

THE FOSSIL MAN OF RHODESIA

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I

THE recent discovery, at the Broken Hill mine in Northern Rhodesia, of a hitherto unknown species of man is an event of peculiar importance to the student of the early history of the human family and its wanderings. The addition of one more to the two or three species of the genus *Homo* with which we were previously acquainted is in itself a noteworthy incident; but its interest is enormously enhanced by the bizarre features of the newly discovered member of our family, and the fact that the continent of Africa, famous among the ancients as the purveyor of surprises, — *semper aliquid novi ex Africa*, — has at last begun to reveal some of the secrets of her extinct types of mankind, which she has so closely guarded in the past.

The Broken Hill of Northern Rhodesia has attracted considerable attention during the last fifteen years, in spite of the inaccessibility of the locality, which is some 300 miles north of the Zambezi. Mr. Arthur E. V. Zealley gave an interesting account of the mine and its history to the South African Association for the Advancement of Science in 1912, from which I quote the following statement. 'Few localities in the world can be of such interest to the mineralogist as these remarkable deposits of lead, zinc, and vanadium. The variety and the extreme beauty, no less than the rarity, of several of the minerals render its study immensely attractive, and the unique association of mineralized bones, the implements, and other evidences of

human occupation of the caves in the deposit further increase the interest in the mines that have been opened up.'

Nearly fifteen years ago Messrs. F. P. Mennell, E. C. Chubb, and Franklin White called attention in several journals¹ to the evidence of early human occupation afforded by the stone implements and the broken and worked animal bones in the caves. But although hundreds of tons of animal bones had been removed from the mine since then, no human bones were seen until last summer, when parts of the skeletons of two human beings were found.

Before mining operations began at Broken Hill there stood, on the spot where the open quarry-like excavation is now found, what the Dutch colonists call a kopje (or hillock), nearly sixty feet high, tunneled from west to east by a natural cave more than 120 feet long, the walls and roof of which consisted of dolomite and silicate of zinc; while on the floor was piled up, to a height varying from four to twelve feet, a vast collection of animal bones, so strongly impregnated with the salts of zinc and lead as to be worth mining. Many hundreds of tons of these bones had been taken out of what for fifteen years has been famous as the 'Bone Cave,' and put into the smelters, along with the mineral deposits found in the kopje itself, which has now been de-

¹See especially *Geological Magazine* for October, 1907, p. 443.

molished; and the excavations had been carried down 90 feet below ground-level. In the course of this work the blind end of the Bone Cave was reached last summer and the human remains found.

If it were not for the fact that originally there had been a cleft in the roof of the cave just above the place where the skull was found, we might have drawn the conclusion that the men or women whose bones were found in the depths of the cave had already met their death before the hyenas made it a dining-hall and began the accumulation of the vast collection of animal bones, which represents the work of, perhaps, many centuries. But the cleft does leave open the possibility of the human beings having fallen into the cave at a more recent period. However, the fact that all the bones which have been examined represent animals of species that are still alive in Africa shuts out any possibility of determining the age of the human remains. In addition to this, the incrustation of the surface of the human bones with salts of zinc and lead has protected them from the action of the soil, so that, in the strict sense of the term, they are not fossilized. Although the bones are not mineralized or, strictly, fossilized, the custom of human palæontologists makes it not incorrect to refer to these bones as 'fossils.' If the investigator is grateful for this protection of the texture of the bony remains, he has to lament the absence of even the slightest indication of their age, which the state of fossilization might have afforded, had the circumstances been other than they were.

The upshot of all this is that the condition of the human remains, and the remarkable circumstances under which they were found, do not give us a scrap of information as to the date, either absolutely or relatively to other human fossils, when the Rhodesian

species of man lived and became extinct. To determine his place in the human family, we are thus thrown back entirely on inferences from the anatomy of the remains themselves.

The bones that have been recovered consist of the almost complete skull (without the lower jaw), a sacral bone and tibia and the two ends of a femur, and a small fragment of the upper jaw of a second individual of the same type. According to Mr. William L. Harris, a metallurgical chemist employed at the mine, who saw the human remains when they were first brought to light and photographed them in the place where they were found, practically the whole skeleton was discovered, and was encased in a metallic cast of the surface of the body; but the negro miners destroyed most of the bones and broke up the cast, which would have been a unique and invaluable record of the actual bodily form and proportions of an extinct type of mankind. The skull is that of a comparatively young adult who had suffered severely from dental caries. The form of the sacrum suggests that it formed part of a female skeleton.

