THE RECEPTION OF THE FIRST MISSING LINKS *

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I. INTRODUCTION

In the year 1859 man discovered he was an animal. He did so by indirect deduction. The year 1859 is generally regarded as the climactic point in the long, involved, and somewhat sporadic efforts toward the development of a satisfactory explanation of organic change. In that year Charles Darwin published the *Origin of Species* in which he dared only one solitary and wary sentence upon the evolution of man. "Light," he cryptically intimated in the conclusion of his epoch-making book, "will be thrown on the origin of man and his history." It was not until later editions that he ventured to add the adjective "much" to his use of the word "light." Nothing better illustrates the oppressive theological atmosphere of the time than Darwin's response to an inquiry from Wallace prior to publication of the *Origin*, as to whether he intended to discuss man. Darwin rejoined as follows: "I think I shall avoid the whole subject, as so surrounded with prejudices, though I fully admit that it is the highest and most interesting problem for the naturalist." [1] In a similar vein he confessed to Jenyns, "With respect to man, I am very far from wishing to obtrude my belief; but I thought it dishonest to quite conceal my opinion." [2]

In the clamor that arose after his book appeared, Darwin, in spite of this last remark, was not to avoid insinuations of deceit in failing to elaborate upon the place of man in his system. It was, perhaps, partly in indirect answer to such slurs that he undertook the publication of the *Descent* of Man in 1871 when his position and that of his theory had ceased to appear so novel and revolting to the public mind. In the judgment of the present writer there can be no doubt, considering the temper of the times, that Darwin's caution was well justified, and probably had the salutary effect of broaching what was then an unpleasant topic by successive doses which were found assimilable rather than, as Lyell was accustomed to saying, "going the whole orang" all at once.

It is a matter of considerable historical interest that Darwin postulated his theory and extended it to man without having available as evidence a single subhuman fossil by which, on the basis of his theoretical views, he could have satisfactorily demonstrated the likelihood of man's relationship to the world of the subhuman primates. Yet, curiously enough, at least two early human fossils had been discovered and one had been published upon.[2a] The historian of ideas should be attentive to the discussions of the closing half of the nineteenth century in order to observe, once the theory of evolution began its diffusion, the effect that the first paleontological discoveries had, not necessarily upon the lay mind, which could be expected to discount them, but upon the minds of scholars and savants who were at that time either weighing or had committed themselves to a belief in human as well as animal evolution.

That our generation has accepted this commitment we know; evolution forms the guiding motif in all our biological studies. But no episode in science affords a better glimpse into the workings of even the cultivated mind than an exploration of that combination of motives which revolves about the scientific investigation of the first human fossils. The subject was one touching deeply upon human emotions, and it tended to become proportionately distorted. The reigning political prejudices, racial and religious shibboleths, are all caught up in an intellectual ferment which invaded staid congresses and cropped out in sober scientific pronouncements.

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[1] Darwin, Francis, *Life and letters of Charles Darwin* **2**: 109, London, John Murray, 1888.

[2] *Ibid.*, 263.

[2a] The Gibraltar and Neanderthal skulls.

The following study is offered not in a critical spirit, nor to uphold our scientific fathers to ridicule, but to show with what doubt and withdrawal and hesitation, along with an almost morbid fascination, man discovered he was an animal. It is my genuine belief that no greater act of the human intellect, no greater gesture of humility on the part of man has been or will be made in the long history of science. The marvel lies, not in the fact that the bones from the caves and river gravels were recognized in trepidation and doubt as beings from the half-world of the past; the miracle, considering the nature of the human ego, occurs in the circumstance that we were able to recognize them at all, or to see, in these remote half-fearsome creatures, our long forgotten and beloved fathers who had cherished our seed through the ages of ice and loneliness before a single lighted city flickered out of the darkness of the planet's night-time face.

That recognition did not come in a day, even with a Darwin to light the path. When it did come those wavering apparitional faces were masked by the projected fantasies arising in the minds of scientists themselves. They were ill seen, ill understood, and, above all, their numbers were pitifully few. The account which follows deals with the only two fossil men known from the nineteenth century—*Homo neanderthalensis,* ironically and indirectly named for a forgotten poet, and *Pithecanthropus,* who is really, in nineteenth-century terms, closest to a true missing link and who came closest to convincing the doubters. His earlier colleague from the valley of the Neander had no such success. The two forms together, however, cover almost a fifty-year span in the history of the search for human origins. In the words of Max Müller, "The skull as the shell of the brain has, by many students, been supposed to betray something of the spiritual essence of man. . . ." [3] Upon those fossil skulls, then just beginning to be wrenched from caverns and river drifts, the eyes of the world were now to be centered in horrified fascination. Man has probably never waited before in such a prolonged suspense of mingled hope and fear; his very faith in his uniqueness within the animal world was being shaken at last.

There is, however, a certain irony in the first results, for the bones were to be read ambiguously. In addition, ideas from the pre-Darwinian world of the eighteenth century were destined to shape much of the thinking of the nineteenth. Roaming Britishers at the world's far-flung margins were to see half-men slouch through the forests. Long armed, bandy legged, these nightmare creatures were subjective mental projections straight from the bookshelves of *philosophes* and Darwinists. Even now the last of them haunt the snow fields of the Himalayas or startle Malayan planters. The key to this labyrinth of ideas lies in picking up the separate thought streams which flow out of the eighteenth century and which mingle with true Darwinism in the nineteenth. Before examining the first genuine human fossils, therefore, it may be well to ascertain with what preconceptions our Victorian predecessors entered upon their archaeological search and what it was, precisely, that they expected to see.

II. THE SCALE OF BEING

Superficially, it would appear that the growing number of archaeological discoveries bearing upon human antiquity which were made during the time Darwin was engaged upon his book aroused an interest which, after the publication of the *Origin,* simply coalesced about the theory of evolution. This is true, but there is a deeper substratum of ideas unconsciously carried over from the reigning philosophical doctrines of the eighteenth century; namely, the concept of the missing link as it flourished in that older pre-Darwinian atmosphere of the *Scala Naturae*; and the concept of the Scale itself. "Next to the word 'Nature,'" remarks Professor Lovejoy, to whom we are indebted for a most profound study of the concept, "the Great Chain of Being was the sacred phrase of the eighteenth century playing a part somewhat analogous to that of the blessed word "evolution" in the late nineteenth." [4]

This belief can be stated in the words of Addison: "The whole chasm in Nature, from a Plant to a Man, is filled up with diverse Kinds of Creatures, rising one over another by such a gentle and easy Ascent, that the little Transitions and Deviations from one Species to another, are almost insensible." [5] This chain of organized beings is not, of course, an evolutionary chain, but one instantaneously conceived at the moment of Creation. Everything holds its appropriate place and does not, or at least is supposed not to, aspire

[3] Müller, F. Max, *Nature* **44**: 430, 1891.

