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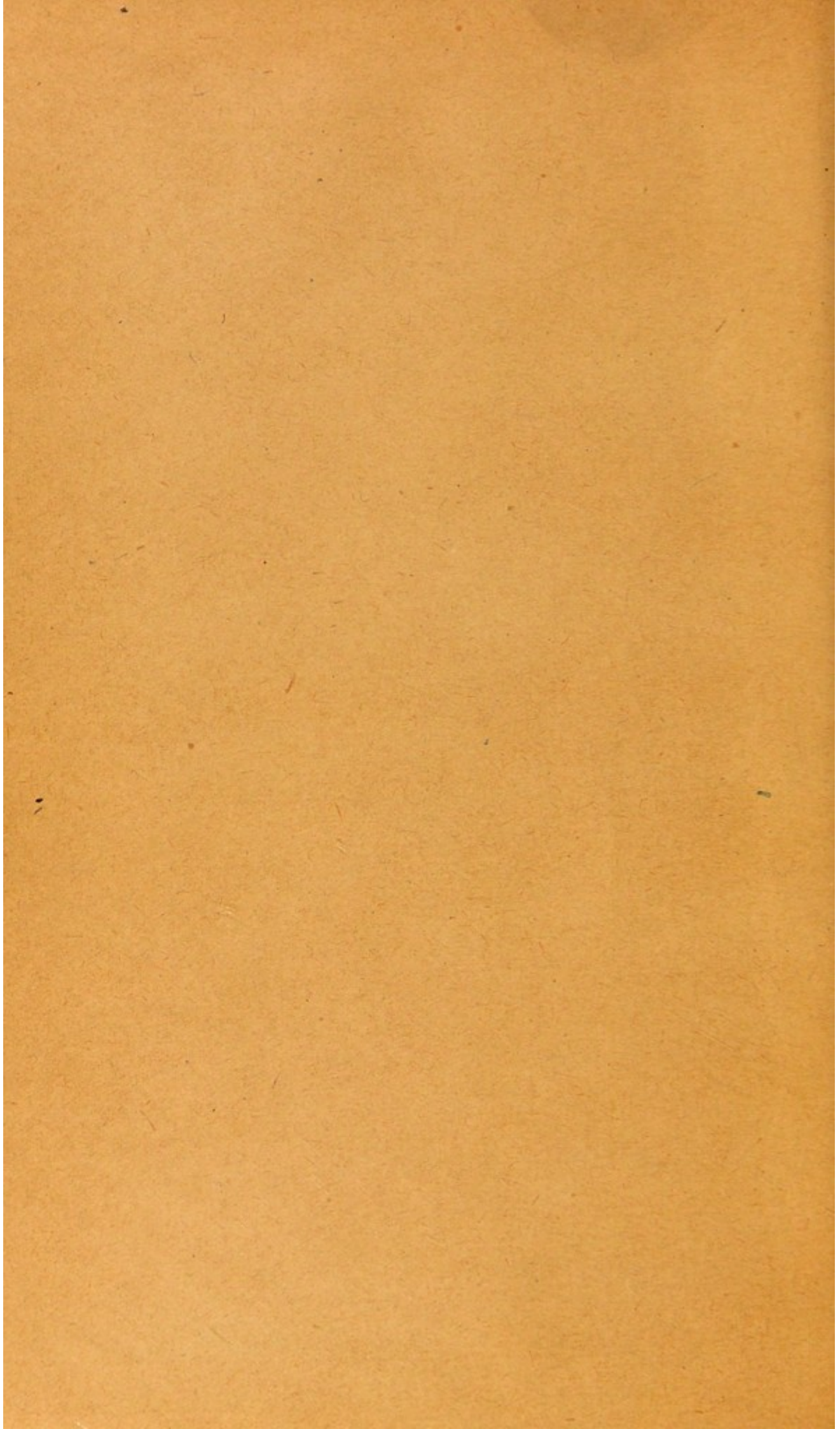


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BY

ARTHUR J. EVANS

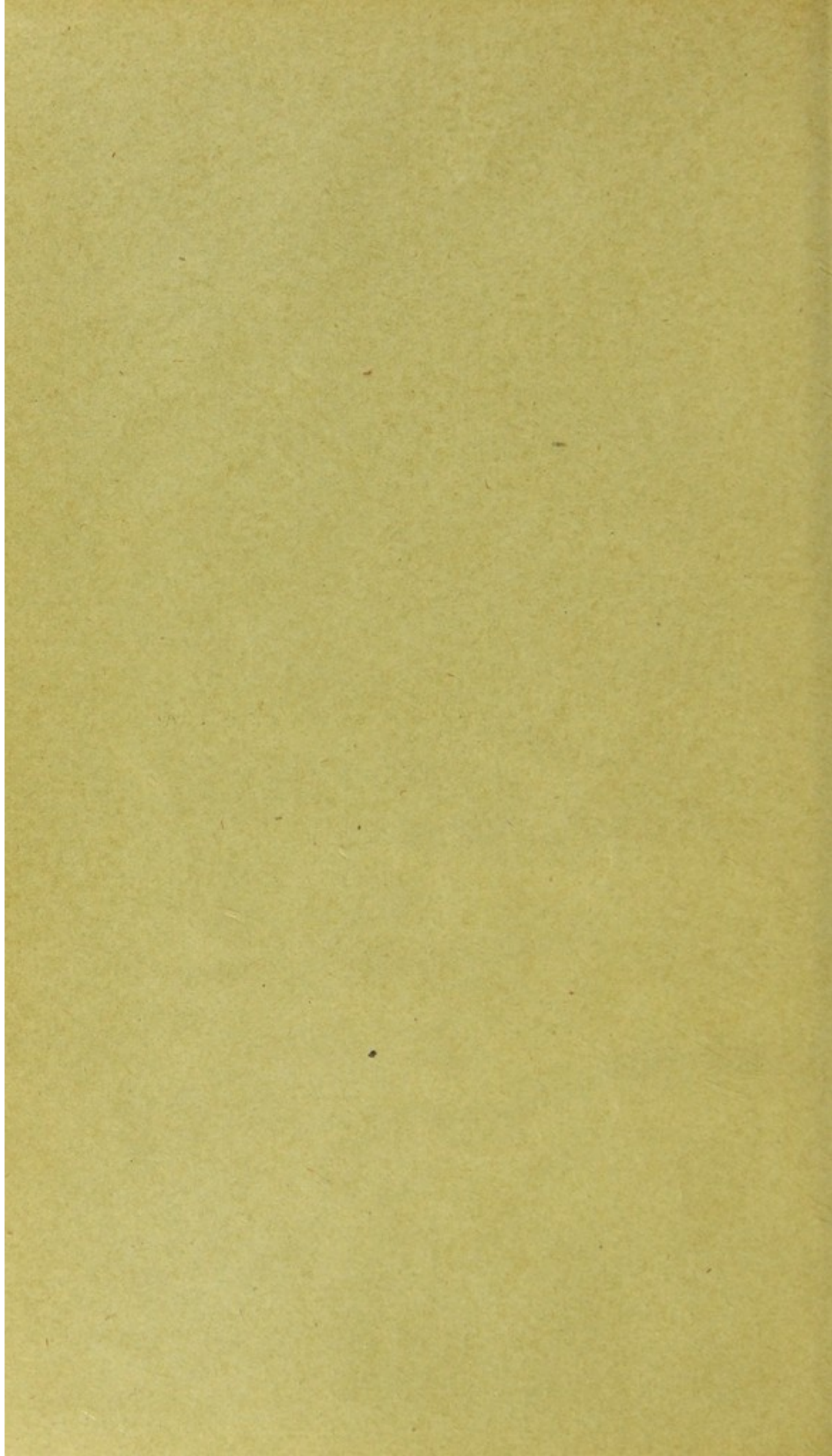
FROM THE SMITHSONIAN REPORT FOR 1913, PAGES 617-637
(WITH PLATES 1-3)



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ARCHAEOLOGY. Crete

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CRETE. Archaeology



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THE MINOAN AND MYCENAEAN ELEMENT IN HELLENIC LIFE.¹

By ARTHUR J. EVANS.

[With 3 plates.]

In his concluding address to this society our late president remarked that he cared more for the products of the full maturity of the Greek spirit than for its immature struggles, and this preference for fruits over roots is likely to be shared by most classical scholars. The prehistoric civilization of the land which afterwards became Hellas might indeed seem far removed from the central interests of Greek culture, and it was only with considerable hesitation that I accepted, even for a while, the position in which the society has placed me. Yet I imagine that my presence in this chair is due to a feeling on its part that what may be called the embryological department has its place among our studies.

Therefore I intend to take advantage of my position here to-day to say something in favor of roots, and even of germs. These are the days of origins, and what is true of the higher forms of animal life and functional activities is equally true of many of the vital principles that inspired the mature civilization of Greece—they can not be adequately studied without constant reference to their anterior stages of evolution. Such knowledge can alone supply the key to the root significance of many later phenomena, especially in the domain of art and religion. It alone can indicate the right direction along many paths of classical research. Amidst the labyrinth of conjecture we have here an Ariadnê to supply the clue. And who, indeed, was Ariadnê herself but the great goddess of Minoan Crete in her Greek adoptive form qualified as the most holy?

“The chasm,” remarks Prof. Gardner, “dividing prehistoric from historic Greece is growing wider and deeper.”² In some respects perhaps—but looking at the relations of the two as a whole I venture to believe that the scientific study of Greek civilization is becoming

¹ From the address of the president delivered to the Hellenic Society, June, 1912. Reprinted by permission from *The Journal of Hellenic Studies*, London, vol. 32, pt. 2, 1912, pp. 277–297.

² *J. H. S.*, xxxi (1911), p. lix.

less and less possible without taking into constant account that of the Minoan and Mycenaean world that went before it.

The truth is that the old view of Greek civilization as a kind of "enfant de miracle" can no longer be maintained. Whether they like it or not, classical students must consider origins. One after another the "inventions" attributed by its writers to the later Hellas are seen to have been anticipated on Greek soil at least a thousand years earlier. Take a few almost at random: The Aeginetan claim to have invented sailing vessels, when such already plowed the Aegean and the Libyan seas at the dawn of the Minoan age; the attribution of the great improvement in music, marked by the seven-stringed lyre, to Terpander of Lesbos in the middle of the seventh century B. C.—an instrument played by the long-robed Cretan priests of Hagia Triada some 10 centuries before, and, indeed, of far earlier Minoan use. At least the antecedent stage of coinage was reached long before the time of Pheidôn, and the weight standards of Greece were known ages before they received their later names.

Let us admit that there may have been reinventions of lost arts. Let us not blink the fact that over a large part of Greece darkness for a time prevailed. Let it be assumed that the Greeks themselves were an intrusive people and that they finally imposed their language on an old Mediterranean race. But if, as I believe, that view is to be maintained it must yet be acknowledged that from the ethnic point of view the older elements largely absorbed the later. The people whom we discern in the new dawn are not the pale-skinned northerners—the "yellow-haired Achaeans" and the rest—but essentially the dark-haired, brown-complexioned race, the *Φόινικες* or "Red men" of later tradition, of whom we find the earlier portraiture in the Minoan and Mycenaean wall paintings. The high artistic capacities that distinguish this race are in absolute contrast to the pronounced lack of such a quality among the neolithic inhabitants of those more central and northern European regions, whence ex hypothesi the invaders came. But can it be doubted that the artistic genius of the later Hellenes was largely the continuous outcome of that inherent in the earlier race in which they had been merged? Of that earlier "Greece before the Greeks" it may be said, as of the later Greece, *capta ferum victorem cepit*.

It is true that the problem would be much simplified if we could accept the conclusion that the representatives of the earlier Minoan civilization in Crete and of its Mycenaean outgrowth on the mainland were themselves of Hellenic stock. In face of the now ascertained evidence that representatives of the Aryan-speaking race had already reached the Euphrates by the fourteenth century B. C. there is no a priori objection to the view that other members of the same linguistic group had reached the Aegean coasts and islands at an even

earlier date. If such a primitive occupation is not proved, it certainly will not be owing to want of ingenuity on the part of interpreters of the Minoan or connected scripts. The earliest of the Cretan hieroglyphs were hailed as Greek on the banks of the Mulde. Investigators of the Phaestos disk on both sides of the Atlantic have found an Hellenic key, though the key proves not to be the same, and as regards the linguistic forms unlocked it must be said that many of them represent neither historic Greek, nor any antecedent stage of it reconcilable with existing views as to the comparative grammar of the Indo-European languages.¹

The Phaestos disk, indeed, if my own conclusions be correct, belongs rather to the eastern Aegean coast lands than to prehistoric Crete. As to the Minoan script proper in its most advanced types—the successive linear types A and B—my own chief endeavor at the present moment is to set out the whole of the really vast material in a clear and collective form. Even then it may well seem presumptuous to expect that anything more than the threshold of systematic investigation will have been reached. Yet, if rumor speaks truly, the stray specimens of the script that have as yet seen the light have been amply sufficient to provide ingenious minds with a Greek—it is even whispered, an Attic—interpretation. For that it is not even necessary to wait for a complete signary of either of the scripts!

For myself I can not say that I am confident of any such solution. To me at least the view that the Eteocretan population, who preserved their own language down to the third century before our era, spoke Greek in a remote prehistoric age is repugnant to the plainest dictates of common sense. What certain traces we have of the early race and language lead us in a quite different direction. It is not easy to recognize in this dark Mediterranean people, whose physical characteristics can be now carried back at least to the beginning of the second millennium before our era, a youthful member of the Aryan-speaking family. It is impossible to ignore the evidence supplied by a long series of local names which link on the original speech of Crete and of a large part of mainland Greece to that of the primitive Anatolian stock, of whom the Carians stand forth as, perhaps, the purest representatives. The name of Knossos itself, for instance, is distinctively Anatolian; the earlier name of Lyttos—Karnessopolis—contains the same element as Halikarnassos. But it is useless to multiply examples, since the comparison has been well worked out by Fick and Kretschmer and other comparative philologists.

¹I especially refer to some of the strange linguistic freaks of Dr. Hempl. Prof. A. Cuny has faithfully dealt with some of these in the *Revue des Études Anciennes*, T. XIV (1912), pp. 95, 96. The more plausible attempt of Miss Stawell leaves me entirely unconvinced.

When we come to the religious elements the same Asianic relationship is equally well marked. The great goddess of Minoan Crete had sisters east of the Aegean even more long-lived than herself. The Korybantes and their divine child range in the same direction, and the fetish cult of the double axe is inseparable from that of the Carian labrys which survived in the worship of the Zeus of Labraunda.

Some of the most characteristic religious scenes on Minoan signets are most intelligible in the light supplied by cults that survived to historic times in the lands east of the Aegean. Throughout those regions we are confronted by a perpetually recurrent figure of a goddess and her youthful satellite—son or paramour, martial or effeminate by turns, but always mortal, and mourned in various forms. Attis, Adonis, or Thammuz, we may add the Ilian Anchises,¹ all had tombs within her temple walls. Not least, the Cretan Zeus himself knew death, and the fabled site of his monument on Mount Juktas proves to coincide with a votive shrine over which the goddess rather than the god originally presided. So too, on the Minoan and Mycenaean signets we see the warrior youth before the seated goddess, and in one case actually seem to have a glimpse of the "tomb" within its temenos. Beside it is hung up the little body shield, a mourning votary is bowed toward it, the sacred tree and pillar shrine of the goddess are hard by.² In another parallel scene the female mourner lies prone above the shield itself, the divine connection of which is shown by the sacred emblems seen above, which combine the double axe and life symbol.³

Doubtless some of these elements, notably in Crete, were absorbed by later Greek cult, but their characteristic form has nothing to do with the traditions of primitive Aryan religion. They are essentially non-Hellenic.

An endeavor has been made, and has been recently repeated, to get over the difficulty thus presented by supposing that the culture exemplified by the Minoan palaces of Crete belongs to two stages, to which the names of "Carian" and "Achaean" have been given. Rough and ready lines of division between "older" and "later" palaces have been laid down to suit this ethnographic system. It may be confidently stated that a fuller acquaintance with the archeological evidence is absolutely fatal to theories such as these.

The more the stratigraphical materials are studied, and it is these that form our main scientific basis, the more manifest it appears that

¹ "Tombs" of Anchises—the baetylic pillar may also be regarded as sepulchral—were erected in many places, from the Phrygian Ida to the sanctuary of Aphrodite at Eryx.

² See my "Mycenaean Tree and Pillar-Cult" (*J. H. S.*, 1901), pp. 81, 83, and p. 79, fig. 53.

³ *Op. cit.*, p. 78, fig. 52.

while on the one hand the history of the great Minoan structures is more complicated than was at first realized, on the other hand the unity of that history, from their first foundation to their final overthrow, asserts itself with ever-increasing emphasis. The periods of destruction and renovation in the different palaces do not wholly correspond. Both at Knossos and at Phaestos, where the original buildings go back well nigh to the beginning of the middle Minoan age, there was a considerable overthrow at the close of the second middle Minoan period. Another catastrophe followed at Knossos at the end of the third middle Minoan period. At Phaestos, on the other hand, the second, and in that case the final, destruction took place in the first late Minoan period. The little palace of Hagia Triada, the beginnings of which perhaps synchronize with those of the second palace of Phaestos, was overthrown at the same time, but the Minoan sovereigns who dwelt in the later palace of Knossos seem to have thriven at the expense of their neighbors. Early in the second late Minoan period, when the rival seats were in ruins, the Knossian Palace was embellished by the addition of a new façade, on the central court of which the room of the throne is a marvelous surviving record. At the close of this second late Minoan age the palace of Knossos was finally destroyed. But the tombs of Zafer Papoura show that even this blow did not seriously break the continuity of local culture, and the evidence of a purely Minoan revival in the third late Minoan age is still stronger in the new settlement of Hagia Triada, which may claim the famous sarcophagus as its chief glory. There is no room for foreign settlement as yet in Crete,¹ though the reaction of mainland Mycænæan influences made itself perceptible in the island² toward the close of the third late Minoan period.

Here then we have a story of ups and downs of insular life and of internecine struggles like those that ruined the later cities of Crete, but with no general line of cleavage such as might have resulted from a foreign invasion. The epochs of destruction and renovation by no

¹ There is no foundation for the view that the later oblong structure at Hagia Triada is a megaron of mainland type. The mistake, as was pointed out by Noack (*Ovalhaus und Palast in Kreta*, p. 27, n. 24) and, as I had independently ascertained, was due to the omission of one of the three cross walls on the Italian plan. By the close of the Minoan age in Crete (*L. M. III, b*) the mainland type of house seems to have been making its way in Crete. An example has been pointed out by Dr. Oelmann (*Ein Achäisches Herrenhaus auf Kreta*, *Jahrb. d. Arch. Inst.* xxvii (1912), p. 38, seqq.) in a house of the reoccupation period at Gournià, though there is no sufficient warrant for calling it "Achaean." It is also worth observing that one of the small rooms into which the large "megaron" of the "Little Palace" at Knossos was broken up in the reoccupation period has a stone-built oven or fireplace set up in one corner. This seems to represent a mainland innovation.

² This concluding and very distinctive phase may be described as late Minoan III, *b* (see preceding note) and answers at Knossos to the period of reoccupation, *L. M. III, a*, being represented there by the cemetery of Zafer Papoura, which fills a hiatus on the palace site. Judging from figures on very late lentoid bead seals in soft material (steatite), the long tunic of mainland fashions was coming in at the very close of the Minoan age in Crete.

means synchronize in different Minoan centers, but when we come to regard the remains themselves as stratified by the various catastrophes it becomes evident that they are the results of a gradual evolution. There is no break. Alike in the architectural remains and in the internal decorations, in every branch of art the development is continuous; and though the division into distinct periods stratigraphically delimited is useful for purposes of classification, the style of one phase of Minoan culture shades off into that of another by imperceptible gradations. The same is true of the remains of the early Minoan periods that lie behind the age of palaces, and the unity of the whole civilization is such as almost to impose the conclusion that there was a continuity of race. If the inhabitants of the latest palace structures are to be regarded as "Achaean," the Greek occupation of Crete must, on this showing, be carried back to Neolithic times. A consequence of this conclusion—improbable in itself—would be that these hypothetical Greeks approached their mainland seats from the south instead of the north.

