point wholly in Belgian territory as there was for the Juliana Canal. The Dutch finally appealed to the Permanent Court of International Justice at The Hague, but judgement was pronounced against them, and the construction of the Albert Canal took place. The great work took ten years to complete; the formal opening in July 1939 was postponed owing to a breach in the embankments, and it was reported that it was finally opened in December 1940 during the period of German occupation.

A number of schemes were projected or in progress in 1939 to meet

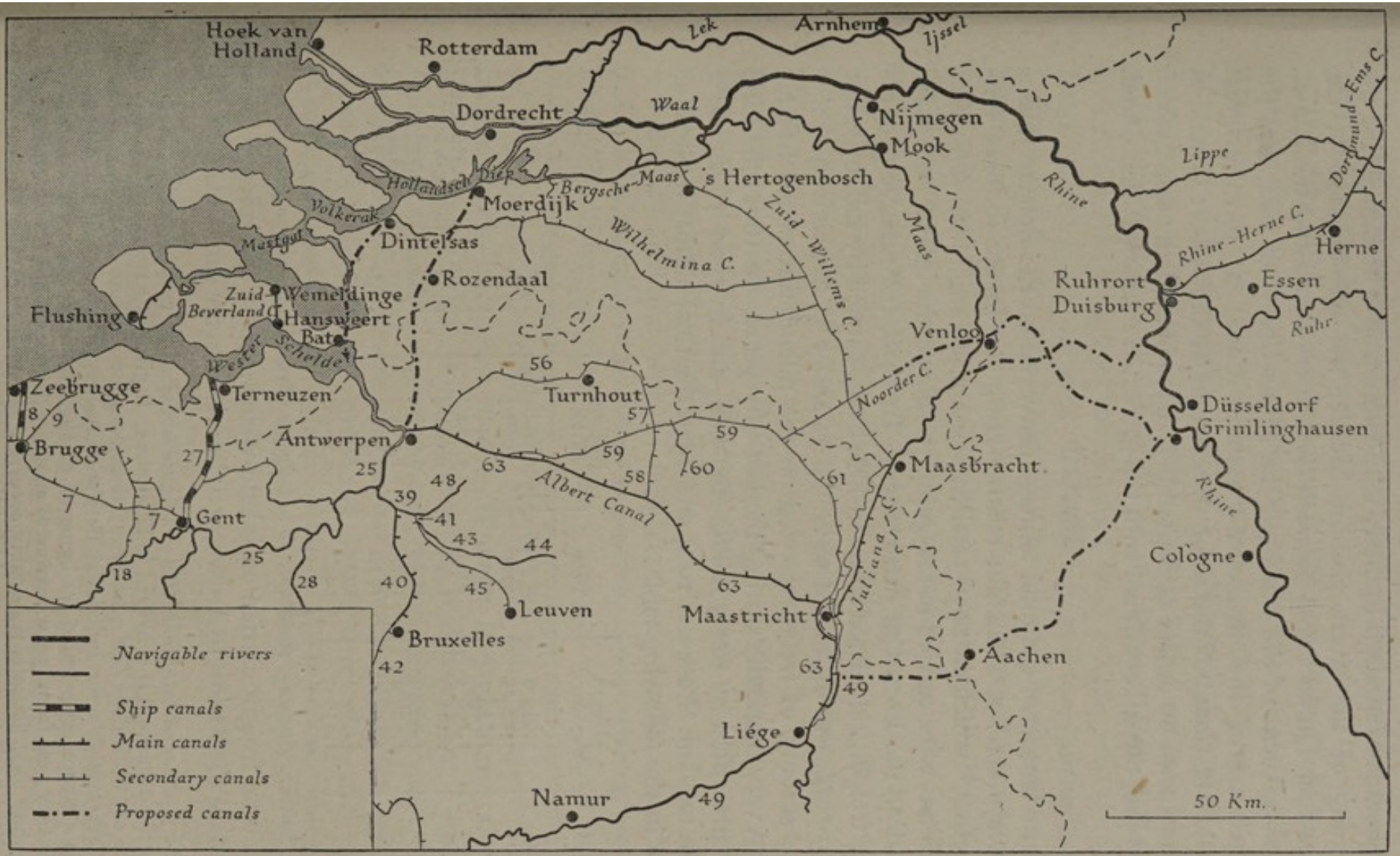


Fig. 122. Antwerpen (Antwerp) and the Rhine-Meuse-Scheldt estuaries

Based on: (i) G.S.G.S. Series 5270, 1 : 500,000, Europe (Air), sheets NE 50/6, NE 48/6, and Ordnance Survey, 1 : 500,000, Great Britain (Air), sheets 6 and 8 (1940)—for the outline of the waterways and coast; (ii) R. Schuiling, *Nederland: Handboek der Aardrijkskunde*, vol. II, p. 420 (Zwolle, 1936)—for the projected canals between Antwerpen and the Maas; (iii) A. Delmer, *Le Canal Albert* vol. II (Liége, 1939)—for the projected canals between the Meuse and the Rhine.

The numbers on the waterways refer to the tables on pp. 518, 520, 524, 527, 531.

the demands of modern industry and commerce. These included the deepening of the rivers Sambre-Meuse, the construction of the Viersel-Lier-Duffel Canal between the Albert Canal and the Rupel, the enlargement of the canals in the Mons-Charleroi area, and the enlargement of the Bruxelles-Charleroi Canal to form a great Leopold III Canal of the same dimensions as the Albert Canal. A scheme drawn up as late as September 1939 postulated a canal which should link the Albert Canal with the projected Aachen-Rhine Canal.

Freight

Absolute figures of the total tonnage conveyed on the Belgian inland waterways are not available; returns are given in the form of ton-kilometres,* which in 1936 totalled some 2,900 millions. A further 75 millions were carried in sea-going vessels on the inland waterways (excluding the Escaut to Antwerpen). In 1936, the relative proportion of freight, calculated on a ton-km. basis, carried by rail, by water and by road, was estimated to be 64, 31 and 5 % respectively.

The amount of freight carried on the inland waterways has increased very markedly during the last fifty years. In 1892, the total was represented by 623·4 million ton-km., and in 1900 it was 894·2 million ton-km. Between 1904 and 1936 the total almost trebled, as shown in the following table:

Year	Million ton.-km.	Year	Million ton-km.	Year	Million ton-km.
1904	1,019·9	1914–19	Not available	1929	2,185·1
1905	1,124·5	1920	998·5	1930	2,407·5
1906	1,153·7	1921	942·1	1931	2,506·9
1907	1,198·3	1922	1,322·4	1932	2,513·0
1908	1,111·7	1923	1,532·4	1933	2,610·4
1909	1,200·0	1924	1,610·1	1934	2,758·2
1910	1,327·2	1925	1,732·3	1935	2,841·2
1911	1,403·9	1926	1,765·8	1936	2,931·0
1912	1,569·9	1927	2,044·5		
1913	1,636·0	1928	2,265·8		

Source: *Annuaire statistique de la Belgique* (Bruxelles), various years.

The total freight carried on inland waterways by sea-going vessels (excluding the Escaut to Antwerpen) has risen in the same proportion,

* The number of ton-kilometres is a figure obtained by multiplying the load in tons by the distance it is conveyed in kilometres. It gives as a rule a more accurate estimate of 'work done' on a waterway than does the absolute tonnage. Absolute figures are available for individual Belgian waterways, but to add these would produce a figure exaggerated by items of through traffic being included several times as they pass from one waterway to another. In the case of France, however, the absolute total figure is reasonably accurate, as tonnage is recorded once only and credited to the waterway on which it is embarked.

from the representative figure of 24·7 million ton-km. in 1904 to 74·9 million ton-km. in 1936.

The outstanding individual item is coal, which in 1936 comprised over one-third of the total. Some waterways, such as the Sambre, the Meuse and the Mons-Condé Canal, had considerably more than half of their total freight made up of coal. The Kempenland canals steadily increased their coal traffic as the Limburg field developed; by 1939 seven collieries were in operation on the Belgian part of the field. Before the completion of the Albert Canal, a large part of the coal from Belgian Limburg went via Maastricht and the Juliana Canal to Rotterdam. It was hoped that the Albert Canal would be the future artery and Antwerpen the future distributing centre for the Limburg field, and that Kempen coal would be substituted for Ruhr coal at the Belgian ports. A group of Belgian collieries built the Genk coal-port on the Albert Canal with a capacity of some 110,000 tons a day, and other coal-ports are at Herentals, Beringen and Zolder. Coal also passed south in increasing amounts to Liége and to the Sambre-Meuse heavy industrial area to supplement the declining output of the Ardenne fields. In spite of this decline, however, a large amount of coal moved from the Borinage field across the frontier to the industrial region of northern France.

Other considerable items of freight include bricks, made largely in the Kempenland, stone from the quarries in the Ardenne and near Lessines, and cement (these items are grouped in the official returns as 'constructional materials'). Oil is an important item of freight on the Bruxelles-Charleroi, the Willebroek, the Brugge-Zeebrugge and the Gent-Terneuzen Canals. Pottery and glassware are considerable items on the Brugge-Oostende, Willebroek and Turnhout-Antwerpen Canals. Fertilizers, grain and flour circulate widely. Iron ore from French Lorraine is imported through Antwerpen and then moved towards the Meuse industrial area. The representative figures of these commodities for 1936 are given in the following table:

	Million ton-km.		Million ton-km.
1. Coal and coke	998,849·9	7. Other manufactured articles	164,371·2
2. Mineral oil	44,044·3	8. Timber	35,867·1
3. Mineral ores	231,859·3	9. Cereals	220,544·2
4. Finished and semi-finished metallurgical products	151,541·2	10. Other agricultural products	85,271·1
5. Constructional materials	487,831·0	11. Fertilizers	117,839·9
6. Pottery and glassware	232,680·0	12. Various and unclassified	160,329·8

Source: *Annuaire statistique de la Belgique*, pp. 260–3 (Gand, 1939).
Except where otherwise stated the other tables in this chapter are also taken from this source.

The total traffic on the individual waterways is shown diagrammatically on Fig. 123. This reveals strikingly the importance of the lower Escaut, and of Gent and Antwerpen. It must be noted that in 1936 the Albert Canal had not been completed.

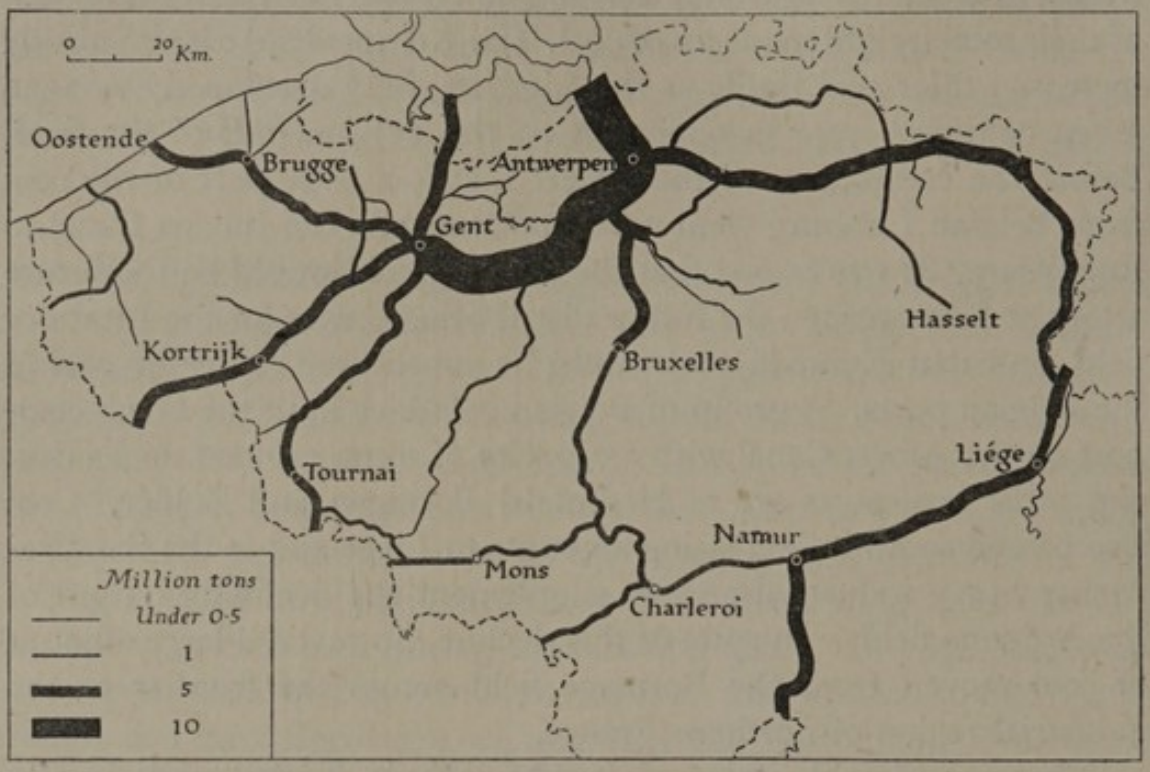


Fig. 123. Tonnage of freight conveyed on Belgian waterways, 1936

Based on *Annuaire statistique de la Belgique*, p. 260 ff. (Gand, 1939).

Tonnage carried in sea-going vessels on the waterways is not included. The tonnage of freight is arrived at by adding all freight carried on the waterway, irrespective of the distance travelled. It is obvious that substantially more traffic is carried on the section of the lower Escaut (Scheldt) near Antwerpen than on that near Gent. Absence of data makes it impossible to do more than represent diagrammatically the relative importance of each waterway as a whole.

Frontier Traffic

Belgium is bordered by three countries, France, the Netherlands and Germany, each of which has a well-developed system of inland waterways. Large quantities of freight therefore pass by water from one country to another. The total absolute freight which crossed the Belgian frontier in 1936, together with the comparative 1913 figures which show how little change there has been, was as follows (in metric tons):

	Imports	Exports	Total
1913	11,733,905	11,826,485	23,416,390
1936	12,390,886	12,336,451	24,727,337

There is no direct waterway traffic across the Belgian-German frontier, as this runs through the forested massifs west of the Rhine.* There is a considerable amount of German traffic between Antwerpen and the Rhine; the returns are included in the Dutch figures. The route usually taken by barges between Antwerpen and the Rhine is from the Wester Schelde across Zuid Beverland by a canal from Hansweert to Wemeldinge, thence through the east Scheldt estuary, the Mastgat, the Volkerak and the Hollandsch Diep to the Waal. The increase of traffic from the Rhine since 1919 has caused this route to become increasingly inadequate. Various schemes have been suggested, including a canal via Bath through the polders of Dutch Brabant to the Volkerak at Dintelsas. Belgium favoured a direct cut in a northerly direction from Antwerpen, running east of Bergen-op-Zoom to Moerdijk on the Hollandsch Diep, but in 1925 the Dutch Chamber rejected Belgian proposals to pay for such a scheme, fearing for the prosperity of Rotterdam. It has been estimated that 80 % of the trade of that city is Rhine-borne, compared with a respective figure of about 25 % for Antwerpen. The proposed canal would bring Antwerpen to about the same distance economically from the industrial Rhine as Rotterdam (Fig. 122).

The following table summarizes the international traffic arriving at or departing from Antwerpen by inland waterway in 1936:

Million tons

	Discharged from	Loaded for	Total	% of inland waterway traffic of port
Germany	2·99	1·64	4·63	54·62
France	0·63	1·01	1·64	19·34
Netherlands	0·88	0·71	1·59	18·74
Switzerland	0·02	0·30	0·32	3·78

Source: *Report on Belgium*, Department of Overseas Trade, p. 85 (London, 1937).

Trade across the Dutch and French frontiers in 1936 was as follows (in metric tons):

	To Belgium	From Belgium	Total
Netherlands	11,419,772	8,774,717	20,194,489
France	971,114	3,591,734	4,562,848

* There has been a project to construct a direct canal from the Rhine near Ruhrort. Some 32 km. of a canal from the Rhine at Grimlinghausen above Düsseldorf were completed before 1914; it was designed to run through Neuss and the Niers valley to Venlo on the Maas. One of the clauses of the Treaty of Versailles stated that if within 25 years Belgium should decide to make a canal to the German frontier, Germany must complete it through her territory; Belgium, however, has made no move to construct such a waterway.

The returns for the Netherlands reflect the outstanding importance of Antwerpen and the lower Escaut. The other cross-frontier routes are by the little-used Brugge-Sluis Canal, by the Gent-Terneuzen Ship Canal, which provides a direct route to the Honte, by the Maastricht-'s Hertogenbosch Canal which crosses the frontier twice, and by the Liége-Maastricht Canal. The figures for 1936 for these waterways were as follows (in metric tons):

Waterway	To Belgium	From Belgium	Total
Lower Escaut	6,863,847	4,506,710	11,370,557
Brugge-Sluis Canal	9,353	3,838	13,191
Gent-Terneuzen Canal	2,657,674	1,445,659	4,103,333
Maastricht-'s Hertogenbosch	911,070	1,235,067	2,146,137
Liége-Maastricht Canal	997,824	1,553,983	2,551,807
	11,439,768	8,745,257	20,185,025

[*Note.* There is an unexplained discrepancy between these totals and the summary figures in the previous table.]

The completion of the Albert Canal, obviating the necessity of vessels passing through the Maastricht enclave, will reduce considerably the frontier trade on the last two canals.

Several Belgian rivers rise in France, and their regulated upper courses form convenient cross-frontier routes. The detailed network of canals in eastern and north-eastern France brings these rivers into contact with both the Paris Basin and with Lorraine. There are a number of possible through routes from Antwerpen to Paris.*

The traffic moving from Belgium to France is more than three times that in the opposite direction. This is due chiefly to the coal traffic; the Ardenne coalfield straddles the frontier and there is considerable continuity of industrial activity. In 1936, nearly 3 million tons of coal (2,952,849) moved into France, and 275,000 tons, chiefly along the coastal canals, moved into Belgium.

The freight conveyed in 1936 on the individual cross-frontier waterways was as follows (in metric tons):

* These routes are as follows: (1) Via the Meuse, thence by the Ardenne Canal to the Aisne, or to Lorraine by the Est Canal. (2) Via the Sambre, thence by the Sambre-Oise Canal. (3) Via the Bruxelles-Charleroi, the Centre and the Mons-Condé Canals to the French Escaut, thence by the St Quentin Canal to the Oise. (4) Via the Escaut, thence by the St Quentin Canal or by the Sensée Canal to Douai. (5) Via the river Dendre and the Antoing-Pommerœul Canal to the Mons-Condé Canal, thence as by (3). (6) Via the Escaut and Scarpe to the Deûle Canal. (7) From the Escaut via the Espierres Canal, continued on the French side as the Roubaix Canal, thence by the Deûle Canal to Lille. (8) Via the rivers Lys and Lawe to the river Aa. (9) and (10) There is a double link along the coast. One runs from Veurne to Bergues, the other from Veurne to Dunkirk.

	To Belgium	From Belgium	Total
Dunkirk-Nieuwpoort Canal	39,962	141,452	181,414
Veurne-Bergues Canal	—	—	—
R. Lys	400,521	339,977	740,498
Mons-Condé Canal	73,826	657,462	731,288
Upper Escaut	333,082	981,946	1,315,028
R. Sambre	84,720	586,010	670,730
	965,287	2,941,318	3,906,605

Note. There is an unexplained discrepancy between these totals and the figures in the total on p. 511.

Types of Vessels

During the last eight years there has been a slight decrease in the number of Belgian-owned vessels on Belgian waterways, from 7,001 in 1931 to 6,912 in 1938, but the total tonnage increased from 2,367,958 to 2,436,800. The number of self-propelled vessels increased strikingly from 1,368 (with a tonnage of 322,233) in 1931, to 2,138 (with a tonnage of 563,892) in 1938.

The varied dimensions of the waterways have produced a great variety of types of craft, unlike France, where the standard vessel is the 300 ton *péniche*. The vessels may be classified as follows:

Vessel	Tonnage of each (metric tons)	Length m.	Width m.	Loaded draught m.	Number in 1938
Grands chalands rhénans	Over 2,000	100+	14·30	3·00	7
Do.	1,500–2,000	80–90	9·00–9·50	2·50–3·00	22
Do.	1,000–1,500	70–80	8·20–9·00	2·50	153
Do.	750–1,000	60–70	8·20	2·50	98
Casts Campinois (*Kempenaar*)	450–600	50	6·00	1·90–2·50	409
Bateaux sambrésiens	350–450	47	5·05	1·80+	466
Bateaux wallons (*péniches, bélandres*)	275–360	38–50	5·05	1·80–2·25	881
Spits	300–500	47	5·00	1·80	1,781
Bateaux-tanks	Various	60+	5·00+	1·90+	99
Steam tugs	Various		Various		347
Motor tugs	Various		Various		115
Small barges	Under 275		Various		2,534
Total number of vessels					6,912

Source: O. Tulippe, 'Etat des Travaux de Navigation Intérieure en Belgique', *Bulletin du Cercle des Géographes Liégois,* (Liége, 1936).

In addition to Belgian-owned vessels, 2,831 foreign craft used the waterways in 1938 on one or more occasions. The great majority of these belonged to the Netherlands, France and Germany, as follows:

	Number	Total tonnage
Netherlands	2,037	608,806
France	404	229,712
Germany	205	114,623
Others	185	Not available

The German vessels were chiefly *rhénans*, including the smaller D.E.K. (Dortmund-Ems Kanal) type, $67 \times 8{\cdot}20 \times 2{\cdot}10$–$2{\cdot}50$ m., the larger R.H.K. (Rhein-Herne Kanal) type, $80 \times 9{\cdot}50 \times 2{\cdot}50$ m., and a few of the very big Grotius barges, which attain a dimension of $130 \times 14{\cdot}3 \times 3{\cdot}00$ m. All these vessels are self-propelled, and are known generally as *grands bateaux automoteurs du Rhin*. They make the through journey to Antwerpen from Cologne, from Mannheim and less frequently from Strasbourg.

The waterways of Belgium may be conveniently grouped into five main categories according to the dimensions of vessels which may be accommodated. They are thus classified in the tables of canals, and on Figs. 124–6.

(A) Waterways which can accommodate the *chalands* of 1,350–2,000 tons or over.

(B) Waterways which can accommodate the *casts campinois* and the smaller *chalands* (450–1,350 tons).

(C) Waterways which can accommodate the *bateaux sambrésiens*, the numerous *péniches* and the steel-built *spits* (275–450 tons). These correspond to the *Freycinet* first class waterways in France.

(D) Waterways which can accommodate smaller vessels, such as the *Charleroi baquets*, of some 100–300 tons.

In addition, there are the ship canals which can accommodate sea-going ships, although they are also used extensively by large canal boats. (*Note*. The Escaut below Antwerpen is not included in the list of inland waterways.)

Geographical Description of the Waterways

Except for the short river Yser, the natural drainage of the country is almost entirely towards the north-east, away from the North Sea coast. A number of low watersheds may be distinguished, which, however, rarely presented any great obstacles to canal construction. Gradients are low; the maximum average fall on any river is 0·48 m. per km. or about 1 in 2,000 on the Sambre. Only the Blaton-Ath, the Antoing-Pommerœul and the Bruxelles-Charleroi Canals are summit-level waterways; the last overcomes a height of 130 m. The steepest artificial gradient is on the Centre Canal, which rises 4·3 m.

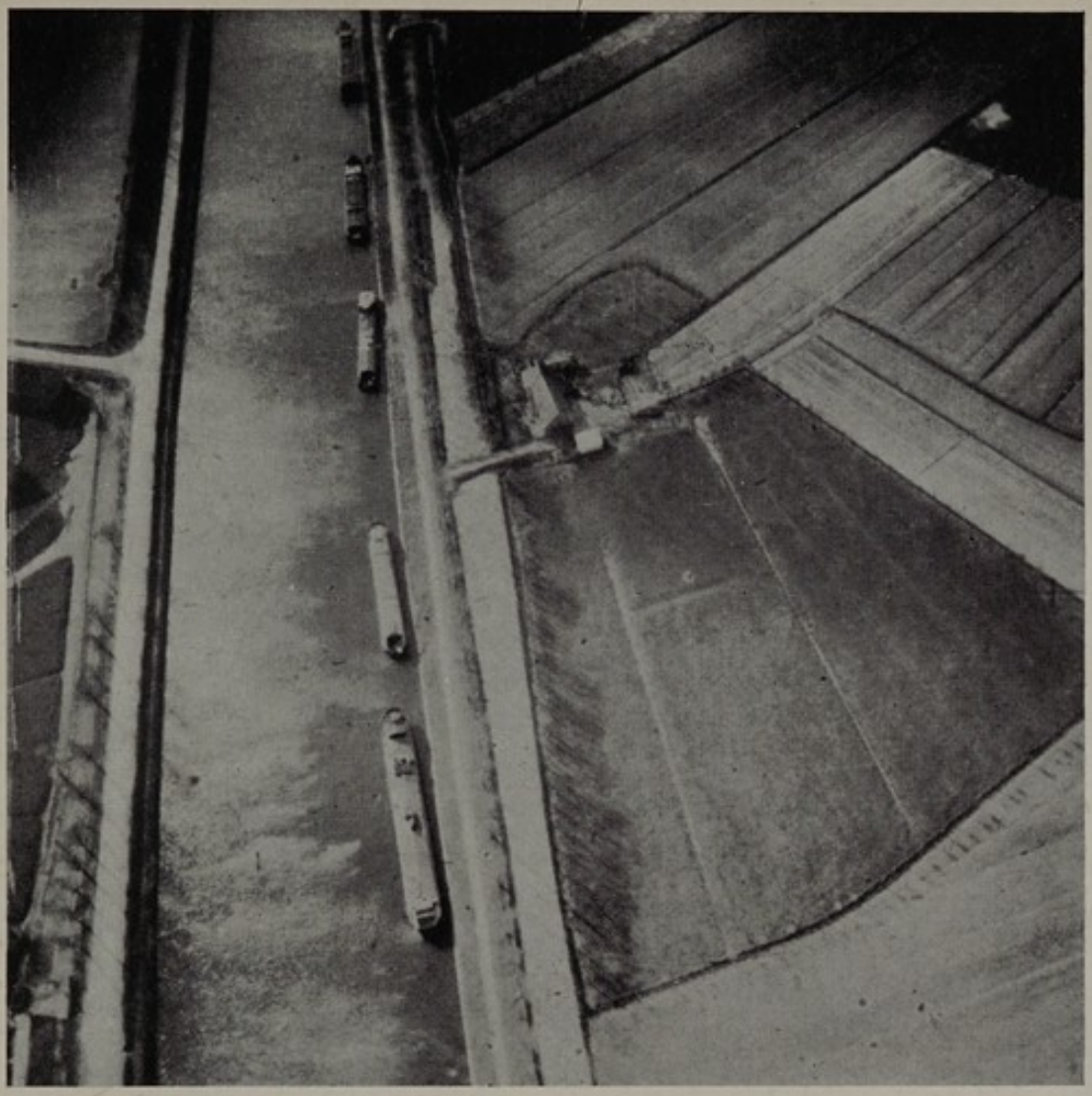


Plate 77. The Gent-Oostende Canal

The Gent-Oostende Canal crosses the plain of Maritime Flanders and is bordered by polder land. The canal banks and many of the fields are lined by poplars.

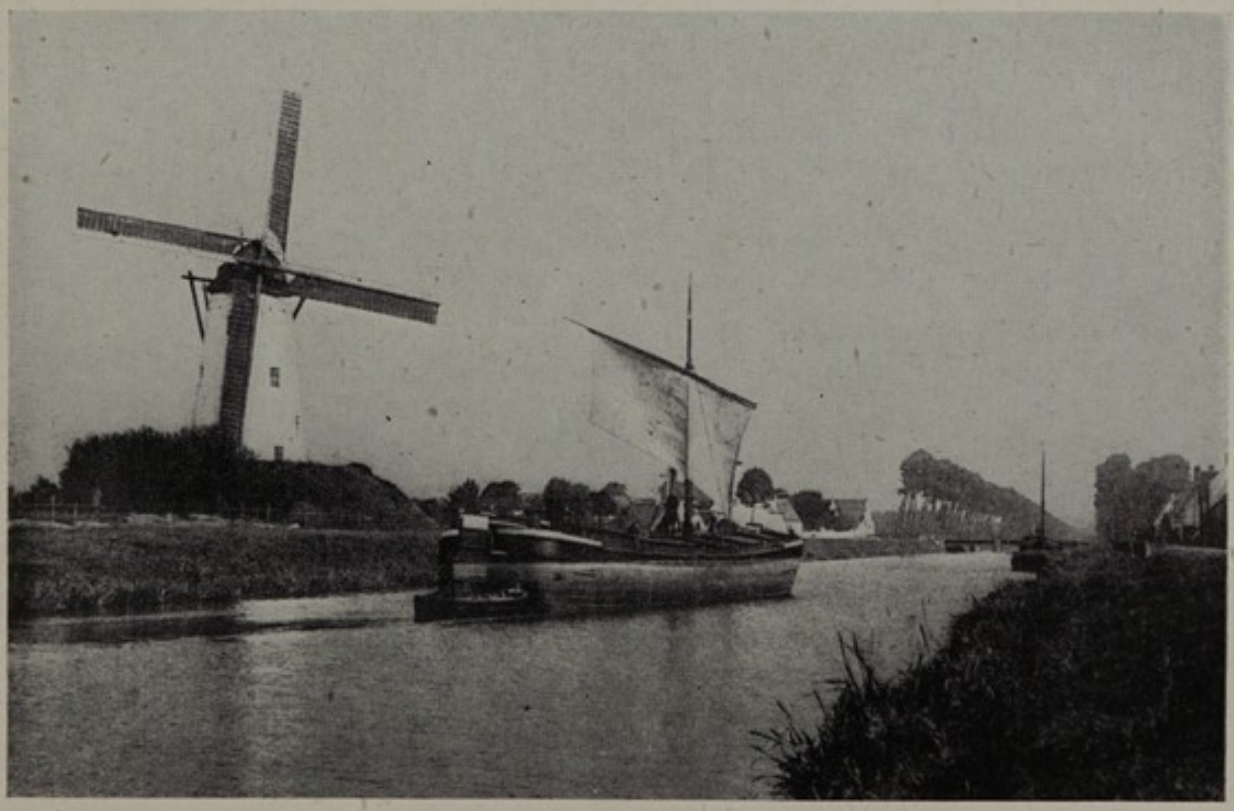


Plate 78. The Brugge-Sluis Canal, near Damme

This waterway, which crosses the frontier into the Netherlands, is only of secondary importance.



Plate 79. The South Docks at Antwerpen (Antwerp)

These docks are entered from the Escaut (Scheldt) by a lock between the *Quai de la Station* and the *Quai Cockerill*; the lock can be seen on the left of the central dock.

per km., or about 1 in 230. The chief engineering problems were encountered during the construction of the Albert Canal, where a series of deep cuttings had to be made through the Kempenland plateau.

Five main regional groups of waterways may be conveniently distinguished:

(1) *The Flanders Coast:* the river Yser and the coastal canals. These are not of any great importance, chiefly because they are away from the commercial and industrial life of Belgium centred on Antwerpen and the Escaut.

(2) *The Western Escaut basin:* the more or less parallel rivers of the western Escaut basin (Lys, upper Escaut and Dendre), which flow north-east to the lower Escaut. This group is separated from the first by low hills of clay capped with sand, crossed only by the Gent-Brugge Canal, and formerly by the Yser-Lys Canal.

(3) *The Eastern Escaut basin:* the Rupel collects the tributaries of the eastern Escaut Basin—the Senne, Dyle, Démer and Nèthe.

(4) *The Meuse basin:* the upper Meuse and the Sambre flow in a great curve through south-eastern Belgium. The system receives practically no drainage from the north, as the headwaters of the Escaut rise near the Meuse valley on the Brabant-Hesbaye plateau, which sinks northwards into the Flanders Plain.

(5) *The Kempenland:* a number of canals between the Meuse and Escaut cross the low Kempenland plateau.

(1) The Flanders Coast

(1) The *Dunkirk-Nieuwpoort Canal* runs parallel to the coast at a distance of some 4–6 km., and 2–3 km. behind the zone of sand dunes. It crosses the flat coastal plain through a maze of drainage canals; the last 4 km. to Nieuwpoort are embanked. Veurne and Nieuwpoort form small canal junctions.

(2) The *Nieuwpoort-Plasschendale Canal* continues the line of (1) eastwards from Nieuwpoort to the Brugge-Oostende Canal over lowlying polder land. It is embanked and lined with trees along most of its length.

(3) The *Veurne-Bergues Canal* forms a second longitudinal route, some 6–8 km. south of (1), between Veurne and the river Aa in France. It skirts the northern edge of the outlying chalk hills and the southern edge of the coastal marshes. It is shallow and its annual traffic is small; no vessels crossed the frontier in 1936.

(4) The *river Yser* rises in the low chalk hills west of the frontier and flows in a curve to the North Sea near Nieuwpoort. It has been

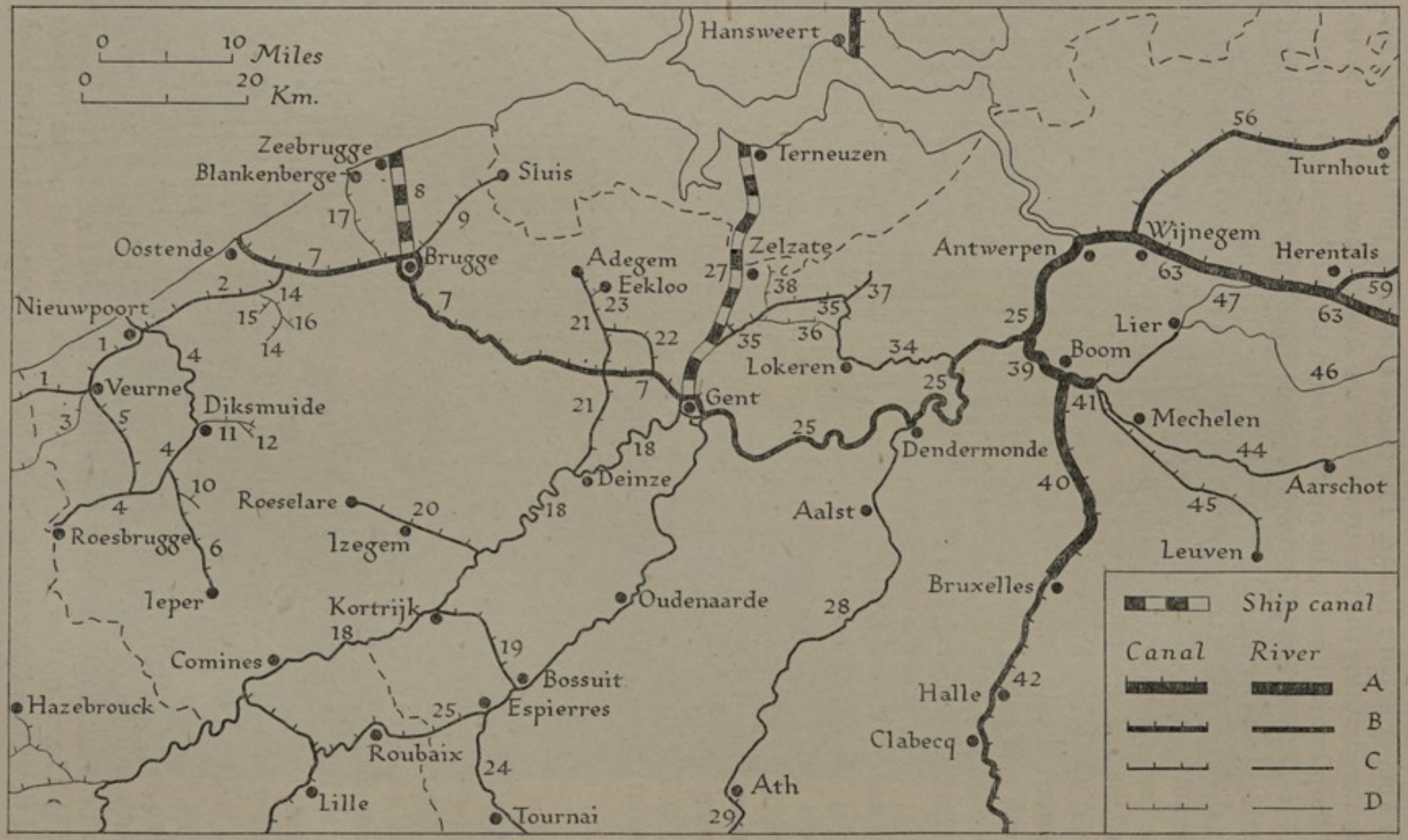


Fig. 124. The waterways of Flanders
Based on G.S.G.S. Series 2517, 1 : 380,160, Belgium and North-east France (1938).

canalized from Roesbrugge, 2 km. east of the frontier. Numerous drainage channels flow into it and help to maintain its somewhat variable level; even so, it is not navigable for long periods in summer. The Yser is linked to Veurne by the *Loo Canal* (5), which leaves the river at Elsendamme, and to Ieper by the *Ieper-Yser Canal* (6). The latter was formerly continued south over the watershed to the river Lys as the *Ieper-Lys Canal*; it was destroyed during the war of 1914–18 and has not been rebuilt.

(7) The *Gent-Oostende Canal* is important in that it links the Escaut directly with the North Sea. It runs west from Gent, and is joined at Veldeken by the Liéve Canal. The Lys Derivation Canal and numerous drainage streams are siphoned under it in culverts. At Brugge the canal passes in a semicircle to the east of the city. The town is intersected by numerous minor canals lined with quays, which are now little used. The main port is in the north of the city; the Gent-Oostende Canal widens out into the *Bassins du Commerce* and *du Flottage*, while the latter is connected by two locks with the *Bassin Ouest*, the terminus of the Zeebrugge Ship Canal.

The section from Brugge to Oostende runs across the gently undulating coastal plain between tree-lined embankments. Near Oostende there is a locked entry on the left bank into an interconnected series of basins, the *Bassins Sas*, *d'Evolution*, *aux Bois* and *à Flot* mainly for canal traffic. At the Slykens Lock, 150 m. farther on, the canal meets the Oostende Ship Canal, 6·5 m. deep, and so enters the maritime port of Oostende (Plate 77).

(8) The *Brugge-Zeebrugge Ship Canal* runs from the *Bassin Ouest* at Brugge to the inner harbour at Zeebrugge. The canal is embanked on both sides and a railway runs parallel to it. A number of industries are served by the canal, including coke ovens, glass works and an oil refinery. The ship canal was begun in 1895 in an attempt to revive some of the prosperity of Brugge, but the chief benefit has been to the coal trade of Zeebrugge.

(9) *Brugge-Sluis Canal.* This relatively unimportant canal, built during the regime of the United Netherlands, runs from Brugge across a flat drained plain to Sluis, 2 km. over the Dutch frontier (Plate 78).

(10–17) *Minor Canals.* Several short branches run into the main waterways, while some of the maze of drainage channels which cover the Flanders Plain are named and listed as navigable waterways. None of these carried any freight in 1936.

THE FLANDERS COAST (Fig. 124)

No. on Fig.	Waterway	Category	Length km.	Depth m.	No. of locks	Freight 1936	
						Metric tons	1,000 ton-km.
1	Dunkirk-Nieuwpoort C. (Belgian section)	C	18·71	1·80–1·90	2	343·322	4,780·9
2	Nieuwpoort-Plasschendale C.	C	20·98	2·00–2·20	2	585,984	10,604·8
3	Veurne-Bergues C.	D	11·03	0·75–1·00	1	925	6·0
4	R. Yser	C	41·17	1·30–1·90	1	172,860	2,693·9
5	Loo C.	C	14·33	1·80	1	54,640	606·5
6	Ieper-Yser C.	C	15·29	2·10–3·75	2	59,572	840·8
7	Gent-Oostende C.	B	67·75	2·20–6·50	5	5,489,670*	118,059·9*
8	Brugge-Zeebrugge C.	Ship-canal	10·00	8·00	2	296,873*	1,055·9*
9	Brugge-Sluis C. (Belgian section)	C	13·60	2·30–2·50	—	127,362	1,657·0
10	Martje C.	D	3·8	0·50–0·70	—	Nil	Nil
11	Handzame C.	D	12·57	0·70–1·20	—	Nil	Nil
12	Zarren C.	D	2·76	0·70–1·30	—	Nil	Nil
13	Oudenburg C.	D	0·72	1·20–1·50	—	Nil	Nil
14	Moerdijk C.	D	8·44	1·25–1·50	—	Nil	Nil
15	Ghistelles C.	D	1·34	1·25–1·50	—	Nil	Nil
16	Bourgogne C.	D	1·62	1·25–1·50	—	Nil	Nil
17	Blankenberge C.	D	12·13	0·65–1·80	—	Nil	Nil

* These returns do not include freight carried in sea-going ships; figures for the latter are 16,731 m. tons and 21·7 ton-km. for (7) and 1,770,174 m. tons and 48,715·7 ton-km. for (8).

(2) The Western Escaut Basin

(18) The *river Lys* rises in the hills of Artois and is followed by the Franco-Belgian frontier for 27 km. It continues east-north-east to its confluence with the Escaut at Gent. The valley is extremely flat, and the fall from the frontier to Gent is only 8·4 m. As a result, the river meanders in a series of great loops. The river has been embanked, and in places the loops have been rectified by cuts across the necks of the meanders. The volume of the river fluctuates considerably from the normal flow of 7·0 cu. m. per sec.; high water (maximum 25·0 cu. m. per sec.) is in winter and low water (minimum 2·4 cu. m. per sec.) in summer.

The water of the Lys is very suitable for flax-retting, and numerous textile towns are strung out along the valley; coal for these industries is water-borne.

The Lys is linked with the upper Escaut by the *Bossuit-Kortrijk Canal* (No. 19), and with the textile centre of Roeselare by the *Lys-Roeselare Canal* (No. 20). The *Lys Derivation Canal* (No. 21), which serves chiefly as a drainage channel, leaves the river near Deinze, and runs north for 14 km. to the Gent-Oostende Canal; it is navigable beyond it for a further 13 km. to Adegem. It receives the short *Liéve* (No. 22) and *Eekloo* (No. 23) *Branches*.

(24) The *upper Escaut* crosses the frontier 1 km. beyond the Scarpe confluence and meanders northwards through a marshy flat-bottomed valley only 10 m. above sea level. Near Espierres it turns at right angles and follows to Gent the general north-easterly direction of the central Belgian rivers. It has been extensively embanked and regularized, and there are numerous drainage channels parallel to the river.

The *Espierres Canal* (No. 25) links the Escaut near Espierres with the textile region of Roubaix in France.

(26) The *lower Escaut* joins the upper Escaut at the Gentbrugge weir, south-east of Gent; this is the tidal limit. Between the weir at low water and the estuary is a fall of only 2·6 m. There is a tidal range of 3·5 m. at Antwerpen and of 1·8 m. at Gent. The river broadens considerably as it is joined by several large affluents, notably the Rupel. Its width in metres is as follows:

Gent	40	Mariakerke	175 (at high tide, 250)
Wetteren	65	Temsche (Tamise)	275 (at high tide, 400)
Dendermonde	100	Antwerpen (Batteries St Michiels)	336 (at high tide, 415)
		Antwerpen (Kattendijk Sluice)	500 (at high tide, 550)

THE WESTERN ESCAUT BASIN (Fig. 124)

No. on Fig.	Waterway	Category	Length km.	Depth m.	No. of locks	Freight 1936	
						Metric tons	1,000 ton-km.
18	R. Lys	C	108·46	2·10–2·40	6	6,147,201	70,506·0
19	Bossuit-Kortrijk C.	C	15·36	2·00	11	381,088	4,209·2
20	Lys-Roeselare C.	C	16·59	2·00	2	517,046	7,608·6
21	Lys-Derivation C.	C	27·46	2·20–2·50	2	1,392,790	19,395·6
22	Liéve C.	C	10·65	0·95–1·25	1	Nil	Nil
23	Eekloo C.	D	1·71	2·00–2·20	—	—	—
24	Upper Escaut	C	92·98	2·50–2·75	6	4,465,431	282,782·9
25	Espierres C.	C	8·40	2·00	4	286,731	2,373·2
26	Lower Escaut	Estuary to Antwerpen; (A) to Rupel; (B) to Gent	107·78	2·00–12·40	—	19,964,885*	718,192·3*
27	Gent-Terneuzen C. (Belgian section)	Ship-canal	17·50	5·70–8·20	—	6,348,519*	71,408·3*
28	R. Dendre	C	65·32	2·10–2·30	13	1,071,793	29,861·9
29	Blaton-Ath C.	C	21·59	2·10	21	416,757	7,172·6
30	Antoing-Pommerœul C.	C	25·17	2·40	13	1,847,652	39,298·4
31	Mons-Condé C. (Belgian section)	C	20·19	2·10–2·40	5	2,561,775	3,628·7
32	Centre C.	C	20·92	2·10–2·40	6	2,325,055	37,880·8
33	Centre-Houdeng Branch	C	16·01	2·40	—	2,043,205	17,639·4
34	R. Durme	C	23·56	1·55–6·00	—	153,080	1,537·7
35	Moervaart C.	C	21·11	1·40–1·70	1	89,613	1,008·2
36	Zuidleede C.	D	12·73	0·50–1·15	—	518	Not stated
37	Stekene C.	C	5·01	1·10–1·55	—	14,743	71·1
38	Langeleede C.	D	5·17	1·10–1·40	—	2,962	15·4

* These returns do not include the freight carried in sea-going ships; figures for the latter are 2,783,642 tons and 48,715,700 ton-km. for No. 27. (For the freight carried on the estuary of the lower Escaut to Antwerpen, see p. 521.)

