date and layer proposed for the objects from Troy together with the connection between these and the objects from Alacahöyük in the light of now finds peculiar to this area. The Dorak objects,[88] in spite of the differences in date and technique between them, show that with the progress of research new materials may be obtained in Western Anatolia.[89]

Ankara Burhan TEZCAN

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[88] ILN. no. 6278 November 28 1959 p. 754 ff.

[89] After this Article given to print H. Kocabaş kındly shoved me one Bronze Castanet and four silver vases, from his rich collection. We have no doubt that these give pieces also belongs to the Horoztepe.

THE RELATIVE SIZE OF THE PERMANENT INCISORS IN THE SUBORDER ANTHROPOIDEA

MUZAFFER ŞENYÜREK

In the second part of my doctorate dissertation entitled "A Metric Approach to the Study of the Evolution of Human Dentition" presented to Harvard University in 1939, I had studied the relative size of the permanent incisors in the great anthropoids and hominids by means of diagrams.[1] In the published summary of this thesis, in this regard, I had stated: "*In the common ancestors of Hominidae and Pongidae the size of the incisors relative to the size of the molars was small as in man and gorilla.*"[2] During the course of a second visit to the United States in 1946 and 1947, I had occasion, by utilizing the collections of the American Museum of Natural History in New York and the United States National Museum in Washington, D. C., especially that of the latter institution, to enlarge the series of some species of infra-human primates which I had studied at Harvard, and also to add the measurements of the teeth of some species I had not examined before. In view of this body of material and the new fossil discoveries that have accrued since 1939, I have considered it worthwhile to study the relative size of incisors in the suborder Anthropoidea,[3] by the extension of an index that had been utilized by the late Prof. Weidenreich.[4]

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[1] Şenyürek, 1939.

[2] Şenyürek, 1942, pp. 9-10.

[3] Simpson's division of the order Primates into only two suborders, namely Prosimii and Anthropoidea, has been adopted in this study (see Simpson, 1945, pp. 61 and 64).

[4] Weidenreich had expressed the robustness value of I_2 as a percentage of that of M_1 (see Weidenreich, 1937, p. 132). In the present study the robustness values of the two lower incisors are expressed as percentages of that of M_1 and those of the upper incisors as percentages of that of M^1.

MATERIAL

The material measured by me was studied in the Museum of Comparative Zoology and the Peabody Museum of Harvard University (1938-1939 and 1946-1947), the Mammals Department of the United States National Museum in Washington, D. C. (in 1946-1947) and in the American Museum of Natural History in New York (in 1946-1947).[5] The teeth measured, excepting a small portion, were *in situ* in the jaws. In this study on the teeth only one selective requirement was made; namely, that only fresh or very slightly worn teeth were measured. The reason for this, as I pointed out before, is that attrition not only affects the heights of the crown, but also its length.[6] While the length is affected by occlusal as well as interproximal wear, the widths of the teeth are not so much affected, save in advanced stages of attrition.[7] As the degree of attrition affects the dimensions of the crown it is clear that the teeth examined should be nearly of the same state of preservation in order to insure comparable measurements.[8] In the incisors, as in other teeth, the advance of the wear reduces the robustness value and at the same time increases the crown index. In view of this observation, the teeth with strong attrition were not measured. However, a slight degree of attrition was present in some of the teeth of recent man measured at the Peabody Museum of Harvard University. This mixed series of recent man, including the teeth of Melanesians, Polynesians, Negroes, American Indians and Whites was called "*Homo sapiens* series" in my former studies.[9] However, as I now include the Neanderthal men also in the

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[5] In this connection I wish to express my thanks to Professor A. S. Romer and Mrs. Barbara Lawrence Schevill of Harvard University; Dr. R. Kellog of the U. S. National Museum and Professors W. K. Gregory and E. H. Colbert of the American Museum of Natural History for allowing me to study the primate collections in their institutions. In this connection I also wish to remember the memories of my late teachers Prof. E. A. Hooton of the Anthropology Department and Prof. G. Allen of the Mammals Department of Harvard University for permitting me to study the material in their respective Departments.

[6] See Şenyürek, 1939.

[7] *Ibid.*,

[8] *Ibid.* See also Şenyürek, 1951b, p.460.

[9] See Şenyürek, 1939; Şenyürek, 1941, Tables 1 and 2; Şenyürek, 1946, Table 2; Şenyürek, 1952.

species *Homo sapiens*, considering them a subspecies group of this species,[10] in the present paper this mixed series, including the teeth of specimens of various living races of man, is called Recent Man. In addition to this series in the tables appended are also included the measurements of the teeth of a small portion of the ancient inhabitants of Anatolia, which I have studied to date. In this series also some teeth exhibit some attrition.

In the appended tables the measurements of all species of living infrahuman primates are those taken by me. In addition to these, these tables include the measurements of the teeth of various fossil apes, fossil hominids as well as living races of man, that have been taken from the literature. For the sexes of the forms of Neanderthal man from Europe the study of Hrdlička [11] and the "Catalogue des hommes fossiles" [12] have been consulted. For the synonomies of the specific names of infrahuman members of Anthropoidea the recent works of Fiedler [13] and Hill [14] have especially been followed. In addition to these the works of Elliot,[15] Coolidge [16] Pocock [17] and Kloss [18] have also been consulted.

METHOD

The size of the teeth, or more properly the area of the crowns, is expressed by the robustness value (length × width),[19] utilized by the late Professor Weidenreich in his monumental work on the

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[10] See Şenyürek, 1959, p. 124.

[11] See Hrdlička, 1930.

[12] See *Les préhominiens et les hommes fossiles. Commission pour l'homme fossile. Catalogue des hommes fossiles.* Fascicule V. Congrès Géologique International. Comptes Rendus de la dix-neuvième session, Section V. Alger.

[13] See Fiedler, 1956.

[14] See Hill, 1957 and 1960.

[15] See Elliot, 1912.

[16] See Coolidge, 1929 and 1933.

[17] See Pocock, 1927.

[18] See Kloss, 1929.

[19] In the present study, the length of the incisors is the maximum mesio-distal diameter of the crown along the incisive edges of the teeth and the width is the maximum bucco-lingual dimension, within the confines of enamel, taken at right angles to the previous measurement, both dimensions having been measured in millimeters with a vernier-caliper, to the tenth of a millimeter.

dentition of *Pithecanthropus pekinensis*.[20] The relative sizes of the incisors are expressed by the following indices: [21]

$$\frac{\textit{Robustness of } I^1 \times 100}{\textit{Robustness of } M^1}, \frac{\textit{Robustness of } I^2 \times 100}{\textit{Robustness of } M^1}, \frac{\textit{Robustness of } I_1 \times 100}{\textit{Robustness of } M_1}$$

$$\text{and } \frac{\textit{Robustness of } I_2 \times 100}{\textit{Robustness of } M_1}.$$

THE NUMBER OF THE PERMANENT INCISORS

In comparing the incisors of Anthropoidea and Prosimii Sir Clark states: "*Compared with the latter, the incisors in the higher Primates, i. e. the Anthropoidea, display a much greater constancy of form, and are characterized by their spatulate form and their relatively straight cutting edge.*" [22] This statement of Sir Clark is especially true for the number of incisors in the suborder Anthropoidea. In the recent Prosimii, while the common number is two incisors in each half of each jaw, the number is three in each half of the lower jaws of *Tupaia* and *Ptilocercus*.[23] On the other hand, in *Tarsius*[24] the number is reduced to one in each half of the lower jaw, to one in each half of the upper and lower jaws of *Daubentonia*,[25] and none in the upper jaw of *Lepilemur*.[26] As for the fossil Prosimii, while two incisors also occur amongst them, the primitive Eutherian condition of 3 incisors in each half of each jaw seems to have been retained by the fossil tupaioid species *Anagale gobiensis*.[27] In contrast to this in some other genera of fossil Prosimii the number of incisors is reduced to one on each side of the lower jaw or both jaws and even to none in the lower jaw or, apparently

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[20] See Weidenreich, 1937, p. 57.

[21] As we stated before, Weidenreich had used only the last one of these indices (see Weidenreich, 1937, p. 132).

[22] Clark, 1959, p. 83.

[23] See Clark, 1934, p. 231 and 1959, p. 87.

[24] See Elliot, 1912, p. 7; Clark, 1934, p. 87; Clark, 1959, p. 101; Hill, 1955, p.155; Fiedler, 1956, p. 125.

[25] See Elliot, 1912, p. 1; Hill, 1953, p. 677; Fiedler, 1956, p. 98; Clark, 1959, p. 99.

[26] See Elliot, 1912, p. 115; Clark, 1934, p. 78; Hill, 1953, p. 443; Fiedler, 1956, p. 83.

[27] See Clark, 1934, p. 231 and 1959, p. 87; Piveteau, 1957, p. 35.

more rarely, in the upper jaw, which need not be gone into in detail here.[28] These observations are in complete harmony with the statement of Sir Clark to the effect that: "*It seems that, of the whole dental series, the incisor teeth have shown the greatest variability in the lower Primates.*"[29]

In contrast to the Prosimii, in which the reduction in the number of incisors may even be a generic character in some cases, in members of Anthropoidea the number is commonly two in each half of each jaw. The supernumerary incisors are of infrequent occurrence in recent man,[30] and they occur also rarely in the infrahuman members of Anthropoidea.[31] The congenital absence of the upper lateral incisors are known to occur relatively rarely in various racial groups of recent man,[32] and also scantily in the anthropoid apes.[33] The lower incisors are also known to be rarely missing in some racial groups of recent man,[34] and Schultz records the occasional absence of the lower central incisor in some members of Cercopithecoidea and Ceboidea.[35] However, these reductions are neither generic, nor specific characters in the suborder Anthropoidea, and occur on the whole rather rarely. Thus, it can safely be stated that two incisors in each half of each jaw occur more commonly in members of Anthropoidea than in Prosimii which manifest a greater variation in this respect.

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[28] For the reduction in the number of incisors in fossil Prosimii see Hill, 1953 and 1955; Gregory, 1920; Clark, 1934 and 1959; Fiedler, 1956.

