

# The Anthropology of the Brain

## The Evolution of the Neanderthal Brain

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### I

In 1856 a fossil human skullcap and some postcranial bones were found by workmen quarrying in the valley of the Neander River near Düsseldorf, Germany. The remains were taken to Dr Johann Fuhlrott, the local teacher of natural sciences, and later to Professor Hermann Schaafhausen, the Bonn naturalist.<sup>1</sup> The bones were those of a 40-to-50-year-old male, with a sloping brow and heavy brow ridges.<sup>2</sup> The cranial capacity, however, was within the modern European range. Boule later estimated the capacity of this fossil skull to be 1408 c.c.,<sup>3</sup> while Coon (1962) lists it at 1450 c.c.<sup>4</sup> In 1864 the British anatomist, Dr William King, designated the fossil find as *Homo neanderthalensis* or Neanderthal Man.<sup>5</sup>

In 1833 Dr Schmerling had discovered a similar human cranium in the caves of Engis in the valley of the Meuse in Belgium. The skull was found in an osseous breccia associated with the bones of now extinct mammals, such as the mammoth (*Elephas primigenius*) and the woolly rhinoceros (*Rhinoceros tichorhinus*).<sup>6</sup> Fuhlrott and Schaafhausen and later Sir Charles Lyell and Thomas Huxley (1863) concluded that "the Neanderthal skull is of great, though uncertain, antiquity."<sup>7</sup> In the absence of accurate methods of dating in the mid-nineteenth century, this view was disputed by many of the leading scientists of the time — including the noted pathologist, Dr Rudolf Virchow.<sup>8</sup>

During the next fifty years, additional Neanderthal fossils

<sup>1</sup> T. D. McCown and K. A. R. Kennedy (editors), *Climbing Man's Family Tree*, Prentice-Hall, Englewood Cliffs, 1972, p. 93.

<sup>2</sup> Carleton S. Coon, *The Origin of Races*, Alfred A. Knopf, pp. 519-520 and 524.

<sup>3</sup> Karl Saller, *Lehrbuch der Anthropologie*, Gustav Fischer, Stuttgart, Germany, 1959, Vol. II, p. 1215.

<sup>4</sup> Carleton S. Coon, *op. cit.*, p. 672.

<sup>5</sup> T. K. Penniman, *A Hundred Years of Anthropology*, Gerald Duckworth, London, England, p. 108.

<sup>6</sup> T. K. Penniman, *op. cit.*, p. 67.

<sup>7</sup> T. H. Huxley, "On Some Fossil Remains of Man," 1863, in T. D. McCown and K. A. R. Kennedy (editors), *op. cit.*, p. 101.

<sup>8</sup> T. D. McCown and K. A. R. Kennedy (editors), *op. cit.*, pp. 93-94.

were found in several countries of Western Europe. These included finds at La Naulette, Belgium, in 1866 and in Spy, Belgium, in 1886, in the Sipka cave, Moravia, in 1880, and at Dordogne and Corrèze, France, in 1908.<sup>9</sup> A similar skull had also been excavated at Forbes' Quarry in Gibraltar as early as 1849. Forgotten at the time, its importance was not recognized until 1864, "When it was labelled a member of the Neanderthal group."<sup>10</sup>

In 1908 an adolescent male skeleton was found at a rock-shelter in Le Moustier, France. Flake tools were found associated with the remains.<sup>11</sup> The Mousterian culture of the Neanderthals, which was named after the rock-shelter of Le Moustier, was subsequently found to extend with many variations from "the Atlantic seaboard to the area north of the Black Sea and Inner Asia."<sup>12</sup> The European Neanderthals generally lived in a time period of extreme cold — the fourth or Würm glaciation of Europe. Extensive use was made of fire, while only "limited use was made of bone and related materials."<sup>13</sup> Neanderthal man was chiefly a hunter of the larger animals of his time — mammoth, woolly rhinoceros, cave lion, bison, *et al.*<sup>14</sup> Wooden spears, stone balls, and primitive pit-traps were employed in these hunts.<sup>15</sup> Many — but not all — of the Neanderthal cranial and skeletal remains were found in caves and rock-shelters.

The Neanderthal find at La Chapelle aux Saints in Corrèze, France, was that of a middle-aged male and included a nearly complete skeleton. The specimen was described in the anthropological literature by the noted French palaeontologist, Marcellin Boule (1912-1913).<sup>16</sup> Boule's reconstruction of the skull and skeleton of the La Chapelle aux Saints fossil find greatly influenced both popular and scientific conceptions of the physical appearance and cultural status of Neanderthal man. According to Coon (1962), Neanderthal man "is pictured as a crouching, stooping, squat and brutal creature, with huge jaws and little or no forehead, and a low grade of intelligence. Flesh reconstructions of his face make him look like an ape. . . . This, the popular image of Neanderthal

<sup>9</sup> Ales Hrdlicka, "The Neanderthal Phase of Man," 1927, in T. D. McCown and K. A. R. Kennedy (editors), *op. cit.*, pp. 272-274.

<sup>10</sup> Carleton S. Coon, *op. cit.*, p. 519.

<sup>11</sup> Ales Hrdlicka, *op. cit.*, pp. 267-270.

<sup>12</sup> Grahame Clark, 1969, *World Prehistory: A New Outline*, Cambridge University Press, New York, pp. 42-43.

<sup>13</sup> Grahame Clark, *op. cit.*, p. 44.

<sup>14</sup> Ales Hrdlicka, *op. cit.*, pp. 260 and 266.

<sup>15</sup> Grahame Clark, *op. cit.*, p. 44.

<sup>16</sup> Marcellin Boule, *L'Homme Fossile de la Chapelle aux Saints*, Masson et Cie, Paris, 1912-1913.

man . . . is wrong, and so are most of the elements in the total Neanderthal concept.”<sup>17</sup>

## II

The taxonomic status and the relation of Neanderthal man to modern man has long been a subject of debate among anthropologists and palaeontologists.<sup>18</sup> Many early students of fossil men were impressed by the “primitive” morphological traits of the “classic” Neanderthals of western Europe and the relative material poverty of the Mousterian cultures and classified Neanderthal man as a separate and distinct species. The Neanderthals appeared to contrast sharply with the anatomically modern Aurignacians of Upper Palaeolithic Europe, who possessed a highly developed cave art, and “suddenly” replaced the Neanderthals some 30,000 to 35,000 years ago.<sup>19</sup> Most of these investigators concluded that Neanderthal man — or at least the “classic” Neanderthals of western Europe — formed a side evolutionary line that became extinct and was not ancestral to the living peoples of Europe.

The French palaeontologist, Marcellin Boule (1923), for example, wrote: “*Homo neanderthalensis* is an archaic species of man. It was abruptly followed by the Aurignacians, ‘who differed from the Mousterians as much in their superior culture as in the superiority or diversity of their physical characters.’”<sup>20</sup>

Similar views were expressed by M. C. Burkitt (1921)<sup>21</sup> and G. G. MacCurdy (1924)<sup>22</sup> in the past, and more recently by Weckler (1957)<sup>23</sup> and Le Gros Clark (1966, 1971).<sup>24</sup>

<sup>17</sup> Carleton S. Coon, *op. cit.*, pp. 519-520.

<sup>18</sup> Ales Hrdlicka, *op. cit.*, pp. 257-259.

<sup>19</sup> Ales Hrdlicka, *op. cit.*, p. 258.

<sup>20</sup> Marcellin Boule, *Fossil Men*, University of Edinburgh Press, Edinburgh, Scotland, 1923, pp. 242-243.

<sup>21</sup> M. C. Burkitt, *Prehistory*, Cambridge University Press, Cambridge, England, 1921, p. 90. “The race who made this culture (Mousterian) was of a low type known as the Neanderthal race. This appears to have been a throwback in the line of evolution of mankind and this retrograde sport seems to have had no successor.”

<sup>22</sup> George G. MacCurdy, *Human Origins*, D. Appleton, New York, 1924, Vol. 1, pp. 209-210. “During ages long subsequent to the time when the races of Pildown and Heidelberg lived, there spread over the greater part of Europe, the primitive Neanderthal race, of coarse mental and physical fiber. . . . This race contributed nothing, in fact, save utilitarian artifacts, the so-called Mousterian industry. . . . The Aurignacians were a ‘new race,’ which supplanted completely the archaic Neanderthal race of Mousterian times.”

<sup>23</sup> J. E. Weckler, “Neanderthal Man,” *Scientific American*, 1957, Reprint No. 844.

<sup>24</sup> W. E. Le Gros Clark, *History of the Primates*, Phoenix, Chicago, 1966; W. E. Le Gros Clark, *The Antecedents of Man*, University of Edinburgh Press, Edinburgh, Scotland, 1971.

According to Le Gros Clark (1971), the Early Mousterian population of Europe (*i.e.*, represented by the fossil finds from Ehringsdorf, Saccopastore, Ganovce, Krapina, *et al.*), dating from the last interglacial into the onset of the Würm glaciation, gave rise to two separate evolutionary lines — “the specialized Neanderthals which became extinct and the modern forms of *Homo sapiens*.”<sup>25</sup> This proposed sequence of fossil hominid types is presented in Figure 1.

The outstanding physical traits of the specialized or “classic” Neanderthal type (*i.e.*, represented by the fossil finds from La Chapelle, La Ferrassie, Neanderthal, Le Moustier, La Quina, *et al.*) are “the massive brow ridges, retreating forehead, large projecting jaws, absence of a chin eminence, and certain peculiarities of the occipital region and base of the skull.” Some of the limb bones are regarded as being “unusual in the thickness and curvature of their shafts and the relative size of their articular extremities.” The size of the Neanderthal brain — as indicated by the cranial capacity — is, however, “surprisingly large, on the average even larger than that of modern *Homo sapiens*.”<sup>26</sup>

Le Gros Clark interprets the fossil and archaeological record as indicating that “at the end of the Mousterian period Neanderthal man disappeared from Europe quite abruptly to be replaced by a population of the modern *Homo sapiens* type.”<sup>27</sup> This new population — the Aurignacian — is viewed as “having developed their distinctive culture elsewhere, probably in Asia, migrated into Europe and, with their superior social organization, quickly displaced Mousterian man and occupied his territory.”<sup>28</sup>

Weckler (1959) advanced the hypothesis that “Neanderthal man and *Homo sapiens* arose and developed separately in the two worlds — Neanderthal in central and eastern Asia, *sapiens* in the world of Europe, Africa, Asia Minor and India.”<sup>29</sup> According to this theory, the series *Pithecanthropus* - *Sinanthropus* - *Homo soloensis* - Classic Neanderthal form one evolutionary line, while Heidelberg - Swanscombe - Fontéchevade - Cro - Magnon form a second and separate evolutionary line. “For hundreds of thousands of years, through the first three Ice Ages, they evolved along separate lines until Neanderthal finally made his way to Europe some time later in the third interglacial period, less than 150,000 years ago.”<sup>30</sup>

In Weckler’s view, the two species lived at the same time,

<sup>25</sup> W. E. Le Gros Clark, *The Antecedents of Man*, *op. cit.*, p. 357.

