

since it is deficient in new names, boundaries and details such as wire fences, which fail to show up on the photograph, or which have been obscured by shadows, it is taken into the field for final revision. From it, when finally revised, the fair plan is drawn in the ordinary way. This, shortly described, without going into detail, is the process employed in revision from air photographs using the simplified epidiascope.

Owing to the small tilt of the photographs, which should not exceed some 2° , and the small area embraced by the triangles, the residual errors

due to the theoretical inexactitude of the epidiascope design are so small as to be negligible. The advantage of the modified machine is that it is cheap to construct, a consideration of importance where a good many of them are required to deal expeditiously with a large number of photographs; also it is simple to operate.

Fig. 2 is a reproduction of a portion of an old plan; Fig. 3 a photograph of the same area as it now exists and Fig. 4 the resulting plan plotted from the air photograph.

Archæological Discoveries at Předmost

THE site in Moravia known to archæologists as Předmost actually is, or was, a small hill to the west of the little village of Předmosti, which lies about two kilometres north of Přerov, a junction on the Central European line between Warsaw and Vienna. The hill rose to a height of forty metres above the marshy plain, and was known locally as "Hradisko" (oppidum), evidently having served the inhabitants as a place of refuge in time of war. The substructure of the hill consisted of two limestone rocks joined by a saddle of yellow brick-earth, or loess. The complete quarrying away of one of these rocks many years ago has exposed the face of the loess, and at the base level of the rock in a band of darker deposit have been found relics of prehistoric man in such a quantity and of such a character as to justify the verdict that this is one of the most important palæolithic sites ever discovered.

The former inhabitants had evidently used the rock as an *abri*, or shelter, and had lived by hunting, mainly of the mammoth. Relics of this animal are almost innumerable. A thousand teeth and five milk-teeth have been found, and of the tusks, complete or broken, there are some hundreds. In the first series of explorations of the site, no less than twenty thousand implements of stone, bone and ivory were collected, while the carvings and engravings of ivory and bone are æsthetically and culturally of great interest and importance. The outstanding feature in the discoveries which have been made, however, is an assemblage of the skeletal remains of early man, in which twenty individuals were represented in a single find. The ethnic character of these individuals is no less interesting than the conditions in which they were found.

The first recorded discovery at Předmost was made so long ago as 1571, when "giants' bones" were discovered by John Blahoslav; but it was

first recognised as a palæolithic station by Dr. J. Wankel in 1880 and 1881 as the result of an investigation which had begun in 1878. The great explorer of Předmost, however, was K. J. Maska, a schoolmaster, who first turned his attention to the site in 1882, and excavated it systematically and continuously in the ten years 1884-94. It was in this last year that he made his sensational discovery of human remains, when, as already mentioned, skeletons and parts of skeletons representing twenty individuals were found in a small space, an elliptical grave, measuring 4 metres long by 2.5 metres wide by 30 cm. deep. These remains were closely packed, side by side and one upon another, in a crouched position, the heads in most instances towards the north. They lay in the loess above undisturbed quaternary deposits, but separated from them by a calcareous layer 30-50 cm. in thickness. Above the skeletons was the complete skull of an Arctic fox, at the north-west edge was a fragment of the shoulder-blade of a mammoth, which had been graven by a flint tool, and at the south-west lay a complete mammoth shoulder-blade. Two lower jaws of the mammoth, found two metres away, may be related to the burial. Other finds adjacent were fragments of flint and jasper and carbonized bones. Stones to a thickness of 40 cm. had been piled above the interment. Nevertheless, gnawed human bones nearby, and the incomplete condition of some of the remains, suggest that these stones had not availed to keep away beasts of prey.

Unfortunately, no photographic record or drawing was made of the find; and discrepancies in detail have gained currency in accounts of the discovery. The finds associated with the skeletal remains and their position mentioned above are those recorded by Dr. J. Matiegka, to whom Maskra's material was entrusted.

This interment is evidently a communal grave, though whether it was the result of an epidemic or some other simultaneous catastrophe, or represents a succession of burials, thus accounting for the evident disturbance of the remains, there is nothing to show. There are sufficient close resemblances between individuals, some of them inherited, to warrant the conclusion that, if not all of one family as Maska thought, they were at least members of a single familial horde.

