A NEW SPECIES OF TORTONIAN ANTHROPOID (PRIMATES, MAMMALIA) FROM ANATOLIA

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SUMMARY. — We discovered in 1973—during a paleontological research in the continental Series of the Middle Miocene of Turkey—a fossil mandible of an Anthropoid which is significant for Turkey and Eurasia. The mandible was found at Hırsızderesi, near the town of Çandır (Kalecik), in Ankara Province. We examined the specimen and consider that from the anthropological point of view it has both Anthropoid and Homo characteristics. Since both primitive and advanced characteristics were observed in this specimen, we assigned this mandible to a new species of *Sivapithecus* genera and called it *Sivapithecus alpani.*[1]

INTRODUCTION

The Mammalian biozone of Çandır is one of the most important discoveries resulting from the paleontological investigations of the last years. For this reason it is hoped that the representatives of the continental Mammalian fauna in this Series will solve many problems regarding the Cenozoic of Turkey and the migration of Mammalian fauna from Asia to Europe.

This Mammalian fauna was first discovered in 1968 by the Turkish-German teams of investigators. That year a small excavation was made., and again in 1969 the same group made a second small excavation at the same locality. The last investigation was made in 1973, in the area between Kalecik-Çandır-Çankırı by the Turkish Vertebrate Paleontology Group of the M.T.A. Institute. This most recent work uncovered valuable evidence of Mammalian fossils which were studied and are now exhibited in the Natural History Museum, M.T.A. Institute, Ankara, Turkey.

GEOLOGY

In previous years this locality and the surrounding areas were visited by many investigators, who carried out various Studies here. However no mention of finding any characteristic continental Vertebrate fossils, that might help in determining the age of the continental Series, was made in their reports.

E. Lahn (1943) accepted all the Çandır Sediments as gypsum Series and attributed these Series to the Oligocene age.

F. Baykal (1943) was of the same opinion as E. Lahn and included also this series in Oligocene.

M. Blumenthal (1948), who worked in a wider field which included also the Çandır series, attributed a Miocene age to the entire series.