<sup>26</sup> W. E. Le Gros Clark, *The Antecedents of Man*, *op. cit.*, p. 356.

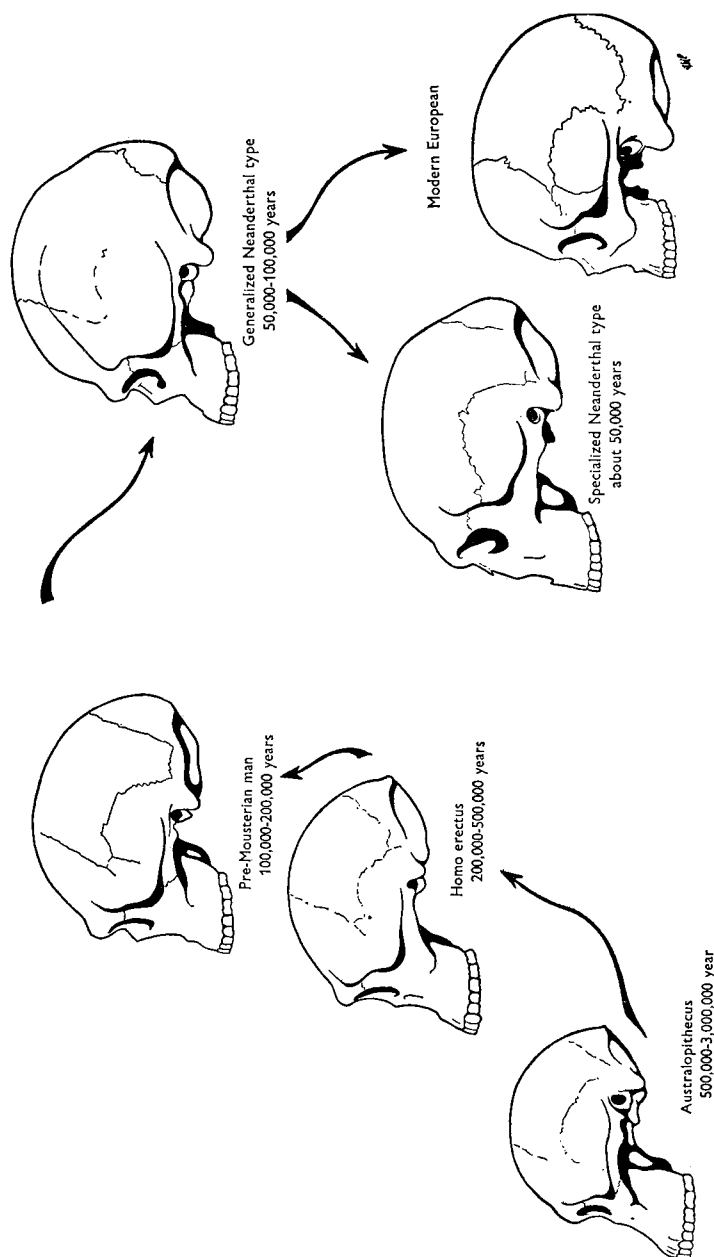
<sup>27</sup> W. E. Le Gros Clark, *The Antecedents of Man*, *op. cit.*, p. 357.

<sup>28</sup> W. E. Le Gros Clark, *History of the Primates*, *op. cit.*, pp. 116-117.

<sup>29</sup> J. E. Weckler, *op. cit.*, p. 4.

<sup>30</sup> J. E. Weckler, *op. cit.*, p. 8.

FIGURE 1



Le Gros Clark's construction of hominid phylogeny (Le Gros Clark, 1971)

with the “progressive” Neanderthal type — characterized by a high-vaulted skull and some other *sapiens* features — resulting from hybridization between Neanderthal and *sapiens* during the third interglacial. The “classic” Neanderthals of the fourth or Würm glacial period were regarded as possessing “very distinctive features: a long, low-vaulted skull, a big, jutting brow-ridge running across the forehead, a broad, low-bridged nose, a jutting, muzzle-like mouth, a retreating chin.”<sup>31</sup> Weckler’s comparison of the reconstructed crania of the *sapiens* Cro-Magnon man and the “classic” Neanderthal man is presented in Figure 2.

Contrary views regarding the relation of the Neanderthals to modern *Homo sapiens* were expressed by several prominent anthropologists of the time, including Ales Hrdlicka (1927),<sup>32</sup> Franz Weidenreich (1947),<sup>33</sup> and Hans Weinert (1943: 1955).<sup>34</sup> Dr Hrdlicka extensively reviewed the known archaeological, geological and skeletal material relating to the origins and taxonomic status of Neanderthal man in a paper entitled “The Neanderthal Phase of Man,” which was delivered as “The Huxley Memorial Lecture for 1927.” He concluded that the Neanderthals represented a phase in the evolution of man rather than a separate species which “perished abruptly and completely, without leaving any progeny” and that the known evidence favored the assumption of “the evolution of the Neanderthaler into later man.”<sup>35</sup>

Dr Hrdlicka observed that the Mousterian or Neanderthal phase of man began towards the end of the warm inter-glacial period and reached to the culmination of the main ice invasion. During this period great changes of environment occurred, which called for “new adaptations and developments in hunting.” Neanderthal man was “gradually confronted with hard winters, which demand more shelter, more clothing, more fire, and storage of provisions.” These major changes in the principal environmental factors were regarded by Hrdlicka as having brought about “greater mental as well as physical exertion” and “an intensification of natural selection, with the survival of only the more, and perishing of the less, fit.”<sup>36</sup>

<sup>31</sup> J. E. Weckler, *op. cit.*, p. 4.

<sup>32</sup> Ales Hrdlicka, *op. cit.*, pp. 281-285.

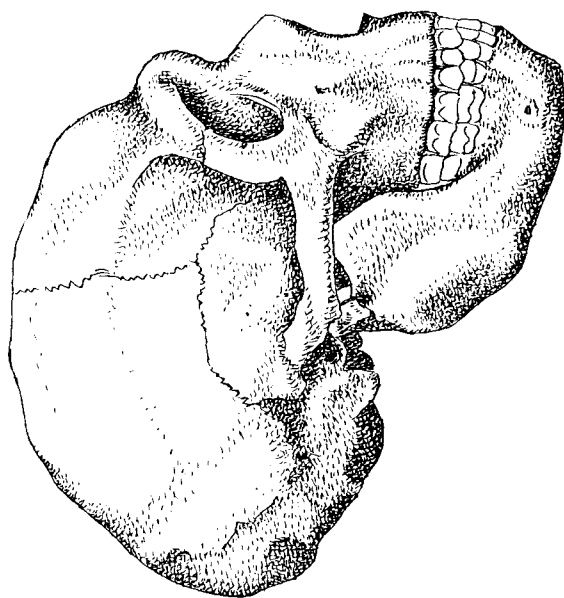
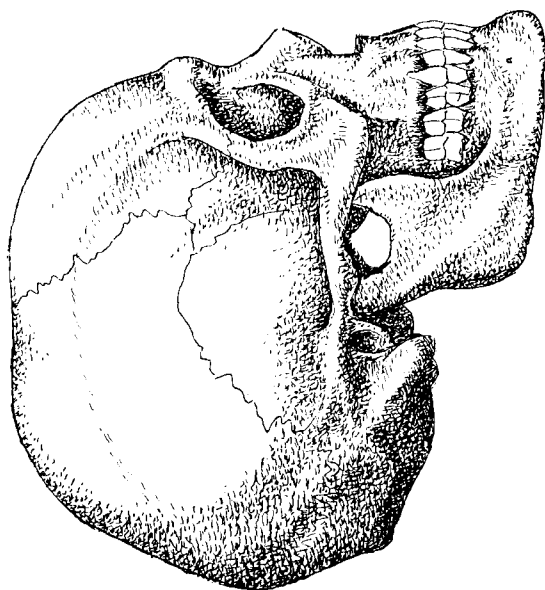
<sup>33</sup> Franz Weidenreich, “Facts and Speculations Concerning the Origins of *Homo sapiens*,” 1947, T. D. McCown and K. A. R. Kennedy, *op. cit.*, pp. 346-352.

<sup>34</sup> Hans Weinert, *Stammesgeschichte der Menschheit*, Franck’sche Verlagshandlung, Stuttgart, Germany, 1943; Hans Weinert, *Die Neanderthaler Gruppe und die Praesapiensfunde*, Berlin, Germany, 1955.

<sup>35</sup> Ales Hrdlicka, *op. cit.*, pp. 281 and 285.

<sup>36</sup> Ales Hrdlicka, *op. cit.*, pp. 282-283.

FIGURE 2



Comparison of the reconstructed crania of Cro-Magnon Man (left) and "classic" Neanderthal Man (right). (Weckler, 1959)

The Neanderthal skeletal remains considered as a population were found to exhibit great variability. The physical differences between Neanderthal man and *Homo sapiens* were found by Dr Hrdlicka to be essentially of two categories: "reduction in musculature — that of the jaws as well as that of the body" and "changes in the supraorbital torus." However, both these categories of change have been observed as long-run evolutionary trends which have continued from Magdalenian times to the present day. Consequently, Hrdlicka concluded that these trends characterized "the progressive evolution of Neanderthal man" and that "such evolution would inevitably carry his most advanced forms to those of primitive *Homo sapiens*."<sup>37</sup>

Weidenreich (1947) in a later review of the "paleontological facts" concerning the origin of *Homo sapiens* contended that the Neanderthals represented an evolutionary phase of man and that modern man derived "from forms like the Neanderthal man."<sup>38</sup> The famous German anthropologist, Dr Hans Weinert (1943), also concluded that one or two of the living great racial lines (*grosse Rassenlinien*) could be traced back to *Homo neanderthalensis* of the middle Stone Age.<sup>39</sup>

### III

Since the early finds of Neanderthal cranial and skeletal remains at a number of sites in Western Europe, additional discoveries and improved research techniques have both added to and modified our knowledge of Neanderthal man. These include the discoveries of Neanderthal fossils in East Europe, southern Russia, Soviet Central Asia, and Southwest Asia, and "Neanderthaloid" fossils in Africa and Southeast Asia.<sup>40</sup> The other advances comprise more refined dating of Neanderthal cultural and skeletal remains<sup>41</sup> and statistical analyses of the Mousterian culture complexes.<sup>42</sup>

In 1921 a virtually complete cranium was discovered in the course of mining operations at the Broken Hill Mine in Northern

<sup>37</sup> Ales Hrdlicka, *op. cit.*, p. 284.