[29] Clark, 1959, p. 83.

[30] See Pedersen, 1949, pp. 32-35; Lasker, 1950, p. 193; Moorrees, 1957, p. 50.

[31] See Schultz, 1935, p. 552.

[32] See Hrdlička, 1921, pp. 174-176; Schultz, 1935, p. 551; Ashley-Montagu, 1940, pp. 336-342 and 349-350; Pedersen, 1949, pp. 38-45; Dahlberg, 1951, Table 24; Şenyürek, 1952, p. 160.

[33] See Schultz, 1935, p. 551 and Table 21.

[34] See Schultz, 1935, p. 551; Pedersen, 1949, pp. 39-45; Moorrees, 1957, p. 51.

[35] See Schultz, 1935, p. 551 and Table 21. According to Schultz the lower central incisor is absent in 3.8 % of *Alouatta* (see Schultz, 1935, Table 21). For the superfamilies Ceboidea and Cercopithecoidea see Simpson, 1945, pp. 64 and 66.

THE RELATIVE SIZE OF THE INCISORS

On account of the great bodily size differences in the members of the suborder Anthropoidea, a comparison of the absolute sizes of the incisors in the whole suborder is not as informative as the relative sizes of the front teeth, except in the related forms. For this reason in the present paper the relative sizes of the incisors in the suborder will be studied and only a brief passing reference will be made to the absolute size of these teeth in the hominids.

The robustness values of the upper and lower incisors relative respectively to those of the upper and lower first permanent molars are listed in Tables I and II. In these tables, in the case of the series measured by me the incisors and molars contrasted come from the same individuals, which has been done in order to safeguard against discrepancies which may be caused by differences in numbers in various teeth.[36] However, in the case of fossil material this could not always be realized and thus in some of these the indices are calculated from a single tooth or the average robustness values of the incisors and molars based on different numbers of specimens. In case of the teeth of the recent races of man taken from the literature the indices were obtained from the average robustness values of the incisors and molars, calculated from the average length and width dimensions given by various authors.

Upper Central Incisor: The size of I^1 relative to that of M^1 in the suborder Anthropoidea is shown in Table I. This table shows that in Ceboidea there is considerable variation in the relative size of the upper central incisors, both relatively small and relatively large ones occurring. The relatively smaller upper central incisors are found in *Leontocebus geoffroyi*, *Callithrix santaremensis*, *Leontocebus oedipus and Callicebus cupreus*. These are followed by *Saimiri sciurea*, *Callicebus remulus*, *Leontocebus midas* and one specimen of *Pithecia monacha* which clearly have relatively smaller upper central incisors than the other species of Ceboidea listed, possessing larger upper first incisors. From the

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[36] In some of the series more specimens than those shown in these tables were measured. But as either the incisors or the first molars were not available or were not measured due to a defect, these extra specimens are not listed in these tables. These will be incorporated in the series of individual teeth that will be published in the near future.

same table it is seen that the ranges of the averages of Cercopithecidae overlap those of Ceboidea, again both relatively small and relatively large upper central incisors occurring. In Cercopithecidae, the three species of Semnopithecinae listed *(Presbytis cristatus, Nasalis larvatus* and *Colobus polykomos)* have relatively small indices, the size of the upper first incisor in this subfamily being comparable with those of Ceboidea with relatively small upper central incisors. In Cercopithecinae only one specimen of *Theropithecus gelada* has a small upper central incisor like those of members of Semnopithecinae, while in other forms of this subfamily the upper central incisor is a relatively large tooth, in some even exceeding M^1. It is evident that, as in Callithricidae and Cebidae, in Cercopithecidae as well there is considerable variation in the size of the upper central incisors, even in the same genus.

As for Hominoidea,[37] it will be observed that in *Limnopithecus legetet* from the Lower Miocene of East Africa[38] and in *Pliopithecus cf. antiquus* from the Upper Vindobonian, i. e. Middle Miocene, of Europe,[39] the upper central incisors are relatively small being comparable to those of members of Semnopithecinae listed. In *Limnopithecus macinnesi*, on the other hand, the upper central incisor is relatively larger than those of *Limnopithecus legetet* and *Pliopithecus cf. antiquus*. The living members of Hylobatinae are seen to display some variation in the I^1/M^1 ratio. The values of *Hylobates hoolock* and *Hylobates concolor*, each represented by a single specimen, are lower than those of the the Miocene species, that is they appear to be reduced. Aside from these, however, the values of most species of living Hylobatinae occupy positions between those of *Limnopithecus legetet* and *Pliopithecus cf. antiquus*, that is their upper central incisors are either relatively small or slightly enlarged. Among the recent gibbons the value of only one specimen of *Hylobates agilis* comes close to that of *Limnopithecus macinnesi*, in which I^1 appears to be rather enlarged.

In *Proconsul africanus* from the Lower Miocene of East Africa[40] the relative size of this tooth is near that of *Limno-*

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[37] For the superfamily Hominoidea see Simpson, 1945, p. 67.

[38] For the geological age of East African sites see Clark and Leakey, 1951, pp. 4-6.

[39] For the geologic ages of the finds of *Pliopithecus* see Hürzeler, 1954, pp. 55-56.

[40] For the geologic age of *Proconsul* see Clark and Leakey, 1951, pp. 4-6.

pithecus legetet and comparable with those of some members of Semnopithecinae. In *Proconsul nyanzae* the size of this tooth appears to be slightly larger than that of *Proconsul africanus*, but still it is no larger than those of some members of Semnopithecinae. As for the modern great anthropoids, the relative size of the upper central incisor of *Gorilla gorilla* is only somewhat larger than those of *Proconsul africanus* and *Proconsul nyanzae*, that is it is only slightly enlarged as compared with that of *Proconsul*. On the other hand, in living *Pongo* and *Pan* the upper central incisor is, relatively speaking, much greater than those of *Gorilla* and *Proconsul*. Indeed, in *Pongo pygmaeus* and *Pan troglodytes* the robustness value of I^1 is, on the average, greater than that of M^1. It is evident that, as compared with the Miocene form *Proconsul*, the upper incisors of the living great anthropoids are enlarged, this tendency for enlargement being least in *Gorilla*, which has retained a more primitive condition than the other two genera. In *Oreopithecus bambolii* from the Pontian, that is the Lower Pliocene, deposits of Italy,[41] the relative size of this tooth appears to be larger than that of *Gorilla*, but is smaller than those of *Pongo pygmaeus* and the species of *Pan*.

As for Hominidae, it will be observed that in *Pithecanthropus pekinensis* and especially Neanderthal man the relative size of this tooth is as large as that of *Proconsul nyanzae*, but in some, especially in some specimens of Neanderthal man it is somewhat larger. It thus appears that in some of the Pleistocene hominids also the upper central incisors tended to be slightly enlarged, although the enlargement was not more than that of the living *Gorilla* and certainly less than that of the earlier *Oreopithecus bambolii*.[42]

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[41] For the geologic age of *Oreopithecus bambolii* see Hürzeler, 1958, pp. 4 and 45. The Pontian stage in *sensu stricto* is now referred to as Pikermian by Crusafont Pairo (see Crusafont Pairo, 1954, p. 102), a term which is now gaining adherence.

[42] The robustness value of an upper incisor, considered to be an upper lateral incisor of *Pithecanthropus modjokertensis* by the late Prof. Weidenreich is given by this author as 104 (see Weidenreich, 1945, Table 5). I/M^1 ratio calculated from this incisor and M^1 of *Pithecanthropus modjokertensis* (the average robustness value of the right and left M^1 calculated from the dimensions given by Weidenreich, 1945, is 167.21) is 62.13. The absolute size of this tooth as well as the I/M^1 ratio of 62.13 are too large for upper lateral incisors of hominids, fossil and living (see Table 1). Thus it is more likely that this incisor may represent an upper central incisor of *Pithecanthropus modjokertensis* (for the specific names of *Pithecanthropus* of Java see von Koenigswald, 1950), which is also the opinion of von Koenigswald (see Weidenreich,

In at least most of the recent races of man listed in Table I the upper central incisor is relatively smaller than those of *Pithecanthropus pekinensis* and especially that of Neanderthal man. Among the recent races listed Bantus seem to have relatively larger upper central incisors than the other races.

In this brief review of the relative size of the upper central incisors, the members of Australopithecinae have been left to the end. From Table I it will be seen that the upper central incisor of *Australopithecus africanus transvaalensis* of South Africa is relatively smaller than those of not only the fossil hominids discussed but also relatively smaller than those of the recent races of man, that is in this form this tooth is reduced. The I^1/M^1 ratio of *Paranthropus robustus crassidens*, which is of later date than *Australopithecus*,[43] is even smaller, that is further reduced. The I^1/M^1 ratio of the recently discovered "*Zinjanthropus*" *boisei*[44] from the Olduvai Gorge is still smaller than that of *Paranthropus robustus crassidens*. It is evident that the tendency for the reduction of I^1 displayed by *Australopithecus* and *Paranthropus* is even more extreme in this form from the Olduvai Gorge, found with an Oldowan industry.[45]

Upper Lateral Incisor: As can be seen from Table I, in Ceboidea the relative size of I^2 also shows considerable variation, *Leontocebus geoffroyi*, *Callicebus remulus*, *Callicebus cupreus* and *Aotes trivirgatus* having the lowest indices in this superfamily. The indices of the members of Cercopithecidae again overlap those of Ceboidea, those with small indices coming close to the South American monkeys with relatively the smallest upper lateral incisors. In contrast to the upper central incisor, in the relative size of the upper lateral incisor there is a great deal of overlapping between the members of Semnopithecinae and those of Cercopithecinae. As is true for Ceboidea, members of Cercopithecidae also display both relatively small and large upper lateral incisors.

1945, p. 29). Thus if this isolated incisor is an upper central incisor of *Pithecanthropus modjokentensis*, as seems likely, it would further support the conclusion reached above that in the early hominids the upper first incisors tended to be somewhat enlarged.