[4] See Lovejoy, A. O., *The great chain of being,* Cambridge, Harvard Univ. Press, 1936, for a detailed study of this concept and its historical origins.

[5] *The Spectator,* No. 519.

beyond its station. It is important, however, to take note of the fact that this widespread biotheological doctrine had conditioned men—first, to the idea that one form of life passed insensibly into the next on the scale beneath it so that, in the words of a contemporary writer, "Man is connected by his nature and, therefore, by the design of the Author of all Nature, with the whole tribe of animals, and so closely with some of them, that the distance between his intellectual faculties and theirs . . . appears, in many instances, small, and would probably appear still less, if we had the means of knowing their motives, as we have of observing their actions." [6]

Secondly, this humbling thought had another corollary: it roused a high pitch of interest in those animals, such as the great apes, which appeared to stand close to man. The law of continuity, furthermore, implied that there might be "many degrees of intelligence found within the human species." [7] Though the vast majority of the eighteenth-century thinkers did not assume an actual genetic blood link between man and his nearest primate relatives, they were extremely conscious of the close position of the great apes to man on the scale of being. Moreover, when earlier the confusion as to whether exotic, little known apes were actually men began to disappear, it was replaced or at least intensified by a search for some creature who, though speaking, would exemplify the imperceptible transition on the Scale of Being from an ape into a man. At this time the far-flung world of primitive cultures was being discovered, and western man was being made increasingly aware of the vast gulf that seemed to yawn between his society and that of remote and, to his sophisticated eye, unquestionably benighted heathen peoples.

We find, scattered through the accounts of voyagers of the late seventeenth and eighteenth centuries, numerous accounts of the Hottentots of the Cape of Good Hope. Their low state of culture and the phonetic peculiarities of their speech, "a farrago of bestial sounds resembling the chatter of apes," [8] led to great interest as to their position on the Scale of Nature. It is not surprising, therefore, to find "the brutal Hottentot" standing only an infinitesimal degree above the ape, nor did the American Indian escape similar attentions.[9] What is more interesting, however, is to find, long after the Scale of Being has lapsed out of existence as a serious philosophic concept, that this same "brutal Hottentot" is continuing to occupy his time-honored position in the minds of nineteenth-century scholars. Darwin, writing to Sir Charles Lyell in the year of the *Origin,* indicates with careful conservatism that "we have a very fine gradation in the intellectual powers of the Vertebrata, with one rather wide gap . . . between say a Hottentot and an Ourang . . . even if civilized as much mentally as the dog has been from the wolf." [10]

We need not confine ourselves to Hottentots, however. The French anthropologist, Pouchet, by 1864 [11] has faced up grimly to the implications of the new doctrine of evolution. "Let us no longer put *ourselves* on the stage," he exhorts his reader. "Let us descend boldly the steps of the human ladder. . . ."

> Examples are not wanting of races placed so low that they have quite naturally appeared to resemble the ape tribe. These people, much nearer than ourselves to a state of nature, deserve on that account every attention on the part of the anthropologist. . . . What will become of the unity of the human species, if we can prove that certain races are not a whit more intelligent than certain animals. . . ?

Pouchet goes on to picture the Australian aborigine as existing "in a sort of moral brutality," surviving by means of "a kind of highly developed instinct for discovering the food which is always difficult for them to obtain. . . ."

Earlier than this, however, and unsullied by contact with the *Origin of Species,* there is the eye-witness record of Henry Piddington published in the *Journal of the Asiatic Society of Bengal* in 1855 [12] and relating, actually, to events of 1824.

> We have [he affirms] upon three points of continental India the indubitable fact . . . that there are wild tribes existing which the native traditional names liken to the Orang-Utang, and my own knowledge certainly bears them out; for in the gloom of a forest,

[6] Bolingbroke, H., quoted by Lovejoy, 196.

[7] Lovejoy, *op. cit.,* 197.

[8] Frantz, R. W., Swift's Yahoos and the voyagers, *Modern Philology* **29**: 55, 1931. See also Lovejoy, 234.

[9] Rosenfield, L. C., *From beast machine to man machine,* 196, 204, New York, Oxford Univ. Press, 1940.

[10] Darwin, Francis, *Life and letters of Charles Darwin* **2**: 211, London, John Murray, 1888.

[11] *The plurality of the human race,* English translation, 15, London, 1864.

[12] Memorandum on an unknown forest race **24**: 207–210, 1855. See also "Krao," the so-called missing link, by J. P. Harrison, *Report of the British Association for the Advancement of Science,* 575, 1883.

the individual I saw might as well pass for an Ourang-Utang as a man.

He was short, [Mr. Piddington continues to reminisce] flat nosed, had pouch-like wrinkles in semicircles round the corners of the mouth and cheeks; his arms were disproportionately long, and there was a portion of reddish hair to be seen on the rusty black skin. Altogether, if crouched in a dark corner or on a tree, he might have been mistaken for a large Orang-Utang.

The Geneva scholar, Carl Vogt, strives to be anatomically precise: "The pendulous abdomen of the lower races . . . shows an approximation to the ape, as do also the want of calves, the flatness of the thighs, the pointed form of the buttocks, and the leanness of the upper arm. . . ." [13] Giving particular attention to pubertal changes in the Negro, he comments with gloomy insight:

It is a repetition of the phenomena occurring in the anthropoid apes. In them also the skull presents, until the second dentition, a remarkable resemblance to the human skull, the cerebral portion being arched and the jaws but little projecting. From that time the cerebral skull remains stationary, the internal capacity in no way increases. . . . Young orangs and chimpanzees are good natured, amiable, intelligent beings, very apt to learn and become civilized. After the transformation they are obstinate savage beasts, incapable of any improvement.