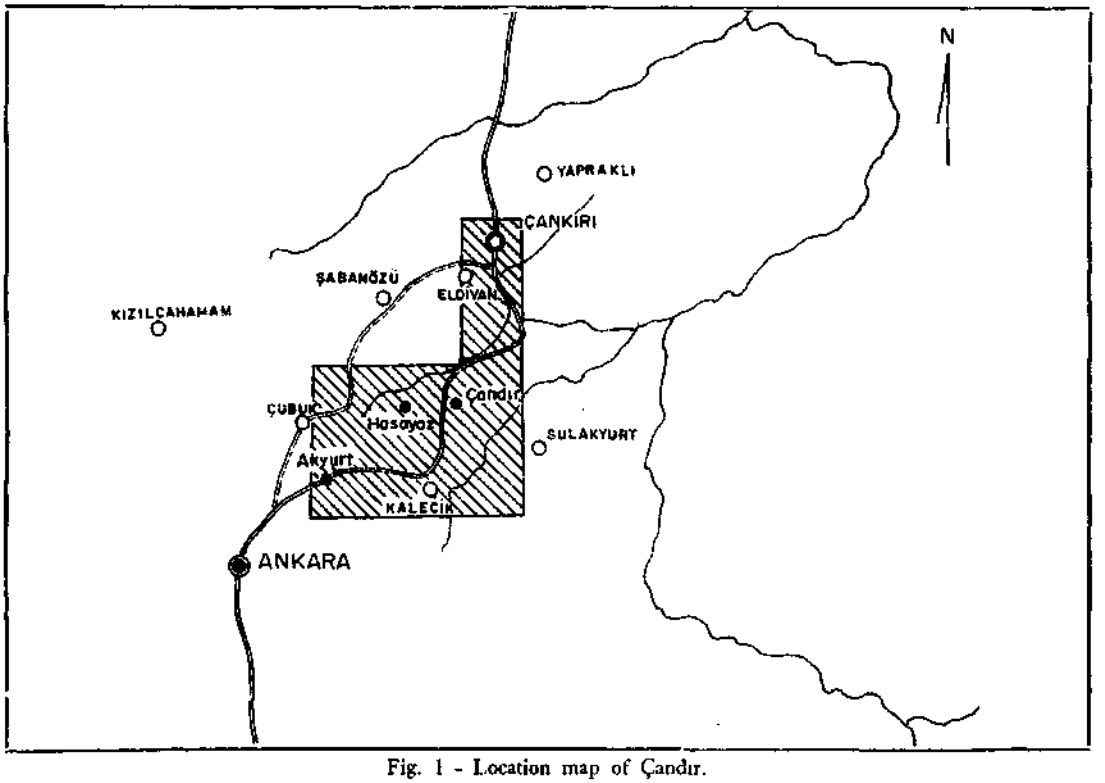

Fig. 1 - Location map of Çandır.

In 1953, O. Erol reported the Çandır Series in our area as gypsiferous series of Oligo-Miocene age. However, in the study carried out by the same author in 1954, he attributes a Miocene age to all the gypsiferous series in this area; and, again, in 1955 he stated that the upper part of this gypsiferous series belongs to Neogene.

I. Yücel (1954) referred these series to Neogene.

STRATİGRAPHİC STUDY

The Anthropoid fossil of Çandır, which represents the object of this study, was discovered in the Miocene series of Hırsızderesi[2] and its vicinity. These Miocene series overlie unconformably the serpentines of Cretaceous age. An example of this unconformity can be found near the Babas village (Fig. 2). Within these serpentines in some places brown-colored massive limestones of Mesozoic age are observed, while in other places limestones, which are Jurassic-Lower Cretaceous in age, are encountered (Fig. 2, 4).

Çandır formation

This series can be easily distinguished from the overlying green-colored marly layer and the underlying red-colored gypsiferous series—observed in the nearby villages—because of its lithologic structure and the presence of continental Vertebrate fossils.

The sedimerits of Çandır formation are represented by two facies which both contain continental Vertebrate fossils: the upper layer consists of green-colored, clayey, sometimes marly, sandy and very rarely of gypsiferous Sediments, white underlying this series are found red-colored, clayey, rarely marly, and sandy beds (Fig. 2, 3, 4).