Who would defend such a view? Much new light has recently been thrown on the history of the mainland branch of the Minoan culture at Mycenae by the supplementary researches made under the auspices of the German Institute at Athens, at Tiryns, and Mycenae. It is now clear that the beginnings of this mainland plantation hardly go back beyond the beginning of the first late Minoan period—in other words, long ages of civilized life in Minoan Crete had preceded the first appearances of this high early culture on the northern shores of the Aegean. From the first there seems to have been a tendency among the newcomers to adapt themselves to the somewhat rougher climatic conditions, and, no doubt in this connection, to adopt to a certain extent customs already prevalent among the indigenous population. Thus we see the halls erected with a narrower front and a fixed hearth, and there is a tendency to wear long-sleeved tunics reaching almost to the knees. An invaluable record of the characteristic fashions of this Mycenaean branch has been supplied by the fresco fragments discovered at Tiryns from which, after long and patient study, Dr. Rodenwaldt has succeeded in reconstructing a series of designs.¹

These frescoes are not only valuable as illustrations of Mycenaean dress but they exhibit certain forms of sport of which as yet we have no record in Minoan Crete, but which seem to have had a vogue on the mainland side. The remains of an elaborate composition representing a boar hunt is the most remarkable of these, and though belonging to the later palace and to a date parallel with the third late Minoan period shows extraordinary vigor and variety. Cer-

¹ In course of publication.

tainly one of the most interesting features in this composition—thoroughly Minoan in spirit—is the fact that ladies take part in the hunt. They are seen driving to the meet in their chariots, and following the quarry with their dogs. Atalanta has her Mycenaean predecessors, and the Kalydonian boar hunt itself may well represent the same tradition as these Tirynthian wall paintings.

But the point to which I desire to call your special attention is this: In spite of slight local divergences in the domestic arrangements or costume, the “Mycenaean” is only a provincial variant of the same “Minoan” civilization. The house planning may be slightly different, but the architectural elements down to the smallest details are practically the same, though certain motives of decoration may be preferred in one or the other area. The physical types shown in the wall paintings are indistinguishable. The religion is the same. We see the same nature goddess with her doves and pillar shrines; the same baetylic worship of the double axes; the same sacral horns; features which, as we now know, in Crete may be traced to the early Minoan age. The mainland script, of which the painted sherds of Tiryns have now provided a series of new examples, is merely an offshoot of the earlier type of the linear script of Crete and seems to indicate a dialect of the same language.

In the palace history of Tiryns and Mycenae we have evidence of the same kind of destruction and restoration that we see in the case of those of Minoan Crete. But here, too, there is no break whatever in the continuity of tradition, no trace of the intrusion of any alien element. It is a slow, continuous process of decay, and while at Tiryns the frescoes of the original building were replaced in the second palace by others in a slightly inferior style, those of the Palace of Mycenae, to a certain extent at least, as Dr. Rodenwaldt has pointed out, survived its later remodeling, and were preserved on its walls to the moment of its destruction.

The evidence as a whole must be regarded as conclusive for the fact that the original Minoan element, the monuments of which extend from the Argolid to Thebes, Orchomenos, and Volo, held its own in mainland Greece till the close of the period answering to the third late Minoan in Crete. At this period no doubt the center of gravity of the whole civilization had shifted to the mainland side, and was now reacting on Crete and the islands—where, as in Melos, the distinctive “Mycenaean” megaron makes its appearance. But the return wave of influence can not, in the light of our present knowledge, be taken to mark the course of invading hordes of Greeks.

Observe, too, that in the late Minoan expansion which takes place about this time on the coasts of Canaan the dominant element still seems to have belonged to the old Aegean stock. The settlement of Gaza is “Minoan.” Its later cult was still that of the indigenous

Cretan god. In Cyprus, again, the first Aegean colonists brought with them a form of the Minoan linear script, and a civilization which sufficiently proclaims their identity with the older stock.

We must clearly recognize that down to at least the twelfth century before our era the dominant factor both in mainland Greece and in the Aegean world was still non-Hellenic, and must still unquestionably be identified with one or other branch of the old Minoan race. But this is far from saying that even at the time of the first appearance of the Minoan conquerors in the Peloponnese, or, approximately speaking, the sixteenth century B. C., they may not have found settlers of Hellenic stock already in the land. That there were hostile elements always at hand is clearly shown by the great pains taken by the newcomers at Tiryns, Mycenae, and elsewhere to fortify their citadels, a precaution which stands out in abrupt contrast to the open cities and palaces of Crete. In the succeeding period, that of the later Palace of Tiryns, we find on the frescoes representing the boar-hunting scene—dating perhaps from the thirteenth century B. C.—the first definite evidence of the existence of men of another and presumably subject race existing side by side with the Mycenaean. An attendant in a menial position, apparently helping to carry a dead boar, is there depicted with a yellow skin in place of the conventional red, which otherwise indicates the male sex. Is it possible that the paler color was here chosen to indicate a man of northern race?

That there was in fact in the Peloponnese a subject race of Hellenic stock during the whole or a large part of the period of Mycenaean domination is made highly probable by certain phenomena connected with the most primitive of the Greek tribes, namely the Arcadians, whose religion and mythology show peculiar affinities with those of Minoan Crete. Shortly after the break up of the Mycenaean society, during the period of invasion and confusion that seems to have set in about the eleventh century B. C., men of Arcadian speech (who must then have been in possession of the Laconian coast lands) appear in Cyprus in the wake of their former masters, and this Cypriote offshoot affords the best evidence of the extent to which this primitive Greek population had been penetrated with Minoan influences. The very remote date of this settlement is established by the important negative fact that the colonists had left their mainland homes before the use of the Phœnician alphabet was known in Greece. Considering the very early forms of that alphabet at the time when it was first taken over by the Greeks, this negative phenomenon may be taken to show that the Arcadian colonization of Cyprus took place before 900 B. C. The positive evidence seems to indicate a still higher date. Thus the fibulae and vases of the early tombs of the Kuklia Cemetery at Paphos show a distinct parallelism

with the sub-Mycenaean types from those of the Greek Salamis, and point to an impact on Cyprus from the mainland side about the eleventh century before our era, which may well have been due to the advent of the Pre-Dorian colonists from the Laconian shores. These, as we know from inscriptions, brought with them local cults, such as that of Amyklæ; but what is especially interesting to observe is the whole-hearted way in which they are seen to have taken over the leading features of the Minoan cult. Fanassa, the Queen, the Lady of the Dove, as we see her at Paphos, Idalion or Golgoi, is the great Minoan goddess. The Paphian temple to the end of the chapter is the Minoan pillar shrine. Were all these Minoan features taken over in Cyprus itself? May we not rather infer that, as the colonists arrived, with at least a sub-Mycenaean element in culture, so too they had already taken over many of the religious ideas of the older race in their mainland home? In the epithet "Ariadnê" itself, applied to the goddess both in Crete and Cyprus, we may perhaps see an inheritance from a pre-colonial stage.

In Crete, where Hellenic colonization had also effected itself in pre-Homeric times, the survival of Minoan religion was exceptionally great. The nature goddess there lived on under the indigenous names of Diktynna and Britomartis. A remarkable example of the continuity of cult forms has been brought to light by the Italian excavation of a seventh century temple at Prinià, containing clay images of the goddess with snakes coiled round her arms, showing a direct derivation from similar images in the late Minoan shrine of Gournià and the fine faïence figures of considerably earlier date found in the temple repositories at Knossos. At Hagia Triada the earlier sanctuary was surmounted by one of Hellenic date, in which, however, the male divinity had now attained prominence as the youthful Zeus Velchanos. As Zeus Kretagenes, he was the object of what was regarded in other parts of the Greek world as a heterodox cult. But in spite of the jeers of Kallimachos at the "Cretan liars" who spoke of Zeus as mortal, the worship persisted to late classical times and points of affinity with the Christian point of view were too obvious to be lost. It is at least a highly suggestive fact that on the ridge of Juktas, where the tomb of Zeus was pointed out to Byzantine times and on a height above his birth cave little shrines have been raised in honor of *Ἀθηνῆς Χριστοῦς*—Christ, the Lord.

In view of the legendary connection of Crete and Delphi, illustrated by the myth of the Delphian Apollo, the discovery there by the French excavators of part of a Minoan ritual vessel has a quite special significance. This object, to which M. Perdrizet first called attention, forms part of a marble rhyton in the form of a lioness's head of the same type, fabric, and material as those found with other

sacred vessels in a chamber adjoining the central shrine of Knossos. It clearly proves that at Delphi, too, the religion of the spot goes back to Minoan times and stands in close connection with a Cretan settlement.

How profoundly the traditions of Minoan and Mycenaean religion influenced the early cult of Greece has been nowhere illustrated more clearly than by the excavations of the British school at Sparta. A whole series of the types of ivory figurines there found are simply derivatives of the scheme of the Minoan goddess with her associated birds and animals. It was the same in Ionia. The Ephesian Artemis has the same associations as the lion goddess of Knossos, and among the jewels found by Mr. Hogarth in the Temple Treasure occur miniature representations of her double axe.

I will venture to point out another feature which the advanced religious art of Greece inherited from Minoan prototypes, such as those which influenced the Spartan ivories. The lions' gate scheme, appropriate to its position in a tympanum, is only one of a series of Late Minoan schemes of the same kind in which the central figure—either the divinity itself or (as in the above case) a sacred column, which as the pillar of the house, stands as the epitome of the temple—is set between two heraldically opposed animals.

Seal impressions from the palace shrine of Knossos show the Minoan goddess in this guise standing on her peak between her lion supporters. The same idea is carried out in a variety of ways on Minoan gems and signets.

The Mycenaean element in Doric architecture itself is generally recognized, but I do not think that it has been realized that even the primitive arrangement of the pediment sculptures goes back to a prehistoric model. That the gabled or pedimental front was itself known in Minoan times may be gathered from the designs of buildings on some intaglios of that date acquired by me in Crete (fig. 1 *a, b*).¹ When we realize that the pediment is in fact the functional equivalent of the tympanum on a larger scale, it is natural that an arrangement of sculpture appropriate to the one should have been adapted to the other.

In recently examining the remains of the pedimental sculptures from the early temple excavated by Dr. Dörpfeld at Palaeopolis in Corfù, which have now been arranged by him in the local museum (fig. 2),² the observation was forced upon me that the essential features of the whole scheme were simply those of the Mycenaean tympanum. The central divinity is here represented by the Gorgon, but on either side are the animal guardians, in this case apparently pards,

¹ The gem fig. 1*a* is from Central Crete (steatite). 1*b* is from Siteia (cornelian).

² Fig. 2 is taken from a diagrammatic sketch kindly supplied me by Mr. J. D. Bouchier, which accompanied his account of these discoveries in the Times.

heraldically posed. Everything else is secondary, and the scale of the other figures is so small that at a moderate distance, all including Zeus himself, disappear from view. The essentials of the architectural design were fulfilled by the traditional Minoan group. The rest was a work of supererogation.

The fragment of a sculptured lion found in front of the early sixth century temple at Sparta was clearly part of a pedimental scheme of the same traditional class.

The extent to which the Minoans and Mycenaeans, while still in a dominant position, impressed their ideas and arts on the primitive Greek population itself argues a long juxtaposition of the two elements. The intensive absorption of Minoan religious practices by the proto-Arcadians previous to their colonization of Cyprus, which itself can hardly be later than the eleventh century B. C., is a crucial instance of this, and the contact of the two elements thus involved itself implies a certain linguistic communion. When, reinforced by fresh swarms of immigrants from the northwest, the Greeks began to get the upper hand, the position was reversed, but the long previous interrelation of the two races must have facilitated the work of fusion. In the end, though the language was Greek, the physical characteristics of the later Hellenes prove that the old Mediterranean element showed the greater vitality. But there is one aspect of the fusion which has a special bearing on the present subject—an aspect very familiar to those who, like myself, have had experience of lands where nationalities overlap. A large part of its early population must have passed through a bilingual stage. In the eastern parts of Crete indeed this condition long survived. As late as the fourth century before our era the inhabitants still clung to their Eteocretan language, but we know from Herodotos that already in his day they were able to converse in Greek and to hand on their traditions in a translated form. It can not be doubted that at the dawn of history the same was true of the Peloponnese and other parts of Greece. This consideration does not seem to have been sufficiently realized by classical students, but it may involve results of a most far-reaching kind.

The age when the Homeric poems took their characteristic shape is the transitional epoch when the use of bronze was giving place to that of iron. As Mr. Andrew Lang well pointed out, they belong to a particular phase of this transition when bronze was still in use for weapons and armor, but iron was already employed for tools and implements. In other words the age of Homer is more recent than the latest stage of anything that can be called Minoan or Mycenaean. It is at most "sub-Mycenaean." It lies on the borders of the geometrical period, and though the archeological stratum with which it is associated contains elements that may be called "sub-Myce-

naean," it is, artistically speaking, a period of barbarism and degradation—a period when the great cities of whose rulers the poet sang had for some two centuries been heaps of ruins. The old art had passed away. The new was yet unborn.

"Homer" lies too high up in time for it to be admissible to seek for illustration among the works of nascent art in Greece, or the more or less contemporary importations, such as Cypro-Phœnician bowls of the seventh or sixth centuries B. C., once so largely drawn on for comparison. On the other hand, the masterpieces of Minoan and Mycenaean craftsmen were already things of the past in the days in which the Iliad and Odyssey took their organic form. Even the contents of the latest Mycenaean graves have nothing to do with a culture in which iron was already in use for cutting purposes and cremation practiced.

How is it, then, that Homer, though professedly commemorating the deeds of Achaean heroes, is able to picture them among surroundings which, in view of the absolute continuity of Minoan and Mycenaean history, we may now definitely set down as non-Hellenic? How explain the modes of combat borrowed from an earlier age and associated with huge body shields that had long been obsolete. Whence this familiarity with the court of Mycenae and the domestic arrangements of palaces that were no more?

I venture to believe that there is only one solution of these grave difficulties, and that this is to be found in the bilingual conditions which in the Peloponnese, at least, may have existed for a very considerable period. The Arcadian-speaking Greek population of that area, which apparently, at least as early as the eleventh century, before our era sent forth its colonists to Cyprus, had, as pointed out, been already penetrated with Minoan ideas to an extent which involves a long previous juxtaposition with the element that formerly dominated the country. They had assimilated a form of Minoan worship, and the hymns and invocations to the Lady of the Dove can hardly have been other than adaptations of those in use in the Mycenaean ritual—in the same way as the Greek hymn of the Dictaeon Temple must be taken to reflect an original handed down by Eteocretan choirs.

We may well ask whether a far earlier heroic cycle of Minoan origin might not to a certain extent have affected the lays of the primitive Greek population. When, in a bilingual medium, the pressure of Greek conquest turned the scales finally on the Hellenic side, may not something of the epic traditions of the Mycenaean society have been taken over? Englishmen, at least, who realize how largely Celtic and Romance elements bulk in their national poetry should be the last to deny such a possibility. Have we not, indeed, the proof of it in many of the themes of the Homeric lays, as already

pointed out? They largely postulate a state of things which on the mainland of Greece existed only in the great days of Mycenae.

In other words, many of the difficulties with which we have to deal are removed if we accept the view that a considerable element in the Homeric poems represents the materials of an earlier Minoan epic taken over into Greek. The molding of such inherited materials into the new language and the adapting of them to the glories of the new race was no doubt a gradual process, though we may still regard the work in its final form as bearing the stamp of individual genius. To take a comparison from another field, the arch of Constantine is still a fine architectural monument, though its dignity be largely due to the harmonious incorporation of earlier sculptures. Not less does Homer personify for us a great literary achievement, though the materials that have been brought together belong to more than one age. There is nothing profane in the idea that actual translation, perhaps of a very literal kind, from an older Minoan epic to the new Achaean, played a considerable part in this assimilative process. The seven-stringed lyre itself was an heirloom from the older race. Is it, then, unreasonable to believe that the lays by which it was accompanied were inspired from the same quarter?

And here we are brought up before an aspect of Minoan art which may well stand in relation to the contemporary oral or literary compositions covering part of the Homeric ground. The Homeric aspect of some of its masterpieces has indeed been so often observed as to have become a commonplace. In some cases parts of pictorial scenes are preserved, such as primitive bards delight to describe in connection with works of art. The fragment of the silver vase with the siege scene from Mycenae affords a well-known instance of this. A similar topic is discernible in the shield of Achilles, but in this case a still nearer parallel is supplied by the combat on the shield of Heraklês, described by Hesiod. Here the coincidence of subject extends even to particular details, such as the women on the towers shouting with shrill voices and tearing their cheeks and the old men assembled outside the gates,¹ holding out their hands in fear for their children fighting before the walls. The dramatic moment, the fate of battle still hanging in the balance—so alien to oriental art—is equally brought out by the Mycenaean relief and by the epic description of the scene on the shield, and the parallelism is of special value, since it may be said to present itself in *pari materia*—artistic composition on metal work.

So too at Knossos there came to light parts of a mosaic composition formed of faïence plaques, and belonging to the latter part of the middle Minoan age. Parts of the composition, of which we have a

¹ *Ἄσπις*, vv. 237 *seqq.* Cf. Tsuntas, *Ἐφ. Ἀρχ.*, 1891, pp. 20, 21, and *Μωσῆμας*, p. 94 (Tsuntas and Manatt, *Myc. Age*, pp. 214, 215).

fragmentary record, represent warriors and a city, like the *siège* scene on the silver cup. But we also have glimpses of civic life within the walls, of goats and oxen without, of fruit trees and running water suggesting a literal comparison with the Homeric description of the scenes of peace and war as illustrated on the shield of Achilles. These tours de force of Minoan artists were executed some five centuries before the Homeric poems took shape. They may either have inspired or illustrated contemporary epic. But if Greeks existed in the Peloponnese at the relatively early epoch, the close of the middle Minoan age or the very beginning of the late Minoan, to which these masterpieces belong, they must still have been very much in the background. They did not surely come within that inner palace circle of Tiryns and Mycenae, where such works were handled and admired in the spirit (with which we must credit their possessors) of cultivated connoisseurs. Still less is it possible to suppose that any Achaean bard at the time when the Homeric poems crystallized into their permanent shape had such life-like compositions before his eye or could have appreciated them in the spirit of their creation.

Again we have the remarkable series of scenes of heroic combat best exemplified by the gold signets and engraved beads of the shaft graves of Mycenae—themselves no doubt, as in like cases, belonging to an artistic cycle exhibiting similar scenes on a more ample scale, such as may some day be discovered in wall paintings or larger reliefs on metal or other materials. Schliemann,¹ whose views on Homeric subjects were not perturbed by chronological or ethnographic discrepancies, had no difficulty in recognizing among the personages depicted on these intaglios Achilles or "Hector of the dancing helmet crest," and could quote the Homeric passages that they illustrated. "The author of the Iliad and Odyssey" he exclaims, "can not but have been born and educated amidst a civilization which was able to produce such works as these." Destructive criticism has since endeavored to set aside the cogency of these comparisons by pointing out that, whereas the Homeric heroes wore heavy bronze armor, the figures on the signet are almost as bare as were, for instance, the ancient Gaulish warriors. But an essential consideration has been overlooked. The signets and intaglios of the shaft graves of Mycenae belong to the transitional epoch that marks the close of the third middle Minoan period, and the very beginning of the late Minoan age.² The fashion in signets seems to have subsequently undergone

¹ In the same way epitomized versions of the scenes on the Vaphelo cups are found in a series of ancient gems. The taurokathapsia of the Knossos frescoes also reappears in intaglios, and there are many other similar hints of the indebtedness of the minor to the greater art, of which the "Skylia" mentioned below is probably an example.

² The curious cuirass, which has almost the appearance of being of basket work, seen on the harvesters' vase and on seal impressions from H. Triada and Zakro has been cited as showing that the corselet was known at a very early period (M. M. III, L. M. I). This particular type, however, has as yet been only found in connection with religious or ceremonial scenes and not in association with arms of offense.

a change, and the later class is occupied with religious subjects. But in the later days of the Palace of Knossos at all events, a series of clay documents attests the fact that a bronze cuirass, with shoulder-pieces and a succession of plates, was a regular part of the equipment of a Minoan knight. Sometimes he received the equivalent in the shape of a bronze ingot or talent—a good suggestion of its weight. On the somewhat later Cypro-Mycenaean ivory relief from Enkomi (where bronze greaves were also found) we see a similar cuirass.¹ This comparison has special pertinence when we remember that in the *Iliad* the breastplate of Agamemnon was the gift of the Cypriote Kinyras.