And so it is with the Negro. . . .[14]

Not content, however, with an attempt to show that the foot of the Negro makes ". . . a decided approach to the form of a hand," and that he "rarely stands quite upright," Vogt finally introduces an extreme statement which is unconsciously revelatory as reflecting attitudes in western society of male superiority. He concludes, in short, "We may be sure that wherever we perceive an approach to the animal type, the female is nearer to it than the male, hence we should discover a greater simious resemblance if we were to take the female as our standard." [15]

After this new subdivision of the scale of nature, a less misanthropic observation like that of Robert Dunn before the British Association for the Advancement of Science in 1862 that "The American Indian is too dangerous to be trusted by the white man in social intercourse and too obtuse and intractable to be worth coercing into servitude," [16] is, for all its frank honesty about Caucasian intentions, a trifle anticlimactic. He does, however, succeed in a few succinct sentences in establishing his notion of a clear succession in the development of the white stock. The report of the conclusion of his address reads as follows:

He observed that the leading characters of the various races of mankind have been maintained to be simply representatives of a particular type in the development of the highest or Caucasian; the Negro exhibiting permanently the imperfect brow, projecting lower jaw, and slender bent limbs of the Caucasian child some considerable time before its birth, the aboriginal Americans representing the same child nearer birth, and the Mongolian the same newly born.

It is apparent from these statements, gleaned from a variety of sources, and which could be endlessly multiplied from the literature, *that long before the clear recognition of fossil forms of man there existed in the minds of western Europeans a notion of racial gradation, and a conception of that gradation as leading downward toward the ape.* Moreover, the less culturally advanced members of the human stock are increasingly seen as affording "a glimmer of the ape beneath the human envelope." These people are regarded as living fossils both culturally and physically; in fact, there is evident a lack of clear distinction between the two categories.

In the century of Enlightenment there had been philosophical admiration, at least in some quarters, for the "noble savage." The idea of progress as it had existed in eighteenth-century France had implied some notion of mankind's ability to absorb learning. Here, however, in nineteenth-century England the earlier Scale of Nature now classifies living men in terms of their cultural achievement by western standards. The hopeful aspects of the idea of progress as they were entertained by the thinkers of Revolutionary France are denied fruition. Instead, a linear biology, so far as human kind, at least, is concerned, reigns in imperial England. Natives are incapable of achieving high culture. Humorlessly, in a dozen forms the philosophers of the Victorian Era repeat the story, "The Mongol and the Negro are but human saurians who reached long ago . . . their full development, and are now moral fossils." [17]

[13] Vogt, *Lectures on man*, 128, London, 1864.

[14] *Ibid.*, 191.

[15] *Ibid.*, 180.

[16] Dunn, Robert, Some observations on the psychological differences which exist among the typical races of man, *Report of the British Association for the Advancement of Science*, 144–46, 1862.

[17] The *Galaxy* **4**: 1881, New York, 1867. See also W. B. Carpenter, *Nature and man*, 406–407, New York, 1889.

Darwin, gazing upon the natives of Fuegia, is appalled by the gap which yawns between savage and civilized man; yet it must be said in justice to his supreme observational powers that, at the age of twenty-four, watching the return of Captain Fitzroy's hostages to their own people, he comments:

> It was quite melancholy leaving our Fuegians amongst their barbarous countrymen. . . . In contradiction of what has often been stated, three years has been sufficient to change savages into, as far as habits go, complete and voluntary Europeans.[18]

His account of Jemmy Button and the last signal fire lit by the latter in farewell to his white friends as the *Beagle* stood out to sea contains the pathos of great literature. It is only in the later years as his constant concern with Natural Selection and the effort to explain the rise of man weigh heavily upon his mind that he forgets and speaks of Hottentots and Ourangs. Charles Darwin came close to envisaging the problem of culture as he bade goodbye to his Indian shipmates. It is perhaps too much to expect of one man in an intellectually confused period that he should have solved both sides of the human mystery, or have distinguished clearly between the biological and the cultural. On that day in his youth, however, in a great surge of human feeling, he stood very close to doing so. The fire from the dark headland stings the eyes a little even now, and Jemmy Button's wistful, forgotten face is an eternal reproach to those who persist in projecting upon the bodies of living men the shadow of an unknown vanished ape. Moreover, even the form of that ancestral ape is illusory. The long arms, the bandy legs, the pendulous belly, the semi-erect posture are conceived in imitation of the apes of today. Modern paleontology offers little encouragement to such notions and none at all to the idea that the existing races represent in the order of their emergence successive "missing links," mentally frozen, so to speak, at various stages of the human past.

III. THE MICROCEPHALI

It would appear from some of the material we have just reviewed that man had mentally so closed the gap between himself and the anthropoids that he would scarcely be conscious that there was a paleontological break in the evolutionary chain or ascent. Actually, however, we have to bear in mind that we are examining a ferment of opinion in which writers are not always consistent with their own more extreme statements, nor do they all represent the same point of view. The more religious minded and the more sober-headed continued to cling to the views expressed by Adam Sedgwick in his Presidential Address before the English Geological Society in 1831, just about the time young Charles Darwin was departing upon his memorable voyage. Sedgwick's speech was devoted to an attack on the Uniformitarian hypothesis of Sir Charles Lyell. In it he called the appearance of man "a geological event of vast importance . . . breaking in upon any supposition of geological continuity, and utterly unaccounted for by what we have any right to call the laws of nature." [19]

It is obvious, of course, that so long as man was regarded in this fashion as "outside" of nature, a unique being divorced from any but the most recent past, he stood as a challenge to all scientific attempts to explain, not alone his own origins, but those of even the "natural" world about him. Only by establishing satisfactorily the continuity of human development and the relationship of man to his nearest primate relatives would it be possible to escape from the foggy atmosphere of supernaturalism which still lingered over the English scene. That atmosphere would not entirely pass away even from the more mundane aspects of geology, until the nature of this strange emergent, man, could be more fully established.

It is not without interest as showing with what reluctance the task was carried out that as late as 1863 this same Sir Charles Lyell, whose geological doctrines form the very groundwork of the *Origin of Species* and who was Darwin's life-long friend and confidant, still speculates as to whether, in the case of man, he may not "have cleared at one bound the space which separated the highest stage of the unprogressive intelligence of the inferior animals from the first and lowest form of improvable reason manifested by man." Darwin, reading this remark in the first edition of the *Antiquity of Man* (p. 505), comments wryly that the sentence "makes me groan." [20]

[18] *The "Beagle" Diary, 1831–1836,* 136, Cambridge, University Press, 1937.