It is embanked along most of its length and is poldered near the Durme confluence and also along the left bank of the section between the Rupel and Antwerpen. The right bank is lined with factories. The river swings north-west below Antwerpen, and continues to the Wester Schelde.

The river port of Gent (Fig. 101) has a very favourable position at the tidal limit of the Escaut, at the confluence of two long canalized rivers and at the meeting-point of two other canals which run to the sea. Thus it is a great Belgian port, second only to Antwerpen (see also p. 411). The upper and lower Escaut are linked to the main *Bassin du Commerce* by the *Canal de la Pêcherie*. The Lys enters by two separate channels and wanders through the town to the Escaut. The Gent-Oostende Canal on the north-west communicates with the avant-port by the *Canal de Raccordement*, while the Terneuzen Canal enters the *Bassin du Commerce* via the avant-port. The town is intersected by numerous branch canals and backwaters, with extensive quays. The port handles a great variety of freight. A substantial part of the Rhine traffic passes via Gent from the Ruhr to western Belgium and to northern France, while oil, pyrites and iron ore pass to Germany.

The great port of Antwerpen (Figs. 103–7) is situated in the angle of the Escaut north of the town (see pp. 421-6). The Albert Canal runs into the Strasbourg and Lefebvre Docks. While Antwerpen is primarily a maritime port, it is the focus of the Belgian inland waterway system and a great distributing centre. The following table compares the proportions of goods handled at Antwerpen in 1936 (in millions of tons):

	Goods entered	Goods despatched
By sea	12·48	12·77
„ river	4·80	3·69
„ rail	6·72	3·17
Total	24·00	19·63

[*Note*. Comparative figures for road transport are not available.]

Source: *Report on Belgium*, Department of Overseas Trade, p. 85 (London, 1937).

(27) The *Gent-Terneuzen Ship Canal* runs from the *Bassin de Commerce* at Gent to the Honte at Terneuzen. Built in 1825–7, it was straightened, deepened and broadened in 1870 and further improved subsequently. It has a width of 50 m. at water level in Belgium (except in the Zelzate cutting near the frontier where it is 34 m.) and

of 67 m. in Holland; the depth varies from 5·70 to 8·20 m. in Belgium and 8·7 m. in Holland. An ambitious scheme planned jointly by the two countries aims to deepen the canal to 10 m. and to widen it to 200 m. (Fig. 100).

(28) The *river Dendre* is formed by the confluence of the Petit-Dendre, the Dendre and other headstreams at Ath; it flows across central Belgium to join the lower Escaut at Dendermonde. The river has been extensively canalized and is navigable from Ath. It is, however, much less important than the other Escaut tributaries.

(29) The *Blaton-Ath Canal* forms a continuation of the river Dendre, from Ath to the Antoing-Pommerœul Canal. It climbs some 32 m. on the north side, and descends 28 m. on the south side through the Beloeil and Stambruges forests.

A group of canals in the south form a line, more or less parallel to the frontier, which links the waterways of the Escaut, Dendre and Senne valleys, and continues the line of the Meuse-Sambre westwards. Their chief importance lies in the fact that they cross the Ardenne coalfield.

The *Antoing-Pommerœul Canal* (No. 30) links the Escaut near Antoing with the *Mons-Condé Canal* (No. 31), a straight west-east waterway which runs from the Escaut in France across the frontier to the *Centre Canal* (No. 32) at Mons. The last runs to Houdeng-Gœgnies, and thence is continued by the *Houdeng Branch* (No. 33) to the Bruxelles-Charleroi Canal and to the Sambre (Plate 81).

(34) The *river Durme* is a small left-bank tributary of the lower Escaut; it rises in the lowlying land near the Dutch frontier south-east of Gent, and meanders through a maze of drainage channels. It is embanked along most of its length.

The Durme is linked to the Gent-Terneuzen Canal by the *Moervaart Canal* (No. 35), and other branches are the *Zuidleede* (No. 36), the *Stekene* (No. 37) and the *Langeleede* (No. 37) Canals, all of which are officially listed as navigable, but are used primarily for drainage.

(3) The Eastern Escaut Basin

(39) The *river Rupel* is a broad estuary-like river, formed at Rumst by the union of the Nèthe-Inférieure from the east with the Senne from the south. The important Willebroek Canal joins the Rupel at Klein-Willebroek and thus the system forms a major through route between Antwerpen and Bruxelles suitable for 2,000-ton barges.



Plate 80. Bruxelles (Brussels): the *Bassin Beco* (*de Jonction*)

This barge basin connects the maritime dock of the port of Bruxelles (*Bassin Vergote*) and the Willebroek Canal with the Bruxelles-Charleroi Canal.

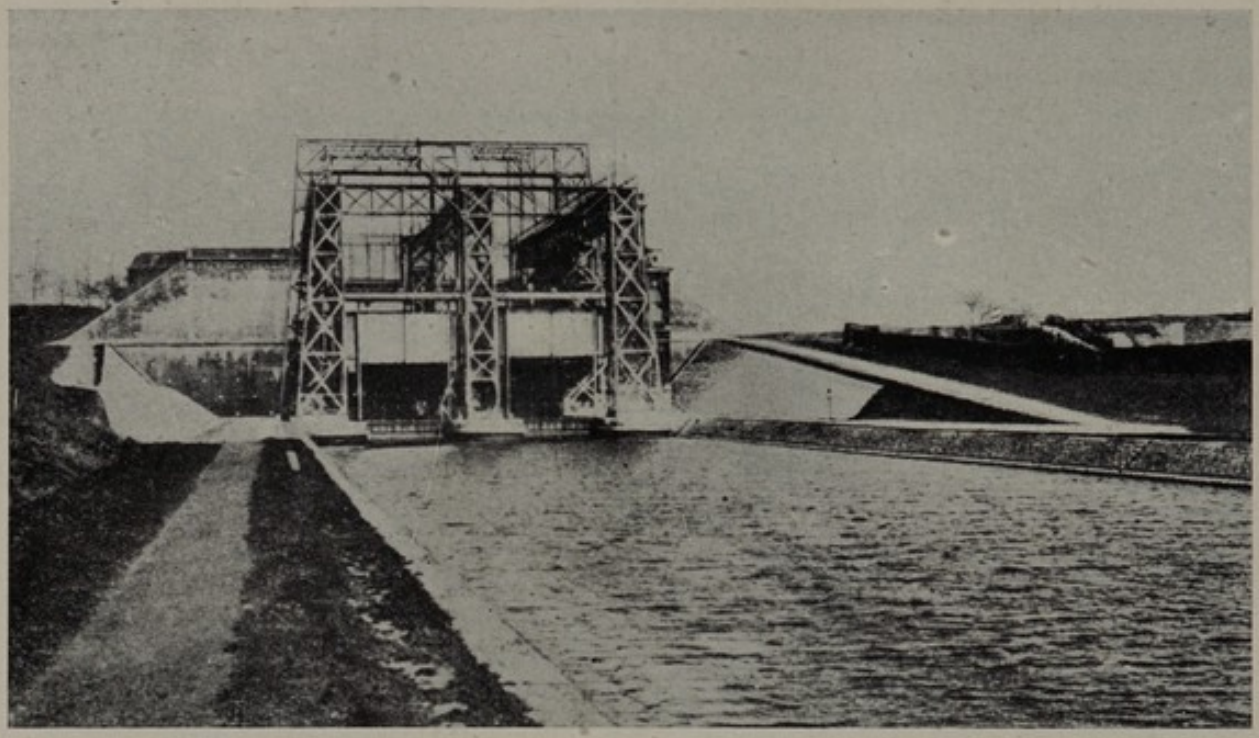


Plate 81. Barge-lift near La Louvière

In the southern part of the country only are the Belgian canals made to negotiate marked gradients; the Mons-Condé-Centre and the Bruxelles-Charleroi Canals cross the watershed and barges are raised or lowered by several electric lifts.

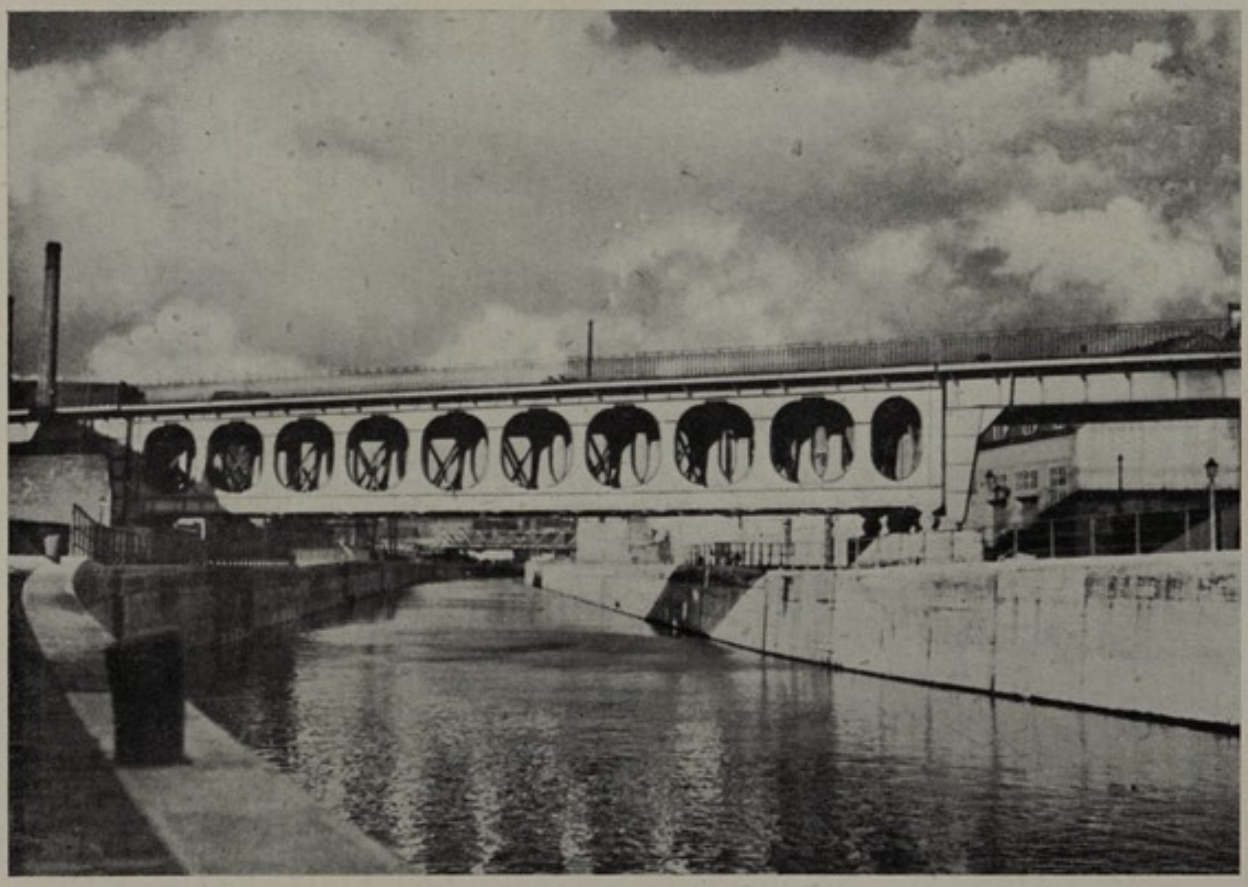


Plate 82. The Bruxelles-Charleroi Canal at Charleroi

The river Sambre at Charleroi is enclosed between concrete walls and is crossed by several railway bridges.

The south side of the Rupel is poldered and embanked, while factories (chiefly brickworks and shipyards) line the north bank.

(40) The *Willebroek (or Bruxelles-Rupel) Canal* takes 2,000-ton barges. It has a double connexion with the Rupel and runs south-east to the Senne valley where it runs near the river into Bruxelles. There are a large number of industrial establishments along the canal, including coke ovens and gas works, chemical factories, cement mills, dye works, timber yards, etc.

(41) The *river Senne* is a shallow stream with a fluctuating depth, and is used for navigation for only 6·72 km. between Schelle (at the Dyle confluence) and the Rupel. It is conducted through Bruxelles in channels which are mostly subterranean.

The river port of Bruxelles consists of a series of docks, suitable for large barges and small sea-going vessels. Situated on the west side of the town, the Bruxelles-Rupel Canal widens out to form an avant-port; this is continued by a channel to the main dock or Vergate Basin, which has numerous railway sidings leading into the adjoining Gare des Marchandises. The last basin opens at its southern end into the parallel *Bassins de Batelage* and *Beco*, the former communicates through the *Bassins de Nieuport* and *de Barthélemy* with the Bruxelles-Charleroi Canal (Plate 80).

(42) The *Bruxelles-Charleroi Canal* was constructed in 1827–32 to accommodate small vessels of some 70 tons. In 1879, works of enlargement were begun to allow the passage of 300-ton barges; these were completed to Clabecq by 1914 and to Charleroi by 1922. A scheme to allow trains of 600-ton barges or 1,350-ton individuals was approved in 1922, and by 1936 this had been put into effect as far as Clabecq. The completion of this vital median route between Bruxelles and the mining area of Hainaut, and its enlargement as the Leopold III Canal to take 2,000-ton barges, was one of the schemes in progress in 1939 (Plate 82).

The canal leaves the Sambre west of Charleroi, making a second junction with the river by the *Dampremy Branch*. It climbs up to the summit level, which it crosses in two branches through short tunnels. Just beyond the summit the Houdeng Branch comes in from the Centre Canal. The canal then descends down the Sennette and Senne valleys, involving a total fall of 108 m. by means of twenty-six locks, and passes through south-western Bruxelles into the *Bassin de Barthélemy*.

(43) The *river Dyle* rises in the hills south-east of Bruxelles and flows through Leuven and Mechelen to the junction with the Senne and the Leuven-Dyle Canal at Schelle. It is classed as navigable from

THE EASTERN ESCAUT BASIN (Fig. 124)

No. on Fig.	Waterways	Category	Length km.	Depth m.	No. of locks	Freight 1936	
						Metric tons	1,000 ton-km.
39	R. Rupel	A	11·98	1·35–7·15	—	6,708,511	35,004·8
40	Willebroek (Bruxelles-Rupel) C.	A	31·56	6·50	3	5,742,792*	136,175·8*
41	R. Senne	C	6·72	0·40–4·75	—	11,498	45·9
42	Bruxelles-Charleroi C.	B to Clabecq, C to Charleroi	72·62	2·40–3·00	37	3,032,989	100,231·9
43	R. Dyle	C	28·52	1·50–5·75	2	967,423	1,841·4
44	R. Démer	C and D	33·21	1·00–1·20	1	50	0·6
45	Leuven-Dyle C.	C	30·04	3·60	5	805,096	19,753·8
46	R. Grande-Nèthe	D	44·29	0·40–2·80	7	Nil	Nil
47	R. Petite-Nèthe	C	6·01	1·35	4	57,167	100·2
48	R. Nèthe-Inférieure	C	15·07	0·45–4·40	—	166,180	1,572·4

* These returns do not include freight carried in sea-going ships; figures for the latter were 893,186 metric tons and 23,497·9 ton-km.

the Démer confluence at Werchter, but there is little traffic above Mechelen.

(44) The *river Démer* drains the uplands west of the Meuse, and has been embanked and regularized as far as Diest. It is, however, little used, and only 50 tons were conveyed on it in 1936.

(45) The *Leuven-Dyle Canal* runs south-west from the Dyle-Senne confluence at Schelle through Mechelen to Leuven. About 4 km. north of Leuven it re-enters the Dyle valley, and reaches its terminus through a gap in a low ridge.

Nearly one-half of its freight consists of agricultural produce, fertilizers, etc., as the canal serves a farming area, and Leuven has for long been a distributing centre. Its importance has diminished, for the enlarged Willebroek Canal has emphasized the pre-eminence of Bruxelles as a distributing centre.

(46) The *Grande-Nèthe* joins the *Petite-Nèthe* at Lier. Their numerous headstreams rise on the low Kempenland plateau, and both rivers are siphoned under the Albert Canal. Below Lier, the river becomes the *Nèthe-Inférieure*, which flows west to the Senne confluence, below which the joint river becomes the Rupel.

Formerly, the Petite-Nèthe linked the Escaut-Meuse Junction Canal to the Rupel, and navigation could proceed to the Escaut and so to either Antwerpen or Gent. However, in 1936, less than 60,000 tons of freight passed along the Petite-Nèthe. After the Albert Canal project had been started, the advantages of the more direct route between the Kempenland coalfield and the Rupel were once more brought forward; it was also claimed that a first-class waterway would not only help to remove the Nèthe flood waters which periodically inundated its basin, but would also strengthen the defences of Antwerpen by forming a broad water barrier on the south-east. This waterway, known as the *Viersel-Lier-Duffel Canal*, follows approximately the line of the Petite-Nèthe and the Nèthe-Inférieure, and uses sections of their courses; as it had not been completed by 1940 it is not shown on Fig. 124, nor included on the table on p. 524. The canal will be 14·5 km. long between its junction with the Albert Canal at the Viersel Lock and Duffel on the Nèthe-Inférieure; about 8 km. had been completed by 1940. Below Duffel the Nèthe will be ultimately enlarged to the same dimensions as the canal. When completed, the waterway will in effect form the final section of a Belgian 'Mittelland' canal from Oostende to Liége across the country, via Brugge, Gent, Rupelmonde, Lier and Herentals, and will obviate the necessity of through traffic being obliged to negotiate the Antwerpen docks.

(4) The Meuse Basin

(49–50) The *river Meuse* rises near the southern edge of the Lorraine plateau, and flows northward into Belgium, crossing the Ardenne in a gorge-like valley. At Namur it receives the Sambre, and follows its direction along the foot of the Ardenne to Liége, thence north into the Netherlands at Maastricht. The river is calm and even-flowing in France, but after it receive the Semois and Sambre it becomes torrential with a variable regime. At very low water the flow is less than 35 cu. m. per sec., while at its maximum it may be 2,500–3,000 cu. m. per sec. Its natural depth before regularization varied very considerably, and even now with stabilizing barrages there is some fluctuation; the average is usually less than 1·5 m. A rise of water level up to 2·5 m. is met by opening the sluices. Liége announces high water 6 hr. before Visé, 12 hr. before Maastricht and 52 hr. before Venlo.

The river has been canalized completely from the French frontier near Givet to the lock at La Fonderie below Liége; it has been partly canalized from Liége to Visé and on through Maastricht. First attempts at regularization began in 1852 and have gone on steadily if slowly ever since. The old-type weirs, designed to raise the water level in successive reaches, were built in 1862–7, and newer ones in 1874–80. After the war of 1914–18, the *Commission des grands Travaux*, responsible for all new waterway works, began the execution of new schemes to lengthen individual reaches by replacing the seven existing barrages by others at Ombret, at Yvoz-Ramet and at Liége-Monsin. The locks were to be enlarged to take 2,000-ton individual barges, and the river was to be dredged to a uniform depth of 4·5–5 m. The barrage at Monsin was finished in 1930, and the one at Yvoz-Ramet in 1938; the third is still a project. When the schemes are completed, the river will be accessible as far as Namur to vessels of 1,350–2,000 tons, and will form a continuation of the Albert Canal. At present these large barges can go through to Huy.

Parallel to the section between Liége and Maastricht is the Liége-Maastricht Canal, the Belgian portion of which as far as Lanaye has been incorporated in the Albert Canal, while the Juliana Canal runs alongside the section north of Maastricht. The river itself between Wandre and Visé has been canalized, and forms a duplicate to the Albert Canal, joined to it at Visé by the Haccourt Junction Canal and at Wandre by a lock. The other sections of the Meuse between

THE MEUSE BASIN (Figs. 125–6)

No. on Fig.	Waterway	Category	Length km.	Depth m.	No. of locks	Freight, 1936	
						Metric tons	1,000 ton-km.
49	R. Meuse (canalized Belgian section)	Liége to Huy A; Huy to Namur B; Namur to French frontier C	123·89	2·10–2·75	21	7,133,064	240,772·1
50	R. Meuse (partly or not canalized)	Wandre to Visé B; rest D	63·26*	0·50–2·10	—	425,678	867·0
51	R. Sambre (Belgian section)	Charleroi-Namur B; below Namur C	93·42	2·10	22	3,233,500	99,166·2
52	R. Ourthe	C and D	106·54†	0·30–2·10	7	156,500	69·9
53	R. Amblève	C	10·98	0·25–0·70	—	Nil	Nil
54	R. Lesse	D	33·01	0·20–0.60	—	Nil	Nil
55	R. Semois	D	79·71	0·40–0·60	—	Nil	Nil

* Navigation is virtually restricted to the lowest section of 11·84 km.

† Only 19·0 km. are actually utilized for navigation.

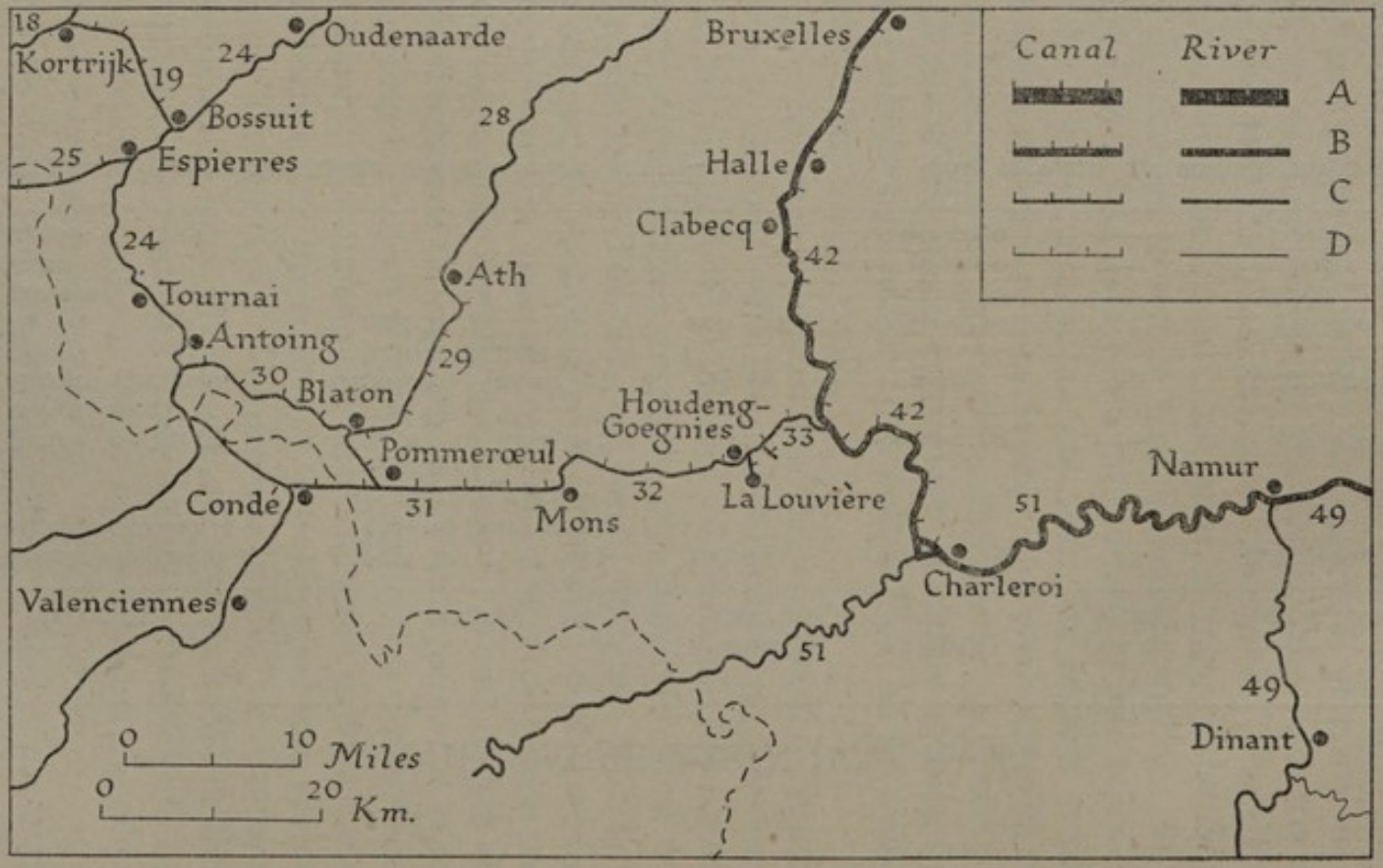


Fig. 125. The waterways of southern Belgium

Based on G.S.G.S. Series 2517, 1 : 380,160, Belgium and North-east France (1938).

Monsin and Wandre and between Visé and Maastricht have remained virtually useless for navigation.

The river serves the mining and heavy industrial area between Namur and Liége, and with the Sambre serves the great Charleroi area. As a result, in 1936 the river carried nearly half a million tons of coal and coke.

(51) The *river Sambre* is navigable from Landrecies in France, at which point it is continued by the Sambre-Oise Canal to the Paris Basin. The river flows through the industrial region of Charleroi in a series of great meanders, the necks of which have in several cases been cut through to rectify the channel. Below Charleroi it flows through a steep-sided wooded valley, along which is a series of industrial districts.

A seven-year scheme to improve the navigation between Marchienne-au-Pont and Namur was begun in 1936. Up to that date the twelve locks would take only 250-ton barges upstream and 340-ton downstream; the new scheme will allow the locking of 1,800-ton individuals and 600-ton strings.

The river port of Charleroi extends along the Sambre, from the junction of the Dampremy Branch of the Bruxelles-Charleroi Canal. The chief port area is on the island formed between the Sambre and a canalized loop to the north which provides over 4 km. of quays. In addition, the *Bassin de Mambourg*, which has free access to the river, has been excavated west of the main port.

(52–55) *Minor Meuse Tributaries*

The river *Ourthe* (No. 52) flows in deeply incised meanders across the hilly country east of the Meuse. It has a double connexion with the Meuse at Liége, in the southern suburbs and also to the north-east of the town. The river has been canalized to Esneux (11·84 km.) and is classified as navigable for a further 94·70 km., but this last section is little used.

The Ourthe is joined by the river *Amblève* (No. 53) near Comblain-au-Pont, and although classified as navigable as far as Remouchamps (11 km.), it is shallow, variable and rarely used.

The rivers *Lesse* (No. 54) and *Semois* (No. 55) both flow in deep valleys across the wooded Ardenne. Neither is used much for navigation.

(5) The Kempenland (Campine)

(56–58) The *Turnhout-Antwerpen* (No. 56), *Turnhout Branch* (No. 57), and *Hasselt Branch* (No. 58) *Canals* form a continuous waterway from Antwerpen across the western Kempenland. Except for No. 56, which serves the brick-fields, cement works and potteries of the Turnhout district, these waterways have been rendered largely redundant by the completion of the Albert Canal.

(59) The *Meuse-Escaut Junction Canal* (or *Kempen Canal*) was originally the most direct water route between Antwerpen and Liége. It runs east-north-east across the Kempenland plateau and joins the Maastricht-'s Hertogenbosch Canal near Bocholt. It is embanked along most of its length; in places there are large banks set back 50 m. from the water edge.

(60) The *Beverloo Branch Canal* runs south from No. 59 to Leopoldsburg near the great military camp at Beverloo.

(61) The *Maastricht-'s Hertogenbosch* (or *Zuid Willemsvaart*) *Canal* runs south from 's Hertogenbosch, situated in the Netherlands on the river Dommel near its junction with the Maas, into Dutch Limburg. After crossing the frontier it runs south-east into the Meuse valley, re-enters the Netherlands near Smeermaas, and follows the Meuse into Maastricht. Its curious course is accounted for by the fact that it was constructed while the Netherlands and Belgium were a single political unit.

(62) The *Neerharen-Briegden Junction Canal* was constructed in 1935; it skirts the frontier on the Belgian side and links No. 61 to the Albert Canal near Briegden.

(63) The *Albert Canal* joins the Meuse and the Escaut by a direct all-Belgian route. Its construction reduced the time between Antwerpen and Liége from 77 hr. for a tow of four lighters and 42·5 hr. for a self-propelled barge by the old Kempenland canals, to 24 and 16 hr. respectively by the new route. The old canals were too shallow to take vessels greater than 600 tons, and the obstacles presented by the numerous locks, by swing bridges and by the political disabilities of the Maastricht enclave caused lengthy delays. The new canal was also intended to have a strategic importance, as it duplicated the obstacle of the Meuse and formed a tank-trap across the north-east of Belgium. It placed both Antwerpen and Liége in direct communication with the new Kempenland coalfield. Coal barges loaded at the Genk coal-port could deliver in Liége 7 or 8 hr. later, while it was

THE KEMPENLAND (CAMPINE) (Fig. 126)

No. on Fig.	Waterway	Category	Length km.	Depth m.	No. of locks	Freight 1936	
						Metric tons	1,000 ton-km.
56	Turnhout-Antwerpen C.	B	37·33	2·40–2·72	10	1,812,350	50,402·5
57	Turnhout-Branch C.	B	25·98	2·50	—	1,704,899	38,363·1
58	Hasselt Branch C.	B	39·15	2·30	1	1,618,517	35,225·1
59	Meuse-Escaut Junction C.	B	86·40	2·30–2·75	10	8,692,981	335,748·1
60	Beverloo C.	C	14·80	2·10	—	619,741	3,904·1
61	Maastricht-'s Hertogenbosch C. (Belgian section)	B	44·65	2·30	2	5,498'067	168,105·0
62	Neerharen-Briegden Junction C.	B	5·12	2·75–3·75	2	8,692,981	335,748·1
63	Albert C.	A	129·6	—	6	8,453,956*	66,763·5†
64	Liége-Maastricht C.	B	14·81	2·50–2·80	2	6,270,408	84,497·2

* In 1936 navigation took place only on the sections Monsin-Wandre and Lanaye-Briegden; the tonnage given here represents the total for these sections. Traffic on sections of other canals (Turnhout-Antwerpen Canal and Hasselt Branch Canal), which were being incorporated into the Albert Canal, is included in the totals for those canals.

† Sections of 6 km. from no. 56, of 23 km. from no. 58 and of 18 km. from no. 64 have been reconstructed and incorporated in the Albert Canal.

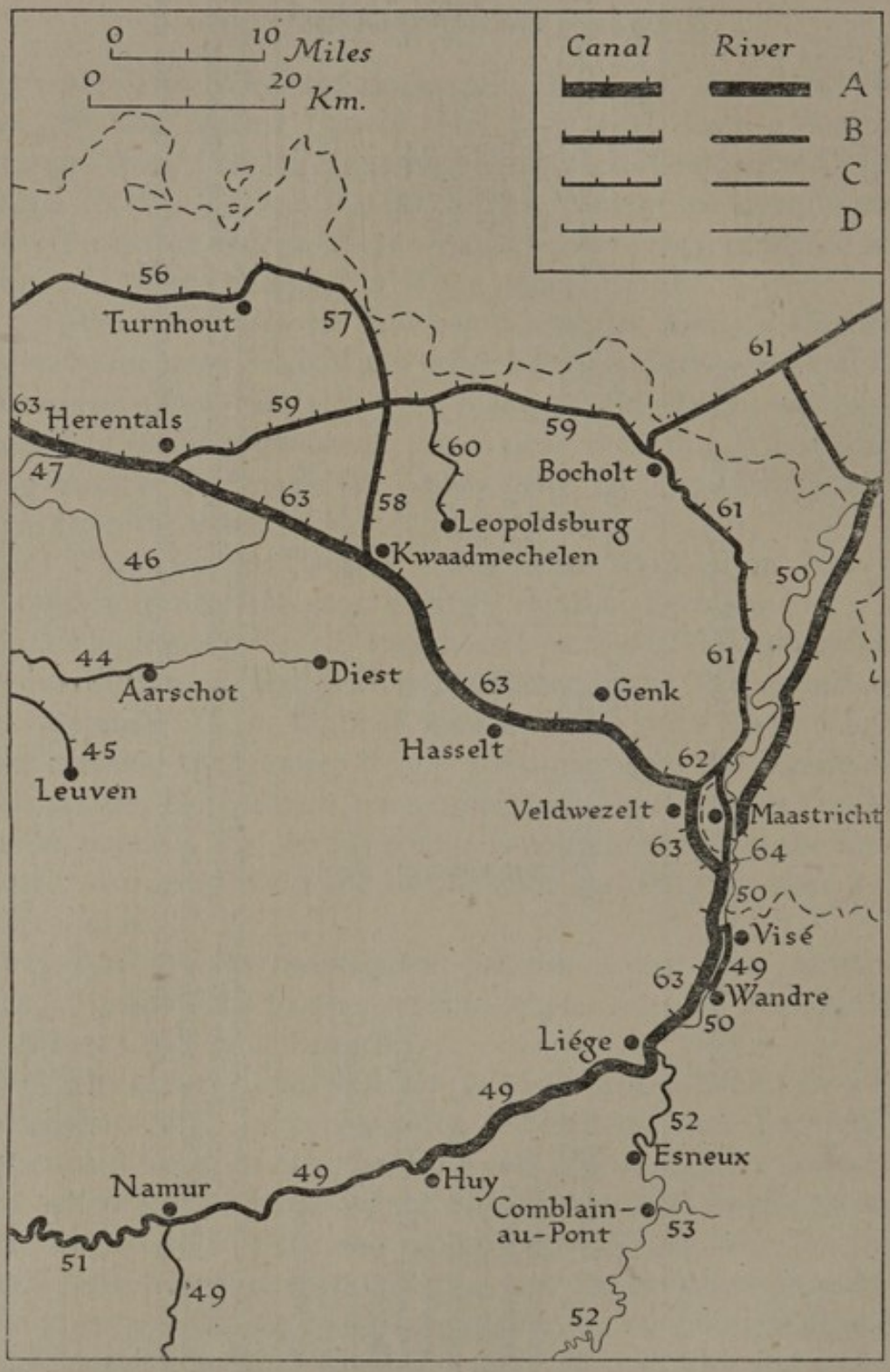


Fig. 126. The waterways of eastern Belgium

Based on G.S.G.S. Series 2517, 1 : 380,160, Belgium and North-east France (1938).

hoped that Limburg coal would gradually replace the Ruhr coal which was extensively used at the Belgian ports.

The project took ten years to complete; the intended opening at the International Water Exhibition at Liége on 20 July 1939 was postponed owing to a disastrous breach in the embankments near Hasselt. It was finally opened on 25 December 1940.

The canal was built in eight locked sections, with a total fall in water level of 56 m. between Liége and Antwerpen, as follows:

Section	Height of mean water level above datum m.	Length km.
Meuse-Monsin lock (within Liége)	60·00	2·0
Monsin lock-Genk	60·00	39·4
Genk-Diepenbeek	49·90	4·2
Diepenbeek-Hasselt	39·80	4·6
Hasselt-Kwaadmechelen	29·70	27·2
Kwaadmechelen-Oolen	19·70	18·6
Oolen-Wijnegem	9·70	23·9
Wijnegem-Lefebvre Dock (Antwerpen)	4·00	9·7
		129·6

This fall of 56 m. is covered by six groups of locks; the seventh lock at Monsin is used to keep the level of the Meuse at Liége stable at 60 m., and is normally open. Each group consists of three locks, of which the two largest will each take a 2,000-ton Rhine barge and the smallest a 600-ton barge; thus a tonnage of 4,600 can be locked through simultaneously, that is, a possible 66 million tons per annum. There are sixty-five bridges, of which five are of reinforced concrete and sixty of steel. Few of the old bridges were retained. The cross-section was chosen to admit with ease barges of 2,000 tons. In practice, the most used vessel is the 1,350-ton barge, as ease of handling makes this the most economical size.

The river port of Liége consists of over 40 km. of quays along the canalized Meuse and its confluent the Ourthe. Upstream is the port of Rénory, downstream the port of Monsin. The various ports around the city have been grouped into the autonomous port of Liége; it handled some 5 million tons in 1936, and this total will be greatly increased when the Albert Canal is working normally (Fig. 80).

The canal leaves the Meuse below Liége near Monsin Island, and as far as Lanaye it utilizes the old *Liége-Maastricht Canal* (No. 64). This canal was built in 1850 to avoid the unnavigable section of the Meuse. In places new embankments were built; between Haccourt and

Lanaye, for example, the great banks are in places 240 m. thick at the base. In other parts the sides are formed by vertical concrete piles.

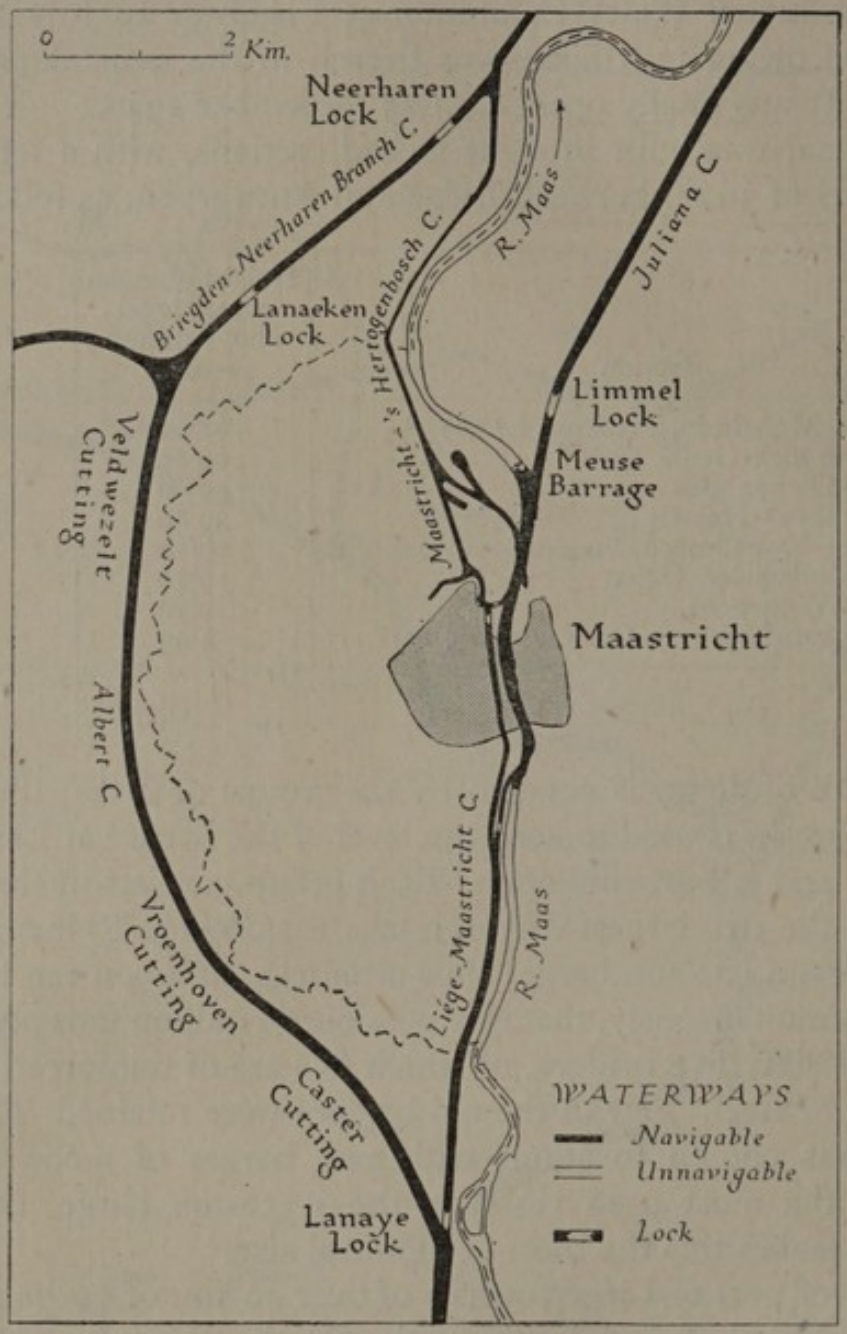


Fig. 127. The Albert Canal and the Maastricht enclave

Based on G.S.G.S. Series 4041, 1 : 25,000, France and Belgium, sheets 58 NE, 58 SE (1940).

At Lanaye the canal leaves the Meuse valley and encounters the steep edge of the Kempenland plateau, the major engineering obstacle to the route. A deep cutting, the Tranchée de Caster, was made through the St Pietersberg ridge to the Geer valley, which is crossed obliquely; the river Geer passes below the canal in a

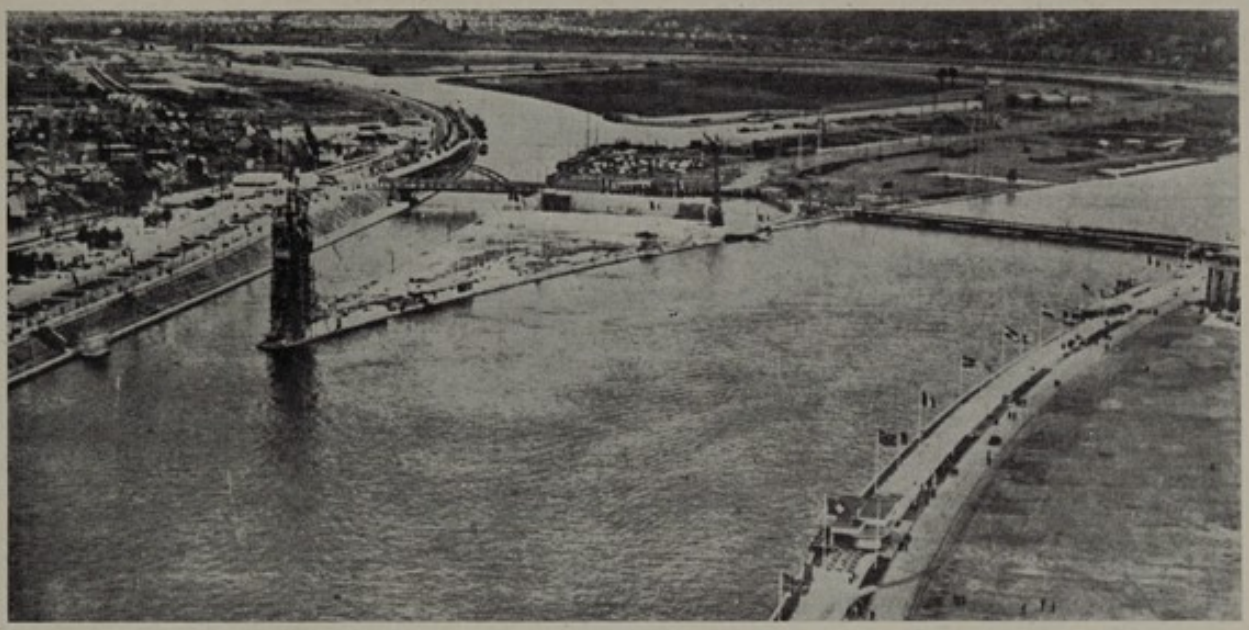


Plate 83. The junction of the Albert Canal and the river Meuse near Liége

Between the Albert Canal (left) and the Meuse (right) lies *Ile Monsin*; at its apex there now stands a massive memorial to King Albert. The photograph, which was taken in 1939, shows the preparations for the International Water Exhibition at Liége.

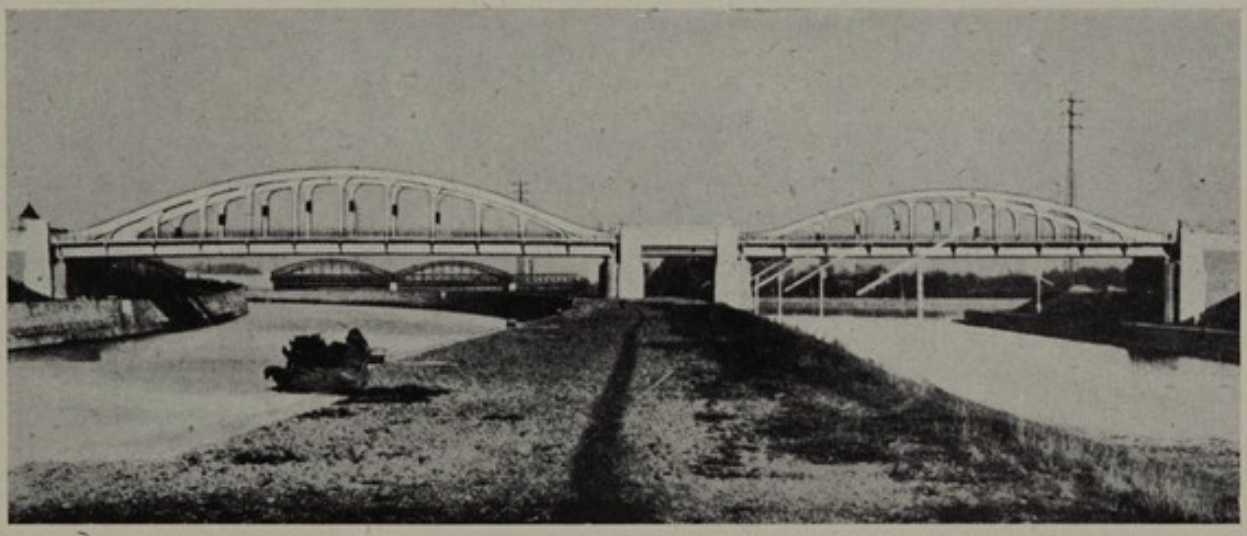


Plate 84. The Albert Canal and the Meuse

Between Liége and Lanaye, the Albert Canal (left) and the river Meuse run closely parallel to each other. Both waterways are crossed by several steel and ferro-concrete bridges.

