

EARLY MAN

HIS ORIGIN, DEVELOPMENT
AND CULTURE

By

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Professor J. L. MYRES, D.Litt., D.Sc., F.B.A.

A popular exposition of an intensely interesting
subject by six leading experts.

With thirteen plates and many illustrations.

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PREFACE

THE contents of this book were prepared as a course of Open Public Lectures for the Royal Anthropological Institute, and were delivered in the Portland Hall of the Polytechnic between October 1929 and March 1930.

Most of them are here reprinted without change; but in Chapter I portions already published elsewhere have been omitted; in Chapter IV the lecture, which described many illustrations, is represented by a summary only: and to compensate for this, the sixth lecture, which was necessarily abbreviated for delivery, is represented by the two Chapters VI and VII.

For permission to reproduce illustrations, the thanks of the Royal Anthropological Institute are due to the Clarendon Press, The Oxford University Press, the Cambridge University Press, the Society of Antiquaries of London, Messrs. Macmillan, Messrs. Kegan Paul, Trench, Trübner & Co., Messrs G. Duckworth & Co., and the publishers of *Antiquity* and the *Illustrated London News*. Fig. 30 is from a photograph supplied by Professor S. Langdon from the Oxford and Chicago Expedition to Kish.

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EARLY MAN

I

THE EVOLUTION OF MAN

By Professor G. Elliot Smith, M.D., F.R.S.

IT is commonly supposed that in ancient times men were curious about their origin, and invented fables or accepted inspired statements in regard to creation to satisfy an innate craving for historical knowledge. Nothing could be further from the truth. Primitive man did nothing without some practical and concrete aim. Even his most fantastic legends and customs were inspired by some definite purpose. To him the story of creation was the most important ritual device for the preservation of life and the attainment of prosperity. Its aim was to define how life was obtained in the beginning and how a fresh supply of vital energy could be secured in times of danger or emergency.

The true history of the creation of man, which we now call evolution, is not to be confused with these ancient traditions. It is a new field of inquiry which, after more than a century of passionate controversy, is now for the first time being cultivated calmly and seriously. The widespread interest being displayed at the present time in fossil remains of man and the handicrafts of extinct types of men affords an impressive

testimony of the fact that Human History is coming into its own.

The fossil remains that have been found in various parts of the world during the last eighty years afford tangible evidence of the antiquity and the diversity of the Human Family and of the range of its early wanderings. The recent discovery of a Pleistocene genus in China that is intermediate in type between *Pithecanthropus* and the Piltdown Man is both stimulating and enlightening. For if the introduction of a hitherto unknown and exotic relative into the family circle increases our pride in the length of our ancestry and the variety of our kinsmen, it is also a useful discipline in humility in reminding us what strange and uncouth cousins of ours once roamed the world, unknown to us and our immediate predecessors. Each new discovery adds a good deal more than the intrinsic evidence of the actual specimen: it also gives renewed confidence in our attempts to reconstruct our pedigree and probe into the sources of our being.

The main objective of such inquiries is to discover Man's place in Nature and to assess at their true value his distinctive qualities. Man is linked to the apes by bonds of affinity which the advancement of knowledge is making plainer and more precise year by year. This helps us to define the problem of the nature of the essential difference between man and his nearest relatives, the African anthropoids.

It has long been known that there is nothing in the bodily structure of man that is not also present in the gorilla—no muscle or nerve, no organ or tissue, no element of the brain. The essential difference is due to the fact that certain localised areas of the brain are larger in man than in his nearest living relative. These confer upon man his intellectual supremacy.

It is generally admitted that all living members of the

Human Family belong to the same species, *Homo sapiens*. All the other species and genera of the family, whose former existence has been made known to us during the last eighty years by the discovery of a series of fossils, became extinct many thousands of years ago in competition with the more skilful members of our own species. It is not part of my business to-day to discuss the races of mankind, which I understand will be the subject of Sir Arthur Keith's lecture in this series. It is essential for my argument, however, to refer to one point in connection with the living races of man.

Whatever criteria may be adopted as racial distinctions (and I need hardly remind you there is still a wide discrepancy among the views of modern anthropologists on this subject), there are certain outstanding features, which the man in the street is competent to recognise without any special training, for differentiating six well-defined types of mankind: the aboriginal Australian, the Negro, the Mongol, the Mediterranean, the Alpine and the Nordic races. However much these various racial strains have become intermingled during the last fifty centuries, most educated people are familiar with their distinctive features, so that I need not take up your time at the present moment in discussing them or in dealing with the question of the effects of intermixture.

My reason for referring to the racial question is to call attention to the geographical distribution of the six races as they are revealed at the present day and by such information as we have of their range in the past. The Australian race, although mixed with other elements in Australia, is represented to-day in certain of the islands of the East Indies, especially in Timor and elsewhere in the Malay Archipelago and Malay Peninsula. The Wadjak skulls found by Professor Dubois in Java afford welcome corroboration of the antiquity of the

wanderings of the Australian people. It is generally recognised—the matter has been recently discussed by my colleague Dr. Zuckerman in a memoir which has recently been published by the Madras Museum—that there is a considerable Australoid element in the population of Southern India and Ceylon. Hence one can assume that there has been a movement of people of this race from India towards the East. There are certain analogies between the skulls and the associated cultures found in the Upper Palæolithic of Moravia by Professor Absolon and the Australian people and their present customs. The earliest members of the species *Homo sapiens* found in Europe—namely, the Aurignacian Grimaldi skeletons and the Combe Capelle skull—present certain analogies to the Australian. Hence it seems possible that during the Upper Palæolithic Period in Europe members of the Australian race, or perhaps it would be less questionable to call it people presenting a proto-Australian likeness, may have reached Eastern Europe (and possibly as far as the Italian Riviera and Combe Capelle in Southern France). Nevertheless all the undoubted members of the Australian race lie east of Mesopotamia.

The members of the Mongolian race occupy Eastern Asia. We know that within comparatively recent centuries they have moved south into what we now call Indo-China and the Malay area. We know also that they moved west through Turkestan, and, for purposes of argument, one can regard China as possibly the centre of the original Mongolian domain. In other words, the Mongol race lies east and north of Mesopotamia, and the Australian east and south of that region. The divergent streams that set out from the original home of the common ancestors of these sharply contrasted peoples cannot be brought together east of Mesopotamia.

The Negro race is found in its greatest numbers and with

least admixture in the heart of Africa. We know that the Bantus have spread south in recent centuries, and that the Sudanese Negroes have moved to the west; so that we can regard Equatorial Africa as the chief centre of people displaying the most characteristic of the Negro characters. There are suggestions in Southern Persia and in India that in ancient times a movement of members of the Negroid race traversed this part of the littoral of the Indian Ocean. Going further east we find scattered in the Malay Peninsula, certain of the islands of the Malay Archipelago and the Philippines, groups of pygmy Negroes and occasionally taller members of the Negro race, until we reach New Guinea and Melanesia proper, where we find both pygmy and taller people displaying undoubted characters distinctive of the Negro race. In view of the more distinctive characters of the African Negroes, one is inclined to regard Africa as the possible centre of differentiation of this race which can be put, in regard to Mesopotamia, in a position to the south and west. Extending due west from that hypothetical Garden of Eden, the earliest known inhabitants of Sumer and Arabia and Syria, of East and North Africa, and the shores of the Mediterranean were people of the Mediterranean Race of Sergi. Some of them wandered to Western Europe at the time of the Neolithic phase of culture. Others spread east along the southern littoral of Asia from Arabia to Southern Persia and to India. The most obtrusive racial ingredient in the present mixed population of India is Mediterranean.

From India they moved further east, and became the original Indonesian, and they probably formed an important ingredient of the mixture of peoples from the Malay Archipelago which moved up along the eastern coast of Asia and also pushed out into Oceania to the north of the hypothetical centre of the

species *sapiens*. In other words, the spot from which all these distribution areas seem to radiate was somewhere in the neighbourhood of Western Asia to the north of which was probably the home of the Alpine Race and somewhere in the north-west the original area of characterisation of the Nordic Race.

If the implication of these distributions is accepted, we may tentatively assume that the species *sapiens* probably lived somewhere in the region between India and Northern Africa, and that from this centre they radiated out in different directions in groups which became segregated respectively in six different areas and assumed the distinctive characters of the fundamental races of the species. In the earliest dispersal there also wandered to the west several groups of people whom it is difficult to assign to any of the existing races of mankind. The Crô-Magnon people, the earlier Grimaldi race, which in some respects resemble the Australian aboriginal, and probably much earlier than any of these, a very primitive and still enigmatic people who reached England possibly as early as, or even earlier than, the Mousterian phase of culture. Of this earliest known representative of the species *sapiens* nothing is known beyond what can be gathered from the Lloyd's skull which was found in the City of London five years ago.

Neanderthal Man.

It is unnecessary that I should say much on the present occasion with regard to the oft-discussed remains of Neanderthal Man. Since the discovery of the earliest member of this group in 1848 and the definite recognition twenty years later of the fact that it represented an extinct species of the Human Family, remains of this uncouth species have been found in Germany, France, the Channel Islands, Gibraltar,

Italy, Yugo-Slavia and Palestine. As our knowledge of the makers of the original Mousterian implements has increased, the geographical range has been pushed further east, until it reached the spot to which we have just assigned the possible original home of the species *sapiens*. When one considers the many points of analogy between the most primitive members of the species *sapiens*, such as the Australian aboriginal and the Lloyd's skull from England, the conviction is strengthened that possibly a divergence between *Homo sapiens* and *Homo neanderthalensis* may have taken place somewhere in the neighbourhood of Western Asia. The discovery in 1922 of the remains of Rhodesian Man revealed a hitherto unknown type of the Human Family definitely more primitive than Neanderthal man; and there can be no doubt that Sir Arthur Smith Woodward had ample justification for recognising this distinction by creating the new genus *Rhodesiensis*. In fact, as further information accrued from the intensive study of the remains found on the Broken Hill Mine, and comparison with the remains of other fossil men is made, the conviction is forced upon us that Rhodesian Man really belongs to a genus distinct from *Homo*, and the type of the skull found at Heidelberg in 1907 suggests the possibility that Rhodesian Man and Heidelberg Man may be nothing more than divergent species of one and the same genus, which, following the lead of Bonarelli, we might call *Palæanthropus*, who probably diverged from the main line of human development in the Middle Pleistocene. Belonging to a definitely more ancient and more primitive stratum are the three early Pleistocene genera *Pithecanthropus*, found on the banks of the Solo River in Central Java in 1891; *Eoanthropus*, found in 1912 in the Piltdown gravels in Sussex; and *Sinanthropus*, a genus defined in 1927 by Professor Davidson Black on the evidence of a single molar tooth—

a daring adventure which was amply justified by the finding in the following year of the fragments of two jaws suggesting kinship with Piltdown Man; and a year later—that is, in December 1929—by the finding of a brain case which showed that after all *Sinanthropus* was perhaps somewhat nearer in type to *Pithecanthropus*, but revealed features which make it an ideal link between two hitherto irreconcilable forms found in Java and at Piltdown respectively. Professor Davidson Black's investigation of the human fossils found in China will always rank as one of the most momentous achievements in illuminating the early history of the Human Family. It is not merely that he has interpreted the remains of another early Pleistocene genus, so much as the fact that this genus can be linked with the other two earlier genera, and so provide a solid foundation for the interpretation of the characters of the earliest members of the Human Family and their wanderings throughout the world.

The Search for Man's Ancestors.

During the eighty years or so in which these interesting relics of our ancestry have been recovered, the interest of anthropologists and of the intelligent lay public has been keenly alive to the possibility of finding, dead or alive, other links in man's ancestry. It would be interesting and entertaining to discuss the history of some of the false claims made by over-enthusiastic searchers in different parts of the world; such, for example, as the mistaking of the epiphysis of the humerus of the fossil elephant *Stegodon* for another brain case of *Pithecanthropus*; or the assumption that the tooth of a Pliocene peccary from Nebraska gave America the right to claim this "Playboy of the Western World" (*Hesperopithecus*) as the earliest known member of the Human Family. No useful purpose, however, would be served by the further discussion of these false claims,

but I may be pardoned for referring to one of them, because six years ago a story which had very wide currency under the bond of secrecy concerned an incident, the meaning of which has never been publicly revealed to those most intrigued by the rumours of 1924. I refer to the story of the *orang pendek*.

In 1924 Mr. van Heerwaarden claimed that he himself saw in Southern Sumatra an *orang pendek*—a Malay term which means nothing more than a pygmy, but which was interpreted to be a living ape-man. Information regarding these claims was sent under great secrecy to a number of learned societies in different parts of the world, including the most venerable scientific society in this country, and private meetings were held to discuss what should be done to search for this extraordinary creature.

In the early part of 1925 an expedition was sent to Pulau Rimau to endeavour to capture a specimen of Mr. van Heerwaarden's ape-man; and, appropriately enough, in the month of April of that year many newspapers in the Far East announced the discovery of the creature, and crowds of people went to the Zoological Museum in Buitenzorg in Java to see the *orang pendek*. Mr. van Heerwaarden gave a very detailed account of the appearance of the animal which he claimed to have seen. It stood about 5 feet high; it walked erect, with arms reaching to just above the knee; the face was hairless; the forehead high; the nose resembled a negro's, but the wide mouth had ordinary lips; the chin was receding. According to Mr. van Heerwaarden's amazing story—amazing when it is remembered that he had gone out with a gun to capture or to shoot this mysterious creature—when he saw it he was afraid to shoot, because he said the creature looked so much like a human being that he did not want to be accused of murdering one of his fellow-creatures.

Nothing more was heard in Europe of these remarkable incidents until the meeting of the Pacific Science Congress in Java in May 1929, when Dr. W. K. Dammerman, the Director of the Zoological Museum at Buitenzorg, gave a very interesting account of the whole of this mythical search for the ape-man of Sumatra. He reminds us that the whole story goes back at least as early as the thirteenth century, when Marco Polo pricked the bubble of the myth of the *orang pendek*, which assumed an identical form in his day. Marco Polo says that the material evidence which gave rise to this story six centuries ago was the custom of mummifying apes with camphor and spices, and preparing them in such a way by trimming the hair and moulding the form as to give them a roughly human likeness. Dr. Dammerman tells us that in September 1924 his museum was presented with a footprint said to have been made by the *orang pendek*. The Dutch Resident at Palembang arranged to obtain a paraffin-wax impression of the footprint of this mythical creature which was found on the Aerteman estate. Some of the Malays said they had seen the animals with their own eyes walking erect on their hind legs and that they were between $4\frac{1}{2}$ and 5 feet high. But apart from the statements of Mr. van Heerwaarden, all the information came from natives, and so closely reproduced the traditions of the thirteenth century as to make it valueless as evidence of happenings in the nineteenth century.

Hence Dr. Dammerman turned to examine the footprints which were the only positive evidence. He found that the form of the foot and its measurements exactly coincided with footprints of the bear which he happened to have at Buitenzorg at that time. In 1927 fresh rumours were heard of the presence of the *orang pendek* in Southern Sumatra, and an engineer called Nash, who was working in the district, was one

day in the jungle when his guide halted and pointed to what he said was the *orang pendek*. Mr. Nash shot it with his gun, and found that it was a Malay bear.

In the early zoological literature relating to Sumatra, the animal which we know as the *orang utan* was called in Southern Sumatra the *orang pendek*; and there can be no doubt that the stories which have been current all these centuries are the result of the misunderstanding of the natives' ideas of the *orang*. In Southern Sumatra the *orang utan* is either completely extinct or extremely rare; so that, as Dr. Dammerman remarks, the animal only continues to exist there in the memory of the population as a fabulous creature, half man and half ape, and the curious resemblance of the tracks of the bear to those of a human being has served to keep alive the legend that these mythical creatures were still haunting the jungle.

During the years in which this false scent was being followed in Sumatra, China was yielding perhaps the most significant evidence of primitive man yet recovered.

During the last half-century European palæontologists have been exploiting the druggists' shops of China for fossils, "dragons' bones" being an important item in the pharmacopœia of Eastern Asia. As long ago as 1903 a report was published mentioning the presence of a fossilised human tooth among this material whose provenance and age were, of course, unknown. It was not until 1919, however, that Dr. J. G. Andersson discovered rich fossil beds in the neighbourhood of Chou Kou Tien, thirty-seven miles south-west of Peking, and in August 1921 found the main deposit which was destined to provide perhaps the most significant material for the investigation of early Pleistocene Man. Excavating on this site in 1922 and 1923, Dr. O. Zdansky collected a quantity of fossil material, which was prepared for study in Professor Wiman's laboratory

in Upsala and subsequently studied there by Dr. Zdansky. At a meeting of the scientific societies of China held in Peking on October 22, 1926, in honour of the Crown Prince of Sweden, who was then visiting China, Dr. Andersson made the announcement of the discovery by Dr. Zdansky of two human teeth in the fossil beds of Chou Kou Tien. The evidence provided by the remains of horses led Drs. Andersson and Zdansky to consider the possibility that the human remains might belong to the Upper Pliocene age, and represent the first evidence of Tertiary Man so far recovered. Subsequent research, however, in particular the intensive study of the fossil remains, has led Father Teilhard de Chardin and Dr. C. C. Young to identify the horizon as Lower Pleistocene, or at any rate certainly later than Pliocene and earlier than the loess, which is Middle Pleistocene. One of the teeth recovered was a right upper molar, whose characters are essentially human; the other tooth is a lower front pre-molar, of which only the crown was recovered. The molar tooth presents a resemblance in general features to the specimen to which I have already referred, the one purchased by Haberer in a native drug shop in Peking, which was subsequently described by Professor Schlosser in 1903; a left upper third molar with a very much worn crown. Schlosser suggested the probability of it being as early as Tertiary in age, and provisionally described it as either *Homo* (? sp.) or anthropoid. In concluding his description of the tooth more than a quarter of a century ago, he predicted that future investigators might expect to find in China a new fossil anthropoid ape and Human fossils belonging either to the Tertiary or to the Early Pleistocene Period. As Dr. Davidson Black remarked in 1926, the Chou Kou Tien discovery affords a striking confirmation of Schlosser's prediction.

In a monograph which Dr. Zdansky published in 1928

(*Palaeontologia Sinica*, Vol. V, Fasc. 4, p. 141) he claims to have identified the molar *in situ* in the fossil beds when he excavated the material in 1923. In the telegram which Professor Wiman sent to Peking in October 1926 (before the public announcement was made), however, no reference was made to this claim of Dr. Zdansky. In his memoir in the *Bulletin of the Geological Society of China*, Vol. V, which was published in Peking in 1927, Dr. Zdansky says that, granting the human origin of the tooth, he is convinced that the existing material (the two teeth he himself had found) provides a wholly inadequate foundation for many of the false theories based upon it, and goes on to say (to quote his own words): "I decline absolutely to venture any far-reaching conclusions regarding the extremely meagre material described here, which I think cannot be more closely identified than as (?) *Homo sp.*" He adds further, "The above remarks were written largely because I find I am credited in certain quarters with the discovery of the Peking Man which is supposed to be of Tertiary age. My purpose here is only to make it clear that my discovery of these teeth, which are of Quaternary age, should be regarded as decidedly interesting, but not of epoch-making importance."

On the afternoon of October 16, 1927, three days before the suspension of the season's field work, Dr. Birger Bohlin found *in situ* in the Lower Pleistocene beds a human lower molar tooth, and handed it over to Dr. Davidson Black in Peking for examination and report. Dr. Black had no hesitation, after comparing its measurements with those of human beings and anthropoid apes and discovering that it occupied a position intermediate between them, in creating the new genus and species *Sinanthropus pekinensis*. In spite of Dr. Zdansky's repudiation of the importance of his discovery, Dr. Davidson Black thought it right to associate his name

with his own in consideration of the fact that Dr. Zdansky's discovery of the two molar teeth had been responsible for directing attention to the presence of human remains in these deposits. The creation of a new genus of the Human Family on the evidence of a single tooth may seem a very hazardous procedure, yet the fact that the geological evidence of its extreme antiquity was quite clear, and as no early human remains had previously been found in the neighbourhood, favoured the probability of the fossils belonging to some hitherto unknown genus. It was a bold course to create the genus *Sinanthropus*: yet a year later—that is, in November 1928—while the excavations at Chou Kou Tien were being continued by Dr. Birger Bohlin, Dr. C. C. Young and Mr. W. C. Pei in the neighbourhood of the place where in October 1927 the type tooth was found, Dr. Davidson Black's courage was completely justified by the discovery of the greater part of the right horizontal ramus of an adult lower jaw presenting peculiarities unknown in any other human mandible except that of Piltdown Man. In it were three molar teeth *in situ*, and the sockets of the premolar, canine and distal half of the lateral incisor preserved. In addition, a score or more teeth, both deciduous and permanent, representing many phases of wear and differences in age, were found together with the front part of the lower jaw of a child. These fragments of jaw were embedded in blocks of travertine. The fragment of child's jaw was intimately associated with a parietal bone of a child of corresponding age. Although this part of the brain case had not been extracted from the matrix at the time the report was written, sufficient of it was visible to enable Dr. Davidson Black to say that it was definitely human in type. The brain case is no more capacious than that of *Pithec-anthropus*. The importance of this association of part of a

human skull with a fragment of jaw of corresponding age is of special interest and importance, because the jaw presents those same simian peculiarities of conformation which aroused doubts in the minds of many foreign palæontologists when the Piltdown jaw was found as to the possibility of its association with the human skull.