[19] Gregory, J. W., Problems of geology contemporary with the British Association, *Report of the British Association for the Advancement of Science,* 53, 1931.

[20] Darwin, Francis, *Life and letters of Charles Darwin* **3**: 12, London, 1889. As indicating the vacillation of Lyell's thought on this subject, however, one might refer to a letter from Huxley to Lyell dated January 25,

It is plain, as one examines the more guarded statements of the leading evolutionists, that in spite of the tendency to arrange the existing human races in a sequence of stages, or to perceive even lower intermediates flitting through the unexplored forests of Africa or the Far East, the gap between living man and the animal world is still a source of embarrassment. After expressing hope that living apes may eventually be found which approach man in cerebral content, Vogt, for example, confesses that "in the absence of the fact, it would be foolish to form any conclusions." [21] That the evolutionists' hope was by degrees shifting to the fossil record is shown by his following remark. "There may, however, have existed *intermediate forms, which in the lapse of time have become extinct.*" [22] Vogt saw fit to italicize this statement, but he was not the man to be handicapped by any lack of the necessary fossils. Instead, he succeeded in commanding international attention with a very ingenious, if now outmoded, theory.

Undaunted by "the gulf which still exists between the Negro and the ape" Vogt turns to the abnormal. We have a right, he contends, when living forms fail us, to refer to the pathological. "I do not hesitate to uphold . . . that microcephali and born idiots present as perfect a series from man to the ape as may be wished for. . . ." [23] Since the evolutionary development of man from some lower primate inevitably seems to demand an increase in cranial capacity, what would appear more logical than that a modern microcephalic idiot "in its abnormity represents that intermediate form, which at a remote period may have been normal. This arrest . . . is the simian stage." Such an "arrested monstrosity of the present creation," argues Vogt, "fills up the gap which cannot be bridged over by normal types in the present creation, but may be so by some future discoveries." [24]

Vogt, in other words, has taken the notion of atavistic throwbacks and argued that his microcephals, of which he gives several examples, constitute just such returns to the ancestral human line. "The arms," he observes, "seem disproportionately long, the legs short and weak. The head is that of an ape." [25] Though he occasionally hedges upon the teeth and jaw, so far as the skull is concerned, every naturalist, if such a fossil specimen were found, would, he asserts: "at once declare it to be the cranium of an ape." [26] With careful deliberation he places the skulls of a Negro, an idiot and a chimpanzee together in order to show that the idiot "holds in every respect an intermediate place between them." [27]

The various breeding experiments of the Darwinians, along with their eagerness to observe traces of the evolutionary pathway, had led to great interest in what they termed "atavisms" or "reversions" in which a carefully bred and standardized form showed a tendency occasionally to produce descendants who resembled more remote ancestors. Since genetic mechanisms were not clearly understood by the Darwinists, these mysterious episodes were regarded with considerable awe.[28] Darwin himself once remarked that he regarded "reversion—this power of calling back to life long-lost characters—as the most wonderful of all the attributes of inheritance." Red Eye, the ferocious throwback in Jack London's *Before Adam,* is an interesting example of the atavism's appearance in popular literature well within the twentieth century. Today so-called atavisms are explainable on Mendelian principles as the results of various types of gene segregation and recombination, alteration in growth rates, or even outright mutation in the gene system.

Vogt's cases of arrested brain growth, therefore, are certainly not to be regarded as the emergence of missing stages in the long history of humanity, and they bear little actual resemblance to modernly discovered fossils of the hominid line. Vogt's idea was seriously received in the sixties of the last century, however, and Darwin devotes attention to it in the *Descent of Man* (1871). Huxley, in addition, commented that even the Neand-

1859, in which Huxley says in response to a letter now missing, "I do not exactly see the force of your argument that we are bound to find fossil forms intermediate between man and monkeys in the Rocks. . . . How do we know that man is not a persistent type?" (Leonard Huxley, *Life and letters of Thomas Huxley* **1**: 251, London, Macmillan, ed., 1913.) Huxley at the time of this letter seems to have inclined, in the case of man, toward the possibility of some leap of the order of a macromutation taken very long ago. This hypothesis sounds rather similar to Lyell's publicly expressed view of 1863 and since it was written to Lyell may have had some influence in leading his thought in this direction.

[21] *Op. cit.,* 194.

[22] *Ibid.*

[23] *Ibid.,* 194–195.

[24] *Ibid.,* 462–463.

[25] *Ibid.,* 195.

[26] *Ibid.,* 198–199.

[27] *Ibid.,* 198.

[28] Ashley-Montagu, M. F., The concept of atavism, *Science* **87**: 462–463, 1938.

erthal skull might be just such an accidental reversion though he feels that the capacious cranial capacity suggests "the pithecoid tendencies, indicated by this skull, did not extend deep into the organization. . . ." [29]

Arguments were occasionally brought against the theory of human evolution on the ground that man did not show "reversion" as he should if he had really evolved from an ancestor unlike himself. In 1872 we find Darwin responding serenely to one such criticism: "I do not think the absence of reversions of structure in man is of much weight. Carl Vogt, indeed, argues that [the existence of] Micro-cephalous idiots is a case of reversion." [30]

We may observe at this point that, so long as the theory of Microcephalics as "missing links" was seriously entertained, the claims launched by some writers against the first human fossils as merely representing idiots showing premature synostosis of the cranial sutures actually proved nothing at all. A follower of Vogt's views could have simply responded: "Certainly, this is what we have been saying all along. Modern idiots resemble a specific human level of organization in the past. *Now you have found genuine traces of that level in the past.*" Thus those who spoke of Neanderthal or Pithecanthropus in this way were, in actuality, merely begging the question, so far as the true nature of these specimens was concerned. In the light of the intellectual preconceptions of Vogt and his followers it was perfectly possible for a human calvarium to be both that of a true fossil hominid and to resemble in detail the skull of a modern idiot. With this observation, and having seen a slow shift from a belief in living *normal* links passing slowly to a notion of living Microcephalic *abnormals* as in some manner *representing past normals no longer existent in the living world,* we shall now turn to the final remaining alternative. The archaeologist has been busy throughout the Darwinian period. It may be that he can supply the missing evidence from the ground. Let us see how his evidence was received.