A close correspondence can moreover be traced between the Mycenaean and Homeric methods and incidents of combat due to the use of the tall body shield—which itself had long gone out of use at the time when the *Iliad* was put together. One result of this was the practice of striking at the adversary's throat as Achilles did at Hector's—an action illustrated by the gold intaglio from the third shaft grave. On the other hand the alternative endeavor of Epic heroes to pierce through the "towerlike" shield itself by a mighty spear thrust is graphically represented on the gold bezel of a Mycenaean ring found in Boeotia.² The risk of stumbling involved by the use of these huge body shields is exemplified in Homer by the fate of Periphêtês of Mycenae, who tripped against the rim of his shield, "reaching to his feet," and was pierced through the breast by Hector's spear as he fell backward.³ A remarkable piece of evidence to which I shall presently call attention shows that this particular scene seems to have formed part of the repertory of the engravers of signets for Minoan lords, and that the Homeric episode may have played a part in *Chansons de Geste* as early as the date of the Akropolis tombs of Mycenae.⁴

Can it indeed be believed that these scenes of knightly prowess on the Mycenaean signets, belonging to the very house of Agamemnon, have no connection with the epic that glorified him in later days? Much may be allowed for variation in the details of individual episodes, but who shall deny that Schliemann's persuasion of their essen-

¹ I may refer to my remarks on this in "Mycenaean Cyprus as illustrated by the British Museum Excavations" (*Journ. Anthr. Inst.* vol. 30, 1900, pp. 209, seqq., and see especially p. 213). The round targe was now beginning.

² In the Ashmolean Museum; as yet unpublished.

³ *Il.*, XV, 645 seqq.

⁴ I note that Prof. Gilbert Murray, who seems to regard the cuirass as a late element, still sums up his views regarding the armor and tactics of the Homeric poems as follows: "The surface speaks of the late Ionian fighting, the heart of the fighting is Mycenaean" (*The Rise of the Greek Epic*, p. 140). This latter point is the gist of the whole matter. But it is difficult to accept the view that the cultural phase represented by the Homeric poems in their characteristic shape is "late Ionian." The "late Ionians" no longer used bronze for their weapons. Moreover, they were well acquainted with writing and wore signet rings.

tial correspondence was not largely justified? Take the celebrated design on the signet ring from the fourth shaft grave, in which a hero, apparently in defense of a fallen warrior, strikes down his assailant, whose half-retreating comrade, covered behind by a large body shield, aims his spear apparently without effect at the victorious champion. Save that in the case of the protagonist a spear is substituted for a thrusting sword, and that the fallen figure behind the champion is that of a wounded man who still has strength to raise himself on one arm, the scene curiously recalls, even in its details, an episode of the Seventeenth Book of the Iliad. There the Telamonian Ajax, standing before Patroklos's body, strikes down Hippothoos, while Hector behind hurls his spear at Ajax, but just misses his aim.

Much might be added about these pre-Homeric illustrations of Homer, but I will confine myself here to one more example. In the temple repositories of the Palace of Knossos, dating from about 1600 B. C., was found a clay seal impression exhibiting a sea monster with a doglike head rising amidst the waves attacking a boat on which is seen a man beating it off with an oar (fig. 3).¹ But this sea monster is a prototype of Skylla, and though her dogs' heads were multiplied by Homer's time, we have here, in the epitomized manner of gem engraving, the essentials of Ulysses's adventure depicted half a millennium, at least, before the age of the Greek epic. It would appear, moreover, that the same episode was made the subject of illustration in larger works of Minoan art, accompanied, we may suppose, with further details. A fragment of a wall painting found at Mycenae shows part of a monster's head in front of a curving object, recalling the stern of the vessel on the seal impression; and Dr. Studniczka has with great probability recognized in this a pictorial version of the same design.

But, over and above such correspondence in the individual episodes and the detailed acquaintance with the material equipment of Minoan civilization, the Homeric poems themselves show a deep community with the naturalistic spirit that pervades the whole of the best Minoan art. It is a commonplace observation that the Homeric similes relating to animals recall the representations on the masterpieces of Minoan art. In both cases we have the faithful record of eyewitnesses, and when in the Iliad we are presented with a lifelike picture of a lion fastening on to the neck of a steer or roused to fury by a hunter's spear we turn for its most vivid illustration to Minoan gems.

In the transitional epoch that marks the close of the age of bronze in Greece and the Aegean lands the true art of gem engraving was nonexistent,² and so, too, in the Homeric poems there is no mention

¹ See my Report, B. S. A., No. IX, p. 58.

² Rudely scratched seal stones of early Geometric date exist, but they are of soft materials.

either of intaglios and signet rings. Yet in the *Odyssey* just such a scene of animal prowess as formed the theme of so many Minoan gems, a hound holding with teeth and forepaws a struggling fawn, is described as the ornament of Ulysses's golden brooch. The anachronism here involved has been met by no Homeric commentator, for we now know the fibula types of the Aegean "Chalco-sideric age" if I may coin such a word—to which the poems belong, with their inartistic bows and stilts and knobs. It is inconceivable, even did their typical forms admit of it, that any one of these could have been equipped with a naturalistic adjunct of such a kind. The suggested parallels have, in fact, been painfully sought out amongst the fashions in vogue three or four centuries later than the archeological epoch marked by the Homeric poems.¹ As if such naturalistic compositions had anything in common with the stylized mannerisms of the later Ionian art, with its sphinxes and winged monsters and mechanically balanced schemes.

Must we not rather suppose that the decorative motive here applied to Ulysses's brooch was taken over from what had been the principal personal ornaments of an earlier age, when in Greece at least fibulae were practically unknown,² namely, the perforated intaglios, worn generally as periapts about the wrist. An example of one such from eastern Crete with a scene singularly recalling the motive of the brooch is seen in figure 4. It would not have required much license on the poet's part to transfer the description of such a design to a personal ornament of later usage with which he was acquainted. But the far earlier associations of the design are as patent to the eye of the archeologist as are those of a classical gem set in a medieval reliquary.

When in the days of the later epos we recognize heroic scenes already depicted by the Minoan artists and episodes instinct with the

¹ Helbig, for instance (*Hom. Epos*, p. 277), finds a comparison in a type of gold fibulae, with double pins and surmounted by rows of gold sphinxes from seventh or sixth century graves of Caere and Praeneste. Ridgeway (*The Early Age of Greece*, I, 446) cites in the same connection "brooches in the form of dogs and horses found at Hallstatt." The best representative of the "dog" brooches of this class seem to be those from the cemetery of S. Lucia in Carniola (Marchisetti, *Necropoli di S. Lucia, presso Tolmino*, Tav. XV, figs. 9, 10), where in each case a small bird is seen in front of the hound. A somewhat more naturalistic example gives the key to this; the original of the dog is a catlike animal (*op. cit.*, Tav. XX, fig. 12). We have here, in fact, a subject ultimately derived from the Nilotic scenes, in which ichneumons are seen hunting ducks. The same motive is very literally reproduced on the inlaid dagger blade from Mycenae and recurs in variant forms in Minoan art. The late Hallstatt fibulae of this class are obviously the derivatives of classical prototypes belonging to the seventh century B. C. (In one case a winged sphinx takes the place of the cat, or pard, before the bird.) These derivatives date themselves from the sixth and even the fifth century B. C., since the last-named example was found together with a fibula of the "Certosa" class. The S. Lucia cemetery itself, according to its explorer (*op. cit.*, p. 313), dates only from about 600 B. C. It will be seen from this how little these late Hallstatt "dog" fibulae have to do with the design of Ulysses's brooch.

² The early "fiddle-bow" type is hardly found before the L. M. III period, when the art of gem engraving was already in its decline.

naturalistic spirit of that brilliant dawn of art, we may well ask how, according to any received theory, such perfect glimpses into the life of that long-past age could have been preserved. The detailed nature of many of the parallels excludes the idea that we have here to do with the fortuitous working of poets' imagination. We are continually tempted to ask, could such descriptive power in poetry go side by side with its antithesis in art, the degraded, conventional art of the period in which the Homeric epos took its final form?

But if a combination of such contradictory qualities seems in the highest degree improbable, how are we to explain this phenomenon? By what means could this undimmed reflection of a pure, great age have been perpetuated and preserved?

Only in one way, I again repeat, could such passages, presenting the incidents and life of the great days of Mycenae and instinct with the peculiar genius of its art, have been handed down intact. They were handed down intact because they were preserved in the embalming medium of an earlier epos—the product of that older non-Hellenic race to whom alike belong the glories of Mycenae and of Minoan Crete. Thus only could the iridescent wings of that earlier phantasy have maintained their pristine form and hues through days of darkness and decline to grace the later, Achaean world.

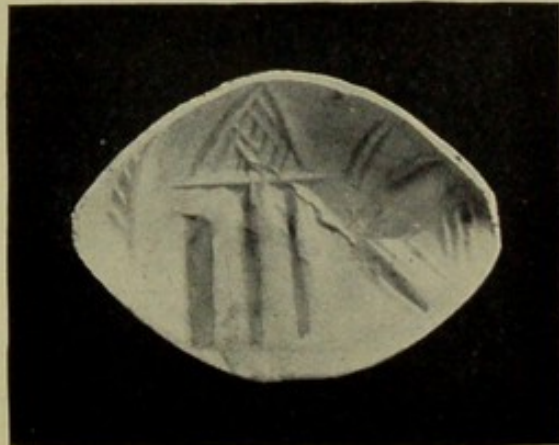
Where, indeed, would be the fly without the amber? How could the gestes and episodes of the Minoan age have survived for incorporation in later epic lays without the embalming element supplied by a more ancient poetic cycle? But the taking over and absorption of these earlier materials would be greatly simplified by the existence of such bilingual conditions as have been above postulated. The process itself may have begun very early, and the long contact of the Arcadian branch, whose language most approaches the original speech of Greek epic with the dominant Mycenaean may have greatly contributed to its elaboration. Even in its original Minoan elements, moreover, we may expect stratification—the period, for instance, of the body shield and the period of the round targe and cuirass may have both left their mark.

The Homeric poems in the form in which they finally took shape are the result of this prolonged effort to harmonize the old and the new elements. In the nature of things this result was often incompletely attained. The evidence of patchwork is frequently patent. Contradictory features are found such as could not have coexisted at any one epoch. It has been well remarked by Prof. Gilbert Murray¹ that “even the similes, the very breath of the poetry of Homer, are in many cases—indeed, usually—adopted ready-made. Their vivid-

¹ The Rise of the Greek Epic, p. 219. Prof. Murray remarks (op. cit., p. 215): “The poets of our ‘Iliad’ scarcely need to have seen a lion. They have their stores of traditional similes taken from almost every moment of a lion’s life.”



(a)



(b)

FIG. 1.—GABLED BUILDINGS ON CRETAN INTAGLIOS (3).

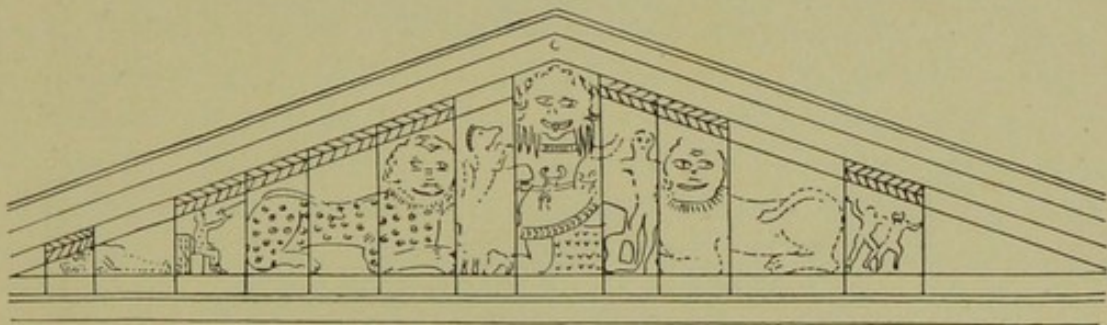


FIG. 2.—PEDIMENT OF TEMPLE AT PALAEOPOLIS, CORFÙ.

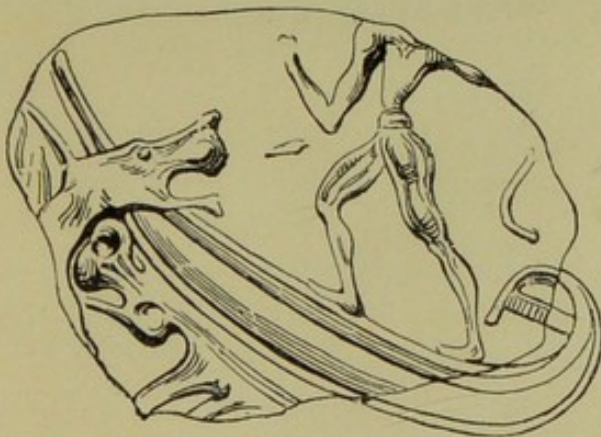


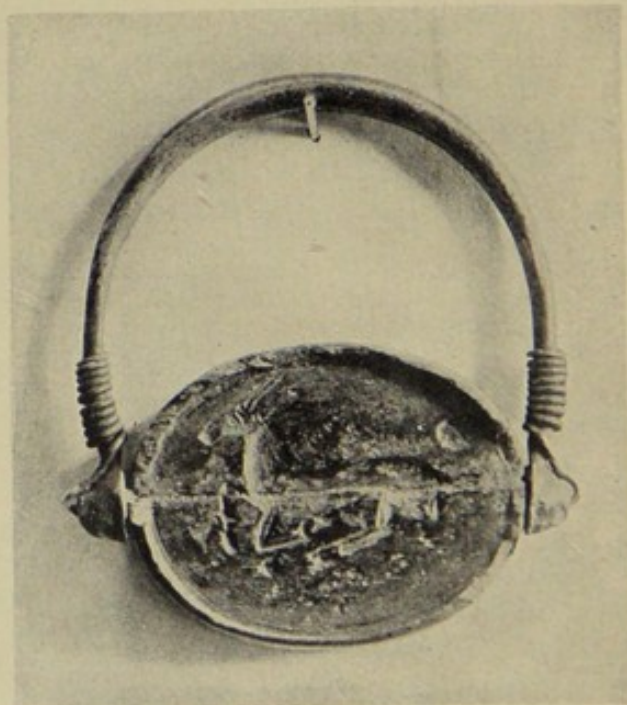
FIG. 3.—CLAY SEALING FROM TEMPLE REPOSITORIES, KNOSSOS (3) (B.S.A. IX. P. 50, FIG. 36).



FIG. 4.—HAEMATITE INTAGLIO FROM E. CRETE WITH DOG SEIZING STAG (3).



5a



5b

FIGS. 5a-5b.—GREEK SIGNET RINGS WITH SILVER HOOPS AND IVORY BEZELS FOUND IN CRETE (3).

ness, their directness of observation, their air of freshness and spontaneity are all deceptive." Many of them are misplaced and "were originally written to describe some quite different occasion."

Much has still to be written on the survival of Minoan elements in almost every department of the civilized life of later Greece. Apart, moreover, from oral tradition we have always to reckon with the possibility of the persistence of literary records. For we now know that an advanced system of linear script was in vogue not only in Crete but on the mainland side in the latest Mycenaean period.¹

Besides direct tradition, however, there are traces of a process of another kind for which the early renaissance in Italy affords a striking analogy. In later classical days some of the more enduring examples of Minoan art, such as engraved gems and signets, were actually the subjects of a revival. I venture to think that it can hardly be doubted that a series of early Greek coin types are taken from the designs of Minoan intaglios. Such very naturalistic designs as the cow scratching its head with its hind leg or licking its flank or the calf that it suckles, seen on the coins of Gortyna, Karystos, and Eretria seem to be directly borrowed from Minoan lentoid gems. The two overlapping swans on coins of Eion in Macedonia recall a well-established intaglio design of the same early class. The native goats which act as supporters on either side of a fig tree on some types of the newly discovered archaic coins of Skyros suggest the same comparisons. On the other hand a version of the lions' gate scheme—two lions with their forepaws on the capital of a column, seen on an Ionian stater of about 700 B. C.—has some claims, in view of the Phrygian parallels, to be regarded as an instance of direct survival.

A good deal more might be said as to this numismatic indebtedness, nor is it surprising that the civic badge on coins should have been taken at times from those on ancient gems and signets brought to light by the accidental opening of a tomb, together with bronze arms and mortal remains attributed, it may be, to some local hero. Of the almost literal reproduction of the designs on Minoan signet rings by a later Greek engraver I am able to set before you a really astonishing example. Three rings (figs. 5, 6, 7) were recently obtained by me in Athens, consisting of solid silver hoops themselves penannular with rounded terminations in which swivel fashion are set oval ivory bezels, with intaglios on either side, surrounded in each case by a high rim, itself taken over from the prominent gold rim of Egyptian scarab mountings. These bezels are perforated, the silver wire that went through them being wound around the feet of the hoops. From particularities in the technique, the state of the metal and of the ivory, and other points of internal evidence, it is

¹ Among recent discoveries are a whole series of late Minoan vases from Tiryns with inscriptions representing a mainland type of the developed linear script of Minoan Crete.

impossible to doubt the genuine antiquity of these objects.¹ They were said to have been found in a tomb in the western part of Crete, reaching Athens by way of Canea, and their owner set no high value on them.² This type of ring with the wire wound around the ends of the hoop is in common use for scarabs, cylinders, and scaraboids in the sixth and fifth centuries B. C., and itself goes back to Minoan or Mycenaean prototypes.³ From the style of engraving, however, it seems impossible to date the signet rings in question earlier than about 400 B. C.

The subjects of two of these are a Sphinx with an ibex on the reverse (fig. 5*a*, *b*) and another Sphinx coupled in the same way with a Chimaera (fig. 5*a*, *b*). The intaglios are executed in an advanced provincial Greek style, in which, however, certain reminiscences of artistic schemes dating from the first half of the fifth century are still perceptible.⁴

But the designs on the two sides of the third intaglio (fig. 7*a* and *b*), though obviously engraved at the same time as the others and by the same hand belong to a very different category. On one side a man in the Minoan loin clothing with a short thrusting sword in his right hand is struggling with a lion, the head of which is seen as from above. It will be recognized at once that this scheme corresponds even in details with that of the hero struggling with a lion, engraved on a gold perforated bead or ring bezel found by Schliemann in the third shaft grave at Mycenae.⁵ On the other side of the intaglio, we see a bearded warrior with a girdle and similar

¹ The exceptional character of these objects and the appearance of Mycenaean motives on one signet side by side with classical subjects on the others made it necessary, in spite of their appearance of undoubted antiquity, to submit them to the severest expertise. I had them examined by a series of the best judges of such objects, but all were unanimous both as to the antiquity of the signets and as to the fact that the ivory had not been recut and reengraved in later times. Examination of various parts of the surface under a strong microscope confirmed these results. In order, however, to make assurance doubly sure I decided on a crucial test. I intrusted to Mr. W. H. Young, the highly experienced formator and expert in antiquities of the Ashmolean Museum, the delicate task of re-breaking two of the ivory signets along a line of earlier fracture that followed the major axis of each and of removing all extraneous materials due to previous mendings or restoration. The results of this internal analysis were altogether conclusive. The cause of the longitudinal fracture was explained in the case of the signet (fig. 7) by the swelling of the silver pin due to oxidization. The whole of the metal, transmuted to the purple oxide characteristic of decayed silver, was here within. In the case of the other signet (fig. 5) this had been replaced by a new pin in recent times, and on removing this the whole of the perforation was visible and proved to be of the ancient character. The ivory has been attacked on both ends by a tubular drill, the two holes meeting irregularly near the middle. The modern method of drilling is, of course, quite different. It is done with a chisel pointed instrument and proceeds continuously from one end.

² The correspondence of one of the scenes on the third ring with a type on a gold bead from Mycenae suggests, however, that its prototypes were taken from the mainland side.

³ An amygdaloid late Minoan or Mycenaean gem representing a ship, set into a silver hoop of this type, found at Eretria, is in my own collection.

⁴ As, for instance, in the attitude of the ibex (fig. *b*) and in the type of the Chimaera. The facing sphinx (fig. *a*) is carelessly engraved and presents an abnormal aspect. Of its genuine antiquity, however, there can be no doubt. (See note 1, p. 634.)