It is unnecessary at the present moment to discuss the far-reaching importance of the material found in 1928. For an even more startling discovery was made on December 2, 1929, by Mr. W. C. Pei of the almost complete brain case of an adult skull which is uncrushed. This new discovery brings home to us in a very much more striking way than the recovery of mere fragments, the reconstruction of which invariably excites suspicion in the minds of most people, the tremendous significance of the discoveries in China. This brain case is more complete than the remains of either *Pithecanthropus* or *Eoanthropus*, and, contrary to the anticipations made in 1929, displays a form on the whole more nearly akin to *Pithecanthropus* than to *Eoanthropus*. The length is 8 millimetres greater than that of the Javan fossil; it presents slightly smaller eyebrow ridges, but the brain case is thicker. It is slightly more lofty than the brain case of *Pithecanthropus* and there are definite localised bulgings in the prefrontal and parietal regions, which are lacking in the Javan specimen. The parietal expansion in *Sinanthropus* gives the posterior part of the skull a form closely resembling that of the Piltdown Man. Thus the newly discovered fossil combines in a most instructive way peculiar features of both its contemporaries.

The importance of the discoveries at Chou Kou Tien depends largely upon the fact that so much of the brain case has been preserved in an uncrushed state as to enable us to appreciate the form of an early Pleistocene human skull in its

natural state. For, however carefully such a skull as that found at Piltdown may be reconstructed, it is difficult to overcome the scepticism associated with a reconstruction from a number of fragments. In the case of the Java skull, the general form of which does not depend upon any artificial reconstruction, unfortunately the most significant region, the temporal area surrounding and including the ear, is lacking.

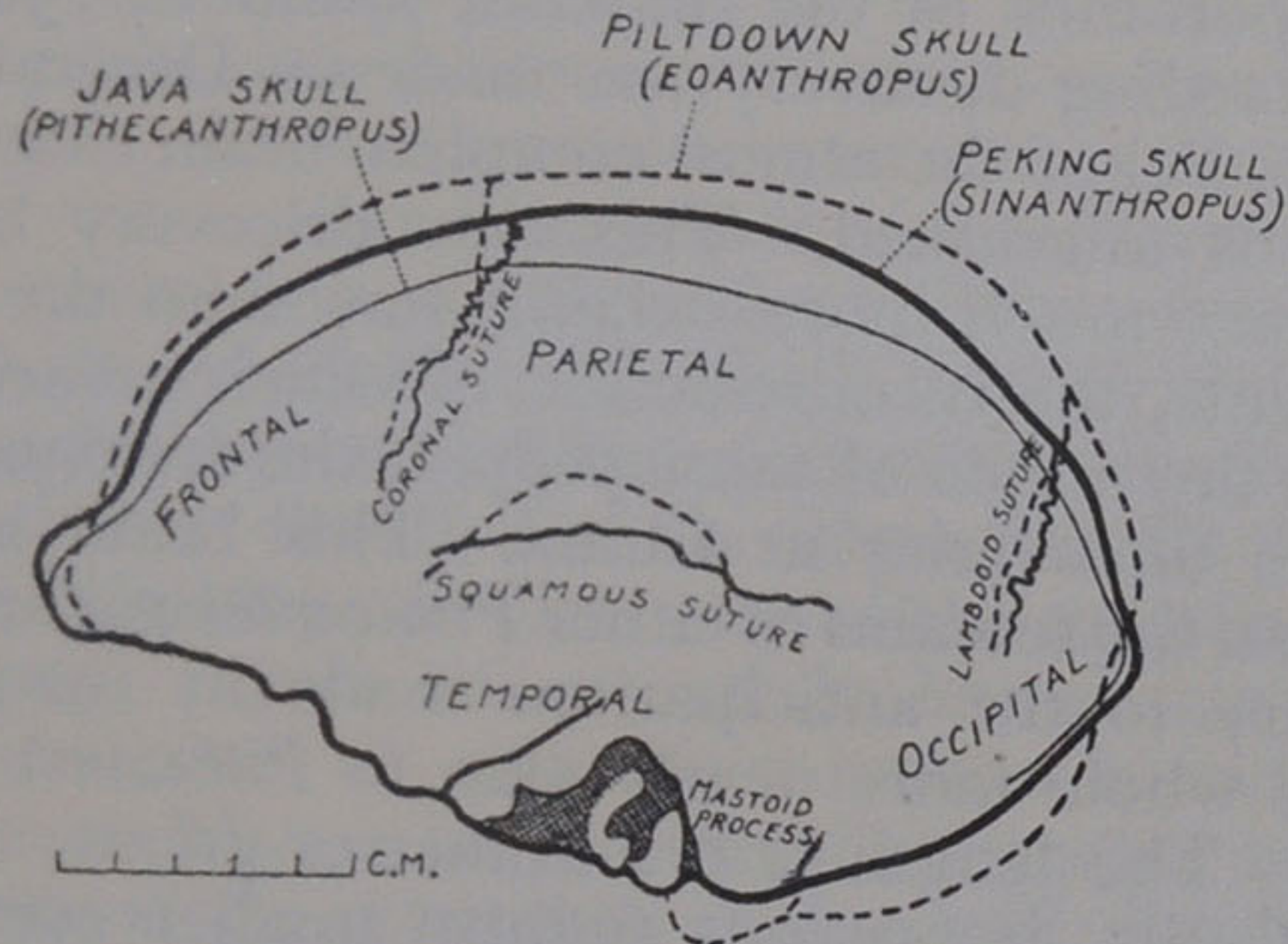


FIG. 1.—Left Lateral Profiles of *Pithecanthropus*, *Sinanthropus*, and *Eoanthropus*, traced from photographs and superimposed for comparison.

In the Peking skull this is one of the most interesting and illuminating parts of the skull.

In his description of the La Chapelle skull Professor Boule emphasised the fact that in Neanderthal Man the under surface of the temporal region lacked those prominent ridges and deep depressions which are found in the corresponding part of the skull of modern man. He compared the relative flattening of this part of the skull to the condition found in apes. In the Peking skull these peculiarities are revealed in a much more pronounced and more ape-like form. The articulation for the

jaw is, however, like that of modern man. The tympanic is a very massive structure, and its general conformation recalls that found in the anthropoid apes. There is a wide, flat depression for articulation in the jaw, and the part of the bone corresponding to the mastoid process resembles the condition often seen in the gorilla, in which the homologue of the mastoid process is quite obvious, although it is not extruded from the

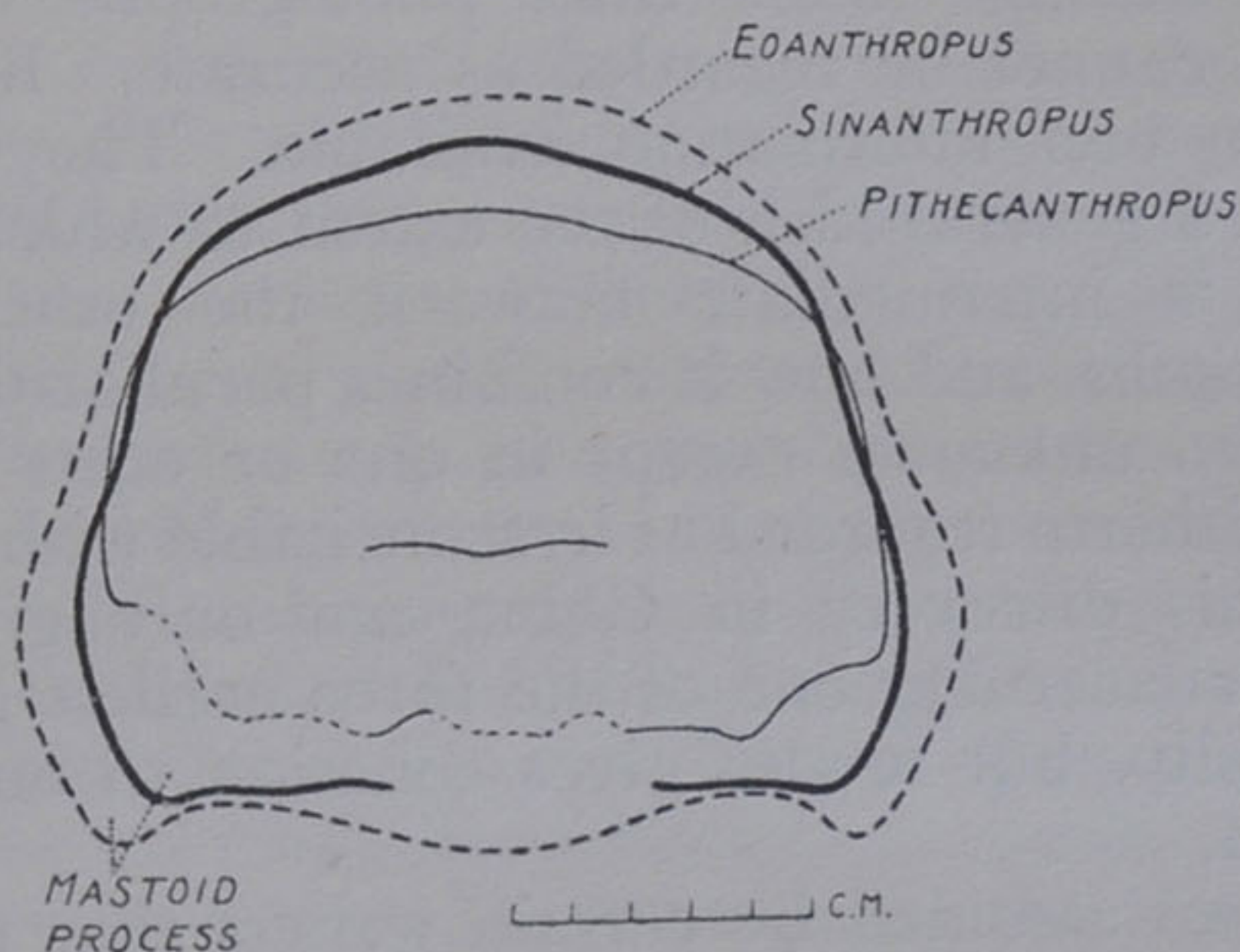


Fig. 2.—Transverse Profiles of *Pithecanthropus*, *Sinanthropus*, and *Eoanthropus*, traced from photographs and superimposed for comparison.

surface of the skull to form an actual process. This is a very peculiar feature of the skull which emphasises its affinity to the giant anthropoid apes. The peculiar conformation of the skull when seen from the posterior aspect, showing a very much greater width in the temporal region in comparison with the much narrower inter-parietal breadth, and a peculiar pentagonal form, is of particular interest because it differs from that of all other human skulls excepting only the Piltown skull. This feature shows a profound difference from that of *Pithec-*

anthropus, and is one of the factors which helps to bridge what hitherto has been the apparent incompatibility of the two earliest known skulls, those of *Pithecanthropus* and of *Eoanthropus*.

Figs. 1 and 2 show respectively the general form of the left profile and the back of the Peking skull superimposed upon corresponding outlines of *Pithecanthropus* and of Piltdown Man. These drawings, which are not orthogonal projections, but simply tracings made from photographs with a wide-angled lens, cannot be regarded as accurate. But at present they are the best information available. They are inserted here to give a general idea of the extent to which the skull of *Sinanthropus* is intermediate between the other two early Pleistocene skulls, and how it combines peculiarities of morphology hitherto unknown except in one or other of the other two fossils, hitherto regarded as irreconcilable with one another.

Hence this discovery in China not only gives us fuller information concerning one of the three earliest genera of the Human Family, but it also gives cohesion to our knowledge of early man.

It has been assumed by certain writers that the discovery of this skull in Eastern Asia and the earlier finding of *Pithecanthropus* in Java afford definite evidence for locating the original home of the Human Family in Asia. I should like to take this opportunity of pointing out that the evidence affords no warrant for such a claim. For long ages before the Human Family came into existence the anthropoid apes had wandered up and down the vast continental mass ranging from Western Europe to Eastern Asia and to the heart of Africa. The distribution of the fossil remains of *Dryopithecus* and of *Pliopithecus*, and the discovery in South Africa of the fossil which Professor Dart has called *Australopithecus* (to which Dr. Robert Broom now assigns an Early Pliocene age), revealed

the fact that the anthropoid apes, more profoundly hampered than human beings are, and less able to adapt themselves to different environments, were able to roam from one end of the area afterwards occupied by primitive man to the other, many ages before man himself appeared upon the scene. Hence the finding of fossil remains of early Pleistocene Man in England, China and Java does not necessarily throw any light upon the home of the much earlier Pliocene common ancestor of these three genera, seeing that ample time was allowed for the much nimbler and more rapidly migrating human members of the Order to roam from one end of the territory to another. Seeing that the common ancestors of the anthropoid apes and men probably occupied Northern India during the Miocene Period, and that all the known members of that family which show any close affinity to man—namely, the African anthropoids, the gorilla and chimpanzee, *Dryopithecus* and *Australopithecus*—all wandered to the west, I am still inclined to accept the view expressed in 1871 by Charles Darwin, that, while evidence is not yet available definitely to answer the question, Africa seems to be a more likely home for the Human Family.

The series of fossil remains of man which are now available provide very significant evidence in the casts of their cranial cavity of the changes which were occurring in the brain to confer upon *Homo sapiens* the skill upon which the attainment of wisdom so largely depends. For although no one would assume that we have yet found a linear series of ancestors passing from *Pithecanthropus* to *Sinanthropus*, from *Sinanthropus* to *Eoanthropus*, through *Palæanthropus* to the genus *Homo*, and from the species *neanderthalensis* to *sapiens*, at the same time, by comparing the forms of the endocranial cavities of this series of skulls, we can detect a progressive expansion of the brain in an orderly fashion, which is of particular interest. It agrees

with the order in which the cortical areas in the brain of the growing child reach their maturity and their full functional significance. Hence we are gradually acquiring from the study of the brain of the modern human child, in comparison with that of the anthropoid apes and the endocranial casts of fossil men, a clearly defined picture of the process of the evolution of the brain. It now becomes a matter of special interest to interpret the processes which went on in the brain to confer upon man his supreme distinction—the human intellect.

New Light on Vision.

Man alone among living creatures really sees the world in the sense that we usually associate with the verb “to see.” The apes and monkeys are provided with eyes which are closely similar in structure to those of man, and on the functional side are perhaps equally efficient dioptric instruments. Man’s comprehension of what he sees, however, and his understanding of the world of things and actions revealed by his powers of visual discrimination, clearly transcend those of the apes, to which we have no reason to attribute the human quality of understanding what is revealed by sight, of appreciation of beauty, and the subtler forms of actions such as facial expression, or of possessing the initiative and skill that result from the wider vision.

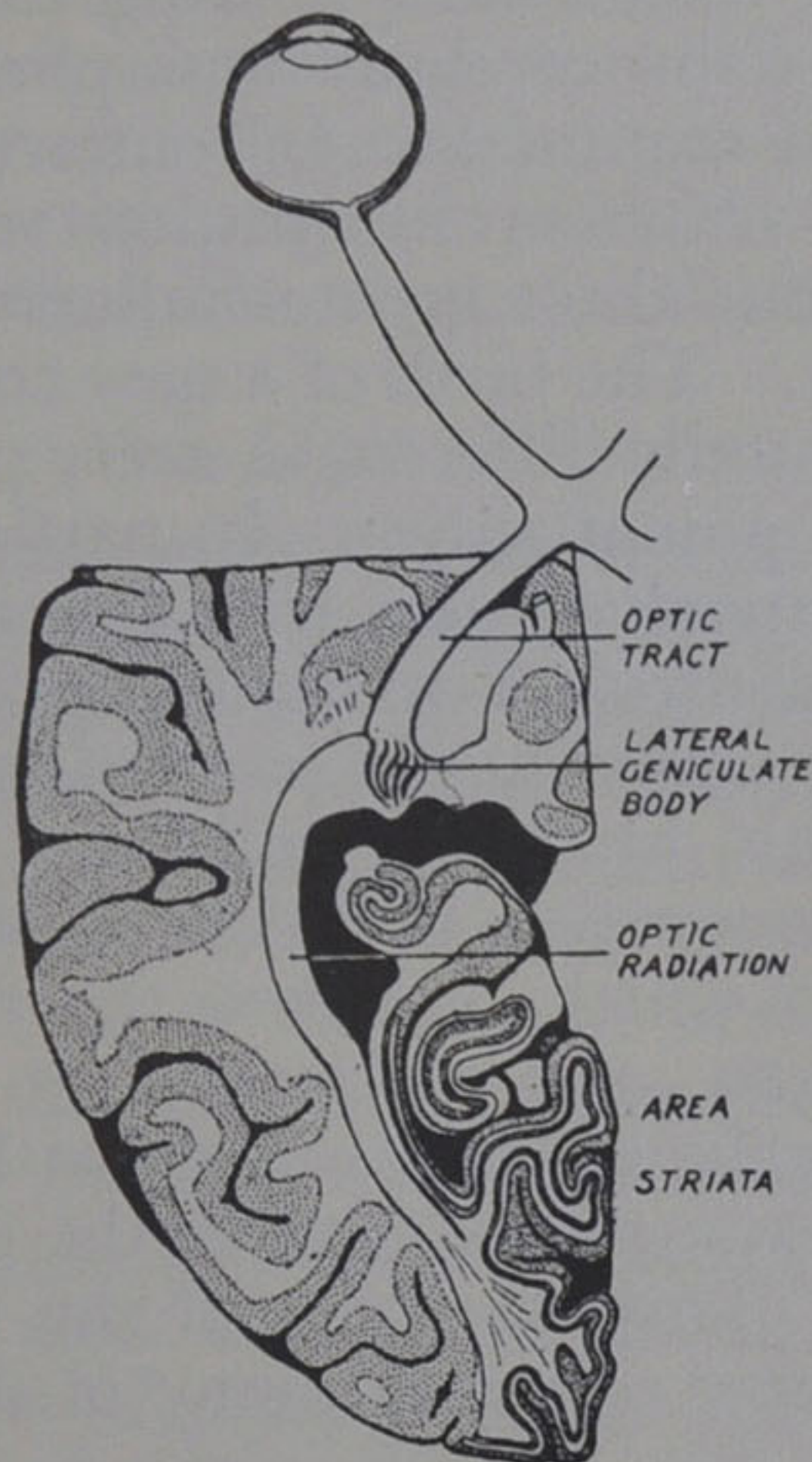
Investigation of the comparative anatomy of the brain reveals the fact that within the natural order of mammals (Primates), to which man belongs, the cerebral connections of the optic tracts have been so profoundly revolutionised that what is virtually a new instrument of vision has been evolved. The progressive cultivation of this “new vision” eventually led to the emergence of those profound changes in the whole organism which transformed an ape into a human being and

conferred upon him the distinctive attributes of mind and skill which are the outstanding tokens of his humanity.

The factors involved in the making of the mind fall into several distinct phases. The acquisition of definite representation for touch, vision and hearing in a newly evolved area (neopallium) of the cerebral hemisphere was responsible for the emergence of mammals. It conferred upon vision not only the possibility of closer integration with other kinds of sensory experience, but also a greater influence in the conscious control of behaviour. The birth of a new cortex created a new type of animal profoundly different in every part of its organism, and especially in its potentialities. In particular the evolution of the neopallium involved the transference to the cerebral hemisphere of the control of voluntary movements, and that led to far-reaching changes in the parts of the brain and spinal cord concerned with muscular activities. The new cortex established direct connection with the spinal cord, new links with the cerebellum which provoked the evolution of a new element in that organ, and corresponding transformations of the cerebral and cerebellar connections with all other parts of the central nervous system involved in the control and regulation of movement. This remaking of the brain involved the usurpation by the new cortex of many of the functions of the midbrain.