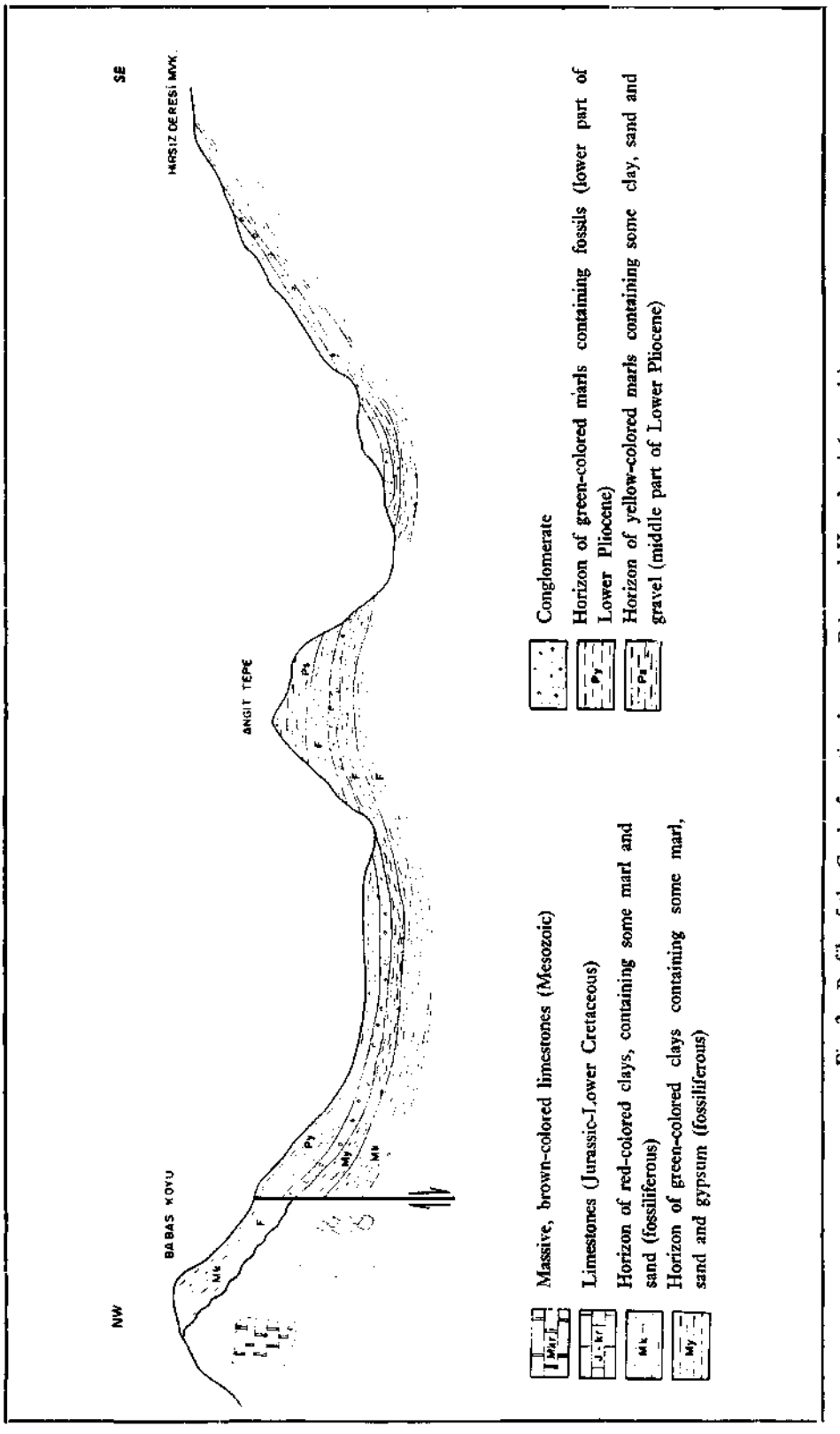

Fig. 2 - Profile of the Çandır formation between Babas and Hırsızderesi (no scale).