[43] For the ages of australopithecines see Oakley, 1954, Table 1, and Robinson, 1956, p. 6.

[44] For this find see Leakey, 1959.

[45] See *ibid.*, p. 491. Leakey also has noted the reduced size of the incisors in this fossil form (see Leakey, 1959, p. 491).

The I^2/M^1 ratio of *Pliopithecus cf. antiquus* is small, being smaller than those of Ceboidea and Cercopithecidae, only the available minimum value of *Callicebus remulus* coming near it. This would suggest that the relative size of the upper lateral incisor of this Miocene member of Hylobatinae might have already been slightly diminished. The indices of the recent members of Hylobatinae *(Hylobates* and *Symphalangus syndactylus)* are higher than that of *Pliopithecus cf. antiquus*, but not higher than those of members of Semnopithecinae. Amongst the species of Hylobatinae there is some variation in the relative size of this tooth. In those with relatively higher indices the upper lateral incisors are probably enlarged to a slight degree.

The I^2/M^1 ratio of *Proconsul africanus* is higher than that of *Pliopithecus cf. antiquus* and near those of some members of Hylobatinae and Semnopithecinae. In the larger species *Proconsul nyanzae* the index is lower than that of *Proconsul africanus* coming, in specimen 712, 1947, where both I^2 and M^1 are present, close to those of some members of Ceboidea and Cercopithecidae with small upper lateral incisors. Amongst the living great anthropoid apes, I^2/M^1 ratio of *Pongo pygmaeus* is still near that of *Proconsul africanus*, that is, unlike its I^1, the upper second incisor of the modern form is not much enlarged. The same is also true for *Gorilla gorilla*, in which this tooth is very slightly enlarged as compared with that of *Proconsul africanus*. On the other hand, in *Pan* this tooth, like its I^1, is greatly enlarged. Indeed the average values of *Pan troglodytes* and one specimen of *Pan paniscus*, the pygmy chimpanzee, are the highest in the suborder Anthropoidea. The values of *Oreopithecus bambolii* do not differ much from those of *Proconsul africanus*. It thus appears that, unlike its I^1, in I^2 this Pontian (Pikermian) form has retained a relatively primitive condition.

As for the hominids, the I^2/M^1 ratios of *Pithecanthropus pekinensis*, Rabat man and especially those of the forms of Neanderthal man from Europe tend to be higher than those of *Proconsul africanus*. It would appear that in some of the Pleistocene hominids the relative size of the upper lateral incisor was somewhat enlarged, as compared with *Proconsul*, the enlargement being in some cases somewhat more than that of *Gorilla*. The index of the Neanderthal man from Et-Tabūn tends to be lower than those of European forms of Neanderthal man, coming near the value of Rabat man. The index of the

Skhūl form of Neanderthal man from the Near East is still lower than that of the Tabūn form, agreeing with that of some living races of recent man. The indices of recent races of man tend to be lower than those of the fossil hominids enumerated above, save those of the Skhūl specimens. Amongst the living races Bantus, Kaffirs and Bushman seem to have the relatively largest upper lateral incisors and the recent Whites the smallest.

As for Australopithecinae, the I^2/M^1 ratio of *Australopithecus africanus transvaalensis* is smaller than those of the fossil hominids as well as those of recent man. Indeed, the value of one specimen of *Australopithecus africanus transvaalensis* is lower than the minima of the infrahuman primates that I have measured. It is apparent that this tooth of *Australopithecus* tends to be relatively small, that is reduced, as I had already noted in 1941.[46] The value of *Australopithecus africanus transvaalensis* specimen falls in the observed range of variation of three specimens of *Paranthropus robustus crassidens*, the average value of which is only slightly lower. It is evident that in australopithecines of South Africa, like their I^1, this tooth also was, relatively speaking, small. The tendency in the direction of a relatively small I^2 displayed by South African australopithecines, is even more extreme in the so-called "*Zinjanthropus*" *boisei* from the Olduvai Gorge, which has the smallest I^2/M^1 ratio among the members of the suborder Anthropoidea studied by me. It is evident that "*Zinjanthropus*" in the relatively small size of its upper incisors comes nearer to the australopithecines of South Africa, especially *Paranthropus robustus crassidens*,

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[46] In my study of 1941 (Şenyürek, 1941, p. 293) I had stated: "*The size of the upper lateral incisor of the female* Plesianthropus *is smaller than that of the anthropoids and* Sinanthropus. *In the degree of reduction of this tooth* Plesianthropus *had overshot the stage represented by* Sinanthropus *and had paralleled the later stages of human evolution.*" A scrutiny of Table 1 will reveal that the absolute size of I^2 in *Australopithecus africanus transvaalensis* (formerly called *Plesianthropus transvaalensis*) and that of *Paranthropus robustus crassidens* are smaller than those of all the fossil hominids listed and smaller even than that of the recent Australian aborigines, falling between the value of Australian aborigines and those of the other living races. It is evident that in these australopithecines of South Africa the I^2 is not only relatively but also absolutely small, that is reduced and precociously specialized. In the recently discovered Olduvai form the robustness value of I^2 is near that of *Paranthropus robustus crassidens*, that is in this newly discovered form also this tooth is greatly reduced, being thus prematurely specialized.

than to other hominids. Indeed, its I^1/M^1 and I^2/M^1 ratios are even smaller than those of *Paranthropus robustus crassidens*, that is more advanced. In this connection it is of interest to note that in a recent paper Robinson has already referred "*Zinjanthropus*" to the genus *Paranthropus*.[47]

Leakey attributes Olduvai Bed I to the Upper Villafranchian (Lower Pleistocene),[48] which would make it earlier than the Swartkrans deposits which are generally considered as Middle Pleistocene. On the other hand, the incisor/M^1 ratios of the Olduvai form are more advanced than those of *Paranthropus robustus crassidens*, despite the earlier age attributed to it. If this earlier age is correct, it would mean that after the separation of the direct forerunners of the Olduvai form from those of the Swartkrans form, some time during the Lower Pleistocene, the drop in the incisor/M^1 ratios was more rapid in the former line than in the second. However, whether this is the case or not will be determined only after the correlation of the fossiliferous deposits of East and South Africa has been more fully established.

Lower Central Incisor: In the I_1/M_1 ratio also the members of Ceboidea show considerable variation, the lower values occurring in *Alouatta*, *Callicebus*, *Pithecia monacha* and *Cacajao* (Table II). It is possible that the relatively very small lower central incisor of *Alouatta* may be a secondary condition due to a reduction. The I_1/M_1 ratios of Cercopithecidae again overlap those of Ceboidea, but members of the former family with relatively large incisors far exceed the available maxima of the latter superfamily. In Cercopithecidae the lower values are found in species of Semnopithecinae, the members of which tend to have lower central incisors, relatively speaking, only slightly larger than those of Cebidae with small lower first incisors. In Cercopithecinae, only a couple of species approach the members of Semnopithecinae in this index, other species of the former subfamily having relatively larger lower central incisors.

The value of *Pliopithecus cf. antiquus* is slightly lower than those of Semnopithecinae, approaching those of *Callicebus*, *Pithecia monacha* and *Cacajao*. As is true for their I^1, the living members of Hylobatinae

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[47] See Robinson, 1960, p. 458.

[48] See Leakey, 1959, p. 493.

display some variation also in I_1/M_1 ratio. In some the value is near that of *Pliopithecus cf. antiquus*, in some higher, that is somewhat enlarged, while in one specimen of *Hylobates concolor* it appears to be reduced, which is also true for I_2 of this specimen.

The values of *Proconsul africanus* are near that of *Pliopithecus cf. antiquus*. Amongst the living great anthropoids, the values of this index are considerably higher in *Pongo pygmaeus* than those of the Miocene anthropoids, that is, in *Pongo pygmaeus* the relative size of this tooth has been enlarged. The values of *Pan* are still higher, that is the relative size of I_1 in this genus is still more increased. Indeed, in the whole suborder only some specimens of Cercopithecidae exceed the values of *Pan*. In contrast to *Pongo* and *Pan*, the relative size of I_1 of *Gorilla gorilla* is only slightly larger than that of *Proconsul africanus*, being, relatively speaking, no larger than those of some members of *Hylobates*. It is evident that the enlargement of I_1 is only slight in *Gorilla gorilla*, which thus retains a more primitive condition than the living *Pongo* and *Pan* which are specialized in this respect. The relative enlargement of the lower central incisor of *Oreopithecus bambolii*, as compared with that of *Proconsul africanus*, is also slight, being slightly less than that of the living *Gorilla gorilla*.

The I_1/M_1 ratio of *Pithecanthropus pekinensis* is near that of *Proconsul africanus*, being slightly less, that is at best only imperceptibly reduced. The value of the Rabat man very slightly exceeds that of *Proconsul africanus*, while the values of Neanderthal man from Europe and the Near East (Tabūn and Skhūl I child)[49] are slightly higher. It is apparent that in Neanderthal man there was a tendency to, relatively speaking, slightly enlarge the lower central incisor, the enlargement being not more than that of *Gorilla*.

The values of the recent races are lower than those of Neanderthal man and, in most cases, also lower than that of *Proconsul africanus*. Among the recent races of man, a series of Bantus, studied by Shaw, has the relatively largest lower central incisor. However, despite this Bantu series the value of which is apparently a result of the differential reduction of I_1 and M_1, a scrutiny of Table II still reveals that in

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[49] The smaller value of the Skhūl series, including also adult specimens V and IV, is apparently due to the attrition in the adults (see McCown and Keith, 1939, Plates XVII and XX).

most of the recent races of man there has been a tendency to somewhat, and to varying degrees, diminish the relative size of the lower central incisor, some having even lower values than *Pithecanthropus pekinensis*.

The I_1/M_1 ratio of *Australopithecus africanus transvaalensis* is slightly smaller than that of *Proconsul africanus*, being identical with the mean of *Pithecanthropus pekinensis*, that is in this form also I_1 is at best imperceptibly reduced. *Australopithecus africanus transvaalensis* is in this respect more primitive than the geologically later form *Paranthropus robustus crassidens* in which the I_1/M_1 ratio is not only smaller than those of all the hominids, fossil and living, listed but is also smaller than the minima of all members of Anthropoidea studied to date by me. It is evident that I_1 of *Paranthropus robustus crassidens* is, relatively speaking, greatly reduced, that is precociously specialized.