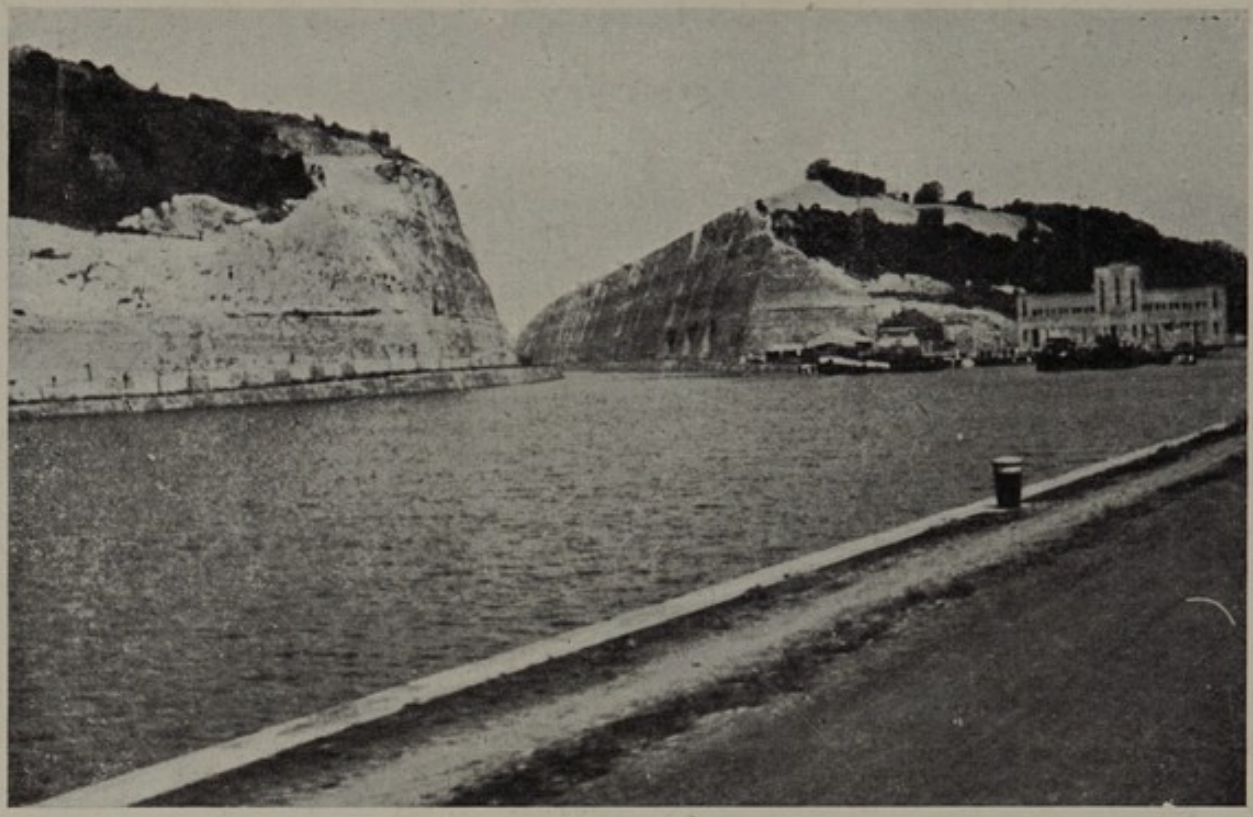


Plate 85. The Albert Canal, near Lanaye

From Liége to Lanaye the Albert Canal follows the bed of the old Liége-Maastricht Canal; near Lanaye, the latter (right) continues north to Maastricht while a deep cutting has been made through the St. Pietersberg ridge to take the Albert Canal west of the Maastricht enclave.



Plate 86. The Albert Canal, near Veldwezelt

The photograph gives a clear indication of the immense excavations involved in taking the canal across the eastern part of the Kempenland plateau. This bridge near Veldwezelt was one of the two bridges crossing the Albert Canal to be left intact in May 1940.

reinforced concrete culvert. Then come the great Vroenhoven-Veldwezelt cuttings, nearly 9 km. long, 175–205 m. wide, and in places 65 m. below the surface of the plateau (Fig. 127). The immense amount of excavated earth was removed to other sections to build the embankments (Plates 83-6).

From Briegden to Genk is another cutting through the low Eigenbilzen hills. The new coal port near Genk consists of a large basin 950 m. long and 81 m. broad, situated where the canal turns due west near the Genk locks. It is equipped with modern coal-loading equipment, and is connected by rail with the collieries at Winterslag, Waterschei, Zwartberg and Houthalen. Coal ports have also been constructed farther along the canal near Zolder and Beringen.

For the rest of its course, the canal follows the enlarged Hasselt Branch and Escaut-Meuse Junction Canals, with a new stretch of about 30 km. between them. The last 11 km. of the Escaut-Meuse Canal has now been filled in; the new locked junction is at Herentals, where a port has been constructed on the north bank of the main canal. The cul-de-sac which was formerly the extremity of the Hasselt Branch Canal, has been enlarged to form the port of Hasselt, with free access to the main canal. The latter continues westward in shallow cuttings, except where it crosses the Nèthe valley between embankments.

In the suburbs of Antwerpen, a short branch running north from the main canal forms the port of Merksem. The old Escaut-Meuse Junction Canal entered the city at the Breda military gate through the moats of the fortifications, ending in the Asia Dock. The new canal runs directly into the Strasbourg and Lefebvre Docks (Fig. 103).

Conditions since the German Occupation

Plans for modernizing and restoring the Belgian fortifications after 1933 included new lines of defence along the Maastricht-'s Hertogenbosch, the Meuse-Escaut and the Albert Canals. It was decided during the alarms of the winter 1939–40 that the Albert-Meuse line between Antwerpen-Liége-Namur was too extended, and could only be regarded as a covering line. When hostilities broke out on 10 May 1940, the Germans obtained a foothold on the left bank of the Albert Canal behind the Vroenhoven, Veldwezelt and Briegden bridges, nullifying the physical barrier presented by the canal to mechanized forces. After the break-through at Sedan, the Allies withdrew

behind the Rupel-Charleroi line, then to the Dendre, and then to the Escaut.

The Belgian waterways suffered considerably, due chiefly to Allied demolition work; numerous bridges were blown up,* and it was estimated that over 1,000 barges, in many cases cement-laden, had been sunk. The German authorities began immediately to repair the damage. By September 1940, it was stated that most bridges had been replaced by temporary structures, by October the Albert Canal was navigable between Liége and Hasselt and the Meuse had been cleared, and by November the route between Liége and Antwerpen via Turnhout was clear. By December 1940, the whole of the waterways were reported to be clear except the Albert Canal, the river Dendre and the upper Escaut. The Albert Canal was reopened early in 1941, and it was reported by the summer of 1942 that every section of the system of waterways was in service.

BIBLIOGRAPHICAL NOTE

1. Detailed statistics of the dimensions of the waterways, and of the character and volume of freight carried, are contained in the *Annuaire statistique de Belgique* (Gand). These figures are analysed yearly in considerable detail in *Annales des Travaux Publics de Belgique: Mouvement de la Navigation Intérieure* (Bruxelles), The latest volume of this is No. 40 (1939), dealing with the year 1936.

2. The chief sources for the history of Belgian waterways are:

(*a*) O. Teubert, *Die Binnenschiffahrt: Ein Handbuch für alle Beteiligten* (Leipzig, 2nd edition, 1932). Part II of this monumental work describes the historical development of European waterways country by country.

(*b*) Y. Urbain, 'La formation du réseau des voies navigables en Belgique,' in *Bulletin de l'Institut de Recherches économiques*, vol. IX, p. 273 (Louvain, 1938–9).

3. The international problems relating to the navigation of the Meuse and Escaut are described in the following:

(*a*) G. Kaeckenbeeck, *International Waterways* (London, 1918). A descriptive monograph based on diplomatic documents, dealing with various points of international law.

(*b*) P. M. Ogilvie, *International Waterways* (New York, 1920). This lists the treaties, conventions and agreements referring to individual waterways.

(*c*) H. A. Smith, *The Economic Uses of International Rivers* (London, 1931). This contains an interesting section on the Dutch-Belgian disputes concerning the improvement of the Meuse and the construction of the rival Albert and Juliana Canals.

4. A discussion of the political and physical problems of the Meuse basin is contained in L. Ardent, *Le problème de la Meuse* (Bruxelles, 1931).

5. The physical geography of the triple delta is described in H. J. Mackinder, *The Rhine*, chapters XI and XII (London, 1908).

* It was stated that the number of bridges destroyed on various waterways was as follows: Charleroi-Bruxelles Canal, more than 100; Mons-Condé Canal, 30; within Gent, 40; Roeselare-Lys Canal, 16; Kortrijk-Bossuit Canal, 18; Albert Canal, 64; and river Lys, 30.

6. An interesting study of the three great ports of the Escaut-Meuse-Rhine delta is given by J. de Keuster, *Hambourg, Rotterdam, Anvers* (Antwerp, 1930).

7. The construction of the Albert Canal is described fully by A. Delmer, *Le Canal Albert* (Liége, 1939). Vol. I consists of text, very fully illustrated with photographs and diagrams; vol. II consists of nineteen folded sheets of maps, geological cross-sections, etc. A series of four sheets covers the whole canal on a scale of 1:100,000.

8. Numerous detailed and often well illustrated articles have appeared in the following periodicals:

(*a*) Belgian:

Bulletin de la Société belge des Ingénieurs et des Industriels, (Bruxelles), *Bulletin du Cercle des Géographes Liégois* (Liége), and *Bulletin de la Société belge d'Études géographiques* (Bruxelles). Mention must be made especially of the article in the last of these, vol. VI, pp. 40–6 (1936), by A. Delmer, 'L'Influence des Voies navigables sur la Localization de l'Industrie belge'.

(*b*) Dutch:

Waterstaats—Ingenieur ('s Gravenhage), and *De Ingenieur* ('s Gravenhage).

(*c*) German:

Wasser und Wegebau Zeitschrift; *Verein Deutsche Ingenieur*; *Der Bau-ingenieur*; *Wasserstrassen Jahrbuch*; and *Zeitschrift für Binnenschiffahrt* (all of Berlin).

(*d*) French:

Génie Civile; *Travaux* (formerly *Science et Industrie*); *Annales de Ponts et Chaussées* (all of Paris); and *La Navigation du Rhin* (Strasbourg).

(*e*) English:

Modern Transport; *Dock and Harbour Authority*; *Engineering*; *The Engineer*; *Proceedings of the Institution of Civil Engineers*; and *Proceedings of the Institute of Transport* (all of London). Attention may be drawn to a series of well illustrated articles on the Albert Canal in *Engineering*, vol. CXLVIII, pp. 375 et seq.

Appendix I

THE GERMAN OCCUPATION 1914–18

The first occupation of Belgium from 1914 to 1918 began with a series of atrocities committed against the civilian population by the advancing German army, drunk with success. But, once the country had been occupied, the German administration was, until late in 1916, relatively moderate in its exercise of power and, again during the first two years, showed considerable respect for the rules of international law governing the occupation of another country and gave little serious evidence of any intention to attempt the annexation of Belgium to the Reich. When, in December 1914, the first military governor, Von der Goltz, was succeeded by von Bissing the internal situation of the country had reached a certain degree of stability and, so long as he could resist the pressure of the High Command, von Bissing sought to rule as mildly as possible if only on the grounds which he gave in a speech of 19 June 1915: 'I believe that a squeezed lemon has no value and that a dead cow no longer gives any milk.' So far as he was allowed to pursue it, von Bissing's policy was to keep Belgium calm and to make its industry as useful as possible to the Reich.

The administrative area which he controlled included all Belgium except the zone behind the front line, which fell immediately under the Army Command and was ruled solely by military law. Within von Bissing's area there was a threefold set of authorities. There was the German military authority, of which von Bissing, as Governor-General, was head, with a military governor for each Belgian province, and subordinate military authorities. There was, too, a German civil administration at each level with a chief administrator, *Regierungspräsident* Dr von Sandt, subordinate, however, to the Governor-General, whose authority derived directly from the Kaiser himself. It was the Governor-General who claimed and exercised legislative power over the occupied territory, and his decrees, covering every measure he deemed necessary to safeguard the interests of Germany, severely limited the sphere of civil government.

The third set of authorities was that of the Belgian state. Although the ministries of Foreign Affairs, War and Colonies were suppressed,

those of the Interior, Justice, Finance, Agriculture and Public Works, Science and Art, Industry and Labour, were retained. Both the central and local Belgian courts continued to administer Belgian law 'pronounced', as Pirenne says, 'in the name of the Belgian people and executed in the name of the king', and, though the process of election was suspended, the existing elected permanent deputations of the provinces and the burgomasters and councillors (échevins) of the communes continued to function, even if under control and constant pressure from the German civil authorities. Yet the continuance of these native institutions and administrators did much to alleviate the lot of the Belgian people during the first two years of von Bissing's rule. A Burgomaster Max might be dismissed and carried off into exile, but his protests, and the further protests aroused by German treatment of him, were not without their effect. In addition, the influence of the Catholic Church was thrown wholeheartedly on the side of the people, and magnificently led by Cardinal Mercier, who appealed in burning words to world opinion, it was able to impose important limitations on the exercise of German power.

It must be remembered, too, that world opinion was a serious factor in the years 1914–17. In the Ministers of America and Spain, Mr Brand Whitlock and the Marquis de Villalobar, and the Ministers of the other neutral states, the Belgians then had helpers able to give efficacious assistance such as, during the present occupation when no Great Power remains neutral and when Spain is officially pro-Axis, they necessarily lack. This help was forthcoming on many issues which arose, but its greatest importance lies in the organization set up by the *Comité National de Secours et d'Alimentation*, itself developed from a Bruxelles Committee supported vigorously by Burgomaster Max and many industrialists and financiers of the capital. The influence of the American Ambassador in London, Mr Page, and the organizing powers of Mr Hoover assisted the Committee, and the British government was persuaded to allow foodstuffs to be sent to Belgium through the blockade; and at the same time, the German government was persuaded to give the necessary guarantees that this relief of Belgian necessity should not be used as a lever to take out of Belgium the home-produced products which would, without it, have been consumed in the country. As early as 2 November 1914, a first shipload of 2,300 tons of flour reached a Belgian port and the work of the *Comité National* increased steadily, so that, before the end of the occupation, 2,313 ships flew its flag and the total imports

effected under its aegis have been estimated at some 5,000,000 metric tons.

But the importance of the *Comité National* was not confined to the direct relief it provided for the food requirements of the Belgian people. Though organized strictly as a private benevolent society with no political attachments of any kind, its voluntary organization, stretching over the whole of the occupied territory, inevitably took on a national and patriotic character and, in fact, served directly to assist resistance to the occupying power, not only by keeping up the spirit of the Belgians, by giving them the sense that the moral and material assistance of the outside world was on their side, but even more directly by supporting the workers in industry who were unemployed either because of the reluctance of themselves and their employers to work for the German war effort, or through the lack of raw materials with which to carry on. Von Bissing indeed once described the *Comité National* as a 'state within the state'.

It has been seen that von Bissing pursued a policy of conserving Belgian resources, though for the benefit not of the Belgians but of the Reich. But, as the war went on and the pressure of the Allied blockade made itself increasingly felt, the High Command grew impatient with the limitations which this policy involved. The imperative need for more and more workers in the German war industries drove them to regard von Bissing's relative mildness as inadmissible, and whilst, during 1914–16, von Bissing and the imperial government had in no way committed themselves on the question of Belgium's future status, the High Command, from 1916 onwards, increasingly adopted an annexationist policy. From the summer of 1916, therefore, von Bissing's position became increasingly difficult, and he was replaced, on his death in April 1917, by General von Falkenhausen, who was more ready to follow the policy of the High Command.

The first stages in the increased stringency of German policy towards occupied Belgium occurred whilst von Bissing was still Governor. Under pressure from the High Command, and despite von Bissing's protests, it was decided, at the end of September 1916, to export Belgian workers forcibly to Germany. Because of the refusal of the local Belgian authorities to hand over their lists of unemployed the German military authorities seized any available men to make up the numbers required. This gross breach of international law naturally met with the strongest opposition from the Belgian side. Cardinal Mercier and the other bishops, senators and

deputies, judges, magistrates and professors, trade union and socialist organizations joined in sending protests to the Governor-General. They were supported by protests to Berlin from the Vatican, Spain and the United States, Switzerland and the Netherlands. Finally, in February 1917, under pressure from the Marquis de Villalobar, Spanish Minister at Bruxelles, the chief of the German civil administration sent an appeal drawn up by Cardinal Mercier and signed by the most eminent Belgians to the Kaiser himself. On 9 March the Kaiser in his reply suspended further deportations and promised that those wrongly seized as unemployed should be permitted to return.

But, though defeated in the policy of deportation from the Government-General, the High Command continued to force Belgians and Frenchmen in the zone behind the lines directly under their control to labour for the German army. Nor did they abandon their determination to pursue an annexationist policy with regard to the country as a whole. The rejection by the Allies, in December 1916, of German peace proposals, and the rupture of diplomatic relations with the United States as a consequence of the adoption of unrestricted submarine warfare, only increased the resolve of Hindenburg and Ludendorf not merely to treat Belgium as a pawn in the diplomatic game, but as a prize of war to be exploited ruthlessly in the gamble for final victory, as a piece of valuable territory ultimately to be united in some way with the Reich, not as an independent state. Thus, during 1917–18, German policy in Belgium took on a twofold aspect. Politically it sought to break up the solidity of the Belgian state by encouraging a Flemish separatist movement (Activism)* and by dividing the country into two separate administrative provinces, one Flemish, the other Walloon (see p. 140). Economically it sought to extract the last ounce of advantage from Belgian industry by forcing industrialists and workmen to work directly for Germany or, if they refused, by simply removing Belgian machinery wholesale into Germany for use there.

The political side of this policy was expressed in the edict of 21 March 1917, separating the administration of Flanders from Wallony, the official recognition of a self-elected Council of Flanders—the *Raad von Vlaanderen*, popularly christened the 'Verraad', i.e. betrayal, of Flanders—and the insistence on the use of the Flemish language in all governmental acts in Flanders. But the results were not happy for the new Governor, von Falkenhausen.

* See chapter on Flemish-Walloon problem (Chap. VII).

It was, indeed, possible to find enough Flemish Activist traitors to form some sort of local administration in Flanders, though even here the vast majority of 'Flamingants' stood aside as soon as they realized that Germany was using the Flemish movement as a means to break up Belgian unity. But, in the Walloon area, the local administration could hardly be brought into being at all for lack of tools to man it, and the Germans themselves were forced, in 1918, to ignore the administrative separation which they had imposed. Worse still, the Belgian Court of Appeal at Bruxelles, on being presented with an indictment against the treasonable activities of the Council of Flanders, ordered the Public Prosecutor to take action against the members of the Council and their abettors. The intervention of the German army and the arrest and deportation of some of the Belgian judges led, in February 1918, to a general strike of the judges, barristers and servants of the courts. Von Falkenhausen was compelled to construct German courts to take their place and to replace the recalcitrant local magistrates either by Flemish traitors or by Germans. The political attack on Belgian unity had produced administrative chaos and, as the fortunes of the German army declined during 1918, the wretched Activists found themselves deserted by their protectors and, when Germany collapsed, forced to flee for their lives.

The more vigorous economic exploitation of occupied Belgium began at the same time as the new political policy. A decree of 17 February 1917 laid down that from 1 March no Belgian factory could continue to work without permission from the German civil authorities. Those industrialists who refused to seek their permission, and closed their works, saw their machinery removed to Germany. But very soon the requisitioning of Belgian machinery was extended beyond the terms of the decree, and Belgian heavy industry suffered particularly heavily. Pirenne writes, in *La Belgique et la guerre mondiale*, that twenty-six out of thirty-seven blast furnaces were demolished, as well as eighteen out of twenty-three rolling mills belonging to the two largest steel companies. But other industries also suffered, especially those in whose machinery copper was used, whilst Belgian rolling stock and railway engines, and even the iron from bridges and the rails from branch lines, were seized and sent into Germany during this last period of desperate exploitation.*

* The main authority for the situation of Belgium under the German occupation 1914–18 is H. Pirenne, *La Belgique et la guerre mondiale*. (*Publicationa de la dotation Carnegie pour la paix internationale*, 1928).

Yet, when the German retreat began in November 1918, the most astonishing phenomenon, and the most encouraging, was the naturalness with which Belgium reasserted its pre-war character and the ease with which it resumed its political and social life. The material losses of the country had been enormous and, despite reparations, were never adequately made good. In particular, the financial situation of the country remained serious throughout the period between 1918 and 1940. In 1924 M. Henri Jaspar, in an address given in England, said: 'The war has left him (i.e. the Belgian) a heavy burden to bear, the restoration of the devastated regions, and the renewal of economic equipment. In order to overcome these obstacles, he has brought his taxes to eight times what they were before the war, and has increased his debt eightfold.' It is one of the tragic injustices of the last war that Belgium was left permanently weaker in her economic system as a result of it.

Politically, however, so long as King Albert lived, Belgium recovered its national life with remarkable success. The fact that the Activists had mostly fled eased the situation, and though the Flemish question remained a cause of political dissension within the state, it was largely solved in the years 1918–30. Despite the necessity imposed by a multi-party system of coalition governments Belgian politics were little affected by extremist movements from right or left, from Flanders or Wallony. It was only the breakdown of collective security and the rise of the Axis powers which once again threatened the free life of the small state and finally engulfed it.

Appendix II

THE GERMAN OCCUPATION 1940–43

Political Conditions

On 13 October 1937 the German government issued a declaration reaffirming the pledge that Germany would respect the inviolability and integrity of Belgium unless she took part in military action against Germany. On 10 May 1940, without any such provocation on the Belgian side, Germany broke this pledge and, in pursuit of her strategic aims, threw the weight of her mechanized armies against both the Netherlands and Belgium. Within three weeks they had swept over the two small countries; the Belgian and British forces had been divided from each other and from the main French armies. On 27 May King Leopold, deeply distressed by the sufferings of the streams of countless refugees continuously bombed from the air and convinced of the impossibility of further military resistance, applied for armistice terms and, in the night of 27–28 May, agreed to unconditional surrender. Another 'scrap of paper' had been torn up by Germany. The second occupation of Belgium by German forces within a generation had begun.

There were certain important differences between the conditions under which the second occupation developed as compared with the first. King Albert had been able, in 1914, to maintain his army intact in its withdrawal to the Yser and in contact with the British and French forces. There was no armistice and no surrender, and, though the Belgian government was forced to make Havre its headquarters, the king and his ministers were in close touch with each other, and their authority was legally and politically unassailable. But, in 1940, King Leopold, against the constitutional advice of his ministers, chose to remain as a prisoner of war with his army. The ministers, who moved to Poitiers and Limoges, were separated from the king and their country, and when, on 17 June 1940, Pétain sought for an armistice with Germany their position became still more difficult. Though two Belgian ministers, M. de Vleeschauwer (Colonies) and M. Gutt (Finance), reached London in August, it was not until October that the Prime Minister, M. Pierlot, and the Minister of Foreign Affairs, M. Spaak, were able to reach London. Since that

time the government has been able to resume its functions as the only lawful government of Belgium. But it is the government of a country wholly occupied, and it is separated from its king.

A further profound difference between the second occupation and the first arises from the total occupation and the fall of France. Since 1940 the Belgian people has had far less external support than during 1914–18. The Netherlands were occupied also on this occasion—the back door through which so much assistance and communication had been possible during the earlier occupation. The influence of the neutral powers was much less, for there were fewer left, and those that were nominally neutral were hardly neutral in fact. No representation of Franco Spain was likely to repeat the Marquis de Villalobar's gallant and persistent fight for Belgian interests (see p. 542), whilst Germany was increasingly indisposed to listen to a United States, which, under President Roosevelt, increasingly displayed its hostility to Germany's policy. Nor could the Belgian people find material and moral support from a *Comité National de Secours et d'Alimentation* (see p. 540), for, in the circumstances of 1940, the British government found itself, for very good reasons, unable to consent to the passage of foodstuffs through the blockade to German-occupied countries.

On the other hand, the Germans had learnt some lessons from the first occupation. They arrived determined to be as conciliatory as it is in their nature to be and to keep the iron hand well padded in the velvet glove. They anticipated only a short occupation followed by a final settlement, once France and Great Britain had succumbed, and they desired to secure the greatest possible degree of co-operation, particularly in the economic sphere, from the Belgian people themselves. At the outset, therefore, as M. Motz says in his *Belgium Unvanquished*, they sought 'to create a general impression among the Belgian people that things were no longer as they had been in 1914–18, and that the Germans had changed'. Both in the organization of the civil government of Belgium as well as in their general policy the Germans clearly showed what they had learned from the first occupation.

During the earlier occupation the Germans had set up not only a military but also a civil administration side by side with the Belgian civil authorities. In 1940, however, they dispensed with a civil administration of their own and determined to work through the Belgian civil authorities, thus avoiding a standing source of friction and at the same time securing a great saving in trained administrative

personnel, estimated by the *Frankfurter Zeitung* in May 1942 as reaching more than 9,000 persons. The German administration in Belgium, therefore, has consisted, since 1940, of a German Commander-in-Chief, General von Falkenhausen, with a military administration under him, of which General Eggert Reeder is the head. There is an *Ortskommandantur* in each arrondissement, a *Feldkommandantur* in every province, and an *Oberfeldkommandantur* over a group of provinces, with headquarters at Bruxelles, where there are a number of high German officials attached to the Belgian authorities. Thus Dr von Becker is Commissioner attached to the Belgian National Bank, Dr Schlumprecht is Chief of the Economic Section, Kriegsverwaltungschef Mickel is Commissioner for Transport and Industry. These, and other high officials, are charged with the duty of seeing that the requirements of the German military administration are carried out by the Belgian civil authorities.

The normal administration of the country, however, as well as the execution of the decrees of the German military administration, is carried on by the Belgian civil service, assisted by the Belgian local government authorities and the Belgian courts of law. On the day of the invasion, the Belgian parliament, recognizing the probability that the government might have to leave Bruxelles, passed a law empowering the secretaries-general of the various government departments to carry on the administration, in the absence of their political chiefs, and to issue administrative decrees within the framework of existing Belgian law. Of this law the Germans have made ingenious use, and, under its authority, have been able to give a semblance of legality to their governance of Belgium. Yet they have only been successful by a series of measures which changed the personnel of Belgian administration radically both at the centre and in local government.

In September 1940, when it became apparent that immediate victory was not yet in sight, the German authorities ordered a purge of all officials who had fled between 10 and 30 May, and should not have returned to duty by 1 October. A large number of burgomasters were dismissed and replaced by 'collaborationist' successors; in the Mons district only nine out of eighty-two burgomasters surviving this purge. In March 1941 this was followed up by a decree reducing the retiring age of Belgian officials from 65 to 60, and again the vacancies thus caused were filled by collaborationists. In addition, the secretaries-general were, in some instances, changed, and in March 1941 a prominent Flemish Nationalist, Gerard Romsée,

was made Secretary-General of the Interior, to which important department ever-widening functions have since been allotted. Romsée, who has also taken over the post of Secretary-General of Public Health, and another German-appointed Secretary-General, Leemans, Secretary-General for Economic Affairs and Labour and Social Welfare, have been able to give effect to the demands of the German military administration over the greater part of Belgian economic life. By November 1942 only three pre-war secretaries-general remained in office. This remodelling of the Belgian civil service and local government personnel has created a situation entirely unforeseen by the law passed on 10 May 1940. The Belgian Prime Minister, M. Pierlot, has said: 'You will have no difficulty in believing me when I tell you that never for a moment did it enter our heads that one day the secretaries-general in charge would be replaced thanks to an elaborate game of resignations and co-options directed by the occupation authorities, never did we think that we would ever see holding office together such an astonishing collection of men....The plan which later became the law of 10 May 1940, would never have been adopted, nor would it have been presented if it had been thought that it was liable to such an interpretation and capable of producing such consequences.' The unforeseen consequences of the law of 10 May 1940 have proved very serious, and the Germans have manipulated it with great skill to their own advantage.

For, in the absence of the Belgian ministers, and with King Leopold as a prisoner, they have built up the body of secretaries-general into an acting 'cabinet', a 'government' with something more than a *de facto* basis, for occupied Belgium. And this process appears to have been well-nigh completed by a recent series of events. Efforts were made in the spring of 1942 to challenge the validity of the administrative decrees issued by the secretaries-general. The courts asserted their competence and, in at least one case, declared a decree invalid. Thereupon on 15 May 1942 the German military command issued an ordinance declaring that 'decision on the validity of general decrees issued by secretaries-general which are or shall be based on express reference to the law of 10 May 1940...is forbidden'. In other words, the secretaries-general were, by decree of the occupying power, made the lawful legislative body of Belgium. For a moment it appeared that an acute crisis between the Germans and the Belgian courts was inevitable, and it seemed possible that, as in 1918, a 'strike' of the courts might take place which would

render internal administration far more difficult. But, after prolonged discussion, the courts accepted a formula which conceded the essence of the German demands. The decree of 15 May 1942 was withdrawn. But the courts have agreed that they will not entertain suits attacking the validity of decrees issued by any secretary-general provided that such a decree has been approved by the secretaries-general as a body. Since the majority of the gecretaries-general are collaborationist it appears most unlikely that this proviso will impose any effective limitation on the legislative power of these officials—the second judicial crisis of November 1942 gave ample proof of the ineffectiveness of the proviso.

In Belgium, therefore, the Germans, since May 1940, have built up what may be described as a semi-legal government without a Quisling, unless Romsée qualifies for this title. Their skill in doing this has affected their treatment of the more frankly traitorous elements—the extreme Nationalists and the Rexists—whom they have used for their own purposes without committing Germany to securing the final aims of either section. From the beginning of the second occupation the separatist Flemish Nationalists have received many favours at German hands. As early as 4 August 1940 it was announced that General von Falkenhausen had received Dr Borms (see p. 142) who was condemned to death by the Belgian courts for treason in 1918, but reprieved, and on 6 September 1940, a kind of reparations commission was appointed by the Germans, under the presidency of Borms himself, to provide compensation for the Flemish traitors who had served German interests in the war of 1914–18 and had suffered in consequence. Borms himself received a capital sum of over a million francs and a monthly pension of 5,000 francs, whilst lesser traitors received lesser rewards.

But, politically, it is in their dealings with the organized Flemish Nationalists, and with Degrelle's Rexists, that German policy must be studied. Since the extreme Flemish Nationalists and the Rexists were the only two political groups which welcomed the German invasion, they have, very naturally, been made by the Germans the only two parties to which political activity is permitted, the one for Flanders, the other for Wallony. The Flemish Nationalists were forced, in May 1941, into a single organization, the *Vlaamsch National Verbond* (V.N.V.) (see p. 144) of which, until his recent death, Staf Declerq was the 'Leider'. Declerq accepted Hitler as the *Führer* of all German peoples, and defined his aims, in September 1941, as being 'to establish the National Socialist Order and to link

up the Netherlands peoples with the complex of the Germanic peoples, at the same time retaining our language and culture'. The party has organized a body of Storm Troopers, a Flemish Guard (*Vlaamsche Wacht*), which seems to be intended as a supplement to the local gendarmerie, a Factory Guard to prevent sabotage, a Flemish Legion, which has sent small contingents to the Russian front, and a Flemish Youth Organization for both boys and girls. Similarly, the Rexists, Degrelle's Fascist party, has its Storm Troops and its Walloon Volunteer Legion, of which Degrelle himself heads a contingent for the eastern front. Yet, despite this array of organizations, backed by German favour, it seems that neither the V.N.V. nor the Rexists can claim to represent more than a small minority of the Flemings and Walloons. *Volk en Staat*, the Flemish Nationalist paper, admitted as much in July 1941, though naturally it claimed that the minority was intelligent. And the march of Degrelle and his Legion through Bruxelles to entrain for Russia had to be protected by occupying troops, and was pursued by catcalls and jeers from the onlookers, whose most polite wish was that their departure might be final.

Moreover, throughout the present occupation, the German authorities have carefully refrained from enunciating any final policy towards Belgium. Whilst, during 1914–18, annexationist aims were freely expressed in the German press and Reichstag, the controlled Nazi press and radio have, since 1940, given no indication of the political status which the Nazi leaders intend to assign to Belgium in the new European order. Although it may be guessed that the military leaders will do everything in their power to prevent Belgium retaining any real political sovereignty or the right to rearm, the military administration nevertheless permits *Le Nouveau Journal* to publish its arguments for the preservation of Belgian territorial integrity against both Flemish and Walloon extremists alike. Here, as in their general policy in Europe, the German adoption of the principle 'divide and rule' may be at work. So long as the administration of the country by their Belgian nominees is undisturbed, the divisions amongst the various sections of their collaborationist allies may not be unwelcome. They weaken each other and the hands of the Germans are left free.

Meanwhile, the German economic exploitation of occupied Belgium has proceeded not less ruthlessly than in 1914–18. Now, as then, the increase of stringency felt by Germany as the war proceeds has led to a steady increase in pressure on Belgian economy.

Requisitioning of material products, including foodstuffs, has been very severe. Cows and pigs, coal and iron, textiles and leather, railway rolling stock and lorries have all been seized for German use, whilst a severe rationing system of all foodstuffs has been introduced which barely provides a minimum subsistence for the population. Indeed, the food situation has become so bad that two Belgian lawyers, MM. Meysmans and Lemmens, publicly argued before a Belgian court that without recourse to the black market it was impossible for Belgians to live, an argument which was met by their imprisonment by the Germans. Food riots have occurred on a number of occasions, whilst German propaganda does its best to advertise any delivery of potatoes into Belgium, and to persuade the people that their sufferings are due, not to German requisitioning, but to the British blockade. Yet there is tragic evidence of the insufficiency of the food available to the Belgian population and of their consequent under-nourishment.

It is very largely as a result of this situation that the Germans have been able to secure labour recruits from Belgium for their overstrained war economy. True, the Belgian trade unions were forcibly united into a single organization, the *Union des Travailleurs Manuels et Intellectuels* (UTMI) under the leadership of the Belgian Socialist senator De Man, who has passed into the camp of open traitors. But UTMI has never secured a hold on the mass of former trade unionists, and there is evidence that, despite its privileged position as the sole agency recognized by the Germans as representative of labour, neither it, nor the corresponding organization of employers, is actually the operative agent in labour negotiations. These take place, for the most part, unofficially and behind the scenes between employers and the old, dispossessed, trade union officials. But, because of the food situation and closing down of many Belgian factories for lack of raw materials; because, too, of the lack of outside help and consequently the far greater reliance during the present occupation of the municipal authorities on the occupying power, sufficient pressure could be and has been brought to bear on the Belgian workers to induce many of them to accept contracts of 'voluntary' labour in the Reich. On 15 January 1942 a ceremonial send-off was given to the 250,000th Belgian worker to leave Belgium for the Reich. It is open to serious doubt whether this figure was not a considerable exaggeration. But there is no doubt that, under threat of the loss of unemployment pay or ration cards, many Belgians have accepted work in Germany. Yet the Germans are not satisfied and,

as in 1916 (cf. p. 281), they have now issued a decree enforcing compulsory recruitment of Belgian workers for the industry of the Reich. Unhappily, on this occasion, there is little prospect that Belgian protests, unsupported now by neutral pressure, will be able to secure the decision of this decree violating the Hague convention.

Yet it would be both an incomplete presentation of the facts and most unfair to the Belgian people to leave the picture unfinished. Despite the far greater difficulties of the present occupation as compared with that of 1914–18 the Belgian people remain overwhelmingly pro-Ally and offer what resistance is in their power. The present Cardinal-Archbishop of Mechelen, Mgr. Van Roey, may not possess the striking eloquence of Cardinal Mercier, but he has shown no less determination to protect the rights of Belgian Catholics against German encroachments. He has encouraged the faithful to cling to their national unity and has warned them against any collaboration which conflicts with patriotic duty. In an address delivered to a Catholic Youth Congress in August 1941, he said: 'Five centuries ago France was invaded by the English. Everyone was resigned to collaboration: Paris, Sorbonne, the Court, and the Bishops, all supported the English. Nevertheless, a maid appeared inspired by God, and in defiance of everybody she fought collaboration: "We must drive these people out of France." She was right.' And he added, though to-day Belgium has no Joan of Arc, 'Reason and good sense point the road of confidence and resistance because we know that our country will be restored and will live again.' It is in the spirit of these words that the Belgian clergy and faithful have acted throughout the occupation. The funeral of a British airman shot down over Belgium is accompanied by a large procession of Belgian mourners and wreaths of flowers are placed upon his grave. But masses for Belgians killed on the eastern front have had to be said by German military chaplains because of the refusal of Belgian priests to allow their churches to be used by Flemish or Rexist legionaries in uniform. It is of the greatest significance that the German attempt to give their attack on Russia the character of a Christian Crusade has evoked no response whatever in the overwhelmingly Catholic Belgian people.

Nor has the spirit of Burgomaster Max died out. His successor, Dr van de Meulebroeck, Burgomaster of Bruxelles, protested against the decree reducing the age limit of officials to 60, and was arrested and imprisoned for publishing his protest on the hoardings of the capital. Many other burgomasters and officials have suffered a

similar fate. In addition, the Belgian manufacturers and workers have offered passive resistance on a large scale, and the production of the heavy industries, and particularly of the coal mines, has fallen very greatly since the occupation began. Further, there are constant acts of sabotage. Military telephone and telegraph cables are cut, power stations are blown up, fires occur in railway sidings, destroying trains loaded with goods for Germany. For such acts many hostages have been taken and a considerable number of Belgians shot. So, too, as during the last occupation, a large number of clandestine newspapers have appeared. These include a revived *Libre Belgique*, which gives the 'Oberfeldkommandantur' of Bruxelles as its address and the Peter Pan statue in the Jardin d'Egmont as its Editor. This clandestine press is of all political shades, but it prints much of the news contained in British broadcasts and makes a most valuable contribution to the maintenance of Belgian morale.

Finally, Belgium contributes still more directly to the war effort of the United Nations. Belgian squadrons work with the R.A.F.; the Belgian mercantile marine of some 350,000 tons has done most useful work, though it has also suffered severe losses; a large part of the Belgian fishing fleet assisted the evacuation from Dunkirk and has since been actively engaged in fishing and mine-sweeping from British ports. The Belgian Congo, too, has proved of great importance in the development of the war. Not only does it provide raw materials of great value—copper, radium, cobalt, palm oil, cotton, rubber—but it also furnishes a safe route across Africa, whilst during the Abyssinian campaign Belgian colonial troops played their part in the defeat of the Italians in the area south of the Blue Nile.

Economic Conditions

During the weeks immediately following the occupation of Belgium in May 1940, the Germans made every effort to secure the resumption of those industries, such as mining, which were of value to their war effort. Small numbers of Belgian workers were induced to go either to Germany or to other occupied territories and unemployment began to show a steady decline. The flourishing Belgian trade union movements were destroyed and replaced by UTMI (see p. 551) which, under the direction of Edgar Delvo, has become one of the instruments for the direct and indirect compulsory deportation of workers from Belgium. In April 1941, the *Office National du Placement et du Chômage* (National Employment Exchange) was transformed into the *Office National du Travail* (ONT), modelled on the

lines of the *Reichsarbeitsamt*. Under the administration of Hendriks, a member of the VNV, this office has become the arbiter of the fate of every Belgian worker. In March 1942, as a result of military needs, the Germans decreed that Belgians could be directed to work anywhere in Belgium or northern France. Later in the same year there was an intensification of the labour drive, and despite protests from the king and from the Roman Catholic hierarchy, provision was made for the conscription of men between the ages of 18 and 50, and even of unmarried women between 21 and 35, to work in the Reich.

Belgian agriculture was seriously affected by the German invasion, many farms were inevitably neglected by the flight of large numbers of Belgians to France and, even though most of the refugees returned, the 1940 harvest was extremely poor. Since the occupation there has been a growing scarcity of agricultural material, implements and fertilizers. The *Conseil National d'Agriculture et d'Alimentation* (CNAA) has been set up to supervize the activities of all enterprises which produce and sell agricultural products, but the prevalence of the black market, the stubborn antagonism of the peasants and administrative inefficiency have helped to make the work of CNAA unsuccessful. Little has been done to increase food production either by ploughing grassland or by increasing the proportion of food to fodder crops. Supplies of wheat and rye have fallen by about 40 %. The production of sugar beet, sugar and chicory (for coffee) has been well maintained but meat production, despite no drastic changes in livestock numbers, has declined by about half. Since Belgium's degree of self-sufficiency in food production is low (see p. 359) it is not surprising that there has been a striking fall in the level of food consumption, and it has been estimated that the average calorific consumption per head per day is now 1,950 as compared with an average of 2,950 before the war. The difference has particularly affected urban dwellers.

Since the German occupation there has been a decline of over 20 % on the 1938 figures in the output of the central Belgian coalfields (see p. 299), while in the Kempen area, on the other hand, there has been a slight increase. As a result of the disappearance of imports, reduced production and increased exports, home consumption of coal has decreased by over 30 %. Ownership and management of coal mines still remain in Belgian hands. Unlike conditions during 1914–18, comparatively little damage has been done to iron and steel plants, but production fell to a very low level after

the occupation and recovery has been extremely slow. Allocations of iron and steel for the home market are small since 90 % of exports go to Germany. The *Comptoir de Vente de la Sidérurgie belge* (*Cosibel*) has been dissolved (see p. 314) and the *Syndicat belge de l'Acier* (*Sybelac*) has been set up in its place, with far wider control over the producers of crude steel and the independent rolling mills.

Belgian commerce has naturally been affected by the disappearance of imports from outside Europe and by the attempts of Germany to bring Belgian industry into line with her own trade and supply plans, and trade with Germany in imports and exports has increased to about six times the volume of 1938. For a short period the Germans issued their own occupation currency in the form of *Reichskredit-kasse* notes, but a *Banque d'Emission* has now been set up. It is housed in the same building as the National Bank, which is under the control of a German commissioner, and it has the same staff. The functions of the National Bank are now confined to financing the state, to domestic credit operations and to the issue of bank-notes. The *Banque d'Emission* deals with the financial operations in which the German authorities are directly interested and it does not issue banknotes. Both banks, however, have from time to time shown considerable resistance to German demands. All trade and foreign payments must be made through the *Verrechnungskasse* in Berlin and all trade agreements must be negotiated by the occupying authorities. Heavy burdens have been imposed both directly and indirectly on the public finances by the cost of hostilities and of the German occupation—since 1940 Belgium has been paying to the Germans more than 1 milliard francs per month towards occupation costs, a sum which is in itself equal to the total expenditure of the state in peace-time. Taxes have been increased, there has been considerable borrowing (mainly short-term) to meet the Treasury deficits, and the national debt has risen by over 100 % since the occupation. There has been a considerable increase in the circulation of banknotes and in prices, especially for foodstuffs, while the rise in wholesale prices has been smaller than in retail prices. Subsidiaries and branches of German joint-stock banks have been established but there has been no German control of existing Belgian commercial banks. Communal finances are in serious straits. The occupying authorities have suspended municipal councils, delegating authority to the burgomasters and they have both re-organized the existing agglomerations, and have formed new ones (see pp. 594, 602, 607, 619).

A commissioner-general for provincial and communal finances has been created by the Belgian administration. The commissioner-general has been granted wide powers of supervision over local budgets and, as a consequence, the hitherto extensive privileges of the local authorities (see p. 155) have become more firmly under the control of the central administration.