The next phase is displayed in the Primates, in which the increasing dominance of vision accentuated the process of transference to the neopallium of the control of movement. The increasing concentration of visual functions in the cerebral cortex conferred upon vision a fuller participation not merely in the affairs of conscious life, but also in the regulation of motor behaviour, and integrated visual, tactile, and motor experience with the kinæsthetic products of the animal's own

movements, the consciousness of the postures and actions of its own body. The cortex came to play a part in the control of posture, and this conscious activity eventually conferred upon man not only the erect attitude, but also that intimate integra-



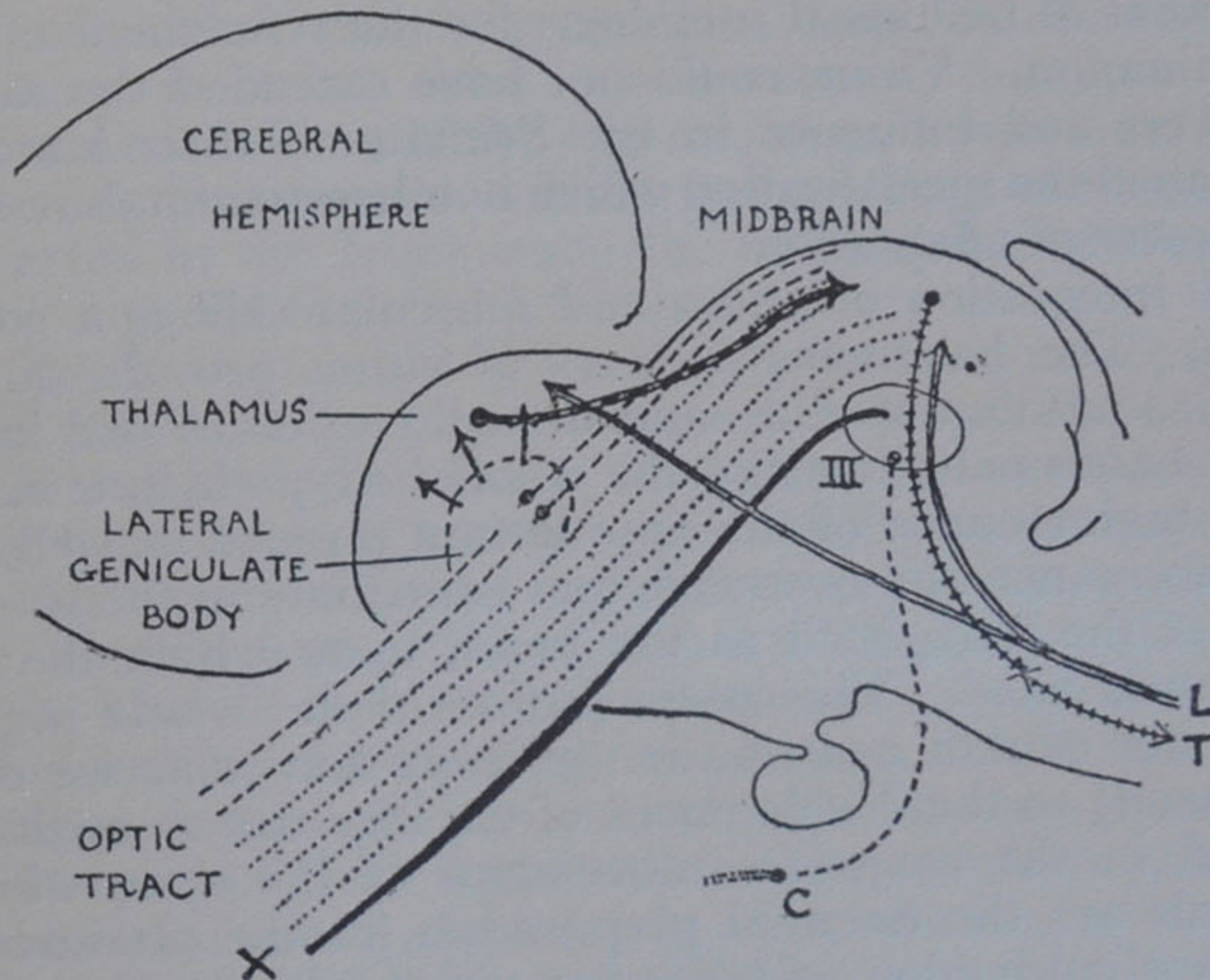
*Reproduced from G. Elliot Smith, "Essays on the Evolution of Man,"
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FIG. 3.—The Optic Tracts in Man.

tion of skill of hand and eye with the no less important factors we call balance, poise, and rhythm, which with perfection of timing are the essential elements in dexterity.

The nervous system was first called into being to facilitate the performance of rapid and precise movements. In the

direction of these activities an important part has always been played by the eyes. Long before they were capable of true vision, such as the appreciation of images, they were instruments for recording movement in the outside world, and for guiding the animal's own movements. Throughout the whole



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FIG. 4.—The Optic Tracts in a Reptile.

of its subsequent history the refinement of muscular skill has been intimately associated with the progressive modification of the nervous system. In its highest manifestation the making of the mind was in large measure due to manual dexterity, the exploration of space with hand and eye, and the integration

of the knowledge of the world acquired by vision with the intimate personal experience of the movements of our joints.

The comparative anatomy of the brain reveals the fact that the progressive development of vision is strictly conditioned by the ability of the hands to be used as skilled instruments. It seems that manual dexterity is an implicit condition for the attainment of biological usefulness for the refinement of visual discrimination. Vision could not have extended the range of its powers and influence in the Primates if their hands had not escaped the specialisation which in other mammals restricted their power of adaptation.

The integration of vision and muscular skill is a complex process. The heightened powers of vision provide direction for the acquisition of skill—and the cultivation of skill involves not the hands only, but also the whole body, which is essential for the maintenance of the appropriate posture as well as for the performance of movements that contribute to the successful action of the part, such as the hand, upon which the visual attention is fixed. This participation of the whole organism in any act of skill contributes (in some way that we do not understand) to the development of the intricate co-ordinations involved in the conjugate movements of the eyes, which in mammals are the essential preparation for the attainment of the fullest cultivation of binocular vision, the development of a macula and fovea, and the ability to see stereoscopically, and so add a third dimension to spatial discrimination. In addition, the proprioceptive impulses from the eye muscles, as well as from the muscles and joints involved in any movement, add their quota to the integration, and link the process of spatial appreciation with the personality of the individual. This coherence between vision and skill is the essential mechanism for the making of mind and for giving

it its distinctive individuality as an intimate part of the personality. The practice of manipulation to satisfy visual curiosity, which is aroused in its most intense form when the macula is developed, necessarily led to the cultivation of tactile discrimination and stereognosis. Visual perception and conception are products of the integration of these factors with vision and as the result the progressive evolution of intelligence.

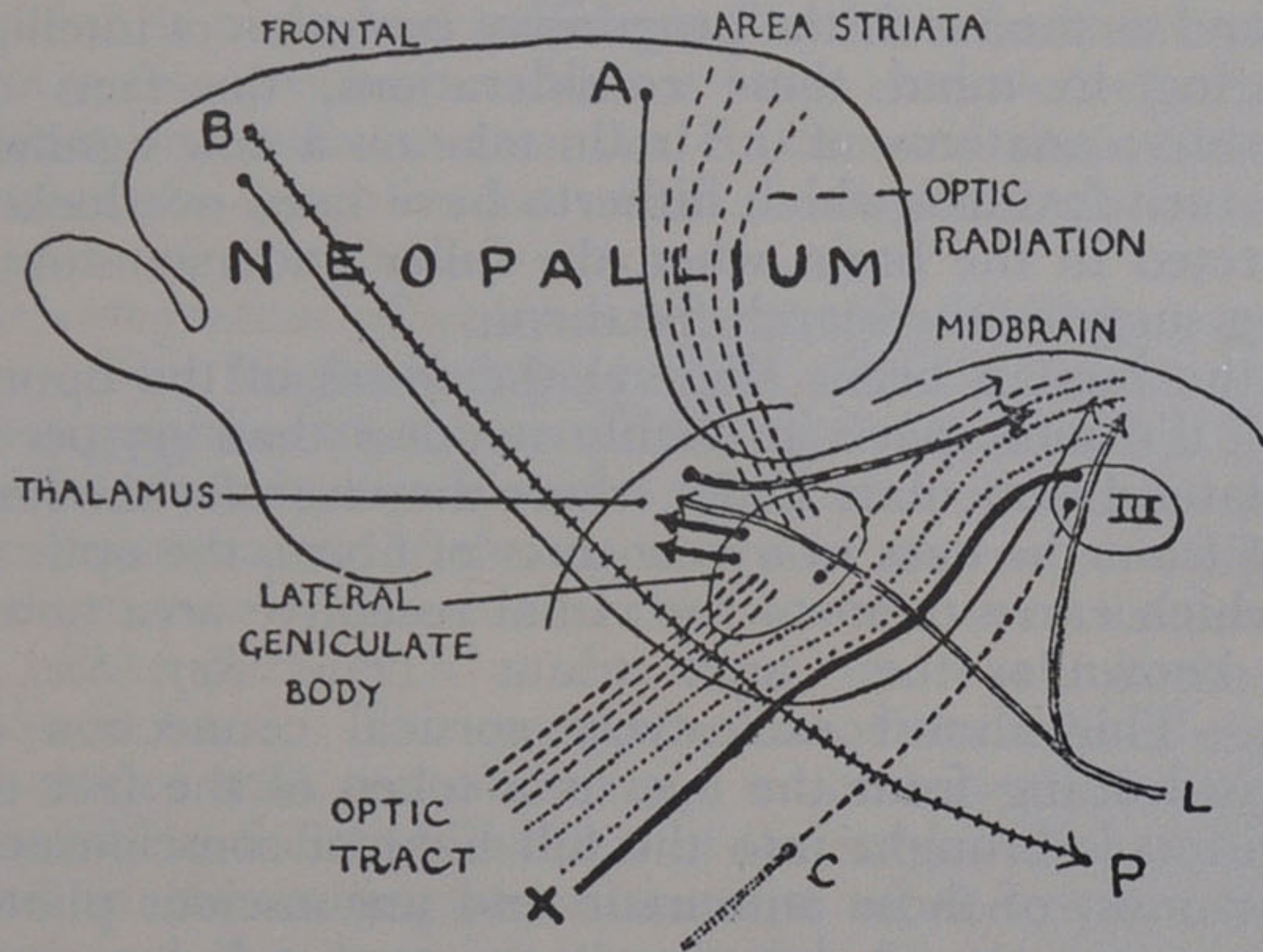
Bearing in mind these considerations, the facts of the comparative anatomy of the brain take on a new significance; and in turn features which hitherto have been overlooked can be detected in the brain when the fuller understanding of its working suggests the search for them.

In the human brain (Fig. 3) the fibres of the optic tract end for the most part (probably not less than 95 per cent.) in the lateral geniculate body, where they transfer the impulses coming from the eyes to a new tract of fibres, the optic radiation, which carry them to the visual receptive area now commonly known as the "area striata" (*Proc. Roy. Soc.*, 1904 p. 62). This almost exclusively cortical connection of the pathway leading from the eyes is a token of the fact that in man vision is brought into the full light of consciousness. It had lost most of those automatic and unconscious photostatic influences that are so obtrusive in most other living creatures. Vision is the foundation of intelligence and the chief source of our knowledge.

This distinction can be graphically displayed by means of three diagrams. In the reptilian ancestor of mammals (Fig. 4), the optic tract, in spite of the wide currency of Monakow's diagram, does not establish any connection with the cerebral cortex. Most of its fibres end in the midbrain, from which tracts (*T*) proceed to the motor nuclei in the brain and spinal cord. In addition to this connection, which automatically

directs the movements of the animal, there is also a group of fibres (*X*), which forms part of the light-reflex mechanism, using the oculomotor nucleus (*III*) and the ciliary ganglion (*C*) to influence the iris and the size of the pupil.

Most of the fibres of the optic tract are functionally related



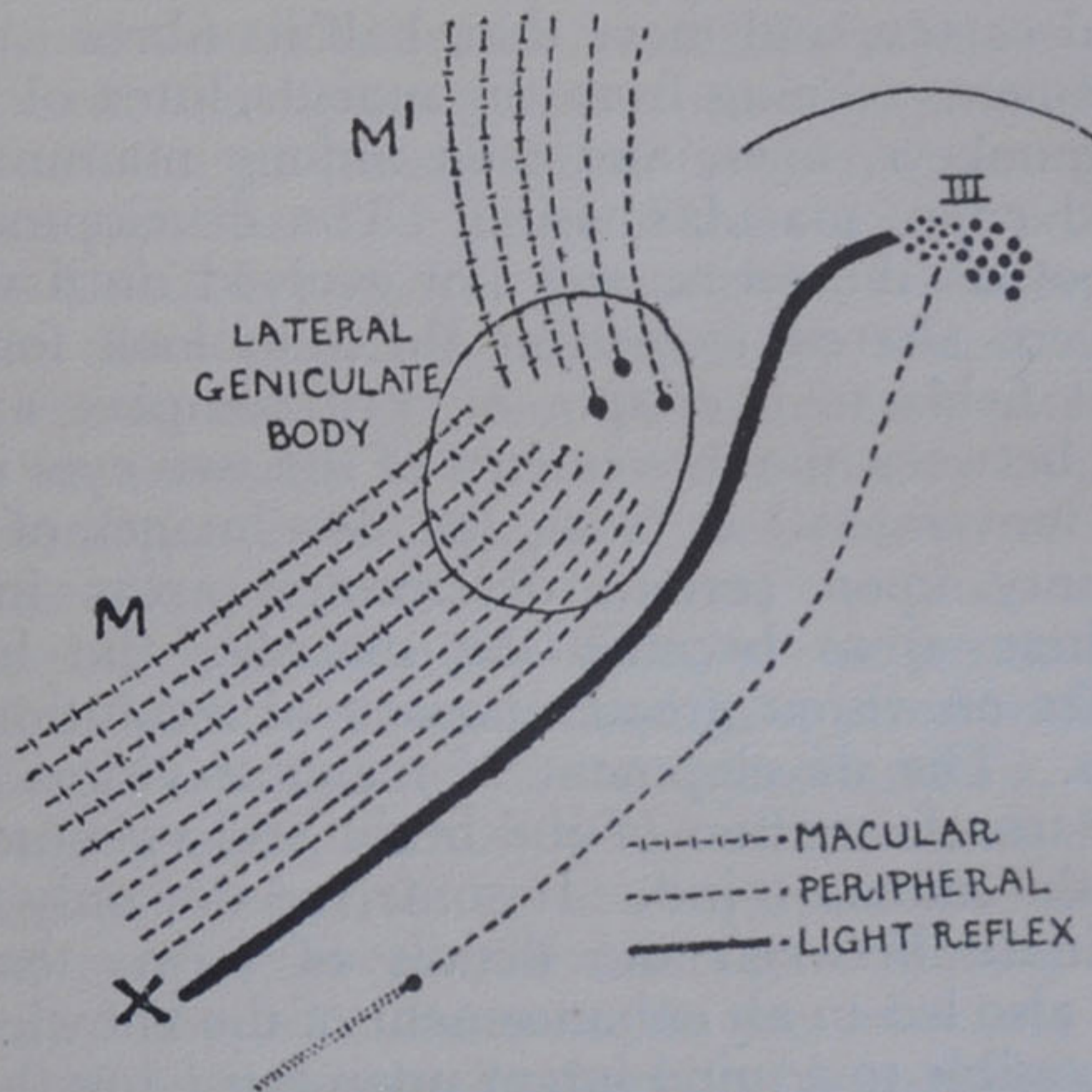
[Reproduced from "Nature," May 31, 1930.]

FIG. 5.—Optic Tracts in a Primitive Mammal.

to these unconscious activities. The number of fibres concerned with the conscious awareness of vision is small. They pass to the lateral geniculate body and from it to the thalamus.

In mammals (Fig. 5) the lateral geniculate body receives a larger proportion of the fibres of the optic tract and transmits some of the impulses (by means of the optic radiation) to the

newly developed cortical area, neopallium, which affords a representation of vision (area striata) in the cerebral hemisphere. The transference to cortical control of functions previously performed by the midbrain necessitates the establishment of new connections between the cerebral cortex and the mid-



[Reproduced from "Nature," May 31, 1930.]

FIG. 6.—Changes effected in the Optic Tracts of Man.

brain, both (A) from the receptive visual area and (B) from the area which controls voluntary movements. For vision and movement are intimately interrelated. In addition, the assumption by the neopallium of the control of the movements of the whole body leads to a profound revolution in all the

motor mechanisms in the brain and provides the visual area with opportunity to exercise a wider influence on behaviour.

In man (Fig. 6) all the midbrain connections shown in Fig. 4 have been lost, excepting only the light-reflex arrangements (*X*). The visual pathway leads almost exclusively to the cerebral cortex, and more than half its fibres (*M* and *M*¹) are new elements coming from the macula lutea of the retina. Only the monkeys, apes, and men among mammals have a macula and enjoy macular vision. The development of this sensitive spot on the retina was not evolved until the axes of the eyes were altered to permit them to look forward and their visual fields to overlap. A very complex and precise correlation between the movements of the two eyes is required (conjugate movements) to bring the two images of an object with certainty upon certain determined areas in the two retinae. These areas become the maculae, the instruments which confer on vision greater powers of resolution and discrimination. The development of macular vision led to the progressive transformation of the brain and eventually to the making of the human mind. It conferred not only the ability to discriminate between the details of form, texture, and colour, but also led to an enhancement of the knowledge which became accessible to a mind intent upon satisfying the curiosity awakened by such new revelations.

Binocular vision enriched by macular efficiency provided the conditions which made possible the attainment of stereoscopic powers, the conscious appreciation of a third dimension in space, the recognition of solidity and perspective. A vision of the world was thus revealed to man, with an appreciation of form, colour, size, and space, and a fuller understanding of distance and movement. The most significant enrichment of

the sensory basis of the mind is conferred by the macula. To paraphrase the account given by the late Dr. Henry Watt, it "refines and distinguishes positions and forms, and, aided by the more precise accommodation which becomes evolved in association with it, it sharpens the objects of attention and dissipates the rest." "Stereoscopy adds a new character to a group of forms that may persist for indefinite periods of observation; delicate skin gives greater sensitivity to variations of pressure, and the prehensile hand implies a very great refinement in the positions and forms of the derived articular sense. In the hand this becomes a fine mobile tridimensional sense which, like the stereoscopic eye, can go round and through things, so almost isolating them from their surroundings."

When, in response to the visual curiosity excited by the new vision of the forms, textures, and colours of objects, the hand, under the guidance of the eyes, examines these objects, and explores their positions in space, not only is tactile information added to visual knowledge and integrated with it, but also the impulses from the joints, muscles, tendons, and in fact from the whole body, recording the effects upon the organism of the accomplishment of the action, are added to the visual, tactile, and motor sources of knowledge. Hence, as Dr. Watt expresses it, "the articular sense is the conscious correlate of action and of the individual's share in his experiences." Thus "action enters into the data of sense to integrate with it and so built up psychical mind-stuff."

The consciousness of action makes possible "the integrations of percept and probably of concept that are the beginnings of intellect." It adds the essential personal element in the process of interaction of mind and mechanism, and the interpretation of the means whereby motor skill creates mind. For "the first purpose of the mind is to serve the ends of action.

It is not merely a speculative instrument given to man that he may form for himself a disinterested knowledge of the world, create and enjoy works of art, and plan an elysium of happiness and love." It is primarily a means for seeking actively, under the guidance of attention and interest, the objects of its own desire, and for expressing in movement and other forms of behaviour the satisfaction of the impelling appetites. Vision and touch are closely integrated with movements and feelings and the effective results of such expressions of the mind's searching for satisfaction.

This brings us back once more to the essential fact one is trying to make clear in this discourse. Man's intellectual pre-eminence is based primarily on the evolution of macular vision in a Primate with adaptable hands, which attained the erect attitude when the cerebral cortex under the conscious influence of vision came to control and regulate posture. The profound and widespread effects of this revolution upon the structure and functions of every part of the brain—cerebral hemisphere, cerebellum, red nucleus, substantia nigra, corpus striatum, midbrain, and hindbrain—will not be discussed in this discourse. But attention must be directed to some of the obtrusive expressions of this new vision in the anatomy of the optic parts of the human brain.

The development of the macula was responsible for adding to the optic nerves and tracts as many new fibres (Fig. 6) as the whole of the rest of the retina (peripheral) supplies. In the lateral geniculate body a new receptive nucleus of corresponding dimensions is provided to transmit macular impulses to the cerebral cortex. For many years neurologists have been speculating on the nature of the representation of the macula in the cerebral cortex. During the War, Henschen's idea of the "cortical retina" was revised and corrected by the observa-

tions made upon wounded soldiers by Sir William Lister, Dr. Gordon Holmes, and many other physicians.