<sup>38</sup> Franz Weidenreich, *op. cit.*, p. 346 and pp. 350-352.

<sup>39</sup> Hans Weinert, 1943, *Stammesgeschichte der Menschheit*, *op. cit.*, p. 70.

<sup>40</sup> Carleton S. Coon, *op. cit.*, pp. 519-577.

<sup>41</sup> David S. Brose and Milford H. Wolpoff, "Early Upper Paleolithic Man and Late Paleolithic Tools," *American Anthropologist*, Vol. 73 No. 5, 1971, pp. 1156-1194.

<sup>42</sup> Sally R. Binford and Lewis R. Binford, "Stone Tools and Human Behavior," *Scientific American*, Reprint No. 643, 1969.



Rhodesia. The Broken Hill skull was low-vaulted and possessed "the broadest, most massive brow ridges of any human skull yet found."<sup>43</sup> From 1931 to 1933 several hominid skulls were unearthed in the Solo River Valley of Central Java. The Solo skulls were "as thick as their Middle Pleistocene predecessors," low-vaulted, and had "large brow ridges."<sup>44</sup> The discovery in widely separated areas of Africa and Southeast Asia of hominid fossils with resemblances to the "classic" Neanderthals in a few morphological features led some anthropologists to write of "tropical Neanderthals."<sup>45</sup> Weckler even derived the European "classic" Neanderthals as lineal descendants of the Javan Solo population.<sup>46</sup>

Carleton Coon has recently criticized this tendency to label as *Neanderthal* "fossil-man remains in Asia, Africa, and even America." The last category includes "some low-vaulted American Indian crania."<sup>47</sup> The Javanese Solo crania are estimated to be "between 150,000 and 75,000 years old."<sup>48</sup> The mean cranial capacity of the group is some 1150 c.c., with a range of 1035 c.c. to 1255 c.c. Dr Coon finds many points of similarity between the earlier Djetis and Trinil *pithecanthropine* crania and the later Solo crania. He thus concludes that Solo man "although larger-brained than his predecessors, was still *Homo erectus*," that "he occupied the same evolutionary grade as *Sinanthropus*," and that "he had nothing to do with Neanderthal."<sup>49</sup> The Rhodesian Broken Hill skull is "believed to be no more than 25,000 years old" and has an estimated cranial capacity of 1280 c.c. Coon finds that "its brow ridges, palate, and teeth match in size those of the much earlier *Pithecanthropus* skulls, but its features are those of Negroes."<sup>50</sup> He classifies the Rhodesian skull as a specimen of *Homo erectus*.

Professor Ernst Mayr (1963) in his discussion of "The Taxonomic Evaluation of Fossil Hominids" also points out that Rhodesian man and Solo man "differ in many details of skull shape and cranial capacity from Neanderthal as well as from *s. sapiens*," although "sharing the large supraorbital torus with Neanderthal." Hence, he considers it "quite improbable" that

<sup>43</sup> Carleton S. Coon, *op. cit.*, pp. 621-627.

<sup>44</sup> Carleton S. Coon, *op. cit.*, pp. 390-399.

<sup>45</sup> Ronald Singer, "Der Solo-Mensch von Java: ein Tropischer Neanderthaler," in G. H. R. Koenigswald (editor), *Hundert Jahre Neanderthaler*, Kemink en Zoon, Utrecht, Holland, 1958, pp. 21-26.

<sup>46</sup> J. E. Weckler, *op. cit.*, p. 5.

<sup>47</sup> Carleton S. Coon, *op. cit.*, pp. 519-520.

<sup>48</sup> Carleton S. Coon, "New Findings on the Origin of Races," in T. D. McCown and K. A. R. Kennedy, *op. cit.*, p. 368.

<sup>49</sup> Carleton S. Coon, *The Origin of Races*, *op. cit.*, pp. 398-399.

<sup>50</sup> Carleton S. Coon, "New Findings on the Origin of Races," *op. cit.*, p. 371.

these peripheral African and Asiatic types "are directly related to Neanderthal." Dr Mayr believes that Rhodesian man and Solo man "may have to be classified with *Homo erectus*, in view of their small cranial capacity." On the other hand, he concludes that the differences between the European or classical Neanderthal and *sapiens* "are mostly of a rather superficial nature, such as the size of the supraorbital torus and the general shape of skull." The cranial capacity is "remarkably similar in the two forms."<sup>51</sup>

Gerhard Heberer (1959) similarly maintains that "one cannot call everything which is neither clearly *Pithecanthropus* or *sapiens*-type Neanderthals." He lists in this category "the discoveries of Broken Hill, Rhodesia, and the recently found Saldanha skull, and the series of finds in Ngandong, East Java, which should not be called respectively African or Asiatic Neanderthals." In the opinion of Dr Heberer, "the concept 'Neanderthalian' should be left for periglacial forms from Europe in the first half of the Würm ice age."<sup>52</sup>

Carleton Coon<sup>53</sup> in his study of fossil man and racial origins contends that the "genuine Neanderthals" are "represented by the skeletal remains of people who lived in Europe and parts of western and central Asia during Würm I, and in some places a little later, . . . and who bore certain anatomical features in common, notably heavy, undivided brow ridges, small mastoids, pointed prognathous face, and large, projecting noses."<sup>54</sup> Consequently, he defines the concept of Neanderthal man as follows:<sup>55</sup>

If the concept of a Neanderthal people is to have any validity, it must be limited in terms of time, space, and culture. Only in this way can the Neanderthals have formed a population with a gene pool of its own. Their time span is Early Würm or Würm I, from about 75,000 years ago to the beginning of the Göttweig Interstadial, about 40,000 years ago. Its *lebensraum* was Europe, western Asia, and central Asia as far east as the Altai Mountains and south to the Hindu Kush. Its culture was Mousterian, itself a complex of earlier tool-making techniques.

Employing this definition of Neanderthal man, Professor Coon finds that as of 1962 some 82 true Neanderthals, found in 42 sites,

<sup>51</sup> Ernst Mayr, "The Taxonomic Evaluation of Fossil Hominids," 1963, in T. D. McCown and K. A. R. Kennedy, *op. cit.*, pp. 372-386.

<sup>52</sup> Gerhard Heberer, "The Descent of Man and the Present Fossil Record," *Cold Spring Harbor Symposia on Quantitative Biology*, Vol. 24, 1959, p. 242.

<sup>53</sup> Carleton S. Coon, *The Origin of Races*, *op. cit.*, p. 520.

<sup>54</sup> Carleton S. Coon, *The Origin of Races*, *op. cit.*, p. 523.

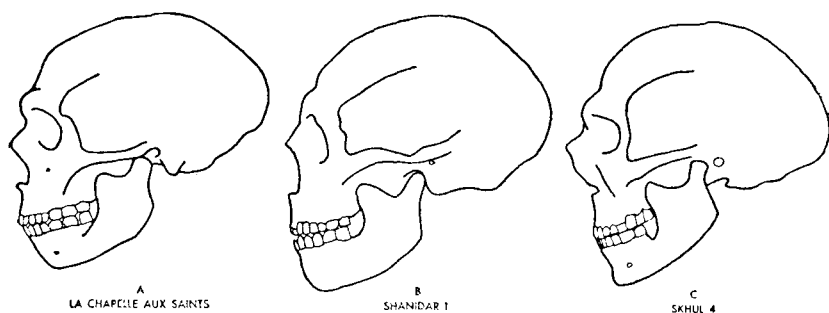
<sup>55</sup> Carleton S. Coon, *The Origin of Races*, *op. cit.*, p. 520.

FIGURE 3



Geographical distribution of Neanderthal fossils (Gieseler, 1959)

FIGURE 4



Comparisons of three Neanderthal crania — La Chapelle aux Saints (A), Shanidar 1 (B), and Skhul 4 (C). (Coon, 1962)

have been described in the anthropological literature.<sup>56</sup> These fossil finds are listed in Table I. The geographical distribution of the most important Neanderthal sites is presented in Figure 3.<sup>57</sup> Although remains of some 55 Neanderthal individuals are included in Carleton Coon's sample many of them consist of only a few fragments. Hence, reconstructions of complete crania and estimates of cranial capacity can vary from one investigator to the next. Sufficient cranial and skeletal material is available, however, to statistically analyze some of the hypotheses regarding the origin and affinities of Neanderthal man and his culture.

#### IV

Statistical analysis of Neanderthal morphological traits has demonstrated a high degree of variability within the Neanderthal group. Brose and Wolpoff (1971) calculated the coefficient of variation (CV) for ten cranial measurements taken from samples of "classic" Neanderthals, Upper Palaeolithic Europeans, Predynastic and Late Dynastic Egyptians, Harappa Indians, and extant populations from Europe, Asia, Africa, Australia and North America. The anthropometric measurements comprised: cranial capacity, cranial length, cranial breadth, cranial height, nasion-basion, upper facial height, nasal height, nasal breadth, bizygomatic breadth, and foramen magnum area. The "classic" Neanderthals were more variable in most features than any of the contemporary populations. The European Upper Palaeolithic population was the closest to the "classic" Neanderthals in terms of the coefficient of variation.<sup>58</sup>

This morphological variability within the Neanderthal group can be seen from Carleton Coon's comparison of three different Neanderthal crania — La Chapelle aux Saints, Shanidar 1, and Skhul 4 (see Figure 4). Dr Coon observes that although the three were possibly contemporary, "their skulls form an evolutionary sequence from the low-headed prognathous La Chapelle aux Saints to the high-headed, orthognathous Skhul 4." The three Neanderthal crania come from widely separated geographical areas, with La Chapelle aux Saints showing "the most extreme form of cold adaptation and Skhul 4 the least."<sup>59</sup>

<sup>56</sup> Carleton S. Coon, *The Origin of Races*, *op. cit.*, pp. 523-526.

