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FIRST INTERNATIONAL  
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LONDON,

July 24th to July 30th, 1912,  
UNIVERSITY OF LONDON,  
SOUTH KENSINGTON.

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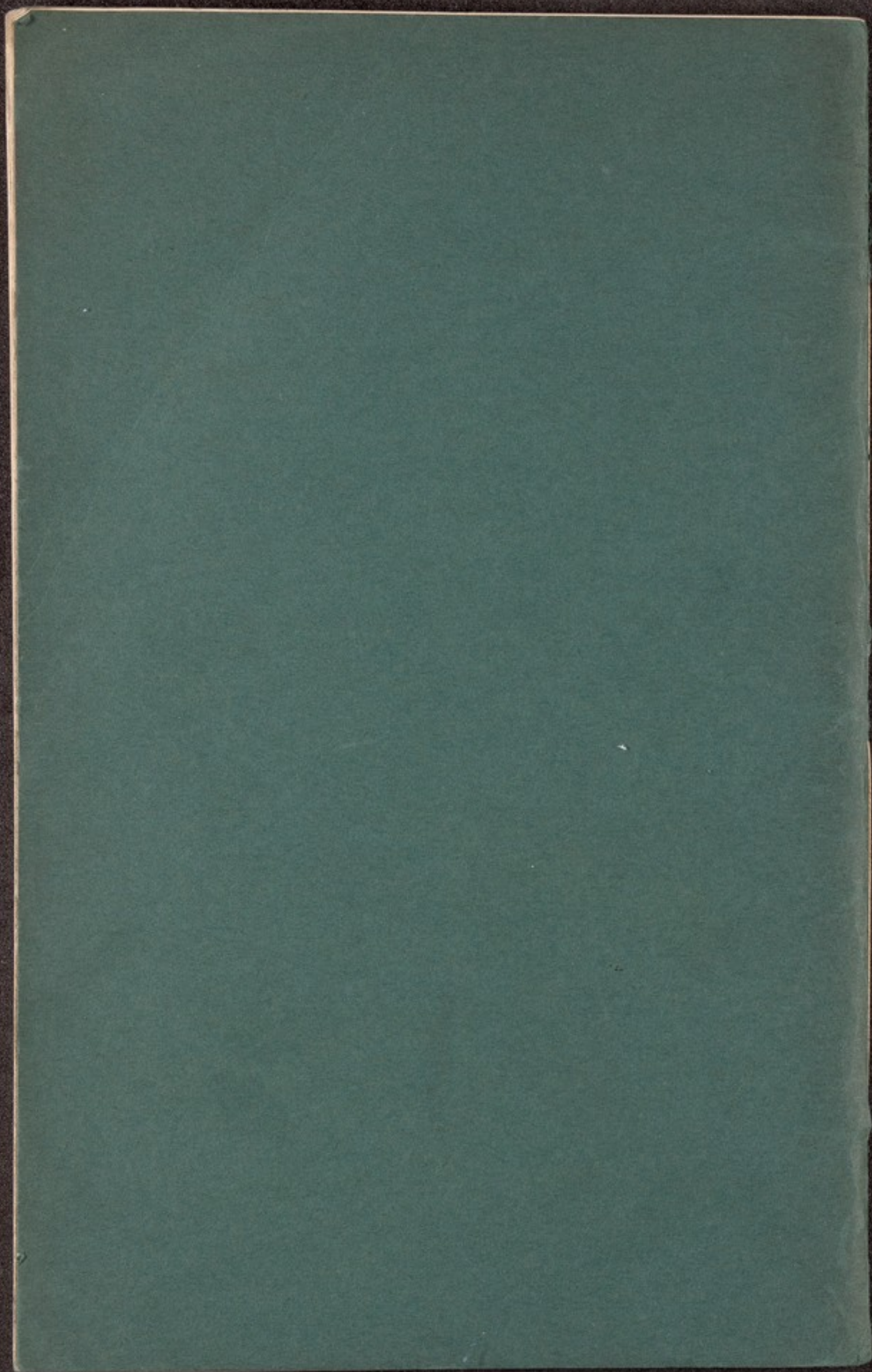
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The Exhibition Committee desire to take this  
opportunity of expressing their thanks to the Exhibitors  
for the loan of their exhibits. They desire specially to  
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First International Eugenics Congress,  
London, July, 1912.

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LIST OF EXHIBITS.

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EXHIBITED BY E. G. WHEELER, ESQ.

A.

- Portrait of Sir Francis Galton, by Charles Furze, 1903. A 1  
Silhouettes of Dr. Erasmus Darwin and his son Erasmus. A 2  
Silhouette of Mrs. Darwin. A 3  
Silhouettes of Samuel Tertius Galton, his son Erasmus and three daughters. A 4

EXHIBITED BY WILLIAM E. AND LEONARD DARWIN.

B.

- Portrait of Charles Darwin, by W. W. Ouless, R A., painted in 1875. B 1  
Portrait of Erasmus Darwin (after Wright, of Derby), the common grandfather of Charles Darwin and Francis Galton. B 2  
Photograph of Charles Darwin, by Maul & Polyblank, taken about the year 1854. B 3  
Leopold Flameng's Engraving, after the portrait of Charles Darwin, by the Hon. John Collier, painted in the year 1881—now in the National Portrait Gallery. B 4  
Photograph of Charles Darwin on his horse Tommy. B 5  
Photograph of the small study at Down in which the "Origin of Species" was written. B 6  
Etching by Axel Haig of the large study at Down, which Charles Darwin occupied from about 1887 onwards. B 7  
Water-colour Drawing of Down House, by Albert Goodwin, painted in 1882. B 8  
Two letters of Charles Darwin, on "Worms and their Habits." B 9

EXHIBITED BY PROFESSOR VON GRUBER.

C

Experiments by P. Kammerer on changes produced in the colours in the skin of the Fire Salamander—*Salamandra maculosa*—by keeping them on yellow or black earth respectively. C 1 & 2

According as to whether the animals are kept on yellow or black earth the yellow or black colouring of the skin spreads, and



this change of colour appears in the same way in the offspring, though a direct influence of the colour of the earth on the germ plasm is absolutely unthinkable. The two pictures in the lower part of Figure C 1 show the colouring of that generation to which the animal portrayed above belongs, according as to whether they have been kept permanently on yellow soil (right) or returned again to black soil (left). Here, it is true, it is not a question of a new quality or tendency. The capacity in the parents to deposit black pigment in their skin has been increased or decreased according to their surroundings. But the distinctive point remains, that their offspring is subsequently endowed with the inherited tendency to produce proportionately more or less pigment. This may, however, be a direct result of the abnormal life conditions of the parents, in so far as the depositing of more or less pigment in the skin of the parents is certainly not a purely local process, but rather is bound up with other metabolic changes which may extend to or influence the developing gametes.

## C 3 &amp; 4

Very remarkable are the hereditary changes which Kammerer established in Alytes obstetricans—the midwife toad.

With them copulation normally takes place on dry land. The male extricates from the female the string of eggs, winds it round his hind legs and carries it about until the eggs are ready. Then, and not till then, he enters the water where the larvæ escape. If, however, one keeps these toads in a high temperature (25-30 C.) they enter the water to cool themselves and abandon their normal way of manipulating their brood because the string of spawn swells in water and does not remain sufficiently sticky to allow the male to fasten it to his thighs. The animals become gradually accustomed to live in water, and continue to carry on the business of reproduction there, even when the temperature is normal. As soon as the new instinct has become sufficiently established with the parents they beget offspring, which at a normal temperature go of their own accord into water to deposit their eggs, and also produce eggs more numerous than, and somewhat different from, those of the normal toad. Further, the males of this succeeding generation develop thumbs and fore-arms of a character which enables them to perform the difficult task of holding the females during copulation in the water.

## C 5 &amp; 6

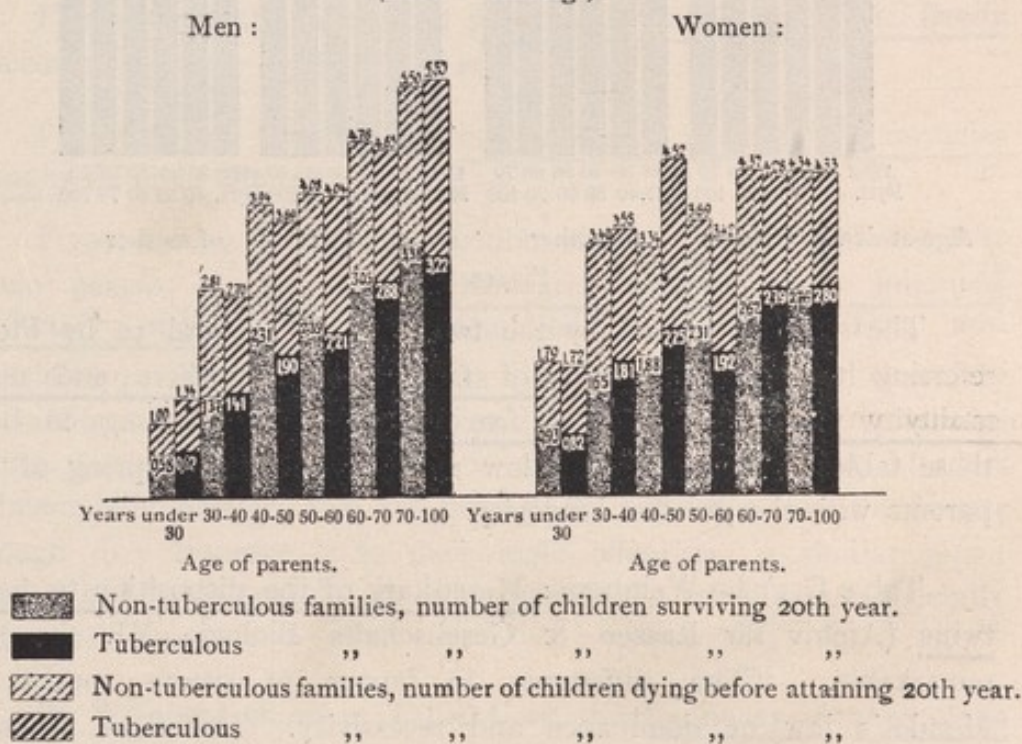
The likeness of offspring to their parents is extremely great and goes into many details; this we frequently overlook because a divergence strikes us more than a similarity. A similarity becomes striking when it is a question of familiar peculiarities. These often relate to exterior unimportant peculiarities. Our collection contains



a pedigree (taken by Dr. Walter Bell from Bateson's "Mendel's Principles of Heredity"), Figure C 5, of a family with peculiarly curled hair; also in Figure C 6, a case of heredity of a lock of white hair, likewise taken from Bateson's work by Rizzoli.

The heredity of physical qualities is strikingly illustrated in C 7 Weinberg's Table C 7, showing the age at death of the parents and the marital gross and nett fertility. It is founded on the Stuttgart family registers, and comprises about 1,900 non-tubercular and about 3,000 tubercular families ("Archiv für Rassen and Gesellschafts Biologie" and Württemberger Jahrbücher für Statistik und Landeskunde, 1911). W. Weinberg adds:

RELATION OF AGE AT DEATH OF PARENTS TO GROSS AND NETT FERTILITY.  
(After Weinberg.)



Number of non-tuberculous families about 1,900 (1876-79-86), of tuberculous about 3,000 (1873-89); from Stuttgart family registers.

Figure C 7.

“The gross as well as the nett fertility of those which have died increases with the age attained, the latter, however, in a greater degree, because the mortality of children decreases with the greater age attained at death. With the wife the curve is less steep and less regular, because in her case mortality is unfavourably influenced by the birth functions; this is particularly plainly seen in the case of tuberculous women, when the curve has two peaks.”

The same fact of heredity of "constitution" is demonstrated C 8 in Weinberg's Table C 8 showing the age at death of the parents and



the mortality of the children up to the age of 20. It is based on the same material as Table 7 and proves: "With the increasing age of the parents child mortality decreases, especially so in the case of the children of the tuberculous, and the number of children reaching the age of sexual maturity increases correspondingly."

AGE AT DEATH OF PARENTS AND MORTALITY OF THE CHILDREN UP TO THE AGE OF 20 (INCLUDING STILLBORN).

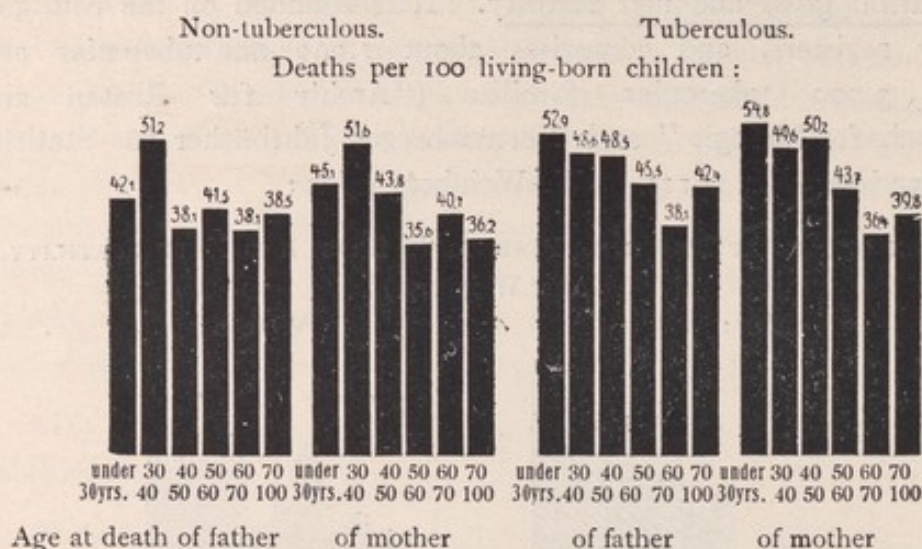


Figure C 8.

C 9 & 10

The same is proved by the two Tables C 9 and 10 by Ploetz referring to age at death of fathers and mothers and child mortality up to the age of five years. Very striking in both these tables is the extremely low mortality of the offspring of the parents with the greatest longevity.

C 11

Table C 11 by Weinberg: Hereditary of the disposition to beget twins (Archiv für Rassen & Gesellschafts Biologie VI. 1909) is remarkable. "The difference in favour of sisters speaks for Mendel's law of dominance and recessivity. The more twins a woman has borne, the more frequently the same phenomenon is found in her nearest female relations." That the mortality among twins is very great is a well-known fact.

INHERITANCE OF TENDENCY TO BEAR TWINS.

About 2,000 families from Wurtemberg family registers (after Weinberg).

IN EVERY 100,000 BIRTHS TWIN BIRTHS OCCUR IN THE FOLLOWING NUMBERS:

Total population	1087
Among daughters	1304
,, mothers	1523
,, sisters	2135

Figure C 11.



IN EVERY 1,000 BIRTHS THERE ARE THE FOLLOWING NUMBERS OF TWIN BIRTHS  
AMONG THE IMMEDIATE RELATIVES :

Of all mothers	11
Of women who have had 1 multiple birth	17
"    "    2    "    "	20
"    "    3 or more    "	56

#### MORTALITY OF TWINS.

Percentage of deaths before the age of 20 :

Single-born Children	39
Twins	61

Figure C 11 (*continued*).

Figure C 12 the celebrated pedigree of the Hæmophilic family C 12  
(bleeders) Mampel (by Rüdin after Lossen).

Figure C 13 showing the inheritance of progressive muscular C 13  
atrophy (after Eichhorst).

Figure C 14 a partial reproduction of a pedigree comprising over C 14  
2,000 people of the family Nongaret suffering from inherited  
stationary night blindness (compiled by Cunier, Truc and  
Nettleship). With regard to these figures it is to be noted that only  
a fraction of the offspring is affected with the illness, the remainder  
being perfectly normal. It is remarkable with the bleeders  
(Hæmophilic persons) that the females do not suffer from the disease  
though they transfer it to their male offspring; a similar latent  
disposition is observable in other hereditary conditions, especially  
colour-blindness.

W. Weinberg shows in Table C 15 the frequency of tuberculosis C 15  
within families. He adds: "This is a comparison of the  
experiences of married tubercular individuals, regarding the frequency  
of tuberculosis among their parents, brothers and sisters, with the  
corresponding experiences of their husbands or wives who come on an  
average from similar surroundings. The experiences of the latter  
represent the normal expectation. It is especially striking that the family  
influence tells most with the children of the well-to-do." The well-  
known fact that the tuberculous frequently come from tuberculous  
stock is clearly demonstrated in the figures of this table.

In Table C 16 Dr. Otto Diem shows the distribution of particular C 16  
taints in every hundred of the tainted members among the nearest  
relations (parents, grandparents, uncles, aunts, brothers and sisters)



- C 17 of the entire material he deals with. It is shown for instance that with the mentally sound, 15% of the tainted relatives were mentally diseased against 45.9% with the mentally diseased. Figure C 17 shows the share of this percentage among the parents only. It is demonstrated that with the mentally diseased a much larger percentage of the total hereditary taint is traceable to parental madness, alcoholism, abnormality of character, than with the mentally sound.
- C 18 Figure C 18 corresponds with figure C 17, except that not only the parents are reckoned but the nearest defective relative in any degree.
- C 19 Figure C 19 teaches that the reckoning of all the taints in the ancestry taken together with the collaterals fails to give as clear and convincing a picture of the dissimilarity in the heredity of mentally sound and diseased, as the reckoning of the taints among the parents alone. The establishment of the hereditary taint in the direct ancestry appears therefore by far the more important.
- C 20 In Figure 144 (Journal f. Psychologie und Neurologie. XIII. Bd.) Drf. Hans W. Mayer gives a number of examples of heredity among moral imbeciles, and he draws the following conclusions: "Consequently moral defect in frequent combination with alcoholism is hereditary in the highest degree. Remedy: Incarceration of these dangerous individuals, not according to the accidental form of the crime committed, but as diseased and forming a public danger. If there is a risk of escape or if liberty is conceded—undoubtedly sterilisation to prevent perpetuation of the defect." This latter course is already followed in North America, and a start has been made with it in Switzerland, at least in cases where the consent of the patients is obtained.
- C 21 The pedigree of the family of Zero von Jorger, figure C 21 (Archiv für Rassen & Gesellschafts biologie I.), shows in a convincing manner how very important for the protection of society is the prevention of the reproduction of the degenerate. In the course of time this family has burdened the sound and fit with taxation amounting to hundreds of thousands of pounds. The author remarks: "The family Zero springs from good peasant stock intermarrying with homeless female tramps. Its history shows how alcohol (especially spirits) and bad environment (in this case always combined) may create a scourge to society which continues from generation to generation. The family has produced many criminals, lunatics and feeble-minded persons. The offspring of these are destined to die out. Their great fertility at times is counteracted by great infant mortality."



"In places regeneration is evident which invariably is inaugurated by marriage with a good woman and the consequent abandonment of the abuse of alcohol. As with the degeneration so with the regeneration the wife takes the leading part."

The question whether modern civilized races are degenerate in body and mind is much disputed. In some respects for instance in the increase of myopia and caries of the teeth it is generally admitted, but in others it is doubtful, though it may be considered an established fact that the general average of health among all civilized nations is unsatisfactory. We do not know for certain whether the general level of all or certain qualities is being lowered or not, and still less can we say what part is played by heredity.

The demand for the systematic collection of data on these points is the first which Race Hygiene has to make from Governments.

The examinations as to fitness for military service in Germany might offer an excellent index of the physique of the people, but for this purpose the physical condition of the conscripts would have to be recorded in a much more thorough manner than at present (S. Gruber Concordia, 1910). There appears, however, to be no doubt that in general the country and agricultural pursuits produce young men of better average health than do towns and other occupations. This agrees with the fact that the life of the inhabitants in rural districts and of those engaged in agriculture is longer than that of town dwellers.

Table C 22 compares the duration of life of men living in towns C 22 with those living in rural districts in Prussia. Beyond all doubt the peasant population is still constitutionally the most valuable part of the people, and the colonisation at home, such as the Prussian Government is pursuing to an increasing degree, may become of the very highest value for the improvement of the race.

Dr. Walter Abelsdorff gives the following explanations to Table C 23, and figures C 24 and C 25. "They endeavour to show the number of families brought 'back to the land' in North Germany in the years 1900-1910." C 23, 24 & 25

"The Royal Commission for settlement in West Prussia and Posen has achieved notable results since the beginning of its activity in 1886. This body has brought about from 1886 to 1910 the settlement in the country of 18,507 families, 18,127 in leaseholds and 305 in labourers' dwellings. For 1900 to 1910 the total number of families settled amount to 14,511."



"The Royal General Commission began its activity later, but since 1906 has been energetically pursuing the settlement of agricultural labourers. At Münster, in the years 1908 to 1910, 247 leasehold small holdings for artisans have been created."

"The results of the Royal District Administrations are as yet less considerable, those of private societies with State subvention, though irregular, are worthy of note."

"The total work of settlement is almost exclusively effected by the Commission for settlements and the General Commission."

"Counting five members to each family, 130,000 people have been brought into economically improved conditions. In how far this may benefit the second generation—the children of the settlers—cannot as yet be determined."

"These efforts, however, may be looked upon as a regenerative component among the measures for the improvement of the people."

C 26 & 27

Figure C 26 deals with the fitness for military service in Germany in relation to the locality of birth and the occupation of the individual or the parents. Table C 27 with fitness for military service in town and country (both after Wellmann).

#### FITNESS FOR MILITARY SERVICE ACCORDING TO PLACE OF BIRTH AND CALLING.

German Empire, 1902-08.

Percentage of Recruits examined and found fit :

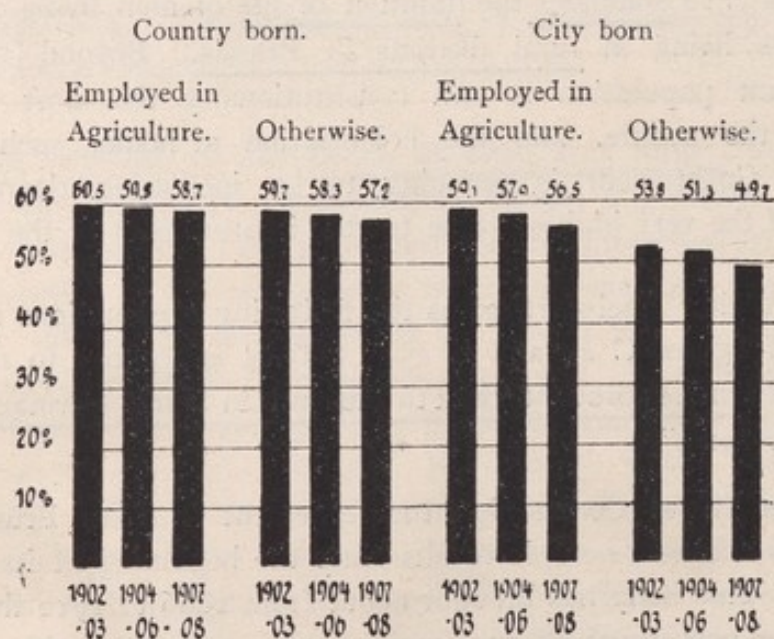


Figure C 26.



## FITNESS FOR MILITARY SERVICE IN TOWN AND COUNTRY.

(After Wellmann.)

Trade.	Percentage of fit.	Locality of Birth.			
		Of those examined.		Of both parents.	
		Large city. %	Village. %	Large city. %	Village. %
Brewer ... ..	63·4	3·0	55·3	3·0	55·3
Cab Driver ... ..	63·3	3·2	69·0	1·6	69·8
Smith ... ..	61·2	1·9	71·0	1·2	75·7
Skilled Mechanic ...	29·7	44·4	10·9	30·9	30·0
Implement maker or Tool maker ...	28·5	36·3	15·9	24·8	28·3

Figure 27.

Enlistments into the Army in Germany in 1907 and 1908, C 28 according to size (number of inhabitants) of native place, are shown by Dr. Walter Abelsdorff in Figure C 28.

Figure C 29 shows the percentage of those found fit in the final C 29 examination in Bavaria and occupation of the parents.

Table C 30 shows the total of all the non-commissioned officers C 30 and privates in the German Army on December 1st, 1906, classed according as they came from town or country and according to the occupation of the parents.

Attention is invited to the fact that according to Figure C 26 the percentage of those found fit for military service in Germany has diminished in recent years, but it is doubtful whether this is caused by a general lowering of physique. It may be due to the application of a higher standard in consequence of increased supply. The distinct increase in height, in Germany as well as in many other European countries, of those obliged to offer themselves for military service speaks against deterioration in the average of physique. Against the suggestion that with the increase in height may be coupled a greater disposition to tuberculosis must be set the fact that amongst the tall is found a percentage of fit higher than the average.

Abelsdorff remarks of Table C 27: "The results of recruiting for the years 1907 and 1908 have been grouped according to the size of the place of birth of the recruits.



The average for the whole empire in 1907 is 54.9, in 1908 54.5, fit in every 100 finally examined. The percentage of fitness has diminished 0.4% from 1907 to 1908. The numbers for 1904, 1905 and 1906 are respectively 56.4, 56.3, and 55.9%.

Towns with over 1,000,000 inhabitants show the smallest number of fit: 1907, 31.4%; 1908, 28.2%. The decline is 3.2%. Compared with the figure for the whole empire it shows 23.5% less fitness in 1907 and 26.3% in 1908.