Lower Lateral Incisor: In I_2/M_1 ratio also members of Ceboidea exhibit some variation, the lowest values being found in *Alouatta, Callicebus, Pithecia monacha, Ateles geoffroy, Leontocebus midas, Cacajao* and *Leontocebus geoffroyi*. It is probable that the lower lateral incisors of *Alouatta* may be somewhat reduced. Again the ranges of means of Cercopithecidae overlap those of Ceboidea. In Cercopithecidae the smallest values are found in members of Semnopithecinae, only a few species of Cercopithecinae having comparable low values. The value of *Pliopithecus cf. antiquus* is as low as that of some species of Semnopithecinae. The I_2/M_1 ratios of some living species of *Hylobates* are near that of *Pliopithecus cf. antiquus*, that is primitive, while in some they are slightly larger, save in females of *Hylobates lar*, that is in these forms I_2 is, relatively speaking, slightly enlarged. As already noted the relative size of I_2 of one specimen of *Hylobates concolor* seems to be reduced.

The I_2/M_1 ratios of *Proconsul africanus* are near that of *Pliopithecus cf. antiquus*. In the cast of the mandible of *Dryopithecus fontani* the lower incisors, first and second, which are considerably worn, are nevertheless clearly seen to be small relative to the first molars.[50]

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[50] The ratio of the robustness value of I_2, which is slightly less affected by attrition than I_1, to M_1 is about 38.8 on the cast. It is evident that in the fresh state the index would be somewhat higher, as this tooth is more worn than M_1. For the pictures of this mandible see Gaudry, 1890, Pl. I, figs. 2-3 and Gregory, 1920, Fig. 254.

Unfortunately the upper incisors of this species are not known. Regarding *Dryopithecus pilgrimi*, subsequently referred to *Sivapithecus sivalensis* by Lewis,[51] from the lower Chinji zone of the Siwaliks Gregory and Hellman stated: "*As only the roots and alveoli of the incisors remain in the type of* Dryopithecus pilgrimi *(Fig. 9), there is little to be said, except that from the very moderate width across the crowns of the canines, as compared with the dimensions in modern anthropoids, it may be inferred that the transverse width of the central incisor crowns was by no means as great as in many modern orangs.*"[52] It would thus appear that in addition to *Dryopithecus fontani* from the Miocene of Europe, this Siwalik form also was more primitive, in the relative size of the incisors, than the living *Pan* and *Pongo* that will be described below.

The diagram of the robustness values of the teeth of *Parapithecus fraasi* published by Weidenreich clearly shows that in this Lower Oligocene genus the sizes of the lower incisors were comparatively small, the ratios of the lower incisors, as far as can be deduced from this diagram, being very near those of *Proconsul africanus*.[53] It is thus apparent that the relatively small size of at least the lower incisors in the Miocene anthropoids is a continuation of a primitive condition, exemplified by the Lower Oligocene genus *Parapithecus*.

In *Pongo pygmaeus* the I_2/M_1 ratio is considerably higher than that of *Proconsul africanus*, that is in living *Pongo* I_2 is considerably enlarged. The enlargement of I_2 is still greater in the living *Pan*, which has extremely large lower second incisors, only some forms of Ceboidea and Cercopithecoidea approaching it. As compared with *Pongo* and *Pan* the enlargement of I_2 of *Gorilla gorilla* appears to be slight being no more than that of some members of *Hylobates*, that is, I_2 of *Gorilla* again seems to have been less modified than those of *Pongo* ane *Pan*. The values of *Oreopithecus bambolii* also come near those of *Proconsul africanus*, tending only slightly to be larger.

The values of *Pithecanthropus pekinensis* (range 27. 61—38. 44) tend to be lower than those of *Proconsul africanus*, that is in this early

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[51] See Lewis, 1937, p. 144.

[52] Gregory and Hellman, 1926, p. 34.

[53] See Weidenreich, 1937, Diagram 49. The relatively small size of the lower incisors of *Parapithecus fraasi* from Egypt is also clearly seen in the pictures of this mandible (see Schlosser, 1911, Pl. IX, fig. 3, and Abel, 1931, fig. 53).

hominid the relative size of I_2 tends to be somewhat diminished. The I_2/M_1 ratio of Rabat man is near that of *Proconsul africanus*, being only slightly smaller. The values of Neanderthal man from Europe and the Near East (Tabūn) are somewhat higher than that of *Proconsul africanus*, that is in these forms the lower lateral incisors are relatively larger. On the other hand, the value of Skhūl X child from the Near East is near that of *Proconsul africanus*, but higher than those of recent man.[54] The indices of recent races of man are lower than those of *Proconsul africanus* and Neanderthal man and in most cases also lower than that of *Pithecanthropus pekinensis*. It appears that during the course of evolution of recent man a tendency to reduce the relative size of I_2 has been acquired.

The value of *Australopithecus africanus transvaalensis* is lower than those of *Proconsul africanus* and Neanderthal man, is in the observed range of variation of *Pithecanthropus pekinensis*, but, is still larger than the averages of recent races of man. It is apparent that the size of this tooth of *Australopithecus africanus transvaalensis* is somewhat diminished but not, relatively speaking, to the same extent as its upper incisors. The same is also true for I_1 of this form. On the other hand, the values of *Paranthropus robustus crassidens* are much lower, being lower than those of all the members of Anthropoidea studied by me, including the recent races of man. It is evident that *Paranthropus robustus crassidens* is precociously specialized in this respect.

The account given above, on the relative size of the upper and lower incisors in the suborder Anthropoidea, shows that the relative size of the incisors in the Oligocene form *Parapithecus fraasi*, of the family Parapithecidae,[55] and in the Miocene representatives of Hylobatinae and Ponginae, already mentioned, the incisors, despite some variation, were on the whole relatively small teeth. The conditions existing in *Parapithecus fraasi*, *Limnopithecus legetet*, *Pliopithecus cf. antiquus*, *Proconsul africanus*,[56] *Proconsul nyanzae*, *Dryopithecus fontani* and

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[54] The smaller index of the Skhūl series, including the adult specimens V and IV are apparently a result of attrition (see McCown and Keith, 1939, Plates XVII and XX).

[55] For this family see Schlosser, 1911, p. 58 and Simpson, 1945, p. 67.

[56] Leakey (1953, p. 176) and Clark (1959, p. 120) also have noted the comparatively small size of the incisors in *Proconsul*. However, these authors do not

Sivapithecus sivalensis (D. pilgrimi) suggest that the relatively small size of the incisors in some members of Semnopithecinae, some of Cercopithecinae, and some members of Ceboidea[57] already enumerated do indeed represent a primitive condition and that the relatively large incisors of other members of Cercopithecoidea and Ceboidea represent not a primitive but an advanced stage. It would appear that the members of Ceboidea[58] and Cercopithecoidea with enlarged incisors have acquired these features independently of each other.

The evidence of the fossil forms shows that in the ancestral stock of Hominoidea the incisors were comparatively small teeth, which is in harmony with the conclusion I reached in 1939 to the effect that the incisors of the common ancestors of the hominids and anthropoids were relatively small teeth.[59] It appears that in some of the living members of Hylobatinae[60] and in the genus *Gorilla*, of the subfamily Ponginae, the primitive conditions have been little modified, the enlargements occurring being of a slight extent. On the other hand, the incisors of *Pan* and those of *Pongo pygmaeus*, with the seeming

mention the somewhat larger relative size of I^1 in *Proconsul nyanzae*, as compared with *Proconsul africanus*.

[57] As far as can be judged from the pictures, the lower second incisor of *Homunculus patagonicus* from the Miocene of Argentina (see Stirton, 1951, Pl. 14, fig. 6) is, relatively speaking, small, which is also true for the lower second incisor of *Neosaimiri fieldsi* from the Miocene of Columbia (see Stirton, 1951, pl. 13, fig. 1). As far as can be judged from the alveoli, the lower incisors also appear to be small in *Homunculus tatacoensis* again from the Miocene of Columbia (See Stirton, 1951, Pl. 14, fig. 1).

The likelihood of the secondary reduction of the lower incisors in *Alouatta* has already been recorded.

[58] In *Cebopithecia sarmientoi*, from the Miocene of Columbia, which according to Stirton (1951, p. 325) is related to the living *Pithecia*, the upper central incisor, to judge from the preserved root (see Stirton, 1951, p. 321 and Pl. 7) was strongly developed, like that of *Cacajao*, which also belongs to the subfamily Pithecinae. It is seen that already in Miocene times the Ceboids displayed variation in the relative size of the incisors, as is the case in the living members of Ceboidea, some like *Homunculus* and *Neosaimiri fieldsi* possessing relatively small lower incisors and *Cebopithecia sarmientoi* displaying an enlarged upper central incisor.

[59] See p. 1 and also Şenyürek, 1939, and 1942, pp. 9-10.