<sup>57</sup> Wilhelm Gieseler, "Die Fossilgeschichte des Menschen," in Gerhard Heberer (editor), *Die Evolution der Organismen*, Gustav Fischer, Stuttgart, Germany, 1959, p. 962.

<sup>58</sup> David S. Brose and Milford H. Wolpoff, *op. cit.*, pp. 1167-1175.

<sup>59</sup> Carleton S. Coon, *The Origin of Races*, *op. cit.*, p. 529.

TABLE 1

*Neanderthal fossil man sites in Europe and the Near East*

(Coon, 1962)

<i>Site</i>	<i>Country and Description</i>
<b>GERMANY</b>	
Neanderthal, near Düsseldorf	Male, 40-50 years; calva and postcranial bones
Neuessing, Kelheim, Bavaria	1 milk incisor
<b>BELGIUM</b>	
Bay-Bonnet, Liège	1 rt. femur, lower end
Engis, Liège	No. 1, baby skull, fragmentary
La Naulette, Namur	Mandible, ulna, metacarpal, all fragmentary
Spy, Namur	} No. 1, male or female, 35 years; calotte, fragments of } maxilla, 14 teeth, postcranial bones } No. 2, male, 25 years; fragments of maxilla and man- } dible, 13 teeth, postcranial bones No. 3, child; tibia and 2 teeth
<b>FRANCE</b>	
Bau de l'Aubesier, Monieux, Vaucluse	1 milk molar
La Chaise, Vouthon, Charente	No. 1, calva and three molars No. 2, child, 4 years; mandible, 3 teeth, parietal, 1 phalange
La Chapelle aux Saints, Corrèze	1 adult male skeleton
Combe-Grenal, Dordogne	Child, 1 fragment mandible
La Ferrassie, Dordogne	6 individuals: No. 1, adult male skeleton; No. 2, adult female skeleton, skull crushed; Nos. 3, 4, and 6, infants; No. 4, fetus
Grotte de l'Hyène, Arcy-sur-Cure, Yonne	5 individuals, mostly teeth, fragments of mandible and maxilla, fibula, and metatarsal
Grotte du Loup, same	1 molar tooth, fragments of a parietal
Malarnaud, Montseron, Ariège	Male, 21 years; mandible, 1 molar, 1 vertebra
Marillac, Charente	Adult, fragment mandible with 2 teeth
Le Moustier, Peyzac, Dordogne	Male, 18 years; skeleton, complete
Pech de l'Azé, Sarlat, Dordogne	Child, 5-6 years old; cranium

<i>Site</i>	<i>Country and Description</i>
Le Petit Puymoyen, Charente	4 individuals: No. 1, a half mandible with teeth; No. 2, a piece of maxilla with teeth; No. 3, a piece of mandible with teeth; No. 4, two isolated teeth (originals all lost)
La Quina, Gardes-Le-Pontaroux, Charente	About 12 individuals, principally: No. 1, adult female skeleton; No. 2, 8-year-old calvarium; No. 3, 10 + pieces of skull; No. 4, fragment of a mandible; No. 5, various postcranial bones
Regourdou, near Lascaux, Dordogne	Mandible, nearly complete, all teeth, various postcranial bones
Vergisson, near Solutré, Hte. Saône	3 teeth

#### BRITISH ISLES

La Cotte de St Bré- lade, Isle of Jersey	3 individuals: No. 1, fragmentary child's skull; No. 2, 13 teeth and a piece of tibia; No. 3, 13 teeth
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#### SPAIN AND GIBRALTAR

Bañolas, Gerona, Catalonia	1 mandible, nearly complete, no teeth
Cova Negra de Bel- lus, Játiva, Valencia	1 right parietal bone
Piñar, Granada Gibraltar	1 adolescent skull, fragmentary 3 individuals: No. 1, Forbes's quarry, adult female skull, fragmentary; No. 2, Devil's Tower, 5-year-old skull, fragmentary; No. 3, Genista Cave, 1 molar (lost) (Dating is unknown for all three)

#### SWITZERLAND

St Brais	1 upper incisor
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#### ITALY

Circeo (Rome)	3 individuals: No. 1, adult male cranium; No. 2, adult mandible; No. 3, adult mandible
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#### CZECHOSLOVAKIA

Sipka, N. Moravia	8-10-year-old child, chin portion of mandible
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#### HUNGARY

Subalyuk, Bükk Mts.	2 individuals: No. 1, adult female mandible, 4 vertebrae, sacrum, 7 limb bones; No. 2, 6-year-old cranium broken into over 90 pieces, various vertebrae, ribs, and metatarsals — said to be Late Mousterian
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#### RUMANIA

Ohaba-Ponor Cave, Transylvanian Alps	1 first phalange of second right toe
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#### U.S.S.R.

Kiik-Koba, Crimea	2 individuals: No. 1, teeth, hand, feet, tibia, fibula, patella; No. 2, a newborn infant
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<i>Site</i>	<i>Country and Description</i>
Starosel'e, Crimea	1½-year-old child's skull
Teshik-Tash, Uzbekistan	8-10-year-old child's skeleton
<b>TURKEY</b>	
Karain, Adala	1 milk molar
<b>IRAQ</b>	
Shanidar, Kurdistan	7 individuals: No. 1, adult male skeleton; Nos. 2, 3, 4, 5, 6, adult skeletons; 1 infant skeleton
<b>IRAN</b>	
Bisitun, near Kermanshah	1 upper incisor, 1 fragment ulna
Tamtama, near Rezaizyeh	1 fragment femur
<b>PALESTINE</b>	
Mugharet al-Tabun, Mount Carmel	1 adult female skeleton, teeth of 4 individuals
Mugharet-al-Skhul, Mount Carmel	Skeletons of 9 adults and 1 child
Mugharet al-Zuttiya, Galilee	1 fragmentary cranium, Galilee man
Jebel Qafza, Nazareth	Skeletons of 5 adults and 1 child
Shukba, Wadi Natuf	Skeletons of 1 adult and 6 children
Amud Cave, Lake Tiberias	1 nearly complete skeleton
<b>LEBANON</b>	
Ksar 'Akil, near Beirut	1 child's skeleton, "Egbert"

TABLE 2  
*Classification of lithic technologies*  
(G. Clark, 1969)

<i>Archaeological divisions</i>	<i>Dominant lithic technologies</i>
Lower Palaeolithic	Mode 1: Chopper-tools and flakes
Lower Palaeolithic	Mode 2: Bifacially flaked hand-axes
Middle Palaeolithic	Mode 3: Flake tools from prepared cores
Mesolithic	Mode 4: Punch-struck blades with steep retouch
Advanced Palaeolithic	Mode 5: Microlithic components of composite artifacts

Carleton Coon (1962) in his review of Caucasoid racial origins contends that many of the "characteristic" features of the jaw and cranium of the western Neanderthals are special adaptations "towards the bitter cold of western Europe in which the Neanderthals lived."<sup>60</sup> Dr Coon finds that the large cranial base, flattened brain case, and flattened brows of the western Neanderthals are combined with "a remarkable forward projection of the face, or beakiness, dependent on the excessive size of the nose."<sup>61</sup> The prognathism of these skulls is also confined to the nasal region. Coon suggests that "the size of the nose in the western Neanderthals, the expansion of the maxillary sinuses, and the forward position of the nose in reference to that of the brain case may have had a survival value under conditions of extreme cold without adequate headgear or protection for the neck."<sup>62</sup> The jaws were also "carried forward by the nasal skeleton."

Features of the jaws and teeth of the western Neanderthals have also been recently analyzed by Carleton Coon (1962) and Brose and Wolpoff (1971). Coon employs ten adult or nearly adult Neanderthal mandibles in his samples. He finds that La Chapelle aux Saints is "probably the only completely chinless Neanderthal mandible." On the other hand, "La Ferrassie, La Naulette, Arcy 2, and Circeo 3 have rudimentary chins." (See Figure 5.) Multiple mental foramina are present on "at least five of the mandibles."<sup>63</sup>

Brose and Wolpoff tabulated the averaged individual mandibular and maxillary anterior summed tooth lengths, breadths, and areas for *Homo erectus*, Neanderthal, and *Homo sapiens* populations. The three groups were compared for statistical significance of the differences by means of the small sample size t-test. The authors found that "while the anterior dentitions of Neanderthals and *Homo erectus* are not statistically distinguishable for length, breadth, and area . . . , there is a very significant dimensional decrease for anatomically modern *Homo sapiens*." Brose and Wolpoff interpreted their results as indicating that "the large Neanderthal anterior teeth are a specific adaptation to the type of extensive use implied by the pattern of anterior occlusion seen in Neanderthal jaws, as well as the general muscularity evinced by Neanderthal skeletal rugosity."<sup>64</sup>

As of 1962 Carleton Coon found that some 138 western Neanderthal teeth were available for study, with published measurements of 45 in the anthropological literature. The size of the Neanderthal teeth falls "in the same general range as those

<sup>60</sup> Carleton S. Coon, *The Origin of Races*, op. cit., p. 539.

<sup>61</sup> Carleton S. Coon, *The Origin of Races*, op. cit., p. 532.

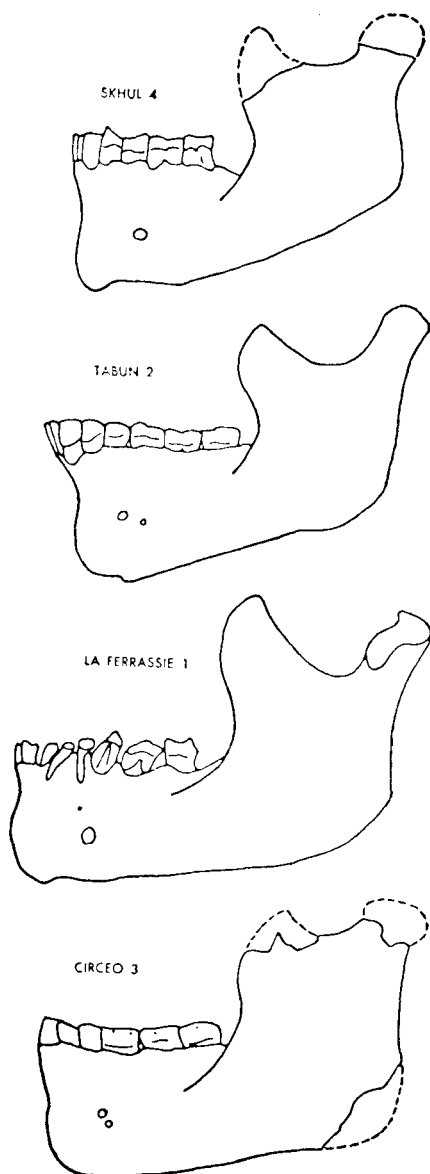
<sup>62</sup> Carleton S. Coon, *The Origin of Races*, op. cit., p. 534.