For towns of 500,000 to 1,000,000 inhabitants the figures are slightly better; they reach 39.9% in 1907 and 44.0% in 1908; an improvement of 4.9% on the figures of the largest towns. The other three classes, viz., towns with 200,000 to 500,000; 100,000 to 200,000 and 50,000 to 100,000 inhabitants, show comparatively little variation in their figures for fitness for military service. They are 50.1% and 48.9%; 47.9 and 48.2%; 51.8 and 51.5%. The differences between the two years are not material. With the towns of from 200,000 to 500,000 and from 50,000 to 100,000 inhabitants there has been a decrease against an increase in those of from 100,000 to 200,000 inhabitants. But the figures for all three classes remain behind the average figure for the empire and so do those of all towns, they show 50.4 and 50.1%.

The most favourable results are yielded by the country districts. Here there were fit in 1907 58%, in 1908 57.7%. A trifling decrease is shown even here. The figures, however, are higher by 3.1% in 1907 and 3.2% in 1908 than the average for the empire. The conclusion is that the fitness is highest in the smallest, and lowest in the largest places.

Taking the average for the Empire as 100, those found fit from country districts number 106, from towns 92, from towns of over 50,000 inhabitants 83, and from towns of over 100,000 only 80."

The tables showing the recruiting results amongst those qualified for the one year voluntary service are particularly interesting.

In Table C 31 Schwiening (Veröffentlichungen aus dem Militär Sanitätswesen. 40. Berlin, Hirschwald, 1909) gives the figures of those finally passed as fit for military service in the Mittelschulen (secondary schools), which are classified according to their nature. The figures are too optimistic because no account has been taken of those who were found temporarily unfit. The Classical Schools (Gymnasium) give the least satisfactory results.



## FITNESS FOR MILITARY SERVICE AND SECONDARY SCHOOLS.

Of every 100 of the pupils of the following Schools

Class of School :	there were found fit for Military Service :
Classical High Schools (Gymnasium) ... ..	62,2
Old Scientific & Classical High Schools (Realgymnasium)	64,0
Lower Grade of Classical High Schools (Progymnasium)	64,5
Polytechnics ... ..	64,8
Lower Grade of Scientific Schools... ..	66,0
" " " " and Classical High Schools ...	66,9
Modern Scientific High Schools ... ..	67,7
Commercial Schools ... ..	69,4
Training Colleges ... ..	73,1
Private Schools ... ..	74,9
Agricultural Schools ... ..	83,4
Average ... ..	64,7

Figure C 31.

Table C 32 gives the principal reasons for which students have C 32 been rejected as unfit for military service.

## CAUSES OF UNFITNESS FOR MILITARY SERVICE IN THE GERMAN EMPIRE, 1904-6.

Of every 100 permanently unfit.

There were rejected on account of:

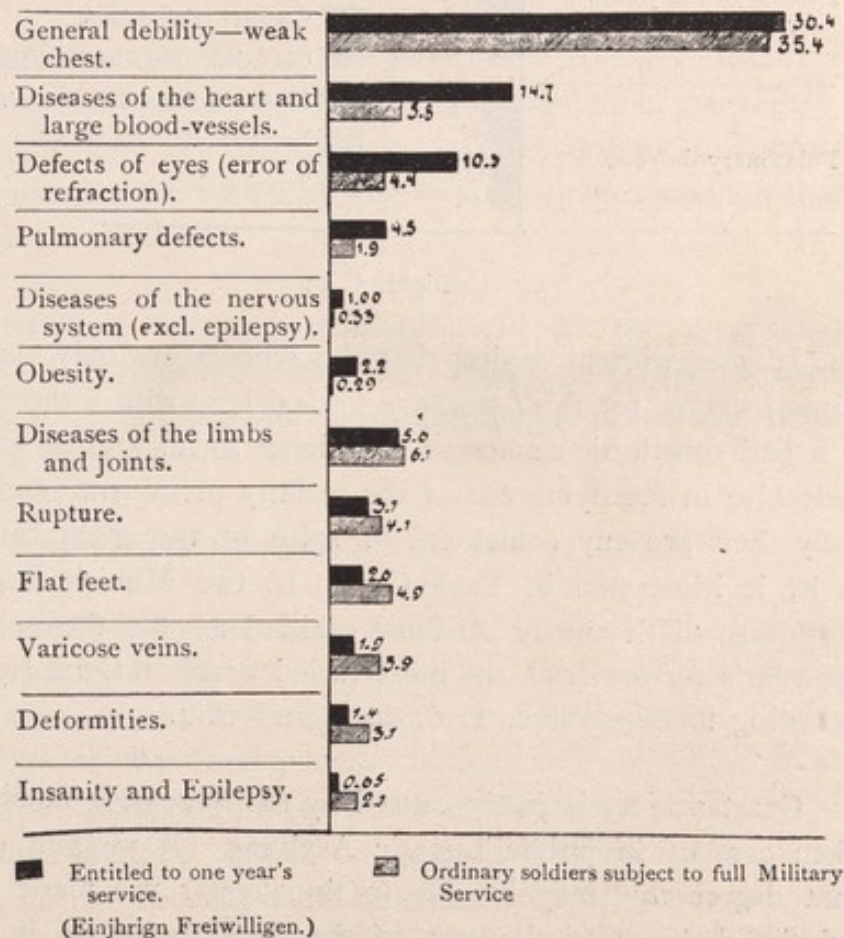


Figure C 32.



C 33

Table C 33 is a comparison of the frequency of the various causes of unfitness as between those qualified for the one year's voluntary service and the recruits in general. This table is very remarkable, because it shows the preponderance of general weakness, diseases of the heart and large vessels, and pulmonary defects among the former.

## MILITARY FITNESS AND SECONDARY SCHOOLS.

Percentage of unfit to every 100 recruits examined.

Cause of rejection :

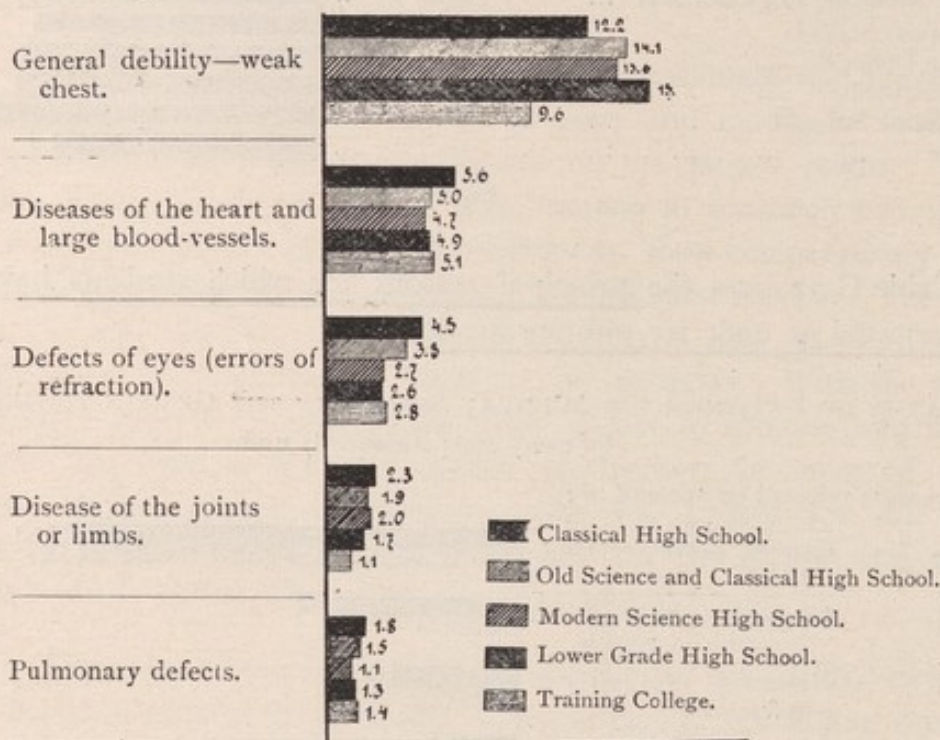


Figure C 33.

C 34

It goes without saying that the schools are only responsible to a lesser degree for this ; we have to deal here with a serious symptom of a bad constitution amongst the higher social grades which betrays itself also in the dying out of the socially prominent families. How badly their progeny comes off, in spite of the great care bestowed on it, is illustrated in Table C 34. In two Munich Regiments the percentage of fit among all those entitled to offer themselves for the one year's service from the most varied parts of Germany was only, according to Dieudonné, 21.6, 20.1, and 16.4.

C 35 &amp; 36

Great anxiety is justly caused by the increasing number of those taken care of in public Lunatic Asylums. It remains doubtful to what degree this may be due to the greater use made of asylums and the decrease of the care of the mentally infirm in the family home ; the deterioration of the nervous system nevertheless remains according to the general impression an incontestable fact. As a



symptom of this may be interpreted the increasing number of suicides in civilised countries, demonstrated in Rüdin's Tables, C 35 and C 36, showing the number of suicides in every one million of inhabitants.

More serious still than the frequency of mental and nervous diseases is another phenomenon which demonstrates how unsatisfactory is the constitutional condition of large circle of our population of to-day.

This phenomenon which as yet has received much too little attention is the large scale on which families die out, at first in the male line. Apparently (sufficient observations for control are not available) those families which hold an eminent economical or social position (aristocracy, old county families, etc., etc.) are mainly concerned. Because exceptional endowment in one or more respects (intelligence, talent, will power, etc.) is generally required to secure or to maintain a leading position, and because such endowment is given to only a small fraction of the population, but is inherited largely by the progeny, this dying out of the leading families means a serious loss to the race.

The deficient fertility of the stock thus endowed results in a lower average of mental capacity in the population generally, and cannot in the long run be made up by the constant re-appearance of distinguished men appearing as variations, the smallest number of whom are "mutations."

The tendency among town families to die out appears to be wide-spread. Professor S. Schott in Tables C 37-C40 adds materially to our knowledge on this point, Professor Schott makes the following comment on his Tables :—

" S. Schott. Old Mannheim families, 4 tables."

" Source: ' Old Mannheim families. A contribution to the family statistics of the 19th Century by Professor Dr. Sigmund Schott, Mannheim and Leipzig, 1910. J. Rensheimer.' Statistical demonstration of the development, decline, and extinction of about 4,000 families which were in existence at Mannheim at the beginning of the 19th Century, based on permanently maintained family registers. This research, pursued on a basis of population statistics, lends itself only to a limited degree to application for biological purposes."

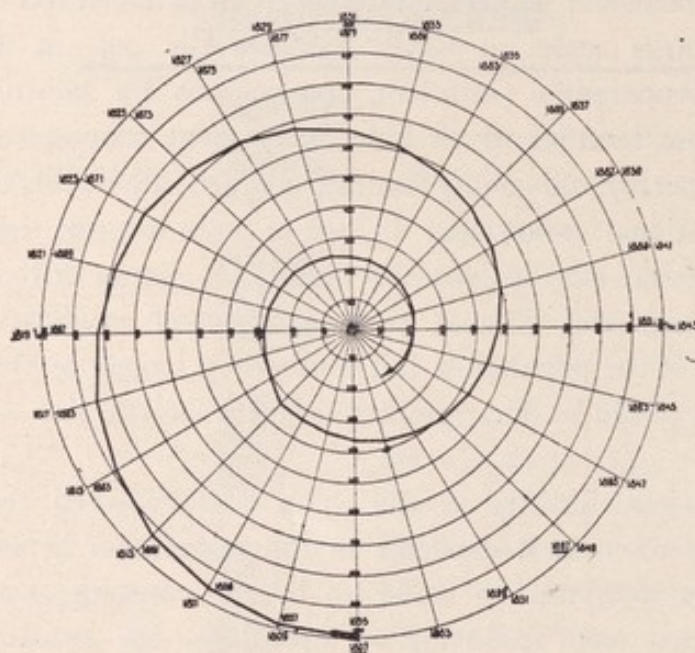


C 37

Gradual extinction of the Mannheim families in the 19th Century.

Only extinction by death in Mannheim and in the male line are taken into account. Families which have disappeared through emigration have been excluded. Branches of families which have become extinct at Mannheim may be flourishing elsewhere. Of 3,081 families, 2,538 have become extinct by death at Mannheim itself, 543 survive. The spiral curve shows the number of survivors in any year as so many per thousand of the original number.

## OLD MANNHEIM FAMILIES.



Gradual extinction of Old Mannheim Families during the 19th century.

Figure C 37.

C 38

Average number of children in each generation; the families being grouped according to the number of generations they attained. The families of 1807 (original families) and their descendants were classed into five groups, according to the number of generations they attained in Mannheim. For each group is calculated the average number of children within one generation—for each separate family as well as for the entire family (*i.e.*, the total of all the separate families which have sprung from the same "original family"). For instance: "Original families" which have lasted into the third generation, 464; the separate families show in the first generation, 464 families, 2,377 children; in the second generation, 718 families, with 3,645 children; in the third generation, 754 families, with 2,454 children. Accordingly, the total families show average numbers 5.1, 7.9, 5.3; the separate families, 5.1, 5.1, 3.3. All these averages are minimum figures, because it was impossible to eliminate the moderate number of couples who emigrated before the number of their offspring was completed.



In the generations up to the third inclusive, reproduction may be considered as terminated, but in the fourth, and especially the fifth and sixth, it still is in progress.

Age intervals separating the various generations.

C 39

Taking into account all the families investigated, the average length of time between the birth of the originator of the family and his first born son was  $33\frac{1}{4}$  years, his first born grandchild  $63\frac{2}{3}$  years, and his first born great grandchild  $95\frac{1}{3}$  years. The curves become gradually flatter, because the possible difference between minimum and maximum age distance from one generation to another increases in arithmetical progression.

Prolificness of first marriages in the 19th century. Taking the C 40

entire period from 1811 to 1890 together the percentage of large families (six children or more) and of small families (one-two children) produced by all first marriages, excluding childless ones, is indicated by the horizontal centreline. The positive or negative deviations from the average during each decade are entered respectively above and below this line. The note in Figure C 38 referring to the families which may have emigrated while still productive applies here also. The temporary increase in prolific marriages after 1870 may be in connection with the material decrease in the age of those contracting marriage for the first time, as compared with the preceding decade. (Men 28.65 in the earlier period as against 27.41 in the later, and women 25.92 against 24.68 years.)

The extinction of the families is undoubtedly due partly to other causes than the voluntary limitation of families—to a process of degeneration. A very remarkable proof of the degenerative character of the dying out of families is given by Pontus Fahlbeck in his book, "The Aristocracy of Sweden" (Fischer, Jena, 1903).

The six Figures C 38-43 give what is biologically of greatest C 38-43 interest in it. Note how the terribly quick extinction of the families of the nobility is inaugurated by catastrophic changes: rapid fall in the frequency of marriages, in the number of fertile marriages, and in the number of their progeny. The curves of the surviving families (red in the original tables) are for comparison. That we have to deal here with a natural and not a voluntary process is shown by the rapid increase in the mortality of male youth in the last generations; also by the extraordinary change in the proportion of the sexes of the children—which, of course, is beyond any control, marked preponderance of girls amongst the survivors (possibly also by the frequency of stillborn male children).



A disturbance in the normal proportion of the sexes as a symptom of abnormal germ production may also assert itself in the opposite direction. O. Lorenz has pointed out the frequent occurrence of an extraordinary increase of male children immediately before the extinction of a family in the male line. One of the most celebrated of these cases is the one of the family of the Emperor Max II. He had six sons and two daughters, who all reached the age of maturity, but not a single male grandchild in the legitimate male line.

C 44

Fresh evidence is exhibited by von den Velden in Figure C 44. With the families described by von Riffel, who have died out in the male line, there is still a great preponderance of boys in the last generation in which boys have reached the age of sexual maturity, whereas there is a preponderance of females amongst the brothers and sisters of the wives of the last male issue of the family.

## FAMILIES IN PROCESS OF EXTINCTION.

(From Riffel's Tables, after v. d. Velden in the Archiv für Rassen- und Gesellschafts-Biologie, 1909, No. 6.)

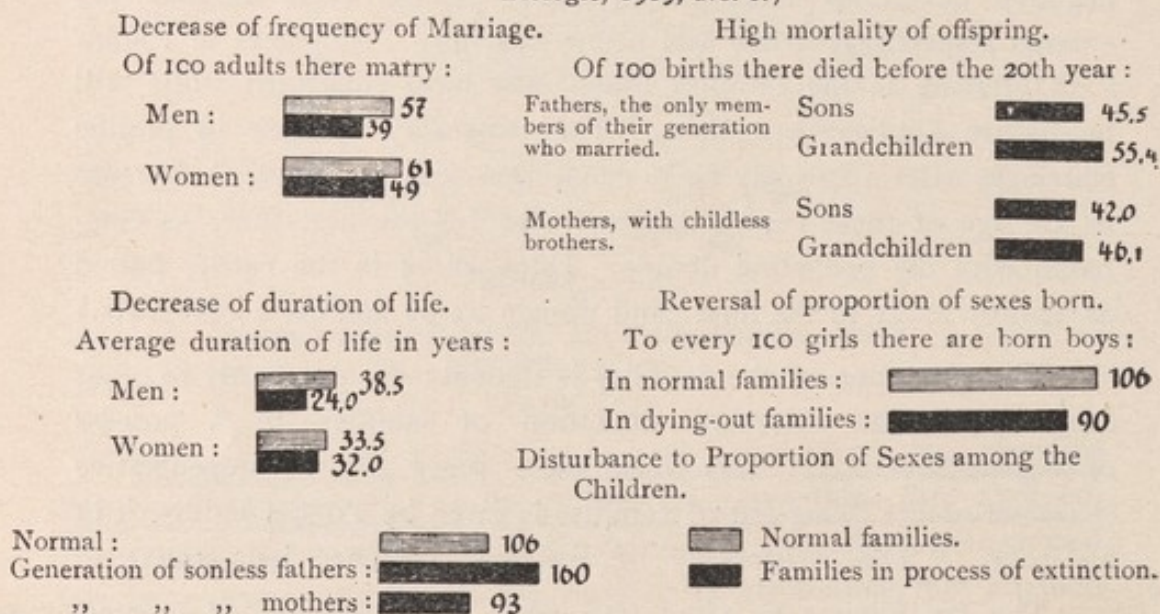


Figure C 44.

C 45

In this connection another figure, C 45, by von den Velden ought to be mentioned. He shows, from investigations made by von Riffel, that the physical condition of childless couples is on the average inferior to that of fertile parents. This, however, by no means holds good in every case. Evidence to the contrary is given by the pedigree of an aristocratic family which has died out in the male line. It may be looked upon as typical. One generation (the second), with three times as many grown up men than women, produces only four boys (44% of the children), of whom two reach maturity. With the fourth generation the male issue dies out.



Though a large majority of the members of all three generations (2-4th) have good health and attain to an exceptionally high age, most of the female lines also die out. Only in two branches, which spring from the marriage of an aristocratic daughter with a man from the people, there are children in the fifth generation of whom at least a part promise a healthy progeny. Fahlbeck, too, has drawn attention to the fact that the dying out Swedish aristocracy shows no signs of striking degeneracy in the individual.

This fact is of the greatest theoretical and practical importance because it proves that there exists, up to a certain degree, an independent degeneration of the germ plasm, even as the germ plasm may remain unaffected by damage to the soma. That such a one-sided degeneration of the germ plasm with respect to the power of reproduction may take place among animals has been known for a long time.

In particular, Chs. Darwin has collected facts of this kind in his "Variation of Animals and Plants under Domestication." For civilised peoples it is a matter for reflection that with animals even slight deviations from their customary "natural" mode of living may lead to such serious consequences.

#### RACE-HYGIENE.

As the nature and aims of race-hygiene are still unknown in wide circles it will be useful to show in Tables C 46 and C 47, by A. Ploetz, what its position is amongst other sciences and what the various branches of its activity consist in. C 46 & 47

Many theoretical workers hold that the most important mission or race-hygiene is to fight against Therapeutics and Hygiene of the individual, for about these they have the most serious misgivings. They consider, that by maintaining inferior variations up to the age of reproduction, the average quality of the race must suffer and that to certain defects—which otherwise would rapidly disappear—an opportunity is given to spread through an entire people. This point of view, short sighted as it may be, must be examined into. It appears to be forgotten that on the one hand hygiene is powerless in cases of a high degree of degeneration and that on the other hand hygiene, by prevention of illness, does away with a number of causes of inferiority. Finally it appears to be entirely overlooked that with the best inherent qualities and unfavourable surroundings the individual development may be poor and stunted. Of what use are the highest potentialities if they remain latent? The main point



is that so far convincing proofs of the preponderant harmfulness of hygiene are entirely absent. (S. Gruber, Heredity, Selection and Hygiene. Deutsche med. Wochenschr, 1909).

C 48

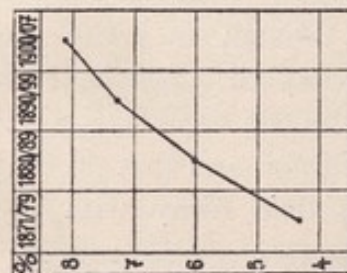
Dr. Agnes Bluhm contributes to the question of the deterioration of the race by therapeutic measures in dealing in Figure C 48 with "The increasing frequency of surgical operations in connection with childbirth and its significance for the race." She writes in explanation "The number of doctors having increased relatively much more than the number of the population, it follows that for

THE INCREASING FREQUENCY OF OBSTETRICAL OPERATIONS AND THEIR SIGNIFICANCE TO THE RACE.

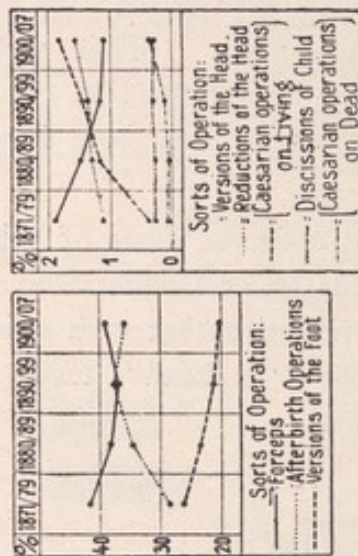
(Based on the official statistics of Baden by Dr. Agnes Bluhm)

The frequency of operations, 1871-1907.

Total operations to 100 births.

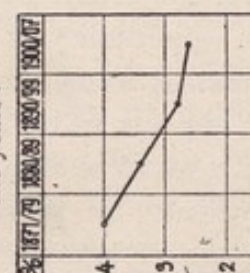


The share of the various sorts of operation in the sum total of operations.

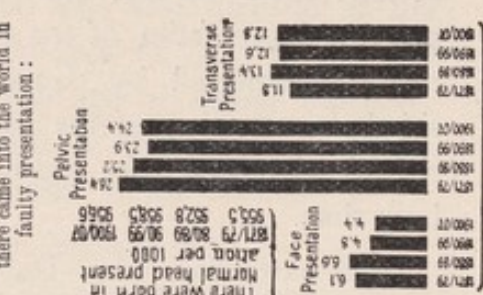


The frequency of stillbirths.

Average percentage of stillbirths during the years:



The frequency of faulty presentation of fetus. Of each 1000 born there came into the world faulty presentation:



The share of faulty presentation of fetus in stillbirths.

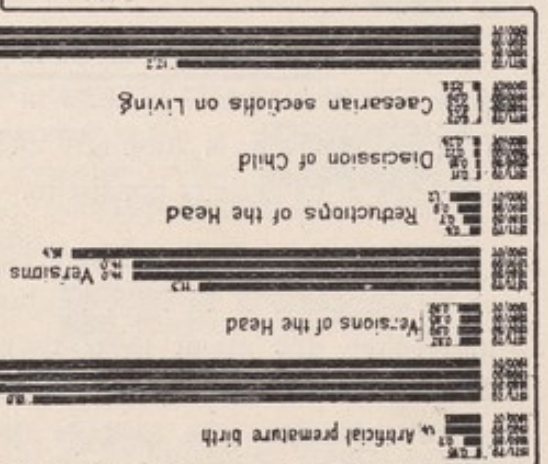
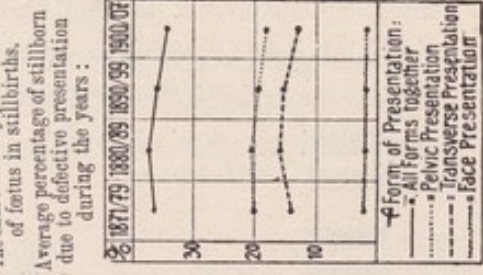


Figure C 48.

a growing number of women medical assistance at childbirth is available. To this must be added that progress in surgical technique, above all the diminished danger of infection, allows of a



much more frequent operative interference with good results for mother and child. Both these facts find expression in the reduction of the number of stillbirths. The purpose of these operations being to assist a diminished birth capacity in women, and this diminished capacity arising partly from constitutional and consequently hereditary factors, this question suggests itself: Is the average birth capacity of women progressively diminished by the fact that an increasing number of women, more or less unfit for childbirth, are artificially assisted in bringing forth living children who inherit this weakness from the mother? "

" Our table attempts to answer this question on the basis of official Midwifery Statistics compiled in the Grand Duchy of Baden reaching back to 1871, that is the beginning of the antiseptic era.

" To avoid the errors, which small figures might lead to, each calculation has been based on the average figures of a lengthy period. The material dealt with comprises over two million births."