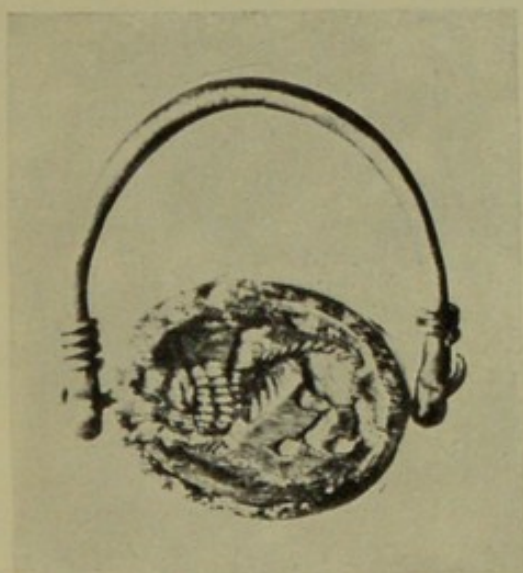
⁵ Mycenae, p. 174, fig. 253.



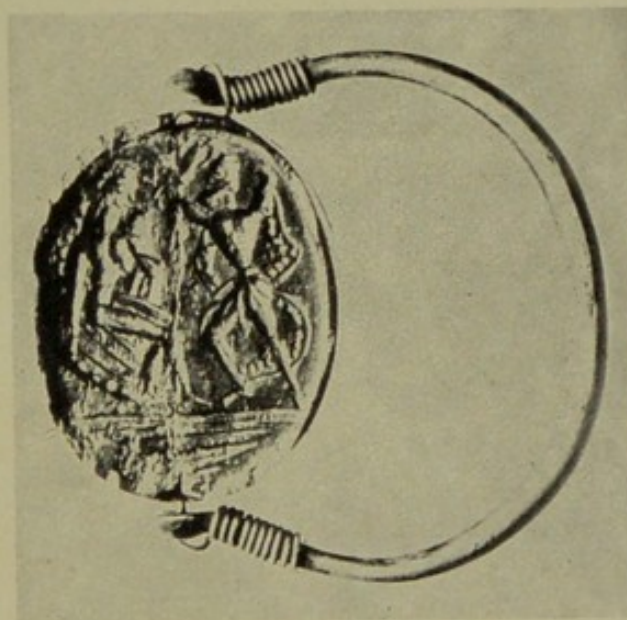
6a



7a

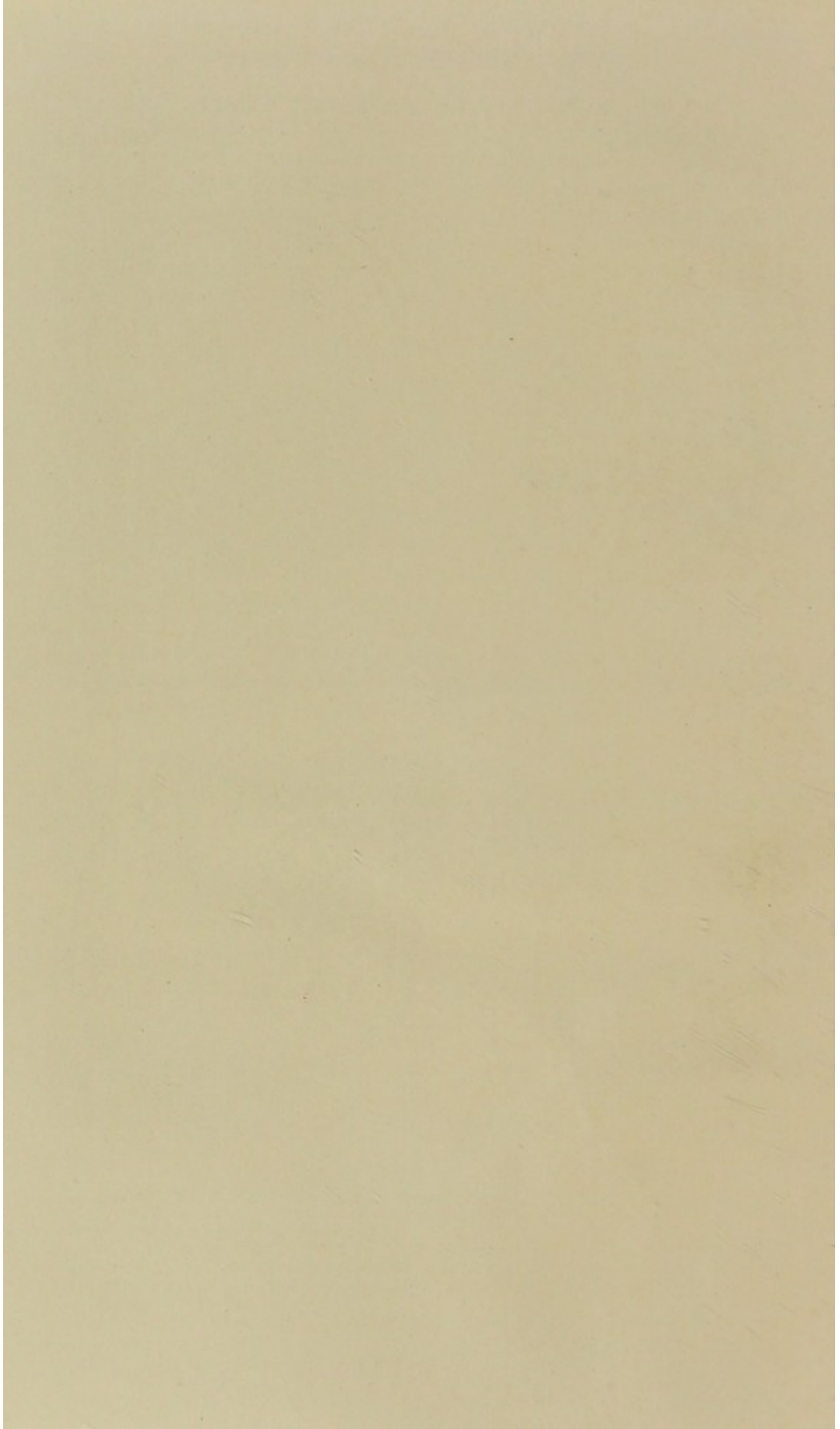


6b



7b

FIGS. 6-7.—GREEK SIGNET RINGS WITH SILVER HOOPS AND IVORY BEZELS FOUND IN CRETE(4).



Minoan costume, wearing a helmet with zones of plates and bearing a figure-of-eight shield on his back. Owing to the defective preservation of the surface it is difficult to make out the exact character of the stroke intended or to distinguish the weapon used from the warrior's raised arms. That he is aiming a mortal blow at the figure before him is clear. The latter wears the same narrow Minoan girdle, but his helmet, which is broader, is not so well executed. He is shown in a helpless position, falling backward over the lower margin of a similar shield and holding a sword in his left hand, which, however, is rendered unavailable by his fall.

Here we have a scene closely analogous to that on a sardonyx lentoid from the third shaft grave at Mycenae,¹ except that in the present case the body shield of the falling warrior reaches to his heels. If, as seems probable, this latter detail belongs to the original of the type, and the warrior has tripped backward over the lower rim of his cumbrous body shield, the scene itself would absolutely correspond with the Homeric episode of Periphêtês, to which I have already referred.

*στρεφθεῖς γὰρ μετόπισθεν ἐν ἀσπίδος ἄντυγι πάλτο,
τὴν αὐτὸς φορέεσκε ποδηγεκέ', ἕρκος ἀκόντων.
τῆ δ' ἄρ' ἐνὶ βλαφθεῖς πέσεν ὕπτιος, ἀμφὶ δὲ πῆληξ
σμερδαλέον κονάβησε περὶ κροτάφοισι πεσόντος.²*

We have here, in fact, the curious phenomenon of a pre-Homeric illustration of Homer revived by a classical engraver.

¹ Furtwängler, *Antike Gemmen*, Pl. II, 2, and cf. Reichel, *Homerische Waffen*, p. 7, fig. 6. A strange and indescribably misleading representation of this gem is given in Schliemann, *Mycenae*, p. 202, fig. 313.

² Il., XV, 645 seqq.

...the warrior, wearing a helmet with horns of oxen and bearing
a shield of eight sides on his back. (Turning to the left) ...
...of the shield it is difficult to make out the exact character of
...intended or to distinguish the warrior from the way
...is shown. That he is wearing a helmet that is the figure
...The latter wears the same armor as the warrior
...his helmet, which is broader, is not so well executed. It is
...in a different position, falling backward over the lower part
...of a smaller shield and holding a sword in his left hand. While
...is considered unsuitable for the fall.

There we have a somewhat different answer to that of a warrior, the
...and from the fact that the warrior is shown in the same
...the left side of the falling warrior reaches to his head.
...the latter detail belongs to the original of the
...and the warrior has tripped backward over the lower part of
...the warrior's body shield, the same detail would naturally occur
...with the warrior's episode of the shield, to which I have
...already referred.

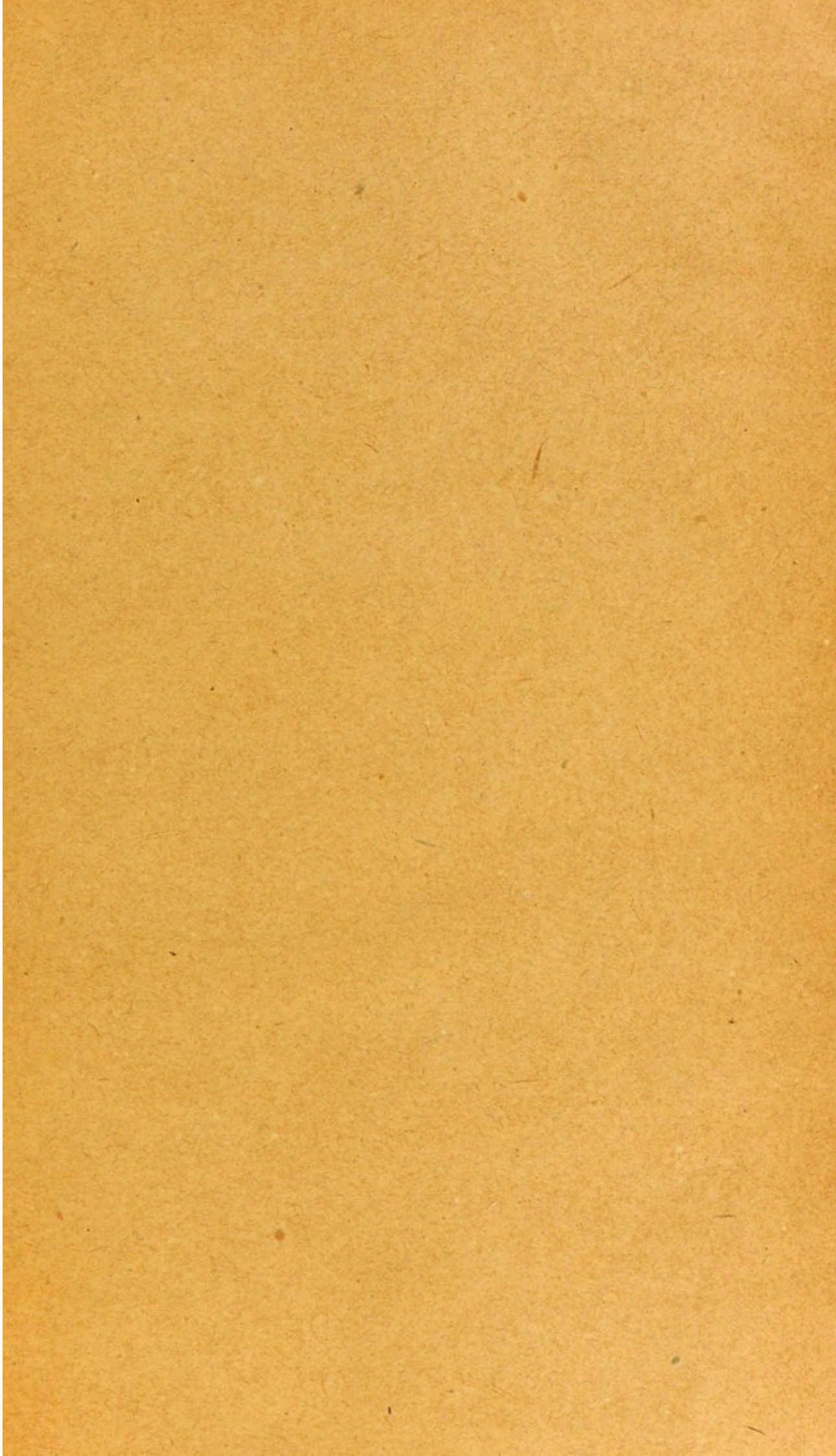
...the warrior is shown in the same
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We have here in fact the various positions of a warrior
...of Homer revised by a classical painter.

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Ideas that have Changed the Face of the World.
Shrewd Observation as the Basis of Inspiration.

THE MAN OF IDEAS

THE world is ruled today, as it ever has been ruled, by the men of ideas. Behind the thrones of the Great Powers they stand, directing the hand which nominally wields the sceptre. In the Great Republics the men with ideas are they whom the nations choose. In all lands where government is pure and for the greatest good of the greatest number, the high offices of State are held by the men gifted with brains.

Lineage and academic distinction shrink to insignificance in the fires of modern competition. The possession of ideas has become a man's richest asset, provided always that he has the practical turn of mind rightly to apply them.

No man can command the birth of an idea. They come and they go, these will-o'-the-wisps, and no man knows whence nor whither. Their advent may be wholly without the volition of the brain in which they are born; it is for the brain to see to their retention and use. Men's minds vary in degree of receptivity and retentiveness, as one photographic plate differs from another. For one plate the merest glimpse of light suffices it to record an object within its focus, no matter how swiftly that object moves; the other needs long exposure and steady light before an impression can be received. Both plates are essential to the photographer's art—the one for rapid movement, the other for still-life, dim interiors, and detail.

So it is with men. To some, ideas come, complete in every particular, like an inspiration—a melody which shall sound throughout the world, a revolution in mechanics, in locomotion, in abstract science. Another man, the movement of whose mind no stimulus can accelerate, assimilates an idea by laborious mental process, but brings it in the end perfect to its work. So we find the broad line dividing the genius from the plodding, unwearying thinker, the poet from the cautious philosopher, the Browning from the Gray, the Macaulay from the Herbert Spencer, the Edison from the Singer, the man of a myriad schemes from the man of one grand idea, slowly and with vast

effort won from nebulous gleams of coherent reality.

Life runs so smoothly now, that idleness, the superficial think, cannot possibly deflect its course to ways still smoother. So the superficial thought in all ages, deriding and persecuting the pioneers of change. But history teaches that the revolutionary and the visionary of today, in science, in commerce, in politics, are apt to be found least advanced among the men of to-morrow. The discovery of the possibilities in steam accomplished greater advance for civilisation than any thing previously done for the improvement of locomotion from the beginning of time. Sir Robert Peel travelled from Rome to London to form a Government exactly as Constantine had travelled from York to Rome to become Emperor. Each traveller had all that sails and horses could do for him, and no more. A few years afterwards the humblest steerage passenger had at his disposal the means of reaching Rome from London within a few hours. It was the result of an idea.

The basis of the idea was not new. Two thousand years before, Hero, the mathematician of Alexandria, had designed the first steam-engine. It was an idea which enabled Napoleon to throw an army—horse, foot, and artillery—across the Alps, and, sweeping like a hurricane down upon Italy, to lay her conquered at his feet. He was another idea which had lain dormant since two hundred years before the dawn of the Christian era, when Hannibal, with horses, elephants, and 90,000 men, crossed first the Pyrenees, and then the Alps. A new idea in naval attack gave Nelson the victory of the Nile, and enabled him to form those plans which swept the French and Spanish fleets from the sea.

There is no phase of life in which the fertile mind does not lift its master above his fellows. Year after year surgeons practising in all the cities of Europe contrived, by operations, more or less to relieve affections of the ear. One day an accident occurred; a Viennese surgeon made too deep an incision and cut the bone. By a happy mischance a new and

important operation was discovered. He seized the idea. Years of experience had failed to impress him with the obvious advantage thus forced upon his notice by an accident seemingly unfortunate.

Ideas are begotten, very often, of suggestion. There are suggestions everywhere for the eye which sees. Nature is still the great teacher if we can but read her lessons. What relation can there be between a tree and a lighthouse; between a leaf and a revolution in architecture? Monumental record exists today of a very close connection. The Eddystone Lighthouse, which has braved the fury of the waves for more than a hundred years, is modelled on the trunk of a tree. Winstanley's lighthouse had been destroyed by a storm, and Rudeyard's by fire, when John Smeaton undertook to erect a successor. So narrow was the ledge of rock upon which to build that he determined the only course was to root his building after the manner of a tree. Just as the trunk is held in place by its roots deep down in the ground, so the foundations of the new Eddystone were sunk in the excavated rock, and fastened there by an ingenious dove-tailing. The Eddystone still stands, strong, immovable as ever, the model upon which all subsequent lighthouses in similar situations have been built.

The Crystal Palace, the latest national playground to be acquired for the nation, we owe, not to an architect, but to a gardener with ideas—Joseph Paxton. No man in England was able to furnish plans to meet the requirements of the building for the Great Exhibition, the purpose for which the Crystal Palace was constructed. Defects spoil the most promising. Paxton overcame the difficulties. He had found his idea in his garden. An examination of the Victoria Regia had shown him the wonderful power of flotation possessed by the leaves of this plant, and the principle upon which this was contrived. What a plant could do, a man could imitate. The old and unsightly heavy ties and girders which architects had always been accustomed to employ were unnecessary. He showed by homely illustration the effect of his plan. A splinter of wood may be easily snapped if its ends be pushed towards each other, but a great force is required to pull the ends asunder. So iron and glass came to take the place of wood and stone, and a new system of building was introduced—by a gardener.

From such insignificant sources do great creations spring. In the dust of the earth, in the industry of a worm, in the colours of a soap-bubble, the great mind finds that which aids him some way further to read the writings of eternal laws. This is no mere flight of fancy. In the very dust is an exquisite story of the marvellous provisions of Nature to give shadow and tint; in the soap-bubble Newton found that which gave it a legitimate place among the most curious of optical phenomena. And the worm? It taught us sub-aqueous tunnelling.

From the beginning of history the teredo or pholas, the soft white worm which lives in our harbours and the mouths of rivers, had pursued its destructive course, boring its way through the hulls of ships, eating the defences of harbours. Then there came Brunel, who, watching its operations, saw how he might construct his tunnel beneath the Thames. The worm, he learnt by close watching, encased itself in a calcareous tube of masonry as it bored its way into the timber. Here was the fountain of his engineer's idea. He set men to bore with rods into the mud from a shield, which was moved forward as they made their way, and a brick arch constructed in the rear, in exact imitation of the calcareous tube of the worm.

So the seeing man finds his inspiration. Lessons such as these are everywhere to be gleaned by the observant. Take another instance, not less romantic. The engineers who built the mighty break-worker at Cherbourg noted with what strength common mussels cement themselves together, adhering to rocks and stones or any solid substance which happens to lie about them. Taking advantage of this knowledge, they saved themselves the trouble of extending their submarine masonry indefinitely. They deposited in the sea at the proper places huge quantities of loose stones. Upon these they tipped tons of live mussels, knowing well that the shell-fish speedily would spin their string-like webs and so bind together the stones with a cement more durable than any man could make.

Paxton was not the only man of his generation who knew the mechanism of the Victoria Regia; Brunel was not the first to observe the process by which a soft, gelatinous worm made its way through oak timbers—their knowledge on these subjects was commonplace to the botanist

and the naturalist. It was the application of the idea which was startling. Ideas occur to man after man in successive generations and are wasted, until there is fashioned the mind which is productive as well as assimilative.

How can ideas be applied? That depends largely upon the circumstances of the individual and the nature of his scheme. There never was a better time than now, when greater scope was afforded for the carrying out of new projects. "The men for whom we look now with a view to possible partnerships are no longer those with capital," a prominent member of the House of Commons said to the writer. "We must have men with ideas capable of adequate expression in practical production." One man, a working plumber in a Kentish village, devotes his leisure at nights, and the scanty holidays granted him, to materialising ideas which occur to him in odd moments during his work. A year of nights he sacrificed to the fashioning of an appliance for soldering—a tiny mechanism which he carries in his waistcoat pocket—lamp and blowpipe combined, which enables him to dispense with the cumbersome brazier and melting-pot. Such a man, with increased opportunities, might prove a second Nasmyth, and give us a contrivance as important as the hammer with which the name of that genius is associated. The villager's inventions are his voluntary creations: Nasmyth invented his titanic hammer in response to the appeal of a man who could not otherwise get a forge hammer capable of producing the shaft which he needed.