In 1928 Professor B. Brouwer and his collaborators, Drs. van Heuven and Biemond, in Amsterdam, introduced a new precision into the cortical localisation of the macula in monkeys. Studying preparations of the human brain in the light of their

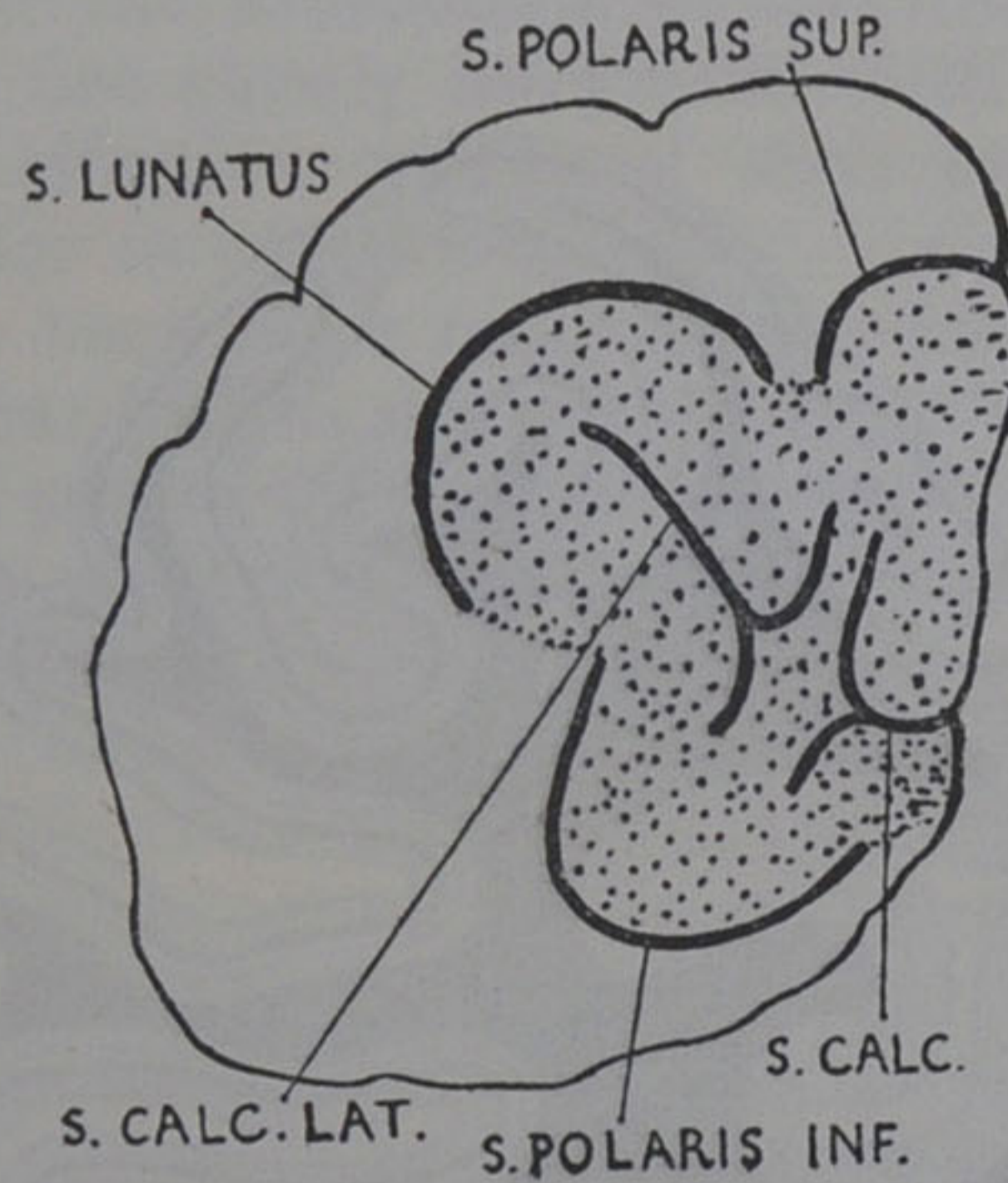


FIG. 7.—The Human *area striata*.

truly epoch-making investigations, I was able to detect with the naked eye a sudden change in the texture of the area striata at the place corresponding morphologically to where in monkeys Professor Brouwer and his colleagues located the boundary between the peripheral and macular territories.

A drawing of the photograph (the negative) of a horizontal section through the posterior pole of a human cerebral hemi-

sphere is reproduced in Fig. 7. The area striata, distinguished by the presence of an intracortical black line, is seen to undergo a sudden change in character as the peripheral part (*P*) on the medial surface is traced backward. At the point marked by the white arrow the thickness of the black line is reduced and the pale band on its inner side disappears. The macular



[Reproduced from "Nature," May 31, 1930.]

FIG. 8.—The Macular Shamrock.

cortex begins at this place, and extends around the pole on to the lateral surface of the hemisphere to end (at *M*) at the lip of a deep furrow (lunate sulcus). As this lateral part of the area striata is much broader than the medial part (*P*), exact measurements reveal the fact that the macular part is at least as extensive as the whole peripheral part.

It is possible also to identify the macular part of the area striata in many human brains by simple observation of the

morphological features of the surface of the cerebral hemisphere. Looking at the posterior aspect of the hemisphere (Fig. 8 represents the pole of the left hemisphere) three semilunar sulci—lunatus, polaris superior, and polaris inferior—may often be seen arranged in a trefoil or shamrock-leaf pattern (grouped around the calcarine sulci in the axis of the area striata). The rapid expansion of the lateral part of the area striata to afford cortical representation of the macula is responsible for the formation of opercula bounded by these three semilunar sulci. Hence the presence of this cortical shamrock-pattern affords definite evidence of the position and extent of the macular area. It is so situated in relation to the other cortical areas as easily to be linked up with them in the functions of wider vision, which involve the activities of the cerebral hemisphere as a whole—the process of mind-building upon the foundation of macular vision.

It is a matter of such vital importance not to overlook the part played by action in mind-making that the argument may be emphasised once more. When under the guidance of vision some delicate manipulation is performed, in addition to the success or failure of the mechanical operation, and the emotions of satisfaction or disgust which the results of the attempt and the attendant circumstances excite, the action itself starts a series of impulses from the joints, muscles, tendons, and from other parts of the body, which integrates the whole process with the intimate texture of the individual's consciousness and personality. The appetites and feelings which prompt the action, no less than the discriminative experience and knowledge which play their part in determining whether it is worth doing and how to do it, become associated with the activities of the whole organism during the progress of the movement. It is no longer a mere matter of muscular contraction under

visual control, but a complex process of integration of experience and of creating understanding and intellect.

[Certain parts of the lecture—the questions of right-handedness, the evolution of speech, etc.—have been omitted, as they are included in the writer's *Essays on the Evolution of Man and Human History*.

The Peking Skull was found two months after the lecture was delivered. Hence the remarks about the teeth and jaws of *Sinanthropus* were elaborated (in July 1930) to include references to the brain case.

Since then the writer has studied the actual fossils in Peking and the results of this examination (published in The Henderson Lecture on "The Significance of the Peking Man," February 1931 (Edinburgh, Oliver and Boyd), and the article "The Discovery of Primitive Man in China," in *Antiquity*, March 1931), call for some minor alterations in the account given in the foregoing pages.]

II

THE EVOLUTION OF HUMAN RACES, PAST AND PRESENT

By Sir Arthur Keith, M.D., F.R.S.

Division into Race is a Continuous Source of Trouble.

THE differentiation of mankind into races is a source of continuous trouble in our world. Every morning, as you open your newspaper, you find that the peace of some part of the earth is being disturbed by the friction which is engendered when race meets race. One day it is Palestine; the Jew and the Arab find it hard to live in harmony. Another day it is South Africa; the Boer and Briton, who have everything to gain by working together, find themselves thrust apart by some impulse which is stronger than their individual wills. If men in all parts of the world had been cast in the same mould, if Nature had dressed every human being in the same racial livery, the task of establishing new and harmonious settlements in East Africa would have been easy. As it is, the problem of planting in the same country peoples wearing three different liveries—white, brown and black—is taxing the resources of our statesmen to the utmost. The vast population of India suffers constantly from the disorders of racialism. Racialism keeps the Balkans in a state of perpetual ferment. From the first settlement of North America down to the present day our kith and kin have been dogged by the problems of race—the problem of

the Red Indian, the problem of the Negro, the problem of Asiatic races. Racial divergence gives rise to the most distracting of issues—to disturbances not only of social and political peace, but also of the human conscience—for when men of one race occupy territory in the possession of another, they find it impossible to frame laws which give equal justice to all. If we had all been of one race, if Nature had dressed our bodies in one common fleshy uniform, we would have been free from our ever-present racial difficulties; the world would have been free from the most potent cause of war; the task of the League of Nations would have been rendered much less difficult. Why, then, has Nature introduced this ever-disturbing factor into human life—the differentiation of Mankind into Races?

The Scheme of Man's Advancement had been Organised on a Racial Basis.

The ancient philosophers of the East, whose ideas have come down to us in the Book of Genesis, felt as we do, that an explanation must be given of the division of mankind into races. They launched the theory that descendants of the three sons of Noah—Shem, Ham, and Japheth—spread abroad into the various continents of the earth and there underwent racial transformation. No suggestion is made as to how the transformation was effected nor of any advantage or drawback which resulted therefrom. We now know that all the continents of the Old World have been inhabited from times so remote that we have to reckon the degree of their antiquity by the geologist's calendar—that of the historian is useless for this purpose. The further back we go the greater do we find the degree of racial differentiation. These ancient types were more pronounced in their characteristics and apparently more restricted in their areas of distribution. So far we have dis-

covered less than a dozen of ancient human types; there were probably hundreds of them. They were organised on a race basis—each with its peculiar livery of flesh and feature. This widespread organisation of mankind into many and diverse types was, and is, Nature's way of evolving higher types. I use the word "higher" merely to indicate that the races which replaced others, whether by evolution or substitution, were the better adapted for the needs of the time and the locality; in this sense only were they higher; they need not have been larger brained. The general trend of evolution had been to give man better knowledge of his surroundings, and, from being their slave, to make him their master to greater or less degree. Nature had hundreds of these experiments in human production on foot throughout the latest geological period of the earth's history—the Pleistocene period. It was under such conditions of unconscious competition that there were produced the races which we find in possession of the world at the dawn of the historical period.

The Racial Types of To-day.

At the dawn of the historical period we find going forward four vast and successful experiments in race production—each assigned to a different quarter of the Old World. In Asia, north of the Himalayas, had come into being the most markedly differentiated examples of the Mongolian type—represented to-day in the facial features of the natives of Tibet, China and Japan. Variants of the type, however, extend right across the world from the North Cape in Europe to Cape Horn in South America. So long has this experiment been on foot that hundreds of local divergencies have come into being, many of which claim a separate racial status. South of the Himalayas was another great evolutionary cradle in which the Brown type of Man was evolved—the type which has given us the swarming

millions of India, long since broken up into a great but uncertain number of races. Africa south of the Sahara was devoted to Nature's third great experiment—the production of men of Black type—represented in its most differentiated form of the Negro of the Congo. In this same African area was also evolved that most peculiar and most highly specialised of ancient types—the Bushman. The fourth and most remarkable of the four major centres of human evolution extended across the Old World, beginning with Afghanistan and the Arabian Peninsula in the East and ending in the West with Ireland and the Shetlands. This is the area in which the White type, with its innumerable racial differentiations, came first into being. No doubt there had been an immense racial disturbance in the White area long before the historian appeared on the scene; nevertheless, so far as Europe is concerned, the darker races still prevail in the South and the fairer races in the North, with no sharp line of division to separate them.

Some of the Factors concerned in the Evolution of Races.

Now if early men and women had been world-wandering nomads, moving here and there as the spirit led them, mixing their blood in all lands with that of the races encountered, no local differentiation of races and racial types could have come about; in every continent there would have been the same monotony of humanity brought about by indiscriminate hybridisation. To have brought about the concentration of racial types in particular areas early man must have been subject to strong influences which bound him to the homeland of his community. He must have been compelled to live so that his homeland and his community were kept intact over long periods of time; only under such conditions could a racial type be preserved and advanced. What were the

influences which tied early man to the soil on which he was born? They were mostly inside himself, not outside. First and chief there were all those emotional reactions which to-day are known as patriotism. This influence must have worked so strongly within the breasts of early man that it compelled him to lay down his life if need be in defence of his homeland and of his community. Not that such an endowment would have kept him, if opportunity offered, from extending his territory at the expense of his neighbour. Secondly, to obtain co-ordination of action in a primitive community, its members must have been richly endowed with that complex of emotional reactions which are grouped under the name "herd instincts"—reactions which cause members of a community to move together when the safety or welfare of the community is threatened from without or within. What we call susceptibility to public opinion is a survival of this ancient outfit used by Nature in the evolution of races. The third influence which bound early man to his homeland was an instinctive preference for beings who wore his own livery of flesh, spoke and acted as he did. Early man had not to ask the stranger he encountered whether he was or was not of the same race; Nature safeguarded her experiment by dressing each racial community in a distinctive garb of flesh—the more distant the race the more distinctive the racial uniform. Unless we presume that all of those racial reactions are inherent in man's nature and have been in action from the dawn of humanity, we can give no reasonable explanation of how the races of mankind have been evolved, and why each has been given a distinctive racial uniform.

Patriotism as a Factor in Race-building.

My argument in the previous paragraphs is so condensed that I may have failed to convince you that patriotism is an

essential part of Nature's machinery for the improvement of man. Let me produce evidence from an unexpected source. Mr. H. G. Wells is an acute observer and deep thinker. In all his recent plans for bringing about a universal peace he realises that the first thing that must be done is to eradicate the spirit of patriotism root and branch; until this is done there can be no racial peace. He also sees that all the old instincts concerning recognition of kind—race-prejudice—must be eliminated. A boy or a girl must not be allowed to think, as they are only too apt to do, that their country and countrymen are the very best to be found in the world. Such prejudices must be eradicated in early childhood if the consummation which Mr. Wells desires is to come to pass—namely, the obliteration of all racial barriers by the complete fusion of races. Presently I shall discuss the possibilities of putting Mr. Wells' scheme into practice, and how much man would have to pay for peace at such a price. Meantime I merely cite Mr. Wells as a valuable witness; he recognises very clearly that patriotism and race-prejudice work towards the isolation of races.

There are two Phases of Race Evolution—the Past and the Present.

Towards the end of the period of Palæolithic culture, some ten thousand years ago or more, a change was introduced into human life—one which now threatens Nature's scheme of human evolution. Men about that time discovered how to sow and reap. It is probable that this discovery was made somewhere in South-western Asia—in the territory of "white" races. Miss Dorothy Garrod has shown me an implement from an Upper Palæolithic level of a cave in Palestine which exhibits signs of having served as a reaping tool. It may have been used on a natural grass, not corn. However this may be, the discovery of agriculture led to a gradual break-up—a

disintegration—of the racial areas. The discovery brought about a revolution in this way. The command of a steady food supply permitted peoples, formerly hunters, to build villages and live in them. The villages, in course of time, became cities and city-states. With the rise of cities came commerce. In this way the old tribal territories—the cradles of evolution—were broken down. Then came the most momentous change of all—a change in man's outlook on the world. A tribal people in considering any change in policy asks first: Will this change enhance the prestige, unity, and freedom of our tribe? Whether the proposed change be good for business or not, is a matter of secondary importance; the welfare of the tribe always comes first. With the rise of the city-state the primary question became: Will the proposed change be good for business? If it were, it was adopted. The outlook became economic. Tribal boundaries were found by such states to be bad for trade; they should therefore be broken down. Then came Empire-building; a prosperous city-state established a dominancy over surrounding states, and thus brought within the bounds of a single realm a conglomeration of peoples—many of them still in a tribal state. I am quite sure that the Mesopotamian kings and statesmen who instituted these conquests never dreamt that they were breaking an old and successful piece of Nature's machinery; I can hear a statesman of ancient Babylon assure his audience, when a successful expedition returned, that the object they had had in view had been accomplished: they had introduced the blessings of civilisation to many benighted peoples. The economic development of the world became the undoing of its evolutionary machinery. You may think, from the way I am putting my case before you, that my heart bleeds at the thought of the vandalism which destroyed those ancient tribal cradles and

peoples living in a primitive state. Not a bit of it. The man of science has no business to allow sentiment to come between him and truth. The inevitable must happen. But I do think it important to recognise that with the discovery of agriculture and the accumulation of wealth the human world entered on a new and very difficult period of human evolution. A complete change took place in man's ideals; the earth was no longer a home to be hunted over; a breeding-ground of races. Race-breeding became a secondary matter. Man's chief aim became the exploitation of the economic possibilities of the earth. If a country is not used for the best advantage of civilisation, then it is counted right and proper, under the present dispensation, that some enlightened people should step in and manage such a country for its inhabitants. Hitherto this has been an accepted principle. I do not commend or condemn it. The path has been entered, and we have to follow it to the end.

To dissipate any misconception as to what my own attitude is to race feelings, please suppose I was born in time to become a member of the tribal people who lived round St. Albans in the year A.D. 49. I think I would have tried to kill as many Romans as I could before they killed me. Tribal feelings were then strong and in full action. Of course it is easy to be brave off the battle-field. But I hardly think I would have run away and left my wife and children to face the wicked victors from oversea. But suppose I had made my appearance sometime in the third century, when life went smoothly in Roman Britain. I should then have blessed the Roman peace and been angry with those who wanted to throw off the yoke. I suppose that by then tribal instincts still in being would have become dormant in me. But suppose it was when the Roman legions had sailed away that I was serving as a hind to some owner of a Roman villa. I would have been a tame sheep by that time,

and would not have cared, I suspect, in which flock I was driven. I would have lost the pride inherent in tribalism. Now I know that such a result—the utter domestication of every man, woman, and child in the world—is the aim which some of our philosophers advise us to make for. For my part I think the races which retain their ancient tribal instincts, modified by the will to suit modern conditions, are the races which are best—perhaps not for the economic advancement of the world, but certainly for the ultimate good of humanity.

Nation and Race are the Same Thing.

I have dallied so long over these minor introductory matters that I am running myself short of time to lay before you what I consider to be the most important part of my message.

What is the relationship between nation and race? Huxley said there was none—that a nation is an artificial production—and this is the view which is still held and taught by most anthropologists. Huxley laid down as an axiom that the only scientific method of studying races was to apply the zoological method: if the people of one race could be distinguished by physical markings, then they were races in the right sense of the term. He applied this method to the nationalities of Britain, and came to the conclusion they were all four compounded out of three races, the national differences lying in the proportions of the blend. Now, if Huxley had practised it in the world as it was six or eight thousand years ago, his method would have answered admirably. The racial conditions he had to study in the nineteenth century had become very different. Where Huxley went wrong was in believing that when Europeans of different racial stocks and tradition became planted together in the same land they became, if I may coin a term, deracialised, and permanently so. It never occurred to him that there still

remained deeply implanted in their natures those instincts and tendencies which are concerned in race-building. What actually happens when a land is peopled with a mixture of old races is that a new effort at race-building is initiated sooner or later, just as a wren's nesting instincts are re-awakened as soon as the first nest and clutch are destroyed. So it is among strange peoples who settle in a foreign land; they begin again at the bottom of the racial ladder and work towards, first, a complete racial fusion and then further differentiation. A nation, be it ever so young, is in reality an incipient race. Politicians have been wiser than we; variation in the shape of heads has no terror for them, but they recognise the potency of national spirit. Let a national spirit once become engendered in a people, let it be preserved intact over many generations, and a race which answers Huxley's definition will appear. A nation always represents an attempt to become a race; nation and race are but different degrees of the same evolutionary movement.

The Characteristic Behaviour of Young Nationalities.

I do not suppose that a sparrow, in selecting the first straw for its nest, has any clear idea of the objective in view—the rearing of young. I am quite sure that a young nationality is unconscious of its final objective—the establishment of a separate race. That the process of race-building should be an unconscious one is to be expected, if what I have said is true concerning the separation of early man into races. After the war we had many opportunities of studying the modern process of race-building. The process received the euphemistic name “self-determination”; every small nationality in Europe claimed to exercise this right—the right of self-determination. The result was that the number of states of Europe—areas of

Europe claiming the right of self-determination—was increased from eighteen to twenty-six. Let us look for a moment at the policy which was adopted and pursued by those young nationalities. Let us take Finland for an example, set free by the break up of the Czar's Empire. The Finns are a fair and fine people—one of the fairest in Europe, first cousins to the Swedes. Indeed every tenth man is a Swede speaking the Swedish language. The Finnish language, on the other hand, is Asiatic in origin, and tends to separate its speakers from intercourse with the peoples of Europe. The modern statesman, making the economic welfare of his country his first consideration, we would have expected to take the opportunity of changing the national tongue so that his country might share in a close confederation of North European States. Exactly the opposite policy was adopted: every measure was taken that would isolate and ring off Finland from the rest of the world. Particularly was this principle applied to everything that savoured of Sweden. Places, railway stations, libraries, post offices which had long been known by Swedish names had to be renamed in Finnish. A policy of isolation is bad for trade, but absolutely necessary if there is to be race-building. Another sign of young nationality is its touchiness! In every deliberation the first consideration is: How will the proposed change affect our status in our own eyes and in the eyes of the world? A young nation will sacrifice every economical consideration to enhance its status and independence. That is how you recognise the incipient stage in race-building.

Nationality and Race in Ireland.