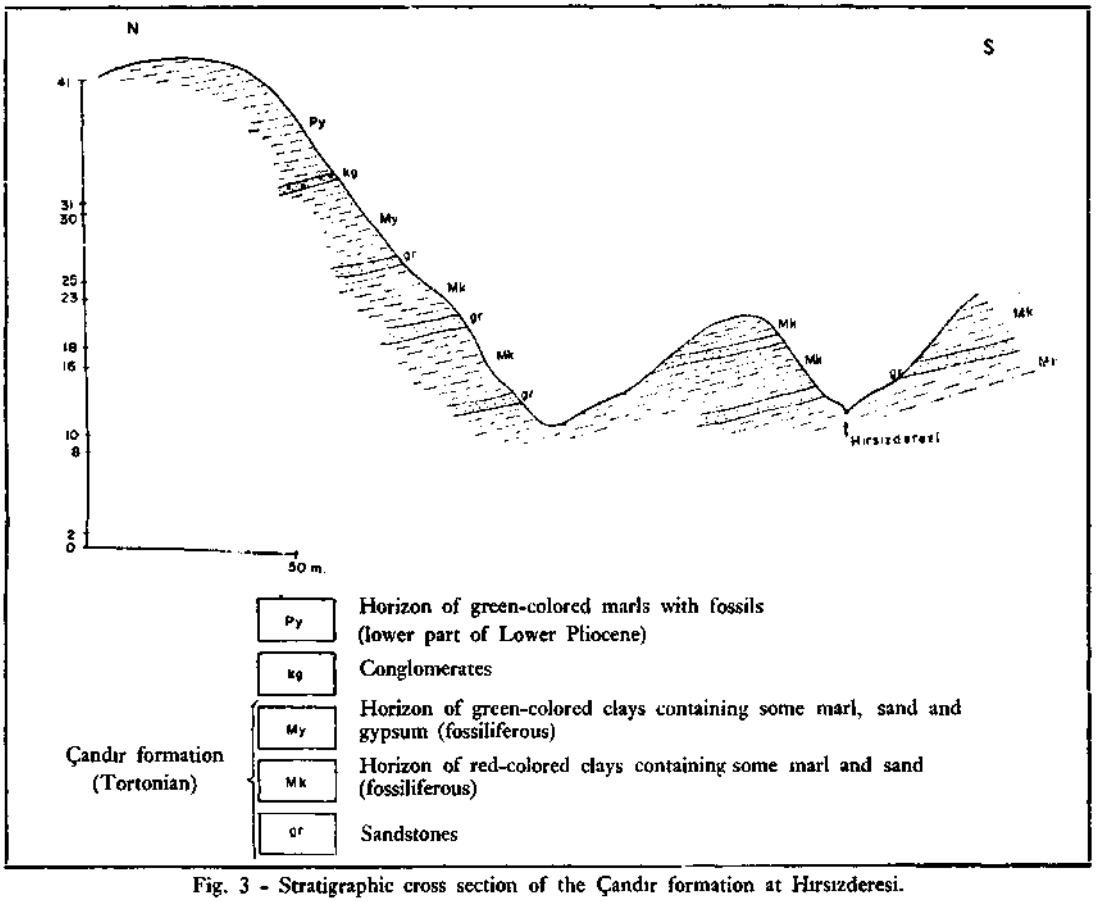

Fig. 3 - Stratigraphic cross section of the Çandır formation at Hırsızderesi.