<sup>63</sup> Carleton S. Coon, *The Origin of Races*, op. cit., pp. 535-536.

<sup>64</sup> David S. Brose and Milford H. Wolpoff, op. cit., pp. 1176-1177.



FIGURE 5



Comparison of four Neanderthal mandibles — Skhul 4, Tabun 2, La Ferrassie 1, and Circeo (Coon, 1962)

of Heidelberg, the teeth of Third Interglacial Europeans, and modern people." Coon finds that "the proportions between molars, premolars, canines, and incisors are normal for Caucasoids." Less than half the Neanderthal molars and premolars were taurodont — *i.e.*, "a condition of the teeth, particularly the molars, in which the fusion of the roots neotenously takes place low down and results in a large pulp cavity." No taurodontism at all was observed in the teeth of La Ferrassie 1, La Quina, Regourdou, and Arcy.<sup>65</sup>

The skeletal remains of La Chapelle aux Saints, Neanderthal, Spy 2, and La Ferrassie 1 were sufficiently complete to permit calculation of estimates of their stature. Coon, for example, estimates that these four Neanderthals "were of about the same height" — ranging from 5 ft. 4 in. to 5 ft. 6 in. (*i.e.*, 163 c.m. to 166 c.m.). He also believes that with their deep chests and heavy bones, the western Neanderthals would have weighed 160 lbs. or more. Their constitutional type was mesomorphic.<sup>66</sup>

Anthropologists from Marcellin Boule in 1911-1912 to Weckler in 1957 have depicted Neanderthal man as walking "in a crouch with bent knees and a shuffling gait."<sup>67</sup> Carleton Coon has pointed out that this view is based upon early descriptions of the first nearly complete Neanderthal skeleton — La Chapelle aux Saints. However, the vertebral column of La Chapelle aux Saints had been shrunk and distorted by age and arthritis. In addition, Dr Coon contends that the bones of this Neanderthal fossil were "inaccurately reconstructed after exhumation."<sup>68</sup> According to Coon, Boule also "faultily reconstructed the cranial base of La Chapelle aux Saints."<sup>69</sup> Boule's reconstruction of the La Chapelle aux Saints' skeleton was immediately criticized by Gustav Schwalbe (1914).<sup>70</sup> More recently Straus and Cave (1957) demonstrated in great detail the completely modern anatomy of the "classic" Neanderthal post-cranial skeletons.<sup>71</sup>

Brose and Wolpoff (1971) also compared Neanderthal and anatomically modern *Homo sapiens* populations with respect to a number of morphological traits, presumed to be characteristic of

<sup>65</sup> Carleton S. Coon, *The Origin of Races*, *op. cit.*, pp. 539-541.

<sup>66</sup> Carleton S. Coon, *The Origin of Races*, *op. cit.*, p. 548.

<sup>67</sup> J. E. Weckler, *op. cit.*, p. 4.

<sup>68</sup> Carleton S. Coon, *The Origin of Races*, *op. cit.*, pp. 542-543.

<sup>69</sup> Carleton S. Coon, *The Origin of Races*, *op. cit.*, p. 531.

<sup>70</sup> Gustav Schwalbe, "Kritische Besprechung von Boule's Werk: 'L'Homme Fossile de la Chapelle aux Saints,'" *Zeitschrift fuer Morphologie und Anthropologie*, Vol. 16, 1914, pp. 527-610.

<sup>71</sup> W. L. Straus and A. J. E. Cave, "Pathology and the Posture of Neanderthal Man," *Quarterly Review of Biology*, Vol. 32, 1957, pp. 348-363.

the "classic" Neanderthals. These traits included: forehead height, shape of the parietal bones, parietal height, degree of development of the supraorbital torus, shape of the occipital area, size of the mastoid process, degree of mid-facial prognathism, facial length, orbital shape and size, dental taurodontism, *et al.* Brose and Wolpoff find that no single morphological feature distinguishes all "classic" Neanderthals from anatomically modern *Homo sapiens*. Conversely, all of the presumed "distinguishing characteristics" for anatomically modern *Homo sapiens* occur, with regular frequency, in the "classic" Neanderthals.<sup>72</sup>

Brose and Wolpoff derive two conclusions from their analysis. First, "the few features which distinguish the group means (although not the individual specimens) show a tendency in the Western European Würm group for heavier bunning in the occipital region and more extensive mid-facial prognathism. . . . Second, it is quite apparent that Neanderthals overlap with anatomically modern *Homo sapiens* in almost every morphological feature, as well as almost every metric one."<sup>73</sup>

## V

In contrast to the westernmost Neanderthals, Professor Coon finds that the "Mediterranean" Neanderthals (*i.e.*, Circeo 1, Gibraltar 1, *et al.*, "Who lived in a milder climate than that of western France, were less beaky than La Chapelle aux Saints or La Ferrassie 1, and their upper jaws, from nasion to prosthion, were shorter."<sup>74</sup> Neanderthal finds from the Crimea and Uzbekistan in Soviet Russia also show closer affinities to modern Caucasoids than the "specialized" western Neanderthals.

The cranial and skeletal remains of an 18 to 19-month-old Neanderthal infant were found in a cave in the Crimean village of Starosel'e in 1952. Coon describes the skull as strongly rounded, with a high steep forehead. The mandible has a firm chin, while "the back of the head is high and rounded." Dr Coon concludes that the skull is "either an early example of modern Caucasoid *Homo sapiens*, a product of mixture with local Neanderthals, or the end result of an evolutionary progression from Neanderthal to modern European man."<sup>75</sup>

The remains of a nine-year-old Neanderthal boy had been previously discovered in 1938 in a Mousterian deposit in the Teshik-Tash cave in southwestern Uzbekistan. The cranial capacity

<sup>72</sup> David S. Brose and Milford H. Wolpoff, *op. cit.*, pp. 1172-1174.

<sup>73</sup> *Ibid.*

<sup>74</sup> Carleton S. Coon, *The Origin of Races*, *op. cit.*, p. 533.

<sup>75</sup> Carleton S. Coon, *The Origin of Races*, *op. cit.*, pp. 557-558.

was 1490 c.c. (adult capacity estimated at 1600 c.c.). The vault of the brain case is high, while "the forehead is high and well-rounded." Coon describes the skull as "more modern-looking than most if not all of the western Neanderthals" (see Figure 6).<sup>76</sup>

The Czech anthropologist, Dr Jan Jelinek (1969), has recently reviewed and summarized the anthropological status of Neanderthal finds in Central and Eastern Europe. Many of these finds "are little known among scientists in the West." These include Neanderthal finds from Petralona in Greece, Sala in western Slovakia, the Kulna cave in Moravia, and the Subalyuk cave in Hungary. Older Neanderthal finds from Ochoz and Sipka in Moravia were also included in the survey. Dr Jelinek concluded that:<sup>77</sup>

(1) The Neanderthal finds from Central and Eastern Europe display pronounced morphological variability, even within a single site, and this variability is associated with wide variation in cultural inventory. These finds show, to various degrees and in various frequencies, many of the characteristics that we find fully developed and universal in *H. sapiens sapiens*. Chronologically, they extend into the W 1/2 interstadial, the period to which the oldest finds in this region of Upper Paleolithic Man of the modern type also belong. (2) The Upper Paleolithic fossil man finds . . . include individuals of the so-called primitive sapient type, displaying archaic morphological characteristics, again to various degrees and in various frequencies. Associated with this physical variation is, again, wide variation in culture. (3) The evidence thus seems to demand that we classify Neanderthal Man as *H. sapiens neanderthalensis* and Upper Paleolithic Man as *H. sapiens sapiens*.

Neanderthal cranial and skeletal remains have also been uncovered in several locations in Southwest Asia — including the Shanidar cave in northern Iraq and some six caves in Palestine. Between 1953 and 1960 the remains of one infant and six adult Neanderthals were found in the Shanidar cave. Although all the specimens lay in Mousterian deposits, 15,000 or more years probably separated the various finds. The cranial capacities were large, with Shanidar 1 estimated at "probably well over 1700 c.c." Coon describes this skull as having a sloping forehead, but with well rounded parietal and occipital profiles. Morphologically, "the face closely resembles those of the French Neanderthals."

<sup>76</sup> Carleton S. Coon, *The Origin of Races*, op. cit., pp. 558-560.

<sup>77</sup> Jan Jelinek, "Neanderthal Man and *Homo sapiens* in Central and Eastern Europe," *Current Anthropology*, Vol. 10, No. 5, 1969, p. 492.

FIGURE 6

Neandertal  
(nach SCHWALBE).



Engis, unter 7 Jahren  
(nach CH. FRAIPONT).



Teschik-Tasch,  
9jährig  
(nach GREMIATZKI).



Comparison of three Neanderthal crania — Neanderthal, Engis, and  
Teschik-Tasch (Gieseler, 1959)

The brow ridges are heavy, but “do not form a continuous bar over the nose.”<sup>78</sup>

Some ten crania and fragments of crania have been obtained from the Skhul cave at Mount Carmel, Palestine. The Skhul crania are large, with three of the male skulls having cranial capacities in excess of 1500 c.c. (see Table 3). In their original report on these fossils, McCown and Keith (1939) wrote: “Like Neanderthal man, the Skhul men were big-brained, but the moulding of their head and jaws was modern. And yet, through the anatomy of the Mount Carmel people there runs a substratum of characters which links them to the Neanderthal type.”<sup>79</sup>

Carleton Coon (1962) finds that the Skhul crania “fall naturally into two groups,” with four skulls showing “both Neanderthal and modern Caucasoid features.” Two skulls are described as “neither Neanderthaloid nor Caucasoid but belong to a different racial line.” The Skhul crania in the first group are long and low-vaulted, with thick, wide brow ridges. However, the occiputs of the skulls are rounded and there is no nasal or alveolar prognathism. Dr Coon concludes that “the skulls of this group show an orderly progression from a Neanderthal to a modern European form.”<sup>80</sup>

Coon (1963) considers the two fossil finds from Swanscombe, England, and Steinheim, Germany, which are dated at 250,000 years — or possibly much older — as *sapiens*, female, and Caucasoid. Dr Coon contends that “from then on all the skulls found in Europe and Western Asia, with one possible exception (Number 5 from the Skhul cave in Palestine, which could have been Australoid) are both *sapiens* and Caucasoid.” This includes the Neanderthals, whom Coon considers “exaggeratedly Caucasoid, with long, pointed faces and beaky noses.”<sup>81</sup> He finds the nasal and alveolar regions of the Neanderthal skulls to be Caucasoid, while the hands of the western Neanderthals are not notably “different from those of hard-working modern Europeans.”<sup>82</sup> The features in which the Neanderthals differed from other Caucasoids are regarded as “mostly if not entirely due to local inbreeding and adaptation to cold.”<sup>83</sup> Consequently, Dr Coon

<sup>78</sup> Carleton S. Coon, *The Origin of Races*, *op. cit.*, pp. 562-564.