Anyone who compares the policy pursued by the founders of the Irish Free State with that adopted by the modern leaders of the Finns will be struck by the extraordinary degree of

resemblance. The business Irishman recognised that close union and co-operation were desirable between Ireland and the rest of Britain. Nor were the Irish political leaders moved by any belief that separation would bring their country an economic gain. The material prosperity of their country did not weigh with them; they reverted to the pre-economic phase of the world's history when race-building took preference to all other considerations. For this purpose Ireland had to be ringed off as completely as possible—for isolation is just as necessary for the raising of a new race of men as for a new breed of cattle. To secure this ideal degree of isolation the Irish Free State has a harder task than Finland. English has become the speech of Ireland; Erse is dying, almost dead. Part of the national policy is to make Erse again the national tongue, thus cutting off its readers and writers from free commerce with the English-speaking world. The change involves the people and their children in a turmoil of confusion and in a long period of strenuous application. And when the change in tongue has been ultimately completed, what will have been the gain? No Irishman will pretend that any material gain has resulted; material motives do not appeal to him when Nationality stands at issue. The objective in view in all such cases is never a material gain. Such a suggestion is rejected with scorn. The search is always for an ideal—the ideal of a Free Ireland set at full liberty to work out her own destiny among the rocks and shallows of the Racial Seas of the World.

Odds and Ends of Race-craft.

I am dealing with the great subject of Race-craft in a somewhat desultory manner. I laid before you isolated incidents concerning divers countries and diverse periods, in the hope that I would convince you that the manifestations of a young

nationality are not wilful perversions of human nature, but have a deep significance. From the way I have stated the case for Ireland you may think that her resolution to adopt the policy of self-determination has the approval of anthropologists—or rather that an anthropological vindication can be given of Ireland's course of action. I shall make my personal position clear by asking a question: Should a man allow his national impulses to guide him or should he guide them? My emphatic answer is: He should guide them. My answer is not theoretical; it is an outcome of experience in many countries and among diverse peoples and over a very considerable number of years. At heart I am still a "Scots wha hae" Scotsman, but when I was invited to join a movement to obtain for Scotland the rights of self-determination, I refused. Now there is no country in the world that can equal Scotland in the fierceness of her patriotism; she has in her heart the materials for a great racial conflagration, but she has also in her head that which controls and directs her wildest impulses. Scotland, at many a point of her long history, has heard the call of race, nor do I believe her union with England has in any way diminished her sense of nationality—which is the same to my way of thinking as a sense of race. But fortunately she has also realised that, in the modern state of the world, her national spirit can be developed more fully and more completely as a member of a great confederation of peoples of like kin than as a separate people cut off from her neighbours to face the world alone. When I add that the process of self-determination is the most costly, the most dangerous, and the most hazardous of all movements on which a young nation can embark, you may think I have not overcome the influences of my early education in Aberdeen. I have not, and I trust they will continue to abide with me. But I am quite sure that if Scotland's head were to capitulate

to her heart and she thereby became convinced that her national well-being could only be realised if she ploughed her lonely furrow, she would plough that furrow to the end, whatever the cost. I consider that it is just as impossible to stop a movement of self-determination in a strong, self-reliant people, once it is fairly started, as to arrest a great migratory movement of lemmings. Nor are the movements altogether unlike.

The Spirit of Wales.

In dealing with the distinctive nationality of Scotland I have not said a word about the diverse races that are incorporated in her population and have inherited the spirit of her nationality. I have spoken as if the entire population of Scotland could be moved by a wave of national enthusiasm. If the Lowlanders would adopt the garb and tongue of the Highlands, then a united movement might result, but if they refused, as I fear they would, then I am afraid the "western fringe" would have to make its independent way as best it could. Nor when I now touch on the nationality of Wales do I propose to consider the racial ingredients that have gone to make up her population. Do not let this statement mislead you as to the value I attach to anthropological measurements; you may think I have not realised the high scientific worth of the anthropological survey made of the people of Wales by my friend Professor Fleure. I attach to it the very highest scientific value; it is the best survey made of any people of Europe—not even excepting Norway and Sweden. What I wish to impress upon you now is that no matter what racial mixtures have entered into the composition of the Welsh people in the past, that mixture is being welded into a new race under the working of a common national spirit. I am of the impression that the national spirit of Wales grows in strength. Never

before have so strong and many measures been taken to secure the teaching of Welsh in her schools. Her universities have thrown themselves into the study of her language, her ancient traditions, and her history. National festivals lose nothing of their fervour and popularity. You may ask: Is there not some danger in such a movement? There would be if the heart of Wales ran away with her head; Welsh reason is sufficiently strongly entrenched to resist any and every inducement that does not lead ultimately towards what is best for Wales, best for the Empire and best for the world.

The Patriotism of England.

I often meet Englishmen who assure me they are completely destitute of all those emotional disturbances and incentives to action, that I am grouping under the term "national spirit," or sense of race. All I can say is that I have seen the national heart of England give a very good imitation of what may be called a soul-shaking manifestation of National Spirit. I would say, after a deliberate study extending over many years, that in no people are race instincts, race prejudices, race determination so strongly entrenched as in the hearts of the natives of England. I think my French colleagues would agree with this verdict. But, then, in no people are these instincts so disciplined and controlled by reason. In the Englishman such feelings are difficult to rouse, but once aroused the effect can be truly cyclonic. I suspect that many of the emotional disturbances which are worked off in other peoples in the form of national animosities find an outlet in the Englishman's love of sport. I regard the sportsmanlike qualities of the Englishman as safeguarding his judgment in matters of race.

Instances from France.

That many races have gone to the making of France, representing types so extreme as the Norseman, and dark-skinned bullet-headed Alpine man, is a truth of universal acceptance. Would I count it legitimate, then, to speak of a French race? I would say that in no country is national spirit more vigorously developed and actively at work than in France. The same spirit has been permeating her people—whatever their racial origin—for centuries. If you ask me how far a real physical fusion has been effected, I reply: Only to a very limited degree. Nevertheless all constituent elements of the French nation behave as if they were a racial entity—with one exception. This particular and partial exception is Brittany, where the Breton tongue persists. Among the Bretons a movement for self-determination has made some headway. Such a movement cannot be upheld from the point of view of the orthodox anthropologist, for physically the Bretons are the same Alpine folk as occupy the greater part of Southern France. It is the spirit which counts when such claims are considered, not the head index.

Peace, War, and Race.

In every way that is open to me I work for peace—a world peace, a peace by mutual understanding. Such is the ultimate aim of all who labour in the field of Anthropology. After the war poor, broken, suffering Europe required a strong anodyne. She was given it; the League of Nations was just the balm she longed for. It held out the promise of a perpetual peace. The sovereign states of the world gave up what every nation, struggling towards a racial status, has counted its most precious right—the right to determine its place and destiny in the world. Most of the great nations and all of the small ones have given

their allegiance to the League and promised to obey its dictates. Nation-building was to be done under licence issued by the League. The racial claws of the nations—their military, naval, and flying forces—were pared, but no attempt was made to eradicate them. While the peace-statesmen were trying to curtail effectively the racial ambitions of the larger powers, they were at the same time setting afoot a number of innocent-looking experiments. Many of the smaller nationalities were encouraged to embark on the task of self-determination. The principle is important; there are many peoples in Europe who have the right to claim that the principle should be applied to their individual cases. Every small nationality is a possible race and a probable source of an infinity of trouble to the world. Such is the strength to which a national spirit can raise a people that I cannot conceive any highly strung people finding that its development and future are blocked by an adverse combination of circumstances abjectly submitting to such a fate without making a fight for a fuller life. No matter how strong the League of Nations may be or how completely the world may become policed, so long as mankind is divided into a diversity of races there can be no real peace.

Is Deracialisation of the World Possible ?

I am convinced that it is possible; some human races are already domesticated in the same sense as our sheep and cattle are. I am sure that a skilled Eugenist, if asked to do so, would undertake—and be successful if he took the task in hand—to reduce our wildest and strongest races to a satisfactory state of domesticity in the course of time—how long I cannot guess. Fifty generations of breeding should make a marked difference. Any individual showing a trace of preference for his home and homeland, for his own people, for his own country, who dis-

plays any degree of independence of spirit or any manifestation of valour must, of course, be resolutely rejected. A tendency to run away from danger should be a commending quality. In short, Eugenists would have to exert their strength and ingenuity in destroying what has taken Nature at least a quarter of a million years to build up: the present races of the world; all like the curate's egg—good in parts. Of course I know you will not listen to, much less accept, such experiments in breeding as sober, serious proposals, especially when you realise that they mean that men of all colours—black, yellow, brown and white—must pool their blood.

The Only Way.

Is there a better way of solving the more acute difficulties of race, and thus obtaining, if not a profound, yet a partial peace? I think there is only one way. Men must be convinced that evolution is true, in everyday life as well as in the laboratory. They must realise, recognise, and bring under the rule of reason the inherited emotional volcanoes that lurk within them. I believe that only knowledge, education, experience can help men to bridge the gulf of race—to bridge it not in a physical sense, but in a mental one. I am convinced that these problems can be approached and solved by men who approach them with the assurance that evolution of man is no longer a theory; it is a truth. Without it we have no clue to the perplexities of racial animosity which ever disturbed the peace of the world.

III

THE ANTHROPOLOGICAL HISTORY OF THE MODERN ENGLISHMAN

By Professor F. G. Parsons, D.Sc., F.R.C.S., F.S.A.

THE task which I have undertaken is to give some of the facts which we have disinterred of the physical characters of the various peoples who have gone to the making of that very composite and little-understood person, the modern Englishman.

Some five to ten thousand years ago, the British Isles were, we believe, part of a tongue-shaped projection from the west of Europe, through which the Rhine ran northward and the Seine westward. Then, too, the Mediterranean was an inland sea or collection of great lakes, the divisions between which are still indicated by the peninsulas and great islands.

Thus it was quite possible for a race of people, called the Mediterranean Race, to wander slowly westward, along the shores of these lakes and swamps, until at length the Atlantic was reached; after which these people turned north, through Spain and France, and so entered the tongue-shaped projection now represented by the British Isles.

I do not want to suggest a definite trek, like the passage of the Children of Israel into the Promised Land, but a slow migration of hunting, and later of pastoral, tribes who loved the sea and never went very far away from it; a migration

which probably took thousands of years to accomplish, and one in which any single individual may not have moved more than twenty or thirty miles during his lifetime.

The remnants of these people in the Mediterranean area are small and dark and very long-headed. They were clever people, too, for they were able to raise great stone monuments, menhirs and dolmens, which showed great engineering skill, and they buried their dead under long mounds or barrows, from which they earned the alternative name of the "Long Barrow People."

"Long-Barrow People."

A glance at Plate I will show what the skulls of these people were like. In Plate I, *a*, is the top view of a series of twenty of them, found in our country. It must be realised that this is an average of a series, and not a single skull selected as a type; because no one has ever seen, nor ever will see, a really typical or normal man of any race. The normal is an abstract ideal never realised in living people. It will be seen that the skull is very long and very narrow; though something is needed with which to compare it before it can be understood how long and how narrow it is.

The way in which this average skullcap was obtained is seen in the lower figures, *p* and *q*, in Plate III. These figures show that a series of measurements has been taken at definite points of all the twenty skulls, and then averaged, and thus the typical contour was built up.

I shall not refer again to these details, but would only have it understood that all the figures of skulls which are given in Plates I-III were built up in this laborious way. They have been shaded because a mere contour tracing does not convey to the eye a fair idea of what the skulls actually looked like.

They were all made from male skulls, since those of females differ somewhat in their proportions from the males.

In Plate I, *b*, is the side view of the Long Barrow skull, and the two views *a* and *b* taken together show that we are dealing with a people who had plenty of room for a very good brain.

Next comes, in Plate I, *c*, the full-face view, which shows at least three characteristics of the Long Barrow skull. One is that the sides of the head are very parallel and do not bulge—"wall-sided" is not a bad epithet for them. Then the orbits are low, which gives a rather sinister appearance, even for skulls, an appearance which is increased by the wide cheekbones and short faces. A physiognomist might read signs of treachery, suspicion, and cruelty in a face like this, as well as of mental capacity, and, judging from their descendants, I do not think that he would be far wrong.

It is thought that these people were coming into our country and settling upon the chalk downs, which then were probably the only habitable parts, from 8000 to 5000 B.C., and the dark element in our population, which increases as we travel westward, is chiefly due to remnants of their blood: see Fig. 10, p. 75. Possibly the Forest of Dean miners are the purest representatives which we have of them.

"Beaker Folk."

Now we come to another race. Plate I, *d*, gives the picture of an average—I regret to say founded on a small number—of "Beaker Folk's" skull-vaults. The Beaker Folk, sometimes known as the Bronze Age People, came into the country about 2000 B.C., probably while Britain was still connected with the continent, and were representatives of the Alpine Race, which is the second of the three great races of Europe. It is hardly possible to imagine a greater contrast than there is between

the average skull-vault of these people and that of the Long Barrow Folk—the one so short and broad, the other so long and narrow.

When we look at the side view in Plate I, *e*, we notice that most of the length is lost in the back part of the skull, and also that the forehead region is more receding than is that of the Long Barrow People. We notice, too, that the parietal eminence of the Beaker skull is close to the posterior end, and, since this eminence always corresponds to a definite convolution of the brain, it is clear that a good deal of brain is present behind the eminence in the Long Barrow People which is wanting in the Beaker Folk. Another thing which we must take into account is that, although they were small men, the Long Barrow Folk had larger heads and therefore larger brains than the much taller Beaker Folk.

One is often asked whether a large head means more intellectual capacity, and I can only say that whenever I take an average of twenty or thirty heads of particularly intelligent students I always find that their size is greater than the average of that of the heads of all the students in their year. It must be clearly understood that I am talking only of averages, for it is common knowledge that many small-headed people are very clever, and *vice versa*. I doubt very much whether the Beaker People could have provided the engineering skill needed to set up the great megalithic remains which the Long Barrow People have left for us to wonder at.

We will just glance at the full-face view of these Beaker Folk in Plate I, *f*, and notice that they, too, had depressed eye sockets and that they were remarkable for massive, broad jaws associated with enormous jaw muscles.

Anthropologists have lately appreciated the fact that the inhabitants of mountain ranges all over the world are usually

broad-headed or brachycephalic, and the suggestion is gaining ground that the cause of this head shape may be environment—that something is present in or absent from their nourishment

Type of Folk.	Ceph. Index.	L+B+H. (mm.)	Proportions.			Period.
			L.	B.	H.	
Long Barrow . . .	72.5	474.5	0.430	0.312	0.258	5000 B.C.?
Beaker Folk . . .	83.0	466.5	0.403	0.334	0.263	2000 B.C.?
Romano-British . . .	76.4	471.5	0.422	0.322	0.256	A.D. 200?
Anglo-Saxons . . .	73.9	477.7	0.428	0.317	0.255	A.D. 500?
Hythe . . .	81.2	457.5	0.409	0.330	0.261	} 14th & 15th centuries.
Rothwell . . .	77.3	464.0	0.418	0.323	0.259	
Whitechapel . . .	75.4	465.0	0.423	0.319	0.258	} 17th century.
Moorfields . . .	76.5	465.0	0.422	0.323	0.255	
Farringdon St. . .	76.4	462.7	0.426	0.326	0.248	
Clare Market . . .	76.5	465.5	0.421	0.322	0.257	18th century.
English Soldiers . . .	75.3	464.1	0.421	0.317	0.262	Early 19th century.
Engineer Privates . . .	77.5	471.9	0.413	0.320	0.267	} 20th century.
St. Thomas's Patients . . .	77.7	470.8	0.410	0.319	0.271	
British Association . . .	78.2	484.0	0.409	0.320	0.271	
St. Thomas's Students . . .	78.5	481.0	0.408	0.320	0.272	
Oxford Undergraduates . . .	78.0	479.5	0.409	0.319	0.272	
British Anatomists . . .	79.1	488.0	0.405	0.320	0.275	
Univ. College Staff . . .	78.2	484.9	0.405	0.317	0.278	

FIG. 9.—Table showing measurements and indices of principal racial types in Britain.

which affects the endocrine glands, such as the pituitary, thyroid, pineal, and adrenals, which are, by means of their secretions or hormones, the growth regulators of the body and of the skull as part of the body. I can only touch upon the suggestion,

and leave it to you to think over, but we must always remember that environment as well as heredity is at work in shaping the skull and the brain which it holds, as well as in shaping the rest of the body.

Look now at the table of head measurements of people who have lived in our country (Fig. 9). The first column gives the "cephalic index," which shows the proportion which the breadth of the head bears to the length if the length be taken as 100. You will notice that, while the Long Barrow People have the lowest cephalic index in the whole column, the Beaker Folk have the highest.

The second column gives the sum of the length, breadth, and height (above the ear-holes) of the heads, when allowance has been made for the soft parts. It is necessary to make this allowance, because later I shall be dealing with living heads, and shall want to contrast them with these skulls. The sum of these three measurements gives a rough, though very useful, idea of the size of the head and brain; and, of course, it is necessary to take the height into account in doing this, and not to rely only upon the length and breadth. Now we can see that the Long Barrow head really is larger than that of the Beaker Folk, and that it is not until we come to the specially educated and educable modern Englishmen, at the bottom of the column, that the size of the head appreciably increases.

The other three columns give the fraction which each measurement forms of the sum of the three, and we may speak of each as a "proportional index." It is a more delicate index than the cephalic, since it takes into account the height which the latter ignores. You will see that it quite bears out the testimony of the cephalic index, and shows that no heads so long or so narrow in proportion to their size have ever been found in these islands as those of the Long Barrow People;

and that no heads so short or so broad as those of the Beaker Folk. We are happy, therefore, in having so marked a contrast with which to make a start.

The question which is troubling us is, how far the advent of these Beaker Folk affected the physical and mental characters of the Long Barrow People, already in possession of the country. We feel pretty sure that they intermarried, because, although in the long barrows we find only long heads, in the round barrows, which the Beaker Folk made for the burial of their dead, short heads preponderate, but long and intermediate forms are found as well. Had the Ancient Britons been merely the result of a fusion of these two races we could have judged by an examination of their skulls how far they had been influenced by the coming of the round-headed people.

In other parts of Europe the Alpine Race always seems to outbreed its long-headed neighbours, owing to the fact that it can survive and breed under conditions which neither of the long-headed races can tolerate; and during the Great War I was surprised to find that German prisoners of war, even from Schleswig-Holstein and Oldenburg, whence our own long-headed Nordic ancestors came, are to-day so round-headed that their cephalic index is over 80 where once it had been about 74.

The same is true in the north of Italy and in many parts of France, and naturally the question will be asked: Why should England have escaped the same fate, and continue, as she does, the longest-headed country in Europe? I will tell you how I explain this fact, and leave it for you to judge whether my explanation be satisfactory. The Beaker Folk, we believe, came here about 2000 B.C., while England was still joined to the continent; but, if the theory of some of our geologists is correct, about 1800 B.C. was a time of marked land subsidence,

when the Channel and the Straits of Dover were formed, and after that no more Beaker Folk or Alpine people of any kind came for a very long while, because they were a race which hated the sea. Moreover it seems that many of them were birds of passage, who were seeking the surface gold then to be found in the Welsh and Irish mountains; and that, having found this, they retraced their steps to the continent. If these explanations are right, it is the 'silver streak' which has kept the Englishman the long-headed man he is, and has prevented him from sharing the advantages and disadvantages of the modern German physique and mentality.

Nordic Celts and Romano-British Folk.

But to return to the Britons. They were not, unfortunately for our present inquiry, a mere blend of Long Barrow and Beaker Folk, since a new incursion, this time of the third of the three great European Races, took place about 800 to 600 B.C. This Nordic incursion consisted of Celts, in the Iron Age of culture, and it is now held that the Celts were a wave of the Scandinavian Nordics earlier than the Teutonic wave which was to come into our country later. Two waves of these Celts are recognised. Firstly, the Goidels, Gaels, or "Q-Celts," with whom we are not much concerned, since they quickly passed or were driven from England into Ireland, the Highlands of Scotland, and the Isle of Man, where their language, abounding in k and q sounds, is still heard. Secondly, the Brythons, Britons, or "P-Celts," who used a p or b where the Goidels used a k. These people, who called themselves Cymry, spoke a language akin to modern Welsh, and certainly intermarried very freely with the pre-existing cross between Long Barrow and Beaker Folk, the proportions of which we are trying to find out. Probably the mixture never became a very homo-

geneous one, for Fleure and James have shown how in the Welsh mountains there are pockets of very broad-headed people, and we know that, even in England, patches of very dark people are to be found.

That these newcomers were long-headed, like all the Nordics, we have no doubt, though their cephalic index was not so low as that of the Long Barrow People. William Wright examined a series of twenty Celtic Iron Age people in Yorkshire, who probably had not intermixed very much with the former inhabitants, and found a cephalic index of 74.2, which is very close to the 73.9 of my Anglo-Saxons: from this it is pretty clear that the Celts brought no addition of round-headedness into the country.

If we only knew what the Ancient Britons were like before the Romans came, we might estimate very fairly the amount of Beaker Folk blood in them, but this we cannot do at present, largely because in their later days the Britons took to burning their dead.