It was Mr. Harris, whose account of the Bone Cave and kopje I have quoted above, who communicated to the *Sunday Times* of Johannesburg the first account (September 25, 1921) of the finding of the Rhodesian man. He also sent to a well-known European Press Agency his collection of photographs of the skull, and a very lucid and intelligent account of their significance: but it is a dramatic illustration of the lack of knowledge and appreciation of simple anthropological facts, that even so startling an object as the grotesque face of this fossil made no impression on the mind of one of the leading disseminators of information to the world at large; for he returned Mr. Harris's manuscript and photographs, with the comment that he had no use for them.

I have referred especially to this remarkable incident because it helps us to understand the dangers to which priceless remains of early types of man are exposed, unless by happy chance some enlightened man is on the spot to save them from destruction. For this reason, it is incumbent on those who appreciate the tremendous significance of such relics to neglect no opportunity of educating the public to realize the meaning of human palæontology, and to understand the importance of rescuing the rare fragments of extinct forms of the human family, which may be found by accident, and through ignorance be lost again forever.

II

I have already explained that the circumstances under which the Rhodesian remains were found afford no indication, not the merest hint, of their age or the place of their possessor in the human family. Any inference that attempts to settle these problems must, therefore, be based upon the features of the bones themselves.

The obtrusive fact, which no one can fail to notice, is the appearance of the face, revealing as it does a form that has never been seen before. It is certainly the most primitive type of face that is known among members of the human family. But in making this statement I must guard against a misunderstanding that has repeatedly arisen in the discussion of the Rhodesian skull during the last few weeks. In referring to it as the most primitive human *face* at present known, I do not mean to suggest that the Rhodesian *skull* is the most primitive type of human being so far recovered. Two members of the human family are known from fossilized remains, found in Java and England respectively, which are vastly older than the Rhodesian man, and so profoundly

different from all other members of the family that they are not included in the genus *Homo*—the new genera, *Pithecanthropus* (Dubois) and *Eoanthropus* (Smith Woodward), respectively, having to be instituted for their reception. But the face of neither of these fossils has been recovered, although the possession of the lower jaw of *Eoanthropus* makes it possible for us to restore with confidence the general form of the face.

This, however, does not affect the accuracy of the statement that the Rhodesian skull provides us with the most primitive example of an actual human face—and a most remarkable one it is. It is more definitely primitive and brutal than that of any other human being, living or extinct, that is at present known. The enormous eyebrow ridges are bigger, even, than those of the most archaic member of the human family, the Javan Ape-Man; and in the extent and form of their lateral extensions, they recall the condition found in man's nearest simian relative, the gorilla.

There is no groove at the side of the nose, to indicate the boundary between it and the face, such as one finds in all races of modern men, even in such flat-nosed individuals as the Negro, the Mongol and the aboriginal Australian. This merging of the nose in the face, to form what, in other animals, would be called a snout, is a peculiarly significant mark of the beast, which is known elsewhere in the human family only in the extinct fossil species from Europe known as Neanderthal man. But the nose of the Rhodesian man was definitely more ape-like than that of Neanderthal man. The lateral margins of the nasal aperture extend vertically downward, toward the teeth, as happens also in the gorilla, in which this arrangement is associated with the widely outspread margins of the nostrils that is so distinctive a feature of

man's nearest simian relative. Perhaps also the Rhodesian man had a wide nose, in comparison with which the Negro's or the Tasmanian's would seem narrow. Yet the presence of a nasal spine on the Rhodesian jaw indicates that, in spite of the simian resemblances in the nose, it had the distinctively human features of a horizontal edge of the nasal septum and a definite tip to the nose.

Another remarkable feature of the enormous facial skeleton is the vast size of the palate and teeth, and especially the extent of the interval between the nose and the margin of the upper jaw. Although the jaw is so extensive and the teeth so large, the canine teeth did not project in the ape-like manner of those of Piltdown man (*Eoanthropus*) and the fossilized proto-Australian found at Talgai in Queensland.