" Figure 1 shows the increasing frequency of all childbirth operations taken together. The period 1871 to 1879 shows an average of 4.38 operations to every 100 births, the period 1900 to 1907 up to 8.12 operations to every 100 births." C 48-1

" Figure 2 shows the frequency of each class of operation in every 1,000 births. Each class of operation shows an increase in number, but the increase has not been uniform throughout the various classes." C 48-2

" Figure 3, A and B, shows the share of each class of operation in the total number for the various periods. A more leading part is taken by aftermath operations, by artificially induced premature birth, by perforation of the head and by Caesarean section on the living. Aftermath operations depend (like the use of the forceps) to such a degree on the teachings of the various schools for midwifery (and on the time at the doctor's disposal) that they can hardly serve as a standard of birth capacity. The Caesarean section, too, can hardly be taken as a guide, as a much wider view is taken now of the indications for this operation. But the equally increasing numbers of perforations of the head and artificially induced premature birth are well worthy of attention. For these two operations exclude one another. With the existing tendency to avoid perforation of the head by artificially inducing premature birth, a rise in the curve of premature births should correspond with a sinking of the perforation curve. 1871 to 1879 a maximum of the former actually coincides with a minimum of the latter; but



from there on both curves rise, though not in the same degree. Premature births have become since then (see Fig. 2) more than eight times as frequent; perforations of the head have trebled; and dismemberments of the child have doubled. This fact must be considered as a sign of lessened birth capacity."

C 48-4 "Figure 4 shows the decrease of the total number of stillbirths."

C 48-5 "Figure 5 gives the share which abnormal position of the child has in this total, and a comparison of the two shows that whilst the total has decreased by 1.42% the decrease (1880 to 1889) has been 2.35% in the case of stillbirth through abnormal position. The conclusion is, that there is now more opportunity for hereditary transmission of the tendency to faulty position of the child than three to four decades ago."

C 48-6 "But Figure 6 proves that up to now an increased inheritance of this tendency has not taken place. The curves of these positions not only show irregularities but (with the exception of cross births) a tendency to sink."

"Recapitulation. The growing frequency of surgically assisted births cannot be taken as evidence of a diminished birth capacity, but is closely connected with the growing number of doctors. Against the indications of a diminished birth capacity stand at the moment those which previously could be taken as pointing in the opposite direction. It would, therefore, appear that medical interference at birth has brought to the race advantages as to quantity and no drawbacks as to quality. But it is probable that the picture will change during the coming decades, because only then will the daughters of mothers who could not have brought forth living children without surgical assistance become themselves mothers. The renunciation of motherhood on the part of the women least suited for this function and the war against rickets might act as preventatives."

The great anxiety about the elimination of the severest struggle for existence is based on the undoubtedly erroneous fundamental conception that the organism is a sorry product of necessity which can barely manage to maintain a laborious existence by the constant straining of all its faculties, and that it requires the continuous use of the whip of necessity to prevent an organism from giving way to its inherent tendency to degeneration. In fact, however, no organism is conceivable which has not the "Tendency" to maintain itself and to react accordingly. There are many facts which prove that a wealth of capacities and tendencies is dormant in



organisms which for innumerable generations have not been active, or, perhaps, have never functioned in every possible way, and that, therefore, if the occasion arises replacements or accommodations of an unprecedented character may occur. In an unprejudiced system of race-hygiene these facts must not be overlooked. The exhibition in this section gives two specially striking instances; the one from animal the other from plant life.

To begin with Figure C 49 gives a diagrammatic representation C 49 of the development of the eye of a vertebrate—after K. Kraepelin (taken from “*Experimentelle Biologie II.*, T. v. Curt Thesing, Leipzig, Teubner, 1911”)—which shows that the lens is formed out of an invagination of the cornea and the retina by an extension of the brain. In the lower part of the plate the various phases of the reconstruction of the lens out of the iris are shown, after it had been removed by a cataract operation from the eye of a Triton larva. (This experiment was carried out by Gustav Wolff.)\* Thus an organ which normally is not concerned with the formation of the lens takes charge of its regeneration.

A large number of tables deal with the influence of the numerical position in the progeny, with the number of births and the interval between births, on the health of the children, partly acting alone, partly in combination with the influence of the manner of nourishment during infancy.

Numerical position in family and infantile mortality, after Geissler. C 50 According to these statistics, the fifth child of a mother has materially less vitality than the first four, the second and third children have the most; but this does not agree with other statistics.

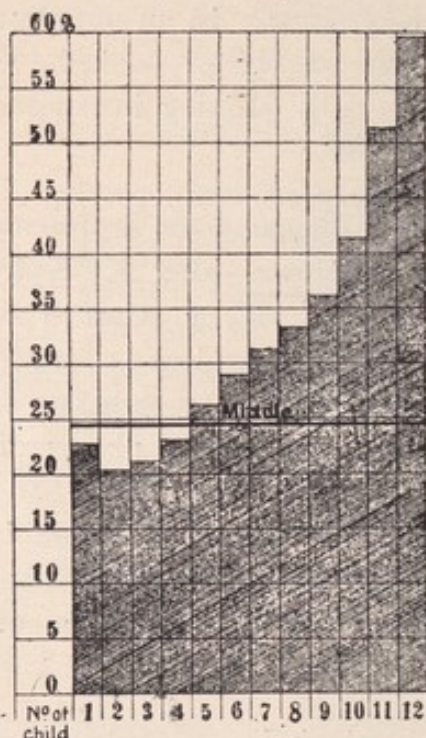
According to Riffel's investigations—influence of the numerical C 51 position of the child and the age of the parents at the time of marriage on infant mortality, after v. d. Velden, a material difference between the mortality of the three earliest born children and the three next born is only shown if both parents at the time of marriage have attained a certain age (man over 28, woman over 25); only the seventh to ninth show under all circumstances a materially greater mortality than the earlier children. The children of more aged parents show a materially greater mortality than those of younger parents. The number of children in a family up to the eleventh has no material influence on infant mortality, only in families with twelve children or more a materially greater number of children perish before the fifth year.

\*Studies in the Physiology of Development II. Archiv. für Entwicklungsmechanik der Organismen, XII. Vol., 3 Part, 1901.



RELATION OF NUMBER OF BIRTHS TO INFANT MORTALITY.  
PERCENTAGE OF DEATHS TO 100 BIRTHS.

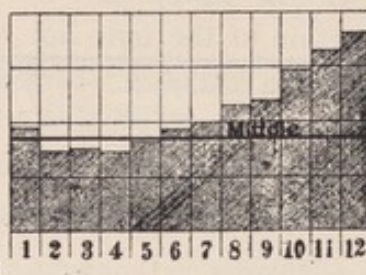
Died during the first year of life.



Geissler.

26,429 births to 5,236 marriages of members of Saxon coalminers' funds. (Some still-born infants, and children of marriages to which there were only one or two births, are not included).

Died before reaching the age of 0.09 of a year, i.e., a little more than a month.



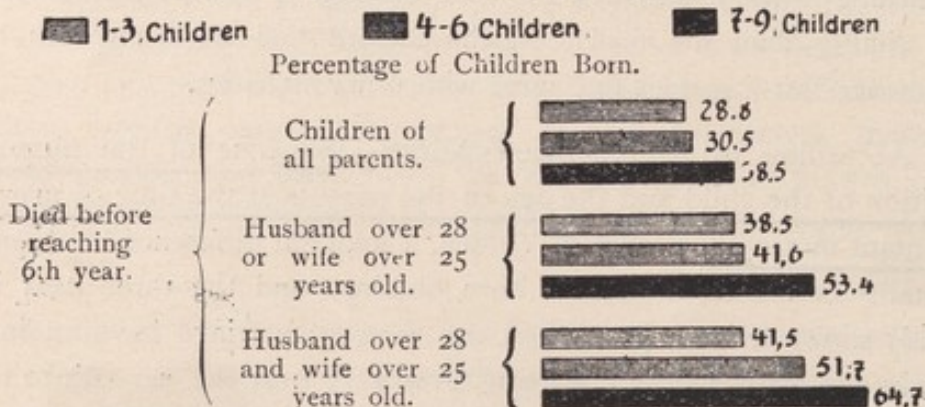
The mortality of the 1st, 2nd, 3rd and 4th child is below the average. Greatest vitality shown by 2nd and 3rd child.

The mortality of the 2nd, 3rd, 4th and 5th child is below the average. Greatest vitality shown by 2nd, 3rd, and 4th child.

Figure C 50.

INFLUENCE OF THE NUMBER OF BIRTHS AND THE AGE OF THE PARENTS AT THE TIME OF MARRIAGE ON INFANT MORTALITY.

(From Riffel's Tables, after v. d. Velden).



INFLUENCE OF THE NUMBER OF CHILDREN BORN TO A FAMILY ON INFANT MORTALITY.

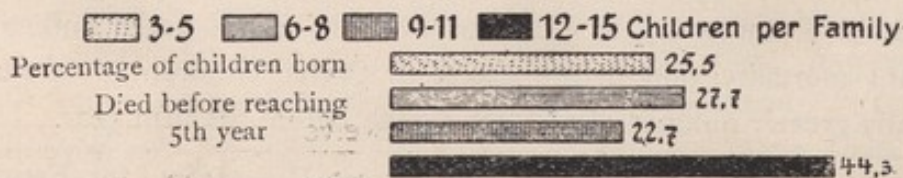


Figure C 51.



Number of conceptions and conception losses, by Dr. Agnes C 52  
Bluhm; the exhibitor gives the following explanation—

Hamburger's material deals with 1,042 marriages of the labouring classes in Berlin, with a total of 7,261 conceptions (an average of 6.97 conceptions for each woman); the material of Bluhm comprises 856 marriages of the wealthier and educated German middle and higher classes with a total of 3,856 conceptions (averaging 4.50 conceptions to each woman). Hamburger has counted as conception losses only miscarriages, premature births, stillbirths, or deaths from illness before the completion of the sixteenth year. Bluhm has included all those up to the twentieth year. Both have only included marriages which have been contracted at least twenty years back. As the births in these marriages apparently date back to twenty years, all living children are reckoned as survivors or conception results, even if they have not attained the sixteenth or twentieth year respectively. This has influenced the result optimistically, but as it has done so with both authors alike, the comparison of their results is admissible.

Figure 1 shows the conception losses in marriages of varying conception numbers (Curve A, Hamburger's working-men's families; Curve B, Bluhm's well-to-do families); both curves confirm Hamburger's words that "the percentage of the survivors gets smaller in proportion as the conception number increases." The mounting of Curve B in the families with ten births is probably a delusion brought about by a very small number. In the marriages with eleven or more births there are lost with the well-to-do one quarter and with the working-classes nearly two-thirds of the conceptions up to the twentieth or sixteenth year respectively. C 52-1

Figure 2 represents the share which miscarriages and premature births have in the conception losses in marriages of different degrees of productiveness (Curve A, Hamburger; Curve B, Bluhm). Amongst the Berlin labouring classes on the average 17.89 per cent. of all conceptions are lost through miscarriage and premature birth; for the wealthier German families the figure is 7.59 per cent. C 52-2

Figure 3 shows the share which deaths and stillbirths have in conception losses. With the labouring classes it amounts on the average to 32.75 per cent. (Curve A), and in the wealthier families to 10.55 per cent. (Curve B). C52-3

Figure 4. To investigate whether the continuous decrease in the percentage of the survivors, going hand in hand with the increase of maternal conceptions, is caused by the constitutional inferiority of the offspring as the numerical position increases, Bluhm has established, in dealing with her material, the loss for each numerical position (first, second, third, etc., conceptions respectively). If this were the case, Curve A, which gives the loss according to the frequency of conception in each marriage, would have to be identical with Curve B, which gives the loss of first, second, and third, etc., conceptions, but this is by no means the case, for only at a very high numerical position of the conception the curves begin to be parallel. This proves that Hamburger's "the percentage of the survivors gets smaller in proportion as the conception number increases" is not a biological law but only expresses a social phenomenon. With the increasing number of children there is a decrease in the value of each individual childlife. The mother is less careful about avoiding miscarriages; she devotes, and must necessarily devote, less care to each child; and the risk of infectious diseases which are a frequent cause of death during infancy increases. C 52-4

How little the increasing mortality of the later born children up to the tenth child is based on a biological law is shown in Figure C 53. Numerical position of birth and infant mortality up to the age of five in princely families, by Ploetz; 463 seventh to ninth children show the same mortality as the 614 first born. C 53



C 54

Pearson endeavoured to prove a high degree of inferiority in the first born, physically and intellectually as well as morally. But his results are very open to attack, as Weinberg has recently shown; one is reminded of Pearson's results in Crzelltizer's Figure C 54—first and later born. Crzelltizer writes thus about this—“A high degree of myopia is more frequent amongst first born than among

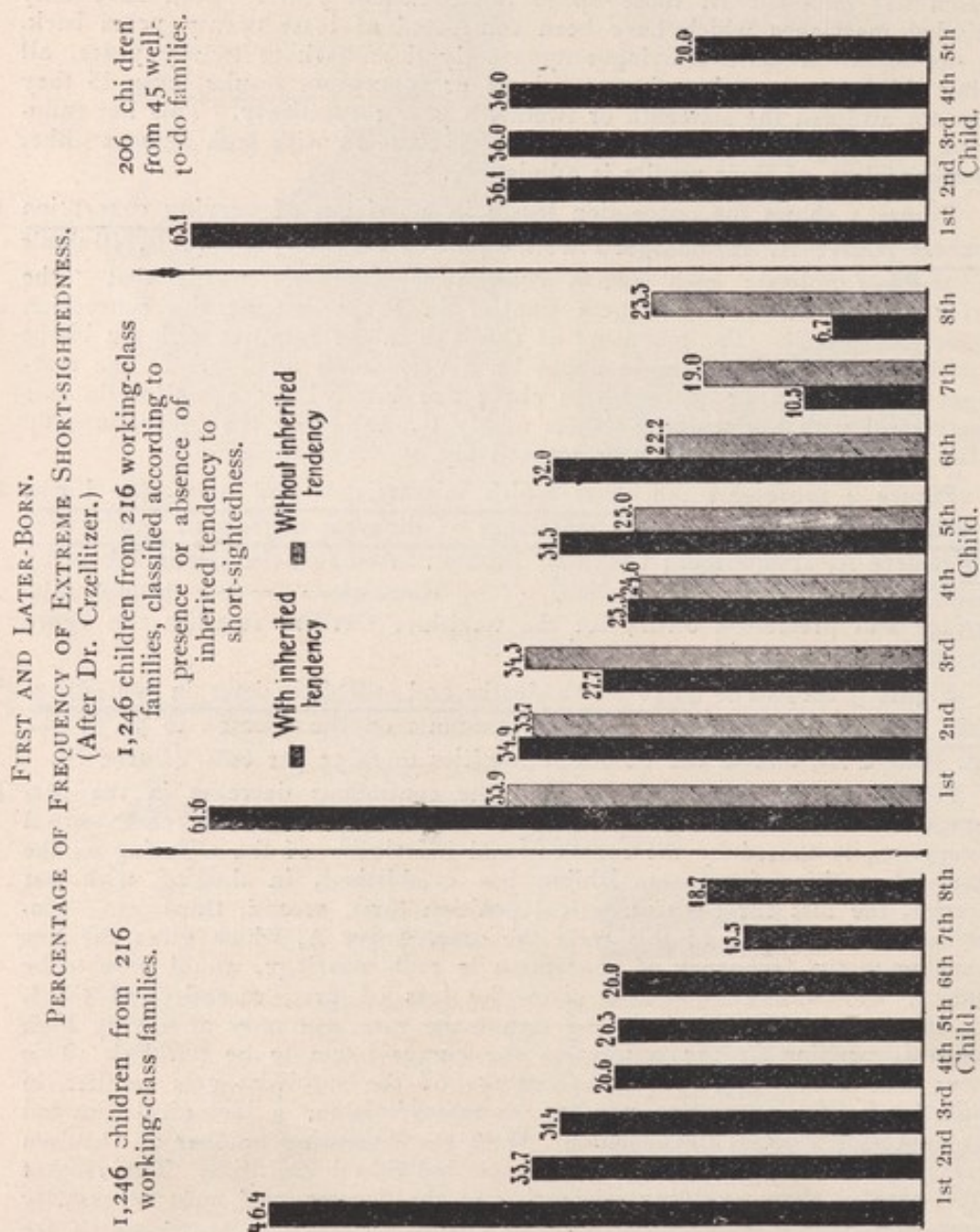


Figure C 54.

later children. The disadvantage of the first born in respect of myopia is based on a greater hereditary taint and on no other factor. Where there is no hereditary taint about one quarter to one-third are affected, no matter whether first, second, third, etc.,



born. Also in well-to-do families, where the age of fathers at the time of procreation is materially higher, the first born are more frequently myopic than their brothers or sisters."

A large amount of material has been treated by W. Weinberg, in which tuberculous and non-tuberculous families are compared.

Figure C 55—influence of numerical position of birth on infant mortality and Figure C 56—mortality of the first and later born. Weinberg writes concerning these: "The parallelograms in the first row indicate for each position in order of birth how many children out of every hundred die before the age of 20. On this, however,

MORTALITY OF CHILDREN ACCORDING TO SEQUENCE OF BIRTH.  
3,129 TUBERCULOUS AND 1,830 NON-TUBERCULOUS FAMILIES OF STUTTGART,  
1873-1889 (after Weinberg).

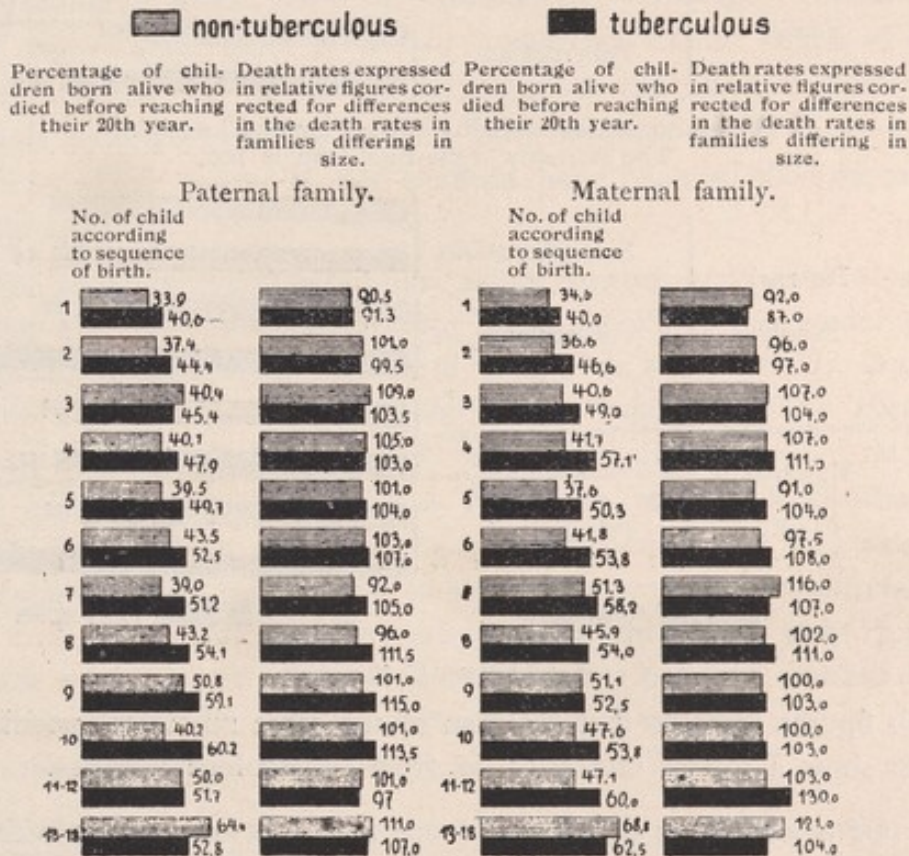


Figure C 55.

the difference in the mortality in families with different numbers of children has an influence. To counteract this, it has been calculated how many children in each position would die if within each family the number of children had no influence, and the actual number of deaths expressed as a percentage of the expectation calculated in this way gives parallelograms to the second row. After eliminating the influence exercised by the size of the family, the increase of the mortality with the higher birth number appears

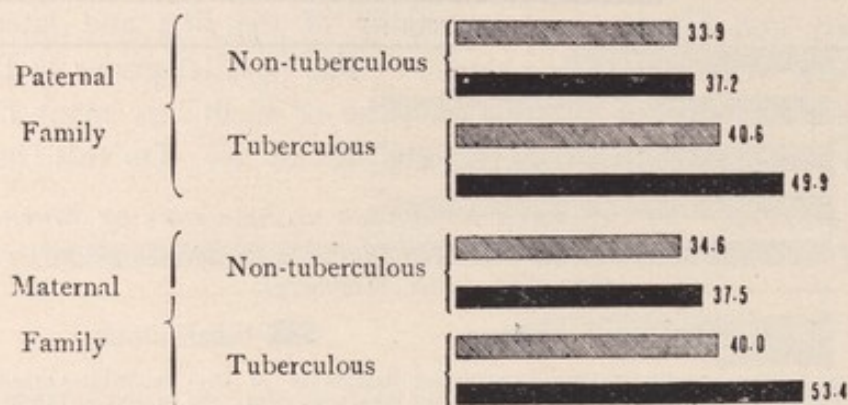


considerably smaller. Figure C 56, which compares the mortality of the first and last born children, is to a certain extent a test of this. This shows clearly a considerably higher death rate in the last born.

RELATIVE MORTALITY OF THE FIRST AND LAST-BORN.

3,129 TUBERCULOUS AND 1,830 NON-TUBERCULOUS FAMILIES OF STUTTGART, 1873-1889 (after Weinberg)

Of each 100 living-born there died before reaching their 20th year :



Comparison of the mortality of the First and Last-born,  
The mortality of the First-born = 100,

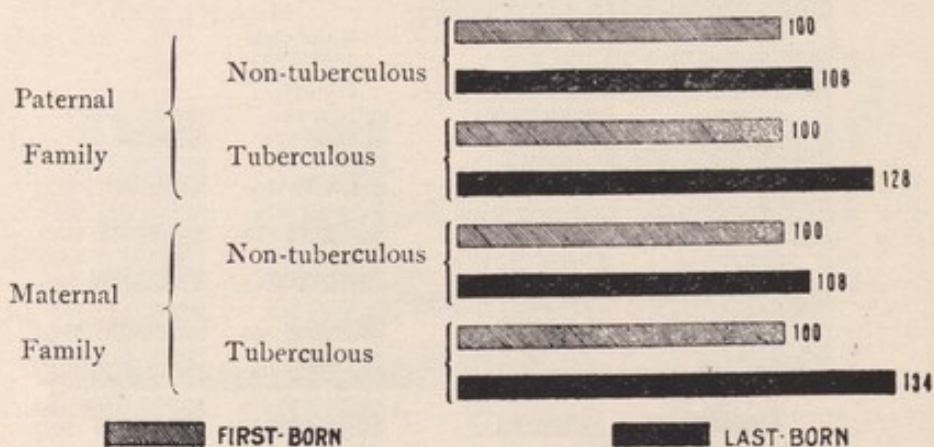


Figure C 56.

Both figures indicate that children of the same numerical position of birth show a higher mortality, if from tuberculous families.

C 57

Of a materially greater influence than the numerical position of birth or the number of children in each family is the length of interval between births. We point at first to Figure C 57—interval between births and child mortality, after Ansell and Westergaard, by Dr. A. Bluhm. She writes in reference to it: "Ansell has demonstrated, from the material of the National Life Assurance Society of London, that a child has an increasingly better chance to survive his first year, the greater the interval between his own birth and that of the child born before him. If this interval is less than a year, the infant mortality is double what it is when there is an interval of two years (15.75% against 7.33%). This influence makes itself felt



beyond the age of infancy up to five years but not in so striking a manner. The proportion becomes modified to 20% against 12%. As the influence of the birth interval on child mortality is still very perceptible after the tenth or later children, it may be assumed that it is not caused exclusively by the exhaustion of the maternal organism produced by the rapid sequence of births. The varying length of breast-feeding of the children has probably also its influence. Though these statistics give no data about the mode of infant feeding, it is nevertheless probable that in those families in which there are longer intervals between consecutive births each child is suckled for a longer period.

Birth interval and health of the offspring, after Riffel—v. d. Velden. C 58

Influence of the length of the birth interval and the duration of breast-feeding on infant mortality, exhibited by Weinberg. C 59  
The author writes regarding the latter table "in proportion to the length of the interval between two births, the mortality of the children following decreases materially, but this relation only becomes clearly apparent in families in which several of the children have been suckled for more than six months."

The intimate connection which exists between birth interval and suckling and the great importance which suckling has under the favourable influence of a long birth interval is shown in Dr. Agnes Bluhm's Figures C 60, C 61, and C 62—infant nutrition (breast feeding), number of children and infant mortality, after Dr. Marie Baum. C 60, 61, 62  
"The material is taken from the towns of Gladbach, Rheydt, Odenkirchen and Rheindalen, and comprises 1,495, mostly poor families, with 9,393 cases in which the mother survived child-birth and 9,487 children born alive. In this table only 7,983 children were counted, because the remainder had not reached the age of one year on the day of counting. Of these 7,983, there died before the completion of the first year 1,276, or 15.98%."