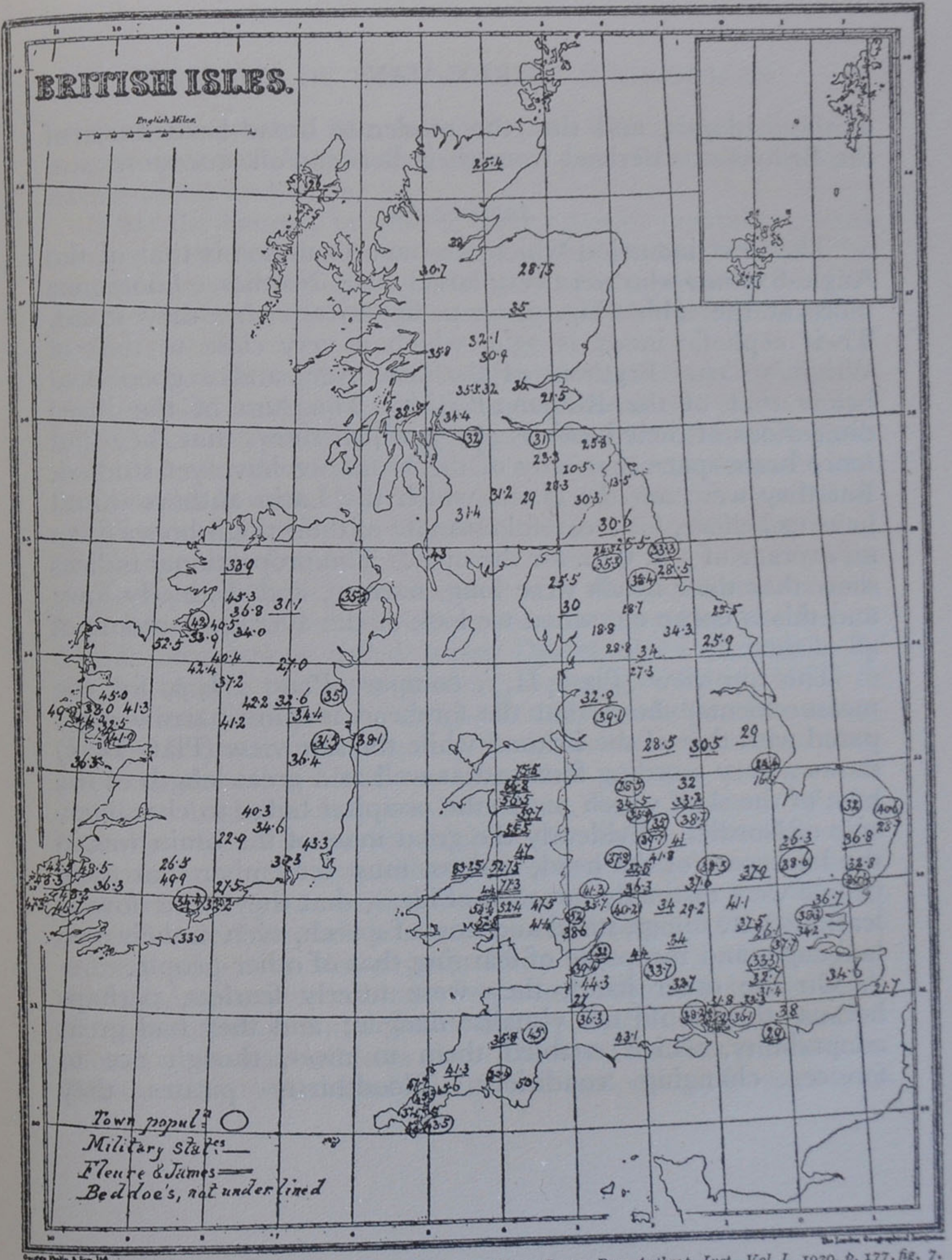
Fortunately, however, we have now quite a large series of British skulls whose owners lived during the Roman occupation, and of these I can show, for the first time, the average of a series of twenty males. From the table (Fig. 9, on p. 69) we see that their cephalic index was 76.4, that the sum of length, breadth, and height was 471.5, which is intermediate between the Long Barrow and Beaker Folk size, while their proportional indices tell us nearly the same tale, except that their heads were lower than those of either of the two races mentioned. This, however, I think, should not be taken too seriously, because Pitt-Rivers, in another series at Cranbourne Chase, got a proportional height index of 0.263, instead of my 0.256.

On looking at their skulls, we notice that the top view in Plate II, *g*, is intermediate between the Long Barrow and

Beaker types, showing that either from the Beaker Folk or from the Romans they had inherited a certain amount of broad-headedness; since the heads of their other ancestors, the Long Barrow People and the Nordic Celts, were much longer and narrower. The side view (Plate II, *h*) shows a moderately long, low head with a rather prominent, aquiline nose, which is one of the characteristics of a Nordic; while the full-face view (Plate II, *i*) gives another Nordic feature in the deep eye-sockets, which contrast with the shallow ones of the Long Barrow People and Beaker Folk.

Clearly enough these Romano-British folk had plenty of Nordic blood in them. That they had Mediterranean blood, also, the dark coloration of the Welsh of to-day makes us sure. But whether they gained their broader heads from Beaker Folk, or from Roman ancestors is the question; though, of course, they may have gained some from each.

When Claudius invaded Britain in A.D. 43 he brought four legions, three of which had been drawn from the army of the Rhine and were probably recruited from Gauls akin to the Southern Britons, though their officers were Romans. The fourth legion, Hispana, came from Pannonia, which is now part of Yugo-Slavia, and the legionaries of this, it is reasonable to believe, were Illyrians and of Slavic origin, and therefore broad-headed. Later, Dacians, Thracians, Tungrians, Spaniards, and even Moors, were drafted up to the "Wall" to repel the Picts and Scots, and it is here, if anywhere, that we should expect to find traces of them. Now it is an interesting thing to note that our map of the nigrescence of the British Isles (Fig. 10) shows that in this region the coloration of the inhabitants is fairer than almost anywhere else, and I am therefore inclined to think that the Roman occupation left very little impress upon the physical characters of the inhabitants



[Reproduced from Journ. Roy. Anthropol. Inst., Vol. L, 1920, p. 177, fig. 7.]

FIG. 10.—Diagram of Nigrescence for Britain.

of these islands, and that the moderate broad-headedness of the Britons was derived from their Beaker Folk ancestors.

Anglo-Saxons.

The next incursion which we have to notice is that of the Anglo-Saxons, who were very largely true Nordics. Look once more at the table (Fig. 9, on p. 69) to see how they stand. Their cephalic index is 73.9, which is very close to that of Wright's Celtic Brythons of the Iron Age, and a good deal below that of the Romano-British. The sum of the three dimensions of their heads is 477.7, which shows that they had more brain-space than any of the heads we have yet studied. But they were not the giants which the Latin authors would have us believe, for a careful estimate of their thigh-bones gives an average of 5 ft. 6 in. for the men. The proportional indices show that their heads were long, narrow, and distinctly low; and this is borne out when we look at the average contours of 48 of them.

The top view (Plate II, *j*, compare Plate III, *p*, for the measurements) shows that the forehead is quite narrow compared with that of the Britons, while the side view (Plate II, *k*) shows a very receding forehead as well as a great length of the base of the skull which masks the occipital bulge so characteristic of Nordics. Evidently the great mass of the brain was in the back part of the head, and we must remember that these people were distinctly not men of ideas, that they were slow at learning new things, stolid and slow of speech, even in their own language, and incapable of learning that of other people.

On the other hand, they were utterly fearless, perhaps because they could not visualise danger; and they had great adaptability, which enabled them to meet, though not to foresee, changing conditions. Bloodthirsty pirates they

certainly were, when first they came, but when they had gained a settlement in England they became peaceful, stolid farmers, hating towns and trade.

That the Britons, in spite of their superior mentality, could not conquer them in battle we know, but had to retire to the mountainous western part of Britain, which probably the Old English coveted very little in comparison with the fertile eastern region.

How far the English mixed and intermarried with the British is a much-debated point, though to me it seems one of academic, rather than of practical importance, for even if, as I believe was the case, there had been little intermixture between the two peoples in early days, there is no doubt that, since the time of Henry the Eighth, the Welsh have been peacefully returning into what was formerly their own country in ever-increasing numbers, and freely intermarrying with the once-hated Saxons. I do not suppose that there is anyone in this room who has no friends or relations called Jones, Davies, Price or Owen. If this be true, it is clear that there is plenty of British blood in the modern Englishman, and, with this knowledge, the anthropologist is content to leave it to the historian and the antiquary to settle when that blood was imported.

The Anglo-Saxons, we have seen, were a wave of the Scandinavian Nordics, later than the Celts. Probably they had not migrated from the parent Scandinavian stock very long before they came here, for their gods, Thunor and Woden, were identical in their attributes, and almost identical in their names, with the Norse gods Thor and Odin. Some day, perhaps, we may be able to find some difference in the skulls of Angles, Saxons, and Jutes, but up to the present this has proved quite impossible to me. All that I can say is that these Nordic tribes were closely akin, and had evidently come into

touch with round-headed Slavs during their sojourn in North Germany, Holland, and Belgium; for some of their heads are quite broad, though not enough to affect the average very much.

For four hundred years they lived in England, as our country was now called, without receiving any fresh blood other than a little British, and then the Danes began to trouble them. These so-called Danes included Norwegians and Swedes. I am sorry that I cannot give any average skulls of these people; but I fancy that when they are worked out they will show little difference from those of the Anglo-Saxon. Mentally the chief difference between the two folk was that, while the Old English hated towns and did only a little peddling and huckstering at their scattered "chepes" or market places, the Dane was a shrewd trader, and therefore used towns a great deal. It was only after they came that London began to regain the importance it had formerly held in the time of the Roman occupation.

The Norwegians seem to have been more numerous than the real Danes in London, and it is they who were responsible for pelting poor old Archbishop Alphege to death with ox bones at Greenwich. That there was a very considerable element of Norwegians in London, as well as in the north and east of England, is shown by the fact that there were three churches dedicated to St. Olaf, and one to St. Magnus, in London. I always like to stress this point, because I think that, directly or indirectly, the modern Englishman owes so much to the infusion of Norwegian blood, for the Norwegians not only provided the most daring and adventurous of the Viking expeditions, but, when they settled in Iceland, they showed themselves capable of producing the Sagas and Eddas which are of much greater literary value than anything which the Old English could produce.

One of the most daring raids of the Norwegians was that into the north-west of France, under Rolf the Ganger in 911, and it was here that an interesting blend of the best stocks in Europe took place; for the Norse, who were the most capable of the Scandinavian Nordics, mixed freely with the Franks, who were the most advanced of the Germanic Nordics, as well as with the remnants of the Belgae, who, Cæsar tells us, were the bravest of the Cymric Gauls; and we have seen that these Gauls were a still earlier incursion of Scandinavian people, often spoken of as Proto-Nordics.

From this splendid mixture of all that was best of the Nordic strain the Normans were evolved; and, by common consent, this people is regarded as the most cultured and energetic of any in Europe.

In spite of the temporary misery which the English suffered under the Norman kings we must, as anthropologists, regard the Conquest as a great blessing for England; for it brought into the country a leaven of this wonderful yeast which the dough of the conservative and unenterprising Old English needed so badly, in spite of the Scandinavian contributions already received.

We cannot think that the advent of the Normans modified the physical characters of the English appreciably, since it is estimated that at the time of the Conquest the population numbered between two and three millions, and William brought an army of only ten to fifteen thousand; but we must remember that, as soon as they were settled, the Norman knights sent for their wives and families, and we must also remember that a great many fighting men from all parts of Europe flocked into England to share in the spoil, and were given Saxon land and sometimes the hand of Saxon heiresses. It is probable that much of the cruelty and oppression of which

we read in the closing pages of the *Anglo-Saxon Chronicle* was due to these soldiers of fortune, who were exploiting the countryside and torturing the peasants in order to extract their last pence.

But wretched though the lives of the country folk were made, the towns were steadily growing in wealth and importance, and the power of the Church was beginning to be felt; for it was just after the Conquest that so many of our older churches, cathedrals, and monasteries were begun. This wave of building needed a good deal of expert labour, which was not to be found in England; and to meet it a large number of Flemish builders and other mechanics settled in the country and provided a short-headed contribution to the successive Nordic waves which had followed one another since the landing of the Celts in 600 B.C. Unfortunately no collection of English skulls of the tenth and eleventh centuries is known, but probably, if there were, they would have shown a cephalic index a good deal lower than those of the thirteenth century, of which we know something.

Another point to notice is that just after the Conquest there was a great exodus of Saxons into Scotland, who were welcomed, with their leader, Edgar Atheling, by the Scottish king. It is these people, who form so large a part of the Lowland Scots, who have been returning into England since the time of James the First; and, instead of being strangers and intruders, are really more English than the English.

The need of money for financing great buildings naturally attracted the Jews, a people who were practically unknown in the country before the Conquest. It often seems to me that the reputation of the Jews for keeping their race pure has been overstated, and that they may have mixed somewhat with the English lower classes. They seem to acquire the head-shape and other physical characters of the people among whom they live

to a certain extent, and, although some of them preserve the Assyrian features with which a Jew is caricatured, these are by no means constant in the Polish Jews in the East End of London to-day. Since all the Jews, however, are said to have been driven out of England, to the number of sixteen thousand, in the reign of Edward the First, it seems that their influence upon the population must have been one of environment rather than of heredity. That the English may have gained something by their association with this cleverer people is likely, but that they absorbed much of their blood I do not believe.

The complete fusion of the English with the Danes was very quickly carried out, for after the Conquest we hear no more of them as separate people, though marked Danish characters may still be seen in the Eastern Counties and in some parts of the Midlands. It took longer, however, for the English to absorb the Normans: still, by the time of the Battle of the Standard in 1138 the two people were fighting side by side against the Scots, and soon after this a contemporary writer tells us that it was no longer possible to distinguish them, since they had intermarried so much.

Turning to the table (Fig. 9) on p. 69, once more, I would call attention to some collections of skulls in country churches. There is a very well-known one at Hythe, the bones of which came from people who (we feel pretty sure) died in the thirteenth, fourteenth, and fifteenth centuries. They form a very interesting collection, because their heads are short and broad instead of being long and narrow, as are those of most English people. You will notice how nearly they approach the Beaker Folk standard in their proportional indices.

That they were something quite peculiar to Hythe I am sure, because I have had the opportunity of examining two other Kentish collections of the same date, one at Dover and

the other at Upchurch, and in both of these the index was about 77·0, instead of the 81·2 at Hythe. Moreover, the great collection at Rothwell in Northants shows us that in the Midlands the cephalic index at this period was 77·3. I can only account for this abnormally short-headed collection at Hythe by assuming that there had been a large incursion of foreigners of Alpine Race, who had come over with their women and children in order to meet some demand for skilled labour. The popular explanation that they were the slain in a great battle is founded on injuries to the skulls; but anyone with expert knowledge can tell that these injuries were inflicted long after death by the spades and picks of the people who dug them up from the churchyard. Thus, though the collection is a puzzling one, it does not negative the evidence that the Englishman of Chaucer's time was a long-headed man with an index of about 77·0.

In the seventeenth century, examination of three plague pits shows that the Londoner, at least, was rather longer headed than was the mediæval Englishman; and the same thing applies to a collection of eighteenth-century Londoners from the region of Clare Market, whose index was 76·5. I do not think likely the suggestion which has been made, that a Long Barrow origin accounts for the low cephalic index; because the three average views of the skull (Plate III, *m*, *n*, *o*, compare *q* for the measurements) show no Mediterranean traits, but do show the characteristic deep orbits of the Nordics; indeed I now think that these skulls resemble the Romano-British most nearly, and it is possible that a good deal of this people's blood survived in London until the eighteenth century.

Modern English Breed.

It will be noticed that there is no sign of any proportional increase in the breadth of the head in any of the twentieth-

century groups, since, although the breadth has actually increased, it has done so in proportion to the increasing size of the head; but there is a very definite change in the head-shape in this century for all that. The length has remained actually stationary, and therefore has proportionately decreased, while the height has both actually and proportionally increased to such an extent that we find it forming 0.278 of the sum of the three dimensions in the University College Staff, against 0.257 in the eighteenth-century Londoners. In order to show this graphically, my last illustration (Plate III, *r*) is a comparison of the head-contour of 158 present-day medical students with that of the eighteenth-century Londoners.

No race with heads like this has ever inhabited our islands in the past, and therefore heredity seems out of the question. I can only attribute this curious change to environment, and point out that for the last hundred years the science of hygiene has been studied and practised with increasing energy, and that this practice is coincident with the changing head-shape, as well as with the increase of stature and longevity.

Perhaps I am not justified in saying more than this, unless it be to remind you that the broad head of the Alpine Race probably was also evolved from the long, by changed environmental conditions.

IV

“ MOST PRIMITIVE ART ”

By Miles C. Burkitt, M.A., F.S.A.

[*Summary only ; see Preface.*]

WHEN we study the earliest manifestations of art that are known to us, we find that certain perhaps very cherished axioms have to be given up. For example, as far as can be judged, there has been no such thing as a continuously developing art—that is, Art with a capital A, which, starting in prehistoric times, developed in various directions among different peoples, with periods when special heights of skill and beauty were attained. We can no longer think of pictorial art, even primitive pictorial art, as an undivided whole ; instead, we have to recognise a series of separate cycles of art which were closely connected with certain parent cultures, and developed, often along somewhat parallel lines, as these cultures themselves evolved. The traces of these art-cycles which have survived for us to study can for convenience be described as “ art-groups,” and we can talk of the “ Franco-Cantabrian art-group ” or the “ Copper Age art-group of Southern Spain.”

Naturally we shall not find an art-group where there has not been an artistic people : only a people with an innate desire to draw or carve can produce an art-group. This separation into groups does not, of course, mean that the art of one people has never influenced the productions of another artistic folk. It would be absurd to suggest such a thing. But it is true to say

that pictorial art is only the handmaid of a culture, and that the art of each such culture must be separately studied.



FIG. 11.—Upper Palæolithic Engraving of a Hind's head, on the wall of a cave at Castillo, Cantabria. The effect of relief is given by careful shading.

In prehistoric times most of the artistic productions had a utilitarian purpose, and were connected with rites of “sympathetic magic” which were thought to have an influence on, or

to increase, the food supply. It is not until a much later date that we can be sure that a considerable proportion of the art was produced for purposes of decoration or "for art's sake," though this may occur exceptionally in Upper Palæolithic "home art."

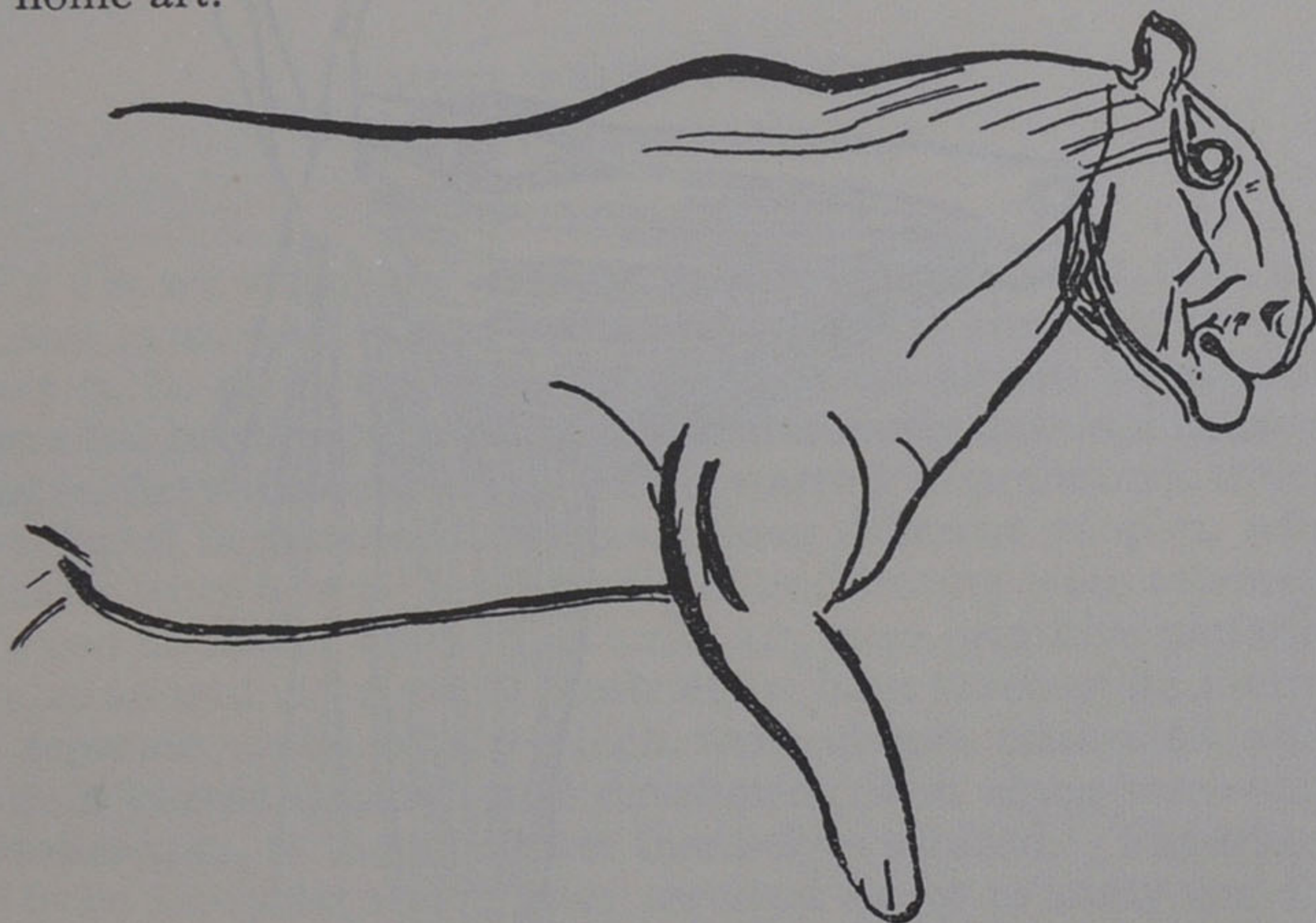


FIG. 12.—Upper Palæolithic Engraving of a Feline, on the wall of the cave at Combarelles, Dordogne. The various parts of the animal are here finished as the artist goes along. The artist sees the projection of the animal on the cave-wall, and not merely an outline.