[60] Variation occurring in recent members of Hylobatinae has already been recorded, those with relatively higher indices probably paralleling to a lesser extent some of the living Ponginae.

exception of I^2,[61] have been greatly enlarged.[62] This represents a specialization, which these living hominoid genera, as is shown by the small size of the incisors in fossil hominoids, have acquired inde-

[61] As a result of the enlargement of I^1, while I^2 lags behind, the index utilized by Remane (1921, p. 29) and Patte (1959, p. 236), expressing the length of I^2 as a percentage of that of I^1 is relatively low in *Pongo*. The values of this index (Length of $I^2 \times 100$/Length of I^1) in some hominoids are listed below, the figures in brackets showing the number of individuals:

	I^1 Length	I^2 Length	Index
Proconsul africanus (Calculated from Clark and Leakey, 1951)	7.00 (2)	5.35 (2)	77.05
Proconsul nyanzae (Calculated from Clark and Leakey, 1951)	8.85 (6)	5.00 (1)	56.49
Pongo pygmaeus pygmaeus ♂+♀	13.68 (11)	8.09 (11)	59.35
Pongo pygmaeus palaeosumatrensis (Calculated from Hooijer, 1948)	14.90 (27)	9.60 (44)	64.42
Pongo pygmaeus pygmaeus (Calculated from Hooijer, 1948)	14.00 (5)	8.60 (27)	61.42
Pan troglodytes ♂+♀	12.43 (9)	9.11 (9)	73.28
Pan schweinfurthi ♀	11.50 (1)	8.20 (1)	71.30
Pan paniscus ♀	10.95 (1)	8.50 (1)	77.62
Gorilla gorilla ♂+♀	13.97 (9)	10.21 (9)	73.06
Australian aborigines ♂+♀ (Calculated from Campbell, 1925)	9.36 (56)	7.65 (78)	81.64
East Greenland Eskimos ♂+♀ (Calculated from Pedersen, 1949)	8.41 (89)	7.05 (87)	83.82
Ancient Anatolians ♂+♀	8.66 (10)	6.62 (10)	76.40
Recent Whites. (From Patte, 1959, after Black)	9.00	6.40	71.11
Recent Man ♂+♀	8.34 (15)	7.04 (15)	84.40

From this list it is clear that *Pongo pygmaeus* possesses the lowest indices among the living great anthropoids (see also Remane, 1921, p. 29). In this feature *Pongo pygmaeus* parallels *Proconsul nyanzae* which also appears to be specialized in this respect, this condition being due at least partly to the relative enlargement of I^1 in this fossil form. The figures listed above show that in this index the ranges of the great anthropoids overlap those of the hominids to some extent.

Regarding this index of the Neanderthal man Patte (1959, p. 236) states: "*Pour les I supérieures, il semble donc que nous trouvions un indice plus fort que chez les Hommes modernes.*" Patte gives (1959, p. 236) the average $I^2 \times 100/I^1$ index of Neanderthal man as 81.0. The mean index of eight individuals of Neanderthal man, pendently from those of Ceboidea and Cercopithecoidea with relatively large incisors. The upper central incisor of *Oreopithecus bambolii*, from the Pontian (Pikermian) stage of Italy, is enlarged to some extent, more than that of *Gorilla* and some of the early hominids, in which this form appears to have paralleled, to a lesser degree, some of the living great anthropoids. The lower incisors of this form appear to have been only slightly enlarged, not more than that of *Gorilla*, that is they are still comparatively primitive, while its upper lateral incisor does not seem, relatively speaking, to have been modified.

The account given indicates that amongst the early hominids there were two main trends in the incisor teeth, in one group the incisors tending to be reduced in size and in the others all or some of the incisors tending to be slightly enlarged. The first trend is represented by the morphologically more primitive australopithecines of South Africa. Amongst the australopithecines the earlier form *Australopithecus africanus transvaalensis*, although already manifesting the tendency toward reduction, is still, in keeping with its geological age, more primitive than the later form *Paranthropus robustus crassidens* in which this tendency has resulted in relatively very small incisors. The small size of the incisors of Australopithecinae is not merely a relative matter, but in some cases actually involves great reduction of the absolute size. For example the upper lateral incisor of *Australopithecus africanus transvaalensis* and all four incisors of *Paranthropus robustus crassidens* in the degree of reduction of the absolute size had overshot *Pithecanthropus* and Neanderthal man and had come near the values of some recent races.[63] It appears that the austral pithe-

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of both sexes, from Europe, calculated from Gorjanović-Kramberger (1906), Klaatsch (1910), Virchow (1920), Martin (1923 and 1926) and Vallois (1952), is 82.52. The index of two Tabūn specimens, calculated from McCown and Keith (1939), is 80.77 and that of four Skhūl specimens is 74.74. A glance at the figures for recent man, which is an incomplete list, nevertheless reveals that Neanderthal man does not differ from some living races of man in this respect.

[62] Both Remane and Weidenreich have already noted that the incisors of *Pongo* and *Pan* are relatively larger than that of *Gorilla* (see Remane, 1921, pp. 26-27 and Weidenreich, 1937, pp. 132-133).

[63] The robustness values of the incisors of the available specimens of *Australopithecus africanus transvaalensis* and *Paranthropus robustus crassidens*, calculated from Robinson (1936), are listed below, figures in brackets denoting the numbers of individuals:

cines of South Africa are precociously specialized in the reduction of the incisors, which is in harmony with the remarks I made in 1941 regarding them: "*However,* Plesianthropus, Paranthropus *and probably* Australopithecus *are too late geologically to be direct ancestors of the Pleistocene hominids. They are somewhat modified survivors from the Pliocene period. We should regard them only as our structural ancestors, that is, as representing forms that resemble our earlier and direct ancestors.*"[64]

The tendency for the relatively small incisors exhibited by South African australopithecines has been carried even further in "*Zinjanthropus*" *boisei* from the Olduvai Gorge, in which the upper incisors are even relatively smaller than those of *Paranthropus robustus crassidens*, that is, it is, morphologically speaking, more advanced. As for the absolute size of the incisors in this form with very large cheek-teeth, the robustness value of its I^1 is near that of *Pithecanthropus pekinensis* while its I^2 is smaller than those of Peking man, Neanderthal man and even slightly smaller than that of the living Australian aborigines, that is, it is also absolutely reduced. It is thus seen that this new Olduvai form, which probably represents a species of *Paranthropus*, is also precociously specialized in the reduction of its upper incisors. Like the australopithecines of South Africa, this new australopithecine form from the Olduvai Gorge is also probably a survivor from an earlier stage of human evolution with relatively larger incisors,

	I^1	I^2	I_1	I_2
Australopithecus africanus transvaalensis	77·54 (1)	39·38 (2)	43·11 (2)	53·57(2)
Paranthropus robustus crassidens	71.25 (7)	50.18 (8)	34·05 (6)	44·92(3)

The values of *Australopithecus africanus transvaalensis* are in the ranges of variation of early hominids *Pithecanthropus* and Neanderthal man, except I^2 which is, as already noted, reduced. On the other hand, robustness values of all four incisors of *Paranthropus robustus crassidens* are inferior to those of *Pithecanthropus* and Neanderthal man and are indeed also somewhat smaller than those of recent Australian aborigines, except I_2 which is near that of the latter group. The robustness value of I^2 of one specimen of the Makapan form, again calculated from Robinson (1956), is 49.0, which is larger than those of two specimens of *Australopithecus africanus transvaalensis* from Sterkfontein (32. 48—46. 29), but is still smaller than those of *Pithecanthropus* and Neanderthal man, falling in the range of the recent races of man.

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[64] Şenyürek, 1941, p. 301.

and not a direct ancestor of later hominids with relatively larger incisors.

The trend for the slight enlargement of the incisors in early hominids, is seen in the upper incisor of *Pithecanthropus modjokertensis*, which is probably an I^1, in the upper incisors of *Pithecanthropus pekinensis*, the lower incisors of which, particularly its I_2, seems to be somewhat reduced, in the available upper lateral incisor of the Rabat man, the lower incisors of which seem to have retained a more primitive condition, and in all four incisors of the Neanderthal man. The robustness values of the incisors of *Pithecanthropus*, Rabat man and Neanderthal man[65] are larger than those of recent races of man, with the only exceptions of I^1 of the Tabūn form and I^2 and I_1 of the Skhūl form of Neanderthal man, coming near the corresponding values of the living Australian aborigines, which have absolutely the largest teeth among the recent races of man.[66] It is apparent that during the course of evolution of recent man, the absolute sizes of all incisors have been diminished, to varying degrees in different racial stocks. The absolute sizes of the first upper and lower molars of *Pithecanthropus*, Rabat man and Neanderthal man are greater than those of most of the living races of man, excepting those of the Australian aborigines, which are exceeded only by *Pithecanthropus modjokertensis*, male specimens of *Pithecanthropus pekinensis*[67] and only some of the Neanderthal specimens.

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[65] Patte also has noted that the absolute dimensions of the Lower incisors of the forms of Neanderthal man from Europe are larger than those of recent man (see Patte, 1959, p. 233).

[66] The average robustness value of I^1 of Tabūn I and the Tabūn series III, calculated from McCown and Keith (1939), is 74.62 which is near the value of Australian aborigines. The average robustness values of I^2 and I_1 of the Skhūl series, including the worn incisors of adults, are near those of the Australian aborigines, but those of the better preserved incisors of the Skhūl I and Skhūl X children are still larger than the values of the Australian natives.

[67] The average robustness values of the upper and lower first molars of the male and female specimens of *Pithecanthropus pekinensis*, calculated from Weidenreich (1937), are as follows (figures in brackets show the individuals):

	M^1	M_1
Male	162.14 [1]	162.20 [8]
Female	131.63 [5]	123.40 [5]

It is apparent that during the course of evolution of recent man, the absolute size of the incisors has usually suffered a greater reduction than the first molars, thus yielding a smaller incisor/M1 ratio. However, the rates of reduction of the incisors and the first molars have not been the same in all races and as a consequence of this differential rate of reduction there are variations in the relative sizes of the incisors in recent races of man, some having relatively larger incisors than the others, due to proportionally greater diminution of the first molars.