Maska's work was followed up by M. Křiž, a lawyer, who carried out excavations in 1894-96. The great collections formed by these two investigators have now been placed, with other valuable archaeological and palaeontological material brought together from different parts of the country, in the Provincial Museum of Moravia at Brno, where they are in the care of Prof. D. K. Absolon, curator of the Quaternary Collections.

Maska spent the remainder of his life at work on his material from Předmost; but his financial circumstances did not permit him to devote to it the time and attention it demanded. He died while his work was still incomplete in 1916, and Křiž died in the same year.

After the Great War, the interest aroused by the discoveries of early man in Moravia, evidently a 'gate of entry' for early migration into Central Europe, led to more systematic study. Chance favoured the resumption of investigation at Předmost. Further commercial exploitation of the remains of the hill for brick-making purposes opened up the loess deposits by trenches. Important discoveries followed and the Government intervened, taking over the site and entrusting its further investigation to Prof. Absolon, whose discoveries date from 1924.

With the aid of later investigation, it is now possible to obtain a truer perspective of the whole site. The occupation level appears as a darker horizontal band in the yellow clay at a depth of one to four metres and 20-70 cm. in thickness, its extent being estimated at 6,700-10,000 cubic metres. There are three main centres of accumulation, of which one is a domestic hearth with broken bones and implements of stone, the second a hearth of greater extent, which may have served for the preparation of food, with larger bones and finer implements, and a third of indeterminate purpose, consisting of a quantity of varied débris, without order and including bones of every kind, among them whole quarters, such as mammoth's feet, part of the backbone of a horse, etc. Some, however, show signs of arrangement, as for example a pile of thirteen mammoth tusks and four skulls placed side by side.

The vast wealth of objects which now form the collections from Předmost—implements of stone,

bone and ivory, carvings and engravings on ivory and bone, personal ornaments of various materials and the like, the human skeletal remains, as well as the remains of the mammoth and other quaternary fauna—reveal the mode of life of the primitive hunter in quaternary Europe in a manner and to an extent which cannot be equalled on any other site, though with it is comparable the site of the horse hunters of Solutré. The development of its art is especially noteworthy. Certain objects, especially a remarkable figure of a mammoth in ivory, are characterized by a naturalism, comparable with the best produced by palaeolithic man elsewhere. Here also are the characteristic cupulent figures, woman or divinity. In striking contrast is the work of another 'school', a school with a marked tendency to conventionalize, which culminates in a female figure engraved on a tusk, in lines which are entirely geometrical. It has been suggested that the two schools represent the influence of two distinct races, which met at this point.

The racial characters and affinities of Předmost man have been the subject of considerable discussion; but as such analyses have been based upon photographs and casts, certain features have been stressed unduly, and an authoritative and first-hand account of the remains has long been desired. Whereas many of the authorities concur in showing a tendency to attach too great a significance to the resemblances between Předmost man and Neanderthal man, it stands to the credit of Sir Arthur Keith's acumen and appreciation of the essential quality of the remains, that while recognizing the importance of the great size of the skull and the massive character of the attachments for the muscles, he has been emphatic in claiming an essentially 'modern' character for Předmost man; and further, while pointing out the marked difference between the sexes, he has not been prepared to go so far as those who hold that it is sufficient to justify the allocation of the woman to a different racial category.

The skeletal material available for discussion of the racial character of the people of Předmost, of which the crania, some represented by fragments only, have now been described, and their evidence analyzed, for the first time by Dr. J. Matiegka*, whose paper has only just recently become available, is regarded as representing twenty-six individuals. To this must be added a further discovery by Prof. Absolon in 1929. Of the material found by Maska, fifteen skeletons were fairly complete, while the remaining material was judged to belong to five individuals. Of the fifteen four were, comparatively speaking, well preserved. Eight of the twenty

* Česká Akademie Věd a Umění (Académie Technique des Sciences et des Arts). Trída 2: Anthropologica. Homo Předmostensis fosilní člověk z Předmostí na Moravě. 1: Lebky. (L'Homme fossile de Předmostí en Moravie. 1: Les crânes.) By Prof. Dr. J. Matiegka. Pp. 145 + 16 plates. (Praha: Česká Akademie Věd a Umění, 1934.)

were adult, three being female, two adolescent, one male and one female, seven were children less than ten years of age, and three were infants of under one year.