A considerable amount of damage was done to the railway system and to the rolling stock in 1940, both during the operations and as a result of Allied demolitions. The actual length of track destroyed was relatively small, involving some 137 km. of line, but considerably more was put out of operation. It was reported that 288 railway bridges, 60 road bridges over railway lines and 10 tunnels had been destroyed before the cessation of hostilities, with many others damaged. It has been estimated, too, that some 45,000 wagons have been destroyed or removed by the Germans. The Germans made immediate and strenuous efforts to re-establish the communications of the Low Countries. The railways near the coast were operated by the army of occupation, the remainder by the German controlled S.N.C.F.B. A large part of the system was in working order by the end of 1940, although bridges were necessarily temporary structures. It was reported in November 1940 that 83 % of the lines and 202 of the damaged viaducts and bridges has been made good. One of the last main lines to be brought into operation was the Liége-Herbesthal section. The electrified Antwerpen–Bruxelles line was not opened until April 1941, when the bridges at Mechelen were restored. Traffic was gradually resumed from 1 August 1940; it was estimated that by December 31 passenger traffic amounted to some 31 % and goods traffic to some 40 % of the volume in the corresponding period of the previous year. This does not include military traffic, which was probably considerable for the Germans operated the railways of northern France, the Low Countries and western Germany as an integral system. Many sections of single track are reported to have been doubled, and the capacity of lines across south Belgium between Germany and France considerably increased. Wagons and rolling stock from all these countries are used intensively; furthermore, it is reported that the carriage and wagon-building industry in Belgium is being operated on an intensive scale. An example of integrated operation is the moving of wheat from northern France to Antwerpen (to be distributed further east), the same wagons going to Limburg and taking coal back to occupied France. The S.N.C.F.B. has been compelled to hand over part of its gross receipts as war

indemnities to the army of occupation while the heavy working losses have been made good by larges advances from the Belgian treasury.

Road transport has been seriously curtailed because of the shortage of fuel and few vehicles, apart from those used by the German authorities, are now running on gasoline. Local distribution of food has consequently become exceedingly difficult.

The Belgian waterway system suffered severely during the fighting in 1940. Large numbers of bridges and locks were destroyed and about one-fifth of the fleet of 7,000 barges was lost. The Albert Canal was re-opened in 1941 and it was reported by the summer of 1942 that every section of the waterways was in service. The heavy demands on the railway system have led to the fullest exploitation of the inland waterways and the *Office Centrale de Navigation* has been created to control all shipping traffic on the canals.

Appendix III

MAPS AND CHARTS OF BELGIUM

Historical Introduction

The history of Belgian cartography is rich in the names of men to whom the development of the science of map-making owes much. Gérard de Cremer, better known as Mercator, was born at Rupelmonde in 1512; among his many productions were a map of Flanders (1540), a *Planisphere à l'usage des marins*, drawn on his famous projection (1569), and his great *Atlas sive cosmographicae meditationes* (1595). Among other famous cartographers were Abraham Ortelius, who produced in 1570 an atlas entitled *Theatrum orbis terrarum*, Gérard and Corneille de Jode, publishers in 1593 of an atlas entitled *Speculum orbis terrae*, and Eugène Fricx, who produced in 1712 an atlas containing a map of the Low Countries on a scale of 1:115,000.

The modern mapping of Belgium began in effect in the eighteenth century, when the country was still part of the Austrian empire. Joseph de Ferraris, *Directeur-général de l'Artillerie*, made several surveys, including a general level executed in three years (1771–4). He produced a series of maps, one of the first being a *Carte de la Forêt de Soignes* (1769). His chief achievement, however, was the *Carte chorographique des Pays-Bas autrichiens* on a scale of 1:86,400, covering the whole of the country in an edition of 25 sheets. The work was completed in 1777 and presented to the emperor Joseph II; it was thus the first complete topographical series to cover an entire country, preceding Cassini's maps of France by a few years, although the latter began his surveys first.

Another outstanding figure in Belgian cartography was Philippe van der Maelen (1795–1869), who founded in 1830 the *Etablissement géographique de Bruxelles*. Among his numerous cartographical productions were a cadastral survey of the whole country between 1807 and 1839, and a *Carte topographique de la Belgique* on a scale of 1:80,000 between 1841 and 1853.

The *Dépôt de la Guerre*, founded in 1831, became in 1883 the *Institut Cartographique Militaire de l'Armée Belge*, at Bruxelles; this is the government department primarily responsible for the production of official maps. Other series for specific purposes have been produced by the *Ministère des Travaux Publics*, by the *Ministère de l'Intérieure*, and by the *Institut National de Géographie*.

The vital strategic position of Belgium has necessitated the accurate mapping of the country for the use of the General Staff, and as a result the official series of maps are of a high standard, and many of them are most attractively produced.

Description of Maps

The maps of Belgium may be described under the following heads:

A. Belgian government topographical maps.
B. Maps issued by the Geographical Section of the British General Staff.
C. British Admiralty charts.

D. Official Belgian charts.
E. Geological maps.
F. Miscellaneous maps.
G. Atlases.

In each group the maps are listed as far as possible in order of scale, those on a large scale coming first. The following particulars are given where possible for each series:

(1) Authority responsible for its production.
(2) Date of production, with subsequent revisions. (Unfortunately, however, a number of Belgian maps are not dated.)
(3) Number of sheets in the series.
(4) Size of sheets, measured to the margin of the area mapped.
(5) Projection.

Note. This is only stated where Bonne's, the customary projection of Belgian maps, was not used. The parallel of origin of this projection is 56 grades or 50° 24′ N; the meridian of origin is that of the old observatory at Bruxelles. The mathematical details are given in *Liste des coordonnées dans la projection de Bonne de la Carte de Belgique* in *Catalogue des Cartes, Plans et Publications*, p. 20 (Bruxelles, 1927).

(6) Meridian of origin: Grid and/or graticule.
(7) Scale.
(8) Miscellaneous marginal information.
(9) Whether coloured or in black.
(10) Method of representation of relief.
(11) Details of roads, railways and other information.

When a map has been issued in several editions, full details are given for the first edition, and amendments only are noted in the case of the others.

A short note is sometimes added on the value of the map, its legibility and accuracy.

A. Belgian Government Topographical Maps and Plans

Geodetic Surveys

The first scientific survey, based on precise trigonometrical and astronomical observations, was begun in 1851–2, when a base was measured in the Kempenland near Lommel; a second base was measured in 1853 near Oostende. Eighty-four trigonometrical points of the first order were chosen, some 30–40 km. apart, to cover the country with a network of 219 primary triangles; 146 points were fixed for the secondary triangulation, and 1,753 for the tertiary network. This geodetic survey was completed in 1873. Detailed astronomical observations were made to fix the positions of points at Lommel (1855, revised 1886), at Nieuwpoort (in 1856, revised 1888) and at Hamipré (in 1884). The revision of the geodetic survey began in 1921 with the measurement of a new base between Habay-la-Neuve and Etalle. Full details of this recent survey are given in *Triangulation du Royaume de Belgique: Nouveau calcul de la triangulation du* 1er *ordre*, published by *Le Comité national de Géodésie et de Géophysique* (Bruxelles, 1928); developments since 1928 are described in various volumes of *Travaux de l'Association Internationale de Géodésie* (Paris, triennial), published by *L'Union Géodésique et Géophysique Internationale*. The cadastral survey on a usual scale of

1:2,500 (scales of 1:1,250, 1:1,000 and 1:500 were used in some urban areas) has been adjusted to the geodetic survey by the fixing of a large number of points of the fourth order, one on an average to each square kilometre; the positions of these were determined by rectangular co-ordinates.

The first general levelling, apart from that of Ferraris, was carried out between 1840 and 1854; it did not, however, cover the whole country. A complete general levelling was carried out between 1854 and 1872; this divided the country into twenty-five polygons, and it was followed by a precise levelling in 1889–92. The mean sea level was established from a series of tide-gauge observations taken at Oostende during the period 1878–85, the datum being fixed as a point 1·64 m. above the sill of the lock in the *Bassin du Commerce* at Oostende. The results of this levelling were published in 1893 by the *Institut Cartographique Militaire*, entitled *Répertoire graphique définissant les emplacements et les altitudes des repères du nivellement de précision* (Bruxelles).

Summary of the Main Series

The first official 1:20,000 sheet was produced in 1850, and during the next four years 250 sheets were published. This edition was superseded by a new one between 1856 and 1860, and at the same time the first edition of the 1:40,000 was published (1861–83). New editions of these have been produced, including one in colours, and many of the sheets have been revised several times. The first edition of the 1:160,000 *Carte Topographique* was issued between 1880 and 1894, followed by a revised coloured edition between 1900 and 1908. A new military map on a scale of 1:100,000 was produced between 1903 and 1912, and an attractive second edition followed after the war of 1914–18. The new *Carte Chorographique* was issued between 1922 and 1930. Work has proceeded steadily on the large-scale 1:10,000 series for about seventy years; by 1939 only about 30 sheets remained to be published. The 1:10,000 series is reduced from the official cadastral survey, consisting of 456 sheets, on a scale of 1:2,500, which has not been published; it undergoes constant revision.

An annual list of official maps, giving latest revisions, new sheets, etc., is published by the *Institut Cartographique Militaire*, entitled *Catalogue des Cartes, Plans et Publications* (Bruxelles).

List of Series

(1) 1:10,000. *Carte de Belgique.*

Produced by the *Institut Cartographique Militaire*, in course of publication. 456 sheets are intended, of which 52 remain to be published. Eupen and Malmédy are not included. Size of sheets 100 × 80 cm., with some half-sheets 50 × 80 cm.

Relief shown by contours at 5 m. interval. All detail in black.

(2) 1:10,000. *Carte des Territoires d'Eupen-Malmédy—Edition Provisoire.*

A provisional series to cover the territories acquired from Germany in 1919 and not yet included in the Belgian large-scale surveys. 17 sheets in black, 60 × 75 cm., photolithographed, revised and enlarged from the German 1:25,000 series.

(3) 1:20,000. *Carte Topographique de la Belgique.*

Earliest edition published about 1850–4 by the *Etablissement géographique de Bruxelles.* 250 sheets, 68 × 49 cm. Margin divided into 10 min. intervals (sexagesimal from Bruxelles), but no graticule. Printed in black.

Relief shown in outline by 'hairy caterpillars'. Submarine soundings taken from British Admiralty surveys of 1842. Roads (four grades) and railways (two grades) shown by single and double black lines; rivers and canals shown, and a variety of symbols used for churches, mills, mines, etc.

(4) 1:20,000. *Carte Topographique de la Belgique.*

This series has been issued in several revised editions. It was begun by the *Dépôt de la Guerre* and continued by the *Institut Cartographique Militaire.* First edition 1866, new edition 1888–90, and subsequent individual sheet revisions. 430 sheets, 40 × 50 cm. Margin divided into grades and minutes (centesimal from Bruxelles, later editions sexagesimal). No graticule.

Relief shown by contours in black at 1 m. interval, every fifth accentuated. 8 m. submarine contour in blue. Roads shown by double lines filled red or black (four grades), railways by double black lines (two grades), dykes indicated by shading, canals and rivers in blue. Delicate tints to indicate land utilization—types of woodland, grassland, arable land, gardens, marshes, etc. Towns in solid red. Extra-Belgian territory uncoloured.

Special maps on the 1:20,000 scale have been made, for military use, of the camps at Beverloo and Brasschaat, 75 × 60 and 85·5 × 55·5 cm. respectively. The former is in colours, the latter in black. Both are gridded.

There is a special map of the camp at Elsenborn, in colours, 65 × 55 cm., gridded, but reduced from the 1:20,000 series to a scale of 1:25,000.

(5) 1:20,000. *Carte Topographique de la Belgique.*

Editions of the coloured series (No. 4) have been produced (*a*) in black, and (*b*) in bistre.

(6) 1:20,000. *Carte des Territoires d'Eupen-Malmédy—Edition provisoire.*

A provisional series to cover the territories acquired from Germany in 1919 and not yet included in Belgian large-scale surveys. Five sheets, 50 × 40 cm., photolithographed, revised and enlarged from the German 1:25,000 series. Produced in coloured and in black editions.

(7) 1:40,000. *Carte Topographique et Militaire de Belgique.*

Old edition in black begun in 1861, and completed in 1881, by the *Dépôt de la Guerre.* Seventy-two sheets, 50 × 80 cm. Margin divided into ½ min. (both sexagesimal and centesimal from Bruxelles). Graticule drawn at 5 min. intervals. Scale in kilometres and leagues.

(8) 1:40,000. *Carte Topographique et Militaire de Belgique.*

First coloured edition 1895–1903, revised edition 1911, and subsequent individual sheet revisions to 1939. Produced by the *Institut Cartographique Militaire.* Seventy-two sheets, usual size 80 × 50 cm., but some frontier sheets irregular. Margin divided into ½ min. intervals (both centesimal from Paris and sexagesimal from Bruxelles), graticule drawn at 5 min. intervals. Scale in kilometres and leagues on the older editions, kilometres only on newer sheets.

Relief shown by contours in black at 5 m. intervals, with spot-heights in black. Sea tinted blue, and submarine contours in black pecked lines at 5, 10, 15, 20, and 25 m., with others at irregular but significant intervals. Roads in red and black (four grades), railways in black (two grades), rivers and canals in blue, and drainage channels in black. Woods shown by green tint and stipple. A variety of stipples are used for heaths, orchards, arable land, dunes, etc. Colours are not continued across the frontier.

(9) 1:40,000. *Carte Topographique et Militaire de Belgique.*

Corresponding sheets in black have been issued of (8).

(10) 1:40,000. *Cartes routières des Environs des Garnisons.*

A special grouping of the sheets of (8) to cover the districts around the garrison towns. Eighteen sheets in colours, 80 × 75 cm., details as for (8).

The towns covered are Antwerpen, Arlon, Bouillon, Brasschaat, Brugge, Bruxelles, Charleroi, Elsenborn, Gent, Hasselt, Kortrijk, Liége, Lier, Mons, Namur, Oostende, Spa and Tournai.

Another edition of this, gridded and with additional detail, is reserved for army use.

(11) 1:40,000. *Carte des Territoires d'Eupen-Malmédy. Edition Provisoire.*

A provisional series to cover the territories acquired from Germany in 1919 and not yet included in the Belgian large-scale series. Four sheets, 83 × 56·5 cm., of a photolithographed reduction from the German 1:25,000 series. Printed in both black and in coloured editions.

(12) 1:100,000. *Carte de la Belgique.* Old edition.

Produced by the *Institut Cartographique Militaire*, 1906–12, with revisions 1922–6, 26 sheets 40 × 48 cm. and 2 sheets 40 × 24 cm. No graticule, but margin divided into ½ min. intervals (centesimal from Paris), with co-ordinates in the corners. Scale in kilometres and also a time scale.

Relief shown by contours in brown at 10 m. intervals, every fifth accentuated, with spot heights in brown. No submarine contours. Sandbanks stippled blue. Roads in red (two grades), railways in black (two grades). Kilometrages in red. Water in blue. Woodland shown by green stipple. Extra-Belgian territory is coloured but is without contours.

(13) 1:100,000. *Carte de Belgique.* New edition.

A new edition of (12) produced by the *Institut Cartographique Militaire*, 1931–4; the Bruxelles sheet was again revised in 1938. Ten sheets, 79 × 60 cm. Details as for (12), revised and clarified.

(14) 1:100,000. *Carte des Environs des Garnisons.*

A special grouping of the sheets of (12) to cover the garrison towns of Arlon and Leopoldsburg. Sheets 40 × 48 cm. in colours.

(15) 1:100,000. *Carte de la Flandre Occidentale.*

Produced by the *Institut Cartographique Militaire*, 1906. Four quarter sheets, each 41 × 45·5 cm. Graticule drawn at 10 min. intervals (sexagesimal from Bruxelles); margin divided into minute intervals. Legend and names on map are in both French and Flemish.

Relief shown by contours in brown, pecked at 5 m., solid at 10 m. interval, with spot-heights in black. Roads in red, green and yellow (four grades), railways in black and red (four grades), canals in blue (five grades), rivers in blue. Sand dunes shown by black stipple, woods by green shading and stipple, towns by black shading and circles (six grades).

(16) 1:100,000. *Carte des Voies Navigables.*

Published by the *Département des Ponts et Chaussées* of the *Ministère des Travaux Publics* (Bruxelles, n.d.). Six sheets in colours, of varying size, with a seventh sheet repeating Hainaut in greater detail. No grid or graticule.

Canals and navigable rivers in blue (four grades). Considerable detail is shown on the maps, including many cross-sections of canals and locks, all locks and bridges (with dimensions), ports, quays, locks, barrages, basins, slipways, gasoline stores, magazines, customs posts, etc. Many factories are named.

A most useful series, both for waterways and for the location of industries.

(17) 1:160,000. *Carte de Belgique.* Old editions.

Several editions have been produced by the *Institut Cartographique Militaire* between 1880 and 1894. Six sheets, 58 × 66 cm. No graticule, and no latitude or longitude shown. Printed in black. One edition has water in blue.

Relief shown by contours at every 5 and 8 m., with spot-heights in black. Submarine contours at 20 m. intervals. Roads (three grades), railways (three grades) and waterways with details of sluices, etc. Woods, grassland, sand dunes, etc., shown by black stipples.

The map is heavy and difficult to read in places.

(18) 1:160,000. *Carte Topographique de Belgique.* New editions.

Produced by the *Institut Cartographique Militaire*, editions of 1900, 1901, 1903, 1907 and 1908. Details of sheet size, etc., as for (17). Printed in colours.

Relief shown by contours in brown at 5 m. interval, with every 5 m. pecked, every 20 m. solid, and every 100 m. accentuated, and spot-heights in black. Roads in red and black (six grades), railways in black (two grades). Detailed information about descents, etc., added by the *Touring Club de Belgique*. Woods shown by green shading. Towns in black (three grades).

(19) 1:160,000. *Carte de Belgique.* Revised editions.

Other styles of (17) have been published as revisions since 1920. Not all sheets are available in these forms. The most useful has details as (17) but in five colours, including contours and hill-shading in bistre. Good military positions are tinted pink. Another form has no relief, another has no woodland.

(20) 1:200,000. *Carte de la Belgique.*

Produced by the *Institut Cartographique Militaire*, first edition 1922, second edition 1930. Eleven sheets, 48 × 60 cm. Graticule drawn at 10 min. intervals (sexagesimal from Bruxelles).

Relief shown by contours in brown at 10 m. intervals, with spot-heights in black. Roads in red (three grades), railways in black (three grades), and rivers and canals in blue. Woods shown by green shading. Towns in black (seven grades).

(21) 1:320,000. *Carte des Chemins de Fer, Routes et Voies Navigables de la Belgique.*

Produced by the *Institut Cartographique Militaire*, first edition, 1880, several subsequent editions. Single sheet, 73 × 90 cm. No graticule.

One edition printed in black, with waterways in blue. Another similar edition, but with provinces tinted.

(22) 1:320,000. *Carte de la Belgique—Comportant la Subdivision Administrative du Territoire.*

A single sheet 71 × 81 cm., produced by the *Institut Cartographique Militaire*, 1938. Boundaries of provinces, arrondissements and communes shown by brown lines. An index to the 1:40,000, *Carte Topographique et Militaire de Belgique* (no. 8), is superimposed in blue. An alphabetical list of communes (in French forms) is given in the margin.

(23) 1:800,000. *Carte de Tableau d'Assemblage des feuilles de la Carte de Belgique aux diverses échelles.*

An index map of the series produced by the *Institut Cartographique Militaire*. With an alphabetical list of communes in French form. One sheet is produced in black, another with rivers in blue and with boundaries tinted.

(24) 1:1,000,000. *Carte Internationale du Monde.*

Produced by the *Service géographique de l'Armée de France*, 1923. The sheet includes the whole of Belgium except the extreme east, southern Holland and north-eastern France. Sheet number North M 31 Paris, size 44 × 45 cm. approximately. Modified polyconic projection. Margin divided into 5 min. intervals (sexagesimal from Greenwich), graticule drawn at degree intervals, lettered and numbered to form a grid.

Relief shown by contours at 100 m. interval to 500 m., layer tinted in seven shades of green and brown, with spot-heights in black. Submarine contours in black at 10 and 20 m. Roads shown in red (two grades), railways in black (one grade), rivers in blue, towns shown in seven grades of lettering.

B. Maps Published by the Geographical Section of the General Staff

(1) 1:25,000. G.S.G.S. Series 4041: France and Belgium.

Topographical series taken from various Belgian official maps, revised and reprinted by the Ordnance Survey, 1940. 196 sheets of Belgium, 40 × 60 cm. Kilometre grid, numbered in margins in blue. Latitude and longitude (sexagesimal from Greenwich) given in each corner.

Produced in five styles;

(*a*) Relief shown by contours in black at 1 m. intervals, every fifth emphasized. All detail in black.

(*b*) Relief shown by contours in red at 5 m. intervals, every fourth emphasized, spot-heights in black. Rivers in blue, but all other detail in black as in (*a*).

(*c*) Relief shown by contours in black at 10 m. intervals, every fourth emphasized. Field boundaries in black. Other detail as in (*a*).

(*d*) Relief shown by contours in black at 5 m. intervals, with interpolated pecked form lines in places.

(*e*) Relief shown by contours in red or orange at 10 m. intervals, every fourth emphasized. Rivers in blue.

(2) 1:40,000. G.S.G.S. Series 4325. *Carte Géologique de la Belgique.*

Reproduction in colours with glazed surface of the *Carte Géologique de la Belgique* (D. 1). Thirteen sheets, chiefly of coastal areas, had been produced by February 1943.

(3) 1:50,000. G.S.G.S. Series 4040: France and Belgium.

Topographical series taken from various Belgian official maps, revised and reprinted by the Ordnance Survey, 1937–9. Sixty-nine sheets of Belgium, but many of them include only small parts of the country. A small area east of Malmédy is not covered. Sheets 52 × 72 cm. Kilometre grid, numbered in the margins in blue. Latitude and longitude (sexagesimal from Greenwich) given in each corner.

Relief is shown by contours in red at 10 m. intervals, every fifth emphasized, but no spot-heights. Roads in double black lines filled red or orgnae (four grades), railways in black (two grades), water in blue, woods by symbols with a green tint and detailed symbols for churches, windmills, etc.

(4) 1:50,000. G.S.G.S. Series 4040: France and Belgium, second and third editions.

New editions of this series, based on air surveys, were in course of production in 1942–3; by February 1943, nine sheets of the second edition and five sheets of the third edition had been issued of Belgian territory. Sheet sizes 60 × 40 cm. Gridded. A reliability diagram is appended to each map showing the extent of the revision.

Details are similar to the first edition, except that contours are in orange.

(5) 1:100,000. G.S.G.S. Series 2364: Belgium and North-east France.

Topographical series revised and printed by the Ordnance Survey, 1912, second edition 1916–18. Twenty-two sheets, 69·5 × 56 cm., of which 13 are of Belgium. Graticule drawn at 5 min. intervals (sexagesimal from Greenwich), numbered and lettered to form a grid. Margin divided into minute intervals.

Relief shown by contours in brown at 10 m. intervals, with spot-heights in black, and light grey hill-shading. Roads in red and black (four grades); adjoining Dutch sections have special symbols for dykes, raised roads, etc. Railways in black (three grades), rivers and canals in blue. Depths shown by submarine contours at 3, 5 and 10 fathoms, tinted shades of blue. Woods in light green. Towns in grey shading or black, fortified areas in red. Population figures for each town or large village are printed on the map.

This series is being superseded by G.S.G.S. Series 4336.

(6) 1:100,000. G.S.G.S. Series 4336: Belgium and North-east France.

A series compiled from G.S.G.S. 2364, which will in due course be superseded. Revised from air photographs, with a reliability diagram in the margin of each sheet. Twenty sheets intended, of which 13 refer to Belgium. Five of the latter had been published by March 1943. Usual size of sheet, 70 × 56 cm. Latitudes and longitudes (sexagesimal from Brussels), in margin

at 5 min. intervals. Kilometre grid superimposed in black, numbered in the margin in black.

Relief shown by contours in brown at 10 m. intervals, every 100 m. accentuated. Land above 50 m. tinted in shades of brown. Three grades of roads according to width in brown, secondary roads by double thin black lines, railways and tramways in heavy black, woods in solid green. Other detail shown by black symbols.

(7) 1:100,000. G.S.G.S. Series 4081: Germany.

Small portions of eastern Belgium appear on three of the German sheets.

(8) 1:200,000. G.S.G.S. Series 4238: Europe Road Map.

Produced at the War Office, 1941. Belgium is covered by 4 sheets of irregular size, photolithographed from the *Carte Michelin de la Belgique.*

(9) 1:250,000. G.S.G.S. Series 4042. Northern France, Belgium, Southern Holland and Western Germany.

Topographical series revised and printed by the Ordnance Survey, 1939. Four sheets, numbers 2, 3, 5 and 6, cover Belgium. Sheet size, 73 × 52 cm. Ten-kilometre grid numbered in blue. Co-ordinates of latitude and longitude (sexagesimal from Greenwich) given in full at each corner.

Relief shown by faint red contours at 50 m. intervals, with spot-heights in black. Main roads are shown in red, secondary roads by fine double black lines, railways in black (two grades), rivers in blue, woods in solid green.

(10) 1:250,000. G.S.G.S. Series 4042: North-west Europe, Ground/Air.

An edition of (9), revised from air photographs. Drawn at the Ordnance Survey, published at the War Office, 1942.

(11) 1:250,000. G.S.G.S. Series 5010: Europe (Air).

Sheet 14 of the second (marine-contoured) edition, published 1942, covers the coast and western parts of Belgium 49 × 39 cm. Projection is Europe (Air) Conical Orthomorphic (Central Zone). Margin divided into 1 min. intervals, with graticule every 10 min. No grid. Lines of equal magnetic declination shown by black pecked lines.

Relief shown by spot-heights in black. Submarine relief stippled in colour: beach and banks dry at mean low-water springs in grey, less than 6 fathoms in pink, 6–13 fathoms in light blue, over 13 fathoms in dark blue. Spot-depths in fathoms in blue. Tidal information given in margin.

Roads in red (two grades), railways in black (three grades), rivers, canals and lakes in blue, woods in solid green with symbols. Towns in solid black, churches in small towns and villages by small circle.

(12) 1:380,160. G.S.G.S. Series 2517: Belgium and North-east France.

A single sheet, compiled and published at the War Office, 1910. Revised 1937, printed at the Ordnance Survey, 1938, and published at the War Office, 1938. Sheet size, 66 × 95 cm. Conical projection with rectified meridians and two standard parallels. Graticule drawn at 30 min. intervals (sexagesimal from Greenwich), lettered and numbered in red to form a grid. Margin divided in 5 min. intervals (centesimal from Paris).

Relief shown by nine shades of green and brown layer-colouring, with spot-heights in metres in brown. Roads in red, railways in black, rivers and canals in blue (three grades of each). Woods shown by a superimposed green stipple. Large towns shaded black.

(13) 1:500,000. G.S.G.S. Series 4072: Europe (Air). Series 4043: France (Air).

Small parts of eastern Belgium are shown on sheets NE 50/6 (Frankfurt) and NE 48/6 (Strasbourg) of Series 4072, and on sheet NM 31 SE (Reims) of Series 4043.

(14) 1:500,000. G.S.G.S. Series 4369: Ordnance Survey of Great Britain. Aeronautical map (fourth edition), R.A.F. (War).

Sheet 8 (Straits of Dover) covers the whole of Belgium except the extreme east. Published by the War Office, 1942. 55 × 89 cm. Margins divided into 1 min. intervals, with graticule in black at 10 min. intervals. Outer margin divided into 10-mile intervals. Grid superimposed in brown.

Relief shown by contours in brown, with purple layer-colouring and spot-heights in black. Rivers, canals, lakes and sea in blue. Roads in red (two grades), railways in black (two grades), towns shown by brown shading. Various aeronautical information by black symbols.

(15) 1:500,000. G.S.G.S. Series 3783: Belgian Railways.

A single sheet in black, 45 × 44 cm., published by the War Office, 1936. Main-line, other double-line and single-line railways shown by various lines. Stations suitable for the loading and unloading of heavy materials and supplies indicated. Inset diagrams of the railway systems of Antwerpen, Gent, Bruxelles, Mons and Liége.

(16) 1:1,000,000. G.S.G.S. Series 2758: Europe.

The whole of Belgium except the Liége district appears on the Paris sheet (North M 31); the rest appears on the Frankfurt sheet (North M 32). Each sheet 44 × 48 cm. (north margin), and × 51 cm. (south margin). Compiled at the Royal Geographical Society from sources listed on each map, drawn and heliographed at the Ordnance Office and published by the War Office, 1916. Revised second edition produced 1932–5. Third edition produced 1939–40.

Relief shown by light brown hill-shading and spot-heights in black. Rivers, lakes and canals in blue, main roads in red. Railways in black (two grades). State and provincial boundaries in black. Towns in black (five grades).

(17) 1:1,000,000. G.S.G.S. Series 2758: Europe, Ground/Air.

A single sheet, Bruxelles-Frankfurt, compiled from sheets M 31 and M 32 of (15). Published at the War Office, 1942. Magnetic declination superimposed in blue.

Relief shown by layer-tinting in purple and brown. Other detail as on (15).

(18) 1:1,000,000. G.S.G.S. Series 3964*b*: Railway map of Holland and Belgium.

Produced at the War Office, 1934, revised 1935. Sheet 67 × 67 cm. approximately. Graticule drawn at degree intervals (sexagesimal from Greenwich). Margin divided into 5 min. intervals.

Railways shown in red and green (four grades) according to the gauge and number of tracks. Train ferries shown by green dots. Rivers in blue.

C. British Admiralty Charts

A key to the charts of Belgium published by the British Admiralty will be found at the beginning of *North Sea Pilot*, Part IV, ninth edition (London, 1934). The charts are based on Belgian government surveys.

D. Official Belgian Charts

A general chart 'Mer du Nord: Bancs des Flandres, 1938' ('Noordzee: Vlaamsche Banken, 1938'), published by the *Administration de la Marine* of the *Ministère des Communications*, covers the Belgian coast. The average scale of the main chart is 1 : 100,000, and it is drawn on the Mercator projection. There are also inset plans of *Oostende* (1 : 10,000), *Zeebrugge* (1 : 20,000), *Dunkerque* (1 : 20,000), *Vlissingen en Sardyngeul*, (1 : 25,000), and inset tables of tidal currents in the North Sea and of tides at Oostende. Other charts, on scales between 1 : 50,000 and 1 : 5,000, cover the main banks, ports and anchorages in greater detail, together with another six which deal with the Escaut (Scheldt) estuary.

E. Geological Maps

(1) 1:40,000. *Carte Géologique de Belgique.*

226 sheets, size 40 × 25 cm., produced by the *Institut Cartographique Militaire* for the *Ministère de l'Intérieur*. Geology superimposed in colours on the topographical series. These were in course of reproduction by the G.S.G.S., Series 4325, in February 1943.

(2) 1:160,000. *Carte Géologique de Belgique.*

Produced by A. Dumont and the *Etablissement géographique de Bruxelles* for the *Ministère d'Intérieure* (not dated). Geology superimposed in colours upon the *Carte Topographique*. Eight sheets, 57 × 50 cm., with a title sheet. It is also issued in twelve sheets.

(3) 1:160,000. G.S.G.S. Series 3072: Geological map of Belgium.

Produced by the British Geological Survey for the War office, 1915. Geological detail reduced from the 1:40,000 *Carte Géologique de la Belgique*, and superimposed in colour upon the 1:160,000 *Carte Topographique*. Six sheets, 58 × 66 cm.

(4) 1:380,000. *Carte Géologique de la Belgique.*

An old but useful map produced by Lieutenants Lelorraine and Henry for the *Dépôt de la Guerre*, 1877. Engraved by J. Bartholomew, Edinburgh. In colours. One sheet, 68 × 60 cm.

(5) 1:800,000. *Carte Géologique de la Belgique et des contrées voisines.*

Produced by A. Dumont and the *Etablissement géographique de Bruxelles*, 1856. One sheet in colours, 58 × 51 cm. Includes the whole of Belgium, and parts of the Netherlands, Germany and France.

F. Miscellaneous Maps

General and Topographical Maps

(1) 1:60,000. *Karte von Belgien.*

Parts of eastern Belgium produced by the German High Command, 1915. Number of sheets not known. Size of sheets, 53 × 33 cm. Graticule drawn at 5 min. intervals (centesimal from Bruxelles), outer margin divided into 5 min. intervals (sexagesimal from Bruxelles). Scale of geographical miles, kilometres and paces. Printed in black. Legend in German.

Relief shown by contours at 5 m. intervals in black, with spot-heights in black. Roads (three grades), tracks and paths (three grades), railways (two grades), rivers, canals and drainage channels. Woods shown by a superimposed black symbol, heaths by black stipple.

The map is heavy and very difficult to read in many places.

(2) 1:240,000. *Nouvelle Carte Générale de la Belgique.*

Published by the *Office de Publicité* (Bruxelles, 1924). A single sheet, 144 × 100 cm., of which about three-quarters is taken up by the map. Numbered and lettered grid superimposed in red.

No relief shown. Rivers and canals in blue, roads in black (three grades), railways in heavy black (two grades), forests shown by tree symbols. Boundaries of provinces and arrondissement shown, provinces tinted.

The wide margin is occupied by an alphabetic list of towns and villages, with grid references and a table of road distances between towns. A very useful location map.

(3) 1:500,000. *Belgique. Carte Oro-hydrographique.*

Produced by A. de Ghellinck, M. A. Lefèvre, and P. L. Michotte, with the help of a subsidy from the *Fondation Universitaire*, and printed by the *Institut Cartographique Militaire*, 1937. One sheet, 73 × 67 cm. Stereographic projection. Graticule drawn at degree intervals (sexagesimal from Bruxelles).

Relief shown by layer-tinting; eleven shades of green, yellow, and brown at 5, 20, 50, 1200, and every 100 to 700, and over 700 m. Water in four layer-tints of blue at 8, 20, 40 m., and below. Rivers and canals in dark blue.

(4) 1:500,000. Belgium and the Grand Duchy of Luxembourg

Produced by John Bartholomew and Son (Edinburgh, 1943). A single sheet, 54 × 43 cm. Graticule drawn at 15 min. intervals (longitude from Greenwich).

Relief shown by layer-tinting in nine shades of green and brown, with spot heights in metres. Roads in brown (two grades), railways and canals in black, international and provincial boundaries tinted purple. All place-names are given in their official forms.

A copy of this map is contained in the pocket at the end of this Handbook.

(5) 1:780,000. Holland and Belgium.

Produced by Geo. Philip and Son (London, 1940). One sheet, 49 × 59 cm., in colours. Graticule at 30 min. intervals.

No relief shown. Each country tinted. Main roads, railways, canals, river, and other details in black.

(6) 1:1,000,000. War Map of the Western Front.

Produced by J. Bartholomew (Edinburgh, 1939). Single sheet, 95 × 72 cm. Covers Belgium, the Netherlands, western Germany and eastern France. Graticule drawn at degree intervals (sexagesimal from Greenwich).

Relief shown by layer tinting in nine shades of green and brown. Roads shown by double brown lines (four grades), with kilometrages in brown. Railways (two grades), rivers and canals in black, frontiers in red, military defensive systems indicated by red symbol.

Maps and Plans in Guide-books

Numerous guide-books containing maps and plans have been published by various firms. Volumes containing useful sheets, especially large scale town-plans, include:

(1) *Les Guides Bleus—Belgique*

Published by the *Librairie Hachette* (Paris, 1935). There are nineteen plans in colour of the chief towns, various sizes, scales usually 1:10,000 and 1:15,000. There is a useful inset folding map, 1:600,000, size 37 × 48 cm., graticule at 30 min. intervals, lettered and numbered to form a grid. Relief shown by hachures in faint brown, with spot-heights in metres in black. Main roads in red, railways and rivers in black, international and provincial boundaries emphasized in green.

(2) *Muirhead's Belgium and Luxembourg.*

Published by F. Muirhead and M. Monmarché (London, 1929). This contains eighteen coloured plans of the centres and environs of chief cities; various sizes, usual scale 1:15,000.

The inset folding map, size 37 × 43 cm., is produced by J. Bartholomew and Son, Edinburgh. Relief shown by seven tints of green and brown. Roads in double and single red lines (three grades), with kilometrages in red. Railways in black (two grades), rivers and canals in blue. Sandbanks stippled.

(3) *Baedeker's Belgium and Luxembourg.*

Published by Kark Baedeker (Leipzig and London, latest edition 1931). Twenty-one town-plans, various scales and sizes, the largest sheets are folding, 37 × 24 cm. There are twelve regional maps, scales varying from 1:50,000 to 1:300,000, and a folding map, 1:1,000,000, 29 × 22 cm., with a 30 min. graticule. No relief shown. Roads shown by double black lines, railways by heavy black line, canals and rivers in blue, international and provincial boundaries emphasized in pink.

Communications Maps

(1) 1:100,000. *Plan du Canal Albert.*

A series of four folded maps of variable size in black and white, contained in vol. II of A. Delmer, *Le Canal Albert* (Paris, 1939). They are: (i) 'Liége-Monsin à Lanaye'; (ii) 'Lanaye-Genk'; (iii) 'Genk-Kwaadmechelen'; (iv) 'Kwaadmechelen-Anvers.'

This volume also contains small-scale maps of the Rhine-Meuse-Escaut system, numerous geological and other sections, and some large-scale plans of ports along the canal (Genk, Hasselt, etc.).

(2) 1:110,000 (approx.). *Carte du Bassin Houiller Belge et des Voies Navigables.*

Produced by W. Seghers (Anvers, undated, but probably 1938). One sheet, 90 × 62 cm., with main map of Meuse basin in two sections, together with insets of the ports of Liége and Charleroi.

The area of the coalfield is shaded grey, with collieries indicated by a solid red circle, numbered to correspond to an inset list. Towns shown by black circle. Canals and rivers in blue, with locks in black and main railways in red.

A very informative map.

(3) 1:200,000. *Carte Routière de la Belgique et des Régions Limitrophes.*

Produced by the *Touring Club de Belgique* (*Société Royale*) (*Bruxelles*, 1938). Nine sheets, 54 × 65 cm., in colour.

(4) 1:200,000. *Carte Michelin de la Belgique.*

Produced by *Michelin et Cie* (Clermont-Ferrand, latest edition, 1939–40). Four overlapping sheets, 106 × 47 cm., with extensions and insets covering Belgium and adjoining territories. Graticule drawn every 5 min. (centesimal from Paris). Detail continued in places across the margin.

Relief is not shown. Roads are in red, yellow and black (seven grades of width, three grades of surface with kilometrages in red), tracks and paths in black. Railways in black (two grades), rivers in blue, canals by double blue lines. Towns in black, with main streets in white. Usual detailed information for tourists.

(5) 1:300,000. *Carte Taride pour Automobilistes et Cyclists.*

Belgium is shown on sheets 1 and 1 *bis* of the series *France Routière Taride* (Paris, not dated), sheet size 85 × 100 and 74·5 × 57 cm. respectively. It is also shown on an *Edition Etrangère* (sheets 38 and 1 *bis*), each sheet 74·5 × 57 cm.

Relief is shown by spot-heights in black. Roads in red (six grades), with kilometrages in red, railways in black, rivers and canals in blue, frontiers tinted red. A variety of tourist information, including steep hills, viewpoints, etc., is given by various symbols.

(6) 1:320,000. *Carte Routière de la Belgique.*

Produced by the *Touring Club de Belgique* (*Société Royale*), (Bruxelles, many editions, latest 1938), sheet size 73 × 91 cm.

No relief shown. Roads in red and green (six grades), railways in black (two grades), water in blue, towns shaded grey (four grades).

(7) 1:320,000. Belgium: Waterways.

Produced by the British Naval Staff, Intelligence Division, February 1941. Single sheet, 68 × 86 cm. Scale in miles and kilometres. Latitude (from Greenwich) and longitude given in margin at degree intervals, but no graticule.

Waterways are shown in blue and black (four grades), unnavigable rivers in black. Locks marked by symbols, dimensions of locks given on map in feet. Frontiers tinted pink.

(8) 1:500,000. *Carte de Navigation Aérienne* (*Luchtvaartkaart*) *Belgique et Environs.*

Produced by the *Institut Cartographique Militaire* for *Le Service Aviation de la Belgian Shell Company* (Bruxelles, 1934). Two sheets, 73 × 65·5 and 73 × 40·5 cm. Polyconic projection. No grid or graticule. Margin divided into 10 min. intervals.

Relief shown by layer colouring in shades of grey, land 0–100 m. heaviest. Roads in green, railways in black (two grades), high-tension cables in red. Towns coloured red, woods green, aerodromes yellow. Detailed symbols showing aeronautical information.

(9) 1:954,000. *Carte des Voies Intérieurs Navigables de la Belgique les Pays-Bas, l'Allemagne-Ouest, le Rhin et le Nord-Est de France*

Produced by W. Seghers (Anvers, latest edition 1934). One sheet in colours, 99 × 68·5 cm. Gives details of waterway dimensions, locks, ports, etc.

(10) 1:1,000,000. Dunlop Road Maps of France, Belgium, etc.

Produced by John Bartholomew (Edinburgh, n.d.), for the Dunlop Company. Belgium is shown on sheets 5 and 6. Sheet size 19 × 24 cm.

Relief shown by layer-colouring, with twelve tints of green, brown, pink and white. Roads shown in red (three grades), railways in black (two grades), kilometrages in red, rivers in black.

(11) 1:1,200,000. *Canaux et Rivières Navigables de la France et de la Belgique.*

Produced at Paris (1918), by the *Société Editrice Géographique.* One sheet in colours, 81 × 81 cm.

Population and Linguistic Maps

(1) 1:620,000. Three maps accompanying M. A. Lefèvre, *L'Habitat rurale en Belgique* (Liége, 1925).

Three folded maps, 44 × 36 cm., in colour. They are entitled:

(*a*) 'Esquisse régionale de la Répartition des Maisons rurales en Belgique.'

(*b*) 'Densité des Maisons en Belgique.' Although in colour this has a stippled transparent overlay.

(*c*) 'Esquisse régionale des Associations des Maisons rurales d'aprés leur Importance.'

(2) 1:800,000. *Overzichtskaart der Autochtone Nederlandsche Dialecten.*

A folded map in Jac. van Ginneken, *Handboek der Nederlandsche Taal,* Deel 1, 'De Sociologische Structuur der Nederlandsche Taal' ('s Hertogenbosch, 1928). Size of sheet 42 × 43 cm. The distribution of dialects is shown by colours and shading.

(3) 1:950,000. Maps accompanying F. Leyden, 'Die Volksdichte in Belgien, Luxemburg und den Niederlanden', *Ergänzungsheft No.* 204, *Petermanns Geographische Mitteilungen* (Gotha, 1929).

Three folded maps in colours, each sheet 51 × 37 cm., with transparent overlays on which are the names of towns and villages in black. The sheets are entitled:

(*a*) 'Volksdichte in den Niederlanden, Belgien, und Luxemburg, 1926.'
(*b*) 'Wohndichte in den Niederlanden, Belgien, und Luxemburg, 1920.'
(*c*) 'Häuserdichte in den Niederlanden, Belgien, und Luxemburg, 1910–20.'

(4) 1:1,120,000. *Carte linguistique de la Wallone.*

A folded map in M. Valkhoff, *Philologie et Littérature Wallonnes* (Groningen, 1938). Size of sheet 19 × 25 cm., printed in black. Linguistic boundaries are shown by pecked lines, and the areas of the Walloon and Picard dialects are stippled.

G. Atlases

(1) *Algemeine Atlas voor België.*

Produced by J. B. Wolters (Groningen, 1936). A useful world atlas in colour with nineteen maps of Belgium. Size of sheet 17·5 × 23 cm. The whole country is shown on a scale of 1:1,300,000, provincial maps on 1:320,000, and town plans on 1:36,000, 1:25,000, 1:22,220 and 1:15,000. Includes maps of relief, geology, roads, railways, waterways, etc.

(2) *A Manual of Belgium and adjoining territories—Atlas.*

Produced by the British Naval Staff, Intelligence Division, June 1919. I.D. 1168A. Twenty atlas maps in colour, of which ten are 43 × 32 cm., seven are 19 × 25 cm., and three are 43 × 26 cm. They show in detail the chief aspects of the geography of Belgium.

(3) *Atlas Classique.*

Edited by J. Halkin (Namur, 1934). A general atlas, but with twenty-one maps devoted specifically to Belgium. Four sheets of the whole country on a scale of 1:1,000,000, sheet size 27 × 29 cm. In colour. Smaller maps on a scale of 1:1,600,000 and 1:2,500,000 portray in colour or in black and white various features of the geography of Belgium. Much detailed marginal information is appended.

(4) *L'Atlas de Géographique historique de la Belgique.*

Produced under the direction of L. van der Essen of the University of Leuven and published by the *Librairie National d'Art et d'Histoire*, Bruxelles (1919–32). Seven parts, 25 × 32·5 cm., containing numerous folding maps in colour, of variable size, usually 50 × 65 and 32·5 × 50 cm. already published. The atlas illustrates the history of Belgium from the Roman period.

(5) *Leopolds Werldatlas.*

Produced by John Bartholomew and Son (Edinburgh, 1940) for *N.V. Standard Boekhandel* (*Brussel*).

Ninety-six sheets, 19 × 31 cm., of which four deal specifically with Belgium. On these sheets the linguistic boundaries between Flemish, French and German are drawn.