As a rule, however, inspiration is an unwilling and unstable guest; it must be seized at once, before it may be too late. Coleridge dreamed his "Kubla Khan," and wrote in his waking moments the precious stanzas which he remembered. John Bright composed all his speeches in bed. Most of us, however, must look to periods of great mental alertness for the coming and thinking-out of ideas. And when they dawn upon our horizon they should promptly be noted down.

There may be value in the flimsiest notion. A man thinks of a metal tip for boots, and makes a fortune from it; another applies a piece of rubber to the end of a pencil. A third compounds a decoction which, smeared upon windows, prevents their "steaming" in cold

weather. Another, of scientific bent, notes that a mineral refuse, thrown away as valueless, emits a strong odour when in contact with water, and the result is acetylene gas and all that that may yet mean as an illuminant. A trickling stream of mineral oil in a Derbyshire mining village was found by the first Lord Playfair to contain paraffin, and from his recognition of its worth sprang up the gigantic industry which in America has made fortunes hitherto undreamed of.

Every invention opens out fresh fields for other inventions, and the examples we have seen may stimulate thought in directions in which advance may still be made. Man sails the air and sails the seas, and hastens with the speed of the bird upon dry land. But in each phase of travel he is anxious still to do better. The electric train supersedes the steam-engine. The turbine steamer ousts the older form, just as the screw propeller gained the day against the paddle-wheel. Electricity and the motor claim the sphere of the horse for travel by road.

These are among the ideas newly utilised. The men in whose brains they took shape perform more notable service for mankind than the greatest general who ever slew a rival's forces. The compositor who sets up the type for the Bible, and the machinist who prints the pages, are greater forces for good than the wisest of the ancients. Those wise men of old, in the dim light which preceded the glow of learning whose glorious dawn our own day was to witness, had their splendid and noble ideas, ideas which live in architecture at which the world still marvels and cannot emulate. With their manual labour, and their implements of which the world has lost count, they fashioned their wonderful Sphinx, that, in spite of all that has since been achieved, remains the greatest stone monument in the world. Their enamels have outlived the shells of which they were but the veneer.

But the modern idea brings mightier things to pass than ever those wise men of the East could dream. We bridge rivers and straits and gorges which would have been impassable to them. We link ocean with ocean, and send our ships where they had not a waterway. We navigate seas which were to them unknown; we race at sixty miles an hour over lands whose existence was to them unimaginable, and we fly in the skies where they could

conceive of no life higher than the birds. The ideas of men have made a new world.

The significance of an idea can never be realised at the moment of its birth. The alchemists were the first to discover the readiness with which sulphur can be ignited, but they left their discovery at that. Meanwhile men, civilised and savage, sought their fire as men had sought it from prehistoric days. The savage rubbed wood; the civilised man plied flint and tinder as they had been plied from the dawn of the iron age.

Then came a simple Stockton chemist, to whom occurred the idea of making the first lucifer match from pieces of wood dipped in chlorate of potash and sulphur. At one bound the ages were left behind, and a distinct boundary between civilisation and savagery was established.

Even more notable was the advance made when the light of coal-gas first beamed forth upon the waters of the Thames from the pioneer lamps upon Westminster Bridge. The oil-lamp of the savage was rough and crude and filthy; that of the philosopher and warrior of cultured Greece and Rome beautiful and ornate, but both were the same in principle. British history in Parliament was all made by candle-light, or by the feeble flame of the bowl of fat and wick of fibre. Then a man's idea literally illumined the dark places of the cities of the world, and the electric light, wonderful as it is, was the less wonderful when it came, because of the manifold merits of its predecessor and rival.

These are facts which enable us, by contrasting the present with the past, to appreciate the power of ideas. The ships with which Nelson crushed the naval might of Napoleon were but developments of the war galleons of the primeval Norseman, and depended upon the principles on which the savage relies as he cuts his way through the waters of the silent rivers of South America or Africa. A single first-class ironclad of today would sink the combined fleets of Nelson and Napoleon. And men's brains are daily exercised to bring about new devices which shall render the present fleets of the world as useless as the old warships of oak.

When a thinker gives an idea to the world, he increases the intellectual capital of the race. He cannot say in what proportion profit will be reaped; he cannot

always predict in what direction results will tend; he cannot, from his close-range view, see very clearly whether his discovery be a pearl of price or merely a day-dream, unworthy of permanent record. He must put it to the test.

Alfred Russel Wallace, dreaming his feverish dreams in the Moluccas, was too modest a man to let himself believe that he had solved a gigantic problem when one afternoon there flashed in an instant upon his mind the idea of Evolution, the survival of the fittest, and the variation of species. That evening he drafted his theory; on the two subsequent nights he elaborated it. Then he posted off his notes to Darwin. Neither had guessed that the other was working on the subject; neither for a moment suspected that he was about to create a revolution in thought which was to rouse the whole civilised world to the highest pitch of excitement. But Darwin, as we all know, was already engaged upon the work of his life, fearing, meanwhile, as he replied to Wallace at the time, that "my work will not fix or settle anything." He did fix and settle a great deal, as it was his privilege in after years to feel assured. But there are countless secrets yet to be rapped out of the stony bosom of Mother Earth. Darwin and Wallace, and their school, gave us the hammer wherewith to do the tapping.

As well by example as by precept, leaders of thought and action teach us how imperative it is alertly to act upon inspiration. Louis Pasteur, whose mighty brain was a magazine of ideas, impressed upon his students that, "in the field of observation, chance favours only those who are prepared." His own record is a signal exemplification of the power of an idea. What to the ordinary, unimaginative analytical chemist would be the significance of two vats of beer containing, the one sour beer, the other good? To Pasteur it meant the opportunity to revolutionise chemical and biological science. It meant to the world that a great and devastating pestilence was to be struck dead. The microscope revealed the fact that the globules of the sound beer were nearly spherical, while those of the sour beer were practically globular. Experiments showed that wine and beer and milk are turned sour by the growth of atmospheric organisms, and that when these are excluded the liquids remain sound. If wine and beer and milk can be

kept sweet when protected from putrefactive germs, why not other forms? Lord Lister seized upon Pasteur's discovery, and the antiseptic treatment for wounds was born.

Until then, anæsthetics, that God-send to suffering humanity, had proved rather a curse than a blessing. In the days when operations had to be borne by conscious patients, the man with the readiest knife and strongest nerve was the most successful craftsman. A serious operation must be raced through, or not attempted. With greater leisure afforded for more extensive and delicate operations, the scope of the surgeons was enormously enlarged. But pestilence stalked in the wake of the new discovery. Gangrene became epidemic in the hospital wards of the world; in places it was attended by a mortality rate of over sixty per cent. after operations. With Pasteur's discovery developed by the master hand of Lister, surgery was revolutionised and no operation was impossible.

No person imagines that the birth of even so epoch-marking an idea as this constitutes a royal road to perfection of knowledge. The investigations of Pasteur and Lister read like a fairy-tale. Lister's, in particular, thrill with human interest as we see the great mind of the thinker groping from the dark into the light; see him win his first triumph over putrefaction of the wounds by the use of carbolic which caked upon the incision, and by the use of a spray which time proves unnecessary; then see him finally attain perfect mastery of the subject. With the antiseptic treatment added to anæsthetics no wound need now be declared hopeless, no organ of the system too remote or delicate for effective treatment.

Into the gravest research and study humour will creep. We laugh at the bizarre and fantastic ornaments of savages, yet a fashion of the early part of the Victorian era was found by the scientific mind of Dr. Buckland to depend upon a misconception more ludicrous than any embraced by travellers' tale or creation of the humorist. Beautiful women, society leaders, were wearing as charms, as earrings, bracelets, and what not, highly polished substances which were understood to be rare British minerals. Certain markings and other evidences gave the brilliant Dean of Westminster a clue, and led him to an analysis of the curious

adornments. The result was as he had suspected. The charms and earrings, and so forth, set in gold and decorated with gems, were simply the fossilised excreta of extinct monsters by which our island was once inhabited. The discovery would have been startling and interesting to the archaeologist, but nothing more, had it remained there.

To the ordinary mind there does not appear any clearly traceable connection between the earring of a society belle and a vast agricultural industry. But the second grew out of the first. Buckland recognised that in these age-old deposits, of which vast quantities were available in certain valleys and river-beds, were properties of value to agriculture. Liebig, the great German chemist, happened to be in England at the time, and the Dean took him to inspect the deposits. He saw at once that they must contain abundance of phosphate of lime. He took back some to Germany, and there made a careful analysis which bore out his theory. And from that discovery originated the great industry of super-phosphates, which has wrought such enormously important results for agriculture.

The field for great enterprises is still largely virgin soil. Men like Sir Norman Lockyer look to sunspots wherein to read the secret of famine and pestilence in India. Others keep their eyes upon the earth, and there win relief and benefit for the million. The story of Sir Clements Markham's introduction of quinine into India is one of a noble idea daringly, unfalteringly carried through. He had to procure the tree from Peru, and the dangers and difficulties attending his task were innumerable. But he succeeded, despite all perils, and has been allotted his place in history as having performed a service of the highest value to humanity. What it means may be estimated from the fact that, unless checked by quinine, malarial fever kills more people every year in Southern India than the worst of cholera epidemics. Now, quinine is the one sovereign specific against this deadly fever.

In spite of all that has been achieved, however, there remains much to be done in our tropical colonies. In India alone five million people died in 1900 from malarial fever; and there have long been more places than Sierra Leone meriting the description of "white man's grave." It remained for a soldier-scientist in Sir

Ronald Ross to elucidate the mystery of malaria and yellow fever; to show, after years of dispiriting effort, that the malaria germ enters the poison gland of the mosquito and is transmitted thence to the blood of the human being. The remedy is, so far, to do away with the swamps and marshes in which the mosquitoes breed—a campaign of cleanliness, sanitation, drainage. The remedy is primitive in its simplicity, but the idea which led to its discovery has given its possessor enduring fame.

When Sir Humphry Davy spoke of "radiating matter," he used a phrase which had no meaning for his generation. A century was to elapse before the idea developed fully in the minds of the gifted M. and Mme. Curie, who were to discover radium to the world. And then, at a bound, scientists were transported to a world whose border-lines had so long eluded them. Infinitesimal as are the quantities in which radium has so far been found, sufficient has come to hand to demonstrate the possibility of its revolutionising science. A competent authority has calculated that there is stored in a single grain of radium sufficient energy to raise 500 tons to a height of one mile, and for an ounce of it to drive a thirty-horse-power car round the world.

Its potentialities as an illuminant, too, seem boundless—even the blind are made to "see" its light. Most important of all, as a curative agency in disease radium seems destined to take a commanding place. Already certain forms of cancer have been cured by its aid, and we are still only at the beginning of our knowledge as to its wonder-working attributes.

Such are some of the ways in which the ideas of thoughtful men benefit the race, and, step by step, bring us nearer to the millennium. Every discovery begets other discoveries.

The day of the dreamer has gone. So many minds are applied to problems that, if the guerdon is to be secured, the man with an idea must see to it that none other comes before him in making plain his discovery. It is to the undying glory of European scientists that all their greatest discoveries are given without money and without price to the world. In America the custom is not always so chivalrous; the aid of patent law is invoked for discoveries in pure science which, if made in England, would be freely given to the people.

This, however, is a consideration which does not affect the many; the dividing line is sharply drawn between ideas upon which the world has a legitimate claim, and those whose profit should rightly accrue only to their originator. The point is that all who set themselves to the elucidation of problems, great or small, must seek without delay practically to apply them. Science must now be applied. The scientific recluse to whom his laboratory is the whole world declaims against this theory. But study for study's sake must be the delight of the selfish few. The man of ideas is a national asset upon whom his country has definite claims. It was a discovery of national importance to Germany when her chemists discovered how to make artificial indigo, for they killed India's great trade in the natural product.

There must, then, be no delay in the application of discoveries to their proper use. Procrastination may mean that a man who rightfully should be acclaimed a pioneer may become merely a follower. Great minds run frequently upon similar ideas. The memoirs of Darwin and Wallace on Natural Selection were read upon the same day before the Linnæan Society; Cros and Ducos de Hauron simultaneously communicated their process of indirect photography in colours. Graham Bell was only two hours ahead of Elisha Gray in patenting the telephone. Many other instances might be cited of simultaneity in discovery. In every field the searchers are busy, but there are many mines yet to be located.

For the art of war initiative and organisation are ever commanded. For the arts of peace there must be even greater alertness. The case remains as Pasteur put it: "Two opposing laws seem to be in contest. The one a law of blood and death, opening out each day new modes of destruction, forces nations to be always ready for battle. The other, a law of peace, work, and health, whose only aim is to deliver man from the calamities which beset him. The one seeks violent conquests, the other the relief of mankind. The one places a single life above all victories, the other sacrifices hundreds of thousands of lives to the ambition of a single individual. Which of these two laws will prevail? God only knows! But of this we may be sure: that science, in obeying the law of humanity, will always labour to enlarge the frontiers of life." ERNEST A. BRYANT

Industries of Belgium and Switzerland. Course of the Rhine in Holland, Germany, and Switzerland. The Alps.

THE RHINE COUNTRIES

BELGIUM (11,500 sq. miles) is a small country, only half as large again as Wales. Geographically, it is a continuation of Northern France, the flat surface being represented by the Plain of Flanders in the north, while in the south the land rises to the forested Ardennes. The rivers are the sluggish Scheldt and its tributary the Lys, and the swift, picturesque Meuse, coming down from the plateau of Langres in a forested gorge through the Ardennes, before it crosses the plain to the delta of the Rhine, which it enters, as does the River Scheldt itself.

Though so small, Belgium is densely populated. In the plain the whole country is highly tilled, and looks like a vast market-garden, unbroken by wall or hedge. Farms and cottages are built on every spot which can be used without reducing the area under cultivation. New land is drained in the marshes or cleared in the forests to supply the needs of the growing population. Enormous quantities of vegetables are grown, as well as rye, oats, wheat, potatoes, and sugar-beet.

The industries are equally important. In Southern Belgium many manufactures flourish on the coalfield, which is continuous with that of Northern France. Iron is also abundant. Iron industries of all descriptions, including machinery, locomotives, and all requisites of modern engineering, are carried on exclusively in and around Charleroi, on the Sambre, and Liège, on the Meuse. The latter makes firearms of all descriptions, and may be called the Birmingham of Belgium. The woollen manufacture, partly due to the excellent wool of the Ardennes, has been important for centuries. The Leeds of Belgium is Verviers, east of Liège, where glass is also made. Brussels carpets are made at Tournai and elsewhere. In Northern Belgium the chief manufacturing city is Ghent, on the Lys, the Manchester of Belgium. It obtains raw cotton through Antwerp, on the Scheldt, the Belgian Liverpool, and the water of the Lys has remarkable bleaching properties. The linen manufacture has been important for centuries. Most towns make lace,

especially Brussels, Ghent, and Mechlin. Brussels, the capital, on a tributary of the Scheldt, is a pleasing city, with modern suburbs. Its grand cathedral, town hall (Hôtel de Ville), and picturesque market-place, surrounded by fine old houses, recall the ancient splendours of the Flemish cities, which, in the Middle Ages, were the busiest manufacturing and trading centres of Northern Europe. Hardly one of the many Flemish cities, now decayed, but has fine specimens of the domestic and public architecture of the Middle Ages. Even Antwerp, with its great docks, enormous commerce, and all that makes up a modern port of the first rank, its broad streets and modern conveniences, its sugar-refining, distilling, shipbuilding, and other industries, preserves in its midst the mediæval city which attracts thousands of tourists annually. Ostend is the largest of Belgian watering-places, and an important packet station, especially for Dover.

So far we have described regions with a geographical as well as a political individuality, but in Central Europe, as any map shows, the boundaries of the countries do not correspond with any geographical features. But here let us select geographical rather than merely political divisions, and begin by tracing the course of the Rhine from its delta on the North Sea to its cradle among the Alpine snows. This will bring us to the Alps, the greatest geographical feature of Europe, after which we can continue the description of the various other divisions.

Let us, in imagination, stand on a commanding peak in the Swiss Alps. We are on the gable roof of Europe, with the land falling away in all directions to the surrounding seas. Looking north on a clear day, we see, beyond the world of snow-peak and glacier in the immediate foreground, low, rounded hills, forested—if we saw them nearer—showing as a faint blue line on the distant horizon. These are not Alps, but part of the Central Highlands which stretch irregularly across Central Europe under various names, and with many breaks, at the base of the

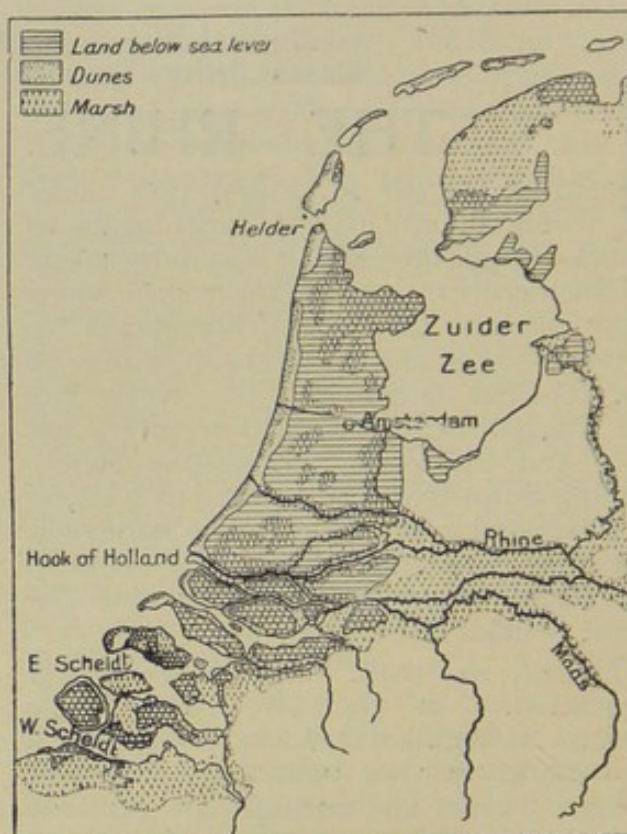
GROUP 2—GEOGRAPHY

Alps. Beyond this blue line of hills, if vision permitted, we should see the land gradually sinking to a vast plain, broken by outliers of the Central Highlands, and ending at last in the flat, marshy shores of the North and Baltic Seas. Across this plain we should trace the silver threads of many rivers, following the slope of the land northward to these seas. But of all these rivers, one, and only one, would be the child of the glacier streams sparkling in the Alpine valleys actually beneath our eyes. This river, the one link between the Alpine snows and the seas of Northern Europe, would be the Rhine.

Entering the Mouth of the Rhine.

Much of Holland consists of the delta of the Rhine. The land bordering the North Sea is so low that the sea must be kept out by dykes, and so waterlogged that it must be drained by canals and pumped dry by windmills. Windmills and more windmills, canals, white houses, and green meadows are every traveller's first impressions of the Rhine and Holland. Of course, the sea has devoured great slices of such a coast, forming the shallow gulf of the Zuider Zee, and leaving a chain of sandy islands parallel to the coast. Across this flat region, which is largely made of sediment brought down by the river, the Rhine reaches the sea by many branches or distributaries, forming an intricate network of intersecting channels. We might, therefore, reach the main stream by many routes, from either the North or the Zuider Zee. The usual route is by the Hook of Holland and Rotterdam, on the Lek. At its delta the Rhine receives the Meuse, or Maas, from the hills of Lorraine, rising not far from the French Marne. It is hard to say whether the Belgian Scheldt from the Ardennes and the hills of Northern France, which enters what we may call the gulf of the Rhine, with innumerable islands and sandbanks, is or is not a tributary, but it must not be mistaken for a distributary. Flushing, on the island of Walcheren at its mouth, is where the pilot comes on board for the intricate navigation of the Scheldt to Antwerp, the port of the Scheldt.