IV. THE DESCENT INTO THE PAST

Up to the time of Cuvier's death in 1832 no remains of any primates were known from fossiliferous deposits. The great master of French biology died in the unshaken belief that man's advent upon the earth did not much exceed the common estimates of around six thousand years, and that probably the lower monkeys were little if any older. Only a few years later, in 1836, his own countryman, Edouard Lartet, unearthed the first fossil anthropoid in Miocene deposits near Sausan in the south of France. The report of the Siwalik discoveries of Falconer and Cautley soon followed.

Cuvier's theory had been breached in so far as man's simian relatives were concerned. There was a consequent feeling of alarm in many quarters for the unearthing of ancient primates made it quickly apparent that the discovery of human fossils was made more probable. The weight of Cuvier's authoritative dogmatism was no longer able to stem the tide. In the words of Geoffrey St. Hilaire: "The question will soon be answered in the affirmative. There are already a sufficient number of facts which would be considered as conclusive, were the question confined to any other animal." [31]

Boucher de Perthes revealed the presence of ancient human artifacts along the Somme in the eighteen forties, and it is interesting to note that Darwin confessed years later that he had read de Perthes' book. Although this is well within the period when Darwin was developing his evolutionary interpretation of life, he confesses humbly, "I . . . looked at [de Perthes'] book . . . and am ashamed to think that I concluded the whole was rubbish. Yet he has done for man something like what Agassiz did for glaciers." [32] It was not until 1859, the year of the *Origin,* that de Perthes' efforts were finally vindicated.

Three years before the antiquity of de Perthes' artifacts had been conclusively accepted, a skull cap of strange aspect had been discovered in a small cave in Rhenish Prussia. This skull, though not the first Neanderthal skull to be observed, was the first to come under the attention of science. It constitutes, therefore, the first genuinely extinct variety of man ever to undergo scientific scrutiny. Moreover, the date of its discovery, 1856, and the descriptions and discussions which followed were juxtaposed so closely upon the evolutionary debate as to have practically insured attention from the leading Darwinians and their opponents.

As might have been expected, attempts to diag-

[29] Huxley, T. H., *Evidence as to man's place in nature,* 157, London, 1863.
[30] *Life and letters* **3**: 163.
[31] Quoted in the *Anthropological Review* **1**: 65, 1863.
[32] *Life and letters* **3**: 15–16.

nose the age and nature of the skull range all the way from a sober, but very cautious, analysis by Thomas Huxley, to claims that the bones represented only a rickety Cossack from the Napoleonic Wars.[33] In short, the individual was geologically old; he was not old. He was pathological; he was normal. Notable names were entered in the lists on both sides of these questions. By way of extenuation it may be said that the confusion among the savants was augmented through the incomplete nature of the calvarium, and the lack of clear stratigraphical information from the Neanderthal Cave. No scientific eye, it must be remembered, had, previous to this time, looked upon the remains of an extinct form of man.

Setting aside some of the more outmoded, if not ludicrous, treatments of the subject, the careful student is still, in the light of historical perspective, forced to conclude that the antiquity of man was as yet little understood, and his salient characteristics less so. In addition to the still heavy prejudice directed against belief in the existence of early man an accidental factor further confused the issue: The Engis skull from a cave along the banks of the Meuse, near Liège in Belgium, was regarded by many as being of similar age. Professor Schmerling had found this skull under nearly five feet of osseous breccia in association with an extinct Pleistocene fauna. Discovered in the eighteen thirties it long predated the Neanderthal discovery. Its significance in the present connection, however, lies in the words of Sir John Lubbock, ". . . there are, as yet, only two cases on record in which the bone caves have furnished us with skulls in such a condition as to allow of restoration. One of these was found by Dr. Schmerling in the cave of Engis . . . ; the other by Dr. Fuhlrott in the Neanderthal near Dusseldorf."[34]

There was as yet no clear stratigraphy separating the Middle from the Upper Paleolithic period. It was inevitable that these two skulls should be compared even though today we know that they are derived from widely separated time levels. Both lack totally the face and jaw, though the Engis skull is more complete. In Neanderthal we possess one low vaulted skull with a massive supraorbital torus, regarded by its describer, Schaafhausen, as belonging to a period prior to the time of the Celts and Germans. The remains, he says, "were in all probability derived from one of the wild races of northwestern Europe, spoken of by Latin writers."[35] The Engis skull in contrast to the Neanderthal had no other interest than its fossiliferous associations. To quote Sir Arthur Keith, "There is not a single feature that marks this skull off from men of the Neolithic or of modern times."[36]

It has been pertinent to our discussion to make plain the fact that the facial character of Neanderthal man was then unknown. This unfortunate situation placed altogether too much emphasis upon the supraciliary ridges. Many writers, searching collections of skulls, thought the problem had been settled when they found a specimen of *Homo sapiens* with a massive supraorbital torus. Huxley, for example, after admitting the Neanderthal cranium to be "the most apelike . . . I have ever seen,"[37] contends that the creature was "in no sense intermediate between men and apes."[38] Taking note of the gradations to be found among recent skulls, he says "there is no ground for separating [Neanderthal] specifically, still less generically from Homo sapiens."[39] This view still finds emphatic expression in an anthropological text referring to the Engis and Neanderthal skulls, as late as 1890: "a number of other anatomical elements, thought to be peculiar in these fossil skulls, such as the superciliary prominences, the small and receding forehead, the form of the ciliary arcs, the amplitude of the occiput, are found to be but the individual and accidental varieties of men living among us."[40]

J. W. Dawson, writing with an eye to the modern races, comments

that the characters for which this skeleton is eminent, are found, through perhaps in less degree, in the rude tribes of America and Australia. It is also doubtful whether this skeleton really indicates a race at all. It may have belonged to one of those wild men, half-crazed, half-idiotic, cruel and strong, who are always more or less to be found living on the outskirts of barbarous tribes, and who now and then appear in civilized communities, to be consigned per-

[33] Gruber, Jacob, The Neanderthal controversy, *Scientific Monthly* **67**: 436–439, 1948.