Appendix IV

POSTS, TELEGRAPHS AND TELEPHONES

Postal Services: Telephones: Telegraphs: Submarine Cables: Wireless Telegraphs and Telephones: Broadcasting: Note on Time

Postal, telephone and land-telegraph services in Belgium are operated by various divisions of the *Ministère des Postes, Télégraphes et Téléphones*. Wireless telegraphic, and telephonic services are also largely state operated, although there is a number of private companies. Submarine cable services are controlled by both Belgian and foreign companies. The broadcasting system is operated by a public utility company controlled by the state, but there are in addition a few privately owned low-power commercial stations.

Postal Services

Postal services are under the *Administration des Postes*. The working of the postal services for 1937 may be summarized as follows:

No. of post offices	1,717
No. of letters dispatched (millions)	393·3
Other dispatches (millions)	990·5

Source: *Annuaire statistique de la Belgique*, p. 265 (Gand, 1939).

The working budget of the post office during recent years is summarized in the following table (in millions of francs):

	1932	1933	1934	1935	1936	1937	1938
Receipts	420·7	401·7	412·4	412·5	432·3	450·4	472·4
Expenditure	426·4	389·3	389·3	367·6	405·0	444·0	488·6
Balance (+) or deficit (−)	−5·7	+12·4	+22·5	+44·9	+27·3	+6·4	−16·2

Soûrce: *Annuaire statistique de la Belgique*, p. 266 (Gand, 1939).

The post office administration supervises other services; these include the issue of postal cheques, special fiscal stamps and permits, as well as the payment of old-age insurance benefits. The total value of postal cheques handled in 1936 exceeded 500 million francs. There is no post office bank in Belgium, but the postal service co-operates with the popular savings bank, the *Caisse générale d'Epargne et de Retraite* at Bruxelles; this is a private company whose functions have been fixed by law and which operates under the supervision of the Minister of Finance.

Telephones

The telephone service is operated by the *Direction des Téléphones*, a subsection of the *Régie des Télégraphes et des Téléphones* created in 1930. The country is divided into twelve regional zones, with their headquarters at Antwerpen, Bruxelles, Charleroi, Gent, Huy, Liége, Leuven, Mechelen, Mons, Namur, Oostende and Tournai.

In 1937, there were 528 exchanges, of which nearly a quarter were automatic, and a further fifty semi-automatic. The conversion from manual to automatic exchanges proceeded steadily and most of the large cities had been so equipped by 1939. In addition, automatic interurban connexions have been gradually installed; thus, by 1938, the Bruxelles, Antwerpen and Mechelen zones and the Huy, Liége and Namur zones respectively had been automatically connected.

In December 1937 there were 287,323 subscribers, and a further 1,412 public telephones. They were connected by 3·1 million km. of line, of which 2·6 million km. were local lines; the remainder consisted of interurban connexions and the Belgian sections of international lines (Fig. 128).

The following table summarizes the working of the system in 1937:

Service	No. of calls	Receipts (1,000 fr.)
Local	275,607,455	228,448·0
Interurban	39,435,613	106,295·4
International	3,167,824	60,020·9
Transit	575,143	
Total	318,210,892	394,764·3

Source: *Annuaire statistique de la Belgique*, p. 269 (Gand, 1939).

International telephonic communication plays a very important part. Not only are most Belgian towns linked directly with other countries, but a number of long-distance circuits between other countries, such as England-Germany and Netherlands-France, pass through the country; these are classed as 'transit' calls. The international calls between Belgium and other countries in 1937 were as follows:

Country	No. of calls
France	1,075,355
Netherlands	743,188
Germany	220,239
Great Britain	174,720
Switzerland	62,073
Others	892,249
Total	3,167,824

Source: *Annuaire statistique de la Belgique*, pp. 269–70 (Gand, 1939).

Telegraphs

The telegraph service is operated by the *Direction de l'exploitation télégraphique*. In 1937, the length of telegraph line was 9,975 km., with a total length of 56,062 km. of wire, serving 1,435 telegraph offices. These figures do not include the private telegraph lines maintained by the *Société Nationale des Chemins de Fer* for the railway service. The following table, which includes also wireless telegraphic messages, summarizes the working of the public telegraph service in 1937:

	No. of telegrams
Within Belgium	3,446,567
International	2,582,653
In transit	532,093
	6,561,313

Source: *Annuaire statistique de la Belgique*, p. 267 (Gand, 1939).

There were in addition over a million 'service' telegrams, as follows:

S.N.C.F.B.	546,442
Régie des Télégraphes et des Téléphones	303,396
Administration des Postes	221,727
Private railways	88,627
Meteorological and marine services	3,281
	1,163,473

Source: *Annuaire statistique de la Belgique*, p. 267 (Gand, 1939).

Bruxelles, Antwerpen and several other Belgian towns have direct telegraphic connexion with other parts of the world. The number of telegrams dispatched to or received from other countries in 1937, including those by wireless telegraphy but not including those in transit, was as follows:

	No. of telegrams
European	2,087,931
Great Britain	510,765
France	442,583
Netherlands	270,134
Germany	194,193
Africa	94,812
Asia	72,497
America	314,197
Oceania	13,216
Total	2,582,653

Source: *Annuaire statistique de la Belgique*, p. 268 (Gand, 1939).

About two-thirds of the international and transit telegrams were handled by the *Régie des Télégraphes et des Téléphones*, but a number of private firms also operated, as shown in the figures for 1937:

Service	Transmitted		Received	
	Departure	Transit	Arrival	Transit
Régie des T.T.	860,585	467,738	985,612	357,085
Belradio	193,839	7,060	91,348	11,366
Cie Belgo-Eastern	79,867	37,102	107,593	65,539
Cie Commercial	20,297	1,064	38,158	1,703
Cie Western Union	46,668	1,728	61,516	30,537
Cie Italcable	47,472	17,401	47,698	65,863
Total	1,248,728	532,093	1,331,925	532,093

Source: *Rapport sur l'Exercice*, 1938, p. 121, published by *Régie des Télégraphes et des Téléphones* (Ostende, 1939).

Belradio handled a total of 303,613 telegrams, of which 83,015 were either to or from New York, 64,381 either to or from Vienna and 34,414 either to or from Léopoldville.

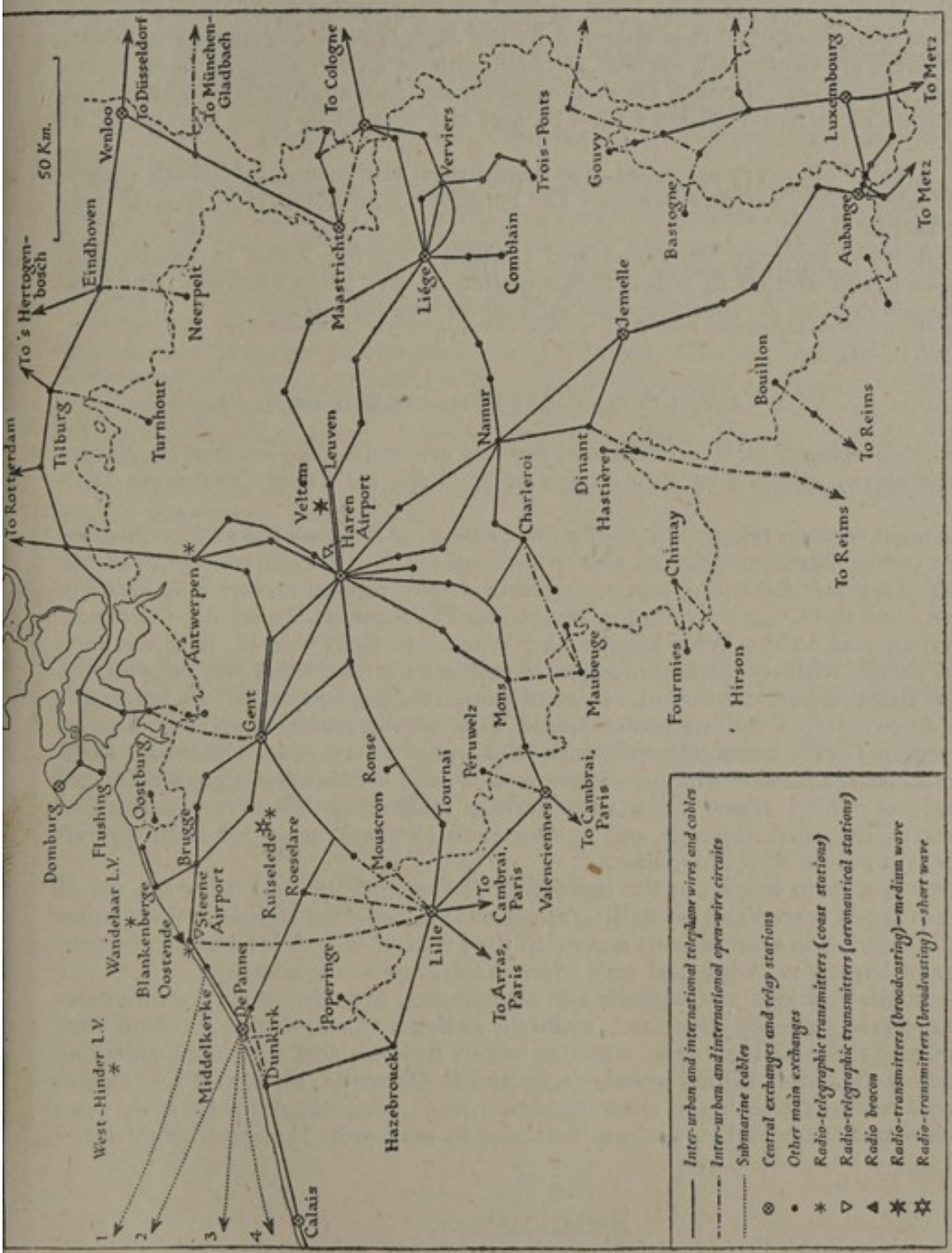


Fig. 128. Signal communications, 1938
Based on official sources.

1. Middelkerke to Dumpton Gap, Margate; 2. De Panne to Dumpton Gap, Margate;
3. De Panne to St Margaret's Bay, Dover; 4. De Panne to Lisbon.

Submarine Cables

The Belgian government operates no submarine cables, but the following cables connect Belgium with England and with Portugal:

(i) A cable, 55·449 sea miles long, opened in 1914, connects Middelkerke and Dumpton Gap, Margate. It is operated by the *S.A. belge de Cables télégraphiques*.

(ii) There are two cables, each of 28 conductors of 48·743 and 50·399 sea miles in length respectively, between De Panne and Dumpton Gap, Margate, both owned by British Cables and Wireless Ltd. The first was opened in 1926, the second in 1930.

(iii) A cable of 49·115 sea miles (120 conductors) also owned by British Cables and Wireless Ltd., extends between De Panne and St Margaret's Bay, Dover. It was laid in 1932.

(iv) A cable between De Panne and Lisbon, 1,135·830 miles in length (one conductor), was opened in 1930. It is operated by an Italian company, *Italcable* (*Compagnia italiana dei cavi telegrafici sottomarini*), of Rome.

Wireless Telegraphs and Telephones

The wireless telegraphic and telephonic services are under the *Direction des Radiocommunications*, which is another section of the *Régie des Télégraphes et des Téléphones*.

The main wireless telegraphic station is at Ruiselede, where nineteen frequencies effect a service between Belgium and other fixed points. All but two are available for public service; the two exceptions operate on government service only between Belgium and the Congo. There are nine coastal stations, at Ruiselede, Oostende, Antwerpen and on the West Hinder and Wandelaar light vessels; they are concerned chiefly with the communication of messages to and from shipping off the Belgian coast and in the Escaut. Four of these stations accept private messages. Thus Antwerpen OSA transmits traffic lists to vessels entering the Escaut, Antwerpen OSW communicates with the pilot boats, and Oostende OST transmits navigational warnings. These coastal stations handled 26,638 messages in 1937, of which about 4,000 were service telegrams. There are aero-radio stations at Bruxelles (Haren) and at Oostende (Steene), used for both aircraft service and public correspondence.

There is a radio beacon at the lighthouse at Oostende, intended for the use of ships equipped with direction finding apparatus; it transmits signals at fixed times daily, increasing to a continuous service in the event of fog. A total of 310 Belgian ships and aircraft are equipped with wireless telegraphic apparatus.

The coastal stations at Oostende and Antwerpen, in addition to the radiotelegraphic services already described, maintain radiotelephonic communication with the Dover-Oostende mailboats, with the steam trawlers and with a considerable number of the motor fishing vessels registered at Oostende, Heist and Zeebrugge.

Direct wireless telephonic communication was inaugurated in 1932 between Bruxelles and Léopoldville, and was extended to most west European countries.

Broadcasting

Broadcasting is controlled by the *Institut national de Radiodiffusion*, which was founded in June 1930 as a public utility company under the *Ministère des Postes, Télégraphes et Téléphones*. The corporation is subsidized by the government, and it has a twelve-year charter; its status is thus almost identical with that of the British Broadcasting Corporation. The *I.N.R.* receives 90% of the receipts from wireless licenses, while the *P.T.T.* receives the remainder. An annual tax of 20 fr. is charged

on all crystal sets, and of 78 fr. on all valve sets. The governing council of the *I.N.R.* consists of the Minister for Posts, Telegraphs and Telephones with nine other members, of which three are appointed by the Crown, three by the Senate and three by the Chamber of Representatives. The council elects a permanent committee in charge of general administration and consisting of the delegate of the minister and three council members.

The *I.N.R.* operates two official medium-wave transmitters from Veltem; Bruxelles I (15 kW., 620 kcyc./sec., 483·9 m.) broadcasts in French, and Bruxelles II (15 kW., 932 kcyc./sec., 321·9 m.) broadcasts in Flemish. In addition, there is the Ruiselede-Bruxelles station (9 kW., 10,330 kcyc./sec., 29·04 m.), owned and operated by the *Régie des Télégraphes et des Téléphones* for short-wave transmissions to the Belgian Congo.

Special organizations and groups are allowed to collaborate in the *I.N.R.* broadcasts. These are known as *Organismes Réconnus*, and include such organizations as *Radio Catholique*, *Solidra*, and *Radio-Wallonie*. They broadcast from Bruxelles I and II for three days each week. Commercial and private advertising matter is not allowed to be broadcast from either of the *I.N.R.* stations.

There are in addition sixteen low power regional transmitters, operated as commercial enterprises by companies or individuals. They depend wholly for their revenue on advertising. These stations include *Vlaamsche Radio-Omroep* at Kortrijk, *Vlaamsche Omroep* at Diest, and *Radio-Ardenne* at Libramont; there are others at Bruxelles, Liége, Diest, Gent, Antwerpen, Eupen, Châtelineau and Verviers.

In 1939 there were 1,139,746 wireless receiving sets in Belgium, representing one for every seven inhabitants.

Note on Time

The standard time normally adopted in Belgium, as in France and Spain, has been that of the Meridian of Greenwich. Summer time, one hour in advance, is usually in force from the middle of April until the beginning of October.

On 24 February, 1940, one hour of summer time was introduced, and a second hour of summer time came into force at the time of the German occupation. Since then, Belgian time changed with that of Germany, as follows:

May 1940–Nov. 1942	2 hr. ahead of G.M.T.
2 Nov. 1942–29 Mar. 1943	1 ,, ,, ,, ,,
Since 29 Mar. 1943	2 ,, ,, ,, ,,

Appendix V

CIVIL AVIATION

There is no separate Ministry for Air in Belgium, and military and civil aviation in the country are under separate administrations. Military aviation is controlled by the *Service de l'Aéronautique*, a section of the *Ministère de la Defense Nationale*. Civil aviation, both within the country and in the Belgian Congo, is under the control of the *Administration de l'Aéronautique*, a section of the *Ministère des Transports*. The *Administration* regulates and supervises commercial and private aviation, prepares agreements with other countries, furthers research, and allocates subsidies. The *Conseil Supérieur de l'Air*, with the Minister for Transport as *ex officio* chairman, was set up as an advisory committee to assist the *Administration*. A monopoly of all civil and commercial aviation, other than private and club flying, has been held since 1923 by the *S.A. belge d'Exploitation de la Navigation aérienne* (*Sabena*).

The Development of Sabena

The real beginning of commercial aviation in Belgium dates from 1919, when a number of interests grouped themselves together as the *Syndicat national pour l'Etude des Transports aériens* (*Sneta*). Its function was to study problems connected with the operating of national and international air-lines. The first service to be arranged by *Sneta* was operated three times a week between London and Bruxelles in the summer of 1919, and it was run by the British firm Handley Page Transport Ltd. By 1920 there was a daily service, and in that year *Sneta* also opened a line between Bruxelles and Paris, operated by the French *Cie des Messageries aériennes*. In 1921, this service was extended to Amsterdam, and *Sneta* acquired several machines to share the traffic with the French company. In September 1921, a fire at the Haren airport destroyed most of *Sneta's* machines and equipment, but in the following year the summer services between Bruxelles and Amsterdam were resumed, while the *Cie des Messageries aériennes* operated the Bruxelles-Paris section. In June 1922, *Sneta* suspended activity, because it was found impossible to show a profit on the running of regular air-lines without a government subsidy. The French company, however, continued to work the Paris-Bruxelles route, while the *Koninklijke Luchtvaart Maatschappij* (*K.L.M.*, or Royal Dutch Air Lines) operated the Amsterdam-Bruxelles route.

In June 1923, *Sabena* was formed to carry out the actual operation of air services within Belgium, between Belgium and other European countries, to the Belgian Congo and within it. The initial share capital of six million francs was subscribed by the Belgian government, by the Congo Colony and by *Sneta*. The results of the researches made by the members of *Sneta's* staff were transferred to *Sabena*, and *Sneta* became a holding company only. Its other holdings were in the *S.A. belge de Constructions aéronautiques* (*Sabca*) (see p. 319), the largest Belgian aeronautical construction firm, in the *Société colombophile de Transports aériens* (*Socta*), which organized the transport by air of racing pigeons to their starting points, and in the *S.A. belge d'Exploitation de la Photographie aérienne* (*Sabepa*).

The capital of *Sabena* was raised to 10 million francs in 1927, and, following an extension of services both in Europe and in Africa during 1929, it was further raised to 20 million francs. Of this total, *Sneta* held shares of 10 million francs, and the Belgian government and the Congo Colony 5 million francs each. *Sabena*, however, was unable to show a profit; to meet its annual deficiency a direct subsidy

based on the extent of services in operation was made by the *Ministère des Transports*. The company received a further subsidy, shared by the Belgian government and the government of the Congo Colony, for operating the air-line between Belgium and the Congo. These two subsidies amounted to 15 million francs annually.

European Services

The *Sabena* services were inaugurated in June 1923, when the line Bruxelles-Oostende-Lympne was opened for airmail, for newspapers and for special freight. In April 1924, *Sabena* began a service between Bruxelles and Basle, extended later in the summer to Rotterdam and Amsterdam. In 1926, the Bruxelles-Oostende-London service was introduced, and extended in 1928 to Cologne. The development of the air services operated by *Sabena* since 1927 is shown in the following table:

	1927	1930	1933	1934
Total lines exploited (km.)	Not stated	1,881	2,285	2,350
Total distance flown (1,000 km.)	155·0	799·6	1,098·2	1,175·8
Passenger-km. (1,000)	558·4	1,702·4	3,562·7	4,030·1
Mails (ton-km.)	167	13,798	12,318	11,149
Freight (ton-km.)	19,064	76,459	103,264	98,805
Newspapers (ton-km.)	—	—	—	—

	1935	1936	1937	1938
Total lines exploited (km.)	2,872	2,263	3,693	Not available
Total distance flown (1,000 km.)	1,257·8	1,514·8	1,853·9	2,345·9
Passenger-km. (1,000)	6,343·6	8,673·5	10,665·5	13,292·1
Mails (ton-km.)	14,593	20,746	41,581	128,204
Freight (ton-km.)	133,431	181,522	102,276	256,306
Newspapers (ton-km.)	—	63,117	76,543	85,845

Source: Successive volumes of the *Annuaire statistique de la Belgique* (Gand); the latest figures are taken from vol. LXI, p. 248 (1939).

In 1938, the *Sabena* fleet consisted of twenty-four aircraft; the flying staff comprised twenty-eight pilots and eighteen radio operators.

The services operated in 1939 are shown on Fig. 129. These were, of course, of varying frequency, and some were seasonal. The Paris-Bruxelles-Amsterdam service ran five times daily in each direction, and twice on Sundays; the Bruxelles-Antwerpen local service four times daily; the Bruxelles-Croydon service three times daily: Bruxelles-Cologne twice daily; Bruxelles-Berlin, Croydon-Oostende-Knokke, and Bruxelles-Prague each daily. A night mail service was also operated by *Sabena* between Bruxelles and Croydon and between Bruxelles and Cologne.

A number of services were operated by *Sabena* in conjunction with foreign air lines under the International Air Traffic Association's agreements. Thus *Air France* shared the Paris-Bruxelles route, *K.L.M.* the Bruxelles-Amsterdam route, and *Deutsche Lufthansa* the Frankfurt-Cologne-Berlin route. In addition, a number of services were operated entirely by foreign firms, including the Rotterdam-West Schouwen-Flushing-Knokke line (by *K.L.M.*), Croydon-Knokke (by British Airways), and Bruxelles-Milan (by the *Avio Linee Italiane S.A.*). Further, the *Sabena* air-lines connected with foreign companies to provide through services, such as Bruxelles-Stockholm and Bruxelles-Vienna. By international agreement, the foreign air-lines adhered to specified routes over Belgian territory; thus *Air-France*

machines on the Paris-Bruxelles route followed the line of the main road from Mons via Nimy, Soignies and Tubize to Halle, thence along the line of the Willebroek Canal to Bruxelles.

Air Services to the Belgian Congo

The first flight between Belgium and the Congo Colony was made in 1925, but a regular air service was not opened until 1935. Starting with a fortnightly service in each direction, it was increased in 1938 by collaboration with the French firm

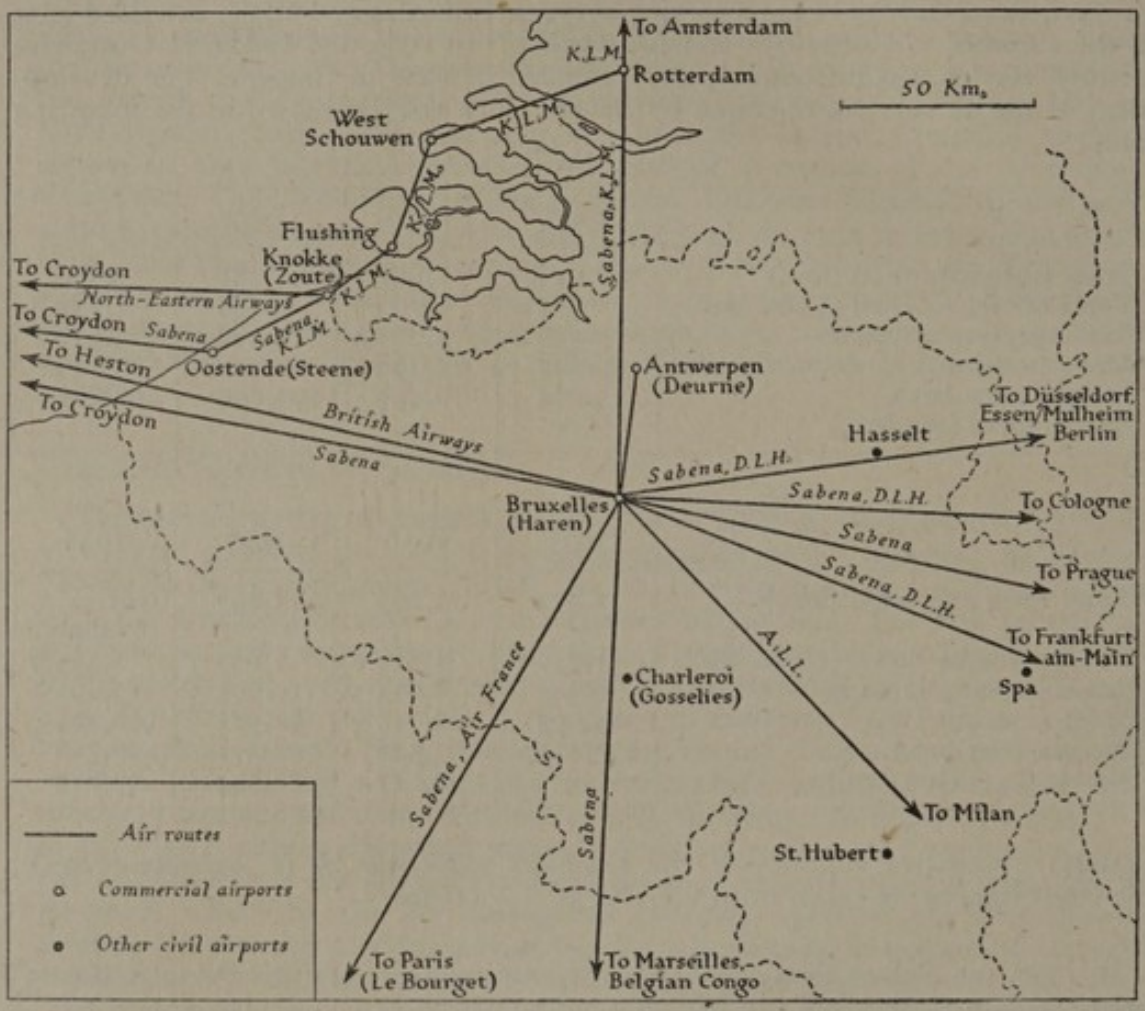


Fig. 129. Commercial air routes in Belgium, 1938
Based on official sources.

Régie Air Afrique to a weekly service. The route flown was Bruxelles-Marseilles-Algiers-El Golea-Gao-Fort Lamy-Libengé; from there one service went to Léopoldville, another to Elizabethville. *Régie Air Afrique* continued the route via Broken Hill and Mozambique to Tananarive in Madagascar. In 1938, *Sabena* aircraft flew a total of 628,765 km. on this route, conveyed 892 passengers, most of whom were government officials, and carried 20,030 kg. of mail and 14,681 kg. of freight.

Air Services in the Belgian Congo

In addition to the Belgium-Congo connexion, *Sabena* maintains air services within the Congo Colony. Thirty-three airfields and landing grounds were in use in 1938. The scheduled routes totalled 3,235 km., and comprised (i) Léopoldville-Boma; (ii) Léopoldville-Banningville-Port Franqui-Luluaborg; and (iii) Léopoldville-Coquilhatville-Lisala-Stanleyville. The total distance flown in 1938 was

254,000 km., and 1,677 passengers, 23,883 kg. of freight and 39,029 kg. of mail were carried. Detailed figures showing the development of the Congo services are given in the following table:

	1933	1934	1935	1936	1937
Total lines exploited (km.)	2,760	3,235	3,235	2,310	3,235
Total distance flown (1,000 km.)	156·5	172·8	243·8	174·1	212·4
No. of passengers	767	1,480	1,390	1,488	1,311
Freight (kg.)	31,428	59,189	59,350	32,374	41,030
Freight (ton-km.)	116,626	135,444	137,069	104,571	103,560

Source: *Annuaire statistique de la Belgique*, p. 299 (Gand, 1939).

Since 1940, *Sabena* has not only maintained the operation of routes within the colony but has also opened lines to Egypt, the Gold Coast, Nigeria and the Union of South Africa.

Airports and Civil Airfields

The activities of the principal state airports are summarized in the following table:

	Bruxelles (Haren)	Antwerpen (Deurne)	Oostende (Steene)	Knokke (Zoute)	Total
Aircraft arrivals*	7,628	1,565	634	950	10,777
Passengers:					
Arrivals	11,852	2,125	929	1,778	16,684
Departures	11,374	1,975	914	1,797	16,060
Transit	14,628	—	644	16	15,288
Total	37,854	4,100	2,487	3,591	48,032
Local passengers	7,532	1,895	1,260	1,219	11,906
Mails (kg.):					
Arrivals	165,146	2,118	4	123	167,391
Departures	193,079	5,528	4	19	198,630
Transit	149,513	—	833	—	150,346
Total	507,738	7,646	841	142	516,367
Freight:					
Arrivals	435,605	35,694	45,373	22,466	539,138
Departures	438,627	107,760	7,201	15,977	569,565
Transit	401,853	133	17,171	3,491	422,648
Total	1,276,085	143,587	69,745	41,934	1,531,351

* The numbers of 'arrivals' and 'departures' were very nearly equal; thus at Haren the 'arrivals' totalled 7,628, the 'departures' 7,626. The 'arrivals' figure only is given in this table.

Source: *Annuaire statistique de la Belgique*, p. 248 (Gand, 1939).

The most important airport is Haren, 6 km. north-east of Bruxelles, which handles about three-quarters of the total air traffic. Owing to its central position, relative to the countries of western Europe, it is used regularly by many foreign air-lines, as indicated by the high 'transit' figures in the table. The other state airports handle only a small proportion of the total air traffic. The airport at Liége (Ans) was closed in 1934.

Other public airports, not used regularly by the commercial lines, are at Charleroi (Gosselies), Hasselt (Kiewit), St Hubert and Spa. Thirteen other airfields are used by clubs, by flying schools and by private individuals.

Private Flying

While private flying prior to 1939 was hardly as popular as in Germany or in France, there has been a fair number of flourishing clubs. These include the *Aéro-Club royal de Belgique*, founded as early as 1901, the *Aéro-Club royal d'Anvers*, and the *Aéro-Club des Flandres* at Gent. Twelve small local clubs are affiliated to the *Fédération des Clubs belges d'Aviation*, founded in 1931. Ten civil flying schools were active in 1939 and received state subsidies. The largest was the *Ecole nationale d'Aviation*, which had branches at Tervuren-Leefdaal near Bruxelles, at Hasselt, at Haren and at Gosselies. Gliding clubs were active at Genk, Linkebeek, Gosselies and at six other places; their activities are co-ordinated by the *Section centrale de Vol à Voile*.

Appendix VI

BRUXELLES AND OTHER CHIEF TOWNS

According to the official population estimates published in *Le Moniteur Belge* (Bruxelles) on 13 April 1939, there were in Belgium on 31 December 1938 fifty-four communes with more than 20,000 inhabitants (see p. 219). It should be noted, however, that the towns in this category include the six communes forming the official agglomeration of Antwerpen, two of those in the Liége agglomeration, two in the Gent agglomeration, and twelve in that of Bruxelles. In the following account the agglomerations of Bruxelles and Liége are each treated as an entity, while Gent (Ghent, Gand), Antwerpen (Anvers) and the port of Oostende are dealt with in Chapter xv. The account of the commune of Wilrijk, a suburb of Antwerpen, has also been included in that of that port. The communes of Gilly, Jumet, Marchienne-au-Pont, Marcinelle and Montignies-sur-Sambre have been grouped together with Charleroi. Thirty-two towns, therefore, are described in this Appendix (Fig. 59), and the population figures are the official estimates for the year 1938.

Bruxelles (Brussels) (191,678)

General Features

Bruxelles is situated on the banks of the Senne, a small tributary of the Escaut in the province of Brabant. The population of the commune of Bruxelles itself is only 191,678, but that of the whole agglomeration reaches 912,774, and it seems as if it is likely to grow even larger. The main expansion of the agglomeration from an island in the marshy Senne valley has been on to the sandstone uplands that lie close to the right bank of the river on the east. It is only since about 1850 that the agglomeration has spread over the alluvial plain on the left bank of the river and on to the more distant western upland (Plate 87).

Until the second half of the nineteenth century the water supply of Bruxelles was derived from the eastern uplands; here, the junction of the sandstone and the underlying clays gave rise to springs that supplied the domestic wells of Bruxelles. The modern agglomeration, however, receives its supply from Spontin, in the Bocq valley near Dinant, and also from the Hoyoux valley, in the Ardenne (see p. 2), some 80 km. away.

History

The original sixth-century site of Bruxelles on the *Ile Saint-Géry* (Fig. 130) is to-day marked by the *Place Saint-Géry*. From the tenth century onwards, the name 'Brucsella' appears in contemporary documents (probably a compound form from 'bruc' a marsh and 'sel' a settlement). The island itself was fortified, while beyond the ramparts were patches of cultivated land amid the marsh, through which ran the numerous branches of the Senne. In the comparative security following the Norse incursions of the tenth century, economic factors began to play a part in its growth, and from the eleventh century onward the settlement grew rapidly; the number of wool weavers quickly increased and Bruxelles cloth acquired great renown. Its position near the great commercial route between Cologne and Brugge, linking the Rhine with the North Sea, contributed greatly to its prosperity. On the drier right bank, within the protection of the island, a market was organized

and trade began to grow; near here, too, were the head of river navigation and the beginnings of a port. The lower river terraces on the right bank provided, moreover, favourable building areas, and the whole of this district (island, market and port) was to develop into the commercial quarter or 'lower town' of later Bruxelles. It was during the eleventh century too that the counts of Louvain, later the dukes of Brabant, built the castle of Koudenberg on the higher river terraces, about 20 m. above the bottom of the valley. Its site is now marked by the *Place Royale*, and it formed a nucleus for the 'upper town'. The first ramparts, which included the

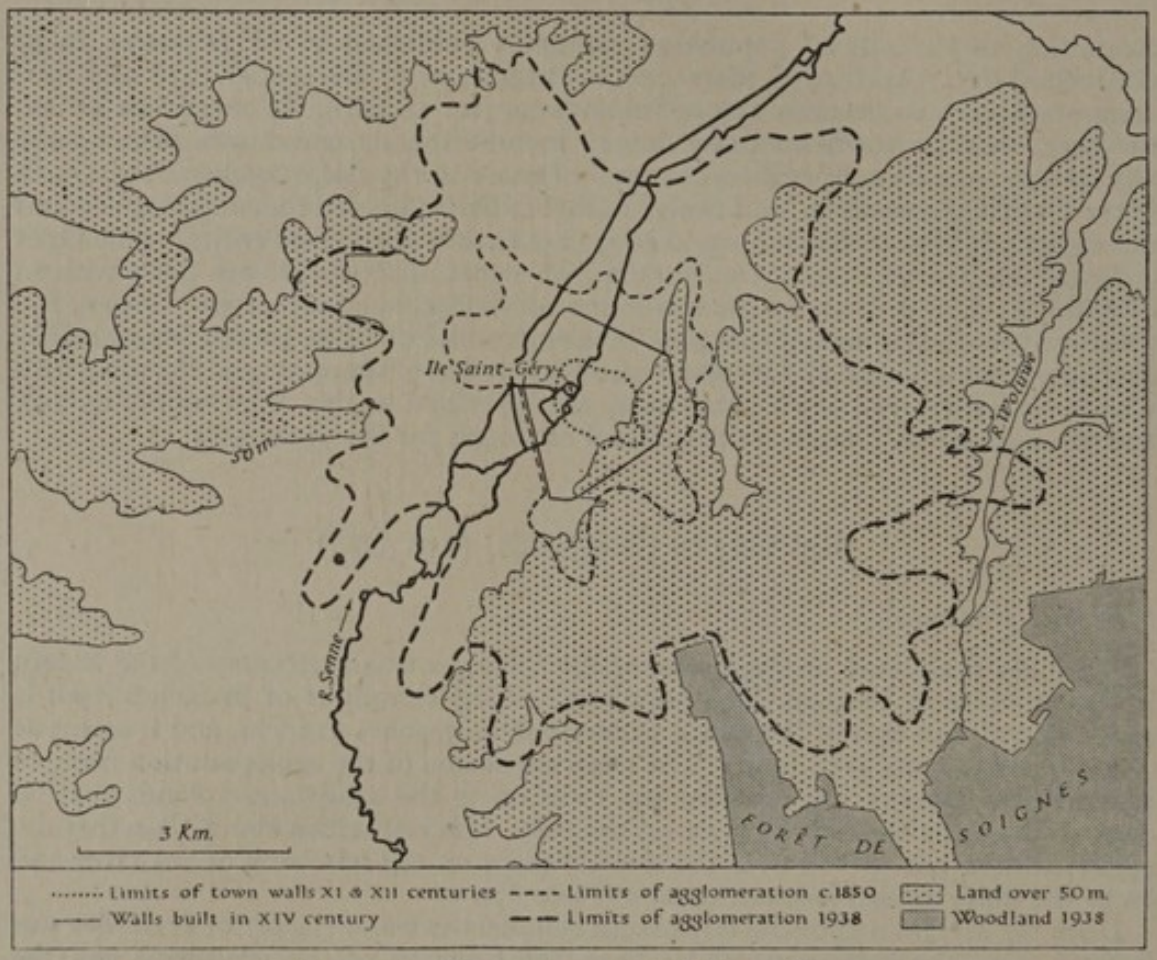


Fig. 130. Site and growth of Bruxelles

Based on *Grande Encyclopédie de la Belgique et du Congo*, vol. I, p. 138 (Bruxelles, 1938).

Koudenberg château, were begun at the end of the twelfth century and completed during the first half of the thirteenth century. Bruxelles received a town charter from Henry I of Brabant in 1229, but during the thirteenth and fourteenth centuries it was relatively less important than Leuven. The town walls were extended in 1357–79 and they remained standing until 1830. Their former course can to-day be traced in the boulevards (Plate 88).

A most significant event in the history of Bruxelles was the decision of the dukes of Brabant in 1383 to make it their permanent residence. Although the dukes already had a temporary residence in the Koudenberg château, Leuven was hitherto their capital. After 1383, however, Bruxelles began to replace Leuven as the most important town in Brabant. In the fifteenth century under the Burgundians, the town prospered greatly, and the various guilds, such as those of the tapestry-makers, the goldsmiths and the silversmiths, assumed far-reaching authority. It has been estimated that about 1450 the population of Bruxelles was 46,000 and it was in this century that the *Hôtel de Ville* was built (Plate 89).

Nor did Bruxelles lose any of its importance when the Hapsburgs gained possession of the Netherlands in 1477. It was the seat of the court which reached its zenith under Charles V, and Philip II made it the seat of the Stadtholder of the Netherlands (1559). In 1561 the Willebroek Canal was constructed and it resulted in an increase in the town's commercial traffic.

The tyranny of Spanish domination under Alba led to the unsuccessful rising of 1566, which broke out in Bruxelles; Bruxelles played an outstanding role as the capital of the southern provinces, during the sixteenth and seventeenth centuries. In 1695 during the wars of Louis XIV, Bruxelles was bombarded by Villeroi. The first serious attempts at town planning were made after this disaster, which affected mostly the lower town. The replanning included the enlarging of streets, the better spacing of buildings, and the improvement of the drainage system; thus the *Grand' Place* was laid out in 1697.

The eighteenth century was a period of relative calm. Ambitious public works were carried out, and the upper town was replanned by the French architects Guimard and Barré. Soon after 1787, Bruxelles became the scene of disturbances and popular agitation, resulting in the Brabant Revolution of 1790 (see p. 108). Under the French occupation which followed five years later, the administration of Bruxelles was considerably modified; it became a canton, and the chief town of the department of the Dyle. The surrounding suburban communes, which since the Middle Ages had in varying degrees remained dependent upon Bruxelles, were redivided into three cantons.

After Belgian independence had been gained in 1831, Bruxelles remained the seat of the central government and the residence of the royal family. The free university of Bruxelles was founded in 1834 with faculties of law, philosophy, medicine and natural science. Between 1853 and 1864, Bruxelles proper extended its area with the addition of the *Quartier Léopold* to the east, the *Quartier de l'Avenue Louise* and the *Bois de la Cambre* to the south-east. Gradually the old unhealthy quarters, especially those near the Senne in the lower town, disappeared. The Senne and its various branches had been used as a drainage system, but under the energetic administration of Burgomaster Jules Anspach, between 1872 and 1874, the *Nord-Midi* zone was transformed by the vaulting built to mask the Senne. The great central boulevards from the *Gare du Nord* to the *Gare du Midi* trace its course.

Although Bruxelles has become the metropolis of Belgium it has not become the focus of national life which Paris is to France. Other historic towns like Antwerpen, Liége, Leuven and Mechelen limit its influence, since the ingrained civic consciousness is one of the most important features of Belgian life.

The Ground Plan of Bruxelles

The town proper, almost entirely enclosed by the boulevards (Fig. 131), is comprised of the lower town and the upper town. The upper town, spreading into the south-eastern suburbs, is the residential and administrative quarter. The lower town, grouped round the *Grand' Place* and the *Hôtel de Ville*, is the commercial quarter and includes the port of Bruxelles. To facilitate the reconstruction of the port, the communes of Laeken, Haren and Neder-over-Heembeek, to the north, together with part of Molenbeek-Saint-Jean, were incorporated in the city in 1921.

Around the town proper the suburban communes, with their own local administration, are divided into an inner ring comprising Anderlecht, Etterbeek, Ixelles, Molenbeek-Saint-Jean, Saint-Gilles, Saint-Joose-ten-Noode, and Schaerbeek, and an outer ring consisting of Auderghem, Forest, Jette, Koekelberg, Uccle, Watermael-Boitsfort, Woluwe-Saint-Lambert, and Woluwe-Saint-Pierre. The agglomeration has now reached the valley of the Woluwe to the east, particularly its upper part. Sint-Stevens-Woluwe, in the middle course of the river, is still rural and marks the approximate limit of the urban zone. Westwards, expansion has been slower and has barely extended from the alluvial plain on to the upland. Notable areas of urban expansion are the communes of Ganshoren and Sint-Agatha-Berchem.

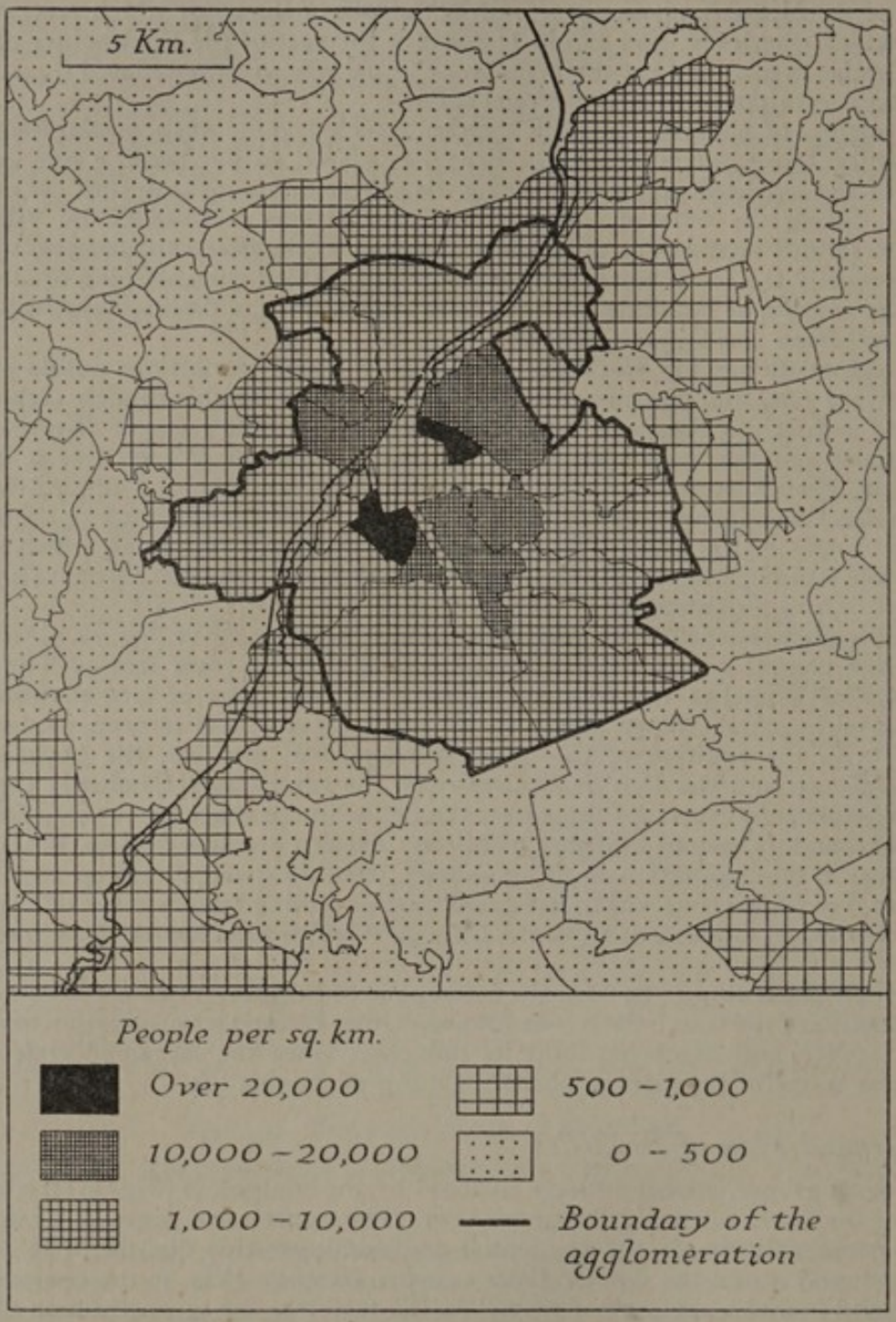


Fig. 131. Bruxelles, density of population by commune, 1938

Based on official population statistics for 31 December 1938, published in *Le Moniteur Belge*, 13 April 1939 (Bruxelles).