The form of the brain-case, and the peculiarly distinctive features of the brain that it once contained, corroborate the inferences drawn from the face, that the Rhodesian species was the most primitive member of the genus *Homo* at present known, but not the most primitive of the human family, which of course includes the vastly more ancient and lowlier genera, *Pithecanthropus* and *Eoanthropus*. The long straight shin bone and the fragments of the femur afford a very clear demonstration of the fact that Rhodesian man is separated by a very considerable hiatus from his nearest relative, the extinct European Neanderthal man. But I must defer the reference to this until a later page.

III

The bones found in Rhodesia, however, have a far wider and deeper significance to the student of mankind than these statements suggest. The recovery of a long-lost and strangely exotic

cousin is an experience that excites our curiosity; and the opening-up of a new continent for the human palæontologist awakens visions of what this ancient domain of the human family may provide for future anthropologists. But the immediate problems that the study of the features of the skull and limb bones brings up for discussion involve comparisons with all the other types of mankind, and a comprehensive testing of the opinions previously put forward to interpret the significance of all the fossil remains of man and their bearing on the history and migrations of the human family.

A newly discovered species comes to have value and importance only when the effort is made to put it in its proper position in its family, and to determine the part it played and the light its structure and associations throw upon mankind as a whole. In an attempt such as this to interpret the significance of the new discovery, it is necessary, above all else, to define this setting — our present knowledge of the family circle of the *Hominidæ* into which a long-lost cousin has to be introduced and assigned his appropriate place. Hence the discussion of the significance of the newly found fossil must inevitably involve some reference to the history of mankind as a whole.

However obvious and profound are the differences in physical structure and intellectual achievement which distinguish the various races of mankind, the one from the other, anthropologists regard all human beings at present living on the earth, whether their skin is white or black, yellow or brown, as members of one and the same species (*sapiens*) of the genus *Homo*. But these modern men represent the survivor of one of probably many species and genera of the human family, all the rest of which have, at different epochs in the past, succumbed in the struggle for

survival in competition with the one successful member of the family, *Homo sapiens*.

The extinct members at present recognized consist of two species of the genus *Homo*, in addition to *Homo rhodesiensis*. These are Neanderthal man (*H. neanderthalensis*) and Heidelberg man (*H. heidelbergensis*). The Neanderthal species lived in Europe long ages ago, when the climatic conditions were vastly different from what they are now; and when a great many animals, such as mammoths, woolly rhinoceroses, and cave bears, which have long been extinct in Europe, shared the Atlantic littoral of that continent with man. The Heidelberg man is so vastly more ancient and more primitive in structure than his Neanderthal successor in the Rhine Valley, that no doubt can be entertained of his right to specific distinction. In fact, Bonarelli may ultimately be justified in his suggestion that even a genus distinct from *Homo* should be created for the reception of Heidelberg man; he has proposed the name *Palæanthropus* for this hypothetical genus, retaining of course the specific name *heidelbergensis*. But so far only the lower jaw of this form is known, — although there is a rumor of the finding of the thigh bone, — and the evidence is too scanty to justify a final decision as to whether the genus of the Heidelberg man should be *Homo* or *Palæanthropus*.

The settlement of this problem may have a very direct bearing on the interpretation of the Rhodesian man's place in the human family. For the Heidelberg jaw so nearly fits and harmonizes with the Rhodesian skull as to suggest the conundrum whether the skull recently found in the heart of Africa may be a relic of the same species as the individual who, countless ages ago, left his remains in the Mauer Sands near Heidelberg. It is only a possibility, and

a very unlikely one at that; but it should not be lost sight of in the final determination of the rank and affinities of the Rhodesian species of fossil man. Both the Rhodesian and the Heidelberg fragments reveal certain affinities to the Neanderthal type, and are more primitive. It is not unreasonable to hint at their possible identity.

But if there is any doubt as to the justification for the creation of a special genus to include the Heidelberg man, there can be no such element of uncertainty regarding two other members of the human family, the so-called Ape-Man of Java (*Pithecanthropus erectus*), whose fossilized remains were found at Trinil, on the banks of the Solo River,² by Dr. Eugen Dubois in 1891, and the Dawn-Man (named *Eoanthropus dawsoni* by Dr. Smith Woodward) discovered by the late Mr. Charles Dawson at Piltdown in Sussex (England) ten years ago.

The peculiarities of structure of these two fossils are so definite and pronounced as amply to justify the creation of the two human genera, *Pithecanthropus* and *Eoanthropus*, quite distinct, the one from the other and from the genus *Homo*. They represent far and away the most primitive members of the human family known to us at present. Their features are so archaic that many palæontologists still regard *Pithecanthropus* as an ape, and the jaw of *Eoanthropus* as a chimpanzee's. But no competent anatomist who has examined the actual remains (and not merely models) of these two genera can entertain any doubt that both of them should be included definitely within the human family.