Holland, or the Netherlands. Holland (12,600 sq. miles) is an almost treeless, alluvial land, destitute of minerals or building stone, but fertile where it can be drained. The climate does not differ much from our own, but is rather wetter. Cereals, hops, and sugar-beet are grown. The polders, or reclaimed meadows, pasture many dairy cattle, and much butter and cheese are exported. In some respects, therefore, it recalls Denmark. The Dutch are great gardeners, famous for their bulbs. Whole fields of them may be seen in flower outside some towns in spring. There are many industries, the raw materials being cheaply brought by water. The chief manufacturing centres—Breda, Tilburg, and Maastricht—are in the south. Rotterdam, the port of the North Sea, and Amsterdam, the port of the Zuider Zee, both manufacture the colonial produce brought to their wharves from the Dutch East Indies. Amsterdam cuts diamonds for all Europe. Many coast towns trade in butter and cheese, and, of course, engage



THE DUTCH LOWLANDS

in fishing. The capital, S'Gravenhage, or the Hague, is on the coast. Inland, a little to the north, is the university town of Leyden. The most important inland town is Utrecht, from which the lower part of Holland can be flooded in case of invasion.

The Lower German Rhine. Crossing the German frontier, we find ourselves on the threshold of a busy industrial region. The valley of the Ruhr, the river which enters on the east bank where the great river port of Duisburg is built, has a large coalfield, which feeds the textile manufactures of Barmen-Elberfeld, and the iron town of Essen, where the famous Krupp guns are made. It also sends coal by water to Krefeld, west of the Rhine, with silk manufactures. To the south is Aachen, or Aix-la-Chapelle, a woollen and cotton town, on a coalfield. Düsseldorf and Köln, or Cologne, the latter with the finest cathedral in the world, are accessible to ocean steamers, and their trade is enormous. So far both banks have been flat and uninteresting, though the regions on both sides are fertile and prosperous.

The Rhine Gorge. At Bonn, above Cologne, we enter the famous gorge cut by the Rhine through the northern part of the Central Highlands, between the Eifel and the Hunsrück on the west, and the Westerwald and Taunus on the east. Mile after mile we sail between mountain walls, each crag crowned by a ruined castle, and the lower slopes terraced for vineyards. At Coblenz, another great river port, the Moselle, from the Vosges, comes in on the west bank in a forested gorge between the Eifel and the Hunsrück. In its basin is the great fortress of Metz, the Saar coalfield with many manufactures, the independent Grand Duchy of Luxemburg,

and the old Roman town of Trier. Nearly opposite the Moselle confluence, on the other bank, comes in the Lahn, flowing in a similar forested gorge between the Westerwald and the Taunus. The Rhine gorge continues to Bingen, where we emerge into undulating country, and soon reach Mainz, at the confluence of the Main. If we could follow up this noble tributary it would take us by the banking city of Frankfurt, the university town of Würzburg, and the picturesque scenery of the Central Highlands, far into the heart of the Franconian Jura. We should certainly want to visit Nürnberg, on a tributary, the finest mediæval city remaining in Europe, and now a busy manufacturing town.

The Plain of the Middle Rhine.

But we must follow the main stream across a richly cultivated plain, 20 or 30 miles wide, between the distant wooded Vosges on the west and the still more picturesque Odenwald and Black Forest on the east. At the busy port of Mannheim a glimpse up the Neckar makes us long to visit Heidelberg, on a lofty crag in its forested gorge. The Neckar is formed by many mountain streams, coming down in lovely valleys from the Swabian Jura, which separate the Neckar from the Danube. The chief town in its basin is Stuttgart, the capital of Würtemberg. The main stream of the Rhine continues across a land of cornfields, orchards, and vineyards. Karlsruhe, the capital of Baden, is connected with the Rhine by canal and has large engineering works; Strassburg, with a fine cathedral, is the port for Mülhausen and other cotton towns of the Vosges. Freiburg lies at the entrance of a lovely valley leading into the heart of the Black Forest. We now approach Basel, or Bâle, the frontier town of Switzerland, a great centre of trade and railway traffic, about 750 miles from the mouth and 250 miles from the source of the Rhine.

The Rhine in Switzerland. The direction of the river valley now changes, narrowing between the Black Forest on the north and the Jura on the south. Above this it flows in a gorge between the Swiss and Swabian Jura, leading to Lake Constance. Swift tributaries, green with glacier sediment, rush down from the snowy Alps, now seen in the distance. The largest is the Aar, which rises among the highest peaks of the Bernese Alps, flows through Lakes Brienz and Thun, past Bern, the capital, and then northwards between the Alps and Jura, receiving, among many tributaries, the Reuss, from Lake Lucerne, and the Limmat, from Lake Zürich. At Schaffhausen are the Falls of the Rhine, where the river leaps madly down from the higher ground west of Lake Constance. We next reach its exit from that lake, and are but a few miles from the Danube, the great waterway of Western Europe. From a summit between the two we might possibly look down on waters flowing to the North and Black Seas respectively, so that here, in a sense, east and west, north and south, meet. After leaving Lake Constance, with its ring of towns, the valley leads us south, through scenery of increasing wildness. Swift rivers,

leaping down 3,000 or 4,000 ft. in 20 or 30 miles, rush to the roaring torrent of the Rhine, whose valley narrows to a wild gorge. At last, 800 miles from the North Sea, our journey ends, at the source either of the Hither or of the Further Rhine, at a height of over 7,000 ft., among the grandest Alpine scenery.

The Alps. We have now reached the heart of the Alps, which stretch across Europe for 700 miles. We generally think of them as in Switzerland, but they extend west into France, east into Austria, north into Germany, and south into Italy.

To describe the scenery of the Alps in words is not easy. It varies greatly in different parts. In the limestone Alps of Austria the peaks and pinnacles are too steep for snow to lie, and they soar into the sky like fantastic obelisks of many-coloured rock. The familiar scenery of the Swiss Alps is something like this: Starting from our centre we climb on foot, or perhaps by rail or coach, up a smiling valley, between mountains clothed with forests of dark pine. Beside the road a swift torrent leaps from rock to rock in cascades of foam. Little villages of wood, with great overhanging roofs to carry the weight of the winter snow, are gay with vines, fruit-trees, and patches of maize. As we go on, the valley becomes more uphill, the mountain walls higher, the villages fewer, and the stream wilder. The bridges which cross it have canopies over them to prevent snow from breaking them down in winter. As we climb, the woods thin out, and their place is taken by steep meadows gay with flowers of every hue. The tinkle of the cow-bells and the little wooden cheese-houses tell us that we are among the high pastures, deserted in winter by man and beast.

An Alpine Glacier. Above the meadows appear walls of rock, and perhaps at the end of the valley a dazzling vision of snow-peak and glacier. The grass ceases, gay to the last with flowers. We are at the edge of the glacier, with its lines of moraine, rocks, and stones, which have fallen from the towering precipices above, clearly marked on its white surface. Most likely its end is hollowed into a glittering blue ice-cave, out of which gushes the stream we have been following. If we would reach the snowy summits, our way lies over the rough surface of the glacier, with its torn and twisted ice, split by deep chasms and crevasses of giddy depth and dazzling blue. The party is roped together, furnished with ice-axes, dark spectacles to dim the glare from the snow, and, above all, with good guides. Silently and cautiously, for a loud noise or a false step may start an avalanche of stones or snow and hurl all to destruction, the climbers make their way over glacier and snow-fields, or along a knife-edge of rock, to the summit, to behold a view no words can describe. They may descend on the Italian side, through similar scenery. The snow and ice will not come so low as on the Swiss side, and in the lower valleys chestnuts will replace pines, and mulberries, vines, figs and other fruit will speak of the Sunny South.

Valleys and Peaks of the Alps.

To understand the geography of the Alps, let us first be clear about the famous St. Gotthard region, the cradle of many Alpine rivers. We reach the St. Gotthard Pass, the gate of this region, from Lucerne, by following the lake, and its feeder, the Reuss, up to a height of 7000 ft. A wonderfully engineered railway follows the valley to a height of 3800 ft. and then plunges into the bowels of the mountains in a tunnel $9\frac{1}{2}$ miles long, emerging at the head of the Ticino valley, which leads down to Lake Maggiore, Milan, and the plain of the Po. Only a few miles from the source of these two rivers are those of the Further Rhine, flowing east, and of the Rhone, flowing west, while those of the Aar, in the Bernese Oberland, are also near. Once clear as to these rivers, we can easily fix the geography of the rest of the Alps in our minds. The Rhone flows west in a great trough between the Bernese Oberland to the north and the Pennine Alps to the south. Zermatt, the needle-like Matterhorn (14,700 ft.), Monte Rosa (15,200 ft.), and other giant peaks are at the end of valleys opening to it from the south. From Martigny, where the Rhone turns north to Lake Geneva, we may visit the highest peak in the Alps, Mont Blanc, over 15,700 ft. South of the Mont Blanc group two rivers must be noted, the Dora Baltea, flowing south-east down to the Po, and the Isère, flowing south-west through the French Alps of Savoy and Dauphiné to the Rhone. Further south the Durance flows to the Rhone and the Dora Riparia to the Po.

The Aar has already been traced from the glaciers of the Finsteraarhorn (14,000 ft.), the highest of the Bernese Alps, to its confluence with the Rhine. Interlaken, between Lakes Brienz and Thun, commands a fine view of the Jungfrau, the queen of the Bernese Alps, and is the starting-point for their finest scenery. The courses of the Reuss and Rhine we know.

The Engadine and the Tyrol. East of the Rhine is the Vorarlberg district, and south the Engadine, perhaps the finest of all, with peaks 11,000 to 13,000 ft. high. The Inn flows through grand scenery to the Danube, between the Bavarian Alps and the Tyrol, with Innsbruck as its chief centre. From the Tyrol the Adige, or Etsch, flows south, near the Ortler group (12,800 ft.), the highest part of the Austrian Alps, the only one of the many rivers flowing south in long parallel valleys which does not enter the Po. Not far from the source of the Adige is the Gross Glockner (12,400 ft.).

Now both the scenery and direction of the valleys gradually change. The rivers no longer flow north and south, but east to the Danube, the largest being the Drave and Save. These eastern Alps form the Austrian provinces of Styria, Carinthia, and Carniola. From the northern end of the Austrian Alps spring the forested Carpathians, and from the southern the Dinaric or Dalmatian Alps, which border the eastern shores of the Adriatic. The Apennines of Italy are also an offshoot from the Alps, but with quite different scenery.

Notable Alpine passes are connected with the valleys mentioned. In the centre the St. Gotthard leads from the head of the Reuss valley to the head of the Ticino valley, thus giving a through route from the North Sea to the Adriatic. In the west the Mont Cenis, also followed by a railway, with a tunnel $7\frac{1}{2}$ miles long through the core of the Alps, leads from the valley of the Arc, a tributary of the Isère, to that of the Dora Riparia, a tributary of the Po, and to Turin. The Brenner, in the east, leads from the Inn to the Adige. All these give through routes right across the Alps. The Simplon, with a tunnel $12\frac{1}{2}$ miles long, leads from the middle of the upper Rhone valley to the valley of the Toce and Lake Maggiore. Many famous passes, not accessible by rail, lead from one valley to another, but these need not be mentioned.

Switzerland. Switzerland (16,000 sq. miles) is a union of many independent cantons which grew up on both slopes of the Central Alps, round the lakes which fill many of the lower valleys, and on the plateau at their northern base. The Federal capital is Bern, on the Aar. Except on the plateau, the larger towns have become important because they command good routes across the Alps. Zürich, Luzern (Lucerne), Bern, Lausanne, and Geneva are examples. On the plateau the climate is that of Central Europe, with hot summers and cold winters. In the Alpine valleys the winter varies in severity with elevation. Winter snow covers the summer pastures, blocks many of the passes, and renders the streets of the higher villages impassable.

Why Switzerland is Prosperous. Switzerland is a brilliant example of what can be done by utilising the national resources, whatever they are. A land of uninhabitable mountains, with hardly any lowlands suited for agriculture, with no coal to feed manufactures, and producing hardly any raw material, it would seem to have small hope of prosperity, yet it is one of the richest countries in Europe. Mountaineers are generally resourceful and energetic, and the Swiss are no exception. They make the most of agriculture on the plateau, their manufactures are flourishing, their dairy industries world-famous, and they have brought to perfection what they call the *Fremden-industrie*, or trade in tourists.

The Tourist Industry. Switzerland discovered this industry and makes a fortune by it. Everything is done to develop it. Railways are carried everywhere, even up nearly perpendicular cliffs. Well-equipped hotels are built actually at the snow-line. Summer brings its tens of thousands of tourists, who enrich the army of caterers, cooks, waiters, porters, railway servants, and mountain guides who follow in their train. The favourite centres are the Engadine, where Davos is a sanatorium for consumptives; Zermatt, in the Pennine Alps; Interlaken, in the Bernese Oberland; Chamonix, for Mont Blanc, Vevey, and many other towns round the Lake of Geneva; and Luzern and smaller towns round that lake for the fine scenery about the St. Gotthard.

Swiss Agriculture.

Agriculture is confined to the plateau and the lower valleys, where rye, oats, and potatoes are the chief crops. The summer is hot enough, especially on Lake Geneva, to ripen the vine and maize, and in the valleys of the southern slopes the mulberry and olive are also cultivated. Not enough food is grown for the population, and food-stuffs are largely imported.

The Dairy Industry.

With the rich pastures of the Upper Alps, dairy farming was bound to be important. Many Swiss cheeses are famous, and the manufacture of condensed milk is a specially Swiss industry. The manufacture of chocolate, for which Switzerland has become world-famous, also consumes large quantities of milk. Notice how the character of a country affects even the way in which it pays to use milk. Other pastoral countries, Ireland, Denmark, Holland, make butter their staple, but they are maritime. Switzerland is in the heart of Europe, and transport is difficult and costly. Cheese, condensed milk, and chocolate, carefully packed, are highly portable, and do not spoil by keeping. Hence their selection. Let us never forget to look for geographical explanations of the nature of a country's trade.

Manufactures.

The manufactures are important, partly because the people are shrewd, industrious, and well educated, but also because there is an inexhaustible supply of cheap motive power. This is furnished by the irresistible force of the rivers rushing down from the Alps. Always important, water-power has become invaluable with the development of electricity as a motive power. The electrical industries are steadily growing in importance all over Switzerland.

The mountain railways are driven by electricity; and the nearer a town or hotel is to the snow-line, the more certain it is to be lighted by electricity. Textiles are manufactured in the busy towns of the plateau, silk at Zürich and Basel (Bâle), and cotton round Zürich



PICTORIAL MAP OF THE BASIN OF THE RHINE AND ITS RELATION TO THE NEIGHBOURING COUNTRIES

and St. Gallen. Textile and electrical machinery is made at Zürich, the industrial capital of Switzerland, and locomotives at Winterthur. Geneva, the commercial centre of the west, gives its name to the watches and clocks made in the valleys of the Jura, in the canton of Neuchâtel, north of the lake of that name. Lausanne, magnificently situated on the north of Lake Geneva, is also a busy town, which has developed a "girls' school industry," if we may so call it, which draws its pupils from all over the Continent, and largely from England.

A. J. AND F. D. HERBERTSON

GORGEOUS RUBENS AND GRAPHIC TENIERS



"THE HOLY FAMILY," BY RUBENS



"INTERIOR OF A TAVERN," BY TENIERS

Renaissance Architecture and Sculpture outside Italy. Painting in Flanders and Holland. The Van Eycks, Rubens and Rembrandt.

THE ART OF NORTHERN EUROPE

JUST as the Gothic style, born in the North, found the Italians reluctant to accept its tenets, so Renaissance architecture could only slowly force itself upon the Northern nations. In France and in Germany the new forms made their appearance comparatively late in the sixteenth century, and to a great extent lost their original purity through combination with Gothic motifs. The church of St. Eustache (A.D. 1532) in Paris illustrates the blending of the two styles, and such French private buildings as the castles of Chenonceau and Chambord show the picturesque combination of Renaissance motifs with Gothic turrets and slanting roofs.

One of the most graceful structures of the Renaissance in France is the famous winding staircase at Blois, which one critic has tried to prove to be designed by Leonardo da Vinci. The Louvre, the Luxembourg, the Panthéon, and the Dome des Invalides in Paris are notable examples of the French Renaissance. In Germany the castle of Heidelberg (A.D. 1545) is a remarkable instance of the blending of Classic decoration with Gothic sentiment. But in both countries the new style did not achieve complete victory before the seventeenth century, when its severe beauty had given way to the flamboyancy of the Baroque.

In England, the introduction of the Renaissance style is due to Italians, such as Torrigiano, the designer of Henry VII.'s tomb in Westminster Abbey, John of Padua, Giovanni da Majano, and Rovezzano.

The Elizabethan style, "an attempt on the part of the English to translate Italian ideas into their own vernacular," was chiefly employed for richly decorated private mansions and dwellings, of which we need only mention Longford Castle, built by John Thorpe; Knole, Kirby, and Penshurst. In the Jacobean period the Renaissance character became more pronounced, especially in the use of columns and entablatures. Holland House and Hatfield House may be quoted as notable examples. But Elizabethan and Jacobean

buildings on the whole only form a transition from the Gothic to the pure Renaissance style, which appeared with Inigo Jones in the seventeenth century. This master's great buildings, such as the Banqueting Hall, Whitehall, and the Duke of Devonshire's villa at Chiswick, prove him a student and follower of Palladio. Inigo Jones was followed by Sir Christopher Wren, the builder of St. Paul's and several other beautiful churches. Wren died in 1723.

The progress of sculpture in Northern Europe cannot be followed as easily as in Italy, for in spite of the colossal output of artistic work in France, Germany, and the Netherlands there is a lack of brilliant individualities which stand forth as landmarks of the progressive stages of development. Local schools there were in vast numbers, and throughout these countries the same tendency is to be noted; but few, indeed, are the men whose names have been handed down through the ages as creators of masterpieces. Love of carefully studied detail, clear rendering of facial expression, close adherence to Nature, and delight in rendering the various textures are the chief characteristics of Northern Renaissance sculpture, which could never rival the triumphs of Italy, partly owing to the lack of classic examples, partly to the absence of the suitable material—the marble of which the Italians had an abundant supply at hand.

During the fifteenth century the art of wood-carving reached an extraordinary degree of perfection in Germany. The tendency of the carved wood statues and altars with many figures in high relief was distinctly pictorial, especially in the restless arrangement of the draperies; and painting and gilding were frequently resorted to to enhance the effect. Nuremberg at that time became the chief centre of German arts and crafts. It is almost essential to visit this quaint, old-world city to form an adequate idea of the art of this period, for it harbours the chief works of such masters as Veit Stoss, the wood-carver; Adam Krafft, the stone-

sculptor; and Peter Vischer, the bronze-worker, the author of the famous figure of King Arthur in the Hofkirche at Innsbruck.

In France the chief works of sculpture produced between the Gothic period and the triumph of the Italian influence of the masters summoned by Francis I. to Fontainebleau are to be found among the monumental tombs at Dijon, Amiens, Rouen, St. Denis, and Bourges. Then Primaticcio and Rosso started the Italianising school of Fontainebleau, which produced sculptors like Jean Goujon and Germain Pilon. The naïve realism of the earlier sculptors had now given way to an elegant and sometimes mannered style, the chief aim of which was decorative effect. The reliefs of the Fontaine des Innocents, at the Louvre, in Paris, represent Goujon at his best, while Pilon's "Three Graces," likewise at the Louvre, illustrate this master's exaggerated elegance. What little indigenous style there was in English sculpture was stifled by Torrigiano, Benedetto da Rovezzano, and other Italians called to England in Tudor days.

The rise of pictorial art in the



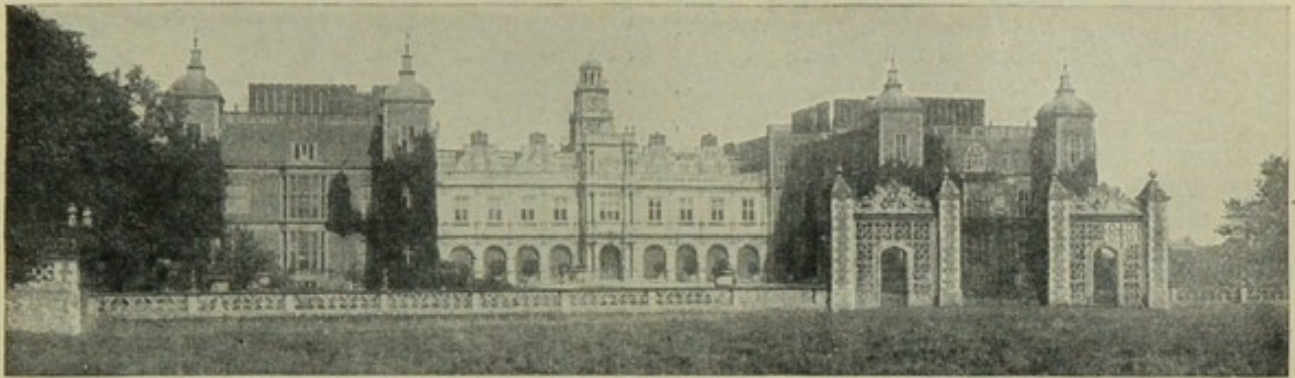
THE BRONZE STATUE OF KING ARTHUR
By Peter Vischer, in the Hofkirche at Innsbruck

North coincides with the invention of oil as a medium for painting by the brothers Jan and Hubert Van Eyck, at the end of the seventeenth century. And, curiously enough, Flemish painting, at its very beginning, appears at a stage of development which Italy has only reached by slow and gradual steps. The Van Eycks are great masters, not only by comparison with those that went before, but even if measured by those that followed them. We have already seen how the conditions imposed by the Gothic architectural system limited the painter's activity to small panel pictures, so that his attention was fixed on the elaboration of minute detail, instead of monumental massing of line of form, and on soulful expression instead of stateliness of pose.