The density of population in the central area of the city has been considerably diminished as a result of the incorporation of the communes in 1921 to facilitate port development. In addition, the outward movement of population has contributed to the decrease (see p. 589).

Recent developments have also tended to include the commune of Evere, to the north-east of Bruxelles (Figs. 132, 133).

Growth of Population

The greatest relative growth of population in the Bruxelles agglomeration as a whole occurred between 1900 and 1910 (see table below); between 1910 and 1920, abnormal variations were due to the war of 1914–18.

Census Returns for Bruxelles and its Suburbs

	1880	1890	1900	1910	1920	1930	1938 Official estimates
Bruxelles	183,315	205,096	218,623	218,969	203,058	200,433*	191,678
Anderlecht	22,812	32,311	47,929	64,137	67,038	80,046	88,048
Auderghem	2,434	3,277	4,685	7,520	9,108	14,090	18,002
Etterbeek	11,753	17,735	20,838	33,227	39,813	45,328	49,238
Forest	4,182	5,885	9,509	24,228	31,152	39,594	45,695
Ixelles	36,324	44,497	58,615	72,991	81,245	83,912	89,317
Jette	4,712	6,635	10,053	14,782	16,109	22,226	27,696
Koekelberg	4,893	6,272	10,650	12,750	12,502	13,906	14,832
Molenbeek-Saint-Jean	41,737	48,723	58,445	72,783	71,225	64,775	62,606
Saint-Gilles	33,124	40,289	51,763	63,140	64,814	64,116	61,341
St-Josse-ten-Noode	28,052	29,709	32,140	31,865	31,843	30,917	28,156
Schaerbeek	40,784	50,826	63,508	82,480	101,526	118,722	123,468
Uccle	10,744	13,400	18,034	26,979	32,056	43,322	52,818
Watermael-Boitsfort	3,658	5,084	6,520	8,613	10,096	16,138	18,500
Woluwe-St-Lambert	1,660	2,298	3,468	8,883	11,300	18,244	24,750
Woluwe-St-Pierre	1,634	1,976	2,866	5,307	8,072	13,512	16,029
Bruxelles and agglomeration	431,818	514,013	617,466	748,654	790,957	869,281	912,774

* Figures from 1930 include Laeken, Haren, and Neder-over-Heembeek, incorporated in Bruxelles in 1921.

Sources: (1) *Recensement général* (Bruxelles, 1937), vol. I, p. 153; (2) *Le Moniteur Belge* (Bruxelles), 13 April 1939.

The population of the commune of Bruxelles itself reached saturation point in 1910 and had started to decline by 1920, and this decline continued up to 1938. The census returns for 1930 include the three communes incorporated in 1921, and hence the decrease in the population of the commune of Bruxelles is actually greater than is apparent from these overweighted figures.

The suburbs since 1880 have been growing relatively faster than the city, while their maximum relative growth occurred between 1900 and 1910.

The outward movement from the city to the suburbs has been due to the extension, facility and cheapness of communications, to high rents in the city, to the purchasing of building sites by large commercial companies, and to the enlarging of streets and the clearing of slums. Between 1920 and 1930, and again by 1938, three inner suburbs showed a decrease in population; these were Molenbeek-Saint-Jean, which had already lost 4,820 inhabitants to Bruxelles in 1921, Saint-Gilles, and Saint-Josse-ten-Noode. This decrease was probably caused by further movements to the periphery.

The Linguistic Position

According to the census returns for 1930, over half the population of the city is bilingual, and of the remainder, two-thirds speak French and one-third Flemish (see p. 60). French is the language of the upper town, where the chief administrative offices and the larger commercial firms are established, but Flemish persists as the usual language of the lower town, and in most of the suburbs except those to the south-east, especially that of Ixelles, which is almost entirely French speaking.

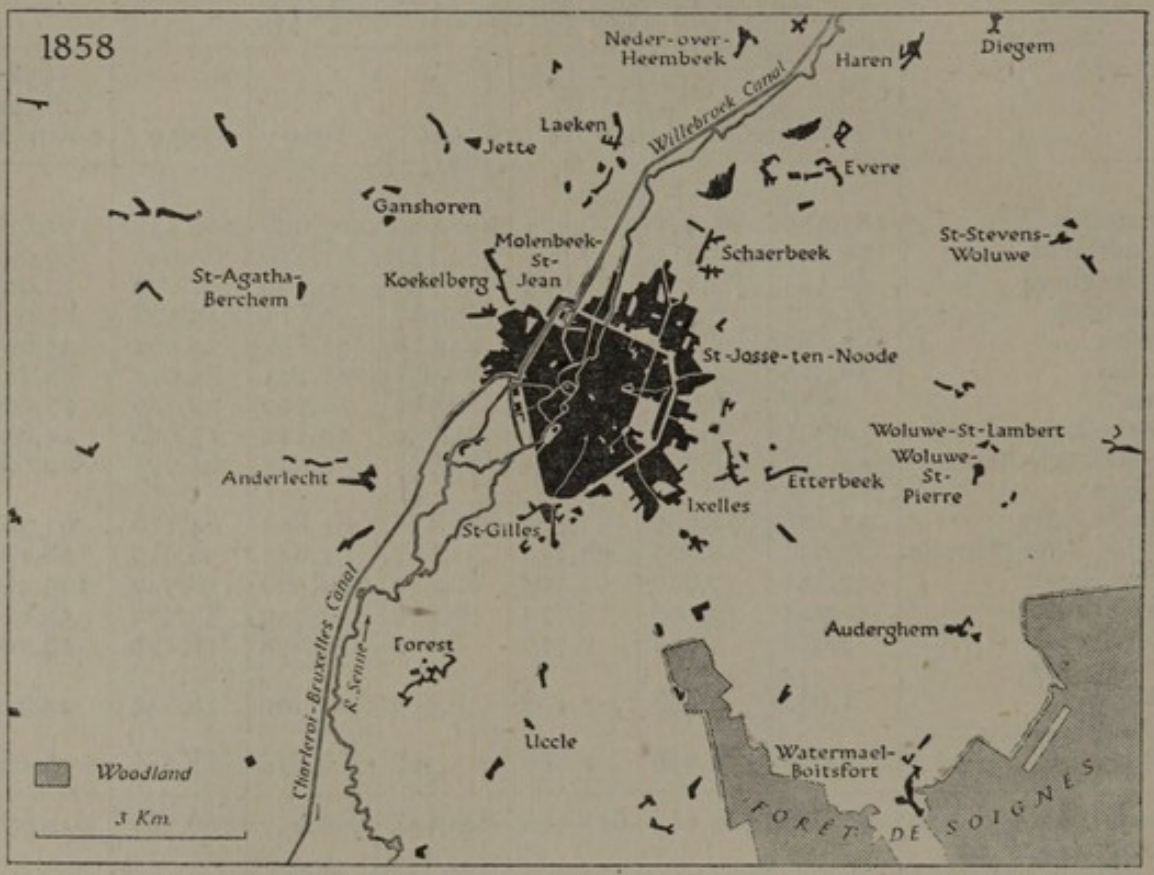


Fig. 132. Bruxelles: built-up area in 1858

Based on 1 : 20,000 *Carte Topographique et Hypsométrique de Bruxelles et ses Environs* (Bruxelles, 1858).

Although Bruxelles lies just to the north of the linguistic frontier and in spite of the town's Flemish origin, it has attracted a heterogeneous population. The south-eastern part of the agglomeration which is French speaking forms a linguistic island (see p. 61). Thus the two main divisions of the Belgian population, Walloons and Flemings, come into closer contact in the capital than in any other town in the country.

Administration

Bruxelles has a complex administrative role, for in addition to being capital of the kingdom, it is the chief town of the province of Brabant, centre of an arrondissement and a commune. The communal organization is similar in every respect to that of other Belgian communes (see pp. 154-6); the communal council consists of forty-one members, including the burgomaster and seven aldermen, in whom the executive power is vested, and thirty-three communal councillors. The other fifteen communes which form the agglomeration of Bruxelles have a similar organization

and are not in any way dependent on the communal council of Bruxelles. Thus in the agglomeration as a whole there is absent any co-ordinated administration, for although the burgomasters of eighteen neighbouring communes meet periodically for informal discussion of general problems, their consultations have no executive force. Among other things, this lack of co-ordination has greatly hindered town-planning in the agglomeration.*

The complex administrative role is again reflected in the judicial sphere; the *Cour de Cassation* is the supreme court of Belgium and the Congo colony, while

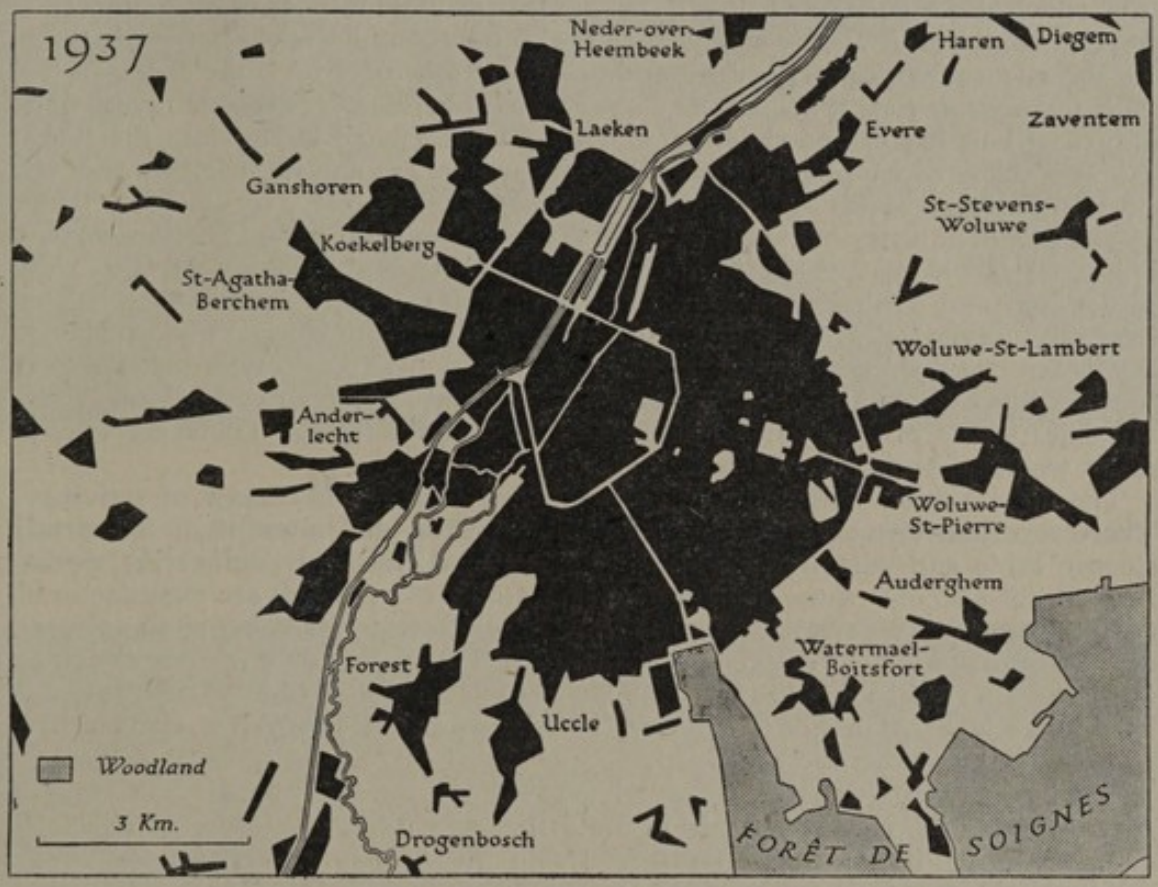


Fig. 133. Bruxelles: built-up area in 1937

Based on *Institut Cartographique Militaire*, 1 : 40,000, sheet 31 (Bruxelles, 1937).

the Court of Appeal is one of three in the kingdom. As chief town of a judicial arrondissement, Bruxelles has a Court of First Instance, a Tribunal of Commerce and a *Conseil de Prud'hommes*. Within the commune there are three judicial cantons, each with a *juge de paix* (see p. 157).

Bruxelles is not the metropolitan see of Belgium; although it has many fine churches there is no cathedral and the town is in the diocese of Mechelen. The free university of Bruxelles has faculties of philosophy and letters, law (including a department of maritime law), science, applied science and medicine. The numerous associated higher educational institutions include the *Ecole des Sciences politiques et sociales*, *Ecole de Commerce*, the *Institut des Hautes Etudes de Belgique*, the *Institut Solvay* (for physiology and sociology), and the state veterinary medicine school.

* The administration of Bruxelles was reorganized in 1942, and the commune together with eighteen surrounding communes represented at the consultative council of burgomasters were united under a single burgomaster. It was hoped that the administrative services, communications and town-planning could thus be more effectively rationalized.

Economic Importance

Bruxelles is the commercial capital of Belgium and the organizing and distributing centre of many industrial products. Within the last century a great variety of industries has developed in the city, attracted by the accumulation of labour and capital. The Bruxelles-Charleroi Canal, constructed between 1827 and 1832, has been the means of transporting the coal necessary for industrial development. Industries have developed well to the south of Bruxelles—towards Halle (15 km. to the south-west) and Tubize (20 km. to the south-west) along the canal banks, from which coal supplies are tapped. These industries include mechanical engineering works, metallurgical works, chemical works and automobile works; at Halle there are also sugar factories, paper mills and printing works. Tubize is the centre of the *S.A. Fabrique de Soie artificielle de Tubize* which manufactures acetate rayon. The industrial belt has extended farther north towards Vilvoorde and into the lower Woluwe valley as far as Zaventem. The city's main gas and electricity works are situated at Schaerbeek.

The textile industry of Bruxelles dates from medieval times and is an important industrial factor to-day. It includes wool-spinning and weaving at Bruxelles, Anderlecht and Woluwe-St-Pierre; there are cotton and pure silk factories at Bruxelles, Anderlecht, Molenbeek-St-Jean, St Gilles and Uccle. Flax-spinning, lace-making and the manufacture of linen, in addition to a variety of textile goods such as blankets and carpets, employ many workers. Like many capital cities, Bruxelles is one of the principal centres of made-up clothing. There are viscose rayon works at Anderlecht.

The metallurgical and engineering industries cover a wide range of activities. There are non-ferrous ore refineries, copper works, and aluminium foundries, electric cable and wire works, and mechanical and electrical engineering works. Bruxelles is also one of the main machine-tool centres. Aircraft are manufactured at Evere and S.A.B.C.A. have works at Haren, both factories being sited adjacent to the airport (see p. 584). The construction of Diesel motors and steam engines forms another specialized industry. The *Ateliers Walschaerts-Ernest Mennig* are leading producers of marine machinery. Electric lamps, wireless valves, transmitting and receiving sets are also produced.

The leading representative of the Belgian chemical industry, the *Union Chimique Belge* (see p. 326), has three works in the Bruxelles region; in addition to a factory at Drogenbosch (6 km. to the south-west), the pharmaceutical division has works and tropical research laboratories at Forest, and the photographic division is situated at Evere. There are soap and margarine works of the *S.A. Huilever* at Forest, and other works manufacture fish oils, including cod-liver oil, in addition to vegetable oils of many kinds.

Bruxelles is one of the chief paper and cardboard-manufacturing centres, and it has several tobacco works. Scientific instruments, rubber manufactures, celluloid goods, furniture and cement are the other representative industrial products. The food industry covers canned goods, chocolate, dairy produce (especially cheese), glucose and sugar.

As the largest single consuming centre in Belgium, Bruxelles is naturally a most important market. Like London and Paris it has on its outskirts a belt of market gardens which specialize in the production of *primeurs* (see p. 248). The Senne valley is a leading market-gardening area, especially the fertile river terraces at Forest, Evere, Haren and Neder-over-Heembeek; Diegem and Sint-Stevens-Woluwe in the Woluwe valley also supply vegetables to Bruxelles. The products of the great glasshouse area at Hoeilaart to the south-east include dessert grapes for export (Plate 23).

Communications (Fig. 118)

Bruxelles is the main focus of the Belgian railway system (see pp. 494-6), of the national road network and of air routes. Seven main lines converge on the city, and

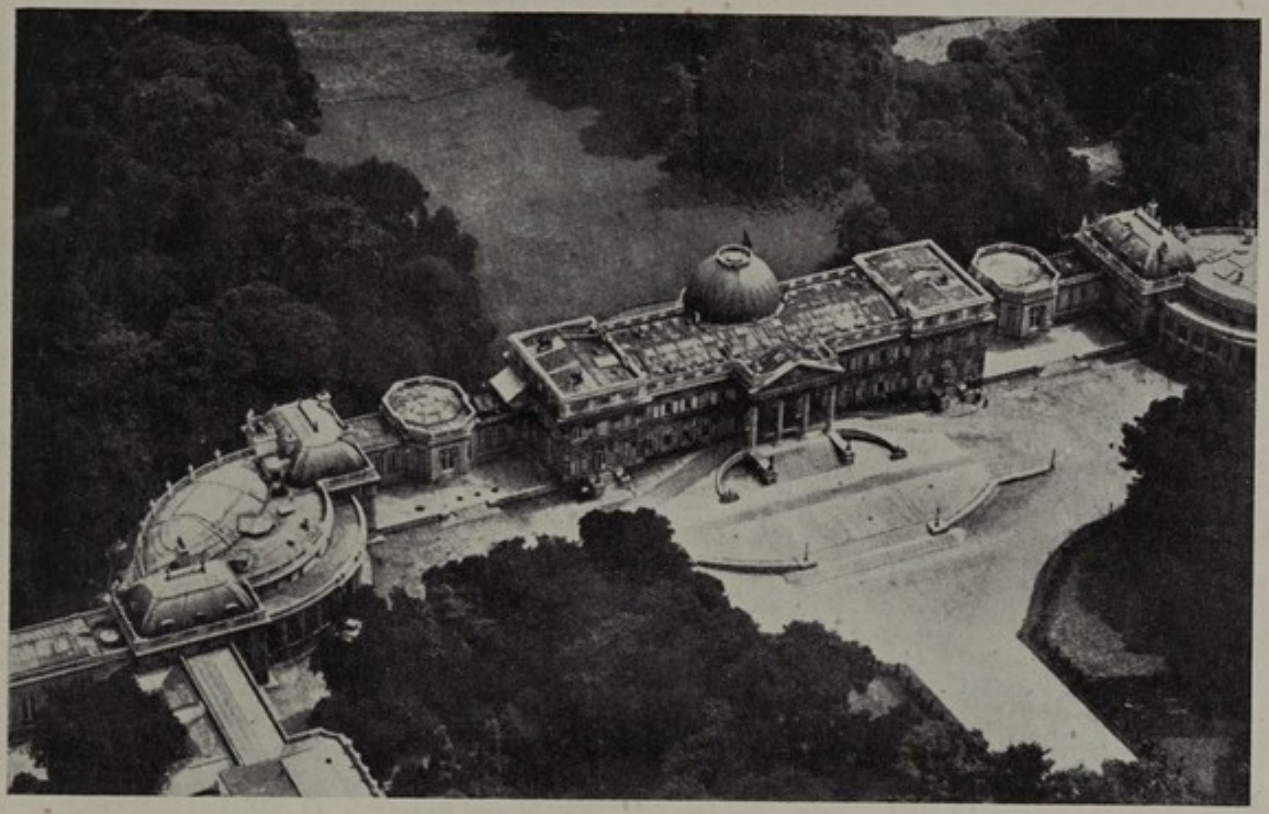


Plate 87. The royal palace at Laeken

The summer palace of the Belgian monarchs was built in 1784 and lies to the north of Bruxelles, on the left bank of the Senne valley.



Plate 88. The *Palais de Justice*, Bruxelles

The law courts lie in the south-western part of the upper town, within the boulevards which mark the site of the fourteenth-century walls.



Plate 89. The *Hôtel de Ville*, Bruxelles

The fifteenth-century Gothic Town Hall is one of the finest in Belgium; in the foreground is the *Grand' Place*, and together they form the centre of the old lower town.



Plate 90. Gent (Ghent): the old inner town

The view looks east, over the bridge of St Michael, across the Lys and its quays towards the centre of the town. The buildings, from left to right, are: the imitation-Gothic Post Office, the turreted church of St Nicolas, the restored Belfry and, in the distance, the cathedral of St Bavon. Along the *Quai des Herbes*, across the Lys, there are several fine examples of guild-house architecture.

all are used by international expresses. Starting in the north and proceeding clockwise, the lines radiate to (1) Antwerpen (for Amsterdam); (2) Liége (for Cologne and thence Berlin or Vienna); (3) Namur (for Luxembourg and Basel); (4) Charleroi; (5) Halle, for Mons (and Paris) or Tournai (and Calais); (6) Gent; (7) Oostende. The main line from Bruxelles to Mechelen and Antwerpen is the only electrified section of the Belgian main-line system. The line to the suburb of Tervuren, to the east, was specially electrified in 1931 to facilitate access to the *Musée du Congo*, and to cater for the heavy traffic of the south-eastern and eastern suburbs. Trains to Liége, Antwerpen (except the Paris-Amsterdam expresses), Gent, Brugge, and the coast, Kortrijk and Ieper, and international trains to Calais and Namur and Luxembourg leave from the *Gare du Nord*. Trains to Tournai (Calais), Mons (Paris) and Charleroi, some trains to Gent, Brugge and the coast, and the Paris-Amsterdam expresses leave from the *Gare du Midi*. The *Station du Quartier-Léopold* or *Gare du Luxembourg* has local services to Namur and Arlon; it is also a stopping place for international trains to Luxembourg and Basle which start from the *Gare du Nord*. Extensive marshalling yards lie between Schaerbeek and Haren. A network of local railways serves to convey industrial labour into the city.

The main-road trend within the city itself has followed a north-south direction along the contours of the valley, but suburban roads radiate in all directions from the city.

During the nineteenth century, important work on maritime installations was planned and carried out. The sixteenth-century Willebroek Canal, giving access to the tidal course of the Rupel and the Escaut, was deepened between 1830 and 1836. At the end of the century it was found to be insufficient and the enlarging of the canal to allow the passage of steamers drawing 19 ft. and the construction of harbour works, begun in 1896, were completed in 1908. These were found to be inadequate, and in 1910 the basins were filled in. The new port, which was completed in 1922, made Bruxelles virtually a seaport (see further pp. 459-60).

The civil airport of Bruxelles is situated at Haren. Services are run to Antwerpen, Oostende and Knokke-Zoute. In addition there are international services to Rotterdam, Amsterdam, Cologne and Düsseldorf (for Hamburg, Copenhagen and Malmö), Paris, Basle and London.

Aalst (Alost) (41,131)

General Features

Aalst, chief town of an arrondissement in the province of Oost-Vlaanderen, is situated at an altitude of 15 m. on the Dendre, 13 km. above its confluence with the Escaut at Dendermonde. The town lies chiefly on the left bank of the river, where several tributaries converge; there has been only slight development on the slopes of the right bank.

History

Aalst was already well known in the ninth century, when it was sacked by the Norsemen. In 1046, the countship of Aalst was created. At this period the town was of considerable importance, for it was here that the great commercial route connecting the Rhine with the coast crossed the Dendre. This crossing-place was fortified at the beginning of the twelfth century. For several centuries Aalst suffered much from its marginal position between the duchy of Brabant and its rival Flanders. The town suffered greatly in the wars of religion in the sixteenth and seventeenth centuries. Under the Austrian Hapsburgs, it was the capital of Flanders. During the nineteenth century Aalst enjoyed increasing industrial prosperity which is reflected in the increase of population from 5,070 in 1784 to 12,151 in 1815, then to 22,431 in 1885, and again to 35,125 in 1910. The town was badly damaged by bombardment in 1914, when most of its population fled.

Economic Importance

The clays and sands of the district around Aalst are generally very fertile, and particularly suited to the cultivation of hops and to market-gardening. The numerous local industries have developed in importance only since the middle of the nineteenth century. The manufacture and bleaching of linen, the spinning of silk yarn and wool, the bleaching, dyeing and finishing of cotton, the manufacture of viscose rayon and the making of lace make Aalst one of the principal centres of the Belgian textile industry. It also has flour mills, vegetable-oil mills, breweries and tanneries; starch and other maize products including glucose are made by the *S.A. Amidonnerie et Glucoserie Le Clercq*. The other chief manufactures are rubber products, agricultural machinery, tobacco and fertilizers.

Communications

Aalst is on the main railway line between Bruxelles (Nord) and Gent, at the point where a branch diverges to Dendermonde.

It is also on the main Bruxelles-Gent road, which crosses the Dendre by a bridge at the south-eastern corner of the town. Other first-class roads are those to Dendermonde, Geeraardsbergen and Ninove.

The canalized Dendre connects the town with the Escaut waterway at Dendermonde; upstream, at Ath, the Dendre links the town with Antoing, Tournai and the upper Escaut; it is joined to Mons by the Blaton-Ath Canal.

Brugge (Bruges) (51,884)

General Features

Brugge,* chief town of the province of West-Vlaanderen and the seat of a bishopric, lies at an altitude of 9 m. on the small river Reye in the flat maritime plain of Flanders, 13 km. from the North Sea and 12 km. from the Dutch frontier. The oldest part of the town, almost encircled by the inner canals fed by the Reye, is centred on the *Grand' Place*; a new quarter has been built in the north-west between the town and the Brugge-Oostende Canal, outside the old fourteenth-century ramparts; the outer ring of canals now marks the position of these ramparts. The industrial quarters along the Zeebrugge and Gent Canals are of very recent development (Plates 91, 92, 93).

History

Brugge has grown out of a pre-Roman settlement established on a sandy hillock in the midst of the lowlying marshland, where the Reye entered the Zwin inlet (Fig. 35). The site continued to be occupied in Roman times, and a Roman road crossed the Reye by a bridge, from which Brugge probably derived its name. By the seventh century it was a flourishing fishing village which gradually developed into a large settlement around a castle built in the ninth century; the site of this castle was that of the present cathedral. The town became an important market and held its first fair during the tenth century.

Brugge, with its outports on the inlet of the Zwin, grew rapidly in importance as it became not only the seaward terminus for the great medieval trade route between Cologne and the North Sea, but also the port for the Flemish cloth industry. By the twelfth century, active commercial relations with England, France, Germany and the Baltic had been established and these relations were maintained throughout the thirteenth and fourteenth centuries. The choice of Brugge as the entrepôt for

* In 1942, the urban agglomeration of Greater Brugge was formed by the inclusion of several neighbouring communes.

the cities of the German Hanseatic League further contributed to its medieval importance; its Bourse regulated the rate of exchange in Europe. The traders of Brugge founded the Flemish Hanse in London, and Brugge practically monopolized the trade with England, especially the wool trade, which was so important to the Flemish cloth factories. Its cloth fairs were well organized and the basis of great commercial activity, and the port reached the height of its prosperity in the fourteenth century.

During the fourteenth century also the town's industries were equally flourishing; they consisted mainly of the manufacture of cloth, but the manufacture of linen, lace and beer was also important. The population of Brugge around 1300 has been estimated at about 100,000. Its increase in size necessitated a larger *enceinte*; the new ramparts, built in 1362, marked until recently the limits of the town, and their former course is now followed by boulevards. These developments were accompanied by considerable urban planning and the construction of public works, including the establishment of a subterranean canal system for the distribution of drinking water.

By the end of the fifteenth century, the greatness of Brugge was on the decline and the city never again recovered its prosperity. A primary cause of the town's decline was the silting up of the Zwin, accelerated by the serious inundation of 1404–5 (see p. 88). By the end of the fifteenth century the outports such as Damme, which had successfully handled the trade of Brugge, had themselves become silted up in spite of a long struggle to keep the Zwin open. The restrictive policy of Brugge compared with the freedom of the newer port of Antwerpen hastened its decline and caused the transfer of markets to Antwerpen. Thus Antwerpen, with greater geographical advantages, profited from the ruin of Brugge. With the changing emphasis of trade routes in Europe the Hanseatic League moved its quarters there in 1545. The decline of the Flemish cloth industry following the political and religious disturbances of the latter half of the sixteenth century caused the final ruin of Brugge. By the end of the sixteenth century, Brugge was almost deserted and England benefited greatly from the technical and artistic skill of the refugee craftsmen.

In the centuries that followed, Brugge acquired the reputation of a 'ville morte', even when other Belgian towns were progressing in every way. During the second half of the nineteenth century, however, after works of restoration, the town regained something of its former prosperity; the steady increase in population from 44,500 in 1880 to 51,657 in 1900 and 53,728 in 1904 is evidence of this. The construction of the maritime canal to Zeebrugge, which was completed in 1907, presented possibilities of considerable extension. But the revival of trade and industry was paralysed by the war of 1914–18, and Brugge was occupied by the Germans from October 1914 to October 1918. During this time it was used as the headquarters of the 'Marinekorps', the docks on the north side of the town serving as a submarine base.

Economic Importance

The tourist industry was formerly the characteristic feature of Brugge, but the construction of the Brugge-Zeebrugge Canal has helped the development of heavy industries, especially on the north side of the town. These include small naval construction yards, shipbuilding and repairing yards (*Brugeoise d'Arrimage et de Réparations de Navires*) and glass works. The *S.A. La Brugeoise et Nicaise et Delcuve* engineering works to the south of the town on the banks of the Gent Canal construct bridges, rolling stock and permanent-way material. The domestic crafts of lace-making and art embroidery have a long tradition. Other textile operations include the washing of wool, flax-retting, the manufacture of linen and rope-making. The town also has breweries, flour-mills, vegetable-oil mills and an important yeast factory. Printing, furniture-making, wood-carving and the manufacture of gold and silver-ware and painted glass are also well established in the town.

Brugge also is an important market for cattle and horses. The alluvial sands and clays of the district are especially suited to extensive horticulture and market gardening. Barley also figures prominently in its important grain trade.

Communications

Brugge lies on the main Bruxelles-Oostende railway line, at the point where the important branch to the coastal resort of Blankenberge and the ferry port of Zeebrugge diverges. Seven other lines of local importance also converge on the town. Passenger traffic to and from the coast so increased between the two wars that a new station had to be built on the southern side of the town.

Seven main roads run from Brugge; east to Eekloo and Gent, south to Kortrijk, south-west to Torhout and Roeselare, west-south-west to Nieuwpoort, north-west to Wenduine and Oostende, north-north-west to Blankenberge and northwards to Westkapelle, branching at Dudzele for Zeebrugge.

Several small canals traverse Brugge; it has two canals linking it with the sea, the most important being that from the new port on the north side of the town to the entrance lock at Zeebrugge: it is 10 km. long, 70 m. wide, and 8 m. deep. The Oostende Canal links Brugge with the sea at Oostende and eventually with Nieuwpoort. The Gent Canal links the town with the Lys-Escaut waterway systems; there is in addition a canal across the frontier to Sluis.

CHARLEROI (27,274)

General Features

Charleroi, chief town of an arrondissement in the province of Hainaut, is situated about 100 m. above sea level near the junction of the Sambre and the small tributary of the Piéton. The town, which lies in an amphitheatre on the slope of a hill, is divided into four parts: the *Ville Basse*, situated on the right bank of the Sambre, the *Entre-deux-Villes*, on the left bank, the *Ville Haute*, rising above the latter on the hill slope to the north-east, and the *Faubourg*, to the north. The town is the centre of one of the most important industrial districts of Belgium, and, together with the adjoining communes, it forms an almost continuous urban agglomeration with a population of over a quarter of a million. The most important of these satellite towns are Jumet (28,919), Gilly (24,565), Montignies-sur-Sambre (24,043), Marchienne-au-Pont (21,619), and Marcinelle (20,461).*

History

Charleroi was a small village when the Spanish governor of the Netherlands built a fortress there on the left bank of the Sambre in 1666, and named the settlement 'Charleroi' in honour of Charles II of Spain. The latter encouraged settlement by granting immunities and privileges to new settlers. It was abandoned to the French in 1667; at the order of Louis XIV the fortress was reconstructed by Vauban, and it became one of the strongest in the country. At this time, too, the *Ville Basse* was built on the south bank of the Sambre. The fortress played an important part in the struggles between the French and Austrians and Spaniards during the seventeenth and eighteenth centuries, and it was besieged several times; it was a 'barrier fortress' in the hands of the Dutch at the beginning of the eighteenth century. The fortifications, rebuilt in 1815, were replaced by boulevards in 1868. The nineteenth century saw great industrial development and a marked increase in population,

* The Charleroi agglomeration was formed in 1942 and with the amalgamation of thirty communes into one unit, slum clearance and the unification of public services have been made possible. The new town-planning scheme reserves certain areas of forest as recreational areas or a 'green belt'.



Plate 91. Brugge (Bruges): view northwards from the belfry

In the foreground is part of the *Grand' Place* with the *Rue Flamande* on the right. In the distance are the docks and the ship canal which crosses the Zeebrugge polder land.



Plate 92. Brugge (Bruges): the *Quai Vert*

The view looks west (upstream) along the river Reye, which feeds the inner canals. The fifteenth-century octagonal tower of the belfry can be seen on the right.



Plate 93. Brugge (Bruges): the *Bassin Ouest*

The vessel on the left lies at the timber wharf, at the north end of the *Quai Nordique*. On the right is the *Quai Britannique* and the Zeebrugge Ship Canal can be seen in the distance.



Plate 94. View north-eastwards across Liége

The *Station des Guillemins*, the main station, is in the foreground; between it and the *Citadelle*, in the background, lies the principal part of the town. The *Quartier d'Outremeuse* is on the right bank of the Meuse, to the right of the photograph.

which grew from 5,675 in 1840 to 28,120 in 1910. The 'battle of Charleroi' is the name given to the struggle all along the Sambre from Namur to Charleroi in August 1914, when the French retreat decided the issue of the war of 1914–18 for Belgium.

Economic Importance

Charleroi is centrally situated in the large coalfield to which it has given its name. There are more than seventy coal mines in the irregular country, intersected by numerous valleys, around the town. It is also one of the principal centres of the Belgian metallurgical industry, especially of iron and steel. In the area there are many blast furnaces, foundries, steelworks producing castings for bridges, locomotives, etc., bolt, wire and nail works, copper, bronze and aluminium foundries. The chief steel works are those of the *S.A. Forges de la Providence*, Marchienne-au-Pont, the *S.A. Union des Aciéries*, Marcinelle, and the *S.A. Hauts Fourneaux, Forges, et Aciéries de Thy-le-Château et Marcinelle*, Marcinelle. The *S.A. des Ateliers Germain*, at Monceau-sur-Sambre, specializes in Diesel motors, Diesel lorries and railway rolling stock. Charleroi is also one of the chief electrical engineering centres; the *S.A. Ateliers de Constructions électriques de Charleroi* produces electric locomotives, Diesel-electric railcars, generators and transformers. The aircraft works of the *S.A. des Avions Fairey* are at Gosselies. The glass industry, too, plays an outstanding part in the economic life of Charleroi, and the chief factory is that of the *Union des Verreries mécaniques Belge*.

Communications

Charleroi is an important railway junction on the main Paris-Maubeuge-Liége-Cologne line, which follows the Sambre and Meuse valleys. The main station is Charleroi-Sud, on the south bank of the Sambre, but trains for the line to Leuven use the Ouest station, on the north bank. Other lines from the Sud station run northwards to Luttre (for Bruxelles), westwards to Piéton (forking for Mons and Gent), and southwards to Marienbourg. Many local lines link Charleroi with the various towns of the coalfield. Freight traffic in the area is naturally heavy, and there are four marshalling yards to cope with it—at Monceau, on the western side, at Lodelinsart on the north, and at Couillet-Montignies and Châtelineau-Châtelet to the east.

First-class roads radiate in many directions, but especially south to Philippeville, west to Mons, north-west to La Louvière, north to Bruxelles, and north-east to Tienen.

The town's industrial activity is in no small degree due to its situation in the deep valley followed by the navigable Sambre and Meuse; this position facilitates the transport of heavy bulky commodities. Upstream the Sambre links it with France, and downstream with the Meuse at Namur. The Bruxelles-Charleroi Canal supplies coal to the industries of the capital and towns along the canal, and links Charleroi with the Willebroek Canal and the Escaut. The *Centre* Canal, which branches from the Bruxelles Canal, links Charleroi with La Louvière and Mons.

Genk (Genck) (27,021)

General Features

Genk, in the province of Limburg, is situated at an altitude of 70 m. on the Dorpbeek, a tributary of the Démer. The population of the town in 1816 was 1,339 and by 1910 it was still only 3,410. The recent large increase in population has been solely due to the opening of the Kempen coalfield in 1917 (see p. 302). The mines are situated to the north and west of the town, and several workers' cities have been built on the neighbouring heather- and pine-clad dunes.

Economic Importance

The chief coal mines are at Winterslag, 2 km. to the north-west, Zwartberg, 6 km. to the north, and Waterschei, 5 km. to the north-north-east.

Asparagus farming is a characteristic feature of the agriculture practised on the sands and clays of the Kempenland around Genk.

Communications

Genk is served by the Hasselt-Maaseik branch railway. A loop from this branch, between Winterslag and Asch, caters for the coal traffic from the mines mentioned above. A short line connects Genk with its coal wharves on the Albert Canal.

There are first-class roads to Diepenbeek and Hasselt, 13 km. to the south-west, and to Asch (for Maaseik and Mechelen) to the north-east.

Geel (Gheel) (20,838)

General Features

Situated in the Kempenland, 44 km. east of Antwerpen, Geel lies at an altitude of 20 m. overlooking the marshy valley of the Grande-Nèthe. Since the thirteenth century, Geel has been known for its colony of people suffering from insanity. These people, who now number about 2,500, live among the local inhabitants, and share their work. Since 1850, this system has been supervised by a state medical staff.

Economic Importance

Geel is the centre of a fertile agricultural area and it is a busy market for dairy produce and cattle. The main industrial activities are linen weaving, the manufacture of lace and woollen goods, dyeing and tanning.

At Oolen, 7 km. to the west, are the largest radium extraction works in the world; they belong to the *Société générale métallurgique de Hoboken*. Congo ore is used and the average monthly output varies from 3 to 4 gr.

Communications

Geel is situated on the main railway line from Antwerpen to the Dutch frontier at Hamont (for the Ruhr).

First-class roads lead north to Turnhout; south-west to Aarschot, with a branch west to Herentals; south-east to Tessenderloo; east to Mol and north-east to Retie.

The Meuse-Escaut Canal passes 4 km. to the north, and the Albert Canal runs at a similar distance to the south.

Hasselt (26,828)

General Features

Hasselt, chief town of the province of Limburg, is situated at an altitude of 39 m. on the southern edge of the marshy valley of the Démer, a tributary of the Dyle. It is the commercial centre of Limburg, and its rapid industrial growth in recent years has been the result of the development of the adjacent Kempen coalfield.

History

Hasselt was only a small village when it received in 1232 its charter as a town. Between the thirteenth and fourteenth centuries it was the capital of the county of

Looz. Its first ramparts were built in the thirteenth century when the inhabitants had already deepened the *Nouveau Démer* to bring the waters of the *Vieux Démer* into the town. The church of St Quentin was built in the fourteenth century and it is around it that the main town has grown. Hasselt largely owed its prosperity in the Middle Ages to its position between the Kempenland and the *pays* of the south, particularly the Hesbaye. Agriculture, water traffic and a very flourishing cloth industry were for many decades the means of livelihood of its population.

During the wars of religion the cloth industry suffered from the general dislocation of the time (see p. 96). New fortifications were built in 1681, and rebuilt with earthworks in 1705. Towards the end of the eighteenth century Hasselt, under French occupation, became the chief town of its canton (1795) and it emerged in the Belgian kingdom in 1831 as the capital of Limburg.

Economic Importance

As the commercial centre of Limburg, Hasselt has very important markets, especially for grain and cattle. Its distilleries are famous, coarse gin being a speciality, but they have suffered in recent years from the restrictions on the sale of alcohol. Hasselt also has flourishing gelatine works, breweries, tanneries and soap works. Its other manufactures are oil, tobacco, and glue in addition to chemical and non-chemical fertilizers. The town is also a popular tourist centre.

Communications

Hasselt is the chief railway centre of Limburg. The main route runs westwards to Aarschot (for Antwerpen, Bruxelles and Oostende) and south-eastwards to Tongeren (for Liége and Luxembourg or Visé and Aachen). Branches of the main-line network run to Mol, Maaseik and Landen, and several local lines also converge on the town.

The main Diest-Maastricht road passes through Hasselt. There are other main roads north to the Dutch frontier, to Genk, Tongeren, Liége and Sint-Truiden.

Kortrijk (Courtrai) (40,979)

General Features

Kortrijk, in the province of West-Vlaanderen, is the administrative centre of an arrondissement. It is situated at an altitude of 20 m. on the river Lys. The greater part of the town is on the south bank of the river and a canalized arm of the Lys isolates part of the town on the north bank. Kortrijk is well laid out with wide streets and boulevards. Its most recent expansion has been on the southern side, south of the railway.

History

Kortrijk was established in Roman times to defend the crossing of the Lys, and it was known as Cortoriacum. It became part of the county of Flanders in the seventh century. The town and the neighbouring territory had acquired a strong degree of semi-independence by the tenth century when the local lord revolted against the higher authority of the counts. Kortrijk was the scene of the battle of the Golden Spurs in 1302 when the Flemish army, chiefly citizens of Brugge and Gent, defeated the larger invading forces of the count of Artois (see p. 87). The town was almost entirely destroyed in revenge by Charles VI of France in 1382, after the French victory at Roosebeke, but it recovered under Philip the Bold and Philip the Good. Between the thirteenth and sixteenth centuries there grew an important cloth industry which varied in its prosperity with political and economic conditions. This industry declined and, in the sixteenth century, was

replaced by the manufacture of linen and damask. The chemical qualities of the water of the Lys (see p. 338) formed a decisive factor in the localization of this industry at Kortrijk. Its fine linen was long known as 'Dutch linen', since it was sent to Haarlem for superior bleaching processes. The town suffered considerably during the religious disturbances of the sixteenth century.

Kortrijk suffered, too, during the wars against France in the seventeenth and eighteenth centuries, from its exposed position on the frontier of the Austrian Netherlands. It was occupied by the French from 1668 to 1678.

Economic Importance

Kortrijk is the leading industrial and commercial centre of the southern part of Flanders. Although domestic weaving largely disappeared in the nineteenth century the town remains the centre of the linen industry. The finest flax in Belgium is grown in the vicinity, and from mid-April to mid-October the meadows on the banks of the Lys are used for flax-retting. The chemical properties of the Lys have not been satisfactorily replaced by artificial processes. Other textile manufactures include damask, 'Valenciennes' lace, and various cotton and woollen commodities, including sewing thread, twine and carpets. Other activities are the manufacture of vegetable oils and soap, and salt refining, while its pottery and furniture are widely known. A considerable proportion of the chicory grown in West-Vlaanderen is marketed at Kortrijk.

Communications

Kortrijk is a railway centre of some importance, a converging point for six sections of the main-line network and a number of local lines. The chief 'international' route is Oostende-Kortrijk-Mouscron-Lille-Paris; the Kortrijk-Mouscron section of the route also leads south-eastwards to Tournai and the coalfield region. Another trans-frontier route of much less importance runs westwards to Comines (for Armentières or for Ieper and Hazebrouck). Inter-urban main lines run north-eastwards to Gent and eastwards to Bruxelles (via Oudenaarde).

First-class roads connect Kortrijk with Tournai, Mouscron and Tourcoing, Meenen, Brugge and Gent. Upstream, the canalized Lys links the town with Lille and Roubaix-Tourcoing, and downstream with Gent and the Escaut waterway. To the south-east, the Bossuit Canal links the town with the Escaut which here flows parallel to the Lys.

Leuven (Louvain) (37,141)

General Features

Leuven, in the province of Brabant, is the centre of an arrondissement and the seat of a university. The town is situated at an altitude of 25 m. on the Dyle where the river flows through a gap in the northern edge of the Brabant plateau. The more important part of the town, grouped around the *Grand' Place*, lies on the right bank. Leuven is still largely confined to the area enclosed by the fourteenth-century ramparts now marked by boulevards. The fifteenth-century town hall is a remarkably fine architectural monument.

An industrial suburb has developed to the north around Wilsele, along the Leuven-Rupel Canal. There has also been urban development towards the southern suburb of Heverlee, along the eastern bank of the Dyle, and towards the north-eastern suburb of Kessel-Loo.

The university of Leuven (see p. 70) has many associated colleges, some of which provide courses in agriculture, brewing methods and industrial technique.

The water supply of the town is operated by a Dutch company from wells in the neighbouring commune of Heverlee.