Number of children and child mortality: Bluhm adds:— C 60  
"Figure 1 shows in Curve A the influence of the duration of breast feeding; in Curve B influence of numerical position of birth on the mortality of the infant. The very divergent course of the two curves expresses the very different influence of both these factors on mortality; the latter is almost exclusively dependent upon the length of suckling, and shows corresponding with its increase a continuous and steep decline down to 1.46% from a maximum number of 35%. The very slight increase of the mortality of children suckled for six weeks compared with those who have not been breast



fed at all is immaterial (35.55% against 35.28%). These figures prove only that breast feeding up to six weeks does not give the child any protection against fatal diseases. The influence of the birth number hardly makes itself felt up to the seventh child, only from the eighth onwards the power of resistance decreases continuously but not nearly to the same degree in which it grows with the length of breast-feeding (greatest difference only 21%). Curve B shows a materially different course from that of similar curves by other authors, for instance—from Geissler's well-known curve, dealing with Saxon miners, in which not only the first born show up less favourably than the second and third born, but in which, from the fourth child on, the mortality increases rapidly. The economical condition of both groups being similar (85% of Baum's families had a maximum yearly income of £75), it is highly probable that the difference in the curves arises from different methods of infant feeding. In the Rhine provinces, as is also proved by Baum's figures, the feeding is good; in Saxony, however, it is notoriously bad. The co-relation of infant mortality with infant feeding is very clearly illustrated in Figures 2 and 3, the former shows the influence of the length of suckling on the mortality of the children classed in order of birth, the latter the influence of the order of birth in connection with different lengthed periods of suckling. The extraordinarily regular course of all the nine curves in Figure 2 and the extremely irregular course of the six top curves in Figure 3 are very striking. From these figures it is shown that the first, second and third born if breast-fed for a short time only, or not at all, are subjected to much greater risks than the eighth, ninth, tenth or later children, suckled for a sufficient length of time (maximum difference 1 to 42). In the curve showing the children who were breast fed for 39 weeks (Figure 3), the influence of the high birth number shows only to a very small degree."

C 61

Number of children and capacity for breast-feeding. Concerning this it is remarked: "The upper curve shows what percentage of children had to do without breast feeding, and the lower one how many enjoyed the sufficient period of 39 weeks of breast-feeding. Though Baum's figures are only intended to deal with the number of cases of breast feeding and not with its duration, and though no difference is made between exclusive and partial breast feeding, yet some conclusions may be drawn with regard to suckling capacity. In a district where breast feeding is as general as it is in the one examined into here, the number of women who voluntarily renounce every attempt at suckling must necessarily be small. The curve dealing with the children who had no breast feeding at all is



therefore likely to give a fairly correct picture of the absolute or primary incapacity for suckling on the mother's part; absolute incapacity does not of course mean that the mother could not produce a single drop of milk, but that she does not produce enough to satisfy the child, and therefore must resort to artificial feeding. As a period of 39 weeks' feeding, even if only partial, points to a good capacity, the lower curve may also be taken as an expression of feeding ability. A comparison of both figures illustrates that the milk production after the first birth is smaller than after the following ones, and that beyond the eighth birth, it decreases materially and continuously, probably in consequence of the exhaustion of the maternal organism."

The habit of breast-feeding as running in families and infant mortality. With this goes the following explanation: "The two figures illustrate the proportion of mortality of the infants in 143 bottle-feeding families and 376 breast-feeding families of the first order. As the line could not be drawn very sharply, and as in the bottle-feeding families there had to be included those in which as an exception one or other child was suckled for a few days or perhaps for a week, one can see in these groups only the expression of the habit, but not the power of suckling. Both figures illustrate the largely avoidable sacrifice in young lives which still goes on through a want of knowledge and of feeling of responsibility towards the coming race. With the absence of breast-feeding the unfavourable influence of a very large number of children becomes much more apparent; whereas in breast-feeding families the difference in the mortality between medium-sized families (four to six children) and very large families (above ten children) amounts to only 1.39%, it reaches 12.90% with the non-suckling families. Here, if the number of children surpasses ten, nearly every second child dies in the suckling age, and amongst thirteen families there is not a single one which has not lost a child in that period, whereas in breast-feeding families of the first order, with the same large number of children, only every thirteenth child died in infancy, and of sixteen families seven (=43.75%) lost no infant." The same material is treated in a different way by Dr. Marie Baum, of Dusseldorf, in Figures C 63-66.

As the length of the period of suckling of the preceding child increases, there is a constant and rapid decrease in the number of children who are born at intervals of less than one year. If the preceding child was not breast-fed a new birth occurred before the expiration of one year in 9.6 cases out of 100. With a suckling period of one-half to three-quarters of a year of the preceding child, this figure is reduced to 1.8 per cent., and after a still longer suckling period to 1 per cent. Out of one hundred mothers who have only partly or not at all suckled the preceding child, seventy must count on a fresh birth within a period of 1½ years.



If the preceding child was suckled for at least 39 weeks, only thirty-eight, and with a suckling period of more than a year only twenty mothers have to reckon on a fresh birth within  $1\frac{1}{4}$  years.

DEPENDENCE OF INFANT MORTALITY ON THE DURATION OF BREAST-FEEDING AND THE LENGTH OF TIME INTERVENING BETWEEN SUCCESSIVE BIRTHS.

□ Average infant mortality of the group in question.  
 Infant mortality arranged according to duration of breast-feeding.

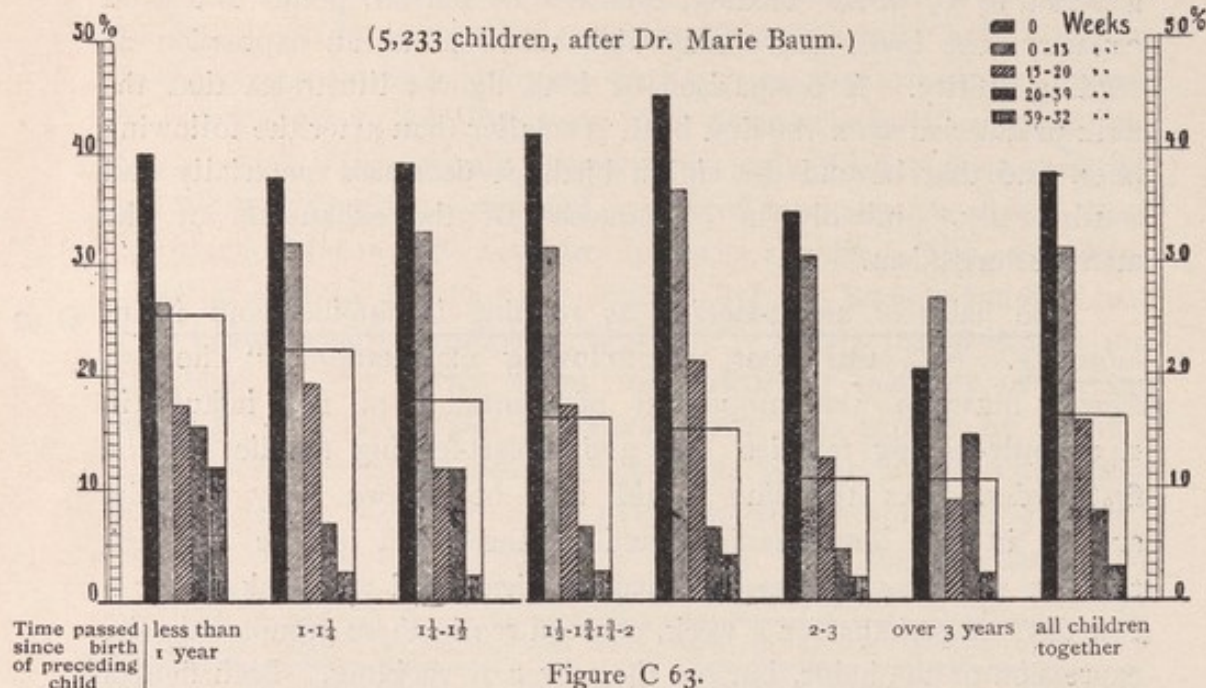


Figure C 63.

C 64

Figure C 64 shows the parallelism between the average length of breast-feeding and the average time between births within the families. A half to three-quarters of the mothers who suckled either long enough or very long show an interval between births of from  $1\frac{1}{4}$  to 3 years, whereas of those who did not suckle at all, or only did so insufficiently, only one-third belong to this group, and figure largely in the column of lower birth intervals.

DEPENDENCE OF INFANT MORTALITY ON THE AVERAGE DURATION OF BREAST-FEEDING AND THE AVERAGE LENGTH OF TIME INTERVENING BETWEEN THE SUCCESSIVE BIRTHS OF THE CHILDREN IN A FAMILY.

□ Average infant mortality of the group in question.  
 Infant mortality according to an average length of time intervening between successive births of

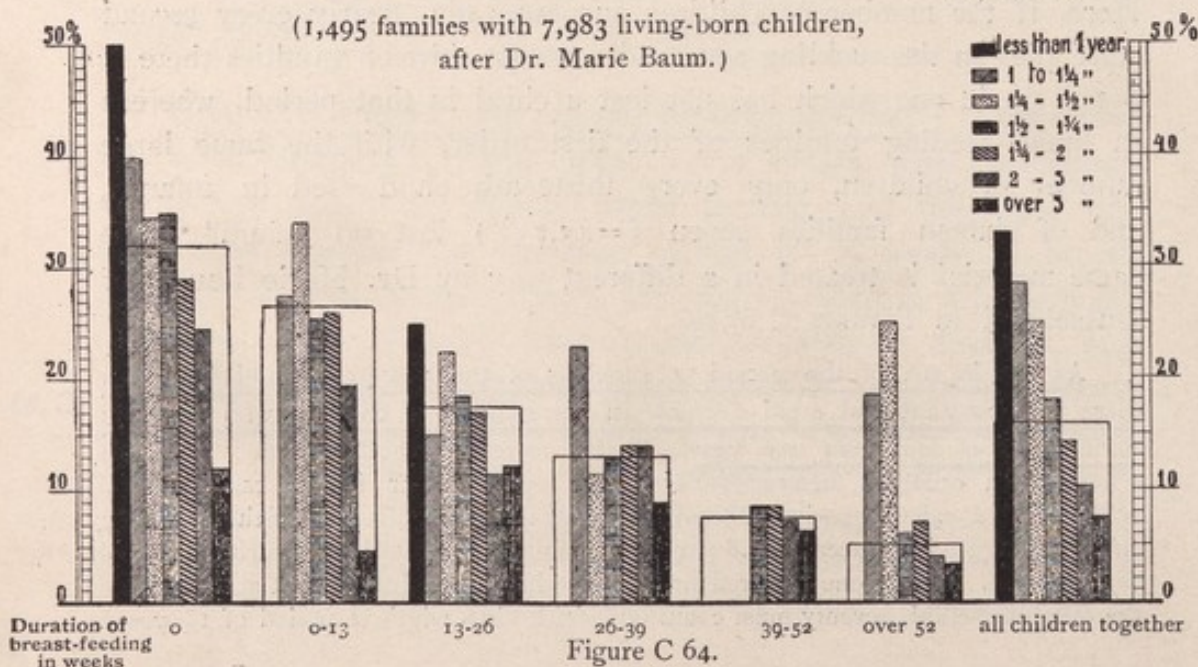


Figure C 64.



Figure C 65 enables us to examine into the influence exercised by a longer or shorter interval after the preceding birth on the vitality of a child, according as to whether the child was not breast-fed at all or only moderately or amply so. The black oblongs demonstrate that the average infant mortality falls regularly and decisively according to the length of time between the birth of the children considered and their predecessors. The average mortality of infants who are born in rapid succession—under one year, one to one and a quarter years, amounts to over 25 and to 22 per cent. respectively, whereas the average mortality of children with at least two years' interval amounts only to 11 per cent. "At the same time, however, it is observed that the influence of the length of suckling is still greater than that of the length of time elapsing between births. Even with an interval of three or more years, the mortality of children who were insufficiently or not at all breast-fed was above 20 per cent. The children who had been suckled for at least three-quarters of a year were only very slightly influenced by this factor in all groups, except that with a birth interval of less than one year, where the influence of short birth intervals is not counterbalanced even by long extended breast-feeding."

C 65

Figure C 66. "The infant mortality within the families dealt with falls materially and evenly as the average birth intervals lengthen. With an average birth interval of less than one year, one-third of the children die in the first year, but only 7 per cent. where the average birth interval was over three years; but here also the influence is strongly modified by the mode of feeding. With the non-suckling families the mortality is almost 25 per cent., even with a birth interval of more than two years. On the other hand, when the duration of suckling is sufficient, short birth intervals almost disappear (see Table 2), and with an average birth interval of  $1\frac{1}{2}$  to 2 years and a suckling duration of at least half a year the mortality remains on an extremely small scale."

C 66

Groth and Hahn have exhibited two large tables C 67 and C 68 and a similar one C 69, the results of their important investigations about breast-feeding and mortality in the administrative districts of Bavaria. Groth shows in Table C 70 "mortality of sucklings in Bavaria," and in Table C 71 "breast-feeding and cancer." In Tables C 72 and C 73 the Groth and Hahn statistics are treated by Dr. A. Bluhm from the point of view of the influence of the habit of breast-feeding on the frequency of births. In connection with Figure C 73 she remarks: "This diagram shows the number of bottle-fed babies in the various Bavarian districts counted at the time of vaccination. To give as correct a picture as possible of the probable influence which the habit of breast-feeding has on the birth-rate (annual number of births per 1,000 of the whole population) there are represented on this figure by green and yellow columns the average birth-rate for the five years, 1875 to 1879, because in that period a record birth-rate was established, so that it may be assumed that there was then no intentional restriction of births. We see within the four 'old Bavarian' districts, where on the average 64.1% of the babies were not breast-fed at all, the number of births is about 4 per 1,000 of the population higher than in the Palatinate and the three 'Frankish' districts, which together only show 18% of non-breast-fed children."

C 67-73



C 72 &amp; 73

"These two figures deal with the influence of the length of suckling on the birth-rate, the longer the duration of the suckling period, *i.e.*, the higher the number of children breast-fed for six months or more, the lower the birth-rate. This only holds good for the country (Curve B) not for towns (Curve A). This circumstance is explained by the fact that the voluntary restriction of births is much more frequent in towns than in the country, where consequently the influence of the length of the period of suckling on the birth frequency can find much stronger expression than in towns, where, as Curve A shows, it is entirely extinguished by artificial birth preventatives. From both tables it results that, to prevent the senseless waste of human life, the interval between every two births must be more than two years; further, that it is possible to increase it by breast-feeding; the number of births in a district is based in the main on the larger or smaller intervals at which the women of reproductive age have children, and it may, therefore, at the same time, be taken as an expression of these intervals. Keeping these two facts in view, and considering the influence of the mode of infant feeding on infant mortality, it appears to be in the interest of the race that by means of the long duration of breast-feeding, the birth intervals should be extended to at least two years. The facts established in these two tables have a considerable bearing on race-hygiene, especially in reference to the Neomalthusian contentions of the necessary inferiority of the later born, and as a confirmation of the utility of breast-feeding for the reduction of birth frequency. Extremely great appears the influence of breast-feeding on infant mortality.

C 74-78

This importance of breast-feeding is further illustrated by Figure C 74—duration of breast-feeding and infant mortality, after Dietrich; by Figure C 75—average number of carious teeth, after Bunge; and by the three figures, C 76, 77, and 78—"average duration of breast-feeding and physical development, duration of breast-feeding and average school reports, and duration of breast-feeding and frequency of rachitic disturbances of development," after the extensive and valuable researches by Röse.

It must be pointed out that a far more direct connection exists between breast-feeding, duration of suckling, infant mortality and physical development than through the mere provision of suitable nourishment for the child. A good suckling capacity is a symptom of a strong constitution which is transmitted from mother to child. Examination of Röse's table offers this suggestion.



The importance of the hereditary constitution (which he considers is dependent on soil and climate) as regards infant mortality v. Vogel expresses in four maps of Bavaria (Figures 79-82), to which he has furnished the following comments (contained in the pamphlet, "Der Ortliche Stand der Säuglingsterblichkeit in Bayern," Munich, Piloty and Loehle, 1911): "The district of the highest infant mortality in Bavaria is inhabited by a population of small height, small fitness for military service, and high tuberculous mortality. The reverse holds good on the whole for the district with a low mortality.

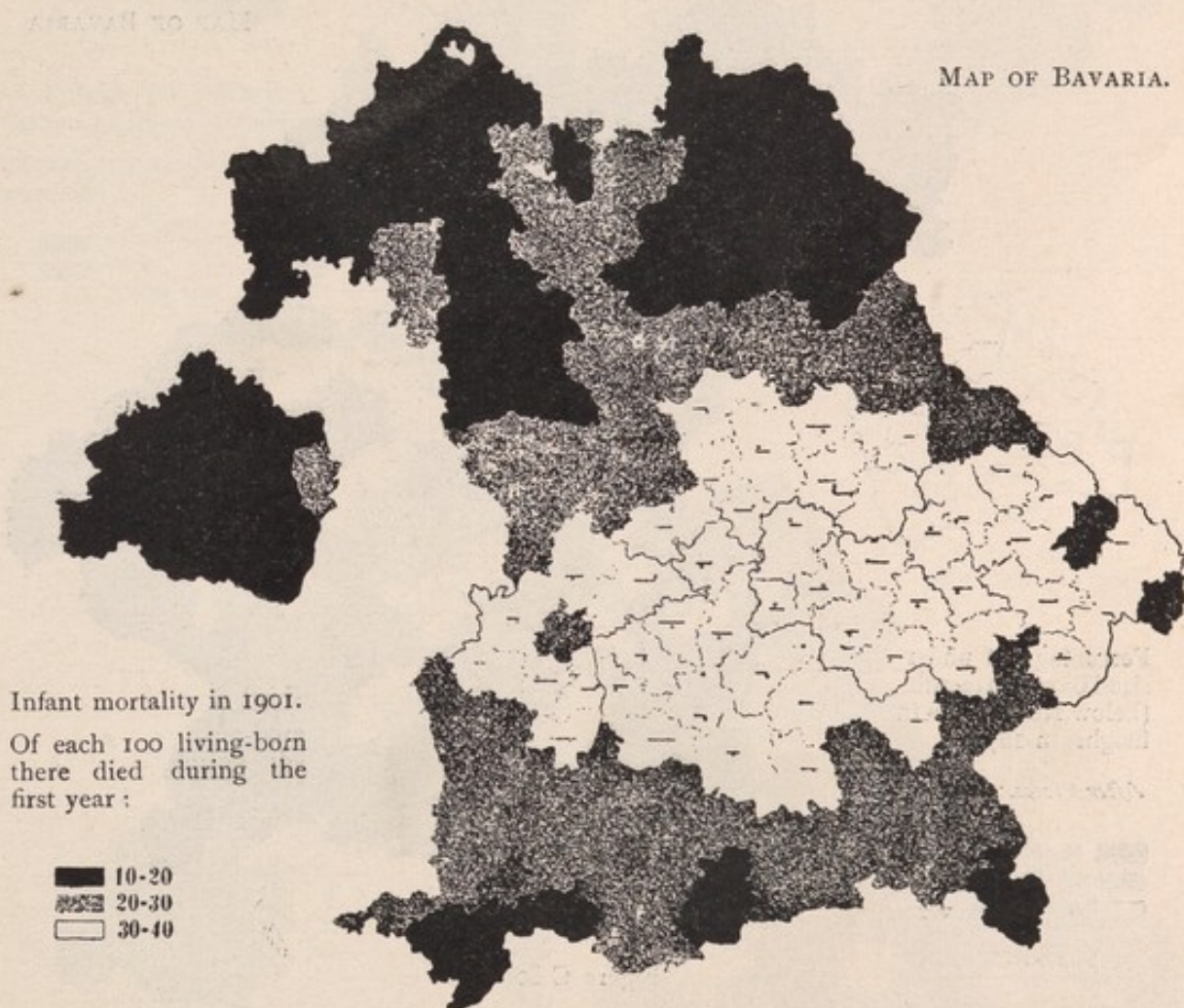


Figure C 79.

I cannot suppress another objection to the usual way of proving the—to my mind undoubted—influence of breast-feeding on the duration of life in infancy. Why is the mortality of those children who have not been suckled for a week so large? Is it because they have not been suckled, or because they have only lived altogether for less than a week? Or, again, to be able to be suckled for 40 or 50 weeks, one must have lived for 40 or 50 weeks, but a child who has lived for 40 or 50



weeks, whether it has been suckled or not, has passed over the worst period. It is well-known that the mortality in the first days of life is the highest in the second week, much higher than in the third week, and so on. In short, the mortality changes in such an extremely high degree in the course of the first year of life that this period is much too long for the comparison between the mortality of suckled