<sup>79</sup> T. D. McCown and Arthur Keith, “The Relationship of the Fossil People of Mount Carmel to Prehistoric and Modern Types,” 1939, in T. D. McCown and K. A. R. Kennedy, *op. cit.*, p. 333.

<sup>80</sup> Carleton S. Coon, *The Origin of Races*, *op. cit.*, pp. 565-574.

<sup>81</sup> Carleton S. Coon, “New Findings on the Origin of Races,” *op. cit.*, p. 369.

<sup>82</sup> Carleton S. Coon, *The Origin of Races*, *op. cit.*, pp. 532 and 545.

<sup>83</sup> Carleton S. Coon, “New Findings on the Origin of Races,” *op. cit.*, p. 369.

TABLE 3  
*Hominid cranial capacities in c.c.*  
(Saller, 1959)

<i>Hominid group</i>	<i>Fossil crania</i>	<i>Author</i>	<i>Cranial capacity</i>	<i>Cranial capacity range (Min.-Max.)</i>	<i>Group mean cranial capacity</i>
Pithecanthropus group	<i>Pithecanthropus I</i>	Weidenreich	935 c.c.		
	<i>Pithecanthropus II</i>	Weidenreich	775 c.c.	775-935 c.c.	855 c.c.
	<i>Sinanthropus III</i>	Weidenreich	915 c.c.		
	<i>Sinanthropus X</i>	Weidenreich	1225 c.c.		
	<i>Sinanthropus XII</i>	Weidenreich	1030 c.c.	915-1225 c.c.	1056 c.c.
East Asian Neanderthal	Ngandong I	Weidenreich	1035 c.c.		
	Ngandong V	Weidenreich	1255 c.c.	1035-1255 c.c.	1145 c.c.
African Neanderthal	Broken Hill	Weidenreich	1325 c.c.	1325 c.c.	1325 c.c.
Neanderthal transition group	Tabun I	Weidenreich	1450 c.c.		
	Saccopastore I	Keith	1270 c.c.		
	Ehringsdorf	Keith	1510 c.c.		
	Skhul V	Sergi	1200 c.c.		
	Teshik-Tash	Gremjackij	1550 c.c.		
	Ganovec	Vlcek	1320 c.c.		
	Gibraltar I	Kappers	1300 c.c.	1200-1550 c.c.	1371 c.c.
Classical Neanderthal	Neanderthal	Boule	1408 c.c.		
	La Quina	Boule	1610 c.c.		
	Le Moustier	Martin	1350 c.c.		
	Circeo	Weinert	1564 c.c.		
	La Chapelle	Sergi	1550 c.c.		
	La Ferrassie	Boule	1641 c.c.	1350-1641 c.c.	1521 c.c.
Diluvial <i>Homo sapiens</i>	Predmost III	Matiegka	1608 c.c.		
	Predmost IV	Matiegka	1518 c.c.		
	Predmost IX	Matiegka	1555 c.c.	1452-1608 c.c.	1527 c.c.
	Predmost X	Matiegka	1452 c.c.		

concludes that the Neanderthal evolutionary line “is patently Caucasoid.”<sup>84</sup>

## VI

Carleton Coon (1962) points out that “neither the Neanderthal people nor the Neanderthal tool-making techniques could have sprung up out of nothing.” He contends that the “Mousterian culture had already come into being during the latter part of the Last Interglacial, as a derivative of the Acheulian, Clactonian-Tayacian, and the Levalloisian flake techniques.”<sup>85</sup> Grahame Clark (1969) in his most recent review of world prehistory finds a clear evolutionary progression “during the Palaeolithic Age in the technology of working flint and stone.” This progression takes the form of enlarging technical possibilities “by the adoption of new processes.”<sup>86</sup>

Dr Clark classifies the type of dominant lithic technology into five stages or modes, ranging from the Lower Palaeolithic chopper-tools and flakes of mode 1 to the Mesolithic microlithic components of composite artifacts of mode 5. His relation of this succession of stone technologies to the major archaeological divisions occurring in Europe and adjacent areas of North Africa and Southwest Asia is presented in Table 2.<sup>87</sup> Illustrations of the major tool types — choppers, hand axes, flake tools, and blade tools — are presented in Figure 7.<sup>88</sup>

The Mousterian industries of the European Neanderthals, which extended with many variations from the Atlantic seacoast to the eastern Ukraine, “made prominent use of flake tools.” Clark contends that “the notion of concentrating on implements struck at one blow from carefully prepared cores is one that seems to have been developed in the northern part of the Lower Palaeolithic world and to have characterized in particular the Middle Palaeolithic Levalloiso-Mousterian province. . . .”<sup>89</sup> Dr Clark finds that mode 2 industries — bifacially flaked hand-axes — “failed to reach south-east Asia or China.” Mode 3 industries — flaked tools from prepared cores — “still did not penetrate these regions in the Far East, but on the other hand extended northwards into European Russia and Inner Asia.”<sup>90</sup>

<sup>84</sup> Carleton S. Coon, *The Origin of Races*, *op. cit.*, p. 539.

<sup>85</sup> Carleton S. Coon, *The Origin of Races*, *op. cit.*, p. 521.

<sup>86</sup> Grahame Clark, *op. cit.*, pp. 29-30.

<sup>87</sup> Grahame Clark, *op. cit.*, p. 31.

<sup>88</sup> Carleton S. Coon, *The Origin of Races*, *op. cit.*, p. 326.

<sup>89</sup> Grahame Clark, *op. cit.*, pp. 42-43.

<sup>90</sup> Grahame Clark, *op. cit.*, pp. 30-31.



Chester Chard (1969) concludes that the Mousterian cultures of western Europe developed out of the highly evolved European Acheulian industries termed Micoquian. The Micoquian industries are found in deposits dating from the Eemian interglacial, some 150,000 or more years ago. In Europe at this time, tool kits were becoming more elaborate, the economy more specialized, and hunting methods improved. The northern plains of Eurasia were being settled for the first time. Technologically, Chard (1969) finds that "this is a time of further development and elaboration of existing traditions in stone technology in the direction of a greater number of more specialized tools, the great majority of which are made on flakes."<sup>91</sup>

At Ehringsdorf, near Weimar, Germany, an incomplete adult fossil brain case had been excavated from Kaempfe's quarry in 1925. Carleton Coon describes the Ehringsdorf skull as showing a "closer similarity to Steinheim and Swanscombe than to either Fontéchevade or Saccopastore." Weidenreich's reconstruction of the skull yielded an estimated cranial capacity of 1450 c.c. The endocranial cast is reported as showing "a modern condition in the frontal lobes." Coon concludes that the Ehringsdorf fossil is *sapiens* and "seems to be on the main line of Caucasoid cranial evolution."<sup>92</sup>

Dr Coon describes the implements found with the human remains at Ehringsdorf as Mousterian. They included scrapers, small hand axes, angular scrapers, fine and coarse drills, and crude burins or gravers.<sup>93</sup> Chard contends that the Weimarian industry represented at the site of Ehringsdorf possessed a technology that "was far ahead of its time." He describes this culture as "a blend of late Acheulian (Micoquian) ideas with the earliest appearance of a number of tool types (true backed blades, burins) that are characteristic of *Homo sapiens* at the end of the Pleistocene." Dr Chard concludes that the Weimarian culture "was specialized for hunting on the plains and possessed the first known projectile weapons as evidenced by their stone points." These were probably hand-thrown spears.<sup>94</sup>

Some of the Acheulian techniques and ideas were diffused for the first time from western Europe into central Europe, and later into the Balkans and eastern Europe, during the Eemian interglacial period. These included "the idea of making bifacially worked tools, the technique evolved by the Acheulians in con-

<sup>91</sup> Chester S. Chard, *Man in Prehistory*, McGraw-Hill, New York, 1969, pp. 112-114.

<sup>92</sup> Carleton S. Coon, *The Origin of Races*, op. cit., p. 506.

<sup>93</sup> Carleton S. Coon, *The Origin of Races*, op. cit., p. 505.

<sup>94</sup> Chester S. Chard, op. cit., p. 114.

nection with their handaxes (. . . “bifaces”), and also the Levallois technique of superior flake tool production.” However, these Acheulian influences never spread to Southeast Asia, “where bifacially worked tools are only accidental, and the Levallois tortoise-core technique is unknown — indicating continued isolation.”<sup>95</sup>

Dr Chard points out that the Eemian interglacial, with its slightly warmer climate than today, “represented a marked environmental change from the preceeding Riss glaciation in many regions.” The areas of Europe suitable for human settlement expanded greatly. On the other hand, climatic “conditions in Africa deteriorated.” The areas available for settlement contracted greatly, and “the Sahara developed into a major barrier with the increasingly drier conditions.” At this time, industries all over Africa — and probably India also — are Acheulian in form. However, from the time of the Eemian interglacial onward, “Africa south of the Sahara became a world apart, developing along its own lines in relative isolation. . . .”<sup>96</sup>

The noted French prehistorian, Francois Bordes (1961), has done much recently to systematize the classification of stone tools.<sup>97</sup> In Bordes’s system, “stone artifacts are classified according to explicitly stated attributes of morphology and technique of manufacture.” The population of stone tools, termed an “assemblage,” is tabulated and described graphically. In this way, “the relative frequencies of different kinds of stone tools from various sites can be compared.”<sup>98</sup>

Bordes’s studies have demonstrated that the Mousterian cultures of Europe are “a composite or complex of industries rather than any specific one. . . .”<sup>99</sup> Tool assemblages and kits varied from site to site and developed over time. Dr Bordes found that the Mousterian cultures of the European Neanderthals employed 63 different tool types, “indicating a wide range of specialized skills, needs, and activities.”<sup>100</sup> These included scrapers, flakes, and points (see Figure 8).<sup>101</sup>

<sup>95</sup> Chester S. Chard, *op. cit.*, pp. 113-114.