History

Leuven first grew around a castle built in the ninth century by the Holy Roman Emperor. The counts of Leuven, who later became dukes of Brabant, set up their residence here in the eleventh century. After the twelfth century, the commercial prosperity of the town developed rapidly, for it was an important transhipment point between the Escaut-Dyle waterway and the Brugge-Cologne highway. Industrial prosperity accompanied this commercial activity, and the cloth industry especially showed a marked advance. Economic development continued throughout the thirteenth century, and by the fourteenth century Leuven cloth was known far and wide in Europe. At the end of the century, however, decline had set in, due partly to the long-drawn-out struggle between the merchant guilds and the workers which culminated in the massacre of 1378 when many of the merchants were killed. The industrial prosperity of Leuven was finally ruined by the gradual displacement of the European trade routes, by the success of English cloth in the continental market and by the economic crises which followed the rising of the weavers. Leuven suffered not only from the emigration of many workers to England but also from plague and fire which exterminated a large part of its population. It was replaced by Bruxelles as the capital of the duchy of Brabant in 1383.

During the fifteenth century, Leuven entered upon a new phase of prosperity which began after the foundation of the university in 1426. The university was established in an attempt to restore the prosperity of the city and to arrest its rapid depopulation. For over five hundred years, the university has doubtless been the most vital influence in the development of Leuven. In the sixteenth century the university became famous through all Europe for the teachings of Erasmus, and it was at Leuven that More's *Utopia* was first published. During the following centuries the town had an uneventful history. In the course of the nineteenth century, especially after 1831, Leuven experienced greater prosperity owing to peaceful conditions. When Leuven was occupied by the Germans in 1914, about one-sixth of the city, including the university library, was destroyed by fire. After 1918, the library was rebuilt largely with the aid of American funds.

Economic Importance

Leuven has a number of miscellaneous industries, of which brewing, with a large export trade, is the oldest and most flourishing; the 'white' and the *Peterman* beers are the best known local varieties. The foodstuffs industry includes flour-milling and food-canning; there are also factories for the extraction of starch from potatoes and rice.

Among the heavy industrial establishments there are engineering works, rolling stock works, assembly shops, bell and iron foundries and agricultural machine works. There are also glass factories and chemical works. Minor activities include saw-milling, tanning and the manufacture of footwear.

Leuven is an important centre for the agricultural, horticultural and extensive market-gardening produce of the fertile clays and sands of the neighbourhood. There is also a considerable trade in grain.

Communications

Leuven is a railway junction on the main east-west line Oostende-Bruxelles-Liége-Cologne, where this is joined by the earlier and alternative route through Mechelen (p. 609). Other main lines run north-eastwards via Aarschot to the Kempen coalfield, and south-westwards to Ottignies. The Mechelen-Leuven-Ottignies route is used by Antwerpen-Charleroi trains as an alternative to the congested route through Bruxelles. A short loop about 2 km. north of the town connects the Mechelen and Aarschot lines and so enables through freight traffic to proceed direct from Mechelen to the Kempenland and Germany without entering

Leuven. There is a large marshalling yard on the north-eastern side; several local lines also converge on the town.

The main Bruxelles-Tienen-Liége road passes through the town. There are alternative roads to Bruxelles, one via Kortenberg, the other via Tervuren. Other roads radiate to Mechelen, Aarschot, Diest, Wavre and Namur.

The Leuven-Dyle Canal, opened in 1793, connects the city with the Rupel and Escaut waterway via Mechelen. The quays on the north side of the town handle much transhipment traffic from Antwerpen.

Liége (162,229)

General Features

Liége is the chief town of the province of Liége, and it is the seat of a Court of Appeal, of a bishopric and of a state university. It also forms the centre of a great industrial agglomeration with more than a quarter of a million inhabitants. The adjoining towns that constitute the official agglomeration of Liége* are: (i) Herstal (26,885), 5 km. to the north-east on the left bank of the Meuse; (ii) Ougrée (19,717), on the right bank of the Meuse 4 km. above its confluence with the Ourthe; (iii) Angleur (11,169), situated between the Ourthe and the Meuse; (iv) Grivegnée (17,687), opposite Angleur on the right bank of the Ourthe; and (v) Bressoux (16,002), 2 km. east of Liége on the right bank of the Ourthe *dérivation*.

Liége is situated at an altitude of 60 m. on the wide alluvial plain just below the confluence of the Meuse and Ourthe, and where the Meuse changes direction from north-east to north. Its geographical position gives the city a peculiar significance, for it is the place of contact between four natural regions; these are the Hesbaye, Entre-Vesdre-et-Meuse, the plateau of the Condroz and the Ardenne. Liége is the historic centre of Walloon Belgium, and the Walloon dialect spoken in Liége has marked peculiarities of its own (see p. 57).

The main town has been built on the left bank of the Meuse, backed by a semi-circle of hills extending from the *Citadelle* in the north to the *Plateau de Cointe* in the south-west, and it is centred upon the *Place St-Lambert* and the *Place de la République-Française*. These squares mark the site of the medieval town, and round them are grouped the principal public buildings and commercial quarters of Liége. The most important industrial district is that of the *Quartier St-Léonard*, to the north-east of the town. On the right bank of the Meuse are situated the artisan *Quartier d'Outremeuse* (on an island between the Meuse and the Ourthe *dérivation*), and the industrial *Quartier du Longdoz*, which lies on the right bank of the Ourthe *dérivation* (Plate 94).

In recent years, the university of Liége has paid special attention to industrial requirements, particularly to industrial chemistry. Its technical faculty includes the *Ecoles spéciales des Arts, Manufactures et Mines* and the *Institut électro-technique Montéfiore*. The school of geography has published some important works on aspects of the geography of Belgium. Walloon studies are also given considerable prominence.

Owing to its strategic position Liége has always been one of the first centres of resistance to invaders from the east; its fortresses form one of the key points of the Belgian defence system and they played a dominant role in the resistance to the German invasion of 1940; the Eben Emael fort is a well-known example.

History

By the end of the seventh century a Frankish settlement had been established at the foot of the narrow spur of *Publémont* (now the Mont St-Martin) on the banks of the Légia, a small left-bank tributary of the Meuse. It was this settlement which

* Twenty-four communes in the Liége region with a total population of 411,058 were amalgamated into a single commune in 1942.

became the centre of the enlarged diocese of Liége, when the two bishoprics of Liége and Tongeren were united early in the tenth century. During this century, the new diocese of Liége expanded its territory considerably, and it became an independent principality within the Holy Roman Empire. Notger was appointed first prince-bishop in 972. From now until 1795 the principality had a distinct history from that of the other Belgian provinces.

Notger built the first *enceinte* of the town which included the *Publémont* and the banks of the Meuse at the mouth of the Légia; settlement also followed on the low, marshy and easily flooded islands of the Meuse. The subsequent history of Liége for centuries was marked by the bitter struggles between the citizens of Liége and the prince-bishops. The citizens unsuccessfully attempted to gain control of the government of the city themselves, and the prince-bishops had frequently to repress these risings of the citizens with the aid of the Holy Roman Emperor and of the dukes of Brabant. Throughout the Middle Ages, the town of Liége itself did not achieve the virtual autonomy which characterized the Flemish towns.

As might be expected, ecclesiastical foundations predominated in the early growth of the town, and during the eleventh century Liége became famous as a seat of learning. It was not until this century that the Meuse became utilized as a means of communication and from now on the main growth of the town was on the banks of the Meuse.

From the end of the twelfth century coal was exploited, and at first open-cast working of surface outcrops was possible. During the thirteenth century, the town possessed many guilds, including those for iron-workers and tanners. Coal was used for iron-working, and charcoal for iron-smelting; the latter industry was scattered in the forests of the Condroz and the Ardenne. A small woollen industry was localized on the left bank of the Meuse, using mainly Hesbaye wool, and the cloth was sold locally.

This industrial and commercial development was reflected in the growth of the town. New ramparts were constructed at the beginning of the thirteenth century, but before the end of the century, further city walls had to be built.

There were continuous troubles during the fourteenth century, but, in spite of disturbed conditions, commercial traffic with Antwerpen progressed. Arms began to be manufactured during this century, although the industry remained for long confined to local requirements. In the fifteenth century Liége suffered many attacks during the struggles between France and Burgundy (see p. 92), and its industrial prosperity was almost ruined by the repeated but unsuccessful attempts of the dukes of Burgundy to annex the principality. It was during these struggles that the town was almost entirely destroyed and the citizens were not permitted to rebuild it for ten years.

The long rule of the prince-bishop Eberhard de la Marck, from 1505 to 1538, was a period of sound administration, and the sixteenth century witnessed the recovery of Liége. The town became increasingly industrial, and the renewed prosperity resulted in increased authority for the guilds. During the seventeenth century attempts were made once more to limit the power of the prince-bishops and to have Liége recognized as a free town by the Holy Roman Empire. Civil war broke out between the partisans of the bishop and of the citizens, who were supported by France and the United Provinces. Bishop Maximilian Henry (1650–88) ended the internal strife by imposing a constitution which abolished the political rights of the guilds and the free institutions of the citizens.

Between this time and the French Revolution, the prince-bishops attempted to preserve neutrality in the various wars between neighbouring states. In 1691, however, during the wars of Louis XIV, the town was bombarded and great destruction wrought. Liége was taken by Marlborough in 1702, and its fortress was garrisoned by the Dutch until 1718. Considerable reconstruction, begun during the seventeenth century, was continued in the eighteenth, and the town became very prosperous in the peaceful conditions after 1763. Its industries flourished and it had an extensive foreign trade.

In 1789, a revolt, contemporary with that in Brabant, broke out in Liége against episcopal authority. Later in 1792 the French invaded the principality, but the rule of the prince-bishops was not ended until 1794 when Liége was annexed by the French; in 1795 it became the chief town of the department of the Ourthe. There was a revival of industry under Napoleon who founded the *Fonderie de Canons*. The town took an active part in the Belgian revolt of 1830, and since then the province has been under the same rule as the rest of Belgium, as the capital of the province of Liége.

Although Liége lost its role as capital city of an independent principality, it remained an important focus of social and political life. Its university, founded in 1817 and reorganized in 1835 as the state university for the Walloon portion of Belgium, gained great prestige. But the most important feature of the nineteenth-century history of Liége was the enormous growth of the town due to industrial development. The iron and steel industry of the Liége basin expanded rapidly after the introduction of the new methods by Cockerill in 1817. The population of the commune of Liége increased from 46,985 in 1815 to 167,520 in 1910. Between 1811 and 1921 the population of Herstal also increased from 5,300 to 23,400 and that of Angleur from 950 to 10,900. Considerable changes took place in the old centre of the town. The medieval fortifications were gradually demolished in the first half of the century and the numerous useless branches of the Meuse and Ourthe were filled in; thus the meander surrounding the *Quartier de l'Ile* was filled in between 1825 and 1844, and it is now marked by the wide *boulevard d'Avroy* and the *boulevard de la Sauvenière*. Liége itself still remains the most densely peopled part of the agglomeration, but during the present century the population has steadily moved out towards the periphery.

Disastrous cholera epidemics in the second half of the nineteenth century necessitated radical improvements in the drainage and water-supply systems of Liége. The water catchment area is now situated in the Hesbaye between the rivers Geer and Meuse; the water-table is formed above impermeable clay at the base of the Chalk. Water supplies are also obtained from the gravel bed of the Meuse.

The Meuse, reinforced by the waters of the Ourthe and Vesdre, has been in the past subject to severe floods. In spite of the embankments built along the Meuse and the cutting of the Ourthe *dérivation* during the nineteenth century, a serious flood occurred in Liége in 1926. This necessitated the undertaking of further embanking and deepening of the Meuse, and the construction of barrage reservoirs, to control flood-water, on the tributaries of the Meuse in the Ardenne.

The ring of forts built round the city at the end of the nineteenth century, together with the Namur forts, offered the first check to the German army in 1914. Sixteen-inch howitzers destroyed the last forts after eleven days, but the Germans suffered severe losses; Liége was occupied until 1918.

Economic Importance (Figs. 76, 80)

Liége is the centre of the Belgian metallurgical and armament industries, which owe their origin to the coal and iron resources of the neighbourhood and to the excellent transport facilities afforded by the Meuse (see pp. 526-9). The coal is of a good coking variety, and in addition there are abundant local supplies of limestone for fluxing purposes. At first, local iron ore was used in the iron and steel industry, but the supplies have now been practically exhausted. But, although 99% of the iron ore must now be imported, the industry has remained at Liége.

In addition to the many factories engaged in every variety of iron and steel processing, there are others engaged in closely associated branches of the industry. These allied activities include boiler-making, the manufacture of aero-engines, steam-engines, locomotives, railway material, electrical machinery, agricultural machines, cycles, motor cars, motor cycles, river steamers and other types of vessels. There is also extensive production of cast iron, alloy steels and sheet iron, cables, wire, nails and metal gauze. The leading firms are the *S.A. d'Ougrée-Marihaye*, at

Ougrée; the *S.A. Métallurgique d'Espérance-Longdoz*, at Liége; the *S.A. d'Angleur-Athus*, at Tilleur; the *S.A. Cie Générale des Conduites d'Eau*, at Liége; the *S.A. Constructions électriques de Belgique*, at Herstal; the *S.A. Ateliers de Construction de la Meuse*, at Sclessin, 5 km. south-south-west of Liége, specializes in marine Diesel engines.

On the basis of this metallurgical industry, the armaments industry of Liége has developed and it ranks with Le Creusot and Essen in European importance as an armament centre. Many types of sporting and war weapons are made, and certain processes in small-arms manufacture are still carried out in the homes of the workers. The chief factories are those of the *S.A. Fabrique nationale d'Armes de Guerre*, at Herstal, and those of the *Manufacture d'Armes de l'Etat*, in the suburb of St-Léonard.

There has also been an important development of non-ferrous metal industries at Liége, formerly based on the lead, zinc and copper deposits near Moresnet and Verviers. The development of the zinc industry was a prominent feature of the nineteenth century. The small factory of Saint-Léonard at Liége, using Moresnet ores, succeeded in obtaining pure zinc. This factory became the nucleus of the *S.A. des Mines et Fonderies de Zinc de la Vieille-Montagne*, at Angleur, which was founded in 1837, and which is to-day the largest zinc producing concern in the world (see p. 314). The production of zinc in the Liége district is the highest in Europe and a large percentage of the production is exported. The non-ferrous metal industry of Liége also includes copper, bronze, lead, tin, nickel and aluminium manufactures.

The other industries situated around Liége include the manufacture of refractory products and chemicals, and glass-making. There are also flax-spinning mills, tanneries and leather works. Moreover, nearly the total Belgian output of pneumatic tyres is produced at the rubber works of *Englebert et Cie*, at Liége.

The industries of Liége depend greatly on electrical energy. There are large thermal-generating stations at Bressoux and at Liége, while a considerable amount of energy is generated by surplus heat from coke ovens and blast furnaces. Three hydro-electric stations are situated in the Ardenne on the Amblève and Warche.

Liége owes its importance as a great regional market to its situation between the Hesbaye, the *Pays de Herve*, the Ardenne and the Condroz. In addition to its great agricultural daily markets, Liége has weekly cattle markets and also horse fairs. Market gardens are established on the slopes of the hills to the north of the city, but the market-gardening areas of the surrounding communes, especially Bressoux and Vottem, are the most important sources of vegetables. Liége is situated at the heart of the most important area of industrial fruit production.

Communications

Liége is a focus of international railways on the main Oostende-Bruxelles-Leuven-Cologne-Berlin and Paris-Charleroi-Cologne lines. There are also main lines north to Tongeren and Hasselt, north-east to Visé and Maastricht, east to Herve, south-east to Luxembourg, and south to the Ardenne and Lorraine. The main station, *Station des Guillemins*, is situated on the left bank of the Meuse in the south-western part of the city and at the foot of the steep incline which leads down into the valley from Ans (see p. 498); the *Station de Longdoz*, on the right bank of the Meuse, is the terminus for the Maastricht line and for Nord-Belge trains to Namur and Charleroi. The principal goods station and marshalling yards are situated on the right bank of the Meuse at Kinkempois, 4 km. to the south; there is also a goods station at Bressoux. A network of local railways unites the communes of the periphery, in addition to more distant towns, with the city (Fig. 116).

Main roads radiate in many directions; north-east to Herstal and along both banks of the Meuse to Visé and Maastricht, east to Herve and Aachen, south-east to Pepinster and Verviers, south to Marche, south-west along both banks of the Meuse to Huy, and to Namur, north-west to Sint-Truiden, Tienen and Bruxelles, and north to Tongeren.

Liége is an important navigable waterway junction. Upstream, the Meuse links the city with Namur and Charleroi, and downstream with Maastricht. The Ourthe is canalized and navigable upstream to Laroche. The outlet to the sea provided by the Albert Canal is of vital significance; the canal begins in the new port constructed on the *Ile Monsin*, which is situated close to the goods station of Bressoux.

Lier (Lierre) (28,631)

General Features

Lier, in the province of Antwerpen, is situated at an altitude of 8 m. on an island at the confluence of the Grande-Nèthe and the Petite-Nèthe, 16 km. south-east of Antwerpen. The *Grand' Place*, with the fourteenth-century Gothic church of St-Grommaire and the seventeenth-century town hall, forms the centre of the town. Lier has preserved its regional Kempen character despite its position within the economic sphere of Antwerpen. It has been for many years an active centre of the Flemish movement. An archiepiscopal college and a state training college are situated in the town.

History

By the twelfth century, Lier had taken its place among the older towns of Brabant. In the following century the dukes of Brabant granted it a charter and the right to hold a free market. Its general commercial prosperity gained much from its position in the midst of fertile country and from its strategic site on a large navigable river, and during the fourteenth century its cloth industry prospered greatly. By the end of the fifteenth century, however, Lier began to decline, mainly because of the rapid growth of Antwerpen, and the events of the revolt of the sixteenth century also left their mark on the town. During the following three centuries, however, there was an appreciable economic recovery, and the old cloth industry gave way to the manufacture of mixed textiles and silk. Owing to its proximity to Antwerpen, Lier suffered greatly from bombardment in 1914.

Economic Importance

The textile industry of Lier, although on a small scale, comprises the manufacture of linen, cotton goods and silk. There are also linen bleaching and dyeing works. The domestic crafts of lace-making and embroidery are still preserved. Cooked pastries (*Liersche Vlaaien*) are a speciality of the town. Lier is an agricultural centre with important fairs and weekly markets.

Communications

The main railway running south-eastwards from Antwerpen forks at Lier; one line runs eastwards through Herentals to the Dutch frontier at Hamont (for the Ruhr), and the other continues south-eastwards to Aarschot (for Leuven or for Hasselt, Liége and Aachen). Several local railways also converge on the town.

There are main roads to Antwerpen, Oostmalle, Herentals, Aarschot and Mechelen.

The river Nèthe is canalized and connects Lier with the Rupel and the Escaut. The canalized Grande- and Petite-Nèthes link the town with the Albert Canal, to the east and west of Herentals respectively.

LOKEREN (25,398)

General Features

Situated in the fertile, densely populated Waasland of the province of Oost-Vlaanderen, Lokeren lies at an altitude of 5 m. on a low hill on the right bank of the Durme, 14 km. above its confluence with the Escaut.

Economic Importance

A flourishing textile industry includes flax, hemp and jute spinning, the manufacture of cotton and woollen fabrics, and bleaching. Lokeren is also the market centre for the agriculture of the fertile neighbouring area, and there is a considerable marketing of grain, flax, hemp and cattle.

Communications

The town is served only by single-line railways. It is on the direct Gent-Antwerpen line (the old 'Pays de Waes' line, see p. 475), and is the junction for Dendermonde and Zelzate.

The main Gent-St Niklaas-Antwerpen road passes to the north of the town.

The canalized Durme links the town with the Escaut waterway system to the east, while the Moervaart Canal connects the river north of the town with the Gent-Terneuzen Canal.

LA LOUVIÈRE (22,657)

General Features

La Louvière,* a flourishing industrial town in the province of Hainaut, is situated at an altitude of 130 m. on the left bank of the Thiriau, a tributary of the Haine. Although the extraction of coal was begun in the neighbourhood of La Louvière towards the end of the fourteenth century, the development of the town dates only from the nineteenth century. With the construction of the Bruxelles-Charleroi Canal and the development of the railway system, La Louvière has become the leading town in the Centre coal basin.

Economic Importance

The Centre coalfield provides excellent coking coal, which forms the basis of the prosperous iron and steel industry. The works at La Louvière range from iron foundries to those manufacturing finished products. There are coke ovens, blast furnaces, rolling mills, steelworks, bolt and wire works, mechanical engineering works and boat-building yards. The chemical industry produces ammonia and soda from coke by-products. Other metal manufactures are electrical machinery (including locomotives), steam engines, railway stock and equipment, and ironmongery. Associated industries manufacture refractory products, earthenware, pottery and glassware. Lime is produced from local chalk.

Communications

Two lines of railway cross just west of La Louvière: the Mons-Manage-Charleroi line runs in a roughly SW–NE direction, following the Thiriau valley, and the Charleroi—Haine-St-Pierre—Braine-le-Comte line crosses it at right angles from south-east to north-west. A connecting loop enables direct fast trains to run from Mons to Charleroi via Haine-St-Pierre, thus avoiding the Manage detour. Several local lines link La Louviere with neighbouring parts of the Centre coalfield.

* The urban agglomeration of La Louvière was formed in 1942.

The main road connexions are north-west to Rœulx for Mons, east and then south-west to Haine-St-Paul for Binche, east to Manage and Charleroi.

A canal running north from La Louvière connects it with the Centre Canal and with a branch of the Bruxelles-Charleroi Canal.

Mechelen (Malines) (62,311)

General Features

Mechelen, chief town of an arrondissement in the province of Antwerpen, is the metropolitan see of Belgium. The town is situated at an altitude of 7 m. on the river Dyle, 6 km. south-east of its confluence with the Nèthe. The main channel of the Dyle skirts the north-eastern part of the town, which is intersected by several branches of the river. The *Grand' Place* and the thirteenth-century Gothic cathedral form the centre of the town (Plate 95).

The water supplies of the town are partly obtained from the Hofstade lakes, 4 km. to the south-east, and partly from the Dyle.

History

There was an early settlement on the banks of the Dyle in Roman times. This emerged into the light of later history in the ninth century, when it was sacked and burned by the Norsemen; towards the end of the tenth century it was rebuilt and fortified by the bishops of Liége, who had acquired control of Mechelen. At the beginning of the thirteenth century, the temporal powers of the bishops were delegated to the lords of Grimberghen, who subsequently gained complete control. One of the chief results of the rivalry between the prince-bishops and the Grimberghen family was that the town gained many privileges, and it was almost independent when it passed successively under the domination of the counts of Flanders and the dukes of Burgundy in the second half of the fourteenth century.

By this time the prosperity of the town was already great. In 1316 a guild of shipbuilders had been set up, but their trade did not last as long as that of the renowned bell and cannon foundries, for which a guild was established in 1420. In 1462, after the sacking of Dinant, a great number of coppersmiths from that town came to join the guild at Mechelen, and although they gradually returned home, the industries of Mechelen had greatly benefited.

In 1473 Charles the Bold, in recognition of the loyalty of Mechelen, chose the town as the seat of the Grand Council of the Netherlands (see p. 90). The end of the fifteenth and beginning of the sixteenth centuries saw the height of Mechelen's prosperity. At the creation of new bishoprics in 1559, the see of Mechelen was elevated to an archbishopric, and its occupant was made Primate of the Netherlands (see p. 63).

In 1572 Mechelen was sacked by the Spaniards for welcoming the troops of the Prince of Orange. After the seventeenth century its status fell to that of a secondary city, and so it remained throughout the eighteenth century. During the union of Belgium with the French Republic, the fortifications of the town were destroyed, and until 1815, Mechelen formed part of the department of *Deux-Nèthes*.

The development of the new industrial quarter, built near the station and near the waterways, dates from the middle of the nineteenth century. As planned in 1834, Mechelen was originally the central point of the Belgian railway system, and its large railway workshops owe their existence to this. During the war of 1914–18, in the course of the German attack on Antwerpen, Mechelen changed hands several times, and the town suffered serious damage.



Plate 95. Mechelen (Malines): the *Grand' Place* and the cathedral
The thirteenth-century Gothic cathedral of St Rombaut is the metropolitan see of Belgium.



Plate 96. Mons, looking north-east

The fifteenth-century late-Gothic church of St Waudru, on the left, is one of the finest examples of its style in Belgium. The park behind it is the site of the old fortress and the highest point in the town; the seventeenth-century belfry is to the right of it.

Economic Importance

The chief industry of Mechelen is furniture-making. The extensive state railway construction and maintenance shops are also important. Mechelen, too, has long been renowned for lace and, in addition, there are wool and cotton spinning and weaving mills, linen bleaching works, and rope works. Minor industrial activities include copper-smelting, the manufacture of art glass, gold and silver ware, printing, tanning, and foodstuffs production.

Mechelen is an important agricultural, horticultural and market-gardening centre, and it has large cattle markets.

Communications

Mechelen lies at the crossing point of two main international railway routes, the north-south route from Amsterdam through Bruxelles to northern France, and the east-west route from the coast to Germany. The former is by far the more important, since in addition to its international function it links the capital and chief port of Belgium, and has four tracks, two of which carry electric trains. Apart from inter-urban passenger traffic—westwards to Dendermonde and Gent, eastwards to Leuven and Liége—the east-west line carries much goods traffic, since it avoids the congested passage through Bruxelles. There is a large marshalling yard alongside the Leuven line between Mechelen and Muizen, just outside the town. Mechelen is also served by the 'Malines-Terneuzen' railway, which runs westwards alongside the Gent line for 4 km. and then swings north-westwards, and by several local lines.

Main roads from Mechelen radiate to Antwerpen, Lier, Heist-op-den-Berg, Leuven, Nivelles; to Vilvoorde and Bruxelles; and to Willebroek and Dendermonde.

The town is linked with the Escaut to the north-west by the Leuven-Dyle Canal and by the Dyle; the latter is navigable upstream to its confluence with the Démer, which is navigable as far east as Diest.

Meenen (Menin) (21,996)

General Features

Meenen, in the province of West-Vlaanderen, is situated at an altitude of 18 m. on the left bank of the Lys and adjoining the Franco-Belgian frontier. It is a Belgian customs post. Two river channels are formed by the Lys to the south of the town; the valley of the river is liable to flooding, especially east of the town. In recent years, Meenen has extended mainly to the north-west.

Since medieval times, when its cloth industry began to flourish, Meenen has been of particular strategic importance. Its industrial development, however, did not become marked until the nineteenth century; its population increased from 4,560 in 1816 to 18,635 in 1910. The main textile activities are the stripping and weaving of flax and the bleaching of yard and linen. Lace figures prominently in the manufacture of finished goods. There are also iron foundries and construction shops as well as foodstuffs, furniture and soap factories.

Communications

Meenen is on the railway from Kortrijk to Comines (for Ieper) at the point where branch lines diverge southwards across the frontier to Roubaix-Tourcoing and northwards to Roeselare. Local lines lead to Kortrijk, Ieper and Mouscron.

There are first-class roads north to Roeselare, north-west to Ieper, south to Halluin and Roubaix-Tourcoing, north-east to Kortrijk.

Downstream the canalized Lys links the town with the Escaut and the Gent-Terneuzen Canal; upstream with the Comines-Ieper Canal and with the French canal system serving Lille and Roubaix-Tourcoing.

Mons (26,417)

General Features (Plate 96)

Mons, chief town of the province of Hainaut, is situated at an altitude of 50 m. on the river Trouille at its confluence with the Haine. The town is partly situated in a plain and partly on the hill from which it derives its name. The fifteenth-century cathedral is one of the finest buildings in Belgium. Situated to the north-east of the Borinage, it is the capital of this great coal-mining and industrial region. There are several important technical institutions in the town, including the *Ecole des Mines*, the *Ecole industrielle*, and the *Institut provincial d'Hygiène et de Bactériologie*.

Water supplies are obtained from springs in the Trouille valley south of the city, in the commune of Spiennes.

History

Mons dates from Roman times, when a fort was built on the hill. During the seventh century, the nucleus of the settlement was the monastery of St-Waudru. Mons increased in importance during the tenth and eleventh centuries. It was fortified in the twelfth century, and it became the capital of the county of Hainaut. Its wool trade flourished during the Middle Ages, and the town reached the height of its prosperity in the fifteenth and early sixteenth centuries when its wool cloth and serges were widely marketed. In the nineteenth century Mons regained much of its former industrial importance.

The events of the war of 1914–18 brought it into prominence. In 1914, Obourg, north-east of Mons, was the scene of the first fighting between Von Kluck's First Army and the British Expeditionary Force. The withdrawal from the Condé-Mons-Binche line began the 'retreat from Mons'. The town was recaptured in November 1918.

Economic Importance

The Mons coal basin, stretching from Quiévrain to Morlanwelz, joins the Valenciennes coal basin of France to the Charleroi basin of Belgium in the east. Coal-mining is therefore the most important industry around Mons, more especially to the south-west in the district known as the Borinage, but unlike Liége and Charleroi, the town is not associated with great metallurgical and glass industries. Indeed, although Mons lies at the heart of a coal-mining and industrial region, it has relatively few heavy industries, but there are a considerable number of smaller industries which are ancillary to coal-mining. Examples of these industries are the explosives of Flénu, the lighting apparatus of Frameries and La Bouverie and the cables of Mons, Hornu and Dour. On the other hand local coal is extensively used in chemical establishments, in refractory and ceramic works, and in coke ovens and briquette factories.

Mons is important as a commercial organizing centre, and as a leading market for coal and sugar. It has cement works, boat-building yards, steam saw-mills, rope-works, cotton-spinning mills, linen bleach works and soap works, and at Obourg is situated a viscose rayon factory of the *Union des Fabriques belges de Textiles artificiels*; minor industrial activities include the manufacture of porcelain and the preparation of tobacco, especially that grown in the Obourg district. There are also large sugar refineries in the town.

Communications

The railway network of the Mons region, especially west of the city, is of some complexity, but four main routes may be distinguished. Mons is a key point on

the route from Bruxelles to Paris, which here forks, one line (the usual express route) running south to Hautmont, and the other west to Quiévrain and Valenciennes. The fourth main line leads eastwards to Charleroi. A fork from the Bruxelles line at Jurbise leads to Ath and Gent, while a fork from the Quiévrain line at St-Ghislain leads to Tournai and Oostende. Local railways connect Mons with most of the towns of the Borinage. Freight traffic in the district is considerable, and there are marshalling yards at Jemappes and special wagon repair works at Cuesmes.

Mons has first-class roads west to Jemappes, Boussu and Valenciennes, south-east to Binche, east to La Louvière, north-east to Soignies and Bruxelles, north to Ath, and north-west to Tournai.

The Mons-Condé Canal links the town with the Escaut waterway in the French department of Nord, while the Centre Canal communicates with the Bruxelles-Charleroi Canal; near Charleroi this joins the Sambre-Meuse waterway system.

Mouscron (35,722)

General Features

Mouscron, a town in the province of West-Vlaanderen, is situated at a distance of 2 km. from the Franco-Belgian frontier. It is a customs post and forms an outlier in Belgium of the Roubaix-Tourcoing agglomeration in the French department of Nord. There is only a narrow gap between the town and Tourcoing, 3 km. to the south-west.

The town underwent great industrial expansion in the nineteenth century, and its population increased from 5,580 in 1816 to 22,515 in 1910.

Textiles form the principal industrial activity. There are cotton spinning and weaving mills; wool also is spun, mainly for hosiery. Wool and cotton fabrics, carpets and furnishings are manufactured on a considerable scale. There are also soap and dye works, vegetable-oil mills—all subsidiary to the textile industry—briquette factories, tobacco works and foodstuff factories.

Communications

The main railway line between Kortrijk and Mouscron carries much traffic; lines converge on Kortrijk from Oostende, Gent and Bruxelles, and at Mouscron the line forks, across the frontier to Tourcoing and Lille (and thence to Paris or the Channel ports), and south-eastwards to Tournai and Mons.

Although there are no first-class roads leading directly from the town, it has connexions with the main Kortrijk-Tourcoing and Oudenaarde-Roubaix roads.

Namur (32,831)

General Features

Namur is the chief town of the province of that name, and the seat of a bishopric. It is situated at the confluence of the Sambre and Meuse, where the latter changes course from a northerly to an easterly direction. From the original nucleus, where the *Citadelle* stands on the dominating spur of the Montagne de Champeau between the two rivers, the main direction of development has been across the narrower Sambre to the wide alluvial plain on the left bank, where the main town is now situated at an altitude of 85 m. In contrast to the six bridges across the Sambre, there is only one across the Meuse, in addition to a railway viaduct, linking the town with the suburban commune of Jambes on the right bank. Although the communes of Saint Servais and Jambes are administratively separate, they form part of the Namur agglomeration (Plate 97).

The Meuse provides an excellent route into the Ardenne country, and Namur, the gate of the Ardenne, is one of the chief tourist centres of Belgium. A well at Jambes is the source of part of the town's water supply.

History

The strategic site of the Montagne de Champeau, dominating both the Sambre and Meuse valleys, was recognized and exploited from Gallo-Roman times. In the eleventh century, the counts of Namur built a château on the site of the present *Citadelle*. The situation of the town at the junction of two navigable rivers brought an increasing volume of waterway traffic. During the eleventh century, a port was established on the left bank of the Sambre, because the dangers of flooding were less here than on the banks of the Meuse. The area adjoining this gradually grew into an important commercial centre. Stone ramparts and a moat were constructed at this time.

The extraction of coal in the Charleroi region was begun in the thirteenth century, and the port of Namur increased in importance. The autumn fair of Namur attracted merchants from many countries, and in the fifteenth century a new *enceinte* was built around the greatly enlarged town. Namur passed to the dukes of Burgundy in 1420.

The bishopric of Namur was established in 1559. Owing to its strategic position, the town suffered many sieges during the wars of the seventeenth and eighteenth centuries between France, Spain and Austria. The Dutch garrisoned Namur as a 'barrier fortress' at the end of the seventeenth century, and it was considered to be one of the 'keys' to the Netherlands; the Champeau became a vast fortified camp. Later, during the French occupation from 1794 to 1814, Namur was the chief town of the department of *Sambre-et-Meuse*.

The old fortifications, reconstructed between 1816 and 1821, were replaced by boulevards in 1868. The construction of the first railway to Namur in 1843, and the canalizing of the Sambre and Meuse, were accompanied by considerable urban expansion. The expansion of the town on to the marshy district of Salzinnes dates from this period.

The position of Namur has made it a vital Belgian fortress and it shares with Liége the defence of the Meuse corridor. After 1889 the defence of Namur relied on a circle of nine detached advanced forts, about 6 km. round the town. This fortified position played an important part in the defence of the Meuse in 1914; it was captured by the Germans after heavy artillery bombardment of the forts.

Economic Importance

The heavy industries of Namur have largely developed as a result of the town's situation on the waterway connecting the major industrial areas of Charleroi and Liége, thus ensuring a plentiful supply of easily transported coal. Owing to the absence of good local coal, heavy industry is largely confined to metal-working and engineering, including heavy constructional work (cranes, rolling stock and permanent-way material, etc.) and boiler construction, especially by a firm at Jambes. Subsidiary industries are lead, zinc and copper working, and the manufacture of red and white lead. There are also large state railway works at Salzinnes. Other industrial interests include the manufacture of cutlery, for which Namur has been renowned since the Middle Ages, agricultural machines, enamelled ware, pianos, briquettes, glue, soap and tobacco. Small industrial establishments include lime-kilns, cement works, glass works, paper mills, printing works and tanneries.

The left bank of the Sambre is favourable to agriculture; it has a southern aspect, and it is well drained. The cultivation of the neighbouring hill-slopes, especially those facing south, has been a feature of the Namur region since the fourteenth century. Jambes is one of the most important market-gardening districts of Belgium and the market gardening of the Namur region is mainly concentrated here to-day, especially on the light alluvial *limon* of the plain formed inside the Meuse meander,

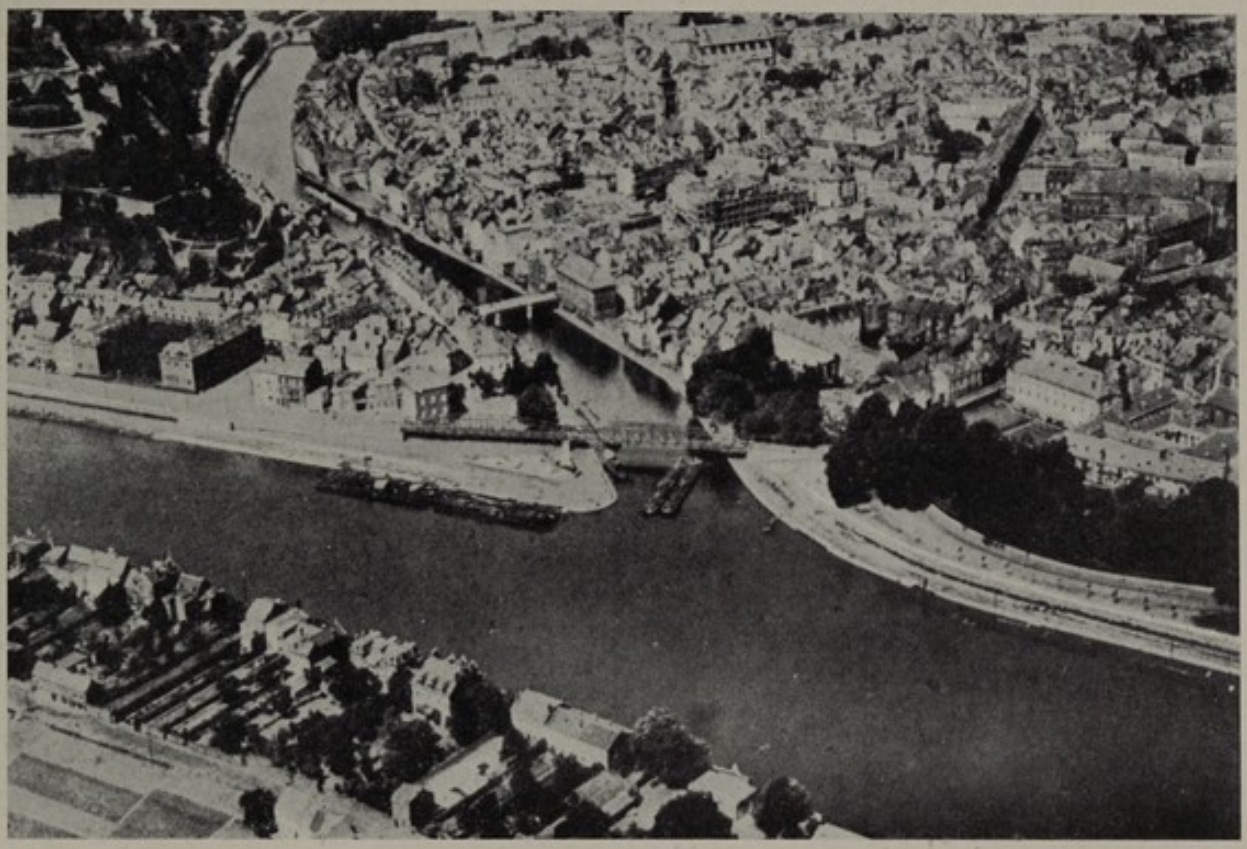


Plate 97. The confluence of the Sambre and Meuse at Namur

The *Citadelle* lies on the spur between the two rivers; across the canalized Sambre lies the main part of the town. In the foreground is the residential suburb of Jambes, on the right bank of the Meuse; the only road bridge offering access to it is the stone *Pont de Jambes*, which crosses the Meuse below the citadel, upstream from this photograph.



Plate 98. Roeselare (Roulers): aerial view, looking east

The town is dominated by the Gothic church of St Michael. The field pattern of the Flanders Plain can be seen in the background, traversed from left to right by the road to Tielt, the Lys–Roeselare Canal and the railway to Izegem and Kortrijk (Courtrai).

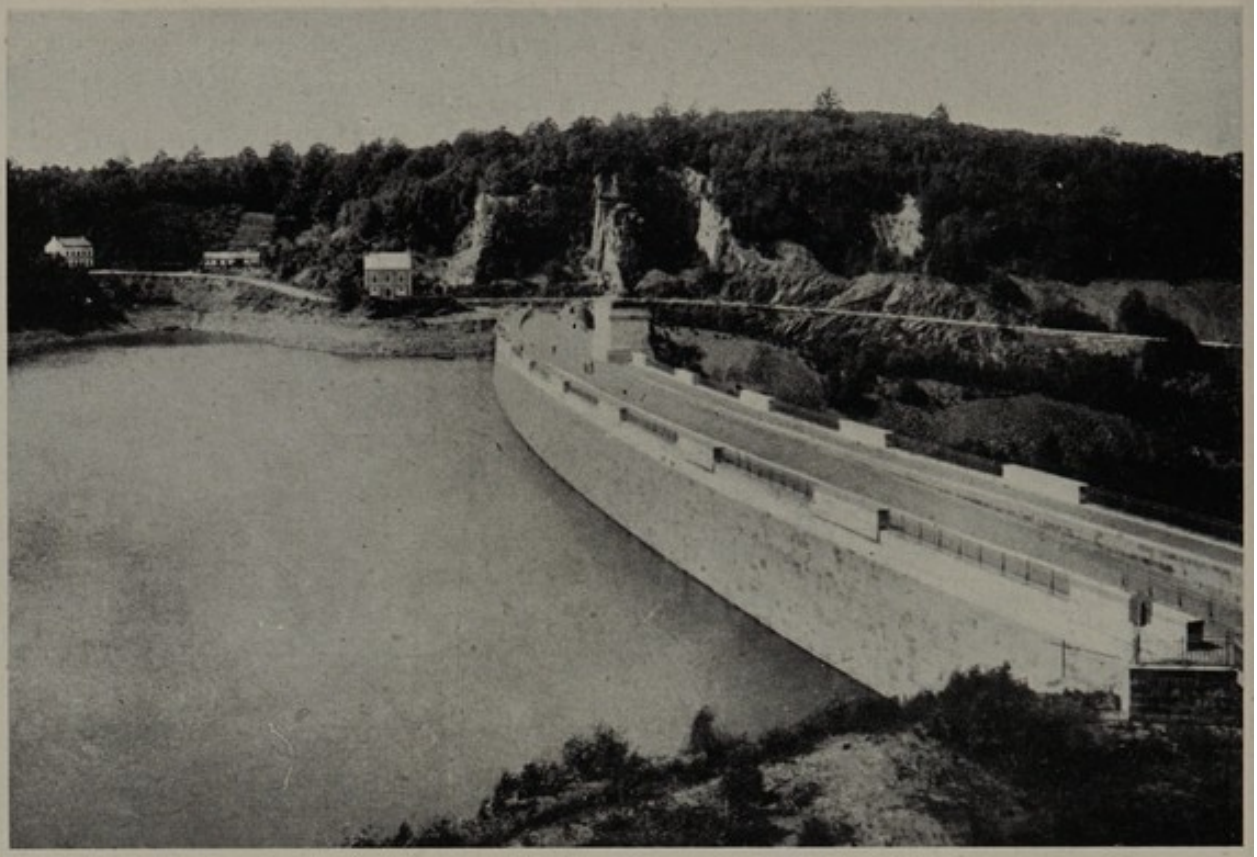


Plate 99. The Gileppe dam

This dam, built across the Gileppe to the south-east of Dolhain, supplies Verviers both with drinking water and with lime-free water for its woollen mills. The reservoir, which has a capacity of 53 million cu. ft., is connected with Verviers by a $5\frac{1}{2}$ mile-long subterranean canal.



Plate 100. Ieper (Ypres): aerial view, looking south

Ieper was one of the most important towns in Flanders during the Middle Ages but it was almost completely rebuilt after the destruction caused in the war of 1914–18. The river Yperlée, on which the town stands, has been vaulted over and the water on the left forms part of the old moat. The white structure is the Menin Gate Memorial.

which is sheltered from east winds. Market gardens, or *cotlages*, occupy about 20% of the area of the commune, although they are now receding before building development. Nine-tenths of the produce is sent to other markets, mostly by rail to the Charleroi basin.

Communications

Namur owes its importance as a market to the convergence of the natural routeways of the Hesbaye, Entre-Sambre-et-Meuse, and the Condroz. The significance of the town as a tourist centre is due to its function as a focus of communications.

Namur is a railway junction of international importance at the crossing of the Bruxelles-Luxembourg and Paris-Charleroi-Liége-Cologne-Berlin main lines. Other lines run northwards to Tienen (on the Bruxelles-Liége line) and southwards to Dinant (for Givet and Mézières or for Bertrix and Athus). Namur is also the junction of several light railways. There are large marshalling yards and locomotive sheds at Ronet in a bend of the river Sambre, 3 km. to the west-south-west.

First-class roads radiate north-west to Gembloux and Bruxelles; north to Eghezée; north-east to Sint-Truiden; east from Jambes to Huy and Liége along the south bank of the Meuse; south-east from Jambes to Marche; south to Dinant along the west bank of the Meuse; south-west to Fosse; west to Floreffe and to Charleroi via Fosse along the south bank of the Sambre; and west-north-west to Nivelles. The roads leading out of Jambes are reached by the *Pont de Jambes*.

The convergence of waterway traffic on Namur from the south (from France and the Ardenne), from the west (from Charleroi down the Sambre), and from the east (from Liége up the Meuse), has been of fundamental importance to the growth of the town and to its function as an inland waterway port.