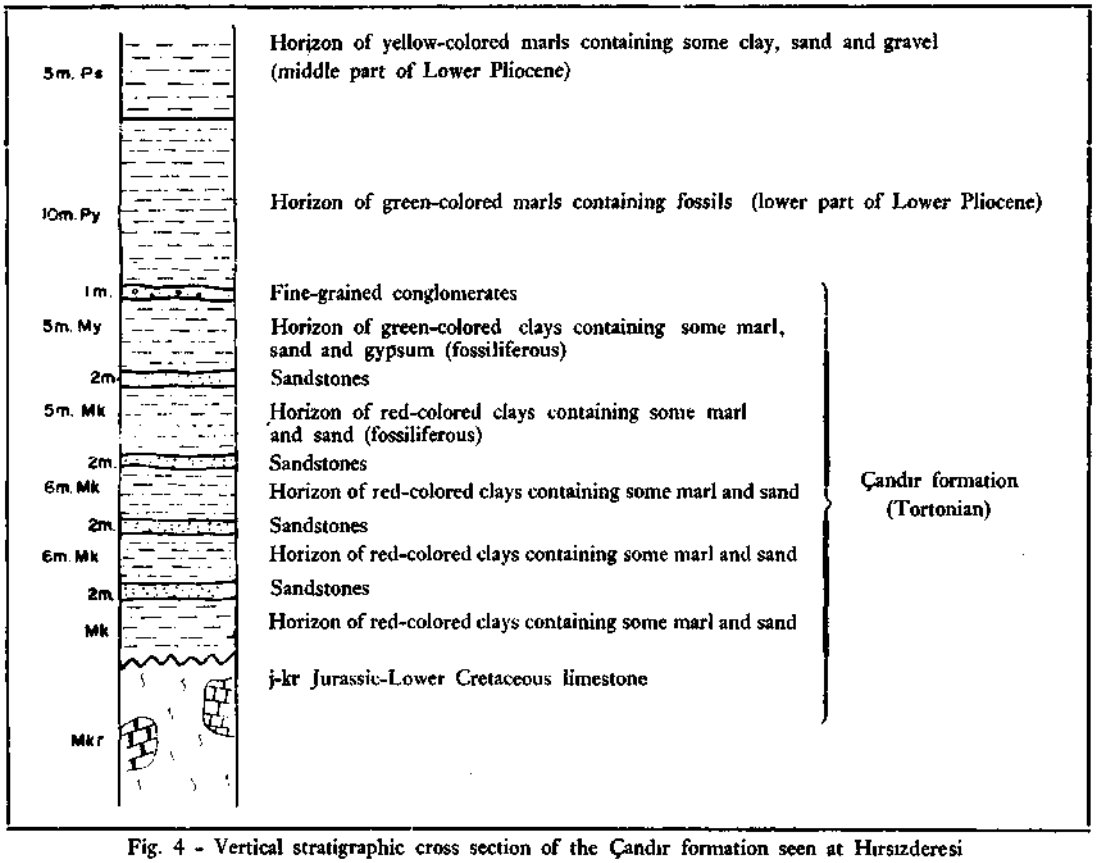

Fig. 4 - Vertical stratigraphic cross section of the Çandır formation seen at Hırsızderesi and in the surrounding area.

The thickness of Çandır formation is about 30 m at Hırsızderesi, but it is as much as 150 m in other places.

The lower red-colored Series underlying Çandır formation is rather thick at Hırsızderesi; locally alternations of sandstones are encountered. A thin conglomerate layer covers this formation and above this layer comes a green-colored, marly Series. These two facies can be observed in the vicinity of Babas Köyü and at Angıttepe, as well as at Hırsızderesi and its surroundings. The thickness of conglomerates is 1 m, while the green marl Series attains some 20 to 30 m.

We made an excavation in this green-colored marl facies where we found some fossil remains of *Gazella gaudryi*. This facies is the lower part of the Lower Pliocene and is probably synchronous with the Middle Sinap Series of Ankara (Fig. 2, 3, 4).

The uppermost of the Series seen at Angıttepe is yellow in color; it mostly contains sand and marl with a small proportion of clay; this Series overlies the green-colored marly facies. We think that the yellow-colored Series, rich in sand and gravels, represents the middle horizon of the Lower Pliocene.

At Hırsızderesi is observed one of the most typical outcrops of the Çandır formation. Here, we made a paleontological excavation in the A and B localities where the following Mammalian fossils were found:

In the lower level (A locality):

Sivapithecus alpani n. sp.
Amphicyon major[3]
Progenetta sp.
Gompotherium angustidens
Anchitherium aurelianense
? *Hipparion* sp.[4]
Aceratherium letradactyhım
Hispanotherium sp.
Listriodon splendens
Micromeryx flourensianus
? *Gazella deperdita*[4]

In the upper level (B locality):

Alloptox anatoliensis[5]
Amphicyon majör
? *Ictitherium* sp.
Palaeogale sp.
Percrocuta sp.
? *Pseudaelurus* sp.
Orycteropus sp.[4]
Anchitherium aurelianense
Listriodon splendens
Hypsodontıs sp.[4]
Micromeryx flourensianus
? *Procervus* sp.
Triceromeryx sp.
? *Gazella deperdita4*
Gompotherium angustidens

PALEONTOLOGIC STUDY

SYSTEMATIC

Order: PRIMATES LINNEAUS, 1758

Family: PONGIDAE ELLIOT, 1913

Subfamily: DRYOPITHECINAE GREGORY & HELLMAN, 1939

Genus: **Sivapithecus** PILGRIM, 1927

Shapithecıs alpani n. sp.