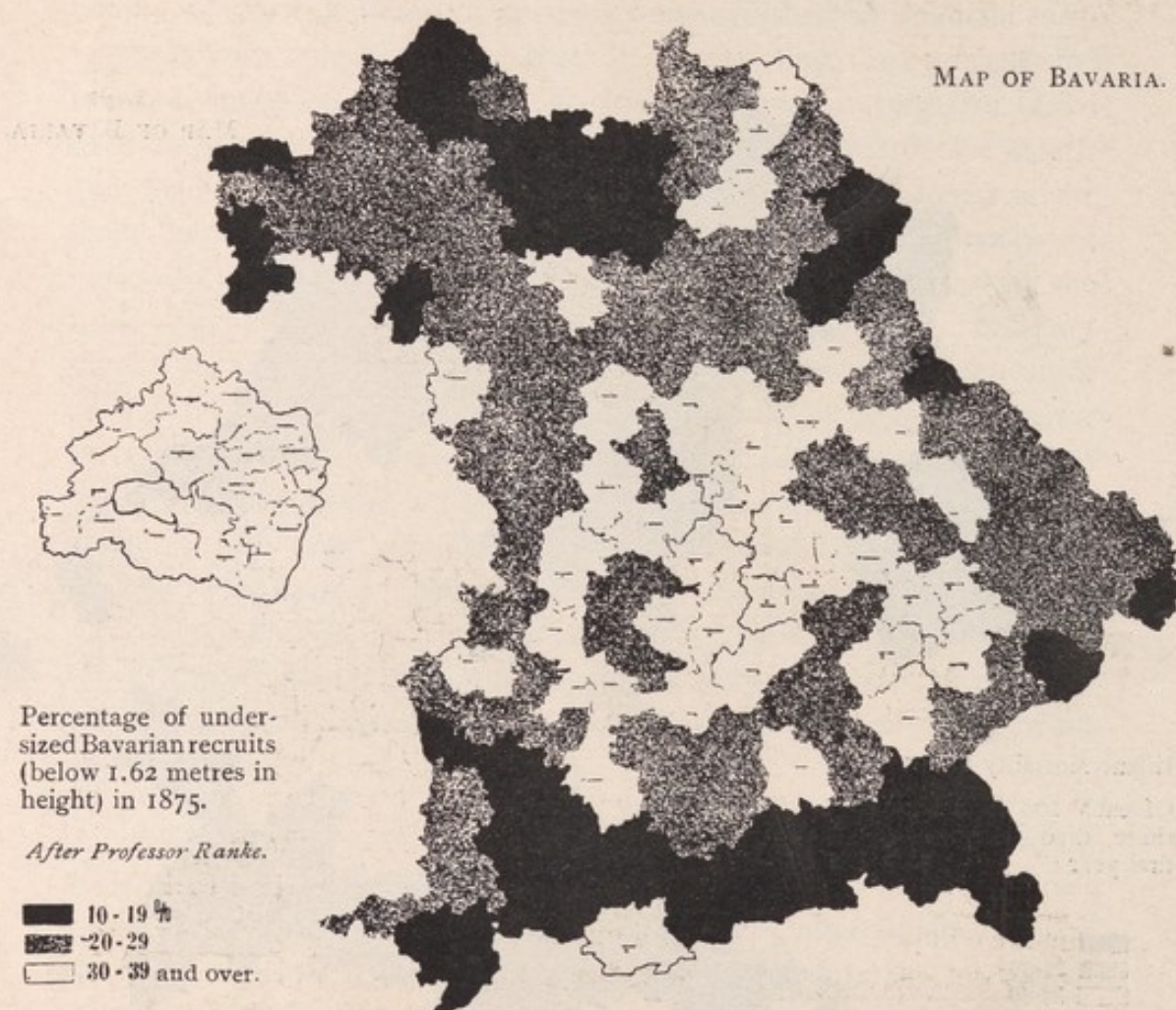
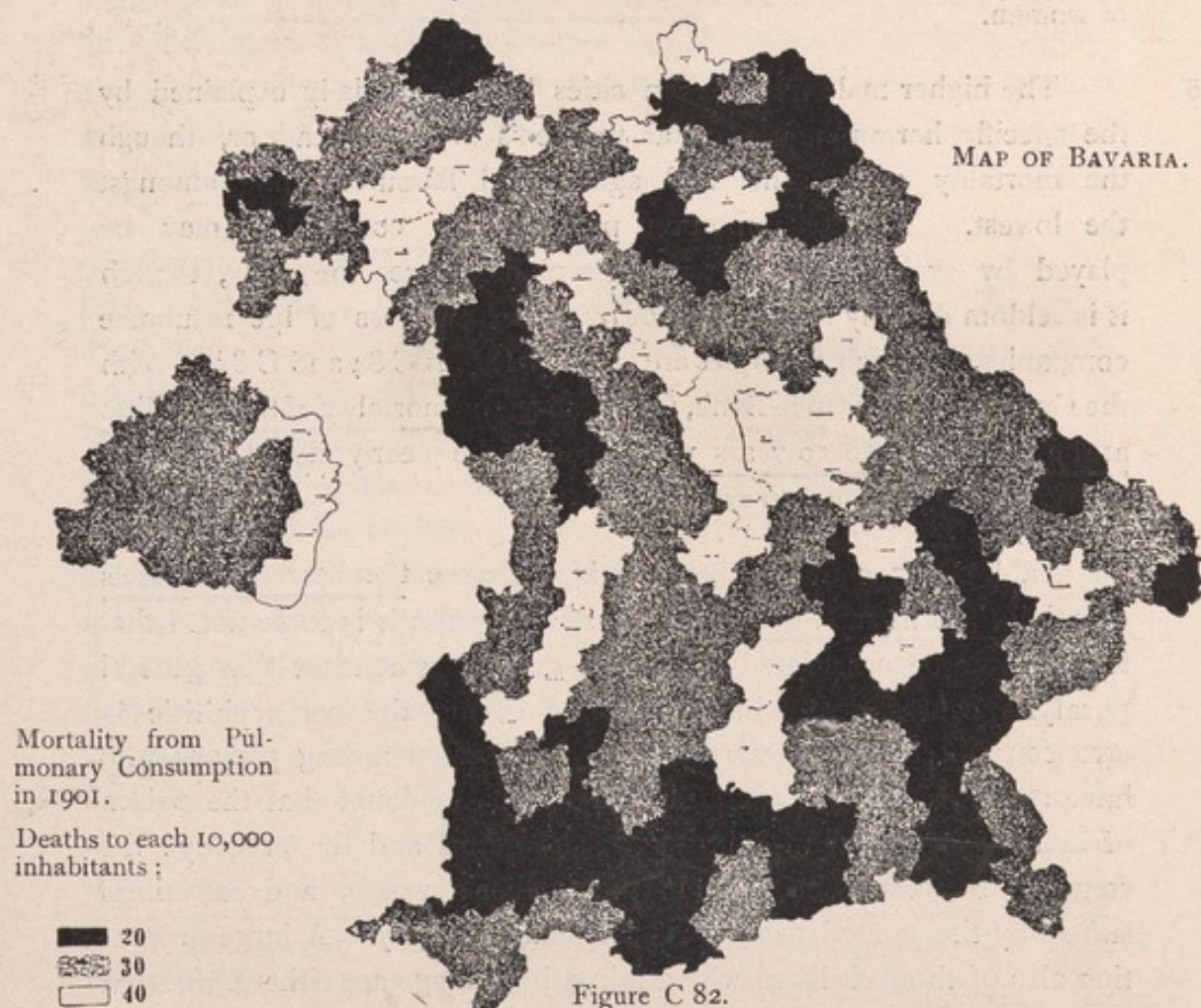
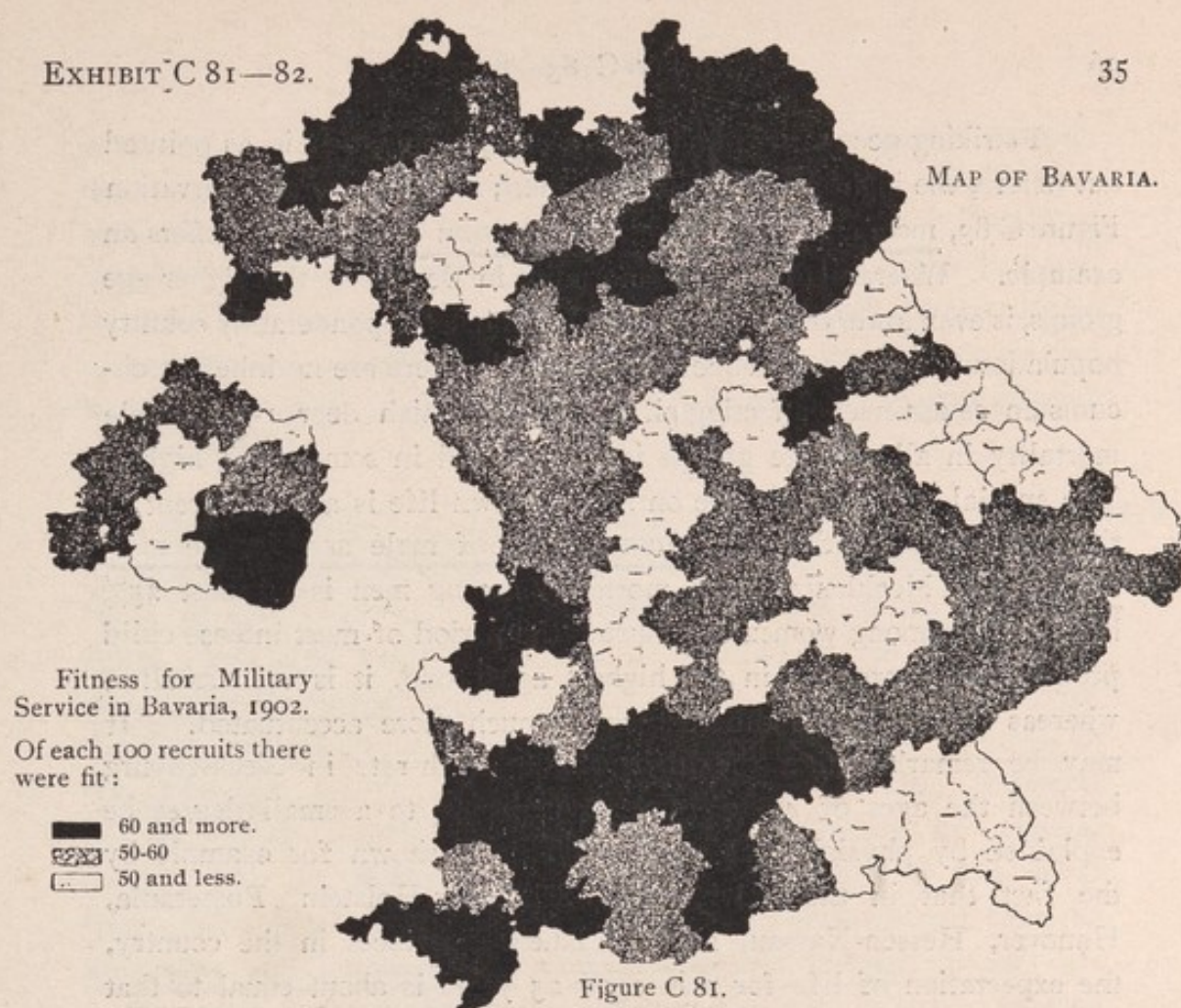


Figure C 80.

and non-suckled children. One ought to calculate how many of those who have been suckled for 0 weeks, one week, two weeks, one month, three months, six months, and so on, have survived the first week, the second week, the first month, and so on. Only in this manner can be established what is the share of the absence of breast-feeding and what is the share of the innate weakness and tendency to disease in the degree of infant mortality."







C 83

A striking peculiarity of cities, especially large cities, is, as pointed out before, the high mortality amongst men; for this general observation Figure C 83, male and female mortality in town and country, offers an example. Whereas the female mortality in Berlin, in the higher age groups, is even lower than in Mecklenburg with its preponderantly country population—which is evidence that in town life there are no inherent circumstances adversely affecting all persons in a high degree—the male mortality in all the age groups is higher, and in some much higher. The special adverse influence on men of town life is also apparent in the upper part of the figure (comparison of male and female mortality). In Mecklenburg the mortality among men is at most 25% higher than among women, and during the period of most intense child production, as well as in the highest age group, it is even smaller, whereas in Berlin the differences are much more accentuated. It may be remarked that the higher male death-rate in Mecklenburg between the ages of 40 to 75 years can only to a small degree be explained by physiological reasons. This is shown for example by the fact that in the provinces of Schleswig-Holstein, Pomerania, Hanover, Hessen-Nassau, and the Rhein Provinces in the country, the expectation of life for men aged 25 years is about equal to that of women.

C 84 &amp; 85

The higher male mortality in cities is only partially explained by the specific harmfulness peculiar to men's town occupations, though the mortality of peasants and agricultural labourers ranks amongst the lowest. A very important part in this connection may be played by syphilis. How terribly syphilis injures the body, though it is seldom directly fatal, is shown by the experiences of life insurance companies, of which examples are given in Tables C 84 and C 85. With the Gotha Life Insurance Bank, for instance, the mortality of the syphilitic at the ages of 36 to 50 years was found to be nearly double as high (186%) as that of the non-syphilitic.

C 85

Table C 85 shows to what a high degree the heart and vessels especially are harmed by syphilis. At this point it is to be noted that it may now be considered as proved that the statement that general paralysis causes death in 2.9% cases among the non-syphilitic is erroneous, because general paralysis only occurs among persons who have been affected with syphilis. There is no doubt that the poison of syphilis is also most injurious to the germs and the progeny; the foetus is sometimes infected in the mother's womb, and sometimes suffers by the general debility of the maternal body. A large proportion also of those children who attain a higher age are either enfeebled



or damaged in many ways, and this inferiority is often passed down to the grand-children. The most recent Serum investigations (the Wasserman reaction) are the first to throw full light on this. In Germany syphilis occurs much more frequently in town than in the country; this no doubt dependent on prostitution and on a much greater degree of promiscuity of sexual intercourse in cities. In the country couples keep together with greater constancy, even in the case of cohabitation without marriage.

The frequency of syphilis and other venereal diseases in town and country is illustrated in Table C 86, which gives the result of the enquiries of the Prussian Government on the 30th April, 1900, and Table C 87 after Schwiening, on the frequency of sexual diseases among military recruits. Also Table C 88 which gives the frequency of delirium tremens, epilepsy, and general paralysis in the Prussian lunatic asylums, points in the same direction by the great differences shown in the frequency of general paralysis in the different institutions. This table, at the same time, indicates what is also supported by other observations, that the frequency and intensity of harmful influences through alcohol are much greater in towns than in the country; this may be partly because in cities there is a greater and more regular abuse of alcoholic beverages than in the country, partly because town-life induces a greater susceptibility to alcoholic poisoning than country life (less intense metabolism with sedentary occupations).

Injury to the reproductive function through alcohol. It has been known for a long time that drunkards are frequently sterile. This must be attributed to the fact that the testicles of drunkards become to a great extent atrophied. The condition is shown in Figure C 89 by R. Weichselbaum,\* representing a section through the testicle of a drunkard. Figure C 90 which shows a section through a normal testicle, enables even the layman to observe the atrophy of the characteristic glandular tissue of the testicle. Weichselbaum has up to now found that in fifty-four cases, without exception, in which alcoholism had been proved, this atrophy could be demonstrated to a greater or less degree. In thirty of these cases the subject was so young that senile atrophy was out of the question. The abuse of alcohol is not the only harmful influence which is able to induce such atrophy of the testicles, but chronic alcoholism acts with special intensity. Very similar results to those of Weichselbaum

\* Verhandlungen der Deutschen Patholog: Gesellschaft, 14th day, Jena, Fischer, 1910, page 234.



have been obtained by Bertholet (Zentralbl. f. allg. Pathologie 20 Bd. 1909) in 37 out of 39 habitual drunkards. They agree with observations on the vesiculae seminales of drunkards by Simmonds, who found that in 61% of the cases examined the spermatozoa were absent or dead. It is a permissible assumption that a poison which can cause the total atrophy of the sexual glands may, in an earlier stage, have adversely influenced in respect to quality the function of those organs.

- C 91      Alcohol and Degeneration, from the tables on the alcohol question by Gruber and Kraepelin, Munich; Lehmann; contains the well-known statistics of Demme, Bunge, and Arrivé.
- C 92      Table C 92 adds to the summary of the statistical observations of Demme, further details of the kind of abnormalities which were observed in children of drunkards. Representing, as they do, exceptionally bad cases with a high degree of degeneration, one may doubt whether and in how far congenital hereditary inferiority of the parents may have had its influence.
- C 93      Figure C 93 contains the well-known result of v. Bunge's investigations on the influence of paternal alcoholism on the suckling capacity of the daughters. The varying frequency of the habitual consumption of alcohol and of drunkenness proper of the father in the two groups of families is most striking. Official investigations of this question on a large scale are urgently called for.
- C 94      Figure C 94 dealing with the interconnection of tuberculosis, nervous diseases and psychoses of the progeny and the alcohol consumption of the father, is derived from Bunge's investigations. It is worthy of notice that he endeavoured to eliminate from his statistics all families in whom hereditary diseases could be traced previously.
- C 95      Table C 95 contains a summary of T. Laitinen's experiments on animals with small quantities of alcohol. The degree of injury to the progeny supposed to be produced by even a minimum quantity of alcohol (corresponding to about one-third of pint of beer for a man) is astounding. Repetition of these experiments on a large scale and with the strictest care would be most desirable here also.
- C 96      Table C 96 also refers to reports by T. Laitinen.\* It deals with the effect of alcohol on the progeny in man. Unfortunately Laitinen's paper is so confused and inexact that it is impossible for

\* Internat. Monatschrift z. Erforschung des Alkoholismus, Juli, 1910.



the reader safely to draw conclusions from it. His personal observations are mixed up with those gathered by means of inquiry sheets circulated by him in such a way that one cannot make out how he has arrived at his weights at birth and mortality. Information is lacking with regard to the nutrition of the children, their age at the conclusion of the investigations, the length of marriage, the rapidity of birth sequence and so on. It is, therefore, indispensable to await the more detailed report before Laitinen's information can be made use of.

Bezzola has sent in in a modified form the data which he C 97 presented to the Eighth International Congress against Alcoholism in Vienna in 1901, on the effect of acute intoxication on the origin of feeble-mindedness. With their help the curve on Figure C 97 has been constructed, showing the distribution of illegitimate births in Switzerland during the different months of the year from Bezzola's data and the corresponding curve of the births of mentally eminent individuals (taken from Brockhaus' encyclopædia.) The author supplies the following comments:—

"Comparison between the general birth curve and the corresponding one for the birth of feeble-minded children."

The casual observation at the registration of the personal history of feeble-minded individuals that 50 per cent. of the birth dates fall within only fourteen weeks of the year (New Year, carnival, and wine harvest) has aroused the desire to deal with the seasonal incidence of the begetting of the feeble-minded on the basis of as much material as possible. For this purpose the author's census of feeble-minded school children, which took place in the year 1897, and referred to the years 1886-90 inclusive, seemed specially suited. Originally (in 1901) a curve was plotted in which all the 8,186 feeble-minded and idiotic children were included whose exact birthdays were known, and this curve was compared with the total curve for that period. (Schweiz. Statistik 112 Liefg.) The latter was constructed in the following manner from the whole number of births (934,619) which occurred in these eleven years:—The general daily average was taken as 100, and the daily average for each month was expressed proportionately. Thus numbers above 100 show a daily birth frequency above the average, while for numbers below 100 the reverse is the case. The curve for the 8,136 feeble-minded persons was constructed in a similar way, and thus a comparison with the general population producing them was made possible. Subsequently (1910-11), in order to secure homogeneous material, the first and last years were left out, since by including them, owing to the non-agreement of the school year and the astronomical year, the earlier months (January-April) were much weighted. By this restriction of the material dealt with the number of feeble-minded is reduced to 7,759, but the material for each separate year is more homogeneous. Distributed between 2,922 days (eight years), the daily production of the feeble-minded is 2.648, the corresponding total number of births of the years 1882-89 is 677,083, or 231.7 per day. 1.14 per cent. of all births are included in the figure for the feeble-minded. If one treats the total number of births for each month as well as the number of births of feeble-minded according to the method described above, and used by the Federal Statistical Bureau, two curves are produced which diverge considerably from each other in particular months. On the whole the curve for the feeble-minded (thick line) is flatter than the curve for the total. Especially striking are the drop in May and June (corresponding to the pro-



creation period from the 25th July to the 23rd September) and two peaks rising above the "total" curve. One of these is slight, yet distinct. It refers to the months of birth, July and August, corresponding with the procreation period from the 24th September to the 24th November. More conspicuous is the second peak of the curve for the feeble-minded from October to December, otherwise a time poor in births. The centre of the corresponding period of procreation (25th December to 26th March) is in February (carnival). This seems to confirm the suspicion that during the wine harvest and carnival an increased procreation of feeble-minded occurs (procreation during drunkenness?).

We cannot suppress the remark that the fluctuations of the curve for the feeble-minded are much too small to admit of the drawing of an ætiological conclusion, but the fluctuations of the intelligence curve and the illegitimate curve partly exceed the limits of probable error. The peaks of both birth curves in February, correspond to a peak in the procreation curve in May. Perhaps one may attribute them to the existence of a remnant of a period of "heat" (or a rutting season) in man.

C 98

*Lead.* Whereas the germ cells are well protected against many harmful influences from without which affect the soma of the mother, they and the foetus produced from them suffer considerably from some. Amongst their deadliest enemies are certain poisons, and notorious in this respect is lead. Table C 98 gives two sets of statistics on this point, they justify the law in Germany, and in other States, forbidding female labour to deal with lead and lead-containing materials. Paul's figures, showing that lead poisoning of the father is also extremely adverse to the production of a healthy progeny, are remarkable.

C 99

*Female Labour.* A baneful influence on reproduction is brought to bear by the growing quantity of professional female labour away from home and by the economic emancipation of women. Evidence of this is given in Table C 99—"female labour and child mortality"—the data of which are taken from Prinzing's work. Infant mortality is higher the larger the percentage of females employed in factories during the childbearing period. This is partly due to interference with breast-feeding and partly to the unfavourable influence on pregnancy.

C 100

Dr. Agnes Bluhm has given in Figure C 100 "Female Labour and Reproductive Activity," the statistics of Roger and Thiriaux, as well as the results of the investigation of the Imperial Statistical Office on the "Relationship of illness and deaths in the Local Invalidity Fund for Leipzig and surroundings." Dr. Bluhm gives the following explanation: "The top figure on the left is based on material of the Local Invalidity Fund for Leipzig and surroundings,



dealing with over a quarter of a million of women of childbearing age. The distinction between obligatory and voluntary members makes possible the estimate of the influence of work continued up to the time of confinement, because the voluntary members receive the same weekly payments during confinement as the obligatory ones, and, consequently, a woman has no object in joining the voluntary insurance scheme except in order to secure rest before confinement, which they procure for themselves at their own expense and with the loss of their wages. (At that time the compulsory support during time of pregnancy did not exist.) It is to be noted that the voluntary members show ten times as many confinements as the obligatory ones."

"The left hand figure at the top shows that the women who work up to the time of confinement fall ill during their pregnancy twice as often, and have six or seven times as many miscarriages and premature births and 1.28 times as many cases of death in child-bed, as those who stop work for a more or less extended period previous to their delivery."

"The frequency of illness after childbirth is in both categories of women almost the same; but the duration of the illness beyond the period for which the legal subvention provides (13, 26, or 34 weeks respectively) is much greater in the case of the obligatory members who do not spare themselves before their delivery."

"Left hand figure at the bottom—the researches were made by Roger and Thiriaux in a maternity home. A comparison is made between the women who entered the home only at the beginning of childbirth and those who entered during the last month of pregnancy or sooner. Premature birth occurs in nearly one-third of the cases among the former, but among the latter only one-eighth."

"Right hand figure at the bottom—dealing with the same material as the left hand figure below compares the weight at birth of the first, second and later born. The average weight of the former is 300 g. and that of the latter 341 g. higher with mothers who cease work two or three months before delivery, than with those who worked up to the last. Possibly this expresses in the main the different duration of pregnancy. The importance of the birth weight of a child for its further development is not to be underrated."

"The top figure on the right shows that the importance of the adverse influence of female labour on the race, shown in the above figures, is growing, because there is an increase of employment amongst married women. Simon's figures show that the manufacturing industries, which in 1907 employed by themselves two million female hands, the number of married women has increased by almost



200,000 during the last twelve years. In agriculture, in which four and a half million females find their main occupation, the share of the married women is much greater still."

"The increase of married female labour being intimately connected with the development of our economic life, which cannot be deliberately influenced, the demand for a Motherhood Insurance for all female labourers of any kind, and for the extension of the legal time of stoppage of work before childbirth to at least four weeks, follows as a practical result of the facts stated above."

Dr. Bluhm's repeated assertion, which is regarded by many as a dogma, that economic conditions cannot be deliberately influenced (*i.e.*, that they are of the character of a law of nature) must not remain uncontradicted as a principal. It is absolutely unproved, though the difficulty of influencing our economic life cannot be denied; the economic order has been created by man and *must* be altered if it proves harmful for the race.

C 101

The adverse influence of female labour on the progeny is shown from a somewhat different point of view in Table C 101—"premature births and abortions in different callings." The most serious fact shown here is that a low birth rate may frequently be found in conjunction with a high rate for miscarriage and premature birth; as the compiler of these statistics points out, this conjunction is most apparent in those callings which demand frequent intercourse with the public, such as domestic service, that is to say in cases where pregnancy is particularly inconvenient. Probably in these cases artificial prevention of pregnancy goes hand in hand with the procuring of abortion!

Race-hygiene does not aim at an indiscriminate motherhood insurance of married and unmarried mothers, but it aims at the economic subvention and encouragement of legitimate fertility of healthy and able parents, connected with, and rendered possible by, a reduction of female labour away from the home. Marriage is one of the most important hygienic institutions for the individual as well as for the race, and it is folly to allow its decay and to replace it by substitutes

C\*102

The importance of marriage for the health to married persons is shown by figure C 102—"condition with regard to marriage and mortality in Prussia, 1894-97," as given in Prinzing's book. That we have to deal here with an actual favourable influence of marriage, and not with a selection of the healthy at the time of marriage, is proved by the fact that the low death rate of the married is maintained through all age classes and that the widowed and divorced show throughout the highest death rate.



"Condition with regard to marriage and mortality, cases of death from tuberculosis," after Weinberg, also confirms with regard to tuberculosis the favourable influence of marriage on the health of men. With women the mortality from tuberculosis up to the age of 60 is lowest among the unmarried. Pregnancy and suckling act here adversely, but by far the worst position is also held here by widows and divorced women. C 103

The advantage of marriage for the progeny is made evident in Figure C 104—"mortality of illegitimate children in different European states, and in Figure C 105 dealing with the 'survival of the legitimate and illegitimate children in Berlin in 1885.'" After five years there are still alive more than 60% of the legitimate, but only 40% of the illegitimate children. The higher mortality of the latter is by no means a purifying process of weeding, but the expression of greater sickness which permanently harms the surviving also. The division of labour between man and wife, with reference to the care of the offspring, is one of Nature's institutions which is of the greatest advantage for parents as well as children. C 104-105

*Inbreeding and the Crossing of Races.* On the whole with mankind inbreeding is viewed with fear, and justly so, in view of our customary carelessness with regard to the physical and mental conditions of those who contract marriage. If blood relations have similar pathological conditions or pre-dispositions to illness or degeneracy, the progeny which results from their union is endangered to a particularly high degree. Our collection brings as an example of this in Table C 106—the pedigree of the celebrated Don Carlos. The bad inheritance of Johanna the Mad asserts itself to a lesser degree yet quite perceptibly also in the children of Max. II. Table C 107—the children of Maximilian and his cousin Maria of Spain; undoubtedly the Emperor Rudolf II. was mentally diseased. Also Charles V. and his son Philip II. were abnormal characters. C 106-107

Blood relationship of the parents and health of the children. which v. d. Velden has prepared from Riffle's family tables, also speaks for the harmfulness of inbreeding. The offspring of blood relations are emphatically weaker and sicklier than those of persons related distantly or not at all. C 108

The harm of inbreeding amongst the pathological is also illustrated by the large Table 222 (exhibited by Schüle). Pedigrees from wine-growing districts in the centre of Baden; against this it may be taken as proved that inbreeding in itself between the healthy and fit is not harmful. Animal breeders (as well as plant cultivators) make C 109



an extensive use of it with the view to the cultivation of certain hereditary characteristics.

C 110 We show in Table C 110, after de Chapeaurouge, the pedigree of Belvidere, an animal which, in spite of close inbreeding, was distinguished by excellent qualities, and by whom, out of his own daughter, another sire of the highest rank was produced.

C 111 After long-continued and very close inbreeding, even with a faultless condition of the germ plasm, the decrease of vitality and fertility of the progeny asserts itself. Important evidence for this is given by Georg. H. Shull in his exhibition of cross-fertilized, self-fertilized and hybridized maize (Exhibit No. C 111). Shull makes the following comments: "Results of inbreeding with maize—crossing between different races or genotypes, if not too distantly related, results in a progeny which excels its parents in vitality, whereas crosses between individuals belonging to the same genotype engender no increase of vitality as compared with the parents."

In maize, and presumably in most other plants and animals in which cross-fertilization is the rule, all individuals are usually complicated hybrids between different varieties of genotype. They owe their vigorous constitution to this hybrid nature.

"The result of self-fertilization or of close inbreeding is that the hybrid nature diminishes in degree. The stock is reduced to a homozygotic condition, and is thus deprived of the stimulus which lies in the hybrid condition."

"When two given genotypes are crossed, the first hybrid generation is possessed of the greatest vigour. Even the second generation shows much less vitality, and this decrease continues with the third and later generations. But each succeeding generation differs less from its predecessor than the latter differed from its own parents. As soon as the stock has become a pure line, inbreeding produces no further weakening."

"The top row of the exhibited collection of maize cobs (large cobs with many grains) is derived from a family in which for five generations self-fertilization has been prevented by using mixed pollen. These conditions approach those prevailing in an ordinary field."

"The middle row of maize cobs (small cobs with few grains) comes from families of the same derivation as the first row; but for five generations they have been self-fertilized. Each one has characters which the others do not possess. They are almost pure bred, and continued self-fertilization produces no further adverse influence. The cob, quite to the right, without grains, has pistils so short that



they do not project from the husks. This genotype must, therefore, be fertilized artificially."