[34] Lubbock, John, Cave man, *Natural History Rev.* **4**: 407–428, 1864.

[35] Schaafhausen, D., On the crania of the most ancient races of man, *Natural History Rev.* **1**: 155, 1861.

[36] *Antiquity of man*, 2nd ed., **1**: 70, London, Williams and Norgate, 1931.

[37] Huxley, T. H., Further remarks upon the human remains from the Neanderthal, *Natural History Rev.* **4**: 431, 1864.

[38] *Ibid.*, 442.

[39] *Ibid.*, 443.

[40] Hughes, Thomas, *Principles of anthropology and biology*, 39, 2nd ed., New York, 1890.

haps to the penitentiary or the gallows, when their murderous propensities manifest themselves.[41]

This curious quotation not alone shows the continuing application of the idea of racial gradation, but Dawson's "wild man" hypothesis seems to echo this tradition as it exists in European folklore.[42] Neanderthal man is here quite close to being made one with those fallen, feral creatures who wander in the green forests of medieval romance.

Carl Vogt, as might have been expected, diagnoses the forehead of the Neander skull as "that of an idiot or microcephalus," [43] though he accepts its antiquity and, as we have had occasion to note, this in no way prevents him from regarding it as "normal." [44] He takes, however, one further step which introduces to us the final vast confusion which can be wrought by archaeological ineptitude. Vogt finds "a great similarity between the Engis and Neanderthal skulls." [45] Moreover, recognizing the female skull to be smaller than than the male and to possess less prominent supraorbital ridges he arrives at the conclusion that both skulls belong to the same race. The Neanderthal skull belonged to a muscular stupid male while the Engis specimen "belonged to an intelligent woman." The race, he assumes, resembled the existing Australian aboriginals. The cultural associations mentioned briefly in his writings suggest a similar confusion of different time levels. In this he was not alone. For over thirty years after its discovery and description *Homo neanderthalensis* was destined to remain the butt of idle speculation as well as the suspected product of disease.

In the meantime, a growing body of archaeologists continued to prowl through the caves and grottoes of civilized Europe. More discoveries of tools and artifacts were made. Additional human remains were discovered but they all proved to be those of big-brained upper paleolithic people. So consistent were these discoveries that for a time the Victorian uneasiness about ape-men began to fade. Perhaps the Darwinians had been wrong about man after all. The drift of thought can be glimpsed in this account by Gill of Riviere's discoveries at Mentone:

> . . . the negative results afforded us indicate that fossil man was, in all respects, a typical man, perhaps even differing less from his successors in Europe than do some other existing races. It is at least very certain that he had no decided ape-like characteristics. Even more! He was man to excess. The proportions of the forelimb to the hind, and of the median and distal portions of each to the proximal, so far from proving a condition intermediate between man and the apes, or embryonic or juvenile humanity or even affinity to the Negro, indicate that he was more unlike the apes in such respects than are some existing races; nor is this evidence rebutted by the skull, the dentition or otherwise. . . .[46]

Continuing in this vein, Dr. Gill goes on to assert that, in the light of such evidence as is revealed at Mentone,

> the anxious may . . . contemplate with a happy serenity the explorations made, for every skeleton found, in its perfect manlike features, will not only disprove the existence of the dreaded intermediate link, but will add to the value of the negative evidence against such a link—that is in Europe or America.[47]

Apparently, Gill is enough of an evolutionist to intimate that perhaps Africa or Asia may *sometime* yield a remote link to man, but he hastens to add comfortingly that "it is not likely to be of very recent origin, most likely Miocene." Another writer, A. S. Packard, similarly inclined, emphasizes ". . . anatomists of high authority have, we cannot but think too hastily, referred their [finds] to the most degraded of savage races." [48]

It may be added in extenuation of Professor Packard's point of view that the activities of confirmed evolutionists, as the Darwinian enthusiasm began to mount, are sadly revelatory of a state of mind in its way as dogmatically fervid as that of those opposed to the evolutionary point of view. Where some saw the big-brained upper paleolithic people, or even the big-brained Neanderthals, as a denial of the possibility of evolutionary change, others just as enthusiastically regarded these types as representing living races lower on the scale of life than the modern Caucasian. Once more existing peoples were being arranged on the time scale of the fossil past. "If we uplift the deposits of the earth's surface," writes a German scholar in 1868, "there appears as the first inhabitant of Central Europe a man whose protruding

[41] Dawson, J. W., On the antiquity of man, *Edinburgh New Philosophical Jour.*, n. s., **19**: 53, 1864.

[42] See R. Bernheimer, *Wild men in the Middle Ages*, Cambridge, Harvard Univ. Press, 1952.

[43] *Op. cit.*, 304.

[44] Vogt, Carl, The primitive period of the human species, *Anthropol. Rev.* **5**: 213, 1867.

[45] Vogt, C., *Lectures on man*, 304, London, 1864.

[46] Gill, Theodore, The fossil man of Mentone, *Popular Science Monthly* **5**: 644, 1874.

[47] *Ibid.*

[48] The hairy mammoth, *American Naturalist* **2**: 28–29, 1869.

jaws and nearly deficient forehead betray a savage animal character. The elongated skull with its strongly projecting eyebrows reminds one of the Negro, the Mongol, the Hottentot and the Australian." [49]

Others read into the fragmentary Neanderthal remains something even more formidable. The jaw of La Naulette found in 1866 in a cave in eastern Belgium is described in one book as extremely apelike "with huge projecting canines." It does not seem to trouble the writers that the teeth of this specimen are missing, having been lost from the sockets after death. Instead they go on to describe the entire Neanderthal tribe with their "gorilla-like eye teeth" as presenting an appearance "in the highest degree hideous and ferocious." [50] No known form of fossil man possesses gorilloid canines. These descriptions are the product of imagination whether they visualize Neanderthal man as a Hottentot or a gorilla. In either case they are simple projections into the past of living forms which the describer sincerely believes are links in the evolutionary scale leading to man. Once more there is an attempt to equate the past evolution of man with a graded *existing* scale of creatures running from the ape to man. Innumerable descriptions characterize natives as apelike in appearance and habits.[51] Similarly the effort to close the gap from the other, or anthropoidal, side leads to assumptions that the existing great apes may possess undeveloped or rudimentary linguistic ability. An anonymous article in *Chambers Journal* speaks of the grunt of the orang as perhaps "some incipient form of speech capable of being cultivated and enlarged." [52] Ernst Haeckel, towards the turn of the century, characteristically proclaims that "the old doctrine that only man is endowed with speech" is outmoded. "It is high time," he says, "that this erroneous impression, resting on a lack of zoological information, should be abandoned." [53]

Returning, however, to our more immediate point of discussion, it might have been thought that the discovery in 1886 of the Neanderthal men of Spy would have dissipated the mist of suspicion which had for so long lingered over the valley of the Neander. Certainly it led some to the belief that Neanderthal man could not be a diseased idiot, or a distorted Lombrosian criminal. On the other hand, the recognition of the great cranial capacity of the type puzzled those who were still anticipating some sort of small brained emergent.