Many other fossil remains of man have been found, besides the two or three genera and the two or three species

² British and American writers usually mistake the Javanese word *Bengawan*, meaning 'river,' for the river's name, which is Solo.

so far mentioned; but all the rest belong definitely to one or other race of *Homo sapiens*, and therefore do not call for enumeration in our list of extinct species.

The few broken fragments of these extinct members of the human family which have so far been recovered probably represent only a small minority of the many experimental types discarded by Nature, before she succeeded in fashioning the supreme species capable of outstripping the rest in the competition for intellectual supremacy. Without undue modesty, we who belong to that species have labeled it *sapiens*.

IV

The vast continents of Africa and Asia represented (or perhaps it would be more correct to say that one or both of them included) the domain of primitive man during the early history of the human family, and the laboratory in which, for untold ages, Nature was making her great experiments to achieve the transmutation of the base substance of some brutal ape into the divine form of man. Until the Rhodesian remains came to light, no fragment of an extinct type of man had come from Africa; and Asia had provided, from Java, — which, at the end of the Pliocene period, was the extreme southeastern corner of the vast continent, — the fragments of one skeleton, *Pithecanthropus*, the most archaic member of the human family. But no trace whatever of human remains has yet been found in the central Afro-Asiatic area, the real cradle of the family. Only the broken fragments swept out to its periphery, Far-Eastern Asia, South Africa, and Western Europe, have so far been recovered, to give us some slight clues as to what was happening in the really vital spot.

The vast geographical area that separates Java from Europe, and the

incalculable span of time that intervened between the epochs of *Pithecanthropus* and the fossil men of Europe, represent a tremendous hiatus in the early history of the human family. Behind the veil of all these hidden centuries, it is well within the bounds of reasonable conjecture to picture the wide stretch of Southern Asia and Africa as peopled by a variety of weird caricatures of mankind, roaming far and wide to satisfy their appetites and avoid extinction. In this competition, the distinctive characters of man were fashioned in the hard school of experience. All that we can learn of the tremendous drama that was being enacted in this laboratory of mankind is based on inferences from a skull-cap and femur from Java, a skull and tibia from Rhodesia, and an assortment of bones from Western Europe!

But if we know nothing of the wonderful story of man's journeyings toward his ultimate goal, beyond what we can infer from the flotsam and jetsam thrown upon the periphery of his ancient domain, it is essential, in attempting to interpret the meaning of these fragments, not to forget the great events that were happening in the more vitally important central area, — say from India to Africa, — and whenever a new specimen is thrown up, to appraise its significance from what we imagine to have been happening elsewhere, and from the evidence it affords of the wider history of man's ceaseless struggle to achieve his destiny.

Nature has always been reluctant to give up to man the secrets of his own early history, or, perhaps, unduly considerate of his vanity in sparing him the full knowledge of these less attractive members of his family, who too obviously retained the mark of the beast.

Thus, during the thousands of years after the members of our species came into being, they remained in ignorance

of the fact that, before the species *sapiens* emerged, the earth was occupied by other species and other genera of mankind. In fact it is only seventy-four years since the first fragment of one of these other species was found at Gibraltar; and not until many years afterward was the momentous significance of this discovery appreciated. In fact, the importance of the fossil skull found at Gibraltar in 1848 was not fully realized until parts of the skeleton of another representative of the same species was found, in 1856, in the Neanderthal cave near Düsseldorf in Westphalia. The latter, unlike the former, happened to come into the hands of a competent anatomist, who was able to appreciate the tremendous meaning of the evidence it provided; and in course of time it was made the type of a species of mankind (*Homo neanderthalensis*), differentiated from that (*Homo sapiens*) to which we ourselves belong.

In the years that followed, further remains of members of this species were found at Spy in Belgium (1886); at Krapina in Croatia (1899–1905); in France at Le Moustier and La Chapelle-aux-Saints (1908); at La Ferrassie (1909–1912); at La Quina (1911); and in Jersey (1910).