Again, it used to be an axiom of belief that, in the development of art, sculpture preceded line-engraving—that human beings first tried to express what they saw in three dimensions, and only at a later date discovered the possibility of expressing the solid in two dimensions. This is not true. Both paintings and engravings occur among the earliest manifestations of art.

The earliest art that we know about dates back to the latter part of the Old Stone Age. At that time mankind in Western Europe knew nothing about agriculture, domestication of

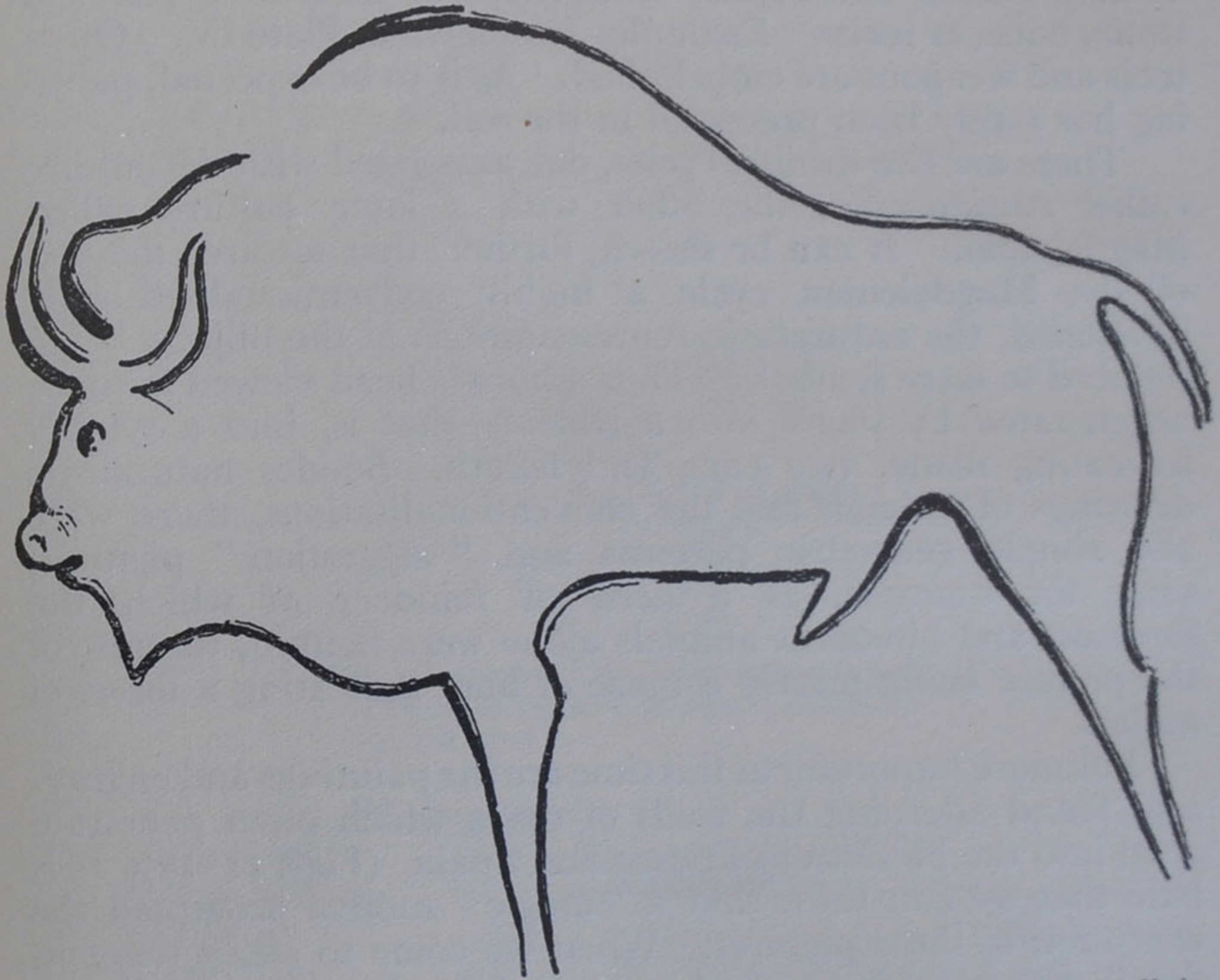


FIG. 13.—Upper Palæolithic Engraving, deep and vigorous, of a Bison, in the little cave of La Grèze, near Les Eyzies, Dordogne; probably of Aurignacian age.

animals, or pottery; the people were simply hunters who generally made their homes under overhanging rocks on sunny hillsides, and hunted the game which roamed about in the

valleys below. Many of the beasts they hunted and pictured are to-day extinct, or only survive in very different regions of the globe. Relics of their art are found in the accumulations of their homes, and consist of engraved or sculptured pieces of stone, bone, or ivory. Examples are shown in Plate IV. Often tools and weapons are embellished. As is to be expected, painting has rarely been preserved in the soil.

There are two distinct cycles, one associated with the culture called Aurignacian, the other with a later culture called Magdalenian. It can be shown, further, that towards the end of the Magdalenian cycle a highly conventionalised style developed, the naturalistic representations of the objects being reduced to mere symbols. Thus a horse's head viewed full-face degenerated by stages into a trident—that is, into a symbol indicating mane, two ears, and length. Besides naturalistic drawings of animals and the conventionalisations, there were also simple geometric patterns and “suggestion” pictures, such, for example, as a herd of reindeer of which the foremost and hindmost animals alone were figured, the rest of the picture being merely a maze of lines indicating a forest of antlers.

But more important at this time are the paintings and engravings found adorning the walls of caves which often penetrate deep into the hillsides in France and Spain (Figs. 11–17). It is here that we can show that a “magic” motive prompted the execution of these pictures. When we come to study them in detail, not only do we find engravings and paintings of great beauty, but we can also show a sequence of different styles which can be dated to different periods of the later Palæolithic Age. The materials used for the paintings were natural minerals such as iron oxide, iron carbonate, manganese oxide, and charcoal. These, when ground up, were mixed with fat to give

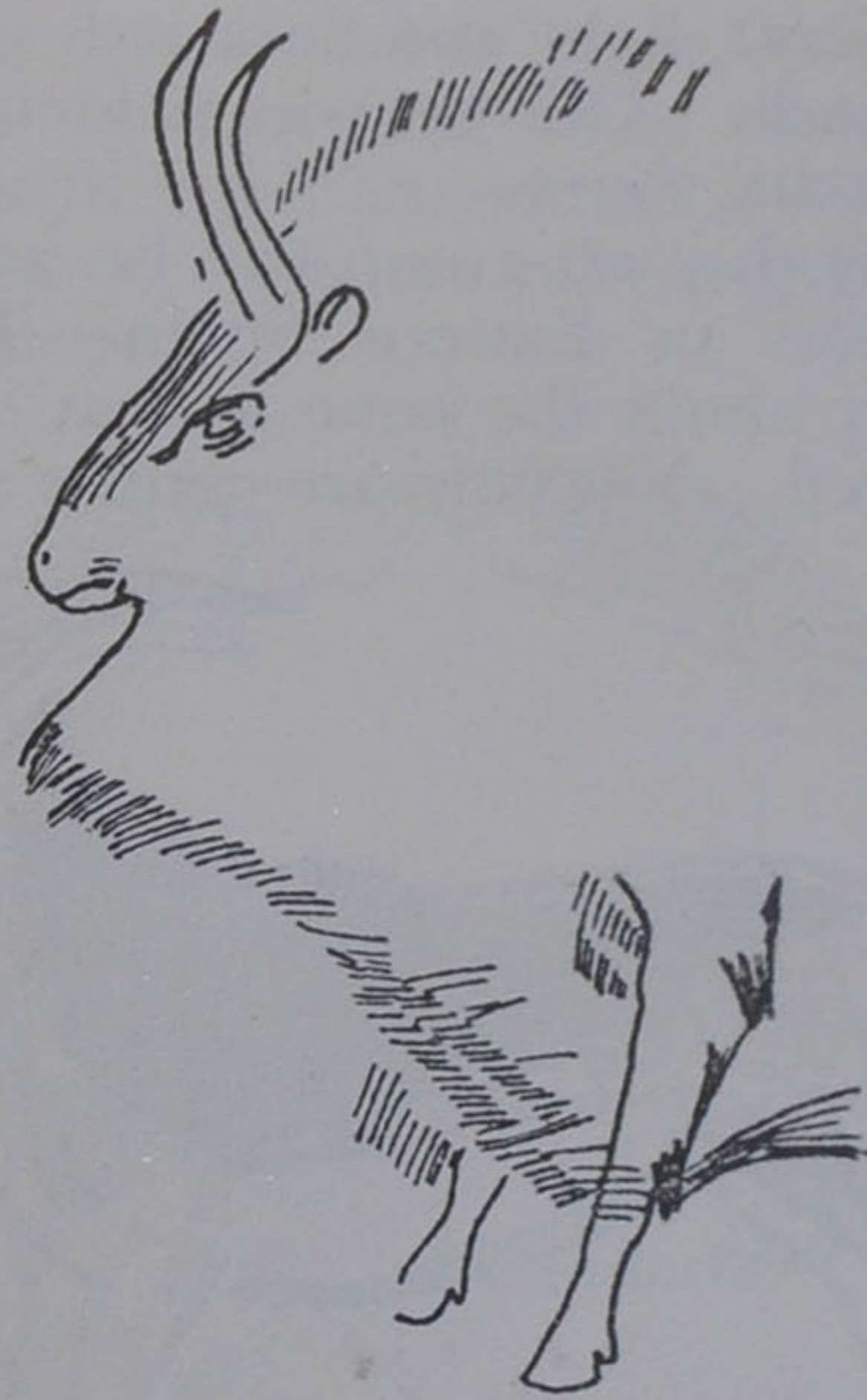


FIG. 14.—Upper Palaeolithic Engraving of a Bison, in the cave at Niaux, Ariège, in the Pyrenees.



FIG. 15.—Upper Palaeolithic Sculpture, in high relief, of a Horse, in a rock-shelter at Cap Blanc, Dordogne.

the following colours: light and dark red, yellow and orange, blue-black and black. This art was suddenly extinguished at the end of quaternary times.

Paintings of another art-group can be seen on the walls of certain rock-shelters in Eastern Spain. The age of these figures is probably about the same as that of the cave art we have just considered. Not only are extinct animals sometimes

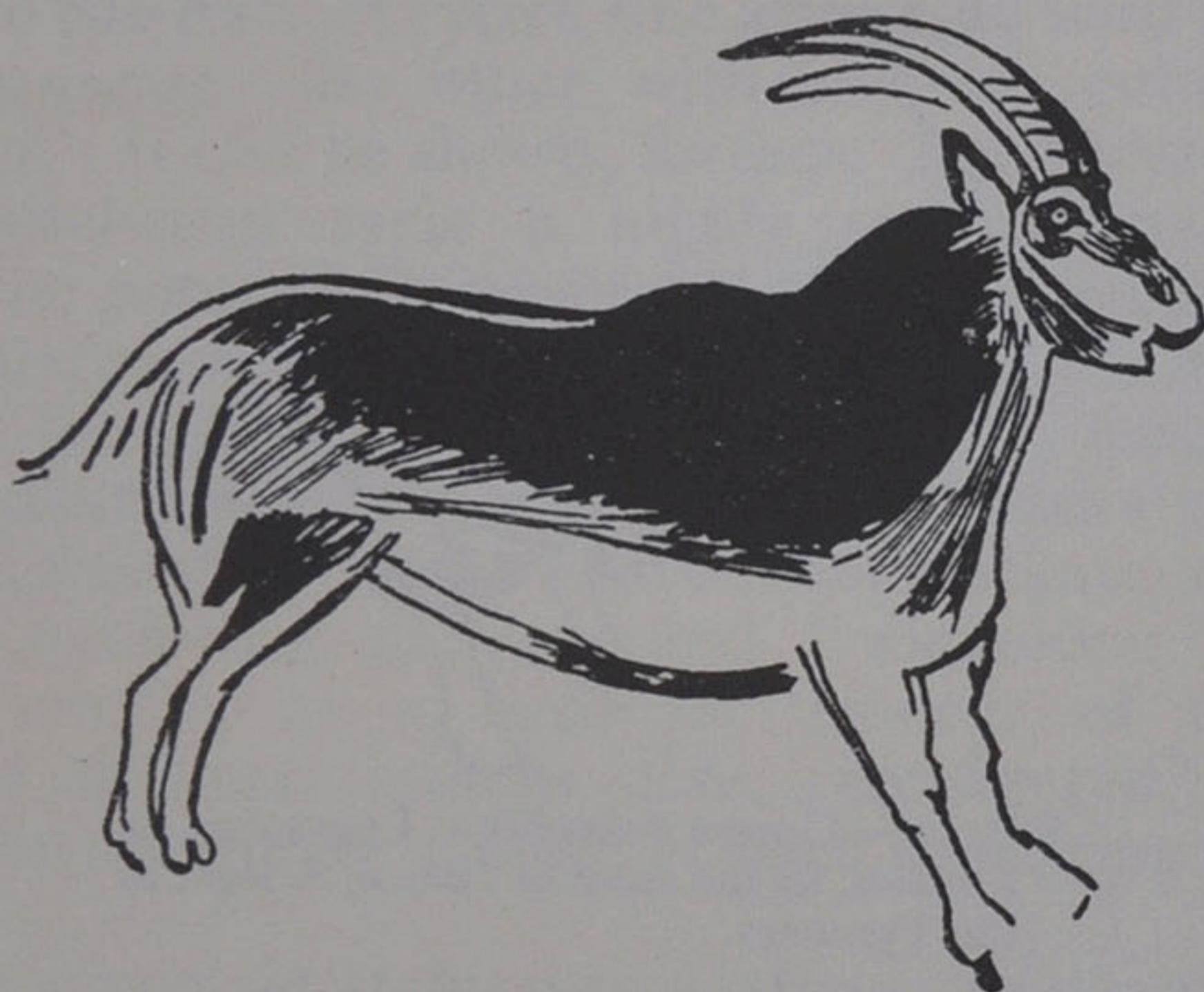


FIG. 16.—Upper Palæolithic Painting, in black, of an Ibex, in the cave at Niaux, Ariège, in the Pyrenees.

pictured, but a few examples of figures drawn in the Eastern Spanish style have been found among the cave paintings further north. It is to be noted that though the drawings were executed in a naturalistic manner, it was the naturalism of a modern Japanese picture, and very different from the naturalism of the true cave art. We now turn to Africa, where, as far south as Southern Rhodesia, there is an art-group which can be connected with that of Eastern Spain, for the style of the earliest

paintings to be found there closely resembles that of the Eastern Spanish examples we have just been discussing. In South Africa also, both within the Union and in Southern Rhodesia, there are distinctions of style and colouring corresponding with earlier and later periods.



FIG. 17.—Upper Palæolithic Painting of a Bison, in the cave at Niaux, Ariège, Pyrenees.

There is also a North African art-group of rock paintings and engravings, and the engravings of an extinct buffalo (*Bubalus antiquus*) indicate that a part at any rate of this art is of considerable antiquity; but for the most part these drawings are probably rather more modern, and may perhaps be compared in date with another very interesting rock-shelter art-group, this time in Southern Spain, which can be dated to the Copper Age



FIG. 18.—Painted Representation in dark red, of a Stag-hunt, in the Eastern Spanish style; in the *barranco* (dry water-course) of Valltorta, Castellon.



FIG. 19.—Painted Representation of a Koodoo-hunt, in a rock-shelter on Readman's Farm, near Fort Victoria, Southern Rhodesia: the stippled figures are in dark brown, the plain ones dark claret-colour.

Figs. 18 and 19 are reproduced from M. C. Burkitt "South Africa's Past in Stone and Paint," 1929. Pl. XVI-XXI, by permission of the Cambridge University Press.

of that country. In this art-group (illustrated by the crowded paintings in Plate VI) most of the drawings, which consist of representations of men and animals, are highly conventionalised. The figures are, indeed, in many cases reduced to mere symbols.

Other early art-groups are the carvings on the glacier-worn rock-surfaces in Western Scandinavia and Northern Russia or the Italian Maritime Alps. But already we have reached the Bronze Age, and perhaps it would no longer be fair to describe whatever art there may be as “most primitive.”

Enough has been shown of these various early cycles of art to stimulate interest in and amazement at the skill and power of the work of the earliest artists. Doubtless when mankind demands a thing it is often quickly supplied, but we can certainly say with the French prehistorian Mortillet “C’est l’enfance de l’art, ce n’est pas l’art de l’enfant.”

V

THE BEGINNINGS OF AGRICULTURE

By Harold J. E. Peake, M.A., F.S.A.

T H E R E are many milestones that mark stages on the way of human progress. The first use of a tool, the discovery of fire, the invention of the bow, are some of these; later on, the route is marked by the invention of pottery, by the discovery that metal can be melted and moulded, by the invention of writing, of printing, of the steam engine, and of the aeroplane. Each of these—and many others could, of course, be cited—was a key invention that led to vast changes in the life of man.

Of all discoveries, none has had greater effect on man's welfare than that of agriculture. For thousands, nay hundreds of thousands of years, man had depended for food and clothing upon the products of the chase; he knew well the wild beasts that lived around him, he had studied their habits, and these beasts he killed that he might eat their flesh and convert their hides into rude garments. Then he took to herding and breeding animals, which he kept for his own use and profit, and to sowing and reaping grain, from which bread could be made. Man had then passed from being an exploiter of the wild resources of Nature, and had become a producer.

Up till then it had usually been necessary for man to wander after the beasts he hunted, while his women-folk and children followed far behind, or lay concealed in some sheltered spot

until he could return to them with some of the spoils of the chase. When he took to agriculture, he acquired a settled home, where his wife and family could live with him all the year round, helping him to till the fields and to keep the crop free from weeds.

Now it was worth while for him to build a permanent house, and in it to store numerous possessions; so inventions and discoveries followed one another in quick succession, for man had become a civilised being.

The early history of man is associated with that series of glacial and interglacial phases known collectively as the Ice Age, and modern man is especially associated with the last great glaciation, known as the Würm. During that phase a large ice sheet covered the Scandinavian peninsula, extending for some distance south of the southern shore of the Baltic Sea. Thus the conditions now obtaining within the Arctic Circle descended in Europe to latitude 53° , and somewhat similar conditions prevailed in North America.

Now outside the Arctic Circle is a zone, in which cold dry tundra conditions prevail; outside this, again, is a zone of storms, then another of light rainfall, another of still lighter rainfall; and outside this, again, an almost rainless zone. During the Würm glaciation, owing to the great increase in the Arctic area, all these zones lay much farther to the South than they do at the present day.

During the time of the Würm glaciation, what is now the Sahara Desert must have been grassland, with woodlands in the regions of greater rainfall, and as the Ice Sheet began to diminish in size, the Plain of North Europe would have become a cold dry steppe, full of hoofed animals feeding on the rich grasses in the summer time. Here man, during the Upper Palæolithic times, would find bison, wild oxen, wild horses, and

reindeer in profusion, and, during the summer months at any rate, his larder would never be empty.

As the ice still further retreated, the tundra zone contracted and the storm zone crossed the European Plain. The rainfall on the Sahara became lighter and dry steppe conditions prevailed in that region. Europe was invaded by a pine forest, coming in from the south-east, and the steppe animals retreated to South Russia and Turkestan, while the reindeer was replaced by the red deer.