As late as 1911, W. J. Sollas, the distinguished English geologist, wrote of this problem as follows:

> The Mousterian skulls are the oldest human skulls of which we have any knowledge; but just as in the case of the Magedalenian and Solutrean, they indicate that the primitive inhabitants of France were distinguished from the highest civilized races, not by a smaller, but by a larger cranial capacity; *in other words as we proceed backwards in time the human brain increases rather than decreases in volume.*[54]

Disregarding Pithecanthropus which even this great student believed diseased, he poses a final paradox: "Thus, as we proceed backwards in time Man departs farther from the ape in the size of his brain, but approaches nearer to the ape in the characters of his bodily framework." [55] It was a reasonably true statement so far as Neanderthal man was concerned, and it may have bolstered the hopes of those who had earlier followed the lead of Gill, Brinton,[56] and others. Nevertheless, it was a paradox and a paradox which could not be long sustained. Though Vogt's microcephals had not stood the test of time a few evolutionists, by pure extrapolation, saw clearly that at some point, however deep it might lie beneath us on the time scale, the transition from the animal brain had occurred.

V. THE JAVA APE MAN

With the discovery in 1891 of *Pithecanthropus erectus* by Eugene Dubois, the first human type of genuinely low cranial capacity was revealed. Some, with considerable reason, would regard it as the only real "missing link" produced in the nineteenth century. By this time much of the

[49] R. Sweichel cited by L. Büchner, *Man in the past, present and future*, 261, London, 1872.

[50] Bergen, J. Y., and F. D., *The development theory*, 196, Boston, 1884. Similarly the anatomist, William King, in opposition to Huxley, regarded the Neanderthal specimen as "eminently simian" and its thoughts "those of the brute." See Keith, *op. cit.*, 1: 188–189.

[51] Büchner, *op. cit.*, 314 ff.

[52] The wild man of the woods, *Chambers Journal*, ser. 3, **6**: 131, 1856. I am indebted to my colleague Mr. Gerald Henderson of Brooklyn College for calling this paper to my attention.

[53] On our present knowledge of the origin of man, *Annual Report, Smithsonian Inst.*, 466, 1899.

[54] Sollas, W. J., The evolution of man, *Scientia* **9**: 121, 1911.

[55] *Ibid.*, 124.

[56] Brinton, D. G., The earliest men, *Nature* **48**: 460, 1893.

public outcry which had greeted Darwin's *Descent of Man* in 1871 had died down. The doctrine of evolution had been widely disseminated, discussed, and accepted in intellectual circles. The time would have seemed ripe for a clinching paleontological demonstration of the pathway of human descent. Unfortunately, however, the face of the Java hominid was missing and almost the same distrust which had been directed at the first Neanderthal discovery emerged once more, though perhaps in a less aggravated form.[57]

At the Third International Zoological Congress which met in Leyden in 1895 Dubois exhibited and discussed his find. The zoologists present maintained that the skull was human and the human anatomists maintained it to be that of an ape. Once more the cry of microcephalic idiot was raised.[58] We have the testimony of Marsh that in the beginning, with the exception of Manouvrier in Paris and himself, no one took Dubois' claims at their full valuation. "Among a score or more of notices," he writes, "I do not recall a single one that . . . admitted the full importance of the discovery. . . ." [59] "M. Dubois," Manouvrier ironically observes, "can congratulate himself on seeing placed in relief at Berlin the reasons according to which his Pithecanthropus could not be a man and, in England, much better reasons according to which the same Pithecanthropus could not be a monkey." [60]

The situation, however, is not one in which the absurdities are all confined to one side. Nothing better illustrates the power of preconceived ideas than to discover Dubois contending that no good can arise from a comparison between his precious skull cap and that of the Neanderthals of Dusseldorf and Spy because these latter specimens are pathological![61] Apparently it never crossed Dubois' mind that this argument was just as readily applicable to his own transitional man-ape calvarium. As for the Pithecanthropus femur, so deep are the preconceptions of the age that it is perhaps not surprising to find Dubois hinting of "indications in that bone of an arboreal habit, such as are not found in the human femur." [62] Today we know that the transition from the trees to the ground long preceded the rise of such true paleanthropic men as Pithecanthropus. At that time, however, constant morphological comparisons of man with the existing apes had left this point less clear.[63] It is with genuine pleasure and a little shock of surprise, therefore, that one encounters in a statement of the anatomist, Cunningham, a very clear modern grasp of the primate phylogeny and an unwillingness to confuse "missing links" with living collateral lines of descent. "Most certainly," he says, the Pithecanthropus fossils

> are not derived from a transition form between any of the existing anthropoid apes and man; such a form does not and cannot exist, seeing that the divarication of the ape and man has taken place low down in the geneological tree and each has followed . . . its own path. The so-called Pithecanthropus is in the direct human line although it occupies a place on this considerably lower than any human form at present known.[64]

With this precise and much ignored observation, Cunningham passes from the scene. It is left for Manouvrier to define Dubois' final contribution as it may now be also interpreted from the midpoint of our century. "He established the fact," comments the Frenchman, "that the craniologic inferiority of fossil human races, according to the specimens we know, increases with their antiquity. . . . We consider [Pithecanthropus] as one of the intermediate fossils theoretically foreseen." [65] Thus man, in his descent through time, had finally passed beyond the range of the big-brained men of the upper Pleistocene. The cerebral reduction was a reality, and the curious paradox of the anthropoidal big-brained Neanderthals could be carried no further. As we have noted, some did not at first accept this view, but by the nineteen fifties it was a commonplace.