From the investigation of this large series of specimens we have learned that, at one time, Europe was inhabited from Gibraltar to Germany and from the Channel Islands to Croatia by a heavily built and brutal type of mankind, with a flat head, sloping forehead, very prominent eyebrow ridges overhanging large orbits, and a very large heavy face, with a defective development of chin. These men walked with half-bent knees and slouching gait, the coarse head being pushed forward on a thick and massive neck, so as to make the profile of the head, neck, and body into an uninterrupted curve, so marked-

ly different from the graceful alternation of curves that constitutes one of the charms in the form assumed by the truly erect figure of modern man.

The discoveries made at Spy (and confirmed at Krapina and the various sites in the Dordogne Valley) revealed the fact that these uncouth members of the human family occupied Europe many millennia ago, at a time when there were living along with them the woolly mammoth, the woolly rhinoceros, the reindeer and the bison, the cave bear, and many other animals that we regard as utterly alien to Europe. Moreover, we have learned to associate the Neanderthal species of man in Europe (though not necessarily elsewhere) with a particular type of stone implement that has long been known and distinguished as Mousterian, from the village of Le Moustier on the banks of the Vézère, where the type-specimens were obtained by Lartet and Christy in 1860–1863.

Only since so large a series of representatives of this species have been discovered and studied, has it become possible fully to appreciate the significance of the discovery made at Gibraltar, in 1848, when Europe was in the throes of a political and social upheaval which threatened widespread revolution. Whether or not the need for putting the defenses of this British fortress in order, to prepare for the threatening contingencies, was responsible for the recovery of the first-known member of another species of man, is not certain. But it was found by an artillery officer, at a time when soldiers were preparing for the coming storm. When the distinctive features of the Neanderthal species were defined, it was recognized that the Gibraltar skull must be allocated to it; and the differences between them were explained as sexual, the Neanderthal specimen being male and the Gibraltar skull female.

But the recovery at La Quina of a female skull, not only of the same species, but also of the same race, as the man from the Neanderthal cave, shows that the difference between the La Quina and the Gibraltar women is something more than a mere sexual distinction. For there is a marked contrast between the forms of the two female skulls, from La Quina and Gibraltar respectively, and the latter is definitely the more primitive of the two. But there is no justification for reviving the old and discarded name *Homo calficus*, suggested by Falconer, or for following the Italian anthropologist, Sera, in regarding the Gibraltar woman as the sole representative of a species distinct from (and more primitive than) the true Neanderthal species. It is more in accordance with the evidence, to regard the Gibraltar fossil as a member of the Neanderthal species, but as belonging to a different and more primitive race (the Calfic) of that species.

I have entered into this question at some length, because the fact of the discovery of the most primitive member of the Neanderthal species at the very threshold of Europe, near the chief gateway from Africa, is not without significance in the discussion of the Rhodesian skull, the possible affinities of which to the Neanderthal species is now the subject of controversy among anthropologists.

The outstanding feature of the Rhodesian man's traits is the suggestion of a half-developed Neanderthal man, with some of his peculiarities grossly exaggerated, while others are lacking, or replaced by primitive features that more nearly approach the type of modern man.

When Charles Darwin discussed the evolution of man, he was inclined to regard Africa as the likeliest place for the original home of mankind. It is generally recognized that the two

African anthropoid apes, the gorilla and the chimpanzee, are more closely akin to the human family than the other anthropoids, the orang and the gibbon, whose geographical domain is now restricted to the Far East; and it seemed to be more likely than not that, in the migrations of man's nearest relatives from their birthplace, perhaps in Northern India, the ancestors of the human family may have accompanied those of the gorilla and chimpanzee when they made tropical Africa their home. These, however, are mere conjectures which future discoveries may or may not confirm. But with regard to the anthropoid apes themselves, the fossil remains of the little *Propliopithecus*, found in the Egyptian Fayum ten years ago, reveal the fact that, ever since the anthropoid apes first came into existence (probably at the end of the Eocene period), Africa has been a part of their domain, if it was not their original home.

I call attention to these considerations, to suggest that the evidence now at our disposal affords some slight justification for the speculation that Africa may have been the area of characterization, or, to use a more homely phrase, the cradle, both of the anthropoid apes and of the human family. In any case, it is probable that Africa played an important part in the early history of man and his ancestors.