Material.— A complete mandible, no incisors and no canines. Right P_3 is absent. The cheek teeth of the left part of the mandible P_3-M_3, are *in situ*. From the cheek teeth of the right part of the mandible only P_4-M_3 are in *situ*. The ramus mandibulae is broken.

Horizon.— Tortonian.

Locality.— Hırsızderesi, about 7 km NW of Çandır.

Diagnosis.— The external surface of the symphysis of the corpus mandibulae is almost erect and does not slope backwards. There is a weak mentum on this surface. The foramen nıentale is situated between P3 and P_4. The inner surface (planum alveolare) of the symphysis is sloping backwards, but is somewhat erect and short. The fossa mandibulare is deep and both the torus transversus superior and the torus transversus inferior are strong. The thickness of the corpus mandibulae reduces from P_3 to M_3 and is the least under M_3. The lower margin of ramus enlarges from that point. This margin is a development under the molars, and the linea myo-hyoidea, incisura myo-hyoidea with fossa sublinguale had clearly been formed on the lingual surface of the corpus mandibulae.

The ramus is broken on both halves of the mandible. The ramus part begins to rise up at the level of M_2. The horizontal part of the mandible is not long. Hence, this gives evidence that the ramus part was not very high.

lncisive teelh. — The first incisors are broken at the level of the alveoli on the right and left halves of the mandible. For this reason, the crown parts of the first incisive teeth are absent. it is seen that the fossa alveolare and the roots in the fossa alveolare of the first incisive teeth are slender and much compressed laterally. We have no idea about the worn shape of the teeth because the crown parts of the teeth are oroken. These teeth rise up vertically from the alveoli.

The second incisive teeth are broken at the level of the alveoli, just like the first incisive teeth in both halves of the mandible. The position of the second incisive roots in the alveoli shows that the teeth were slender and strongly compressed laterally, like the first incisors, but the second incisors were larger than the first incisive teeth and more developed. The second incisive teeth also rise up straight from the alveoli.

Canine teeth. — In our specimen the right and the left canine teeth are absent. The alveolus of the right canine is broken and destroyed. However, the alveolus of the left canine is well preserved. The condition of the alveolus of this tooth shows that it was strong and well developed. Canine teeth rise up almost vertically from the alveoli.

Diastema. — There is no diastema between any of the teeth.

Premolar teeth. — There is a left P_3. The right P3 and its alveolus are broken. The left P_3 has been compressed laterally and elongated. The protoconid is subtriangular and developed. The metaconid has a rudimentary character. In addition the mesial surface of the third premolar has a slight cingulum. There is a talon on the distal part of the tooth.

The P_4 have survived on the two halves of the mandible. These teeth have molar forms, four cuspids are present. The two anterior cuspids protoconid and metaconid, are connected to one another by a low crista. This crista has been cut in the mesio-distal direction by a very weak sulcus. Protoconid is partly broken. The other two cuspids, hypoconid and entoconid, are strongly worn. An important characteristic of the tooth, the vestibulo-lingual diameter is Jonger than the mesio-distal diameter. The P_4 is strongly worn and the lingual cuspids are higher than the buccal cuspids on this tooth.

Molar teeth. — The first molars are also present in the two parts of mandible. The right M1 is less worn than the left M1 However, on both teeth the protoconid, the hypoconid and the hypoconulid are greatly worn. For reasons of wear, there is one fossa on each of the lateral cuspids and these fossae are United to each other by a narrow canal. The metaconid on both molars is the least worn. We see a trace of the base of the external cingulum on this tooth.

On the second molars all internal and external euspids are well developed. The metaconid is least worn on this tooth. The second molar is larger than the *M1.* One can see an external cingulum on the external surface of this tooth. The hypoconulid is well developed and inclined towards the labial side of the tooth.