"The lowest row (the largest cobs with the most grains) comes from families which have been created by the crossing of plants belonging to different genotypes, the relationship in which case is indicated by the lines which connect this row with the middle row."

"The following harvests of grain were made in the year 1910:—

Self-fertilization prevented (average of nine families)	...	...	...	...	53.5	hi	pro	ha.
Self-fertilized (average of ten families)	...	...	...	...	25.3	,	,	,
F <sub>1</sub> hybrid (average of six families)	...	...	...	...	59.2	,	,	,
F <sub>2</sub> hybrid (average of seven families)	...	...	...	...	38.8	,	,	,

It is well-known to what degree inbreeding is practised in reigning families. We show as an example for this, Chart C 112, the pedigree of the Archduchess Maria de los Dolores of Tuscany, exhibited by Dr. Stephan Kekule von Stradonitz, and Chart C 113 of the same exhibitor, pedigree of Ptolemäus X. Soter II. (Lathros), and Chart C 114, pedigree of the celebrated Cleopatra. Though with Ptolemäus X. the effect of sexual reproduction in bringing about new combinations of hereditary units was very limited, since the couple. Ptolemäus V. Epiphanes and Cleopatra Syra having produced all the germ cells from which he developed, he appears, nevertheless, to have been a perfectly normal being. In his granddaughter Cleopatra certainly much "extraneous blood" circulated. C 112-114

Even where there is no high degree of inbreeding, the individuals of a people are much more closely related to each other than is generally assumed. Table C 115, "theoretical number of ancestors," shows that, assuming the duration of one generation to be 35 years, and that no marriages between relations have taken place, the number of the ancestors of a man living now would have been eighteen billions in the year 0 A.D. In reality the germanic race, wandering west, probably only numbered hundreds of thousands. This phenomenon of "ancestral loss," as Ottokar Lorenz calls it (that the number of real ancestors is much smaller than those theoretically possible), can be illustrated in the pedigrees of the reigning houses. C 115

We have in Table C 116 an analysis of pedigree of Emperor William II., after Ottokar Lorenz. Investigations show that twelve generations back the real number of his ancestors amounts to only one-eighth of the possible figure. Only 275 persons have actually been found because in the older lines, the bourgeois element, of which no record can be found, has had a very large share. C 116



C 117

Very little knowledge exists concerning the effect of the crossing of races in man. On the whole it appears not to be favourable, if it is a question of crossing of races from far apart, even in purely physical respects. An example of harmful influence is given in v. d. Velden's Table C 117—"Fertility and Health in relation to the crossings of races."

### NEOMALTHUSIANISM.

C 118-122

The next and the greatest concern of race-hygiene—much greater than the relative increase of inferiority—is, to-day, neomalthusianism, the intentional restriction of the number of births in varying degrees up to complete unproductiveness. Though conscious regulation of the production of children is absolutely necessary, it becomes fatal to a nation if under no control but the egotism of the individual. For its permanent prosperity a nation requires, in order merely to hold its own, a sufficient number of "hands" and a sufficient number of "heads" to guide those "hands." We referred to this when mention was made of sterility as a phenomenon of degeneration, but this cause of sterility during the last decades only takes a second place compared to deliberate intention. The wealthy and higher social classes were first attacked by neomalthusianism. Their progeny is becoming more and more utterly insufficient, so that under our present social conditions, particularly which give mind and talent better openings, and thereby more and more take out of the mass of the people the better elements, make the strongest demand for them and use them up, the danger of an increasing deterioration of the average quality of its progeny grows greater and greater. The baneful influence of wealth on fertility is shown by several tables. Figure C 118 "Fertility and Wealth," after Goldstein and Tallquist, gives the condition in the French Departments; Figure C 119, "Number of Children and Wealth," after Bertillon, for the Arrondissements of Paris; Figure C 120, "Fertility and Wealth," after Mombert, for Munich, 1901, Table C 121, "The Number of Children in Families of Different Classes in Denmark, 1901," after Westergaard; Table C 122, "Fertility of Marriages, Occupation, and Wealth for Copenhagen, and Dutch Conditions," after Rubin, Westergaard, and Verrijn Stuart.

C 123

The worst condition with regard to the fertility prevails among those with the highest mental endowment. Evidence of this is given in Figure C 123, "Insufficient Fertility of the Highly Endowed in Holland," after J. R. Steinmetz. It shows the rapidity with which the number of children decreases. In order to estimate the signifi-



cance of these statistics, it must be noted that after taking into account the mortality among children and young persons, and the unfitness for parenthood of an appreciable fraction of the adults, a fully capable couple would have to produce at least four children to assure the necessary moderate increase in the population which is required to prevent a people from sinking into stagnation and deterioration.

The dying out of highly gifted families is shown to be more C 124 accentuated in Figure 255, after Bertillon, "Progeny of the Highly Gifted in France." Four hundred and forty-five of the best known Frenchmen, with their wives, have not even reproduced that number of individuals, and this in spite of the fact that repeated marriages of the same individuals have not been taken into account.

Even if one has been able, up to the present, to live in the hope C 125-126 that the number of persons of more than average ability produced by the mass of the people is always sufficient to replace those that are used up, at the present time anxiety about the "heads" is replaced by anxiety about the "hands." The knowledge of means of preventing fertilization spreads incessantly, and is recklessly promulgated by the neomalthusians and by a shameless industry. We point to Figure C 125, "Want of Fertility in French Towns," after Jayle, and to Figure C 126, "Fertility in Prussia." In Berlin fertility is decreasing most rapidly; at the end of the sixties it still amounted to 200 in every 1,000 women of child-bearing age. In the five years, 1905-1910, only to 84; in the year 1910 only to 74. This state of things is shown also in the relative increase in numbers of the first born.

Figure C 127, "Decrease of Legitimate Fertility in Berlin—the C 127, 128 & two-children system." The other German towns follow the example 129 of Berlin. Berlin to-day produces 20% less children than are required to maintain its own population without immigration, and the same conditions will soon prevail in other towns. Up to now the country districts in general maintain their fertility (West Prussia on Figure C 128), but there, too, modern practices begin to make themselves felt. The town and industrial population increases so rapidly that the conditions prevailing among them have an ever increasing effect on the people as a whole. Thus we see, even at the present time, a serious decline in fertility among an overwhelming majority of European States: Figure C 129, "Decrease of Fertility in Some European States."



D

EXHIBITED BY DAVID FAIRCHILD WEEKS, M.D.,  
*Director of the New Jersey State Village for Epileptics at  
 Skillman, U.S.A.*

Explanation of Symbols used in the Charts.

Male individuals are indicated by squares and females by circles. The members of each fraternity are connected by the same horizontal line. The fraternity line is connected by a vertical line to the line joining the symbols representing the father and mother. Illegal unions and illegitimate children are shown by dotted lines. As an aid in tracing the patient's immediate family, a green line is used to connect the direct ancestors on the paternal side, and a red line on the maternal side. The red squares and circles indicate epileptics, the green the insane, the black the feeble-minded, and purple the criminalistic. The figures directly above the fraternity line indicate the rank in birth, a figure inside a square or circle shows the number of individuals of that sex. A black dot suspended from the fraternity line stands for a miscarriage or a stillbirth. A line underneath a square or circle shows that institutional care has been received. The hand points out our patient.

The following letters indicate the different conditions: A, alcoholic; B, blind; C, criminalistic; D, deaf; E, epileptic; F, feeble-minded; I, insane; M, migrainous; N, normal; P, paralytic; S, syphilitic; T, tubercular; W, wanderer, tramp; d, died; b, born; inf, infancy; Sx, unchaste.

D 1

This chart shows very clearly the dangerous results of a marriage in which both of the parents are epileptic. Of the four children the first three were epileptic, and the fourth, a boy, who died at the age of nine, was feeble-minded. All four of these children were cared for at public expense, two are patients at the New Jersey State Village for Epileptics, and the other two were wards of the Children's Home Finding Society. The epileptic father is dead, and the mother married again to an alcoholic man. When last heard of she had another child.

D 2

An epileptic woman, married to a feeble-minded man, is responsible for the large number of defectives shown on this chart. The principal mating is that of one of the epileptic daughters of this woman, who, like her mother, married a feeble-minded man. Eight children resulted from this marriage; one died before two years of age, the other seven were epileptic, the five who are living are patients at the New Jersey State Village. Two of the girls in this fraternity



had illegitimate children before receiving proper care. This family is undoubtedly a branch of a family of defectives, most of whom live in an adjoining State.

This is a case of incest, and shows plainly that the “empty germ D 3 plasm can yield only emptiness.” These people lived in a hut in the woods. The feeble-minded man had by his defective sister an epileptic daughter, then by this daughter he had four children, one an epileptic, one a feeble-minded woman of the streets, who spends much of her time in jail, one an anencephalic monster who died soon after birth, and one a feeble-minded boy, who did not grow to manhood. Since the hut in the woods burned down, the epileptic woman and feeble-minded daughter live in a cellar in town, though much of their time is spent in jail.

This chart shows a feeble-minded man, who came from a feeble- D 4 minded family, married to an epileptic woman, who descended from a tubercular epileptic father and a mother who is described as “flighty,” “not too bright.” This couple had six children, three feeble-minded, two epileptic, and one still-born. Since the death of the epileptic mother, the father has secured homes in institutions for all of his children except one, and then married again. As yet he has no children by the second wife.

The wife in the central mating in this case is a low grade D 5 epileptic, who can scarcely recognize her own children. The father is a feeble-minded alcoholic, who works hard, but who spends all his money for drink. There were six children; one died at the age of four, and all of the others except one six-year-old boy are epileptic. All are being cared for by the public. Before the mother and three of the epileptic children were brought to the State Village for Epileptics the family lived in a cellar, slept on rags, and depended on the neighbours for food.

This is a history which illustrates very well the source of a large D 6 number of the almshouse inmates. The central figure is an epileptic woman, who spent most of her life in the poor house. No two of her seven children are by the same father. The epileptic daughter, whose father was feeble-minded, had started to lead the same kind of life as her mother; in the almshouse she gave birth to one illegitimate child before she was put under State care. The mother, when she last left the almshouse, went to live in a hut in the woods with a feeble-minded man, who had three feeble-minded sons; one of these sons married the feeble-minded sister of one of the epileptic patients at the New Jersey State Village.



D 7a

D 7b

This is the history of two patients who have been found to be related, the great grandfather of the one was the brother of the grandmother of the other. The principal mating under D 7a is that of a feeble-minded man married to an epileptic woman, whose mother died in the insane asylum. They had six children, the first died when only a few months old, the next and the fourth were not bright and died young, the third is an epileptic, the fifth is feeble-minded and criminalistic and he is now at the State Home for Boys, the sixth is also feeble-minded and cared for at an industrial home for children. The mother and father, at one time inmates of the almshouse, are now supported by the town. Under D 7b the father, who died of spinal meningitis, was migrainous and had many epileptic relatives, the mother is neurotic. There were four children, the first an epileptic, the second died at 20 of spinal meningitis, the third is of a very nervous temperament, the last, a girl of 16, seems to be normal.

D 8

Both of the parents in this case are feeble-minded. The father was the black sheep of his family, his brothers are intelligent men, and for the most part good citizens; the mother, however, was the illegitimate child of a feeble-minded woman. There were seven children, one an epileptic, the others all feeble-minded with the exception of the sixth, who is now about 11 years old; she was taken from her home and put with a very good family; she shows the effect of the changed environment, and though not up to her grade in school, is only slightly backward. There is some doubt about the parentage of the child, and it is very probable that she is by a different father. Since the father's death the mother has had one illegitimate child; her children were taken away from her except the two oldest because of the immoral conditions in the home, and she now claims to be married to a feeble-minded man, who is the younger feeble-minded brother of her imbecile daughter's husband.

D 9

The central mating in this case is that of an epileptic, alcoholic, sexually immoral man, married to a neurotic and sexually immoral woman, who has many insane and feeble-minded relatives. They had in all ten children; two were epileptic, three feeble-minded, one criminalistic and sexually immoral, the sixth is the only one who has a good reputation, the last was a stillbirth. The father and mother are no longer living together.

D 10

The case illustrated on this chart is of a feeble-minded woman married to an alcoholic man. The wife descended from an alcoholic father, who had several epileptic relatives. The husband also descended from an alcoholic father, and had an epileptic nephew.



Of their nine children, the first three died young of scarlet fever, the fourth was epileptic, and the other five are feeble-minded.

On this chart we have the history of an epileptic man whose attacks were of the petit-mal type. He married a choreic woman. They had four children, the eldest a man who developed epilepsy after his second marriage. His first wife was insane; by her he had two daughters, one of whom is now an inmate in an insane asylum, the other is neurotic and has been treated in a sanatorium. Of the other children two are apparently normal and one migrainous. D 11

This chart shows an epileptic man married to a normal woman; he had both epileptic and insane relatives, while she had epileptic, alcoholic, and tubercular relatives. Their first child was an epileptic, the next were twins, one of these appears to be normal while the other is of a very nervous temperament, the fourth died in infancy, and the last three were stillbirths. The mother married the second time, this time to a man who drank to excess after their marriage; by him she had two children, both of whom seem to be normal. They are both in school. D 12

This is the history of a low grade epileptic. His oldest sister is normal; she was brought up by strangers after her mother's death, and is now earning her living as a saleslady. The second was a boy, who was thought to be normal until he was about sixteen, when he displayed criminalistic tendencies, and for the crime of rape was put in the Reform School. The youngest is a girl, who is of a very nervous temperament. The father was an alcoholic, and went on long sprees; he deserted his wife and family to live with a woman who also deserted a family. His brother is an alcoholic, and married the patient's mother's sister; they are now divorced. The mother was migrainous, she died of tuberculosis; her family shows a neurotic taint, while the father has several epileptic relatives. D 13

In the central mating the father and mother are both migrainous. They both belong to families prominent in the community in which they reside; their homes are among the best, and they are counted as leading citizens. There were nine children; three died before four years of age, one is epileptic, one seems to be normal, and the others all show some nervous taint, though not migrainous. D 14

This is the history of a syphilitic and a sexually immoral couple. They were never married, and the woman for many years supported the man, who was never sober and frequently had attacks of delirium tremens. She finally deserted him. Of their eight children two were D 15



stillbirths, three were epileptic, and the other syphilitic. One of the epileptics in a jealous rage shot the woman whom he loved, and when he found that escape was impossible, killed himself.

D 15a-b                      Charts explaining the method of collecting and recording data.

E                                      EXHIBITED BY MR. E. J. LIDBETTER.

A selection by Mr. E. J. Lidbetter, from his collection of pedigrees, showing pauperism in association with mental and physical defect, justifying the inference that a high proportion of pauperism is to be attributed to the transmission of defect and the perpetuation of stocks of a low type:—

E 1                      Pedigree showing mental disease and destructive eye-disease in the same stock. Insanity, epilepsy, feeble-mindedness and idiocy in various degrees in twelve members, several of them being also blind; partial or total blindness from detachment of the retina without mental defect in several others. Tendency to "anti-dating" or "anticipation" of the mental disease in succeeding generations or younger horn offspring. The printed numbers on the diagram indicate the age of the individual on 1st attack. Prevalence of tuberculosis (three members). Neither mental nor ocular conditions attributable to syphilis. Of the 49 individuals whose history is known 26 have been, or are being, maintained in public institutions (Asylums, Workhouses, Blind Schools, or Poor Law Schools), 29 have been paupers at intervals, and two are known to have been in prison. Several marriages between mental defectives yielding large but inferior families. (Exhibited by Mr. E. J. Lidbetter. The eye-disease reported upon by Mr. E. Nettleship.)

E 2                      Pedigree showing the tendency to intermarry among pauper and defective families. On the left "able-bodied" pauperism and on the right sickness. One hundred and fifty-seven units shown in five generations; 76 paupers shown, including 38 classed as chronic, 32 occasional and six medical only. Twenty-eight died in infancy, nine tuberculous, six insane, two epileptics, and one blind. Shows also pauper children born in lucid intervals of parent suffering from periodic insanity.

E 3                      Pedigree illustrating stock of a low type in which very little physical defect appears. The total includes 61 individuals, of whom 42 are or have been paupers, eight have died in workhouse or



infirmaries, and two in asylums for lunatics; one child is an imbecile. On the whole the stock may be described as mentally sub-normal (not strongly so), but with a marked non-moral tendency. Of the 34 children in the last generation, ten are certainly illegitimate; 15 were, or are, being brought up in Poor Law Institutions, and nine received out-door relief with their parents. The collective period of pauperism in this case exceeds 115 years and the cost to the rate-payers is estimated at about £2,400.

Showing the case of a woman who had two husbands. With E 4 the first her children were consistently defective (deaf and dumb). With the second, one died in infancy and three are doing well. All the children of the first are, or have been, paupers.

A series showing the intimate relation between tuberculosis E 5 infant mortality and pauperism :—

Showing a tuberculous family with apparently normal parents. E 5a both of whom come from tuberculous stocks. Of their 14 children only two are normal; six are consumptive; four died in infancy. The father was one of a family of 8 of whom only he and one other survived—and that other became insane, and his wife and children became paupers in consequence.

Showing insanity, consumption and infant mortality; also the E 5b transmission of insanity through the apparently normal.

Showing the survival of tuberculous stock by accession of E 5c strength from the normal. Only the illegitimate children and their non-sick father survive in this group.

Showing the case of a normal woman who had two consumptive E 5d husbands. Survival of defective strain by accession of strength from the normal.

Consumption in three generations. Male infant mortality. Query, E 5e transmission (?) through the normal.

A series showing transmission of mental defect through the E 6 apparently normal.

Insanity, blindness, epilepsy and feeble-mindedness. E 6a

Insanity in three generations. Transmission through the normal E 6b in each case.

Insanity through the normal twice removed. E 6c

Insanity, epilepsy, and infant mortality—a Mendelian suggestion. E 6d



F EXHIBITED BY PUBLIC HEALTH DEPARTMENT, CITY  
OF LIVERPOOL.

E. W. HOPE, M.D., M.O.H.

- F 1 One large model of insanitary property dealt with in Liverpool, built to scale, etc., with glass cover.
- F 2 Charts showing the decline in mortality from phthisis :—
- F 2a One showing rate for England and Wales.
- F 2b One „ „ England and Ireland.
- F 2c One „ „ Scotland.
- F 2d One „ „ Liverpool.
- F 3 Six framed and glazed photographs illustrating insanitary property  
a b c d e f which has been demolished in Liverpool, and the new dwellings which have been erected to house the dispossessed tenants.

G AN EXHIBIT OF A SYSTEM OF MAKING PEDIGREE  
RECORDS.

EXHIBITED BY DR. RAYMOND PEARL,

*Biologist of the Maine Agricultural Experiment Station, Orono,  
Maine.*

This exhibit consists of a series of blank record forms designed to illustrate the method of keeping pedigree records which has been in use at the Maine Agricultural Experiment Station for a period of five years, in connection with its work in the experimental study of inheritance in poultry and in various plants. The advantages which have been found by experience to inhere in this system of pedigree record keeping are (a) simplicity ; (b) ease of operation ; (c) small chance for error in the keeping of large masses of pedigree records ; (d) uniformity of the system, such that records of all kinds, in any way pertaining to the work, may be brought together with great ease for consultation or study.

In addition to the record blanks there are exhibited also various marking devices and other apparatus connected with the proper working of the plan.

It should be noted that while the blanks here exhibited are devised particularly for work with poultry and plants, the same system, with slight modifications, may be successfully applied to the keeping of human pedigree records ; indeed it is a pleasure to state



that the system here exhibited is an outgrowth and development of a scheme for the keeping of pedigree data in general and particularly human pedigree records suggested many years ago by the late Sir Francis Galton.

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EXHIBITED BY C. V. DRYSDALE, ESQ., D.Sc.

H

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The Malthusian theory of population leads to the conclusion that the population of the majority of countries is held in check by lack of food. Therefore, there should be a correspondence between the birth and death rates, high birth rates producing high death rates and high infantile mortality, and the death rate should rise or fall with a rise or fall of the birth rate.

In the accompanying diagrams, white strips imply birth rates, shaded strips death rates, and black strips infantile mortality, or deaths of children under one year.



H 1

Shows the relation between birth and death rates and infantile mortality in various countries in 1901-1905.

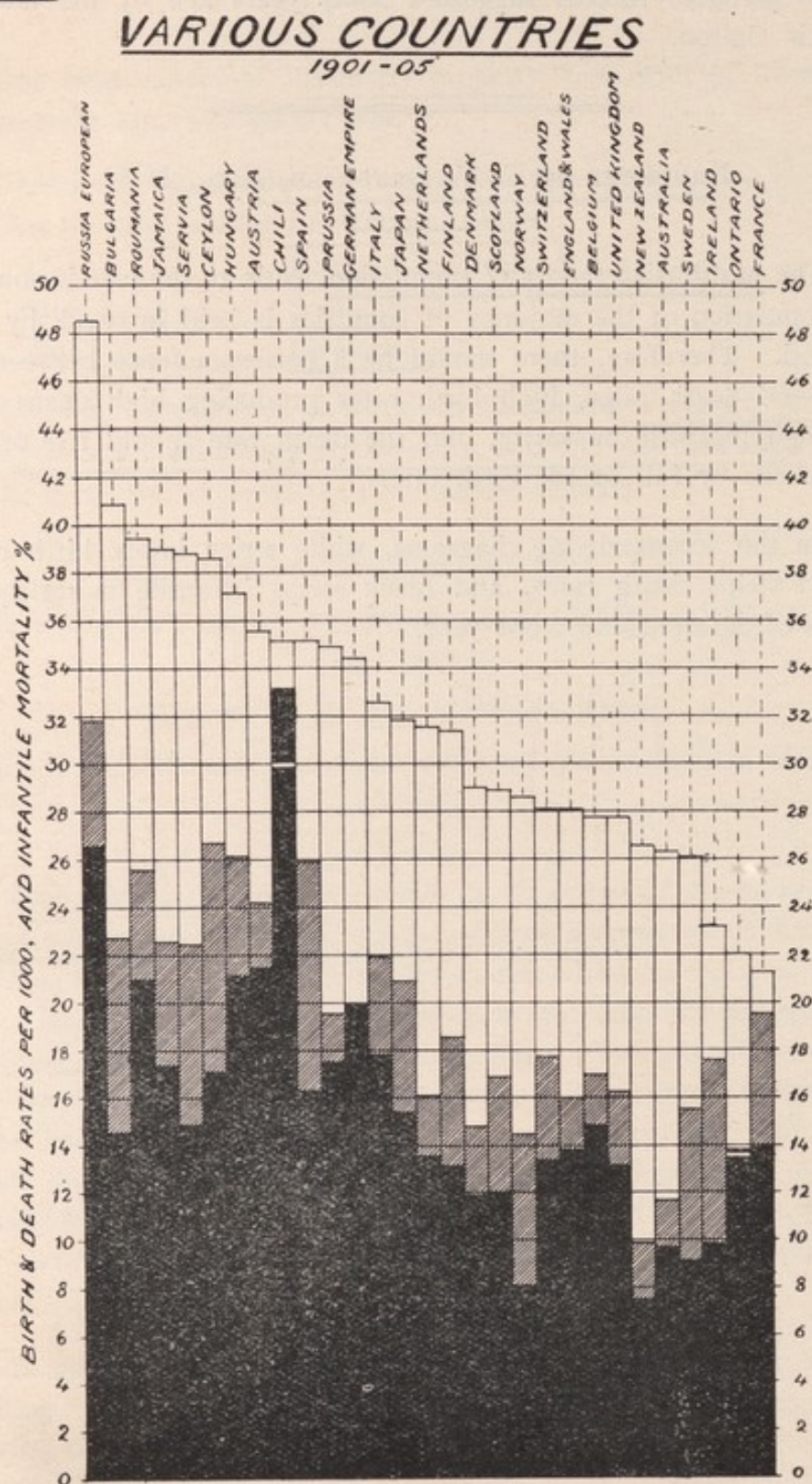


Figure H 1.

H 2

Relation between birth rate and *corrected* death rates in various countries. (This shows that France is healthier than appears in H 1.)



Shows relation between birth and death rates from various causes **H 3**  
in five districts of London.

Relation between the birth rate and death rate for various **H 4**  
arrondissements of Paris in 1906. (Note that the increase in the  
Elysée quarter is as high as the average in the quarters of high birth  
rate.)

Variation of the total population and birth and death rates in the **H 5-6**  
United Kingdom and the German Empire. (Note that the fall in the  
death rate corresponds fairly closely to that in the birth rate.)

Id. for France. (Note that the population is still increasing **H 7**  
although slowly.)

Birth and death rates for France since 1781. (Note that **H 8**  
the rate of increase of population in 1781 was no higher with a birth  
rate of 39 per 1,000 than in 1901-6 with a birth rate of only 21 per  
1,000. A fall of 17.8 per 1,000 in the birth rate has resulted in a  
fall of 17.5 per 1,000 in the death rate.)

Birth and death rates and infantile mortality for England and **H 9**  
Wales. Also marriage rate, fertility of married women, illegitimacy  
and variation of diseases. (Note that the illegitimate birth rate has  
fallen to half since the fall of the birth rate set in.)

Birth and death rates and infantile mortality in the Netherlands **H 10**  
(Notice the rapid increase of population as the death rate falls, and  
the great fall of infantile mortality, probably due to the practical work  
of the Dutch Neo-Malthusian League among the poor.)

Protestant Countries. (Notice the correspondence between the **H 11-13**  
birth and death rates and infantile mortality in all.)