Of the adults, the two best preserved were a male and female between the ages of thirty-five and forty years. They are regarded as type specimens of the race. The two well-preserved adolescents approximate closely to them, due allowance being made for the difference in age. The adult male, in particular, shows the close resemblance to Neanderthal man in a number of characters, notably the prominent supraorbital ridge, or torus, the low retreating frontal bone, and so forth. Indeed in its approach to early palæolithic man, this skull, Dr. Matiegka points out, is very near the border-line of the extreme lower range of 'modern' skulls. On the other hand, in certain features, such as for example the possession of a well-marked, if not prominent chin, and the absence of the characteristic prognathism, it is essentially modern.

All the individuals represented at Předmost, with one exception, are sufficiently homogeneous to be regarded as belonging to a single race. Dr. Matiegka stresses in particular their slender character, seen also in the long bones, their light weight, and in the bones of the skull their thinness, features in which they are distinguished from man of the earlier palæolithic period, and to be viewed in relation to size and capacity. In virtue of pronounced Neanderthaloid characters, Předmost man may be regarded as standing morphologically midway between Neanderthal man and modern man, but not in any genetic sense.

In all its dimensions the Předmost skull, both male and female, is within or well above the average of the modern European. The head length ranges from 189 mm. to 201 mm. male, and 185 mm. to 191.5 mm. female; breadth 139 mm. to 145 mm.; height 133-136 mm. In relation to the great size of the skull, the figure for height appears low, but actually it is above the modern average. The cephalic index varies from 70.15 to 77.63, being slightly higher in the women and children than in the men. The contour is ovoid. The cranial capacity is high, 1,578 c.c. male, 1,520 c.c. female, as against 1,475 c.c. male and 1,300 c.c. female in the modern European.

The development of the supraorbital ridge, assuming in certain skulls the character of a torus, appears also in the women and is even perceptible in the children. The sutures are simple; but in all the skulls there are Wormian bones.

The face is high, especially in the upper part, lower in the woman than in the man. The orbits are low, quadrangular and set slightly on the bias in both sexes. The nose is narrow and prominent

in the men, broader in the women. The lower jaw is large, corresponding with the size of the skull, but notwithstanding its massive appearance, largely due to the disproportionate strength of the muscular attachments, it is slender in proportion to its size. The chin is slightly receding in relation to the alveolar projection, but there is a well-formed mental tubercle. The form of the jaw is modified by muscular pull. The teeth are well preserved. They are large. There is one apparent case of caries. At least two skulls have lost teeth during lifetime. The teeth are much worn down, the wear already beginning to appear in a boy of ten to twelve years. There is also evidence of a peculiar form of attrition of which the cause is obscure. It is more marked on the right side than on the left, and on that side in the upper jaw more than in the lower. It affects the first molar, the second showing it, if at all, only in a slight degree. It has been suggested that this is due to a custom of carrying a pebble in the mouth continuously, though for what reason is not apparent. In view of the cold climate and its continuous use, it could scarcely be for the purpose of alleviating thirst.

In considering the affinities of the crania of Předmost man with those of other forms of Quaternary man, too much importance must not be attached to the resemblances to Neanderthal man, which have been noted in the first-named. They do not warrant the conclusion at which some anthropologists have arrived that Předmost man represents the stage of transition in a series which extends from Neanderthal to modern man; nor are they the results of a cross between Neanderthal and Aurignacian man. They are due, it must now be held, to simple convergence.

Of the types of 'modern' man of Quaternary age to which the Předmost crania may be related, Grimaldi and Chancelade may be ruled out, notwithstanding affinities to the latter, which have been noted. Předmost stands with Brno I and Brno II, distinct from, but closely related to Oberkassel, with the female Oberkassel as a transitional form. In general terms, it is a simple variant of the Cro Magnon race.

This interpretation of the skeletal evidence is in sufficiently close agreement with the geological and archæological evidence. The fauna of the loess beds points to a rather cold climate of tundra type; while the culture of the settlement, which Maska thought to be Solutrean, is now regarded as developed Aurignacian, the Abbé Breuil would hold with strong Solutrean influence from Hungary, but which Prof. Absolon considers entirely Aurignacian, though of later date than Vistonice, the Moravian station which corresponds to the Upper Aurignacian of France.