But hitherto no fossilized remains of early types of man have come to light in Africa, to substantiate these assumptions. Some months before the declaration of war in 1914, the announcement was made of the finding of a fossil human skull at Oldoway, in what was then German East Africa; but from the imperfect accounts that have so far been given, it seems that this type of man does not differ from the African Negroes of the present time. A much more important discovery of fossilized human

remains was made a year earlier (in 1913) at Boskop in the Transvaal. The Boskop man cannot be regarded as a member of any of the races still living in Africa; but he belongs quite definitely to the species *Homo sapiens*, and in some respects is akin to the earliest members of that species found in Europe, often called the Cro-Magnon race.

Investigation of the extinct peoples of Europe has directed attention to the probability that the earliest members of the human family found in Western Europe must have come there from Africa.

For various reasons, in addition to the fact that the Bushmen, Hottentots, Pygmies, and other Negroes are among the most lowly races of mankind, Africa is eminently the place where one might expect to discover the remains of still more primitive types of the human family.

V

The peculiarities of the Rhodesian discovery are not exhausted by the statements that the skull reveals a hitherto unknown type of face and skull, and represents the first traces of a species other than *Homo sapiens* from Africa. For the circumstances under which they were found, and the condition of the remains, are altogether different from those of any of the other famous discoveries of fossilized remains of man. The peculiarities of these circumstances I have already explained.

The claim that Rhodesian man is more primitive than Neanderthal man does not necessarily imply that the individual whose remains were found at the Broken Hill mine was alive in the remote times of the glacial epoch in Europe or had not survived to a period ages later than the period of the fossil men of Gibraltar, Neanderthal, and the Dordogne Valley. The animals with which Neanderthal man was associated

in Europe became extinct there when that type of man disappeared from Europe: but many animals closely akin to them are still living in Africa; and it is quite conceivable that an early type of man also may have survived in Africa, as the elephants, rhinoceroses, hippopotamuses, and hyenas have done, for many centuries after their European relatives had been wiped out of existence. It may have happened that the Rhodesian species lived on in South Africa, free from human competition, until the Boskop race, or the ancestors of the Bushmen, made their way down the Dark Continent.

So far, I have referred only to the face of Rhodesian man, and the very positive evidence it affords of the primitive (that is, definitely pre-Neanderthal) type. It has been claimed that such an inference is rendered untenable by the characters of the brain-case and the leg bones. Let us consider the question thus raised for discussion.

In many respects the features of the skull more closely resemble those found in *Homo sapiens* than those of *Homo neanderthalensis*. Hence certain distinguished authorities have suggested that Rhodesian man is later than Neanderthal man, and intermediate in type between the other two species. Even if the primitive characters of the face of the Rhodesian skull were not fatal to such an argument, it would not be convincing, because it does not take into account the fact that, in many respects, the skull of Neanderthal man is highly specialized and further removed from the primitive condition than modern man's skull is. The particular features of resemblance of the Rhodesian and modern skulls are precisely these primitive features which the Neanderthal man lost through too early specialization. Just as the gorilla and the other apes became differentiated from man's ancestors by too hastily adopting

specializations of habit and structure, which destroyed many primitive features retained in the living members of the human family, so the dominant species of the latter has retained many primitive characters that were modified or lost by his unsuccessful Neanderthal cousins. But the possession of such traits by the more primitive members of the family does not mean that the latter are post-Neanderthal in time and development. Its significance is quite the reverse: these primitive characters have been lost by Neanderthal man, never to return, either in them or any forms derived from them.

But, quite apart from this consideration, the brain-case of the Rhodesian skull does retain a number of characters definitely more primitive than those of either *Homo sapiens* or *Homo neanderthalensis*. This is not the place to discuss the technical details of these anatomical features, which are most strikingly displayed in the architecture of the base of the skull. But there is one aspect of the study of the brain-case to which attention must be called, because it is of fundamental importance in the interpretation of Rhodesian man's peculiar significance. The skull provides precise information concerning the size and general form of the brain and its various parts, which has a very direct bearing on the determination of the rank of its possessor in the hierarchy of the human family.

Charles Darwin fully appreciated the fact that the fundamental distinction between man and all other living beings is the immeasurably superior intellectual power of man. But since his time, like so many other obvious facts, this important aspect of anthropology has not received the attention that its importance merits. The intellectual supremacy of man was attained by virtue of certain structural changes in the brain, which can be studied and, in some

measure, understood. The matter of primary importance to anthropologists is to estimate the significance of these variations of cerebral form and proportions, because they afford more precise and directly relevant criteria of human rank and affinities than any other anatomical evidence can provide. In the case of the Rhodesian remains, presenting as they do certain features of a more or less paradoxical nature, the cast of the interior of the brain-case becomes of special importance, because its peculiarities afford unequivocal evidence of decisive value in settling these difficult problems.