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TABLE I

THE ROBUSTNESS VALUES OF THE UPPER INCISORS RELATIVE TO THAT OF M^1 IN SUBORDER ANTHROPOIDEA

		Number of Individuals	Robustness of I^1	Robustness of I^2	Robustness of M^1	$\frac{\text{Robustness of } I^1 \times 100}{\text{Robustness of } M^1}$	$\frac{\text{Robustness of } I^2 \times 100}{\text{Robustness of } M^1}$
Callithrix santaremensis	♂	1	3.40	3.06	7.50	45.33	40.80
Leontocebus midas	♂	2	4.56	3.40	7.91	58.05 (50.24-65.86)	43.29 (38.46-48.13)
Leontocebus oedipus	♂	2	3.69	3.14	7.87	46.85 (42.75-50.96)	40.63 (36.12-45.14)
Leontocebus geoffroyi	♂	1	4.14	3.23	10.64	38.90	30.35
Leontocebus geoffroyi	♀	1	4.50	3.40	9.80	45.91	34.69
Aotes trivirgatus	♂+♀	5	8.53	4.71	12.66	67.34 (61.53-75.52)	37.27 (33.65-42.55)
Callicebus cupreus	♂	2	5.86	4.52	12.35	47.53 (45.23-49.83)	36.68 (33.04-40.33)
Callicebus remulus	♂	2	7.84	4.97	13.86	56.64 (51.70-61.58)	36.02 (29.82-42.22)
Pithecia monacha	♂	1	10.64	8.64	18.24	58.33	47.36
Cacajao sp.	♂	2	15.00	9.00	19.56	76.76 (75.0 -78.52)	45.96 (44.87-47.05)
Saimiri sciurea	♀+?	2	5.65	4.84	10.42	54.24 (53.79-54.50)	46.53 (45.51-47.56)
Saimiri boliviensis	♀	1	5.72	4.40	8.75	65.37	50.17
Cebus capucinus	♂	1	20.24	13.50	24.36	83.08	55.41
Cebus nigrivittatus	♂	3	18.20	16.39	26.75	68.06 (64.62-69.80)	61.41 (56.79-64.56)
Cebus apella	♂	1	17.22	15.30	25.80	66.74	59.30
Ateles paniscus	♂	1	25.92	16.10	31.11	83.31	51.75
Ateles fusciceps	♂	1	22.05	18.49	31.80	69.33	58.14

TABLE I (Continued)

THE ROBUSTNESS VALUES OF THE UPPER INCISORS RELATIVE TO THAT OF M¹ IN SUBORDER ANTHROPOIDEA

		Number of Individuals	Robustness of I¹	Robustness of I²	Robustness of M¹	Robustness of I¹ × 100 / Robustness of M¹	Robustness of I² × 100 / Robustness of M¹
Ateles geoffroy	♂	1	30.24	15.54	28.42	106.40	54.67
Lagothrix thomasi	♂	1	17.60	14.06	26.88	65.84	52.30
Lagothrix infumata	♀	1	26.88	20.70	38.86	69.17	53.26
Macaca fuscata	?	1	40.20	25.92	62.40	64.42	41.53
Macaca irus	♂	1	48.00	30.24	55.55	86.40	54.45
Macaca irus	♀	1	—	20.16	43.55	—	46.06
Papio doguera	♂	1	106.00	61.50	99.91	106.09	61.55
Theropithecus gelada	♂	1	46.80	35.84	90.64	51.63	39.54
Cercocebus albigena	♀	1	43.52	25.00	43.56	99.90	57.39
Cercocebus galeritus	♂	2	52.19	28.74	56.71	93.20 (78.34-108.06)	51.52 (40.85-62.20)
Cercocebus torquatus	♂	1	48.96	29.50	63.84	76.69	46.20
Cercocebus sp.	♂	1	51.48	27.56	55.71	92.40	49.47
Cercopithecus aethiops	♂	2	24.41	13.47	32.77	74.52 (72.35-76.69)	41.12 (39.90-42.34)
Cercopithecus aethiops	♀	1	19.20	10.24	28.05	68.44	36.50
Cercopithecus cephus	♂	2	29.60	12.60	32.50	92.93 (77.47-108.39)	38.66 (37.76-39.56)
Cercopithecus mitis	♂	2	26.52	11.42	34.92	76.29 (61.09 - 91.49)	32.71 (30.34-35.19)
Cercopithecus neglectus	♂	1	26.68	12.96	33.60	79.40	38.57

TABLE I (Continued)

THE ROBUSTNESS VALUES OF THE UPPER INCISORS RELATIVE TO THAT OF M^1 IN SUBORDER ANTHROPOIDEA

		Number of Individuals	Robustness of I^1	Robustness of I^2	Robustness of M^1	Robustness of $I^1 \times 100$ / Robustness of M^1	Robustness of $I^2 \times 100$ / Robustness of M^1
Cercopithecus nictitans	♂	1	25.08	11.55	24.96	100.48	46.27
Cercopithecus talapoin	♂	1	13.80	8.91	13.32	103.60	66.89
Cercopithecus talapoin	♀	3	12.88	7.09	12.72	102.02 (81.0-122.22)	55.88 (52.55-58.92)
Erythrocebus patas	♂	1	27.00	20.70	40.02	67.46	51.72
Presbytis cristatus	♂	2	18.80	13.95	37.21	50.57 (48.92-52.23)	37.53 (36.06-39.01)
Nasalis larvatus	♂	2	25.92[1]	20.18	46.82	57.50	43.14 (42.07-44.22)
Nasalis larvatus	♀	1	20.16	16.38	42.70	47.18	38.36
Colobus polykomos	♂	4	26.80	23.56	45.80	59.66 (45.82-80.55)	52.48 (37.83-65.62)
Colobus polykomos	♀	1	21.60	16.65	46.90	46.05	35.50
Limnopithecus legetet.[2] Calculated from Clark and Leakey, 1951	?	—	14.80	—	29.50	50.16	—
Limnopithecus macinnesi.[3] Calculated from Clark and Leakey, 1951	?	—	28.80	—	42.45	67.84	—
Pliopithecus cf. antiquus.[4] Calculated from Hürzeler, 1954	?	—	33.67	16.38	57.17	58.89	28.65
Hylobates lar	♂	2	19.12	15.80	37.38	51.18 (49.63-52.74)	42.32 (39.7 -44.95)
Hylobates lar	♀	3	17.62	14.73	31.29	56.76 (50.07-60.21)	47.04 (45.55-48.98)

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[1] One individual.

[2] I^1 and M^1 each is represented by one individual.

[3] I^1 is represented by one individual, while the figure for M^1 is the average of 6 individuals.

[4] Obtained from dimensions calculated from the ranges, except the length of I^1.

TABLE I (Continued)

THE ROBUSTNESS VALUES OF THE UPPER INCISORS RELATIVE TO THAT OF M^1 IN SUBORDER ANTHROPOIDEA

		Number of Individuals	Robustness of I^1	Robustness of I^2	Robustness of M^1	$\frac{\text{Robustness of } I^1 \times 100}{\text{Robustness of } M^1}$	$\frac{\text{Robustness of } I^2 \times 100}{\text{Robustness of } M^1}$
Hylobates lar?	♂	1	18.40	15.99	35.20	52.24	45.42
Hylobates concolor	♂	1	17.02	16.80	44.73	38.05	37.55
Hylobates hoolock	♂	1	17.39	14.80	39.53	43.99	37.43
Hylobates moloch	♂	2	20.00	15.82	38.82	51.51 (51.28 - 51.75)	40.74 (37.34-44.15)
Hylobates moloch	♀	4	20.27	17.46	37.71	54.22 (45.02 - 61.71)	46.72 (39.15-56.51)
Hylobates agilis	♀	1	18.80	15.21	29.12	64.56	52.23
Hylobates klossi	♂	1	18.24	10.85	32.33	56.41	33.56
Symphalangus syndactylus	♂	1	36.92	27.50	63.99	57.69	42.97
Proconsul africanus. Specimen 1948, 50. Calculated from Clark and Leakey, 1951	—	1	38.40	—	75.20	51.06	—
Proconsul africanus. From the averages.[5] Calculated from Clark and Leakey, 1951	—	—	40.48	30.74	75.90	53.33	40.50
Proconsul nyanzae. Specimen 712, 1947. Calculated from Clark and Leakey, 1951	—	1	—	30.00	90.72	—	33.06
Proconsul nyanzae. From the averages. Calculated from Clark and Leakey, 1951[6]	—	—	59.68	30.00	102.29	58.34	29.32
Pongo pygmaeus.	♂	3	184.61	65.54	165.16	112.13 103.16-123.01	39.71 (37.58-41.04)
Pongo pygmaeus	♀	6	151.81	65.10	147.23	103.77 (78.05-137.18)	44.43 (33.34-48.42)

[5] I^1 is represented by two individuals, I^2 by one and M^1 by seven.

[6] I^1 is represented by six individuals, I^2 by one and M^1 by four.

TABLE I (Continued)

THE ROBUSTNESS VALUES OF THE UPPER INCISORS RELATIVE TO THAT OF M^1 IN SUBORDER ANTHROPOIDEA

		Number of Individuals	Robustness of I^1	Robustness of I^2	Robustness of M^1	$\frac{\text{Robustness of } I^1 \times 100}{\text{Robustness of } M^1}$	$\frac{\text{Robustness of } I^2 \times 100}{\text{Robustness of } M^1}$
Pan troglodytes	♂	3	128.87	86.14	124.22	104.92 (89.66-116.75)	69.71 (61.45-77.93)
Pan troglodytes	♀	3	115.62	78.13	111.53	104.48 (93.68-115.77)	81.33 (74.5 -93.68)
Pan troglodytes	♂+♀	8	123.39	82.65	120.40	103.61 (89.66-116.75)	72.59 (61.45-93.68)
Pan schweinfurthi	♀	1	95.45	62.32	107.00	89.20	58.71
Pan paniscus	♀	1	87.50	64.60	87.30	100.34	73.99
Gorilla gorilla	♂	7	157.82	106.99	237.18	66.57 (59.21 - 74.07)	45.13 (39.95-51.06)
Gorilla gorilla	♀	2	143.41	108.32	237.93	60.25 (59.13 - 61.37)	45.46 (41.80-49.13)
Oreopithecus bambolii. Calculated from Schwalbe, 1916	?	—	46.34	23.62	64.00	72.40	36.90
Oreopithecus bambolii. Calculated from Hürzeler, 1949	?	—	50.96	27.34	62.60	81.40	43.67
Oreopithecus bambolii. Calculated from Hürzeler, 1958	♀	—	55.48	26.00	70.55	78.63	36.85
Australopithecus africanus transvaalensis. Specimen Sts. 52. Calculated from Robinson, 1956	?	1	77.54	46.29	172.11	45.05	26.89
Paranthropus robustus crassidens.[7] Calculated from Robinson, 1956	?	3	—	49.00	210.88	—	23.78 (18.77-32.07)
Paranthropus robustus crassidens. From the averages. Calculated from Robinson, 1956	—	—	71.25[8]	50.18[9]	199.32[10]	35.74	25.17

[7] The figures for I^2 and M^1 are averages of individuals Sk. 27, 52 and 55.