<sup>96</sup> Chester S. Chard, *op. cit.*, pp. 112-113.

<sup>97</sup> Francois Bordes, “Principes d’une méthode d’étude des techniques de débitage et de la typologie du Paléolithique ancien et moyen,” *L’Anthropologie*, Vol. 54, 1950, pp. 19-34.

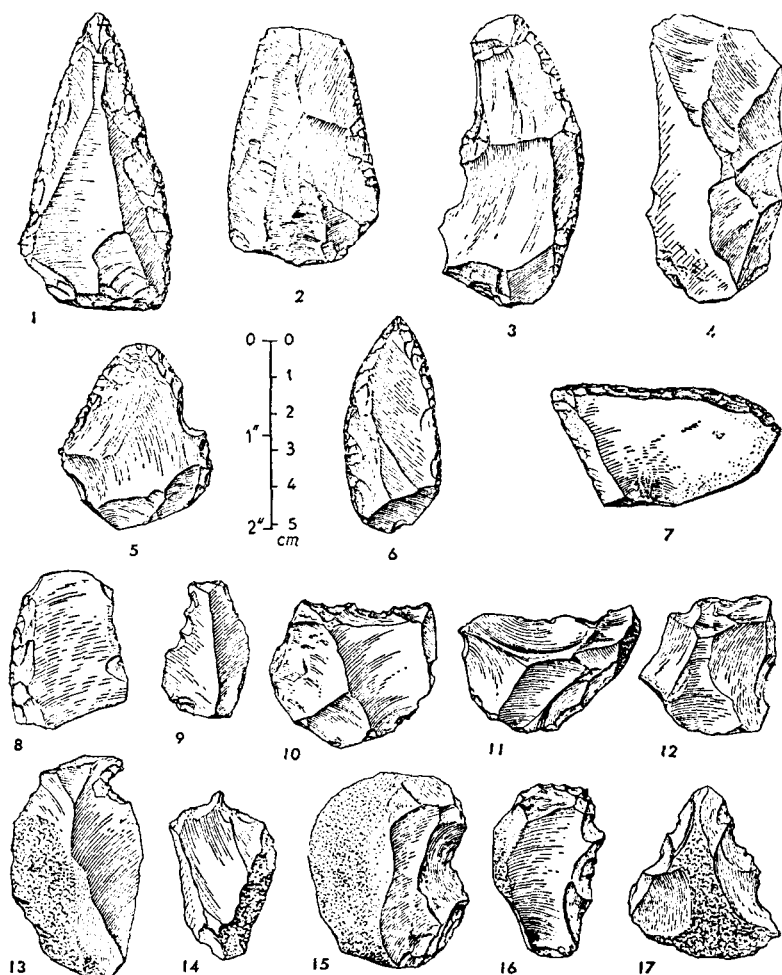
<sup>98</sup> Sally R. Binford and Lewis R. Binford, “Stone Tools and Human Behavior,” *op. cit.*, 1969, p. 5.

<sup>99</sup> Francois Bordes, *The Old Stone Age*, McGraw-Hill, New York, 1968, p. 98.

<sup>100</sup> Alexander Marshack, *The Roots of Civilization*, McGraw-Hill, New York, 1972, p. 77.

<sup>101</sup> Francois Bordes, *The Old Stone Age*, *op. cit.*, p. 99.

FIGURE 8



Mousterian Tool Types: 1, Point; 2, Double Side Scraper; 3, Side Scraper; 4, Levallois Flake; 5, End Scraper on a Flake; 6, Point; 7, Transverse Scraper; 8, Side Scraper; 9, 10, Denticulate Tools; 11, 12, and 13, Notches; 14, Borer; 15, Notch; 16, 17, Denticulate Tools. (Bordes, 1961)

Bordes also found a continuity between the Acheulian cultures of Europe, which preceded the Mousterian cultures, and the Aurignacian or Upper Palaeolithic cultures which succeeded them. In Europe, "the Mousterian has roots that go down to the last interglacial or even to the Rissian glaciation." Dr Bordes lists the sites at Rigabe and La Micoque (Layer 4) in France and Ehringsdorf in Germany as examples of older European industries which had reached the Mousterian level of culture far before the Würm glaciation.<sup>102</sup>

The Early Würm was a time of fluctuating climate, reaching a maximum cold late in the period. Northern Europe became covered with ice, as did mountainous regions elsewhere on the continent. However, the Neanderthal populations remained in Europe and adapted themselves to the changing conditions. Some of the Neanderthal groups, which had developed a specialized hunting economy adapted to the extreme cold, apparently migrated eastward from central Europe across the great northern plain later in Würm I.<sup>103</sup>

Chard describes the Middle Neopleistocene site at Salzgitter-Lebenstedt in Germany as the earliest known example of a cold-adapted group living on the European plain. Salzgitter-Lebenstedt "represents a summer camp of a band of perhaps 20 to 30 persons, apparently occupied for several seasons." At this site "the first really standardized bone tools in the form of points and a picklike antler axe," later known as the Lyngby axe, have been found. The animals hunted for food were mostly reindeer, with some mammoth.<sup>104</sup>

At Tata near Budapest, Hungary, a Middle Mousterian site has been uncovered which is estimated to be about 50,000 years of age. In addition to scrapers and scrapers with bifacial retouch, Bordes reports the find of a "mammoth-ivory 'churinga,' which was once covered with ochre, and an amulet made from nummulite engraved with a cross."<sup>105</sup>

According to Klein (1969), "at least 33 Mousterian occupation sites have been uncovered in European Russia, comprising ten open-air stations and 23 cave sites." The Mousterians are the first known inhabitants of Russia, "settling a large part of European Russia, including all the major river valleys up to at least the latitude of Bryansk (53.15°N.) and quite possibly beyond." Three of the sites are estimated to date from the onset of the Würm glaciation or into the Eemian interglacial: Khotylevo, Il'skaya,

<sup>102</sup> Francois Bordes, *op. cit.*, p. 98.

<sup>103</sup> Chester S. Chard, *op. cit.*, pp. 117-118.

<sup>104</sup> Chester S. Chard, *op. cit.*, pp. 118-119.

<sup>105</sup> Francois Bordes, *The Old Stone Age, op. cit.*, p. 110

and Volgograd. Dr Klein places their age at 70,000 years or more.<sup>106</sup>

The Volgograd site, which is roughly contemporary with the German Salzgitter-Lebenstedt site, is another example of an early European group living on the open plain at a time of extreme cold. Leaf-shaped points, biface scrapers, and bifacially worked stone projectile points have been found at this site. Bison remains predominated among the faunal assemblage.<sup>107</sup>

As Dr Chard observes, "the ability to live on the plains in a time of cold climate implies construction of artificial shelters." Evidence of such a structure has been uncovered at the Molodova I site on the banks of the Dniester River in the southwestern Ukraine. This site is dated later in the Würm glaciation than the Volgograd site and is estimated by Klein to be about 50,000 years old. At horizon 4 of this site an oval arrangement of large mammoth bones was found, with outer dimensions of 10 by 7 meters. The area enclosed by the oval contained "roughly 29,000 pieces of flint, hundreds of fragments of animal bones, 15 hearths, and a spot of red, ochreous pigment." Dr A. P. Chernysh, the Russian archaeologist who excavated the Molodova site, believes that the large mammoth bones "were probably weights holding down skins stretched over the wooden framework of this structure."<sup>108</sup> According to Chard, "this is the oldest dwelling known."<sup>109</sup>

It is among the European Neanderthals that we find the first conscious burial of the dead. Grahame Clark (1969) reports that "the Mousterian deposit at La Chapelle aux Saints was found to overlie a grave, cut into the rock floor and containing the crouched skeleton of a Neanderthal man; similar burials have been found at La Ferrassie, likewise in the Dordogne, and also at Kiik-Koba in the Crimea." A cemetery of ten graves was uncovered at the Mughareh es-Skhul cave near Mount Carmel, Palestine. Clashed in the arms of an older adult male were "the jaw-bones of a large wild boar."<sup>110</sup>

Ralph Solecki (1971) has investigated over a number of years the Neanderthal site at Shanidar cave in northern Iraq. Some nine Neanderthal skeletons were uncovered from the 28-ft. thick layer of Mousterian deposits. He estimates that the Shanidar cave was occupied for some 60,000 years — from about 100,000 to 40,000 years before the present. Dr Solecki finds evidence that the "lame

<sup>106</sup> Richard G. Klein, "Mousterian Cultures in European Russia," *Science*, Vol. 165, 1969, pp. 257-259.