Roman Catholic Countries. (Note that the fall of the birth rate has **H 14-16**  
taken place almost equally with that in the Protestant Countries, and  
with the same result.)

The only four countries in which the birth rate is approximately **H 17-20**  
stationary. (Notice that the death rate has not fallen—except,  
perhaps in Russia—and that the infantile mortality has not fallen.  
Also that the highest birth rate produces the highest death rate and  
infantile mortality, and the lowest birth rate the lowest mortality.)

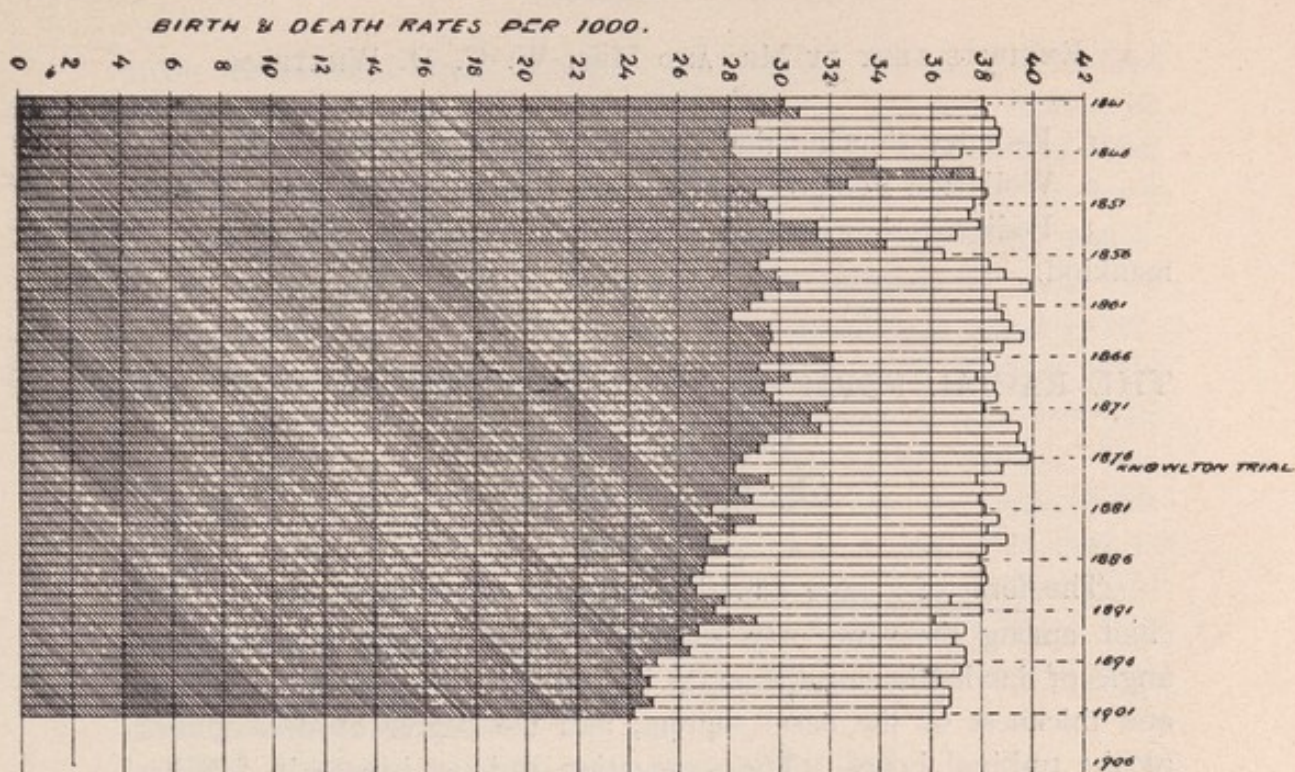
The only four countries with rising birth rates. The death rate **H 21-24**  
and the infantile mortality have increased in every one.



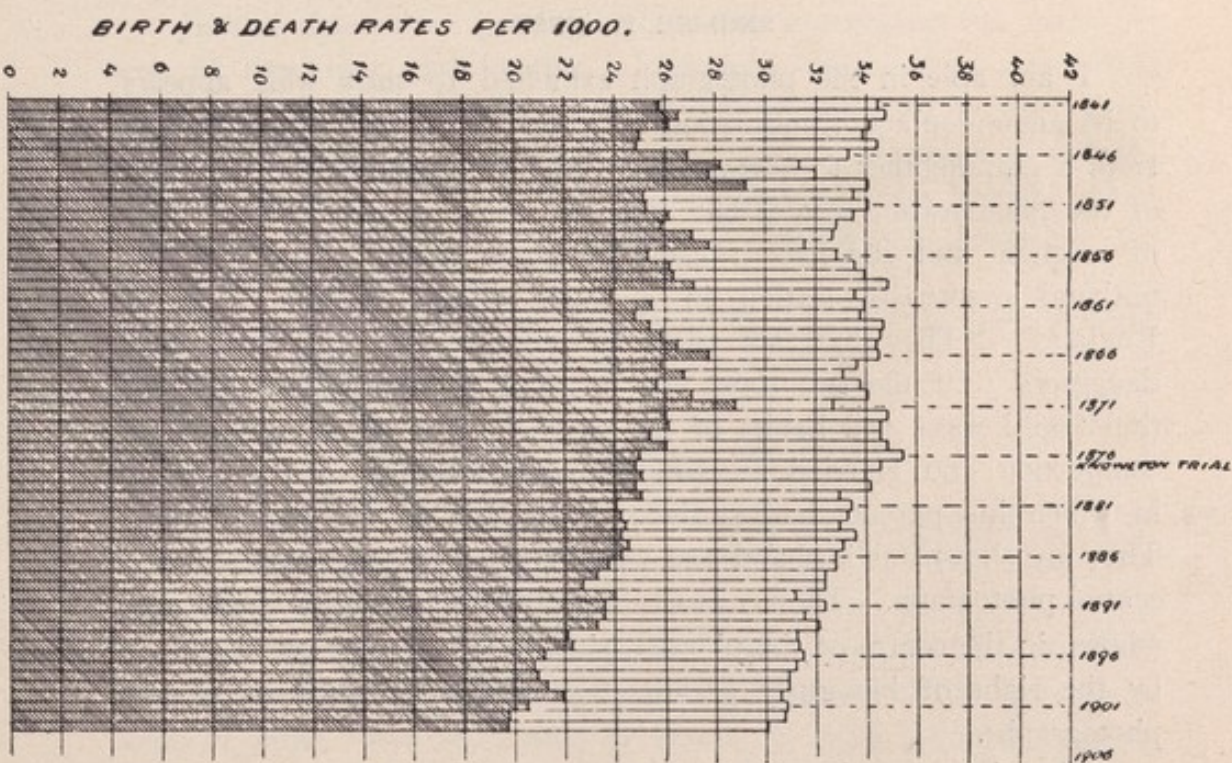
- H 25      Australia. The death rate has fallen with the birth rate, and is now only about 10 per 1,000.
- H 26      New Zealand. The only country in which the fall in the birth rate has not produced a fall in the death rate, and which is not therefore over-populated. The infantile mortality is the lowest in the world, and the death rate less than 10 per 1,000, which gives us an ideal which we can reach in all countries by lowering the birth rate sufficiently.
- H 27      The City of Toronto. The birth rate has fallen and afterwards risen. The death rate has fallen with the birth rate, and afterwards risen, showing that the improvements in sanitation have not been the cause of the falling death rate in other countries.
- H 28      Berlin. The birth rate rose rapidly from 1841 to 1876, and afterwards fell even more rapidly. The death rate, except for epidemics and wars, rose and fell in almost precise correspondence with the birth rate.
- H 29-30      Europe and Western Europe. These show that the total population of Europe is increasing faster, the more the birth rate falls, while in Western Europe the birth and death rates correspond almost exactly. Calculations made from this show that about 25,000,000 fewer deaths have occurred in Europe since 1876, due to the fall in the birth rate caused by the Knowlton Trial and the Neo-Malthusian movement. It should be noted that in the great majority of cases the decline of the birth rate commenced in 1877, the year of the Knowlton Trial.



# EUROPE.



(SEE SUPPLEMENTARY APPENDIX STATISTICS INTERNATIONAL 1905. NO. 16 & 80.)



# WESTERN EUROPE.

(COMPARING THE UNITED KINGDOM, NORMAN, SWEDEN, FINLAND, DENMARK, NETHERLANDS, BELGIUM, FRANCE, GERMANY, AUSTRIA, SWITZERLAND, ITALY, SPAIN, & PORTUGAL.)

Figures H 29—30



I EXHIBITS LENT BY MR. AND MRS. W. C. D. WHETHAM.

- I 1 1. Pedigree showing the descent of Administrative Ability.  
 I 2 2. Wollaston Pedigree, showing the descent of Scientific Ability.  
 I 3 3. Pedigree showing the Mendelian descent of Eye-colour in mankind.

K THE RACIAL FORM OF NOSE AND ITS SEGREGATIVE INHERITANCE.

By GEO. P. MUDGE.

The form of a nose doubtless depends upon many factors. But chief among them we may suppose are the length, breadth, and angle of inclination of the nasal bones; the form, length, breadth, and thickness of the nasal septum, and the degree of development of the turbinal bones. The segregation and persistence in families of a definite type of nose-form is a subject well worth further study. The inheritance of this character from the Mendelian standpoint has not yet been adequately studied. But as with eye-colour, so with nose-form, we desire to know not only how alternative characters are inherited among individuals of the same race, but how they are transmitted among the offspring of mixed races.

ENGLISH V. GIPSY.

- K 1 I am able in the photograph exhibited to show what appears to be an undoubted transmission of a very prominent form of nose from a grandmother to a grandson. The grandmother (on the right of the photograph, who is now over 80 years of age) was the wife of a gipsy and she herself came of gipsy stock. She and her husband eventually settled in a small village in the West of England. They had six children, namely, two sons and four daughters. Of the two sons, one was fair in complexion and had the "wild ways and habits of the gipsy." The other was dark in complexion and married an English countrywoman of the district in which his parents had settled. She was of fair complexion. They are shown, as husband and wife, in the left-hand corner of the central photograph. They have had four children, namely, three girls (shown in the centre of the photograph) and one son (shown standing by the right of his gipsy grandmother in the right corner of the photograph).

The gipsy grandmother has a very prominent type of nose. It is characterised by three chief features: First, the broad base on



which the external nasal apertures are lodged; second, the marked convexity of the contour of the bridge; third, the well-defined or sharp angularity of the general form. Her son's nose differs from hers in all three of these points. His wife's nose is of the more rounded type and differs very widely from that of the gipsy grandmother (her mother-in-law). The three girl children of these two parents clearly do not possess a nose like that of their grandmother. The two younger daughters appear to resemble their mother, while the oldest appears to be an intermediate between her mother and father. So far then there is no feature of any special interest.

But it is otherwise when we come to deal with the nose of the son (grandson of the old gipsy woman). For it resembles hers in all three of the marked features which give to her nose its distinctive and prominent form. The convexity of the bridge is, perhaps, not quite so pronounced, but then he is still young, and this is a feature likely to become accentuated with age.

Two features of Mendelian interest are shown in this group of a grandmother, two parents and four grandchildren. First, there is a hereditary transmission of nose type from grandmother to grandson. Second, there is a clean segregation of the nose type manifested by the brother, from the contrasted nose type or types exemplified by his three sisters. In addition, the case is interesting since it manifests segregation of characters in the offspring of parents of different races, *i.e.*, a gipsy and a native of the West of England.

In the absence of precise information concerning the form of nose of the gipsy grandmother's husband, and of their five other children, and of the brothers and sisters of the grandmother, it is difficult to formulate a scheme showing a definite Mendelian inheritance in this case. But the two features alluded to in the preceding paragraph are strongly suggestive of inheritance according to Mendelian principles.

We are indebted to Mrs. Rose Haig Thomas for the general facts of this case and for the photograph of the group.

#### EUROPEAN V. AMERICAN RED INDIAN.

A few years ago I had an opportunity of meeting two friends K 2 who had spent many years in different parts of Canada and were acquainted with families who were derived from an ancestry partly European and partly North American Indian. I gathered from my friends, in virtue of much kindness and patience upon their part, some valuable facts concerning the nature of various facial features in the offspring of the two mixed races—European and Red Indian. I purpose here to deal with two families and with only one character,



*i.e.*, the type of nose. The Red Indian and European type of nose are easily distinguishable. In the Red Indian the nose is prominent and its frontal profile is formed by two lines which diverge from the bridge towards the base. The latter is, in consequence, very broad. The form of nose is sometimes known as the *busqué* or curved type, since its lateral profile is in outline markedly aquiline. But examination of a series of photographs of Red Indians shows some variation in the lateral profile, since some are decidedly concave. But the broadness at the base is apparently never diminished; it is always marked and unmistakable. The well-pronounced Indian nose can always be easily distinguished from the European nose by persons who have had a long acquaintance with both races. But cases do occur where even an experienced observer would feel some doubt in expressing an opinion as to which type a given nose belonged. Such cases are, however, not common.

K 2 a

From the pedigrees of families derived from a mixed racial parentage in my possession, I select two for exhibition at this Congress. The first is that known as "Family 5" in my list. In this case a Scotchman (Generation A, S) married a full-blood Indian woman. They had a son and daughter (Generation B, 2 and 3). The half-breed son had the Indian type of nose. The daughter had a small and well-shaped European nose.

The son married a full-blood Indian woman (Generation B, 1) and had four children. Two of these were infants at the time my informant knew them, and though they were described as being generally of the Indian type, they were too young to give any reliable details concerning the form of the nose. The two elder children (Generation C, 1 and 2) were a daughter and a son, and both had the Indian type of nose.

The half-breed daughter (Generation B, 4) married twice. Her first husband was a half-breed Indian (B 3). He was not seen by my informant. They had a son and a daughter (Generation C, 5 and 6). The former was Indian in type of nose as well as in other facial characters. The daughter, though she had very decided Indian cheek bones, had the European type of nose. She is of further interest, inasmuch as while her eye-colour was European the shape of her eyes was characteristically Indian.

The second husband of the half-breed daughter was a Welshman (Generation B, W). By him she had seven children. The last was a baby at the time my informant saw it, and we may leave it out of account. The penultimate child was a son (Generation C, 12), and his nose was sunken, and my informant found it difficult to say whether it was European or Indian in type. I rather suspect from an inspection of some photographs of Indians which I have seen



that it resembles a very concave flattened Indian type. Of the remaining five children, four had an European type and one an Indian type of nose.

Assuming that my informant's observations and memory are accurate—and I feel sure they are quite reliable since he spent many years among the Indians and half-breeds of North America in company with other Europeans, and he is a man of naturally sharp discernment—this family shows clear evidence of the segregation of nose type. It is shown more particularly in the children of the half-breed daughter who married twice, since among her offspring (Generation C, 5-13) both types of nose appeared. The reappearance of the European nose was manifested, not only when she was mated back to an European in her second marriage, but when she married a half-breed like herself. This latter marriage, however, did not constitute, as we might at first sight regard it, an experimental mating in every way analogous to a Mendelian cross of DR  $\times$  DR; because although she was a half-breed her nose was not like her brother's of the Indian type, but European.

It thus appears as though the Indian nose was dominant in one case, and the European in the other. Too much stress must not be laid on this point. So many half-breeds are indistinguishable from full-blood Indians, that the possibility is to be borne in mind that this woman's mother, who was married to the Scotchman, was not really a full-blood Indian, and that tradition was in error. I am, however, making further inquiries.

But Mendelian segregation is shown in this pedigree in another way. The granddaughter (Generation C, 6), by the first husband, manifested, as already indicated, an European type of nose and European eye-colour. She also manifested other European characters, with which I do not now purpose dealing. But her cheek bones were decidedly Indian and the shape of her eyes were also Indian. Thus we have the segregation in the same individual of the characters of two distinct races of men. In other words, there has been segregation of racial characters followed by their recombination in a hybrid race. That is a fact of some importance, in what we may designate as anthropological Eugenics, or, if we prefer it, as the Eugenics of Anthropology. For it turns our thoughts to the possibility of calling into being a more perfect type of men by the recombination of the better alternative qualities of two less perfect races.

The second pedigree exhibited is that of "Family 4" in my K 2 b list. I am indebted to another informant for the facts of this pedigree, and they relate to another part of North America. In this case a Frenchman (Generation A, F) married a full-blood Indian



Princess, namely, a daughter of a Chief. She had one only daughter (Generation B, 2) whose nose was of the Indian type, but rather flat.

The daughter married an Irishman (Generation B, 1), and they had six children. Of these three had European types of nose and three the Indian type (Generation C, 1-6).

This family shows again an apparently clean segregation of Indian and European types of nose. The two types appear, side by side, in different individuals of the same fraternity.

K

## THE SEGREGATION OF RACIAL EYE-COLOUR.

By GEO. P. MUDGE.

It is a matter of importance to know the exact influence which a mixture of races exerts upon the hereditary transmission of characters. For instance, do the alternative characters of two races of men, when they are related by marriage, segregate in inheritance in accordance with Mendelian principles? Is the term "blending or fusion of races misleading, and only accurate when employed in a qualified sense"?

It has been shown by Mr. Hurst's very careful investigations in a Leicestershire village that certain types of human eye-colour, which he designates as "Simplex" and "Duplex," are inherited in complete accord with Mendelian principles of inheritance. The two types not only segregate from each other in the course of transmission, but they do so in practically exact Mendelian proportions. And the "Simplex" type, which is the recessive form of eye-colour, breeds true. It begets nothing but the Simplex eye. These results have been confirmed by Professor and Mrs. Davenport in America. In this and similar cases we are merely dealing with the transmission of alternative characters in individuals of the same race.\*

But one of the interesting problems of the future is concerned with the transmission of characters when human races of diverse characteristics breed together. We are not concerned to discuss now whether the races of mankind are varieties or species.

### SPANIARD 7. GIPSY.

K 3

The records of travellers provide certain information which helps us to form reliable though limited conclusions as to the results of the inter-breeding of different human races. Mrs. Rose Haig Thomas,

\* Of course, the "English" race is really a community of many commingled races. But from our present standpoint that matters little. It is rather confirmatory of the further facts and conclusions I am about to describe.



to whom we are indebted for the exhibit of a photograph, taken during a journey through Spain a few years ago, of a Spanish gipsy woman with her three children, has made several observations of some interest. She became acquainted with a family in which "the mother was a dark-skinned, black-haired, black-eyed gipsy woman. (See photograph, Exhibit No. K 3.) The husband was a Spaniard with blue eyes. There were three children. Of these, the eldest had flaxen hair and blue eyes. The second was a boy with black eyes, black hair, and an olive skin as dark as the mother's. The third child was too young to justify any conclusion being based on its characteristics. It was only 18 months old; but was flaxen-haired, blue-eyed, and fair skinned. This observation of Mrs. Haig Thomas, in Granada, affords then a clear example of the segregation of blue-eye and flaxen-hair characters among the gametes of the black-eyed, black-haired, and olive-complexioned mother. For, in the light of Mendelian researches, it is obvious she was carrying these characters recessive, and that some of her gametes were pure in respect of them.

#### ARAB 7. SPANIARD.

The second photograph, exhibited by Mrs. Haig Thomas (Exhibit No. K 4), is of three sisters who were also photographed in Granada. The eldest is of the dark, typical "Arab type," so well recognised by Spaniards wherever it is seen in Spain. The second sister is clearly much lighter in hair and fairer in complexion than her sister. The nose, too, is very distinct in both. The baby is fair. It is impossible, of course, to trace the remote ancestry of these sisters, and Mrs. Haig Thomas obtained no information as to their parents, but from what we know of Spanish history the case suggests a possible segregation of Moorish from Gothic features after the intermixture of the two races, by marriage, had occurred. But the question is extremely complex. It is impossible to say to what extent the inhabitants of modern Spain represent in varying degrees a commingled race of Phœnicians and Iberians, of these with Romans and Goths, and of all with Moors, themselves at the time of the conquest of Spain a mixed race. All that can be said with any degree of probability is that these various races have more or less intermingled\* during the long history of Spain, and that the flaxen hair and blue eyes among its inhabitants are the heritage which the Goths have left them.

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\* I advisedly use the word intermingled and not blended.



EUROPEAN *v.* AMERICAN RED INDIAN.

For the facts of the segregation of European and Indian eye-colour, I am indebted to two friends who resided for many years in different parts of Canada, and who do not desire their names published.

K 5

The first case of this kind (Pedigree Chart, No. K 5) of segregation of racial eye-colour is that of the offspring from a marriage between a blue-eyed Scotchman and a black-eyed, full blood American Red Indian woman.† They had a son and a daughter, and the eyes of both were Indian brown. This brown differs from that of European eyes, and can usually be distinguished by observers who know the two races well. The half-breed son (No. 2, Generation B) married a full blood Indian woman (No. 1), who also had Indian brown eyes, and by her had four children. Two of them were babies at the time my informant knew them, and we may leave them out of account. The other two, a son and daughter (Nos. 2 and 1, Generation C), had Indian brown eyes. This result is in accord with Mendelian expectations.

The half-breed Indian daughter (No. 4, Generation B) of the blue-eyed Scotchman and Indian mother married a Welshman (No. 5, B) with hazel eyes. They had seven children. Of these, two—a son and daughter (No. 7 and 11, Generation C)—had blue eyes. The remaining children—with the exception of a baby, whom my informant had seldom seen—had eyes of varying shades of brown. Two (Nos. 9 and 12, C) had European brown, one dark Indian brown, and one Indian brown eyes (Nos. 8 and 10, C).

The reappearance of blue eyes among two of the Scotchman's grandchildren is a clear example of the Mendelian segregation among the gametes of the half-breed Indian mother of the factors which produce blue eyes. The Welsh father, with the hazel eyes, must, of course, as we deduce from other cases, have carried the blue-eye factors recessive.

The black-eyed full blood Indian grandmother also carried various shades of Indian brown, recessive to the Indian black which she herself manifested, since her daughter and two granddaughters exhibited Indian brown and dark Indian brown coloured eyes. The two European brown-eyed grandsons were probably in eye-colour hybrids between the hazel colour of the Welsh father and the Indian brown of the half-breed Indian mother.

† This is the same family as Family 5 described in connection with Segregation of Nose Form in exhibit K 2a.



The pedigree is thus, in respect of eye-colour—and of other characters also which are not here described—clearly Mendelian in its manifestations. It shows that the offspring of two very different types of human races exhibit the same mode of Mendelian inheritance as do the descendants of two contrasted parents of the same race.

Family 4 (Pedigree Chart, No. K 6) illustrates the same kind of K 6 facts and conclusions. In the A Generation a Frenchman, whose eye-colour was unknown to my informant, married a full blood Indian princess who had Indian brown eyes. There was one daughter only (Generation B) by this marriage, and she had Indian brown eyes. She married an Irishman, who had red hair, grey eyes, and a freckled complexion (Generation B). From this marriage there came six children (Generation C). Two of these had “grey eyes like their father.” Three had dark brown eyes of European tint. My informant had some doubt as to the European tint of two of these three (Nos. 3 and 4, C Generation); their eye-colour was very dark brown, and possibly it may have been the Indian tint. The remaining member of this generation had Indian brown eyes of a very dark shade.

It may be desirable to state that Families 4 and 5 come from different parts of Canada.

The chief feature of interest in this family is the segregation of the grey eye-colour of the Irishman among his offspring. It appears in two daughters. From what we know of analogous cases, there is little doubt that the gametes of his half-breed Indian wife carried the blue or grey factors derived from her French father. The appearance of an European brown eye-colour in Generation C, No. 6, suggests that the French grandfather had brown eyes, and that, therefore, this colour has segregated out among the gametes of the half-breed Indian mother.

EXHIBITED BY Mr. E. NETTLESHIP.

L

Congenital Colour-blindness. Pedigree showing unusual L 1 features, viz.: (a) females affected; (b) twins, of whom one is affected, the other not; (c) marriage between two unrelated colour-blind stocks. Except that two females are affected the inheritance, so far as can be traced, has followed the rule for colour-blindness; viz., limitation to males and transmission through unaffected females.



*Key to Signs.*

- ♂ normal male ;                      ♀ normal female.  
 ♂ colour-blind male ;              ♀ colour-blind female.  
 ○ batch of whom there are no particulars.  
 ○○ twins.      ϕ died in infancy.      ob : dead.  
 × seen and examined.  
 ×× reported normal, but not seen.

L 2

Hereditary night-blindness with myopia (short sight) affecting 21 males and only 1 female in a large pedigree. The night-blindness congenital and stationary. Descent always through mothers themselves unaffected. Mental defects in several of the night-blind stock. Other pedigrees of this male-limited night-blindness are on record.

*Key.*

- ♂ and ♀ night-blind male and female.  
 Otherwise the same as for L 1.

L 3

Pedigrees of hereditary congenital Nystagmus (involuntary rhythmical movements of the eyes) showing two different modes of descent.

L 3a

In Figure L 3a the nystagmus occurs only in males and descends through unaffected females.

L 3b

In Fig. L 3b both males and females are liable to the disease, and either parent may transmit it, although descent is more often through mother than father.

The movements of the eyes are very often accompanied by rhythmical movements of the head in the non-sex-limited type (Fig. L 3b), but head movements very seldom occur in the male-limited type (Fig. L 3a).

In both types many of those affected have also optical defects of the eyes, especially astigmatism. No mental or nerve complications in either kind.

*Key.*

- ♂ and ♀ male and female with Nystagmus.  
 Otherwise as for L 1.