[8] Average of six individuals.

[9] Average of seven individuals.

[10] Average of thirteen individuals.

TABLE I (Continued)

THE ROBUSTNESS VALUES OF THE UPPER INCISORS RELATIVE TO THAT OF M^1 IN SUBORDER ANTHROPOIDEA

		Number of Individuals	Robustness of I^1	Robustness of I^2	Robustness of M^1	$\frac{\text{Robustness of } I^1 \times 100}{\text{Robustness of } M^1}$	$\frac{\text{Robustness of } I^2 \times 100}{\text{Robustness of } M^1}$
"*Zinjanthropus*" *boisei*. Calculated from Leakey, 1959	—	1	80.00	49.00	279.00	28.87	17.56
Pithecanthropus pekinensis. Individual D II. Calculated from Weidenreich, 1937	♂	1	81.00	—	162.14	49.95	—
Pithecanthropus pekinensis. From the averages. Calculated from Weidenreich, 1937	♂+♀	—	81.33[11]	67.23[12]	136.72[13]	59.48	49.17
Rabat Man. Calculated from Vallois, 1960	♂	1	—	68.00	144.00	—	47.22
Neanderthal Man from Europe[14]	♂+♀	5	85.54	77.49	148.43	60.36 (57.14-64.0)	52.64 (44.27 57.14)
Neanderthal Man from the Near East (Et-Tabūn).[15] Calculated from McCown and Keith, 1939	♀+ ?		73.80	61.73	131.96	59.42	46.65 (45.25-49.11)
Neanderthal Man from Near East (Skhūl I child). Calculated from McCown and Keith, 1939	♂	1	94.83	54.56	140.12	67.67	38.93
Neanderthal Man from Near East (Skhūl).[16] Calculated from McCown and Keith, 1939	♂+♀	4	79.00	51.00	133.44	59.33 (47.09-67.67)	38.35 (32.46-45.39)

[11] Average of three individuals.

[12] Average of two individuals.

[13] Average of six individuals.

[14] I^1 is represented by Krapina B (from Gorjanovic' - Kramberger, 1906), Monsempron (from Vallois, 1952), Le Moustier (from Klaatsch, 1910) and adult la Quina (from Martin, 1923) specimens. I^2 and M^1 are averages of the above four individuals and Krapina C specimen.

[15] I^1 is that of Tabūn I, while I^2 and M^1 are represented by Tabūn I, Tabūn series I and Tabūn series III.

[16] Averages of Skhūl I, IV, V and VII.

TABLE I (Continued)

THE ROBUSTNESS VALUES OF THE UPPER INCISORS RELATIVE TO THAT OF M^1 IN SUBORDER ANTHROPOIDEA

		Number of Individuals	Robustness of I^1	Robustness of I^2	Robustness of M^1	$\frac{\text{Robustness of } I^1 \times 100}{\text{Robustness of } M^1}$	$\frac{\text{Robustness of } I^2 \times 100}{\text{Robustness of } M^1}$
Australian aborigines.[23] Calculated from Campbell, 1925	♂+♀	—	74.02	52.86	146.76	50.43	36.01
Pecos Indians. Calculated from Nelson, 1938	♂+♀	—	63.29	45.60	123.93	51.06	36.79
Japanese. Calculated from Campbell, 1925 and Drennan, 1929	—	—	62.16	45.50	120.91	51.41	37.63
Bantu. Calculated from Shaw, 1931	♂+♀	—	63.19	46.08	113.30	55.77	40.67
Bantu. Calculated from Drennan, 1929	—	—	63.70	40.80	112.20	56.77	39.03
Kaffirs. Calculated from Drennan, 1929	—	—	60.90	46.86	115.14	52.89	40.69
South African Bushman. Calculated from Drennan, 1929	—	—	49.92	42.09	102.72	48.59	40.97
Bushman Tribe. Calculated from Drennan, 1929	♂+♀	—	53.95	40.20	104.94	51.41	38.30
Efé Pygmy. Calculated from v.d. Broek, 1939	♀	1	59.86	39.06	122.96	48.68	31.76
Ancient Anatolians[24]	♂+♀	11	61.38	42.37	116.58	53.63 (45.33-56.67)	36.44 (30.38-40.69)
Recent Whites. Calculated from Black, 1902[25]	—	—	63.00	38.40	126.26	49.89	30.41
Recent Man	♂+♀	12	61.22	45.86	121.24	50.66 (44.31-67.75)	37.68 (30.86-47.19)

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[23] For the numbers of the teeth taken from the literature see the works of the authors cited.

[24] This includes 6 Chalcolithic and Copper Age individuals from Alaca Höyük (from Şenyürek, 1952), Maşat Nos. 3 and 7 of Copper Age (Şenyürek, 1946), Polatlı No. 2 of Early Copper Age (from Şenyürek, 1951a) and Kumtepe No. 2 of Chalcolithic Age.

[25] Calculated from the average dimensions of Black (1902), cited by Campbell (1925), Drennan (1929), Shaw (1931) and Nelson (1938).

TABLE II
THE ROBUSTNESS VALUES OF THE LOWER INCISORS RELATIVE TO THAT OF M_1 IN SUBORDER ANTHROPOIDEA

		Number of Individuals	Robustness of I_1	Robustness of I_2	Robustness of M_1	$\frac{\text{Robustness of } I_1 \times 100}{\text{Robustness of } M_1}$	$\frac{\text{Robustness of } I_2 \times 100}{\text{Robustness of } M_1}$
Callithrix santaremensis	♂	1	2.08	2.94	5.04	41.07	58.33
Leontocebus midas	♂	2	3.12	2.53	5.33	58.60 (55.67-61.53)	47.61 (45.23-50.0)
Leontocebus oedipus	♂	2	2.61	3.02	4.37	59.83 (54.46-65.21)	69.21 (65.21-73.22)
Leontocebus geoffroyi	♂	1	3.40	3.74	6.90	49.27	54.20
Leontocebus geoffroyi	♀	1	3.00	3.40	6.96	43.10	48.85
Aotes trivirgatus	♂+♀	5	4.92	5.17	9.54	52.00 (42.33-61.38)	55.05 (44.45-66.74)
Callicebus cupreus	♂	2	2.70	4.00	10.05	26.77 (24.97-28.57)	39.71 (39.01-40.47)
Callicebus remulus	♂	2	3.40	4.95	10.24	33.44 (26.98-39.91)	48.52 (42.61-54.43)
Pithecia monacha	♂	1	5.51	7.26	17.60	31.30	41.25
Cacajao sp.	♂	2	5.58	8.65	17.64	31.64 (31.15-32.14)	49.12 (47.59-50.65)
Alouatta belzebul	♂	1	10.08	14.26	46.20	21.64	30.86
Alouatta palliata	♂	1	6.72	10.50	31.04	21.64	33.82
Saimiri sciurea	♀+?	2	2.68	5.23	7.16	37.58 (36.11-39.05)	73.42 (62.23-84.61)
Saimiri boliviensis	♀	1	3.30	4.56	6.75	48.88	67.55
Cebus capucinus	♂	1	10.40	13.50	22.56	46.09	59.83
Cebus nigrivittatus	♂	3	9.99	14.19	24.28	39.75 (38.26-40.62)	58.46 (57.52-60.33)
Cebus apella	♂	1	9.62	12.30	23.04	41.73	53.38
Ateles paniscus	♂	1	16.80	18.50	26.95	62.33	68.64

TABLE II (Continued)

THE ROBUSTNESS VALUES OF THE LOWER INCISORS RELATIVE TO THAT OF M_1 IN SUBORDER ANTHROPOIDEA

		Number of Individuals	Robustness of I_1	Robustness of I_2	Robustness of M_1	$\frac{\text{Robustness of } I_1 \times 100}{\text{Robustness of } M_1}$	$\frac{\text{Robustness of } I_2 \times 100}{\text{Robustness of } M_1}$
Ateles fusciceps	♂	1	13.76	20.00	30.08	45.74	66.48
Ateles geoffroy	♂	1	12.80	14.08	30.08	42.55	46.88
Lagothrix thomasi	♀	1	13.86	15.84	23.40	59.23	67.69
Lagothrix infumata	♀	1	17.60	21.12	33.00	53.33	63.93
Macaca fuscata	?	1	25.08	22.50	47.20	53.13	47.66
Macaca irus[1]	♂	2	31.20	23.85	45.60	68.41 (68.0 -68.83)	53.00
Macaca irus	♀	2	28.18	20.32	40.23	71.03 (63.59 78.48)	50.60 (49.97-51.23)
Papio doguera	♂	1	64.40	49.28	88.56	72.71	55.64
Cercocebus albigena	♀	1	32.86	22.80	34.56	95.08	65.97
Cercocebus galeritus	♂	2	32.59	24.33	61.18	53.32 (47.50-59.14)	39.77 (39.15-40.39)
Cercocebus torquatus	♂	1	32.64	27.60	50.32	64.86	54.84
Cercocebus sp.	♂	1	34.80	27.45	38.76	89.78	70.81
Cercopithecus aethiops	♂	2	12.15	13.52	29.41	41.50 (34.35-48.65)	46.13 (39.78-52.49)
Cercopithecus aethiops	♀	1	10.50	9.18	21.73	48.32	42.24
Cercopithecus cephus	♂	2	12.84	16.59	22.78	56.55 (54.76-58.34)	74.14 (61.82-86.47)
Cercopithecus mitis	♂	2	14.17	15.94	28.43	49.77 (42.55-56.99)	56.01 (48.40-63.62)
Cercopithecus neglectus	♂	1	14.28	13.86	28.52	50.07	48.59
Cercopithecus nictitans	♂	1	15.48	10.80	22.40	69.10	48.21

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[1] I_1 and M_1 are represented by two individuals, while I_2 is represented by one.