The cusps of the third molars are not worn. One can see here a completely developed cuspid. The M_3 can be easily distinguished from all premolars and molars because of its perfect condition. On the M_3, the metaconid is the highest of all the cuspids. One can see a very weak cuspid (seventh cuspid) which is situated behind the metaconid and connected with it. Moreover, there is another cuspid (sixth cuspid) beyond the entoconid, between hypoconulid and entoconid. This tooth is longer than other molars. There is an external cingulum, as on the M_2. The hypoconulid is well developed and inclined toward the labial side of the tooth.

COMPARISON AND DIFFERENCES

Symphysis.— The external and internal surfaces of the symphyseal region of the Anthropoid fossil from Çandır show some aspects which are different from *Ankarapithecus meteai.* For instance, *Ankarapithecus meteai* (Ozansoy, 1961, 1965,1970) has a mentum, which can be more clearly observed than the mentum of our specimen. In addition, both Anthropoids are mature but the size of these two specimens is different from each other. The inner surface (planum alveolare) of the symphyseal region of *Ankarapithecus meteai* is erect as it is in the Çandır Anthropoid, but at the same time the torus transversus superior, the torus transversus inferior and the fossa mandibulare are more developed in the Çandır specimen than in *Ankarapithecus meteai.* There was no possibility to make a comparison between the characteristics of the corpus mandibulae of the Çandır Anthropoid and that of *Ankara-pithecıs meteai* because it is missing in the latter specimen.

The external surface of the syınphysis of *Dryopithecus fontani* is sloped backwards and also has no mentum. In addition, the internal surface of this symphysis (planum alveolare) is not erect; it is large, well developed and sloped backwards. Moreover, the lineae myo-hyoidea and incisura myo-hyoidea on the lingual surface of the corpus mandibulae of *Dryopithecus fontani* is not clear

and the fossa sublinguale is situated more towards the back, than on the Çandır fossil. All of the above characteristics are primitive and these same characteristics observed on *Dryopithecus fontani* differentiate it from the Çandır Anthropoid, which is more developed.

The external symphyseal surface of *Oreopithecus bambolii* is sloped backwards. For this reason there is no mentum and hence this species is not similar to the Çandır sample. However, according to Genet-Varcin (1969), the symphyseal region of *Oreopithecus bambolii* is narrow to a certain degree and it is this characteristic which is somewhat similar to that of the Çandır Anthropoid. We have no knowledge about the lingual surface of the corpus mandibulae of *Oreopithecus bambolii;* therefore, we could not compare the aspects of this species to those of the Çandır sample.

The erect position of the external symphyseal surface of *Sivapilhecus sivalemis* is similar to that of the Çandır fossil. The form of the mentum, as observed on the mandible of *Sivapithecus sivalensis,* approaches more the mentum of *Ankarapilhecus meteai* than that of the Çandır Anthropoid. However, the planum alveolare on the internal symphyseal surface of *Sivapithecus sivalensis* is erect as it is in the Çandır fossil. Yet, the fossa mandibulare, the torus transversus superior and the torus transversus inferior of the Çandır Anthropoid are stronger than those of *Sivapithecus sivalensis.* These characteristics of the Çandır specimen are also a special feature of Pongidae.

In *Ramapithecus* cf. *brevirostris* the external symphyseal surface slopes backwards and mentum is absent, vvhich makes it different from the Çandır Anthropoid. Moreover, some differences can be observed in the structure of planum alveolare of both fossils. When compared, the mandible of *Ramapithecus* cf. *brevirostris* has weaker torus transversus superior and torus transversus inferior, as well as a weaker fossa mandibulare, while these features are strong in the Çandır specimen.

The external symphyseal surface of *Sugrivapithecus salmontanus* is very similar to that of the Çandır Anthropoid. In fact, they have almost the same form. A weak mentum can be seen in these two fossils. Likewise, the planum alveolare, the torus transversus superior and the torus transversus inferior, as well as fossa mandibulare, resemble each other in both fossils.