Ever since the discovery of the remains of the Javan Ape-Man, *Pithecanthropus*, there has been a difference of opinion among leading anthropologists as to whether the creature was a gigantic ape, a primitive member of the human family, or a creature that was intermediate between the apes and man — that is, a so-called 'missing link.' Speaking generally, it may be said that most German anatomists inclined toward the first point of view, the British toward the second, and the Dutch, — as perhaps one might regard as appropriate to their geographical position, — the third, or intermediate, possibility. But no one who has seen the cast of the interior of the brain-case, and is capable of interpreting its obtrusive peculiarities of form and proportions, could have any hesitation in deciding that *Pithecanthropus* was truly a member of the human family, if a very lowly one. The capacity of the brain-case of the Javan specimen was probably about 950 cubic centimetres (that is, about 100 cubic centimetres greater than Professor Dubois's estimate), which brings it within the range of variation even of *Homo sapiens*; whereas 650 cubic centimetres is the biggest record for an ape, even of a gorilla twice the body-weight of a human being.

Moreover, the endocranial cast of *Pithecanthropus* reveals a localized and precocious expansion of those areas of the brain which we associate with the power of articulate speech, that is, the ability to appreciate, in a far greater degree than other animals are capable of, the auditory symbolism of sounds, and to reproduce them as a means of communication with its fellows, not merely as signals expressive of emotional states, such as most animals can impress upon one another, but also as the means for transmitting information and ideas, and attaining the communion of knowledge and belief that is man's exclusive prerogative. There are grounds for believing that the acquisition of true articulate speech was one of the essential factors in the emergence of man's distinctive characters; and the form of the endocranial cast of *Pithecanthropus* suggests that the Javan Ape-Man possessed this hallmark of human rank, and the right to be included in the human family.

The same distinctive features are recognizable also in the somewhat larger endocranial cast of the Dawn-Man of Piltown. The peculiarities of the brain of Rhodesian Man can best be summarized by the statement that it is intermediate in type between those of the Piltown and of the Neanderthal men. It is distinctly larger than the former, but smaller than the latter. The process of development revealed by comparing the endocranial cast of the Piltown skull with that of *Pithecanthropus* is carried a stage further in the Rhodesian brain. The expansion has involved other areas; but there are still territories in the upper parietal, prefrontal, and inferior temporal regions of the Rhodesian brain, which are singularly ill-developed as compared with the corresponding parts of the brains of either the Neanderthal or the modern species of man.

It is of special interest to note that the defective areas of the brain are those parts which attain their maturity latest in the developmental history of the modern human infant, and are especially associated with the discrimination of the form, weight, and texture of objects as they appeal to the sense of touch, with the power of learning highly skilled movements with the hands, and, in a general sense, with the higher intellectual functions. The part of the brain which has been found to be highly developed in several modern men distinguished for musical genius is remarkably small, and simply folded, in the Rhodesian brain. This brain, in fact, was deficient in those parts by which the high degree of foresight, discrimination, and refinement of modern men is determined and made possible.

VI

The evidence afforded by the brain thus corroborates the inference drawn from the peculiarities of the face and the skull, that the Rhodesian man conforms to a type definitely more primitive than that of the Neanderthal species.

But there is one feature of the remains found at Broken Hill that has raised some doubt as to the correctness of this inference. The leg bones found with the skull are longer and straighter than the corresponding bones of members of the Neanderthal species. The short, thick, and curved leg bones of Neanderthal man, which indicate that this ungainly type of mankind walked with a shuffling gait and bent knees, are often regarded as survivals of man's more simian ancestors. The condition of the neck vertebrae and the skull of Neanderthal man corroborates the conclusions drawn from the leg bones; for they complete the picture of the slouching posture by showing that the

head was thrown forward on the thick massive neck. Instead of being truly erect, the body was carried in a stooping attitude, the line of the back passing, by a gradual curve, along that of the neck to the brutal flattened head.