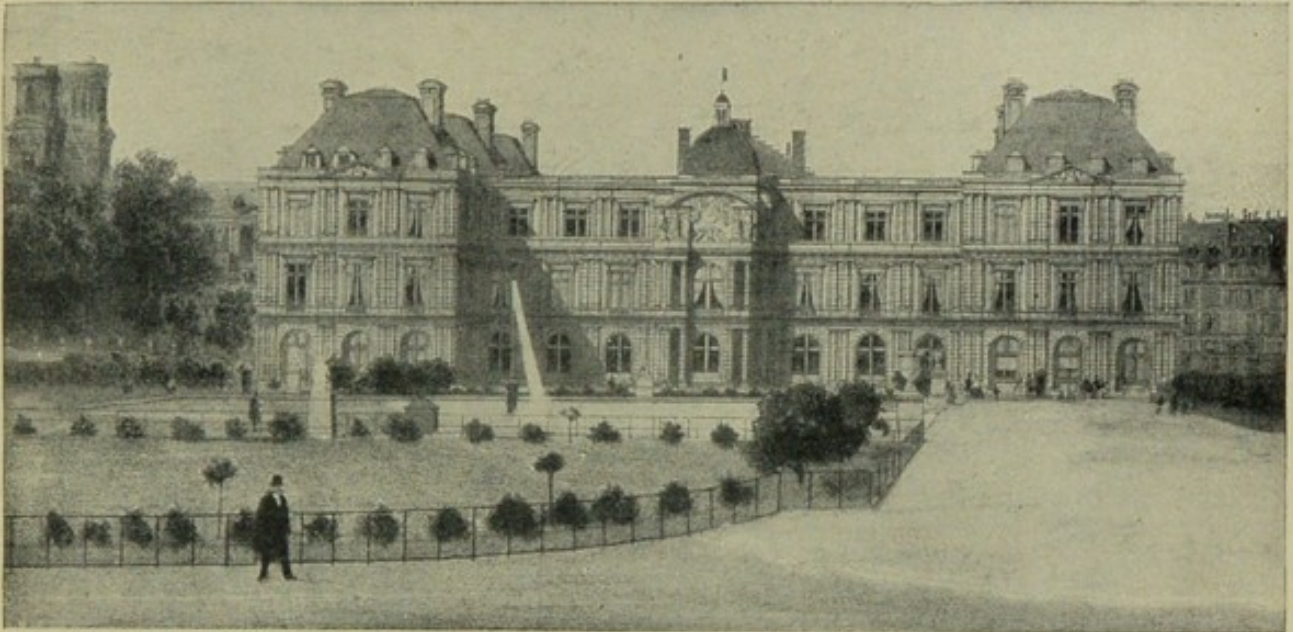
Oil Painting in Flanders.

The new school arose in Flanders—the Belgium of today—which was then one of the chief commercial and industrial centres of the world. The brilliant pageants of the Flemish cities, with their constant coming and going of wealthy traders from every part of the world, must have been a powerful stimulant to the local painters.

STATELY HOMES OF THREE COUNTRIES



HATFIELD HOUSE, A MAGNIFICENT EXAMPLE OF JACOBEOAN ARCHITECTURE



THE LUXEMBOURG PALACE, PARIS, BUILT UNDER THE INFLUENCE OF THE RENAISSANCE



THE OLD CASTLE OF HEIDELBERG, A MONUMENT OF EARLY GERMAN ARCHITECTURE

The Van Eycks. Hubert Van Eyck was born about A.D. 1366, and worked principally at Bruges and Ghent. The subject matter and symbolism of his paintings are still quite mediæval, but the actual incidents, costumes and types, architecture and landscape, are lovingly and faithfully copied from the scenes which he had daily before his eyes, and set down with painstaking precision, which was only surpassed in minuteness by the work of his brother Jan. The "Adoration of the Lamb" is their chief work. Rogier van der Weyden, born in A.D. 1400, was a little less literal in his transcripts of nature, and more emotional in expression. Hans Memlinc, a Bruges painter of German origin, born about 1430, is the most lovable painter of a school which too frequently delighted in the realistic representation of scenes of tortures and other horrors. In him the realistic tendency of the school finds expression in the wonderful rendering of landscape and accessories, but he was an artist full of tender feeling and poetry, with a rare sense of feminine purity and innocent grace. Gerard David, who was born about 20 years later and worked at Bruges at the end of the century, was much influenced by Memlinc, and is distinguished by a glowing sense of colour and beautiful line. Quentin Matsys, born 1460, practised portraiture and genre, besides religious art, and marks a decided advance in expressive modelling. With Mabuse, who died in 1532, and even more with his contemporary, Raphael's pupil, Bernard van Orley, the Italian influence begins to filter through the local tradition, and in the case of the latter is to be detected in a more ample sense of design and a departure from the severe exactitude of the earlier masters. But what had been the result, in Italy, of centuries of slow development, could not be transplanted in its mature form to foreign soil, and became mere mannerism with the later Flemings, until a new era of superb artistry dawned with the advent of the great Rubens.

Rubens. Rubens (A.D. 1577-1640), too, had drunk at the same source of Italian art, and his early work in particular evinces his love of Venetian colour, but he brought into his painting a strong, virile, and altogether personal temperament that could never have been content with mannered imitation. A colourist of tremendous power, Rubens excelled above all in the painting of flesh, in which he stands unrivalled to this day. One may be repelled by the coarse, fleshy type of his women, but the mastery with which

he expressed with bold, sweeping strokes of luminous paint the roundness of form, the texture of the skin, and the very blood coursing under the skin, irresistibly compels one's admiration. The passionate movement, the vigour and verve of his work, seem to exclude the possibility of a deliberately calculated design, and yet the noble disposition of his figures, the effective massing of light and shade are as "scientific" as the movement and sensuous colour are instinctive. Rubens was the most worldly of all painters, yet he could treat a religious subject with a very reverent spirit. He was equally great in portraiture, in genre, in landscape, and in animal painting. But it should be remembered that in accordance with the custom of the period, he had a horde of assistants working under him, and many of the inferior pictures that pass under his name owe to him merely their conception, while the execution is entirely due to his pupils.

Van Dyck. Much the same remark applies to the greatest of his pupils, Van Dyck (A.D. 1599-1641), who, as Court painter to Charles I.,



THE CHILDREN OF CHARLES I., BY VAN DYCK

exercised so potent an influence on English art that he may rightly be considered the real founder of the great English school of portraiture. Indeed, many of the paintings turned out from his studio at Blackfriars during his English period are the work of his numerous assistants, save for the first sketch and the finishing touches. Van Dyck, too, studied for some years in Italy, where, like his master, Rubens, he fell under the spell of the Venetians. An accomplished courtier and man of the world, he became the favourite of society in his native country, as in Genoa and in England. His pictures are a perfect mirror of the English aristocracy of his day, reflecting their taste and distinction and effeminate elegance. As a colourist, he was more subtle and refined, if less vigorous, than Rubens.

The coarser side of Rubens's art attracted Jacob Jordaens, whose lack of refinement is scarcely atoned for by his great technical skill and good humour. Franz Snyders (A.D. 1579-1657) was a brilliant animal painter, whilst Jan Fyt and Jan Weenix excelled in still life, generally of dead game. Melchior Hondekoeter devoted himself almost exclusively to the bird life of the farmyard. All these masters were great colourists, and stand supreme, each in the narrow range he imposed on his art.

Growing Popularity of Art. The earliest Dutch painters, among whom Dierick Bouts and Lucas van Leyden are the most

THE DUTCH MASTERS OF PORTRAITURE



"THE NIGHT WATCH," BY REMBRANDT



"SYNDICS OF CLOTH MERCHANTS," BY REMBRANDT



"A BANQUET OF OFFICERS," BY FRANZ HALS

prominent, were almost completely dominated by the genius of the Van Eycks and the other early Flemings. In fact, in their early stages, the two schools can scarcely be considered separately. Then came the Reformation and the War of Independence, which resulted, in 1648, in the final shaking off of the Spanish yoke. The long period of warfare and bloodshed was not favourable to extensive art production, but when Protestant Holland issued victorious, a great period of art commenced—of art led into new channels, since Protestantism looked askance at religious painting, and preferred bare, white-washed walls in the churches to an imagery of glowing colour. On the other hand, a demand for art arose in the civic community. The well-to-do citizens enlisted art for the adornment of their living rooms, and the subjects favoured were no longer, as may well be imagined, flagellations and crucifixions, and images of the Virgin and saints, but portraits, landscapes, genre scenes depicting the daily life of the burghers and peasants, and, or the guild halls and other official buildings, large portrait groups of prominent burghers.

Pictures in the Dutch Home.

Of idealism and ideology, there is little or nothing in Dutch art which is entirely based on love of nature and on the keen appreciation of the value of pigment. The rich quality of the paint, the subtlety with which the play of light and shade on objects and textures

is observed—these were the chief points that appealed to the Dutchmen. These little genre scenes—interiors of burghers' houses, with ladies before a mirror, or occupied with books or musical instruments; or tavern scenes depicting the life of the humbler classes—are never of anecdotal or literary character; they are just glimpses of real life stated in terms of ornamental craftsmanship. Of this nature are the precious gemlike pieces of Terburg, Vermeer van Deft, Metz, Jan Steen, Mieris, Gerard Dow, and, in Flanders, of the Teniers, who had more in common with the Dutch "small masters" than with the Flemings.

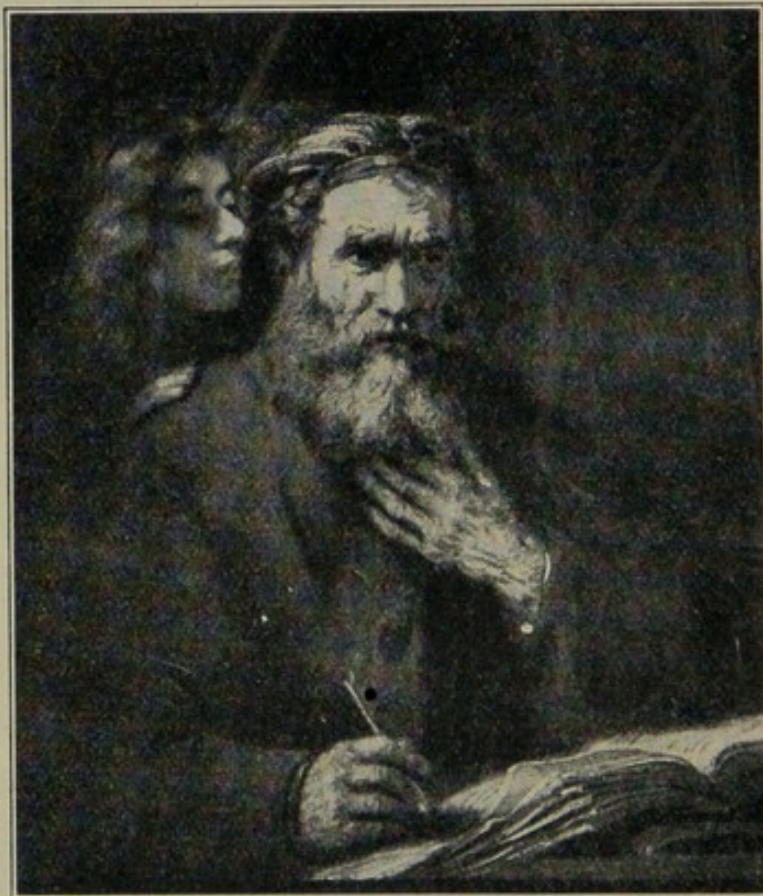
Frans Hals. But the seventeenth century small masters were preceded by a few men who must rank among the very giants in the realm of painting. Rembrandt is one, and by no means the least brilliant, of the great triple constellation that stands out from the firmament of art, the compeer of Velasquez and Titian. Before him, Frans Hals (A.D. 1584-1666) had achieved the greatest triumphs in bold, daring portrait painting. For sheer bravura and dashing brushwork and brilliant characterisation, Hals has probably never been equalled, and his large "Doelen" groups at Haarlem are an inexhaustible source of delight to all who can appreciate masterly brushwork. Then, Van der Helst (A.D. 1613-1670) may be taken as the most capable of the numerous serious portrait painters who recorded with faultless conscientiousness in

a somewhat tight manner the features of civic dignitaries and their buxom housewives.

Rembrandt the Revealer.

But with Rembrandt (A.D. 1606-1669), all hardness, one might almost say all linear design, was abandoned, and everything that the artist's eye could see, or his brain conceive, expressed in terms of soft lights and shadows and golden, liquid half-shadows. Everything is given plastic form through the play of light on the surfaces which are seen through the surrounding atmosphere. In his golden illumination and forced contrasts, Rembrandt is, perhaps, not always strictly true to nature, but he

has the power to make us feel that, if such conditions of light were possible, faces and objects would appear just as he has set them down [see "The Night Watch," reproduced on page 1617]. Rembrandt is the antithesis to the Italians of the Renaissance, who were ever striving for beauty. With him character is everything, but the mastery of his brush and his sympathetic insight into the very soul of his sitters give beauty even to subjects repellent in themselves. Apart from his paintings, Rembrandt's etchings alone would entitle him to one of the most exalted positions among the world's great artists. P. G. KONODY



"ST. MATTHEW," BY REMBRANDT
The Louvre, Paris

The Three Orders of Levers in the Body. How the Erect Position is Maintained. Walking, Running, and Jumping.

MOTION AND LOCOMOTION

MOTION in itself is no more a proof of life in a man than in a steam-engine; it is the method by which it is produced in man that differentiates him from a machine. Motion and locomotion are not the same. Motion is movement only, but locomotion is movement from one place to another; in walking we get both.

A great deal of motion takes place in the body apart from locomotion, although, in fact, the body as a whole does not change its place.

For motion or locomotion four structures at least are necessary as regards the mechanism. Something to be moved—the bones; a place where they move—the joints; machinery that moves them—the muscles; and a force that controls the machinery—the nerves; and all movements involving these structures take place according to mechanical laws. These, then, we will briefly consider.

A System of Levers. The principle with which we are most concerned is that of *leverage*, or movement by means of levers. A lever is simply a bar that lifts (French *lever*—to lift), which may be either straight or crooked, and made of any rigid substance, such as wood, iron, or bone. All our bones are used as levers or bars. [See page 1025.]

Now, as a rule, we can do so much more work with levers than we can do without them that Archimedes, who discovered their use, said that if he had a lever long enough, and a fulcrum to rest it on, he could move the world.

The parts in a lever are three in number. They are the *fulcrum* (F), or the fixed point on which the lever moves, which in the body is invariably a joint; the *power* (P), or the force that moves the lever; and the *weight* (W), or the object that is moved.

Orders of Levers. The orders of levers vary according to their relative position, thus:

WFP is the first order—that is, when the fulcrum is in the middle. PWF is the second order—that is, when the weight is in the middle. WPF is the third order—that is, when the power is in the middle.

Levers of the Body. Now, all three orders of levers are used in the body [71], although the third is undoubtedly the favourite, for a reason that will be evident.

Tapping the foot on the ground, raising the head off the chest, and straightening the arm are examples of the first order. Thus:

W.	F.	P.
foot	ankle-joint	muscles of calf
head	joint with spine	muscles of spine
hand	elbow-joint	triceps muscle

Standing on tiptoe is an instance of the second order.

P.	W.	F.
calf-muscle	body	toes resting on ground and acting as a joint.

Bending the arm, closing the jaw, are examples of the third order, thus:

W.	P.	F.
hand	biceps	elbow-joint
jaw	jaw muscles	jaw joint

Respecting this third order, observe that the power, or the muscle, is attached between the fulcrum in the joint at one end and the weight to be lifted at the other.

The nearer the muscle is attached to the weight to be lifted the more it has to be contracted to lift the weight, whereas the nearer it is attached to the fulcrum the less it has to contract, but greater force is needed. For instance, consider the attachment of the muscles of the arm and leg. You will have noticed how all the body-levers have the fulcrum close to the power at the end of the bar. Thus, the elbow-joint is close to the point of the elbow behind, and the ankle close to the heel; and you will also have noticed in the same way that in every case the muscles are attached as near to the fulcrum, or joint, as possible. Those that lift the arm are fixed just below the shoulder; those that lift the forearm are fixed just in front of the elbow; those that move the thigh just below the hip; and those that move the leg just below the knee.

Why a Muscle is Attached near the Fulcrum. The object is to give the greatest movement of the limb with the least contraction of the muscles. If you take two bits of firewood a foot long, and join them together at one end with a tack, open them at right angles, and tie a string from one end to the other, it will be 17 in. long. To bring the ends of the two pieces together by pulling on the string, you must use up all the 17 in.; but if you tie one end of the string close in front of the joint in the way our muscles are fixed, you will find that, though you have to pull harder to bring the pieces of wood together, you only use up about 1 in. in length of the string to move the ends of the firewood 17 in. [72].

By this contrivance, therefore, the slight contraction of the muscles can move the limbs a great distance. When you kick a football, your foot goes through a great space, but the muscle that moves it only contracts an inch or two.

Shoulder and Hip Contrasted. So special joints in the body call for a brief consideration. Let us first contrast the shoulder and the hip. The shoulder is not a fixed joint, but can be moved backwards and forwards to a certain extent. It is supported behind by

GROUP 4—PHYSIOLOGY

the shoulder-blade, and in front by the collar-bone. This latter bone has a double curve; all shocks received at the shoulder, therefore, as in falls, or in striking, etc., are broken by the spring allowed in the shoulder itself, and by the spring in the collar-bone. If the shock, however, is very violent, the jar breaks the collar-bone about the middle. The shoulder is not a universal joint—that is, it cannot move in all directions, but it practically does so, as it is not stopped by the pressure of flesh against flesh in any direction, excepting inwards, when the arm is brought against the side. In an upward direction, however, we cannot raise the arm above the level of the shoulder, because the end of the collar-bone and the arm-bone then come together. If we wish to raise the arm higher, the shoulder itself, being movable, is tilted up. The joint has muscles on all four sides, which pull the arm upwards, downwards, inwards, and outwards.

Now the hip, though a universal or ball-and-socket joint, differs from this in nearly every particular. While the chief peculiarity of the shoulder is its elasticity and its free mobility, the hip is noted for its great strength and firmness, and limited power of movement.

The hip-joint is perfectly rigid, and never moves itself, the socket being part of the strong, bony pelvis. Although the thigh can move in every direction to a slight extent, it cannot move very far in any. Its forward movement, which is the greatest, is checked by the meeting of all the fleshy part of the thigh with the abdomen. Its backward movement beyond a straight line with the pelvis is checked by a strong fibrous band that stretches across the front of the joint. The movement inwards is checked by the other leg, and outwards by other bands, and by a strong cord that fastens the ball of the head of the femur to the bottom of the socket of the hip-bone of the pelvis. It is surrounded with powerful muscles, except on the inner side, where they are weak.

How we Stand Upright. Some other joints may be considered as we look at the phenomenon of the erect position in man. At

first sight it appears that nothing could be more natural than the erect attitude. It is only when we look at the means by which it is attained that we see what a feat it is to stand upright. The attitude itself is peculiar to man, and is not natural even to the anthropoid apes.

Let us consider how this position is maintained. We will begin at the foundation and go upwards. This tall column, 6 ft. high, more or less, called the body, is balanced on the front of the feet

(about 3 in. square), and upon the two heels (about 2 in. square). The toes are in front of the body, and, if the latter tends to fall forwards, press firmly against the ground to prevent it; the heels, too, are behind to prevent the body from falling backwards. If the body tends to

fall sideways, the foot on the side towards which it leans, pressing the ground, restores the balance.