TABLE II (Continued)

THE ROBUSTNESS VALUES OF THE LOWER INCISORS RELATIVE TO THAT OF M_1 IN SUBORDER ANTHROPOIDEA

		Number of Individuals	Robustness of I_1	Robustness of I_2	Robustness of M_1	$\frac{\text{Robustness of } I_1 \times 100}{\text{Robustness of } M_1}$	$\frac{\text{Robustness of } I_2 \times 100}{\text{Robustness of } M_1}$
Cercopithecus talapoin	♂	1	7.56	6.96	10.73	70.45	64.86
Cercopithecus talapoin	♀	3	6.67	6.65	10.63	62.72 (62.27-62.90)	62.89 (55.64-72.65)
Erythrocebus patas	♂	1	19.68	20.58	33.50	58.74	61.43
Presbytis cristatus	♂	2	12.73	11.67	32.65	38.94 (38.0 -39.88)	35.84 (34.32-37.37)
Nasalis larvatus	♂	1	18.40	20.00	42.00	43.80	47.61
Nasalis larvatus	♀	1	16.34	16.65	37.63	43.42	44.24
Colobus polykomos [2]	♂	4	18.27	18.29	39.98	48.25 (42.22-55.33)	46.49 (34.17-66.88)
Colobus polykomos	♀	1	14.28	16.56	43.20	33.05	38.56
Pliopithecus cf. antiquus. [3] Calculated from Hürzeler, 1954	—	—	12.13	15.64	39.96	30.35	39.13
Hylobates lar	♂	2	11.20	14.00	33.30	33.75 (30.94-36.57)	42.27 (36.77-47.77)
Hylobates lar	♀	2	10.98	14.08	25.16	43.30 (40.43-46.18)	55.82 (54.62-57.02)
Hylobates lar ?	♂	1	10.20	14.40	30.00	34.00	48.00
Hylobates concolor	♂	1	9.76	12.77	39.44	22.21	32.37
Hylobates hoolock	♂	1	11.90	15.20	36.04	33.01	42.17
Hylobates moloch	♂	2	11.77	13.67	31.85	36.88 (32.78-40.98)	42.86 (40.19 45.53)
Hylobates moloch	♀	4	12.63	15.64	33.56	37.50 (27.79-43.44)	46.73 (40.94-52.66)
Hylobates agilis	♂	1	8.40	11.40	27.36	30.70	41.66

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[2] I_1 is reprsented by three individuals, while I_2 and M_1 are represented by four.

[3] In I_1 and M_1 the robustness values are obtained from dimensions calculated from the ranges.

TABLE II (Continued)

THE ROBUSTNESS VALUES OF THE LOWER INCISORS RELATIVE TO THAT OF M_1 IN SUBORDER ANTHROPOIDEA

		Number of Individuals	Robustness of I_1	Robustness of I_2	Robustness of M_1	Robustness of $I_1 \times 100$ / Robustness of M_1	Robustness of $I_2 \times 100$ / Robustness of M_1
Hylobates klossi	♂	1	9.90	11.84	28.50	34·73	41·54
Proconsul africanus. Specimen 1948,50. Calculated from Clark and Leakey, 1951	—	1	17.02	24.00	58.32	29.18	41.15
Pongo pygmaeus	♂	3	79·70	85.60	151.92	52.89 (46·80-58·25)	56.40 (54·65-57·87)
Pongo pygmaeus	♀	6	76.78	79.43	136.59	56.30 (50·45-68·15)	58.58 (50·70-74·03)
Pan troglodytes [4]	♂	8	79.27	91.15	109.28	72.66 (69·59-78·67)	81.89 (78·17-85·61)
Pan troglodytes	♀	1	67.64	73.10	89.76	75·35	81.43
Pan troglodytes	♂+♀	8	74.98	82.26	107.49	70.08 (64·34-78·67)	76.58 (69·31-85·61)
Pan schweinfuthi	♀	1	53·29	59·13	92.70	57·48	63.78
Pan paniscus	♀	1	52·93	54·72	82.08	64·48	66.66
Gorilla gorilla	♂	5	81.54	110.84	225.04	36.63 (29·87-42·46)	50.38 (45·18-55·59)
Gorilla gorilla	♀	1	77.08	87.15	212.67	36.24	40.93
Oreopithecus bambolii. Calculated from Hürzeler, 1949	—	—	20.21	27·49	61.20	33·02	44·93
Oreopithecus bambolii.[5] Calculated from Hürzeler, 1958	—	—	20.09	27.26	57·95	34·66	47·21
Australopithecus africanus transvaalensis. [6] Calculated from Robinson, 1956	—	2	43·11	53·57	157·21	27·34 (26·19-28·49)	34·06 (33·83-34·29)

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[4] I_2 is represented by two individuals.

[5] The robustness value of M_1 is obtained from dimensions calculated from the ranges.

[6] The averages of individuals Sts. 52b and Sts. 24.

TABLE II (Continued)

THE ROBUSTNESS VALUES OF THE LOWER INCISORS RELATIVE TO THAT OF M_1 IN SUBORDER ANTHROPOIDEA

		Number of Individuals	Robustness of I_1	Robustness of I_2	Robustness of M_1	$\frac{\text{Robustness of } I_1 \times 100}{\text{Robustness of } M_1}$	$\frac{\text{Robustness of } I_2 \times 100}{\text{Robustness of } M_1}$
Paranthropus robustus crassidens.[7] Calculated from Robinson, 1956	—	4	34·95	44·92	210.71	16.58 (15·80-17·12)	20.96 (19·86-22·41)
Pithecanthropus pekinensis. Calculated from Weidenreich, 1937	♂+♀	—	40.65[8]	48.32[9]	150.68[10]	27·37 (25·54-31·02)	32·73 (27·61-38·44)
Rabat Man. Calculated from Vallois, 1960	♂	1	42.00	52.75	132.00	31.81	39.96
Neanderthal Man from Europe[11]	♂	3	43·97	55·78	129.66	34·21 (29·15-37·22)	43·76 (34·9 -53·24)
Neanderthal Man from Near East (Et-Tabūn).[12] Calculated from McCown and Keith, 1939	♂+♀	2	43·55	50·47	113.00	38.50 (38-39)	44·90 (41·33-48·47)
Neanderthal Man from Near East (Skhūl x child). Calculated from McCown and Keith, 1939	♂	1	50.05	57.60	145.60	34·37	39·56
Neanderthal Man from Near East (Skhūl).[13] Calculated from McCown and Keith, 1939	♂	3	37·75	48·33	134·78	27·73 (24·22-34·37)	35·70 (33·07-39·56)
Australian aborigines.[14] Calculated from Campbell, 1925	♂+♀	—	37.80	44.22	146.37	25.82	30.21
Pecos Indians. Calculated from Nelson, 1938	♂+♀	—	32.40	37.20	128.45	26.78	28.96

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[7] I_2 is represented by individuals SK. 23, 34 and 845, wile I_1 and M_1 are represented by four individuals (nos. 63, 23, 34 and 845).

[8] I_1 is represented by three individuals (BI, GI and LIV).

[9] I_2 is represented by four individuals(BI, GI, BIII and AI).

[10] M_1 is represented by five individuals (BI, GI, LIV, BIII and AI).

[11] Averages of Ehringsdorf child (from Virchow, 1920), Arcy II (from Leroi-Gourhan, 1958) and Le Moustier specimens (from Klaatsch, 1910).

[12] Averages of Tabūn I and II.

[13] Averages of Skhūl IV, V and X.

[14] For the numbers of the teeth taken from the literature see the works of the authors cited.

TABLE II (Continued)

THE ROBUSTNESS VALUES OF THE LOWER INCISORS RELATIVE TO THAT OF M_1 IN SUBORDER ANTHROPOIDEA

		Number of Individuals	Robustness o I_1	Robustness of I_2	Robustness of M_1	$\frac{\text{Robustness of } I_1 \times 100}{\text{Robustness of } M_1}$	$\frac{\text{Robustness of } I_2 \times 100}{\text{Robustness of } M_1}$
Japanese. Calculated from Campbell, 1925 and Drennan, 1929.	—	—	31.32	37·80	123.05	25·45	30.71
Bantu. Calculated from Shaw, 1931	♂+♀	—	34·40	36.00	115·50	29. 8	31.16
Bantu. Calculated from Drennan, 1929	—	—	28.56	35·40	113·30	25.20	31.24
Kaffirs. Calculated from Drennan, 1929	—	—	31.86	33.60	119·78	26.59	28.05
South African Bushman. Calculated from Drennan, 1929	—	—	27·54	31·36	101.97	27.00	30.75
Bushman Tribe. Calculated from Drennan, 1929	♂+♀	—	26.00	31·36	111.18	23·38	28.20
Efé Pygmy. Calculated from v. d. Broek, 1939	♀	1	26.00	33.60	115·50	22.51	29.09
Ancient Anatolians[15]	♂+♀	10	30.90	37·23	114.19	26.91 (22·16-31·05)	32·73 (29·09-38·18)
Recent Whites.[16] Calculated from Black, 1902	—	—	32·40	37·76	115·36	28.08	32·73
Recent Man	♂+♀	12	30.98	37·59	·118.32	26.35 (22·41-31·53)	31.86 (28·55-34·81)

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[15] This series is represented by five individuals of Copper Age from Alaca Höyük (from Şenyürek, 1952), Maşat No. 3 of Copper Age (from Şenyürek, 1946), Büyük Güllücek specimen of Chalcolitinc Age (from Şenyürek, 1950), Polatlı No. 2 of Early Copper Age (from Şenyürek, 1951a), Öküzini specimen of Neolitic Age (from Şenyürek, 1958) and Kumtepe specimen No. 2 of Chalcolithic Age.

[16] Calculated from the average measurements of Black (1902), cited by Campbell (1925), Drennan (1929), Shaw (1931) and Nelson (1938).