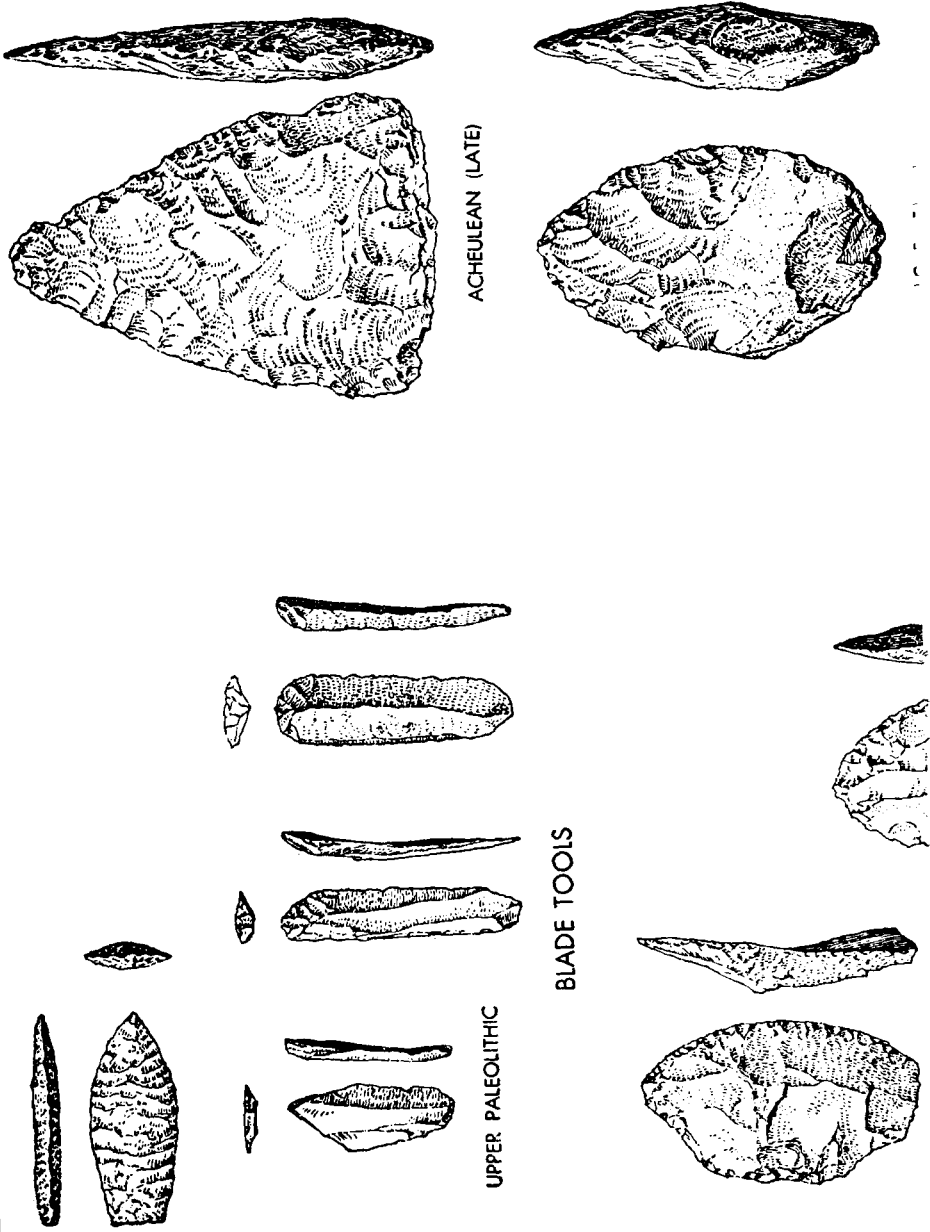
<sup>107</sup> Richard G. Klein, *op. cit.*, pp. 259 and 263.

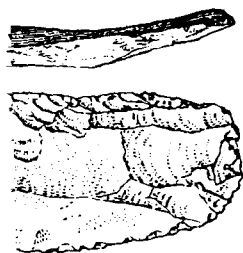
<sup>108</sup> Richard G. Klein, *op. cit.*, p. 263.

<sup>109</sup> Chester S. Chard, *op. cit.*, pp. 120-121.

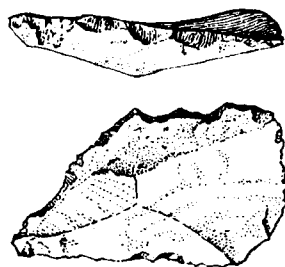
<sup>110</sup> Grahame Clark, *op. cit.*, p. 45.

FIGURE 7



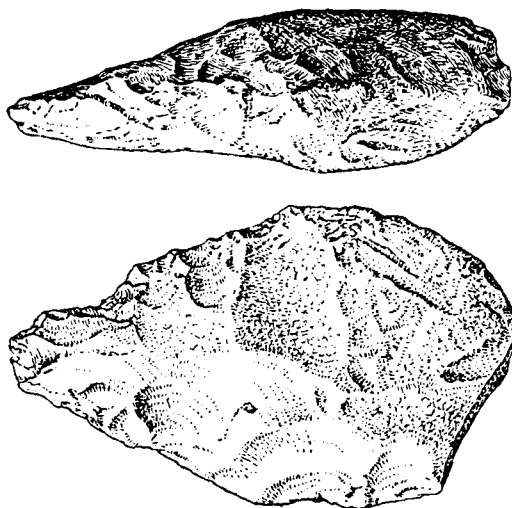


LEVALLOISIAN



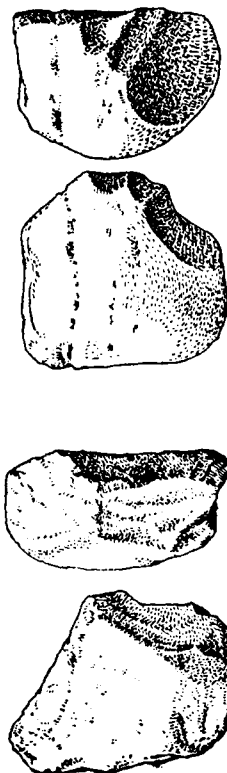
CLACTONIAN

FLAKE TOOLS



ABBEVILLEAN

CORE TOOLS



PEBBLE TOOLS

Tool traditions of Europe — pebble tools, core tools, flake tools, and blade tools viewed from both the side and the edge  
(Washburn, 1960)

and wounded (Shanidar Neanderthals I and III) had been cared for in the cave. . . .” Shanidar IV had even been buried to the accompaniment of flowers, with at least eight species of flowers recognized by pollen analysis. Dr Solecki concludes that: “In the millions of years of evolution that began with the apelike hominids of Africa it is among the Neanderthals that we have the first stirrings of social and religious sense and feelings: the obvious care with which the lame and crippled were treated, the burials — and the flowers.”<sup>111</sup>

The noted German prehistorian, R. R. Schmidt, attempted to delineate “The World-Picture of the Neanderthals” (“Das Weltbild des Neandertalers”) in his famous work *Der Geist der Vorzeit* (1934). He found among the European Neanderthals evidence of “the first care of the dead,” “the beginnings of magical-proto-logical thought,” and a “sense of family.” Dr Schmidt also reported the finding of a number of bear skulls, with the accompanying cervical vertebra and limb bones, in an alpine bear cave — the Drachenloch — and in Peter’s cave at Belden in Unterfranken, Germany. He suggested that the bear skulls may have been employed in sort of ritual, similar to the preservation by contemporary Eskimos and Indians of the skulls of the animals they hunt in the belief of their return to life.<sup>112</sup>

Additional evidence of the emergence of some sort of religious sense or religious ritual in the Early Würm period has been uncovered at the Neanderthal sites of Monte Circeo, Italy, and the Teshik-Tash cave in Uzbekistan. The skull found at Monte Circeo “had been carefully placed on a sort of platform after removal of the brains and surrounded with a circle of stones,” which does “suggest some sort of skull cult or ritualism.”<sup>113</sup> At the Teshik-Tash burial, the head of the Neanderthal infant had been “surrounded by six pairs of horns of the Siberian mountain goat, which had evidently been stood upright in a circle while still attached to the frontal bone.”<sup>114</sup> As Clark (1970) notes, although “the precise meaning of the ring of goat skulls . . . may elude us, it clearly indicates concern with the dead.”<sup>115</sup>

The advances in tool technology, the evidence of the ability to adapt successfully to a deteriorating and extremely cold climate, and the emergence of some sort of magic and religion indicate an

<sup>111</sup> Ralph S. Solecki, *Shanidar: The First Flower People*, Alfred A. Knopf, New York, 1971, pp. 252-253 and pp. 269-270.

<sup>112</sup> R. R. Schmidt, *Der Geist der Vorzeit*, Keil Verlag, Berlin, 1934, pp. 103-108.

<sup>113</sup> Chester S. Chard, *op. cit.*, p. 123.

<sup>114</sup> Grahame Clark, *op. cit.*, p. 45.

<sup>115</sup> Grahame Clark, *Aspects of Prehistory*, University of California Press, Berkeley, 1970, p. 114.



accelerated pace of cultural evolution among the Neanderthal populations of Europe and western Asia. Chard observes that by the Early Würm period, Eurasia had become "the important area of progress." In contrast to the more advanced cultures of Europe and western Asia, Dr Chard notes "the co-existence of areas of extreme conservatism such as southern Africa (where the local version of Acheulian survived after its disappearance elsewhere as at the famous site of Kalambo Falls), presumably India, and certainly Southeast Asia from what we know."<sup>116</sup>

<sup>116</sup> Chester S. Chard, *op. cit.*, p. 120.

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# Herodotus

## I

By R. GAYRE OF GAYRE

Herodotus was the son of Luxes and Rhoëo, Rhoio or Dryo, born at Halicarnassus in Caria, in the south-west corner of Asia Minor, in about the year B.C. 485. It belonged originally to the Doric Hexapolis, but at that time was isolated from this confederacy and so became a Persian dependancy. Early in life he began reading on a great scale, and from 464-454 it would appear that he travelled. He was born a Persian subject and continued as such till 30 or 35 years, although by origin was a Dorian. He belonged to one of the noble and wealthy families of Halicarnassus.

Halicarnassus was under Queen Artemisia, who had been allowed by the Persians to rule after the death of her husband. She was the daughter of Lygdamis. On her mother's side she was a Cretan. She also ruled Cos, Nisyrus, and Calydna, at the time of Herodotus's birth. She left her crown to her son Pisindelis (born about B.C. 498) who was succeeded in turn by Lygdamis.

The family of Herodotus belonged, as we have observed, to the upper class. He had a brother Theodore, and an uncle or cousin of the name of Panyasis, who was an epic poet, and of such importance that Lygdamis, suspecting him of treason, put him to death. It is likely that Herodotus shared his relative's views, and was either exiled, or left voluntarily, from Halicarnassus.

His education was Greek, which consisted of grammar, gymnastic training, and music. A knowledge of literature, and a close acquaintance with the Homeric classics would be essential to a gentleman's education. Very early he adopted the Ionic dialect, and his history is written in that language. There is no doubt that as a result of his early devotion to writing and reading he had a vast knowledge of the literature. Homer's *Iliad* and the *Odyssey* were familiar. He is acquainted with the poems of the epic cycle. He quotes, or otherwise shows familiarity with, the writing of Hesiod, Olen, Musaeus, Bacis, Lysistratus, Archilochus of Paros, Alcaeus, Sappho, Solon, Aesop, Aristeas of Proconnesus, Simonides of Ceos, Phrynichus, Aeschylus, and Pindor. He quotes and criticises Hecataeus.

There was never any doubt that with all his reading he was not a recluse. From an early age he travelled in Greece and foreign countries. He travelled in European Greece and Asia Minor more than once and visited all the more important islands, including Crete. He undertook the perilous journey from Sardis to Susa,