The length and straightness of the Rhodesian leg bones and the features of the base of the skull have been claimed as evidence that the man of Broken Hill walked upright, and had therefore lost the mark of the ape which survived in Neanderthal man's posture. If the Rhodesian man has really lost this simian trait, which Neanderthal man has retained, how, it may be asked, can the former be regarded as a more primitive type than the latter? Is Dr. Smith Woodward right in claiming that the Rhodesian man walked erect, and represents a phase of evolution later than the Neanderthal type? These are the problems that have to be threshed out during the coming months. All that I need say on the matter now is, first, that the base of the skull (and especially the position of the *foramen magnum*) is not in such close agreement with that of modern man as has been supposed; and, secondly, that the leg bones present peculiar features which differentiate them from those both of modern man and Neanderthal man.

In the discussion of this extremely difficult and highly technical problem, the question of the significance of the thigh bone found along with the skull-cap of *Pithecanthropus* will have to be threshed out once more. If the leg bone found in the same formation as the skull at Trinil really belonged to *Pithecanthropus*, and the specific name *erectus* given to the Javan Ape-Man by

Professor Dubois is a correct description of its posture, the recognition of this fact will have a very direct bearing on the estimation of the significance of the Rhodesian man's posture. For, if the most ancient and primitive member of the human family walked erect, the (assumed) erectness of Rhodesian man cannot be fatal to the claim to regard him as primitive. In the meantime, the evidence provided by his face, brain-case, and endocranial cast, seems to me to point conclusively to the fact that, in the bones found in the Broken Hill mine, we have the remains of a type of mankind definitely more primitive than all the known members of the human family, with the exception only of *Pithecanthropus* and *Eoanthropus*, from Java and Piltdown respectively.

The Rhodesian remains have now found a resting-place, beside those from Piltdown, in the Natural History Department of the British Museum at South Kensington; and under the competent direction of Dr. Smith Woodward the difficult problems which will arise in the investigation of their anatomical features, and the interpretation of their significance, will be accomplished with care and sobriety of judgment. Within the next three months Dr. Smith Woodward and his collaborators hope to have ready for publication by the British Museum a comprehensive monograph presenting the evidence relating to the many-sided problems roughly outlined here; so that everyone interested in the history of the human family will then have the materials upon which to base independent conclusions as to the meaning of the extinct species of mankind from Rhodesia.

THE HUMAN SIDE OF BUSINESS ADMINISTRATION

BY B. S. ROWNTREE

I

WAR is shorn of its glory. Men who have fought on many battlefronts, whose well-won decorations show that cowardice is only a name to them, are yet profoundly convinced that such a catastrophe as that which overtook us in 1914 must be made impossible in future. In short, we are gradually awakening to a realization of the fact that for civilized communities to settle their differences as if they were super-hyenas or super-jackals does not reflect much credit on the intelligence of the human race. And so that intelligence is gradually ceasing to develop the science and machinery of war, and beginning to develop the science, and perfect the machinery, of peace.

God knows that men have struggled against this development. They have adopted every artifice and argument to persuade themselves that war is a magnificent thing; that true greatness of character is impossible without it; that all the virtues which go to build up a virile race have their origin in the war-spirit. Only a demonstration so overpowering that it came near to ending the civilization of Europe has persuaded them of their error.

To-day, men are thinking peace. They are thinking it in Washington, they are thinking it in Geneva, they are thinking it in Paris, Rome, and London. Nations are anxiously seeking to discover means by which they can settle such differences as may from time to time arise between them, on a

basis of right rather than of might. This constitutes the hope for humanity.

This development in international relations leads us to believe that the time has come for those who are responsible for the conduct of industry to think industrial peace, and to set it before themselves as an ideal, to be realized, not in some far-distant century, but now. Its realization is perfectly possible. The perpetual industrial warfare from which the whole world suffers, and which we euphemistically call 'unrest,' can be ended in your lifetime and mine.

The trouble is that, hitherto, both Capital and Labor have regarded industrial unrest as inevitable, and have accepted it just as they accept rain and sunshine, summer and winter; whereas it is not inevitable — on the contrary, its existence is a serious reflection on the ability of those who are responsible for the management of business. I believe profoundly that it is possible practically to secure industrial peace without any fundamental changes in the basis of industry. It is possible to-day; it may be impossible to-morrow. The war has had a profound effect on the psychology of the workers. It has shaken them out of their ruts, it has broadened their outlook, so that to-day they are not prepared to accept industrial conditions just as they find them. They are asking many questions that they never asked before. Even the basis of industry is being questioned,