L 4

Pedigree of hereditary Cataract. The cataract in this genealogy begins in childhood, and usually progresses so as to require operation by the time its subject is grown up; results of operation usually good and lasting. Most of the affected members still living; of the four



dead, none died before 54, and two of them lived to 78 and 83 respectively. Both sexes affected and either sex may transmit. No other eye disease and no prevalent constitutional diseases or degeneracies in the cataractous stock.

Many similar pedigrees are known.

*Key.*

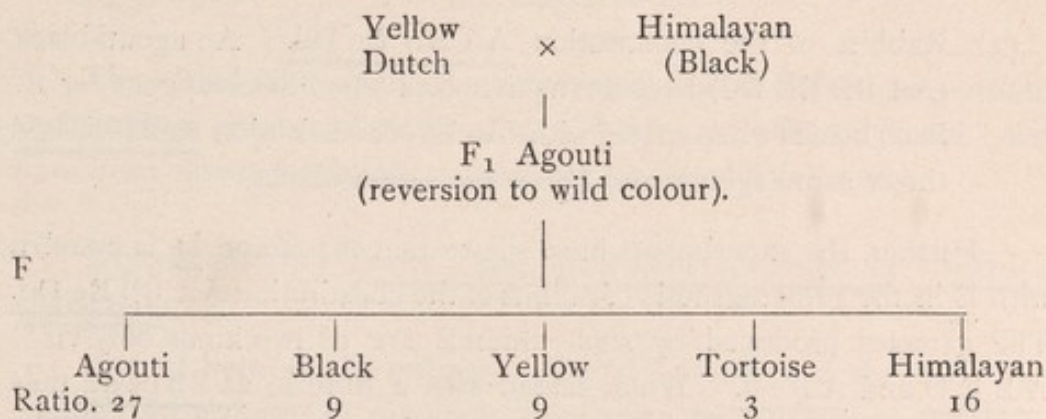
♂ and ♀ male and female with cataract.  
Otherwise as for L. 1.

EXHIBITED BY PROFESSOR R. C. PUNNETT, F.R.S.

M

MENDELIAN INHERITANCE IN RABBITS.

M 1.



Factors concerned :—

- A. the factor for agouti which turns a black into an agouti, or a tortoise into a yellow.
- E. the factor for extension of pigment which when present turns a yellow into an agouti, or a tortoise into a black.
- S. the factor for self colour which turns a Himalayan into a self coloured animal.

All the rabbits in this experiment contain the factor for black (B).

The Himalayan pattern can occur in all four colour classes. Thus the agouti Himalayan has lighter points than the black Himalayan. (C.F. 2 specimens shown.)

M 2.

Experiments to demonstrate that black rabbits may be of different constitution genetically.

Factors concerned in these experiments are :—

- A. the agouti factor.
- E. the factor for extension of pigment.
- D. a factor for density of pigmentation.



All the rabbits are homozygous for the black factor B.

Homozygous agouti = AA BB EE.

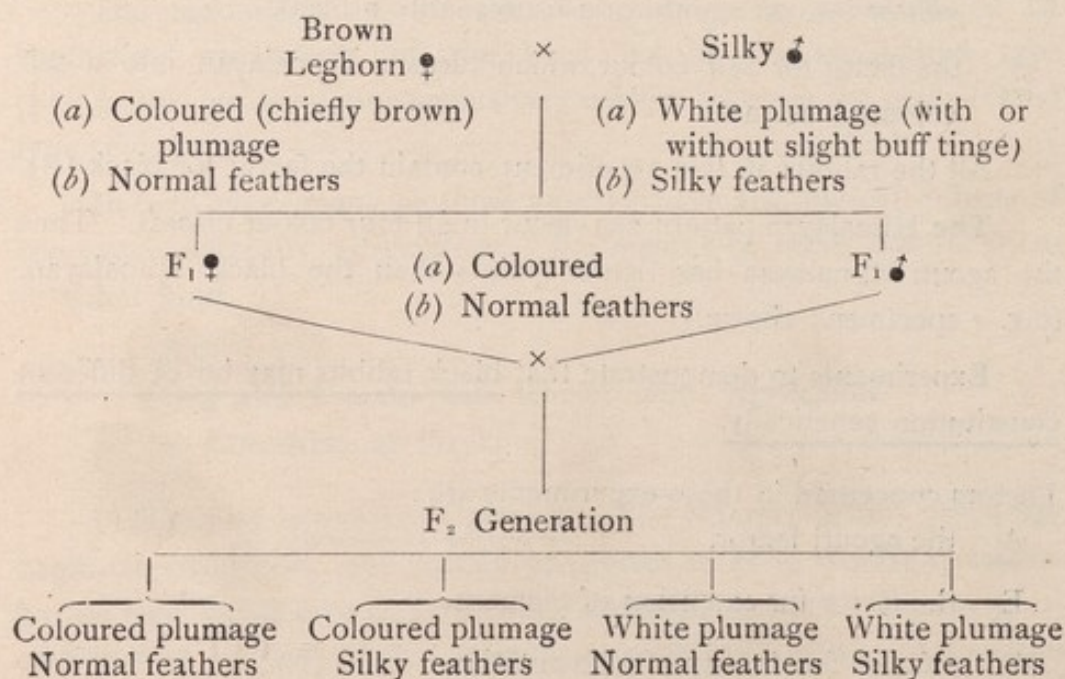
Black rabbits may be either :—

- (1) Rabbits of the constitution aa BB EE. These breed true and behave as simple recessive to agouti.
- (2) Rabbits of the constitution AA BB EE DD, *i.e.*, agoutis to which a double dose of D has been added are pure blacks in appearance, when only a single dose of D is added the animal shows some agouti markings and is an agouti-black. Such rabbits have always proved to be heterozygous, and when mated together give blacks, agouti-blacks, and agoutis in the ratio 7 : 6 : 3.
- (3) Rabbits of the constitution AA BB Ee Dd. An agouti-black (AA BB EE Dd) becomes a pure black when heterozygous for E. Such blacks when mated with blacks of constitution aa BB EE dd throw some agoutis and also some agouti-blacks.

Further, the experiments have shewn that the factor D is coupled with E in the gametogenesis of rabbits of the constitution AA BB Ee Dd. The gametes produced by such animals are of two kinds only viz—A B E D and A B e d. When mated with a tortoise aa BB ee dd they give blacks and yellows only—and no agoutis. So far as is known, the coupling between E and D is complete. At present this is the only case of coupling between characters yet worked out in a mammal.

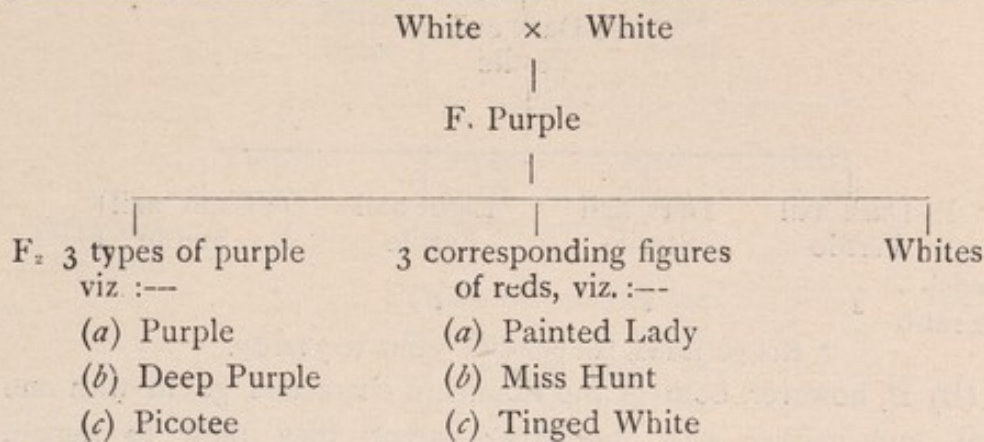
M 3

Experiments with Poultry, illustrating the recombination of characters.





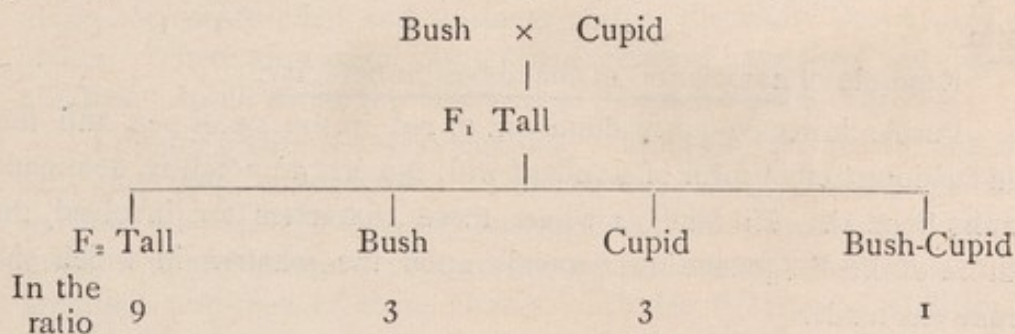
Experiment with Sweet Peas, illustrating reversion on crossing, M 4  
followed by the appearance of numerous types in next generation.



The varied forms in the F<sub>2</sub> generation appear in definite proportions and a certain number of plants of each variety are already "fixed," and have been shewn, by further experiment, to breed true to type.

Experiment with Sweet Peas, illustrating reversion in structural M 5  
characters.

A cross between the ordinary "Cupid" dwarfs and the half-dwarf "Bush" form results in a complete reversion to the normal tall habit such as occurs in the wild sweet pea. A further generation raised from these reversionary tall consists of tall, Bush, Cupids, and a new form, the "Bush-Cupid." These last combine the erect bush-like habit of growth with the dwarfness of the Cupid.

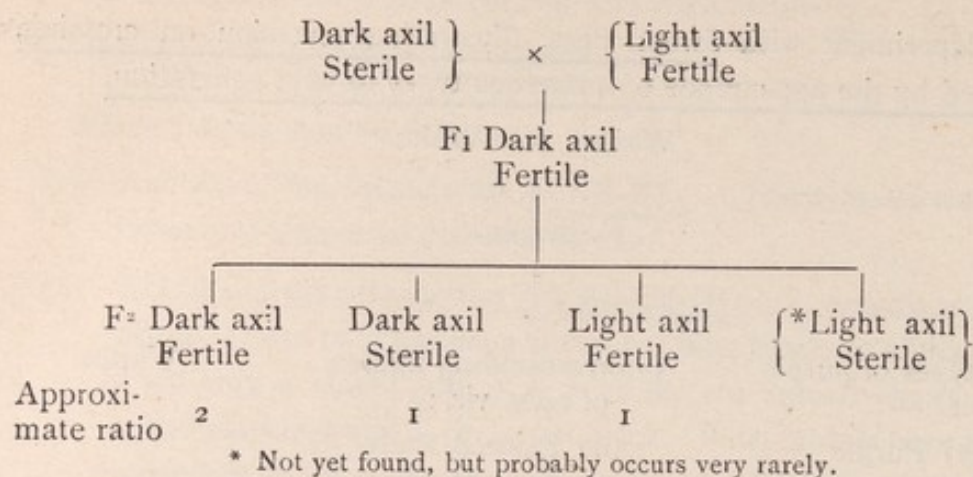


Example of association of characters in heredity.

M 6a

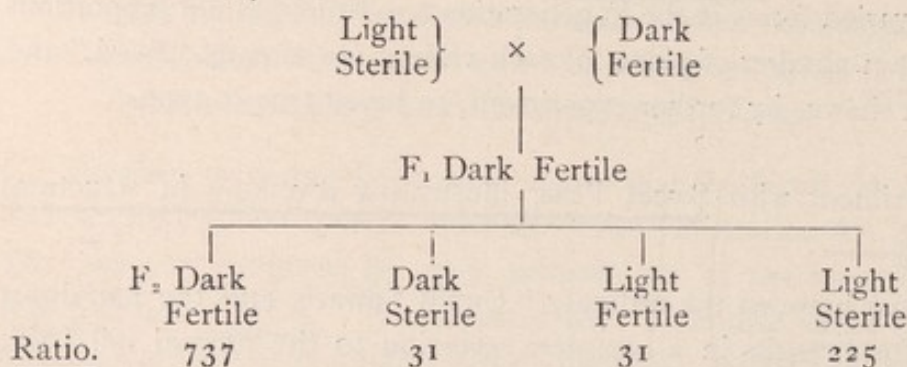
In the sweet pea the dark reddish purple axil is dominant to the light green one. Also the fertile condition of the anthers is dominant to the contabescent sterile condition. In families which involve these characters, the nature of the F<sub>2</sub> generation depends upon the way in which the original cross was made. (A) When each parent has one of the dominant characters.





M 6b

(B) If, however, both of the dominant characters go in with one parent, and neither with the other parent, they tend to remain associated in F<sub>2</sub>; thus:—



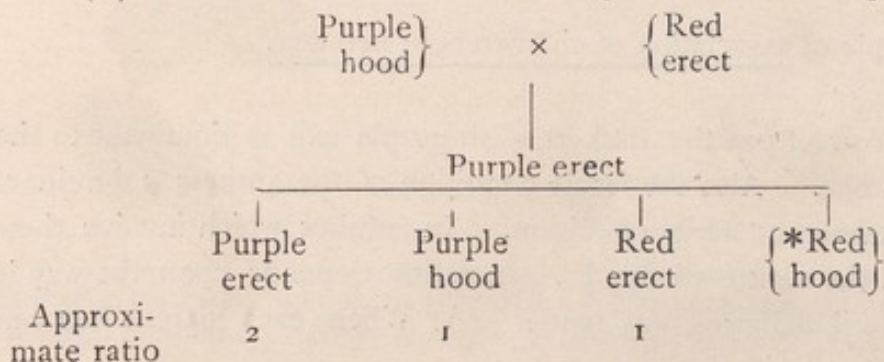
In such a cross the classes resembling the two original parents tend to be produced in excess, while the other two combinations are produced much more rarely. Nevertheless, the ratio of dark to light axil, and of fertile to sterile anthers, is, in each case, a simple 3 : 1 ratio.

M 7a

Example of association of characters in heredity.

Purple flower colour is dominant to red in the sweet pea, and the old-fashioned erect form of standard with the central notch is dominant to the hooded. In families where these characters are involved, the nature of the F<sub>2</sub> generation depends upon the manner in which the cross was made.

(A) When one dominant character goes in with each parent.









opportunity to care for children was very limited. Physicians were not as easily reached, and the methods and appliances of modern times were not at hand. Yet, even under these circumstances, it will be noticed of the 822 persons listed on the chart, that only 68 deaths were those of persons under 25 years.

	GENERATIONS						TOTALS
	I	II	III	IV	V		
PERSONS CHARTED	1	10	10	10	10	10	241
" OF MATURE AGE	1	6	3	34	15	13	64
ABILITY-LITERARY	1	6	7	42	16	54	141
MUSICAL	1	5	30	63	1	2	101
ARTISTIC	1	1	9	14	27	1	57
CONSTRUCTIVE	1	1	4	2	7	1	15
VARIOUS	1	2	16	3	15	3	44
TOTALS	2	11	36	109	7	7	258
NO SPECIAL ABILITY	1	3	8	1	2	1	14
ABILITY UNKNOWN	1	4	26	65	146	61	303
HEIGHT 5 FT. OR LESS	1	3	2	1	2	1	9
5-1 TO 5-2	1	2	3	8	10	16	40
5-3 TO 5-4	1	2	2	14	9	12	39
5-5 TO 5-6	1	2	2	19	4	14	42
5-7 TO 5-8	1	1	1	9	2	10	25
5-9 TO 5-10	1	2	16	3	11	3	35
5-11 TO 6-0	1	3	1	4	1	1	9
6-1 TO 6-2	1	6	13	72	31	71	203
6-3 TO 6-4	1	5	46	51	166	61	336
TOTALS	2	12	102	212	212	212	822
WEIGHT 100 LBS. OR LESS	1	1	10	10	11	1	33
101 TO 120	1	1	6	28	10	27	78
121 TO 150	1	3	4	23	5	11	47
151 TO 170	1	2	4	7	3	5	27
171 TO 200	1	3	1	3	1	1	10
201 TO 220	1	6	17	73	31	58	200
221 TO 250	1	1	45	51	179	58	339
TOTALS	2	12	102	212	212	212	822
UNKNOWN	1	1	1	1	1	1	5

	GENERATIONS						TOTALS
	I	II	III	IV	V		
HEALTH-EXCELLENT	1	10	10	10	10	10	241
GOOD	1	6	3	34	15	13	64
FAIR	1	6	7	42	16	54	141
DELICATE	1	5	3	3	4	8	18
POOR	1	1	1	2	4	4	12
TOTALS	2	11	36	109	7	7	258
UNKNOWN	1	6	15	88	37	208	428
DIED UNDER ONE YEAR	1	3	24	45	147	58	348
1 TO 5 YEARS	1	1	5	13	1	2	26
6 TO 25 YEARS	1	1	11	11	1	1	20
26 TO 40 YEARS	1	1	3	5	2	1	22
41 TO 70 YEARS	1	1	3	5	2	1	3
PAST 70 YEARS	1	1	2	5	2	1	10
AGE UNKNOWN	1	1	2	7	37	41	4
TOTALS	2	12	73	102	102	102	428
CAUSE OF DEATH	1	1	1	1	1	1	6
PREMATURE BIRTH	1	1	1	1	1	1	6
INFANTILE COMPLAINTS	1	1	1	1	1	1	6
DIPHTHERIA	1	1	1	1	1	1	6
SCARLET FEVER	1	1	1	1	1	1	6
MEASLES	1	1	1	1	1	1	6
TYPHOID FEVER	1	1	1	1	1	1	6
PNEUMONIA	1	1	1	1	1	1	6
CONSUMPTION	1	1	1	1	1	1	6
OPERATIONS	1	1	1	1	1	1	6
CHILD BIRTH	1	1	1	1	1	1	6
VARIOUS	1	1	1	1	1	1	6
UNKNOWN	1	1	1	1	1	1	6
TOTALS	2	12	73	102	102	102	428



## EXHIBITED BY THE EUGENICS EDUCATION SOCIETY.

O

## O 1 MENDELISM.

Theoretical Example of Mendelian Inheritance in Peas. (After *O 1a Thomson.*)

Theoretical Example of Mendelian Inheritance in Peas. (After *O 1b Laurie.*)

Theoretical Example of Mendelian Inheritance, with Dominance, *O 1c* in Mice. (After *Laurie.*)

Illustration of the Theory of Gametic Purity in Mendelian Heredity *O 1d* in Mice. (After *Laurie.*)

Example of Mendelian Inheritance, without Dominance, in Blue *O 1e* Andalusian Fowls. (After *Laurie.*)

Illustration of the Theory of Gametic Purity in Mendelian *O 1f* Heredity, in Blue Andalusian Fowls. (After *Laurie.*)

Standard Scheme of Descent. (After *Galton*) *O 2*

Comparison of Mr. Booth's Classification of All London with *O 3* the Normal Classes. (After *Galton.*)

Descent of Qualities in a Population. (After *Galton.*) *O 4*

Inheritance of Ability, as exemplified in the Darwin, Galton, *O 5* and Wedgwood Families. (After *Whetham and Marshall.*)

EXHIBITED BY THE AMERICAN BREEDERS' ASSOCIATION—EUGENICS P  
SECTION.

## C. B. DAVENPORT, ESQ.

Charts of Statistics of Defectives. *P 1-16*

Charts of Classification of Defectives.

Charts of Principles of Heredity.

Pedigrees collected by field-workers in America.

## EXHIBITED BY CYRIL BURT, ESQ.

Q

Description of Diagrams illustrating the use of experimental Tests  
of Mental Capacities.

## 1. "Experimental Tests of General Intelligence."

Q 1

A List of twelve tests applied to two schools at Oxford. The first two columns of figures indicate the "reliability" or self-consistency of the tests as compared with that of examinations and master's general impression. The second two columns give the correlations of the results of the tests with the children's "general intelligence." It will be



seen that several of the tests of higher mental processes are as reliable as the scholastic tests at present in vogue, and that they correlate quite as highly with intelligence. Further experiments show that while examinations and master's estimates measure knowledge and skill acquired by memory and training, the tests seem to provide measurements rather of innate capacities; and that children of superior parentage (*e.g.* the preparatory school boys) are themselves superior at tests, which show an appreciable positive correlation with intelligence (*i.e.* all except tests of touch and weight). The tests thus provide an experimental demonstration of the inheritance of mental ability and a means of measuring the same. (References:—Burt, Experimental Tests of General Intelligence, British Journal of Psychology, Vol. III, Pts. 1 and 2.) Burt, Inheritance of Mental Characteristics, Eugenics Review, 1912, July.

Q 2. 2. Sex-differences in mental tests.

A list of experimental tests applied to children of both sexes with a view to measuring their innate capacities for performing mental processes of different levels of complexity. The amount of divergence between the sexes, is indicated by the column in red. It will be seen that the sex-differences become smaller, the higher the level tested. There is some evidence to show that these differences are the result of inheritance and are not the result of difference of tradition or environment. (References: Burt and Moore, the Mental Differences between the sexes. Journal of Experimental Pedagogy, 1912, June. Burt, Inheritance of Mental Characteristics, Eugenics Review, 1912, July.)

EXHIBIT BY DR. GEORGE PAPILLAUT.

R Four sets of questions drawn up by Dr. George Papillault, Professor of Sociology in the Paris School of Anthropology, with a view to noting and comparing the bio-social characteristics of individuals belonging to different groups of population.

R 1 Set of questions adopted by the Commission of Criminology instituted and presided over by Mr. ——— Keeper of the Seals; Vice-presidents, Messrs. Léon Bourgeois, senator, and Dr. Dron, Vice-president of the Chamber of Deputies and Reporter to the Commission; Scientific Secretary, Dr. G. Papillault.

This set of questions comprises:

- 1st. An individual criminological chart for the purpose of showing biological and social characteristics of the prisoners.
- 2nd. Family Charts for each of the ancestors, descendants or collateral relatives of the prisoner and more particularly intended to note hereditary characteristics.



These Charts have been issued with a view to a methodical enquiry on the criminal, under the direction of the Scientific and Criminological Department.

Set of questions of the French Lay Mission, designed to note the characteristics of the young natives and of their relatives in the French Colonies. The teachers will have to return them filled up with the greatest care to the Lay Mission, where Dr. Papillault, before their departure, delivered a series of lectures to teach them how to proceed. R 2

Questions on the half-breeds, adopted by the Paris Society of Anthropology, and designed to show the bio-social characteristics of the half-breeds proceeding from cross-breeding between different races. R 3

Questions asked by the General Psychological Institute for the purpose of undertaking a vast enquiry on the value taxionomic, organic, bio-social, and selective of the different human races which actually exist in the French Colonies, and particularly in North Africa. R 4

A like spirit and method governs these four sets of questions; to discard the verbalism which obstructs and imperils Sociology; to study characteristics precise, objective, easily controllable and comparable, and likely consequently to form statistics, which alone are capable of revealing characteristics of groups; to establish the correlations which these characteristics may present among themselves, and to arrive at last at the discovery of positive sociological laws.

EXHIBITED BY FREDERICK ADAMS WOODS, M.D. S

Thirteen photographic copies of authentic portraits of distinguished historical personages of the sixteenth century, showing that the boney framework of the face, especially about the nose and eyes, was not commonly the same as it is to-day.

These are samples of a much larger collection.

Charles VII., XV Century, eye-brows very high above the eyes. S 1

Mary of Lorraine, Queen of James of Scotland (National Portrait Gallery). Eyes far apart, and eye-brows high. S 2

Francis I. of France, French School, XVI. Century. (Louvre.) Eyes small, upper eye-lids peculiar, and typical of the period. S 3

Louse de Rieux Marquise d'Elboef, XVI. Century. (Louvre.) Naso-orbital region typical, eyes small far apart, upper part of the nose broad and flat, upper eye-lids long (vertical distance between eye and eye brow considerable.) S 4



- S 5 Dr. Stokesley, Bishop of London (Holbein.) Eyes far apart upper part of nose broad.
- S 6 Jane Seymour (Holbein). Eyes far apart, upper eye lids characteristic.
- S 7 Jean de Bourbon, Comte d'Enghien. XVI Century. Eyes far apart, upper eye-lids vertically prominent.
- S 8 Portrait of a young German gentleman.  
The eye-lids are modern, that is the eyes are set in deeply under the arch, but the eyes themselves are far apart, and the upper part of the nose is broad.
- S 9 Mary Queen of England. (National Portrait Gallery).  
It would seem that allowance might be made for the crudity of the portrait, but the naso-orbital region is typical of the northern races during the XVI century.
- S 10 Holbein's Duke of Norfolk. In the Royal Gallery at Windsor Castle.  
Eyes are more deep-set under the superorbital arch than is usual in portraits of the period, but the upper part of the nose is broad, and eyes are far apart.
- S 11 Henry VIII., attributed to Holbein but on doubtful authority.  
Broad flat nose, small eyes set far apart, eye-brows arching upward and outward. Observe the upper eye-lids in contrast to the Italian by Lorenzo Lotto, which shows the usual modern type of eye-lid.
- S 12 Portrait of the Prothonotary Apostolic Juliano. (Lorenzo Lotto.)  
Modern type of face. Eyes deep set in under the superorbital arch and eye-brow. Upper part of the nose delicate and projecting. This type of face is occasionally, but only rarely met with north of the Alps during the early period. It is common enough in portraits of Italians.
- S 13 Portrait of a German scholar, by Holbein. Modern type, very rarely found.