Towards the close of Magdalenian times the rainfall on the European Plain increased, and the pine forest was replaced by a deciduous forest, mainly of oak trees with a thick undergrowth. The hunting communities were separated from one another by dense woodland, their game had disappeared, and there was nothing to be done but to settle down by the seashore or by the banks of lakes and rivers, and to pick up such small game as had survived.

About the same time the light rainfall on the Sahara came to an end, the dry steppe gave place to desert, the wild beasts fled to the south, and there seems to have been a general exodus of the human inhabitants, who, armed with microlithic flints, dispersed in almost every direction.

These two events, approximately contemporaneous, brought the Upper Palæolithic Period to a close at a date which, following the evidence supplied by Baron de Geer, we may fix provisionally as between 7000 and 6000 B.C.

During the Epipalæolithic Period that followed, the miserable descendants of Upper Palæolithic hunters, hemmed in by the ever-advancing oak forest, killed off such small game as had survived, and from living on fish took to sustaining life on shell-fish, eking out a miserable existence with nuts and berries in their season and a few edible roots.

The microlithic hunters from the Sahara kept to the few open spaces left—the bare limestone hills and patches of sandy loess; they gradually exterminated such small beasts as inhabited these barren wastes.

Epipalæolithic man must often have gone very hungry, and he was reduced to eating anything that he could find, however unpalatable or uninviting. In North Central Queensland some of the aboriginal tribes, living under very similar conditions, collect the seeds of wild grasses, which they use for food. Some of the inhabitants of Kordofan, in the Sudan, who are growers of grain, have been known to do the same when their crops have failed owing to exceptionally dry seasons.

Epipalæolithic man, too, must sometimes have collected grass seeds in those regions where suitable grasses occurred. He may even have tended and cleared round the plants that produced these edible seeds. At length he, or more probably his wife, discovered that if some of these seeds were sown on a clear patch of soil, a better crop was the result. Thus it would be unnecessary to wander so far afield to fill the baskets and to provide an adequate meal.

In some such way, we may well imagine, arose the cultivation of grain, which enabled man to leave behind the savage state of the hunter and to set his foot on the lowest rung of the ladder of civilisation.

It is clear that, if the cultivation of grain arose in the manner that I have suggested, it must have arisen in a region where suitable grain-bearing grasses were to be found. For this reason we must dismiss Kossina's suggestion that agriculture began in the Baltic region, for no suitable grasses are native to that part, nor, from what we know of the past distribution of such plants, does it seem likely that any such grasses grew there during human times. We must therefore seek some other

place in which these grass seeds were first collected, and discuss which of the many grains now grown was the first to find favour with Epipalæolithic man.

Rice has been grown for long in India and China, and its cultivation must have begun in one of those countries. Civilisation, however, did not reach either region earlier than the third millennium before our era, and arrived in both areas from places in which the cultivation of other grains had long been known.

A form of millet, *Panicum colonum*, was used in Egypt in predynastic times, and it has been stated that it was cultivated by these early dwellers by the Nile. This has not been clearly established; they may have been content to collect the seeds from wild plants. We do not find further evidence of the use of millet until a much later date, and then the plant grown was a different species.

Professor Vavilov tells us that rye is, in some parts of the world, a common weed in fields of emmer, a variety of wheat. When grown in higher altitudes, the emmer often fails to come up, while the rye takes its place, so that in some parts of Afghanistan the emmer has disappeared completely and the rye only has survived. What has taken place in high altitudes seems to have happened also in high latitudes, so that rye became a not uncommon crop in Northern Europe.

Oats, like rye, is a crop of North Europe. Wild oats have a wide distribution, mostly to the north of the Carpathians, the Caucasus, and the Kopet Dagh. It is usually stated that this grain was first cultivated in Germany, and that it did not reach the rest of Europe until the downfall of the Roman Empire. This, however, is not strictly correct. Mr. R. C. C. Clay found some grains of cultivated oats stored in some pit-dwellings that he excavated a few years ago at Fifield Bavant in Wiltshire. The prehistoric village of which these pit-dwellings formed part was

shown to date from the First La Tène period—that is to say, between 500 and 400 B.C. It is possible, however, that in this case the oats were growing as weeds in fields of emmer.

The only two grains remaining that are generally grown are wheat and barley. Both these grains were known and cultivated at a very early date. It is believed by some that the cultivation of barley preceded that of wheat. It is said to have been used earlier in Egypt. It may be so, but these statements are not yet susceptible of absolute proof. It is well to note, however, that even as late as the time of Hammurabi rents and wages in Babylonia were often valued in terms of barley, rarely, if ever, of wheat.

Wild barley, *Hordeum spontaneum*, has a fairly wide distribution in the Old World. It is still to be found growing over the greater part of South-west Asia, from the Ægean to Afghanistan. On two occasions during the latter part of the nineteenth century it was found growing wild in Tripoli: in 1890 by Dr. Schweinfurth at Badia in Marmarica, and in 1887 by Dr. Taubert in Wadi Derna in Cyrenaica. These, however, are the only two occasions on which it has been found growing wild on the African continent.

We must admit, however, that Vavilov has claimed that barley grew wild both in Morocco and Abyssinia. He cites no records of its discovery, and I have been unable to find any, so that I am at a loss to understand why he has cited Morocco. His reason for claiming Abyssinia as a habitat of wild barley is, however, clear. In that country the present inhabitants cultivate a great variety of barleys, and it is Vavilov's contention that, where the greatest number of varieties of a grain are now cultivated, there the grain was first grown. This is an interesting hypothesis, not yet susceptible of proof, but it has not found favour with the majority of agricultural botanists. On the

other hand, Dr. Harlan, of the United States Bureau of Agriculture, writes to me that he has wandered over the uplands of Abyssinia at the right time of year, searching for specimens of wild barley, and searching in vain.

Since wild barley has been noted as growing at two spots in Tripoli, we must admit that there is every probability that at some earlier date it had spread from Asia along a strip of North Africa as far west as the Gulf of Gabes. It seems unlikely, however, to judge from the evidence at our disposal, that it ever had a much wider distribution throughout the African continent.

No one has yet claimed that any of the numerous species of wheat has been found growing wild in any part of Africa. Though, as we shall see later on, there are a great number of species and innumerable varieties of the wheat plant, two species only have been found in the wild state. The ranges of both are strictly limited, for they have been found only in Asia Minor and Syria and in certain very restricted regions in South-west Europe.

A large number of species of wheat are recognised by experts, and a still larger number of varieties, but they may for practical purposes be considered as comprised in three groups:

There is the Einkorn group, of which *Triticum monococcum* is the type example; these have seven chromosomes. (Cf. Plate VII.)

There is the Emmer group, of which *Triticum dicoccum* is the type example; these have fourteen chromosomes. (Plate VIII.)

And there is the Bread-Wheat group, to which all our modern cultivated varieties belong, of which *Triticum vulgare* is the type; these have twenty-one chromosomes. (Plate IX.)

Wild einkorn, known to botanists as *Triticum agilipoides*, has been found in most parts of Asia Minor, from the coastlands near Smyrna to Kurdestan on the borders of Persia. It has also been found in North Syria. (Plate VII.)

A smaller variety has been noted in Greece, between Nauplia and Corinth; it is widely distributed on the sides of low hills in Thessaly, Bœotia, and Achæa, in South Bulgaria, and on loamy soils in vineyards in Southern Yugo-Slavia. Three varieties of it were discovered in 1909 near Balaklava in the Crimea, and it has also been reported from the eastern end of the Caucasus. Its European distribution seems confined to the basins of the Ægean and Black Sea, except that it has crept up the Vardar Valley and crossed the divide, for it has been noted growing as a weed in vineyards in the upper part of the Morava Valley.

The occurrence of wild emmer (*Triticum dicoccum*) in South-west Asia has been reported more than once, even in very early days. Berosus states that *πυρός*, by which emmer is meant, grew wild in the land of the Babylonians between the Tigris and the Euphrates. In 1787 André Michaux saw "spelt" wheat growing wild in Persia, north of Hamadan, and at the beginning of the nineteenth century Olivier found growing on the right bank of the Euphrates, north-west of Anah, "near the camp, in a sort of ravine, wheat, barley, and spelt, which we had already seen many times in Mesopotamia." As no specimens of these grains have been preserved, it is impossible to be certain that they were the wild species, and not strays from cultivation. Professor Percival says that "it is highly probable that the 'spelt,' to which Olivier refers, was the fragile-eared wild emmer, *T. dicoccoides*," though it seems to me possible that this and the spelt found by Michaux were plants of the wild einkorn, often called "small spelt."

However this may be, *Triticum dicoccoides*, the true wild emmer, was rediscovered at Rosh Pinar, at the foot of Jebel Safed in Syria, in 1906 by Aaronsohn, who found it later at Rashey-ya and elsewhere on the slopes of Mount Hermon, as

well as on the plateau of Es-Salt, east of the Jordan Valley. He found it growing in crevices of limestone rocks in dry situations between 300 and 500 feet below and over 6000 feet above the Mediterranean level, usually associated with barley, and often with wild einkorn. Specimens of what was believed to be the same species were collected in 1910 by Theodor Strauss in the mountainous region of Western Persia near Kerind, between Kermanshah and Baghdad. Professor Percival tells me, however, that Strauss found only one plant, and that it might have been a stray.

Thus, as far as our certain evidence goes, emmer grows wild only along a strip of country ranging from South Syria to the Mountains of Moab. Though claims have been made for its occurrence farther east, as far as the borders of Persia, it seems possible that some of the plants found there were wild einkorn, or *Triticum dicoccum*, escaped from cultivation. Professor Kalantarian has recently sent me a specimen, which Professor Percival believes to be *T. diccoides* var. *spontaneonigrum*; this was found growing wild near Erivan in Armenia. Professor Percival informs me that Professor Zhukovsky of Leningrad reported a new variety of wild wheat, collected in Georgia, which he has named *T. Timofeevi*. Percival has grown this, and considers it to be very near *T. diccoides*, and possibly a local form of it. From these new facts it seems likely that wild emmer once spread from Palestine to the foothills of the Caucasus.

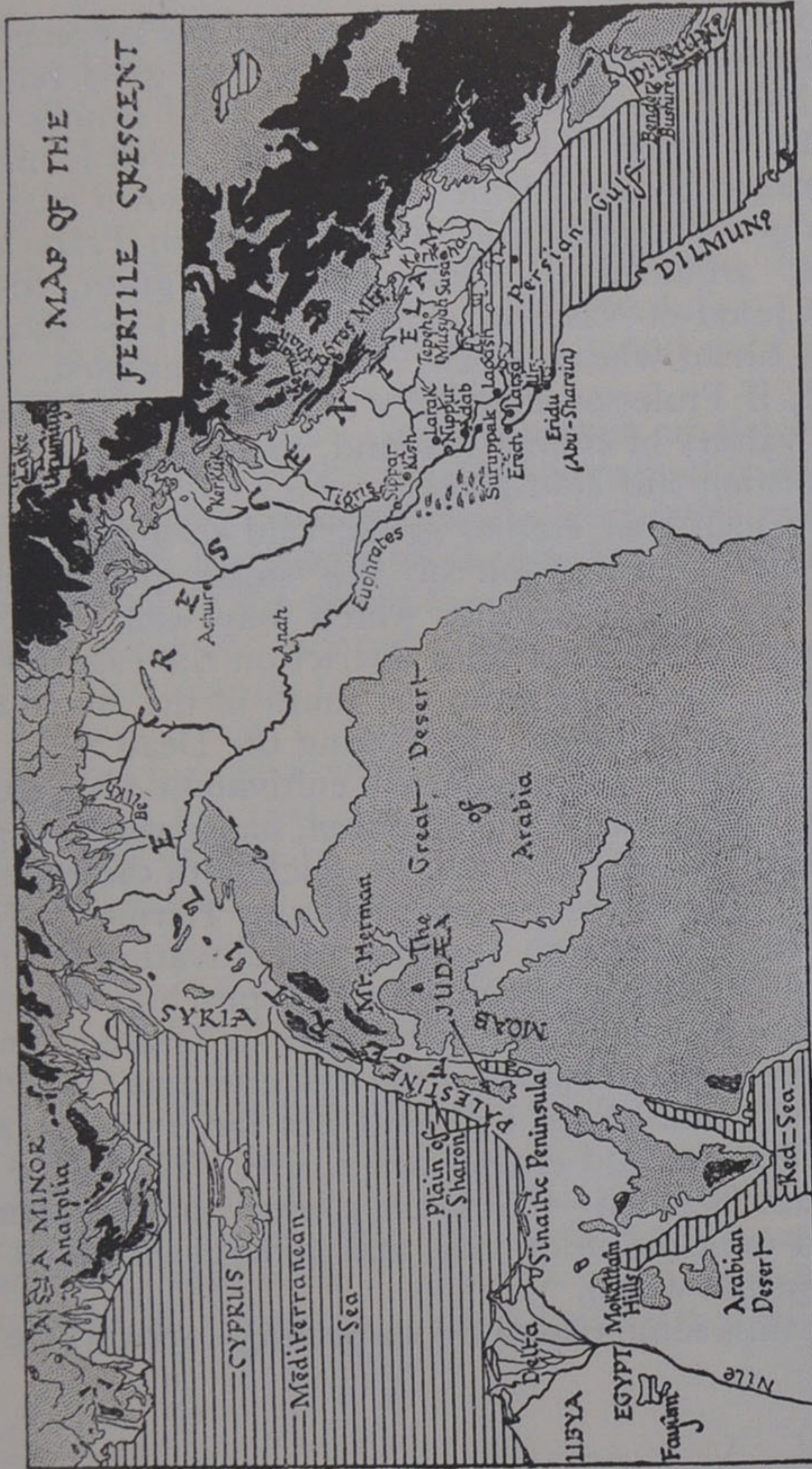
The origin of the bread wheats is unknown. No species of this group has ever been found wild. Some years ago Professor Percival suggested that it was a hybrid, and this suggestion has received universal assent. He suggested that its parents were *T. dicoccum* or its wild form *T. diccoides*, and some wild grass, *Ægilops ovata* or *Æ. cylindrica*. Others believe that it is a hybrid

between an *Ægilops* and some *Triticum* that has become extinct, while Professor Ruggles-Gates has given very good reasons for believing that it is a hybrid between the wild emmer and the wild einkorn. Where this hybridisation occurred is uncertain. The circumstances under which the earliest known examples of this species occur suggest that this happened in Transcaucasia, though this argument is weakened if the grain, found by Langdon at Jemd-et-Nasr—of which more on p. 119—should turn out to be a bread wheat, as Dr. Stapf has suggested. On the other hand, if Professor Percival's identification of Langdon's wheat as a variety of emmer is sound, the arguments in favour of this suggestion still hold good.

We have seen that emmer grows wild in a very restricted region. With the exception of the single plant found by Strauss on the Persian border, which may well have been a stray, its range is restricted to a district on the east side of the Jordan Valley, stretching from the south of the Anti-Lebanon to the Mountains of Moab, overlooking the Dead Sea. Somewhere within this limited region the cultivation of emmer must have begun. Einkorn, as we have seen, has a wider range.

There is one region, however, in which both these grains are to be found: the country around Mount Hermon. It is, of course, not impossible that the idea of cultivating grain arose independently in two or more distinct regions, and that einkorn was first grown in Asia Minor and emmer in Transjordan. It seems, however, more likely that the first attempts at cultivating wheat arose in one place, and that not far from the area in which both einkorn and emmer are native. This is the region around Mount Hermon—that is the country around Damascus, long reputed to be the oldest city, and perhaps the oldest settled habitation, in the world.

We have thus some reason for suspecting a spot where wheat



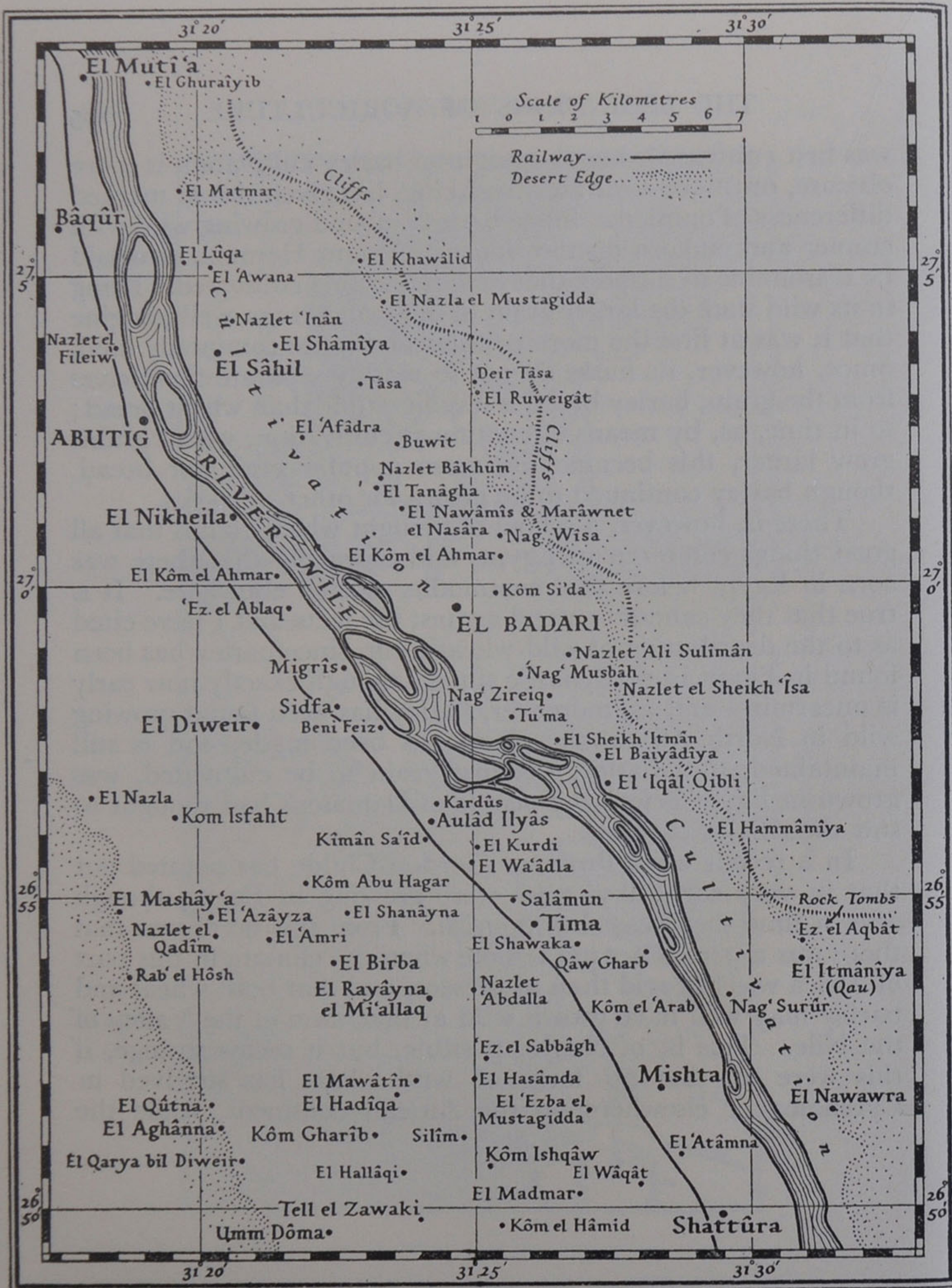
[Reproduced from Peake and Fleure, "Peasants and Potters," fig. 3, by the courtesy of the Clarendon Press.

FIG. 20.—Map of the Fertile Crescent.

was first cultivated, but the origin of barley cultivation is more obscure, or, more accurately speaking, has given rise to marked differences of opinion. Since barley is found growing wild with emmer and einkorn on the slopes of Mount Hermon, it would be reasonable to suppose that here it was first cultivated. Being in its wild state the larger grain of the two, we can well imagine that it was at first the more popular and more commonly used. Since, however, its husks do not so readily separate themselves from the grain, barley bread is less digestible than wheat bread; so in time, as, by means of continued cultivation, wheat grains grew larger, this became the more popular grain for bread, though barley continued to be grown for other purposes.

There is, however, a school of thought which claims that all good things come out of Egypt, and especially that there was corn in Egypt before that commodity existed elsewhere. It is true that they cannot contend against the facts that I have cited as to the distribution of wild wheats, but, since barley has been found in Egypt in predynastic times—though exactly how early is uncertain—and as, moreover, barley has been found growing wild in North Africa, the claim has been made, and is still maintained, that barley, the first grain to be cultivated, was grown in Egypt before the people of Damascus had thought to sow their fields of wheat.

In a recent work Professor Gordon Childe has pointed out that in very early days trees were growing in Egypt, though after a time they ceased to flourish. From this he argues that there was a period not too remote when the climate in this part of Africa was less arid than at present, and that both wheat and barley may well have grown wild at that time in the Valley of the Nile. This is, of course, possible, but it seems strange, if this were so, that no form of wild wheat has survived in Cyrenaica or elsewhere on the African continent, while the



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FIG. 21.—Map of the Badari District in Egypt.