Having the two feet, then, firmly planted, the two legs come next. They are hinged at the knee, and would naturally fold up backwards if not forcibly kept straight. The muscle that does this is the powerful extensor of the leg, which, passing down in front of the thigh, crosses the front of the knee, is fixed into the knee-cap, and continued down to the

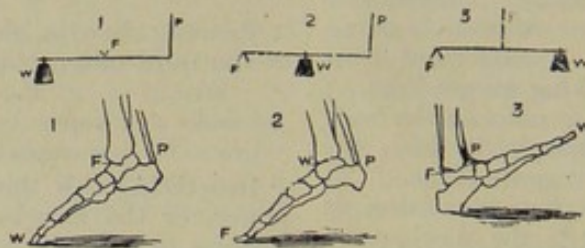
top of the shin, or the tibia, where it ends, and so braces the leg straight. The leg cannot fold forwards because of the crucial ligament in the knee-joint, neither can it twist to one side or the other.

Necessity for Standing Erect.

Now we have the two legs upright, how are we to balance the body on the two balls of the hip-joints without falling over? For it would naturally appear that we should topple forward or backwards unless incessantly

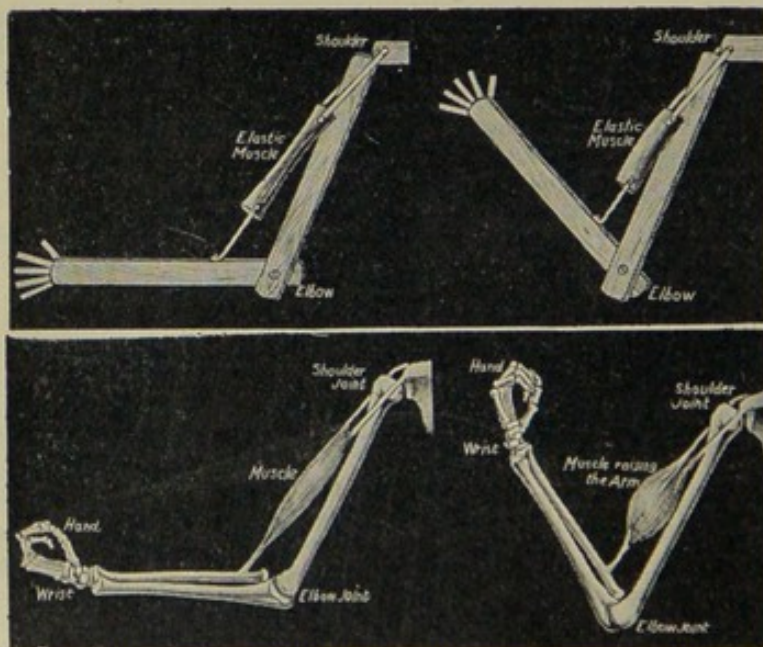
braced up by muscles before and behind. Here, however, we come across a beautiful contrivance for saving the dreadful fatigue a muscle would undergo by such a continued effort. There is no danger of the hip-joint folding up forwards in the erect position, as the body is heavier behind the joints, and the strain is rather to prevent the body from falling backwards.

From the front on each side of the pelvis, therefore, passing across the front of each joint, and



71. THE THREE ORDERS OF LEVERS

- 1. Tapping the ground with the foot. 2. Raising the body on the toes. 3. Raising the toes from the ground.



72. MODEL AND DIAGRAM SHOWING HOW THE MUSCLE RAISES THE ARM

fixed just below in the front of each femur, is a band of fibres, not muscle, so strong that nothing can break or stretch it. If we stand quite erect the whole strain is thrown off the muscles on to these powerful bands, which, when put to the full stretch, just allow the legs and body to extend in a straight line, but not more; so that the body by this means is balanced on the legs without fatigue. Those who have not learned to stand thus, soon tire.

The spine, being firmly fixed into the hip-bones, is first bent forward, to throw the weight of the heaviest part to the front, and then, as the weight gets lighter, it bends backwards between the shoulders, and forwards again in the neck, there being no joint that can double up between the hip and the neck. At the neck a good deal of the strain of keeping the head erect is taken off by an elastic ligament like a strong india-rubber band, which passes from the occiput to the spine, and so keeps the head erect without appreciable effort.

Horses which have a long neck, and a heavy head to hold up at the end of it, have a similar band of immense thickness running from the head along under the mane to the shoulder.

The human body, then, tends to fall backwards below, and forwards above; that is, there is less support for it behind at the heels than forwards at the toes; so the ankle, knee, and hip would all fold backwards if they could, while the head would drop forwards on to the chest when the muscles are relaxed, as in sleep.

Arrangement to Preserve the Brain from Shock. Before leaving this subject the contrivances to preserve the brain from shock are worth noticing. Passing from above downwards, we notice *first* that the brain itself is saved from all jars by not touching the base of the skull, but floating on a sort of water-bed. In the *second* place the spinal column is a double curve, forming a double spring, thus breaking shocks; and, *thirdly*, the pad of cartilage inserted between each pair of vertebrae breaks all jars travelling up the bones. *Fourthly*, at the fourth pair the base of the spine is wedged into the pelvic arch. In this case the keystone is inserted between the two side bones, upside down, so that the broadest part of the sacrum looks downward and forwards, and the narrow end points backwards and upwards. It is thus slung between the bones in such a way, like a carriage hung on "C" springs, that every jar upwards or pressure downwards tends to separate the keystone from the arch instead of jamming the bones together, and so reduce the shock.

The *fifth* contrivance is that the head of the femur is at right angles to the shaft, which alone reduces the force of shock one half.

The *sixth* is the slant of the femur to the middle line; and the *seventh* is at the knee, where we have between the bones two strong pads of cartilage to prevent all jarring.

The *eighth* is the keystone which forms the instep of the foot. In this case it is set in the usual way, with the broad end uppermost, and the narrow end below resting on a *stout* band of fibres, which breaks all jar.

The *ninth* and last is in the foot, where the hinder pier of the arch comes straight down to the ground, and is formed of one bone, called the heel; but the front pier slopes very gradually, like a spring, and is composed of twenty-four bones. Thus, we get in the foot-arch solidity behind and elasticity in front [6, page 101].

Walking. The movement of the body from place to place is the result of combined action of many muscles. In the act of walking the muscles of the arm should be entirely relaxed, as they are not required in any way, and the arms should be left to hang naturally.

In starting to walk, say, with the right leg, the muscles of the calf raise the heel from the ground, while the muscles in front of the abdomen pull the body a little forward, still further raising the right heel. When the body is inclined forward to a certain extent, it would fall over were it not for the next act, which consists in allowing the left leg to move forwards to support it. This is done partly by a pendulum-like swing, and partly by a forward pull of the muscles in front of the thigh.

The left leg is now in front of the body, and the balance is restored; but the right leg has not ceased to act yet. It continues to push the body still further forwards while the muscles in front of the trunk still pull it over, until it is in advance of the left leg, thus raising the right leg off the ground and allowing it to swing forwards in its turn. Walking thus depends on pushing upwards with the leg and pulling forwards with the front of the trunk. As the body is supported alternately on each leg, it is inclined a little from side to side, so as to throw the weight fully on it, and prevent falling over sideways. Thus the body in walking is continually rising and falling, and swaying slightly from side and side.

Jumping, Running, and Hopping. Jumping consists in a spring off the ground, caused by the sudden contraction of both calves forcing the toes so violently against the ground that the body is jerked into the air.

Running is a series of short jumps with each leg alternately, so that both feet are constantly off the ground at the same time. The body is inclined still more forward than in walking.

Hopping consists in a jumping on one leg, caused by the most violent contraction of the muscles of the calf of which they are capable.

We may, in conclusion, note that movement is by no means a necessary sign of strength. Babies move all their muscles a great deal, and often without much reason, because their minds have not yet got much control to quiet their movements, but the older and stronger a person gets, the less he moves excepting when he wants to do so, because he has all his muscles under control. To keep constantly moving, therefore, does not show that we are strong, but may indicate that the brain power is weak.

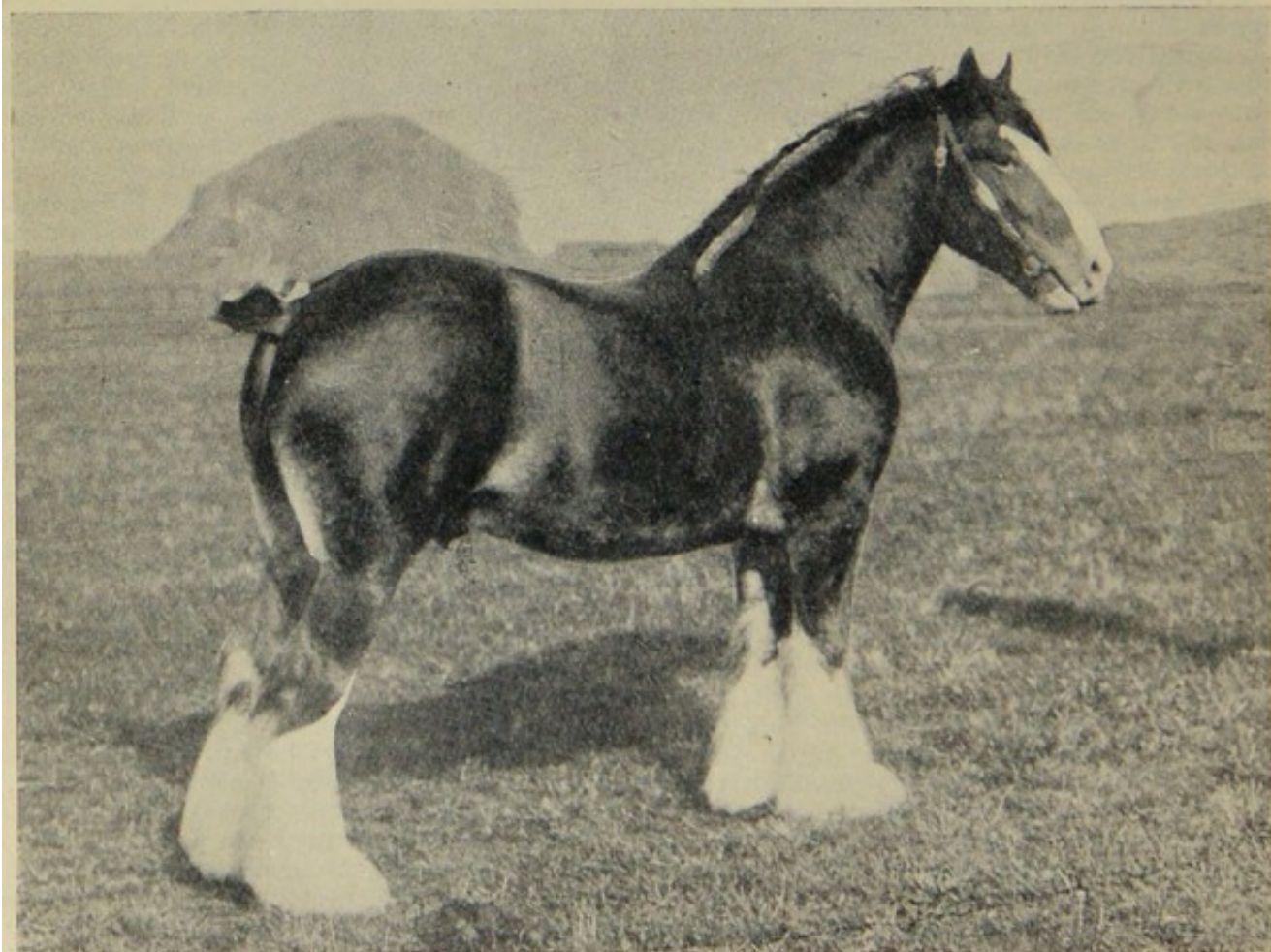
In the locomotor, as in all other systems of the body, there are control centres that prevent unnecessary or excessive action, and tend to promote a steady, healthy condition.

A. T. SCHOFIELD

ENGLISH HORSES FOR LIGHT & HEAVY WORK



A HACKNEY HORSE



A SHIRE HORSE

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Famous Breeds. Rations for Horses at Rest and at Work. The Farm Horse. Breeding and Breaking-in. The Age and the Teeth.

THE MANAGEMENT OF HORSES

Our Breeds of Horses—The Shire.

This magnificent breed was formerly known as the Old English cart horse, and was practically made in the counties of Lincoln, Cambridge, Derby, and Notts, but it gradually extended to adjoining counties, and subsequently to every part of England. Since the establishment of the Shire Horse Society the Shire has become one of the most popular horses with farmers and landowners. It is chiefly black or dark brown, with white marks on the face and feet; bays are occasionally seen, but other colours are rare. It often reaches 17 hands in height, and in a good specimen the girth is from 7 ft. 9 in. to 8 ft. 6 in. While highly symmetrical in form, it may be described as "much in little." In build the Shire is square and massive, possessing a big chest, a short back, powerful shoulders and join, long quarters, deep, well-sprung ribs, muscular thighs, legs short below the knee, heavily clothed with fine silky hair or feather, and short pasterns. The head is long and fine, but broad between the eyes; the neck arched, and the feet large and wide; the body lines are highly symmetrical. The weight of good specimens exceeds 2000 lb.

The Shire is a fast and active walker, and is largely bred by farmers, many of whom keep pedigree mares for the purpose, which they employ in their teams on the land. The produce is chiefly sold for heavy draught purposes to brewers, carriers, and the like. The Shire is perhaps the most powerful horse in the world. It is docile and intelligent, and is believed to be descended from the old English war horse, an animal of much smaller size. Great prices are often obtained for prize-taking stock, and, chiefly owing to exhibitions, the breeding of this animal has become an important industry. Pedigree stallions owned by wealthy landowners and farmers or hired by societies travel through most parts of England.

The Clydesdale. The Clydesdale is the draught horse of Scotland, chiefly used for the heavy work on the farm and the drawing of heavy loads in the great centres of population. In colour it is usually dark brown or black with white markings; not quite so large as the Shire, it reaches a height of 16 to 16½ hands. While symmetrical in form, it is massive and powerful, possessing a gentle disposition and great activity for its size. The head is well formed, the neck arched and strong, the shoulders oblique, the back short and hollow, the chest wide and deep, the ribs round and well sprung, the quarters strong, the thighs powerful, the legs muscular and straight, and the bone, like the knee, flat, the pasterns sloping, and the feet broad and strong. The Clydesdale is a fast and free walker,

and is on one side descended from stock imported from France.

The Suffolk. This variety, which is chiefly confined to East Anglia, is, on account of its heavy body and short limbs, known as the Suffolk Punch. Its colour is almost invariably chestnut, although varying in shade. It is active, courageous, and strong, walking and trotting easily; averaging about 16 hands in height, it sometimes reaches 16·2, and weighs from 1850 up to 2200 lb. The Suffolk possesses a neat head, a short neck, powerful shoulders, a well-rounded body or barrel, which is massive as compared with the legs which support it. The forearms are short and stout, the thigh muscular, but the legs are light in comparison with those of the Shire and Clydesdale, and carry no long hair. The pasterns are short and strong, and the feet smaller than those of other heavy breeds.

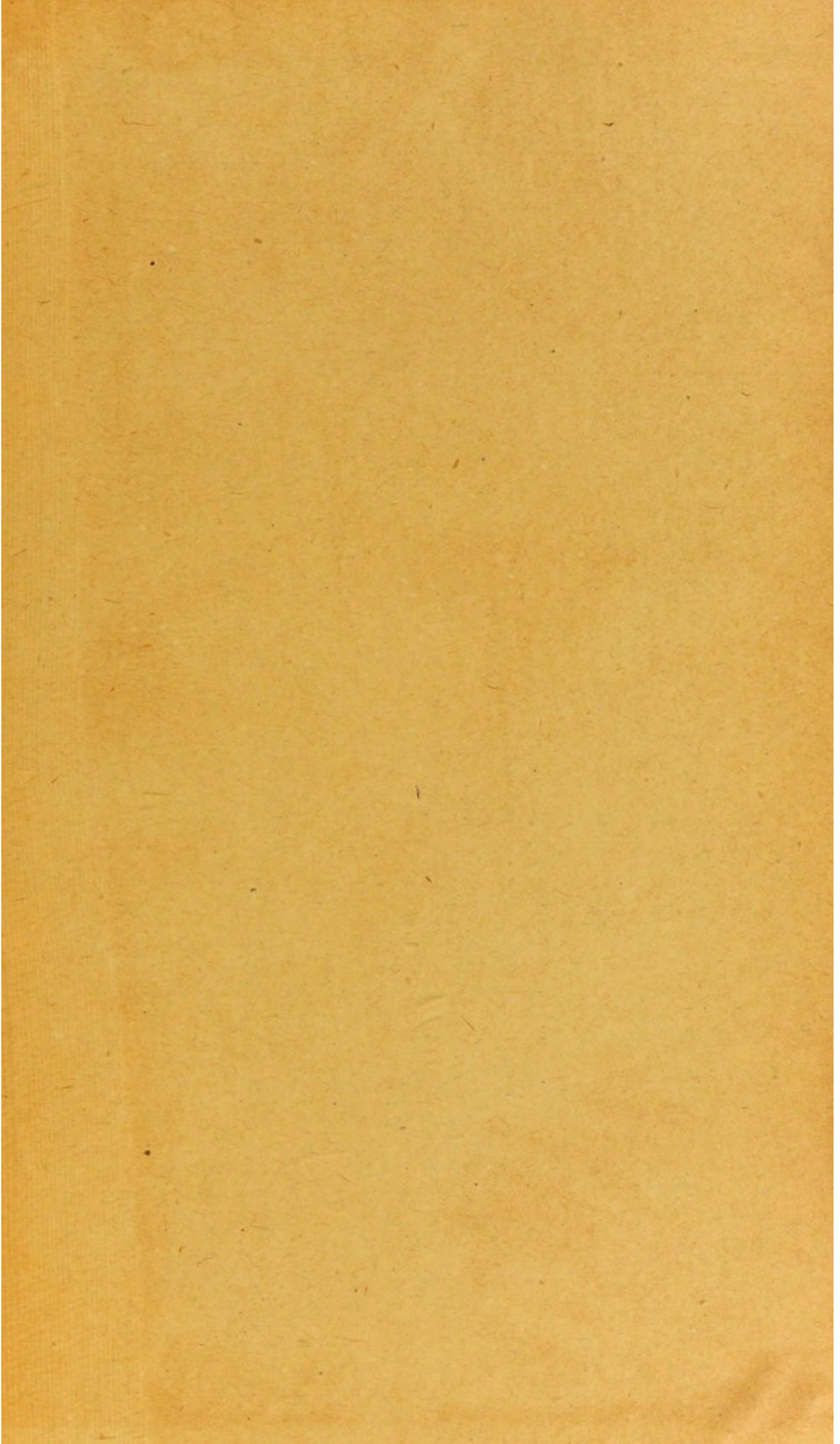
The Thoroughbred. The thoroughbred, or race horse, is the produce of our ancient native breed crossed with the Arab and other horses of Eastern origin. It is a somewhat nervous creature, exhibiting great speed, spirit, courage, and endurance. In build it is graceful, with fine skin, silken hair, and plenty of sinew. Under the management of a Royal Commission money is annually awarded to selected sires, which are distributed throughout the country for the use of farmers and others at low fees. The object is the production of hunters, carriage, and other saleable horses, which the thoroughbred is well adapted to produce when crossed on selected mares. The head, although wide in the nostrils and the forehead, is fine, especially at the muzzle. The neck is long and slender, the shoulders long and flat, the loins short, the quarters muscular, the legs long and flat, but short from the knee to the pastern, which is elastic, the forearm and thigh long, the chest high, and the constitution exceptional. In colour the thoroughbred is usually bay, brown, or chestnut, other colours being comparatively rare. In height it reaches up to 17 hands; according to one of our best authorities, Sir Walter Gilbey, the height of the racehorse was 14 hands in 1700, 14·3 in 1800, and 15·25 in 1900.

The Cleveland Bay. This is an improving breed, which is bred in the Cleveland and adjacent parts of Yorkshire and Durham. It is employed on the farm for light draught work, for the saddle, and even for carriage work, the mares being specially adapted for the production of carriage-horses when crossed with the thoroughbred. In height it reaches from 16 to 16·2 hands, and its colour is the richest bay of any of our native breeds. The mane and tail are black, and the legs dark. The head is not well















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