Roeselare (Roulers) (30,334)

General Features (Plate 98)

Roeselare, chief town of an arrondissement in the province of West-Vlaanderen, is situated at an altitude of 20 m. on the left bank of the Mandel, a tributary of the Lys. The town is dominated by the church of St-Michael. The most recent urban development has been in the eastern suburbs of Batavia and Spanje, and to the south of the Mandel.

History

Roeselare is mentioned as monastic territory in several charters of the ninth century. It had grown considerably by the thirteenth century when a château was built on its western outskirts, and it acquired a town charter in 1287. The manufacture of cloth and linen had become firmly established by the fourteenth century. The town declined during the fifteenth and sixteenth centuries, and in 1700 Roeselare had only 800 inhabitants. Its industrial growth in the nineteenth century is reflected in the growth of population from 8,490 in 1816 to 25,000 in 1910. During the war of 1914–18 about half of the town's houses as well as more than a hundred factories and workshops were destroyed by the Germans. As an important railhead it suffered severe air and artillery bombardment.

Economic Importance

The town has important textile factories including flax-spinning and weaving mills and jute-spinning mills. Dyeing, bleaching and soap manufacture are ancillary activities. There is a considerable output of linen, linen fabrics, lace and carpets.

Additional industries comprise the preparation of chicory, tanning, saw-milling, glove-making and the manufacture of furniture, tiles and pottery.

Roeselare is an important market centre for the market gardening, horticulture and orchard cultivation of the neighbourhood.

Communications

Roeselare is on the main railway line from Oostende to Kortrijk; subsidiary lines run to Ieper and Meenen, and there are also several local railways.

The following first-class roads pass through Roeselare: Brugge-Torhout-Meenen-Lille; Kortrijk-Izegem-Diksmuide; Tielt-Ieper.

The Lys-Roeselare Canal runs south-east from the town and joins the Lys waterway between Kortrijk and Gent.

Ronse (Renaix) (25,261)

General Features

Ronse, in the province of Oost-Vlaanderen, is situated at an altitude of 40 m. on the river Molenbeek, a tributary of the Lys. The town is in one of the hilliest parts of Flanders, and it lies at the foot of the southern slopes of the Monts de Renaix, a chain of sandy wooded hills which are a westward extension of the plateau of Brabant and which rise to over 140 m. in parts.

History

In the ninth century a colony of Saxons who had been transferred by Charlemagne from the banks of the Elbe established themselves on the site of Ronse. During the thirteenth century, Ronse formed part of the county of Aalst, although it had a certain measure of autonomy. It became a fief of the county of Flanders in 1280, at the same time retaining some of its municipal privileges. Until the sixteenth century, Ronse was a flourishing town with a considerable number of workers engaged in the cloth industry. Several disastrous fires occurred during the sixteenth century, and in 1559 Ronse was almost completely destroyed; it also suffered further from the religious disturbances of this century and became practically deserted during the seventeenth century, when the population was decimated by a plague. Between 1816 and 1910 its population increased from 9,906 to 22,300.

Economic Importance

Ronse is an industrial town mainly manufacturing textiles. Although the weaving of cotton and wool, and the manufacture of rayon, form the principal activities, cheap cotton, woollen, and linen goods are also manufactured; bleaching and dyeing are necessary subsidiary industries. Other activities include the manufacture of briquettes and footwear, and brewing and distilling.

Communications

The town has no main-line railways, but it is the junction of four single-track lines: (1) west to Kortrijk, with branches to Tournai and Mouscron; (2) north to Oudenaarde; (3) east to Lessines; (4) south to Leuze.

Ronse is situated on the main Gent-Oudenaarde-Leuze-Valenciennes road; it also has first-class roads north-east to Nederbrakel; east to Lessines; south-west to Tournai.

SERAING (42,981)

General Features (Fig. 80)

Seraing forms part of the Liége industrial agglomeration but it is a separate administrative unit. It is situated on the right bank flood-plain of the Meuse in a bend of the river 6 km. west of its confluence with the Ourthe.

Despite its association with the prince-bishopric of Liége, dating from the twelfth century when the bishops established their country residence at the *château*, Seraing is primarily a product of the Industrial Revolution; for example, its population increased from 1,955 in 1815 to 41,000 in 1910. Its industrial development is a direct result of the pioneer efforts of John Cockerill, who established machine construction works at the *château* in 1817 and these have grown into the great present-day Cockerill works. The extensive coal mines and blast furnaces of the *Société de l'Espérance* were opened above Seraing in 1836. It was at Seraing, too, in 1864 that the production of steel by the Bessemer converter process was first introduced into Europe by the Cockerill firm. Seraing remains one of the most important metallurgical centres in Belgium and the chief machine-manufacturing centre. The firm of Cockerill has a vast vertical organization covering almost every branch of the metallurgical and ancillary industries; it employs about 12,000 workers (see p. 288).

The glass works of the *S.A. Cristalleries du Val-St-Lambert* to the south-west of Seraing on the banks of the Meuse were founded in 1825 by John Cockerill and are now among the largest of their kind in Europe and employ about 5,000 workers (see p. 332).

Communications

Seraing is linked with Liége by the main line of the Nord-Belge railway, and also by local railway.

The main road to Liége crosses the north bank of the Meuse by the *Pont de Seraing*; other main roads run to Liége along the south bank of the river, south to Esneux, south-west to Val-St-Lambert, Huy and Namur along the south bank of the Meuse; and to Huy along the north bank via the *Pont de Seraing*.

The Meuse waterway provides a valuable east-west line of communication, more especially for the heavy industries.

SINT-NIKLAAS (ST NICOLAS) (41,933)

General Features

Sint-Niklaas, chief town of an arrondissement in the province of Oost-Vlaanderen, is situated at an altitude of 15 m. in the centre of the Waasland. It lies on a small stream on the northern edge of a low range of hills which separate it from the Escaut plain.

History

The origin of Sint-Niklaas dates from Roman times. The Waasland was formerly to a great extent beneath the sea, and Sint-Niklaas was probably not far from the sea during the thirteenth century. The reclamation of the Waasland dates from the beginning of the fourteenth century, when the famous dyke of Comte Jean was begun, and the growth of Sint-Niklaas was naturally influenced by this work (see pp. 27-30).

It has been estimated that the population of Sint-Niklaas in 1631 was 3,400; by 1815 it was 11,510. It was not until the nineteenth century, however, that Sint-Niklaas acquired municipal status. By 1910 its population had increased to 34,775.

Economic Importance

Sint-Niklaas is the commercial and industrial centre of the Waasland (Plate 18). Cotton-weaving is the leading industry; wool-spinning and the manufacture of rayon, carpets, felt and hosiery are other branches of the textile industry. There are, in addition, pottery, tile and briquette works, saw-mills and cigar works. An engineering works produces bridge girders, petroleum tanks and rolling stock. The Waasland clog industry is centred around the town, and this is the most important area for clog-making in Belgium.

Agriculture, horticulture and orchard cultivation are the prominent activities of the neighbouring area. Flax and chicory are grown; the former provides the basis of Sint-Niklaas' linen and lace manufactures.

Communications

Sint-Niklaas has no main double-track railway, but it is the junction of several subsidiary lines. It lies at the point where the 'Pays de Waes' line from Antwerpen (Tête de Flandre) to Gent is crossed by the 'Malines-Terneuzen' line; another branch leads southwards to Dendermonde.

The principal road communications are south to Hamme, north-west to Hulst, and north to Kieldrecht, on the Netherlands frontier; the only first-class lengths of road lead north-east to Sterreken and south-west to Belsele, where they link up with the main Antwerpen-Gent road, which forms a by-pass to the south-east of Sint-Niklaas.

Tienen (Tirlemont) (21,952)

General Features

Tienen, in the province of Brabant, is situated at an altitude of 50 m. on the left bank of the Grande Gette, a tributary of the Démer, in fairly hilly country in the plateau of Brabant. The urban area has a circumference of 10 km., including a considerable proportion of arable land. The oldest part of the town, the suburb of Grimde, lies on the south bank of the river.

History

Tienen was originally a Roman settlement connected by road with Tongeren to the east. By the eleventh century the settlement had acquired municipal status, and it formed part of the county of Leuven. Owing to its situation on the commercial route from the Rhine to Brugge, and more especially because of its flourishing cloth industry, the town saw a period of prosperity during the late twelfth and thirteenth centuries. At the beginning of the fourteenth century it reached the height of this prosperity and, after Bruxelles and Leuven, it was the most important town in the duchy of Brabant. Although the terminus of the Rhine trade route was displaced from Brugge to Antwerpen, Tienen remained on the route during the fourteenth and fifteenth centuries. The disturbances caused by the Reformation brought a period of misfortune, and an epidemic in 1596 seriously depopulated the town. It was pillaged in 1635 by the Dutch troops of the Prince of Orange, and in 1693 by the troops under William III of England. Conditions within the town improved noticeably during the Austrian period. The last episode of the campaign for Belgian independence in 1830 took place at Tienen.

Economic Importance

Tienen is situated on the margins of the Hesbaye and its proximity to the *limon* belt accounts for its sugar-beet factory which is the most important in Belgium. In addition, the town has linen bleaching works, soap and starch works, tanneries and leather works. There are machine assembly shops which produce armaments,

steam locomotives, Diesel and petrol engines as well as various types of machinery and heavy constructional work. About 50% of the world output of citric acid is manufactured at Tienen.

The town is an important agricultural market with trade in cattle, grain and wool.

Communications

Tienen is on the main Bruxelles-Leuven-Liége line, at the junction of branches to Diest and Namur. It is also a busy junction of local railways.

The main road from Bruxelles and Leuven to Liége runs through the town; other first-class roads lead south-west to Jodoigne, south-east to Hannut, and north to Diest.

Tournai (35,463)

General Features

Tournai, in the province of Hainaut, chief town of an arrondissement, and the seat of a bishopric, is situated at an altitude of 40 m. on the river Escaut, 8 km. east of the French frontier. The river divides the town into two parts: the south-western part (the old town) rises on the left bank; the north-eastern part (the new town) lies on the right bank, which is rather more flat. The old town is grouped around the *Cathédrale Notre-Dame*, doubtless the finest example of ecclesiastical architecture in Belgium and one of the most remarkable in Europe; its Romanesque work of the eleventh and twelfth centuries, the transitional and Gothic work of the thirteenth and fourteenth centuries, clearly reveal the orientation of Tournai towards northern France. The fourteenth-century Pont des Tours originally formed part of the *enceinte* and commanded the river entrance to the town. In the southern parts of Tournai, on both banks of the river, are barracks and hospitals. To the south-east of the town there are several large open limestone quarries.

History

Under the Romans, Tournai became the military centre of Turnacum on the Roman road from Cologne to Boulogne and, during the Frankish period, it maintained this strategic importance. From 840 to 1187 it was united to Flanders, and in 1187 it passed to France; Philippe Auguste of France granted it a town charter in 1211. From then until the sixteenth century Tournai remained a free and independent town under the protection of France. In the Middle Ages the arts and crafts of Tournai became famous, and by the fifteenth century its fine copper and brass wares were exported all over Europe. During this century, three painters of the town, Robert Campin, Roger van der Weyden and Jacques Daret, were prominent among the leaders of the Flemish school. In 1513, Henry VIII of England captured the town and built a citadel, but five years later it was returned to France. It was incorporated in the Netherlands and annexed to the county of Flanders in 1529. The iconoclasts damaged the town in 1566 and destroyed most of its famous sculpture (see p. 96).

Louis XIV took Tournai in 1667, built vast defence works there, and greatly improved the town. It was later restored to Austria under the Peace of Utrecht in 1713. By the Barrier Treaty of 1715 it became a barrier fortress, and was garrisoned by the Dutch until 1728. In the latter half of the eighteenth century, Tournai became famous for its fine porcelain.

From 1815 to 1910, the town's population increased from 23,250 to 36,980, and during the nineteenth century weaving and tanning factories, as well as cement and metal works, were constructed.

Economic Importance

The extensive limestone quarries to the south-east of the town have long been exploited and form the basis for cement and lime factories, and provide stone for

sculpture. Much of the town's flourishing industry has grown up as a result of its situation on the route from the Borinage to Flanders by way of the Escaut, thus ensuring adequate supplies of coal. Textile products include wool, cotton and linen yarn, hosiery, carpets, cotton-wool, tulle and ribbons. Other industries include non-ferrous metal construction and mechanical engineering. Other miscellaneous industries are tanning and leather working, vegetable-oil manufacture, printing, barrel making, candle manufacture, brewing, distilling and the manufacture of gelatine, glue and vinegar. Tournai porcelain and pottery are well known. At Kain, 3 km. to the north-west, are situated the *Chantiers de l'Escaut* which construct river vessels and ships for colonial service.

There is considerable market-gardening activity on the outskirts of Tournai.

Communications

Tournai is on the main international railway route from Calais via Lille to Bruxelles, at the point where this is crossed by the Oostende-Kortrijk-Mons line. The town is also an important junction of local railways.

The main roads from Tournai lead west to Lille, north-west to Roubaix, north to Pecq and Kortrijk, and east to Ath and Bruxelles.

Upstream, the canalized Escaut links Tournai with towns in the French department of Nord, with the Borinage to the south-east, and downstream with Gent and the Lys waterway system.

Turnhout (29,305)

General Features

Turnhout, the chief town of an arrondissement in the province of Antwerpen, is situated at an altitude of 25 m. in the heart of the western Kempenland. It lies on a terrace above the marshy valley of the Aa, a tributary of the Petite Nèthe.

History

Turnhout owes its origin to the fortified hunting lodge which the dukes of Brabant built at the edge of the forest of Grootenhout in the twelfth century. This became the nucleus of a settlement which developed so rapidly that Henry I, duke of Brabant, granted it a town charter in 1212. During the fifteenth century, many Brabant noblemen chose the town for their residences, and it became known as 'Petit Bruxelles'. The *château* of the dukes was frequently besieged during the disturbances of the sixteenth century and it is estimated that about the middle of the seventeenth century, the population had fallen to below 6,000. Turnhout had an uneventful history during the seventeenth and eighteenth centuries until the Battle of Turnhout in 1789, when the patriots under van der Meersch defeated the Austrians, thus marking the beginning of the Brabant Revolution against Austrian domination. During the nineteenth century, the population of the town increased from 10,820 in 1815 to 23,740 in 1910.

Economic Development

Turnhout has become the economic centre of the western Kempenland. It is well known for its linen-weaving mills, and especially for its fine lace; canvas and cotton goods are also manufactured, and there are associated soap and dye works. Turnhout has important printing works and the Belgian manufacture of playing cards is concentrated almost exclusively here. Cranes are also manufactured. Various other industries include the making of cement, pottery-making, and tanning. Turnhout has diamond-cutting works, largely owned by Antwerpen firms.

The agricultural produce of the fairly fertile Aa valley finds a market here.

Communications

Turnhout is an important centre of communications. By rail it is served by the only main-line railway in this part of the Kempenland, a single-track line running from Herentals (for Antwerpen) north to the Dutch frontier and Baarle-Nassau. Between Turnhout and Baarle-Nassau sidings, this line is used only for goods traffic. Some half-dozen local railways converge on the town.

Main roads radiate in numerous directions, west to Antwerpen, north-west to Merksplas and Hoogstraten, north to the frontier and Baarle-Hertog, north-east to Poppel, south-east to Mol, south to Geel, and south-west to Herentals.

The Kempen Canal is of considerable economic significance: it provides a link with Antwerpen to the west, and with the Escaut-Meuse and Albert Canals to the south-east, as well as with many parts of the western Kempenland along these routes.

VERVIERS (42,931)

General Features

Verviers, chief town of an arrondissement in the province of Liége,* lies at an altitude of 175 m. on the river Vesdre. It lies mainly to the south of the river, and there has been very little development to the north owing to the steepness of the north bank. Hodimont and Dison, situated in the tributary valley of the Dison on the north bank, are, however, important industrial centres. Verviers was the birthplace of Henri Pirenne, the famous Belgian historian.

The town receives its water supply from the Gileppe reservoir, some 8 km. to the east (Plate 99).

History

The original site of Verviers, now marked by the *Hôtel de Ville*, was a river terrace above the level of the winter floods of the Vesdre. Verviers does not seem to have shared in the medieval industrial development of other Belgian cities until the beginning of the fifteenth century, when the first fulling mills were established on the Vesdre. The subsequent rise of the cloth industry at Verviers was due to the power provided for the fulling mills by the Vesdre and its tributaries, and to the special qualities of their water for washing wool. It was because of these, rather than because of the abundance of wool, that Verviers became more important than Liége for the manufacture of cloth. The town was free from the guild regulations which hindered the cloth industry in other towns. Its prosperity from the fifteenth century onwards drew the attention of foreign merchants, especially from Germany and Holland, who provided large quantities of the finest foreign wool, imported principally from Spain. The woollen industry continued to progress unimpeded by the sixteenth-century religious wars, or by the seventeenth-century political wars. Verviers was situated in a region which was comparatively peaceful, mainly because of its inaccessibility. The growth of population in the seventeenth century was striking, but curiously enough Verviers did not obtain a town charter until 1651. Towards the end of the seventeenth century, the troops of Louis XIV demolished the fortifications which had been commenced in 1626.

New dyeing processes were discovered in the eighteenth century, and the town benefited materially from the increased prosperity of the woollen industry, and many fine buildings were constructed by the wool merchants. Working conditions, however, were bad, and numerous strikes broke out. During the French occupation of Liége province after 1795, all industrial activity ceased and between 1784 and 1811 the population fell from 13,500 to 9,980. The establishment by Napoleon Bonaparte of a large market restored activity.

The Industrial Revolution effected a vital change, and it was the enterprise of the Verviers wool merchants in adopting all new inventions as they appeared that

* The Verviers agglomeration was formed in 1942.

ensured the lead of Verviers in Belgium's woollen industry. In 1798 William Cockerill constructed here the first mechanical wool-carding and wool-spinning mills on the Continent (see p. 279). Shortly afterwards, the first spinning-machine construction factory was built. With the use of steam, the mills were no longer dependent on the river Vesdre for power, but the need for pure water for washing wool remained.

The construction of the first railway along the Vesdre valley to Verviers in 1844 marked the commencement of the town's modern growth. The greatest changes took place in the western part of Verviers, and in the Dison valley. Up to 1865 the density of buildings increased in the town itself, but after this date steady expansion took place to the hills to the south. The construction of the Gileppe barrage in 1878 on tributaries of the Vesdre ensured an unlimited supply of lime-free water. The *Canal des Usines*, which traversed the town in a network of channels from east to west, and which was important in the rise of the woollen industry, had become useless, and was abandoned in 1906.

Economic Importance

The eastern and western ends of Verviers are almost entirely industrial, and the woollen industry of the town with its suburbs produces more than half Belgium's production of wool, and employs altogether 30,000 workers. Since the end of the nineteenth century, local supplies of wool have been insufficient, and Australian and Argentine wool has been imported. The spinning of carded wool provides employment for nearly 10,000 workers. Weaving is relatively less important because of greater foreign competition, but many types of fabric are produced. There are important textile machinery works. Other manufactures are leather articles, chemical products, glue and brushes. A number of lead and zinc rolling mills use locally mined ores. The making of gingerbread is a speciality, and there are in addition chocolate works. Verviers is a busy market and consuming centre for the produce of the rich grasslands of the *Pays de Herve* to the north.

Communications

The main Bruxelles-Liége-Aachen-Cologne railway line passes through the southern part of Verviers. A branch line running north to Herve is important for the transport of workers from the *Pays de Herve* to the town's factories; a local line to Spa serves tourist traffic.

Main roads run north to Herve along the Dison valley, south-west to Pepinster for Liége along the Vesdre valley, south to Theux and Spa, south-east to Jalhay and Malmédy up the Mangombroux valley, and north-east to Limbourg and Eupen via the Vesdre valley.

Vilvoorde (26,110)

General Features

Vilvoorde, in the province of Brabant, is situated 10 km. north-north-east of Bruxelles on the flat right bank of the Senne, at an altitude of 15 m. It is a gap town at the northern edge of the plateau of Brabant, where the Senne cuts through the last low range of hills, flowing in a northerly direction. Vilvoorde is the seat of a state school of horticulture and arboriculture. There has been some recent industrial development along the river and canal to the west and south-west of the town, in the direction of Bruxelles.

History

Vilvoorde, which dates from about the seventh century, gained a town charter at the end of the twelfth century. During the thirteenth century, which was a period of great prosperity, a guild for the cloth industry was established. In the

middle of the fourteenth century, its twelfth-century *enceinte* was enlarged to its present extent. Vilvoorde did not fully recover from its pillage in 1489 by the troops of Maximilian of Austria. The town lost most of its sources of prosperity, especially cloth manufacture, but retained its quarrying resources. During the sixteenth century the decline of the town continued. After the middle of the eighteenth century Vilvoorde enjoyed a period of security. Great efforts were made to revive its industry, and several large manufacturing establishments were constructed. With conditions favourable to steady industrial progress, the town's population increased from 2,822 in 1815 to 16,125 in 1910; this increase also reflects the suburban expansion of Bruxelles, and an almost continuous urban zone has developed between Bruxelles and Vilvoorde. Vilvoorde was damaged during the German occupation of 1914.

Economic Importance

The industrial development of Vilvoorde has been largely due to its proximity to Bruxelles, and to the importance of the Willebroek Canal. Industrial products include machine tools, aluminium, chemical fertilizers, varnish, vegetable oils, glue, gelatine and starch; river vessels are also built. There are various important textile manufactures (including rayon fabrics), tanneries and leather works (including glove factories). White stone and paving stone are quarried nearby.

Communications

Vilvoorde is served by the main Bruxelles-Antwerpen railway line, now provided with a good service of electric trains.

The town lies on the main Bruxelles-Mechelen road which runs along the Senne valley. A first-class road north-west to Dendermonde crosses the river and canal west of the town.

The Senne and the Willebroek Canal run parallel from Bruxelles to their divergence just north of Vilvoorde; to the south-west the canal links the town with Bruxelles and the Bruxelles-Charleroi Canal; to the north the canal and the canalized Senne both provide important routes to the Rupel and the Escaut waterways.

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(1) Useful general information on the urban geography of Belgium is found in: A. Demangeon, *Géographie Universelle*, vol. II (Paris, 1927); E. de Seyn, *Dictionnaire historique et géographique des Communes belges*, two vols. (La Haye, 1924–5); F. Leyden, 'Die Städte des flämischen Landes', *Forschungen zur deutschen Landes- und Volkskunde*, vol. XXIII, pp. 123–83 (Stuttgart, 1924).

(2) There are a considerable number of studies giving detailed accounts of individual towns; the more important of these are: A. Hegenscheidt, 'Le Site de l'Agglomération et de la Banlieue bruxelloise', *Bulletin de la Société royale belge de Géographie*, vol. LIII, pp. 77–100 (Bruxelles, 1929); L. Verniers, 'Démographie et Expansion territoriale de l'Agglomération bruxelloise depuis le début du XIX^{e} siècle', *Bulletin de la Société belge d'Etudes géographiques*, vol. V, pp. 79–123 (Bruxelles, 1935); Ph. Lecouturier, 'Liége—Etude de Geographie urbaine', *Travaux du Séminaire de Géographie de l'Université de Liége*, no. 26 (Liége, 1930); F. Nicolas, 'L'Evolution géographique de la Ville de Namur', *Bulletin de la Société royale belge de Géographie*, vol. XLIX, pp. 169–200 (Bruxelles, 1925) (also published in *Travaux du Séminaire de Géographie de l'Université de Liége*, no. 16 (Liége), 1926); S. Petit, 'L'Evolution géographique de la Culture maraîchère à Namur', *Travaux du Séminaire de Géographie de l'Université de Liége*, no. 27 (Liége, 1931); R. Roncart, 'L'Evolution géographique de l'Agglomération verviétoise—Etude de Géographie urbaine', *Travaux du Séminaire de Géographie de l'Université de Liége*, no. 20 (Liége, 1928).

Appendix VII

NOTE ON PLACE NAMES

Both French and Flemish are official languages in Belgium, and their existence is now clearly reflected in the official forms of place names. The 'Language Law' of 1932 (see p. 142) drew a distinction between French, bilingual and Flemish communes; a preliminary list of the official names of communes was published shortly after the promulgation of the law. The final forms of the names of Flemish communes were ratified by the Council of Ministers in 1937, and published in *Spelling van de namen der Vlaamsche gemeenten, van de Vlaamsche namen der tweetalige gemeenten en gemeenten uit de Brusselsche agglomeratie*, (Brussel, 1937). Flemish names are thus official in all Flemish-speaking communes, and French names in French-speaking communes. In certain bilingual communes which, with the exception of Bruxelles, are situated along the French-Flemish linguistic frontier (Fig. 30), French or Flemish has been decreed to be the official language. A complete list of the official names of Belgian provinces, arrondissements and communes, as laid down in government decrees, was published in *Le Moniteur Belge*, 11 June 1938. The official names of the more important places and geographical features appear on the bilingual map, *Belgique : Carte oro-hydrographique à* 1 : 500,000 (see p. 569). The official names of geographical features and of all communes (including countless 'villages' subordinate to communes) will appear in a new edition of the *Carte de Belgique* 1 : 100,000, which will be published by the *Institut Cartographique Militaire* at Bruxelles.

The Permanent Committee on Geographical Names has issued a short list of the more important names now official in Belgium (London, 1941). An article by M. Aurousseau "Flemish Names in Belgium", *The Geographical Journal*, vol. XCII, pp. 539–40 (London, 1938) gives an account of the main stages in the adoption of Flemish place names.

Policy adopted for this handbook. Place name spellings in this handbook are those published in *Le Moniteur Belge*, 11 June 1938, and in the *Carte oro-hydrographique*. Official French forms are therefore used for places in the French-speaking area, and official Flemish forms for those in Flemish-speaking areas. There are, however, three main exceptions:—

(i) The two forms *Bruxelles* and *Brussel* are official for the capital of Belgium, but as the city forms a special linguistic area of predominantly French speech (see p. 60) the form *Bruxelles* is used throughout this volume.

(ii) Rivers which flow through both French-speaking and Flemish-speaking areas, have two official names. In this handbook, however, the French form is generally used.

(iii) In historical context, conventional forms—both English and French—are employed.

The index to the handbook includes both French and Flemish forms with a reference from the non-official form to the official one. The following table shows the official and other forms of the most important places in Belgium.

Provinces :

Official Form		*Other Form*
Antwerpen	Engl.	Antwerp
	Fr.	Anvers
Brabant		—
Hainaut	Fl.	Henegowen
Liége	Fl.	Luik
Limburg	Fl.	Limbourg
Luxembourg	Fl.	Luxemburg
Namur	Fl.	Namen
Oost-Vlaanderen	Fr.	Flandre orientale
	Engl.	East Flanders
West-Vlaanderen	Fr.	Flandre occidentale
	Engl.	West Flanders

Towns :

Official Form		*Other Forms*
Aalst	Fr.	Alost
Antwerpen	Fr.	Anvers
	Engl.	Antwerp
Baarle-Hertog	Fr.	Baerle-Duc
Brugge	Fr.	Bruges
Bruxelles	Fl.	Brussel
	Engl.	Brussels
De Panne	Fr.	La Panne
Dendermonde	Fr.	Termonde
Diksmuide	Fr.	Dixmude
Edingen	Fr.	Enghien
Geel	Fr.	Gheel
Geeraardsbergen	Fr.	Grammont
Gent	Fr.	Gand
	Engl.	Ghent
Halle	Fr.	Hal
Heist	Fr.	Heyst
Ieper	Fr.	Ypres
Koksijde	Fr.	Coxyde
Kortrijk	Fr.	Courtrai
Leopoldsburg	Fr.	Bourg-Léopold
Leuven	Fr.	Louvain
Lier	Fr.	Lierre
Maaseik	Fr.	Maeseyck
Mechelen	Fr.	Malines
Meenen	Fr.	Menin
Meesen	Fr.	Messines
Nieuwpoort	Fr.	Nieuport
Oostende	Fr.	Ostende
	Engl.	Ostend
Oudenaarde	Fr.	Audenarde
Pervijze	Fr.	Pervyse
Roeselare	Fr.	Roulers
Ronse	Fr.	Renaix
Sint-Niklaas	Fr.	St. Nicholas
Sint-Truiden	Fr.	St. Trond
Temsche	Fr.	Tamise
Tervuren	Fr.	Tervueren
Tielt	Fr.	Thielt
Tienen	Fr.	Tirlemont
Tongeren	Fr.	Tongres
Torhout	Fr.	Thourout
Veurne	Fr.	Furnes
Vilvoorde	Fr.	Vilvorde
Waremme	Fl.	Borgworm

CONVERSION TABLES

Metric and British Units

It is customary to think of the ' metre ' and the ' yard ' as representing unalterable units of length. This is not so. The metre was originally intended to be the 10,000,000th part of the earth's meridional quadrant. But the accurate determination of this length proved to be extremely difficult—partly for technical reasons, and partly because of different conceptions of the ' figure of the earth '. In view of these difficulties it became necessary to define the length of the metre in terms of suitable metal bars measured under specified conditions of temperature, pressure, humidity, etc. Similar standard bars were also used to define the length of other units such as the yard. As all these metallic standards are subject to change, conversion tables differ according to the date of comparison between different bars. The tables that follow are based on the comparison between the yard and the metre made in 1895. This made 1 metre equivalent to 39·370113 in.

Metric System. List of Prefixes

Deca means ten times.	Deci means a tenth part of.
Hecto means a hundred times.	Centi means a hundredth part of.
Kilo means a thousand times.	Milli means a thousandth part of.

In abbreviations the Decametre, etc., is Dm., and the decimetre, etc., dm.

Note on ' Nautical ', ' Geographical ' and ' Statute ' miles

A British ' nautical mile ' is the length of the minute of the meridian at any given latitude, and is therefore a variable unit. It is given in feet for Clarke's 1880 spheroid by the formula

$$60771{\cdot}1 - 30{\cdot}7 \cos 2 \text{ Lat.}$$

This is the sea mile of the scale of latitude and distance of the Admiralty Charts. From the above formula it will be found to vary from 6,046·4 ft. at the equator to 6,107·8 ft. at the poles, being 6,077·1 ft. at latitude 45°.

The so-called ' international nautical mile ' of 1,852 m. or 6,076 ft. is the length of the minute of the meridian at latitude 45° on the international spheroid. This corresponds to the 6,077 ft. for Clarke's spheroid.

A ' geographical mile ' is a fixed unit, being defined by some as the length of a minute of the equator and by others as that of the minute of the meridian at latitude 45°. According to the former definition its value on Clarke's spheroid is 6,087 ft. and according to the latter 6,077 ft. The round figure 6,080 is usually adopted for the purposes of ordinary navigation.

The British ' statute mile ' measures 5,280 ft.

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Table 1. *Length*

Nautical mile	Statute mile	Kilometre	Metre	Yard	Foot	Inch	Centimetre
1	1·152	1·853	1853	2027	6080*	72,960	185,300
0·8684	*1*	1·60934	1609·34	1760	5280	63,360	160,934
0·5396	0·621372	*1*	1000	1093·61	3280·84	39,370·1	100,000
0·0005396	0·0006214	0·001	*1*	1·09361	3·28084	39·3701	100
0·0004934	0·0005682	0·0009144	0·914399	*1*	3	36	91·4399
0·0001645	0·0001894	0·0003048	0·3048	0·33333	*1*	12	30·48
0·0000137	0·0000158	0·0000254	0·0254	0·02778	0·083333	*1*	2·54
0·0000054	0·0000062	0·00001	0·01	0·0109361	0·032808	0·393701	*1*

* This is the customary British practice, and not the ' international nautical mile,' which Great Britain has not adopted.

Table 2. *Area*

Square mile	Square kilometre	Hectare	Acre	Square metre	Square yard
1	2·58998	258·998	640	2,589,980	3,097,600
0·386103	*1*	100	247·106	1,000,000	1,195,990
0·003861	0·01	*1*	2·47106	10,000	11,959·9
0·0015625	0·0040469	0·404685	*1*	4046·85	4840
0·00000039	0·000001	0·0001	0·000247	*1*	1·19599
0·00000032	0·00000084	0·0000836	0·000207	0·836126	*1*

Table 3. *Yield per Unit Area*

Tons per acre	Metric tons per hectare	Quintals per hectare
1	2·51071	25·1071
0·398294	*1*	10
0·0398294	0·1	*1*

Table 4. *Volume and Capacity*

Kilolitre	Cubic metre	Cubic yard	Bushel	Cubic feet	Imp. gall.	Litre	Pint
1	1·000027	1·30799	27·4969	35·3157	219·976	1000	1759·80
0·999973	*1*	1·30795	27·4962	35·3148	219·970	999·973	1759·75
0·764532	0·764553	*1*	21·0223	27	168·178	764·532	1345·43
0·0363677	0·0363687	0·0475685	*1*	1·28435	8	36·3677	64
0·028316	0·028317	0·037037	0·778602	*1*	6·22882	28·3160	49·8306
0·0045460	0·0045608	0·0059461	0·125	0·160544	*1*	4·54596	8
0·001	0·001000	0·001308	0·027497	0·035316	0·219976	*1*	1·75980
0·0005682	0·0005683	0·0007433	0·015625	0·020068	0·125	0·56824	*1*

Table 5. *Weight*

Ton	Metric ton or millier	Quintal	Kilogram	Pound
1	1·01605	10·1605	1016·05	2240
0·984207	*1*	10	1000	2204·62
0·0984207	0·1	*1*	100	220·462
0·0009842	0·001	0·01	*1*	2·20462
0·0004464	0·0004536	0·004536	0·453592	*1*

Table 6. *Temperature : Equivalents of Fahrenheit and Centigrade Scales*

°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.
100	37·7	79·25	26·25	58	14·4	37·4	3	17	− 8·3	− 4	−20
99·5	37·5	79	26·1	57·2	14	37	2·7	16·25	− 8·75	− 5	−20·5
99	37·2	78·8	26	57	13·8	36·5	2·5	16	− 8·8	− 5·8	−21
98·6	37	78	25·5	56·75	13·75	36	2·2	15·8	− 9	− 6	−21·1
98	36·6	77	25	56	13·3	35·6	2	15	− 9·4	− 6·25	−21·25
97·25	36·25	76	24·4	55·4	13	35	1·6	14	−10	− 7	−21·6
97	36·1	75·2	24	55	12·7	34·25	1·25	13	−10·5	− 7·6	−22
96·8	36	75	23·8	54·5	12·5	34	1·1	12·2	−11	− 8	−22·2
96	35·5	74·75	23·75	54	12·2	33·8	1	12	−11·1	− 8·5	−22·5
95	35	74	23·3	53·6	12	33	0·5	11·75	−11·25	− 9	−22·7
94	34·4	73·4	23	53	11·6	32	0	11	−11·6	− 9·4	−23
93·2	34	73	22·7	52·25	11·25	31	− 0·5	10·4	−12	−10	−23·3
93	33·8	72·5	22·5	52	11·1	30·2	− 1	10	−12·2	−10·75	−23·75
92·75	33·75	72	22·2	51·8	11	30	− 1·1	9·5	−12·5	−11	−23·8
92	33·3	71·6	22	51	10·5	29·75	− 1·25	9	−12·7	−11·2	−24
91·4	33	71	21·6	50	10	29	− 1·6	8·6	−13	−12	−24·4
91	32·7	70·25	21·25	49	9·4	28·4	− 2	8	−13·3	−13	−25
90·5	32·5	70	21·1	48·2	9	28	− 2·2	7·25	−13·75	−14	−25·5
90	32·2	69·8	21	48	8·8	27·5	− 2·5	7	−13·8	−14·8	−26
89·6	32	69	20·5	47·75	8·73	27	− 2·7	6·8	−14	−15	−26·1
89	31·6	68	20	47	8·3	26·6	− 3	6	−14·4	−15·25	−26·25
88·25	31·25	67	19·4	46·4	8	26	− 3·3	5	−15	−16	−26·6
88	31·1	66·2	19	46	7·7	25·25	− 3·75	4	−15·5	−16·6	−27
87·8	31	66	18·8	45·5	7·5	25	− 3·8	3·2	−16	−17	−27·2
87	30·5	65·75	18·75	45	7·2	24·8	− 4	3	−16·1	−17·5	−27·5
86	30	65	18·3	44·6	7	24	− 4·4	2·75	−16·25	−18	−27·7
85	29·4	64·4	18	44	6·6	23	− 5	2	−16·6	−18·4	−28
84·2	29	64	17·7	43·25	6·25	22	− 5·5	1·4	−17	−19	−28·3
84	28·8	63·5	17·5	43	6·1	21·2	− 6	1	−17·2	−19·75	−28·75
83·75	28·75	63	17·2	42·8	6	21	− 6·1	0·5	−17·5	−20	−28·8
83	28·3	62·6	17	42	5·5	20·75	− 6·25	0	−17·7	−20·2	−29
82·4	28	62	16·6	41	5	20	− 6·6	− 0·4	−18	−21	−29·4
82	27·7	61·25	16·25	40	4·4	19·4	− 7	− 1	−18·3	−22	−30
81·5	27·5	61	16·1	39·2	4	19	− 7·2	− 1·75	−18·75	−23	−30·5
81	27·2	60·8	16	39	3·8	18·5	− 7·5	− 2	−18·8	−23·8	−31
80·6	27	60	15·5	38·75	3·75	18	− 7·7	− 2·2	−19	−24	−31·1
80	26·6	59	15	38	3·3	17·6	− 8	− 3	−19·4	−24·25	−31·25

Table 7. *Pressure : Equivalents of Millibars, Millimetres of Mercury, and Inches of Mercury at 32° F. in Latitude 45°*

Mercury in.	Millibars	Mercury mm.	Mercury in.	Millibars	Mercury mm.	Mercury in.	Millibars	Mercury mm.	Mercury in.	Millibars	Mercury mm.	Mercury in.	Millibars	Mercury mm.
27·02	915	686·3	27·82	942	706·6	28·62	969	726·8	29·41	996	747·1	30·21	1,023	767·3
27·05	916	687·1	27·85	943	707·3	28·65	970	727·6	29·44	997	747·8	30·24	1,024	768·1
27·08	917	687·8	27·88	944	708·1	28·67	971	728·3	29·47	998	748·6	30·27	1,025	768·8
27.11	918	688·6	27·91	945	708·8	28·70	972	729·1	29·50	999	749·3	30·30	1,026	769·6
27.14	919	689·3	27·94	946	709·6	28·73	973	729·8	29·53	1,000	750·1	30·33	1,027	770·3
27·17	920	690·1	27·97	947	710·3	28·76	974	730·6	29·56	1,001	750·8	30·36	1,028	771·1
27·20	921	690·8	28·00	948	711·1	28·79	975	731·3	29·59	1,002	751·6	30·39	1,029	771·8
27·23	922	691·6	28·03	949	711·8	28·82	976	732·1	29·62	1,003	752·3	30·42	1,030	772·6
27·26	923	692·3	28·05	950	712·6	28·85	977	732·8	29·65	1,004	753·1	30·45	1,031	773·3
27·29	924	693·1	28·08	951	713·3	28·88	978	733·6	29·68	1,005	753·8	30·48	1,032	774·1
27·32	925	693·8	28·11	952	714·1	28·91	979	734·3	29·71	1,006	754·6	30·51	1,033	774·8
27·35	926	694·6	28·14	953	714·8	28·94	980	735·1	29·74	1,007	755·3	30·53	1,034	775·6
27·38	927	695·3	28·17	954	715·6	28·97	981	735·8	29·77	1,008	756·1	30·56	1,035	776·3
27·41	928	696·1	28·20	955	716·3	29·00	982	736·6	29·80	1,009	756·8	30·59	1,036	777·1
27·44	929	696·8	28·23	956	717·1	29·03	983	737·3	29·83	1,010	757·6	30·62	1,037	777·8
27·46	930	697·6	28·26	957	717·8	29·06	984	738·1	29·86	1,011	758·3	30·65	1,038	778·6
27·49	931	698·3	28·29	958	718·6	29·09	985	738·8	29·89	1,012	759·1	30·68	1,039	779·3
27·52	932	699·1	28·32	959	719·3	29·12	986	739·6	29·92	1,013	759·8	30·71	1,040	780·1
27·55	933	699·8	28·35	960	720·1	29·15	987	740·3	29·94	1,014	760·6	30·74	1,041	780·8
27·58	934	700·6	28·38	961	720·8	29·18	988	741·1	29·97	1,015	761·3	30·77	1,042	781·6
27·61	935	701·3	28·41	962	721·6	29·21	989	741·8	30·00	1,016	762·1	30·80	1,043	782·3
27·64	936	702·1	28·44	963	722·3	29·24	990	742·6	30·03	1,017	762·8	30·83	1,044	783·1
27·67	937	702·8	28·47	964	723·1	29·26	991	743·3	30·06	1,018	763·6	30·86	1,045	783·8
27·70	938	703·6	28·50	965	723·8	29·29	992	744·1	30·09	1,019	764·3	30·89	1,046	784·6
27·73	939	704·3	28·53	966	724·6	29·32	993	744·8	30·12	1,020	765·1	30·92	1,047	785·3
27·76	940	705·1	28·56	967	725·3	29·35	994	745·6	30·15	1,021	765·8	30·95	1,048	768·1
27·79	941	705·8	28·59	968	726·1	29·38	995	746·3	30·18	1,022	766·6	30·98	1,049	786·8

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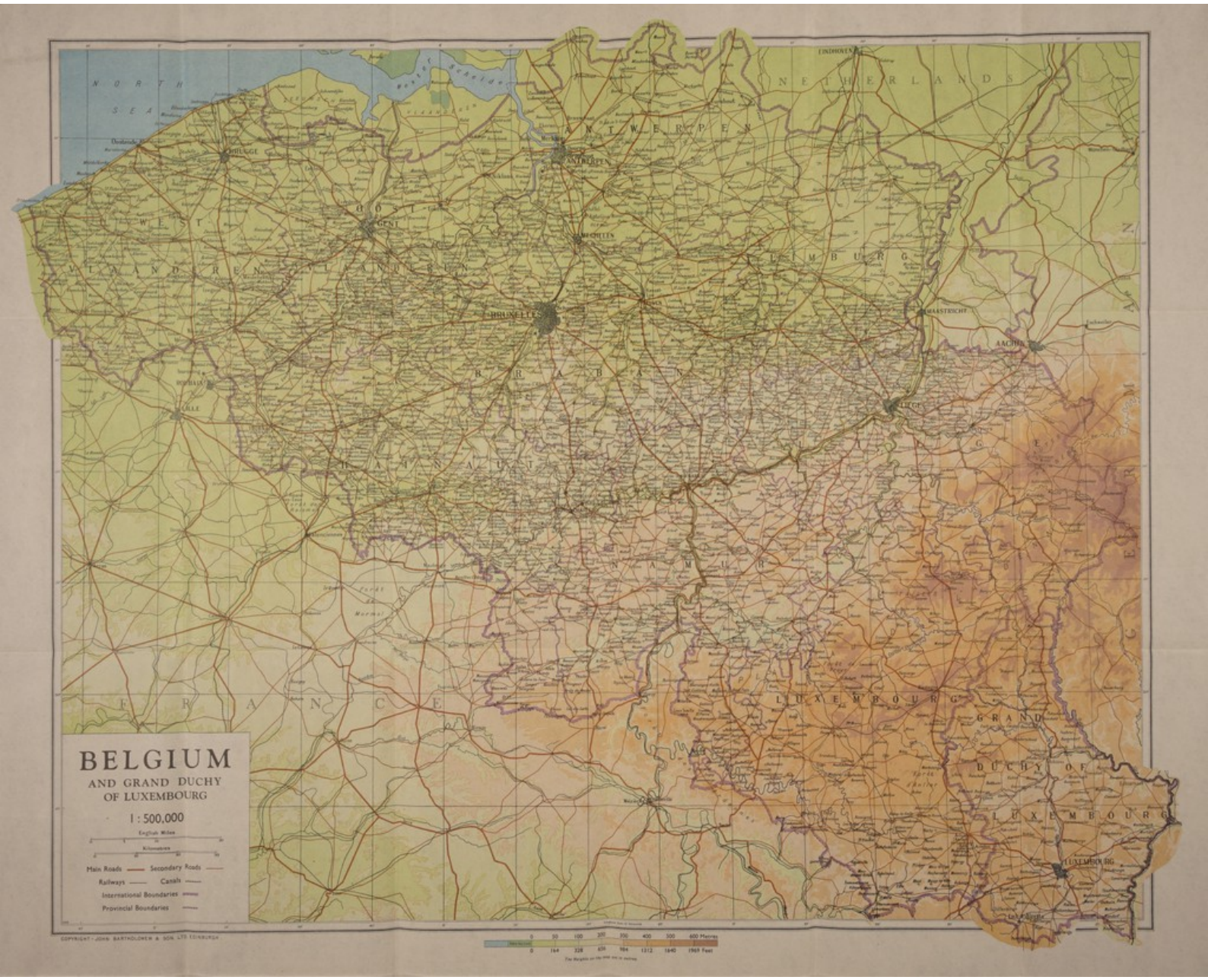
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