The whole of the nineteenth century and at least part of the eighteenth century before it had been devoted to the understanding not alone of

[57] Marsh, O. C., The ape from the Tertiary of Java, *Science,* n.s., **3**: 790, 1896. Wilson, Thomas, The beginnings of the science of prehistoric anthropology, *Proc. Amer. Assn. for the Advancement of Science,* 327, 1899.

[58] Lydekker, R., in *Nature* **51**: 291, 1895.

[59] Marsh, O. C., On the Pithecanthropus erectus from the Tertiary of Java, *Amer. Jour. Science* **1**: 476, 1896.

[60] Manouvrier, L., On the Pithecanthropus erectus, *Amer. Jour. Science* **4**: 218, 1897.

[61] Cunningham, D. J., Dr. Dubois' so-called missing link, *Nature* **51**: 429, 1895.

[62] Dubois, M. E., Remarks on the brain cast of Pithecanthropus erectus, summary of a talk before the International Congress of Zoologists, *Nature* **58**: 427, 1898.

[63] Thomas Wilson, for example, writes in 1899 of Paleolithic man as having crooked legs and projecting teeth. "It has been doubted whether he regularly assumed the upright position." The Beginning of the Science of Prehistoric Anthropology, *Proc. Amer. Assn. for the Advancement of Science,* 330, 1899.

[64] *Op. cit.,* 429.

[65] *Op. cit.,* 225.

man, but of his relationship to the only other living thing on the planet that looks like him—the monkeys. They had been with him since the beginning, grimacing at him from behind the curtain of leaves. Their faces were sad or evil little caricatures of the human face; bone for bone, tooth for tooth, they were built on the human pattern or the human on theirs. In the end, on that great scale of perfection which runs from the crystal to the noblest beings on the farthest worlds, they stood next to man, but the chain had been fixed in the moment of creation. Nothing became extinct, everything was locked in an eternal order. In that order an ape crouched beside man and the two knew each other to be very close. There was only the breadth of a hair between them. They had come to know each other well. "Show me a generic character," cries Linnaeus, "by which to distinguish Man and Ape; I myself . . . know of none." [66]

Even the races ascended in that vast chain and the Hottentot knew best the touch of the ape. In the nineteenth century the chain began to be forgotten, but fragments of it persisted in the minds of men and passed unconsciously into the new doctrine of evolution, where the wheel turned at last.

The nineteenth century drew from the eighteenth century before it an idea of necessary constant progression which had arisen in the field of social studies. Every society in its own time and place would advance by necessary law even though historical chance and incident might promote or incommode that advance. In the nineteenth century aspects of this idea of progress were transferred to biology. Darwin, though he abjured the idea of necessary progression and mentions as illustration animals which had changed little, if at all, through long periods, shows signs of confused thinking on this point. He reveals in occasional passages that he is unconsciously transferring the concept of the eighteenth-century unilinear fixed scale of being to, as Teggart puts it, a "concept of a unilinear and continuous series in time, parallel with the classificatory series." [67] The classificatory series is, of course, the Scale of Being. Darwin speaks of the whole organic world as tending inevitably to "progress toward perfection." He pronounces that "among the vertebrata the degree of intellect and *an approach in structure to man clearly come into play.*" [Italics mine.] [68]

At least once more Darwin seems to imply that other primates would tend to evolve toward man if given the opportunity. In 1860 we find him writing to Lyell: "The simile of man now keeping down any new man which might be developed strikes me as good and new. The white man is 'improving off the face of the earth' even races nearly his equals." [69] Implicit also in this remark is a growing need to explain the gap between man and his nearest relatives because Natural Selection can make each creature only a little more perfect than its competitors. Since the phylogenetic series is now historical the past must be searched and the man-creating, competitive intermediate links in the chain will be found there.

In the meantime, however, the concept "atavism," emerging out of the misinterpreted heredity studies carried out upon recent domesticated forms, promised a way of seeing the ancestor in the flesh without waiting for the laborious uncertainties of paleontological research. It is this which explains the popularity of Vogt's suggestion and the interest that the idea aroused in Darwin. By contrast, the big-brained Neanderthals, particularly after the Spy discovery, must have seemed to the Darwinians at the very least anomalous, if not threatening to their theories.[70] Neither Cro-Magnons nor Neanderthals showed the rapid mental regress which had been assumed, in the underestimated time scale of that day, to characterize the skull of genuine primitives, particularly in the light of the assumptions which had been made about various of the living races of man. It disturbed the old ideas of continuity and progression and is undoubtedly one of the reasons why these first fossil forms were eyed with hesitation. Sollas' statement of his paradox of increasing brain size makes this quite clear.

At first, since by the law of the old Scale nothing became extinct, men had tended unconsciously to see their past story totally revealed among the living races hidden away in the forests. They had seen the half man pass in the jungle;

[66] Cited by Gladys Bryson, *Man and society,* 60, Princeton Univ. Press, 1945.

[67] Teggart, F. J., *Theory of history,* 132, New Haven, Yale Univ. Press, 1935.

[68] *Origin of species,* 93, New York, Modern Library Ed.

[69] *Life and letters* 2: 344.

[70] Darwin, for example, seizes with eagerness upon Broca's suggestion that large cranial size in early man represents a more selected mean than among modern civilized peoples where the weak survive. This clashes, of course, with his cranial statistics aimed to demonstrate the superiority of Caucasians over other existing races. [*Descent of man,* 436–437, Modern Library ed.]

they had interpreted lowly cultures as a sign of lowly brains. Later, as the forests were cleared and the apes were seen in the sunlight, the gap loomed a little larger between man and his beasts.

It was then that his isolation struck him most clearly. He stared thoughtfully at the tiny-brained among his kind. He dug in the earth and found bones beneath it. He began to sense that the wondrous chain was moving, climbing, perishing. He found his own lost, bestial skull in the drift by the river, and the flints that his hands had tried to shape. At first he sought to run away from the sight of these things or to tell the tale differently. In the end it could no longer be done. The tale will tell itself and man will listen. He is quite alone now. In spite of claims that persisted into the beginning of this century, his brothers in the forest do not speak. Unutterably alone, man senses the great division between his mind and theirs. He has completed a fearful passage, but of its nature and causation, even the modern biologist is still profoundly ignorant.