The erect position of the external symphyseal surface of the Chimpanzee, Gorilla and Orangutan is similar to that of the Çandır Antropoid. However, the representatives of Ponginae have no mentum. The planum alveolare of the Çandır Anthropoid fossil is similar to that of the Chimpanzee-Gorilla-Orangutan group, but the torus transversus superior of the representatives of Ponginae are weaker than in the Çandır fossil. Moreover, the dental branch of the mandible of the Çandır specimen is horizontal. This peculiarity reflects a human characteristic.

A bulge under the molars of the corpus mandibulae, the linea myo-hyoidea and the incisura myo-hyoidea is another feature of the Çandır Anthropoid which approaches this specimen towards the human characteristics. These features can be seen only in the *Paranthropıus, Atlanthropus* and *Homo.* On the other hand, Chimpanzee, Gorilla and Orangutan along with other Anthropoids have not this peculiarity. Moreover, the fossa sublinguale of the Çandır Anthropoid is situated very near the sagittal linea of the symphyseal region, as in the case of the *Paranthropns, Atlanthropus* and *Homo.*

Incisive teeth. — We mentioned that the roots of the I_1 and I_2 of our specimen from Çandır are seen in the alveoli, and are compressed and oval in form. The I_1 is weaker and more slender than I_2. All incisive teeth rise up erectly from the alveoli. These characteristics of the Çandır specimen differentiate it from representatives of .Pongidae—especially from *Dryopithecus fontani*—although it is very similar to *Paranthropıus.* Thus, these characteristics of the Çandır fossil are considered as an advanced aspect approaching Hurnans.

Canine teeth. — The Çandır specimen lacks canine teeth. Nevertheless, the position of the fossa alveolare in the mandible indicates that the lacking tooth must have been quite well-developed and projected erectly from the fossa alveolare. It is impossible to make a complete comparison due to the absence of canines, but the position of the fossa alveolare can help to establish some special characteristics of the missing canine. It may be possible, for instance, to assume that in this fossil specimen canines were placed slightly higher than the level of the premolar and molar teeth. This feature suggests that our specimen is somewhat approaching the Pongidae family.

Diastema. — There is no diastema between any of the teeth in the Çandır fossil Anthropoid, which is characteristic also of *Ankarapithecus meteai.* According to Lewis (1934), no diastema is found in *Sivapithecus* or *Sugrivapithecus* fossils. From this point of view it may be assumed that there is a relation between these genera and the Çandır specimen. *Dryopithecm fontani* (from the model in the Natural History Museum of M.T.A.), on the other hand, has an obvious diastema between the canine teeth and the third premolar teeth, and this diastema differentiates it from our specimen and other fossil Anthropoids.

Premolar teeth. — In the first analysis, the third premolar does not seem as very typical, but alter a careful study certain aspects of this tooth could be noted which differentiate it from the representatives of *Sivapithecus, Dryopithecus, Oreopithecns* and *Ramapithecus.* For instance, *Oreopithecus bambolii* has two cusps (protoconid and metaconid). The third premolar of the Çandır specimen also has two cusps; hence, these fossils are similar to each other in this respect. According to Hürzeler, Piveteau (1957) stated that the third premolar of *Homo* has also two cusps. In the *Oreopithecns bambolii* the protoconid and metaconid are well-developed on the third premolar and are separated from each other. In addition, these two cusps are linked by a short crista. This tooth has a quatriform talonid. Therefore, *Oreopithecus bambolii* has some advanced characteristics different from the Çandır fossil. The third premolar of the Çandır Anthropoid has two roots; the anterior root is larger than the posterior. However, the roots of the third premolar of *Sugrivapithecus salmontanus* show an equivalent development. On the other hand, the third premolar teeth of *Ramapithecus* cf. *brevirostris, Sivapithecus sivalensis,* and *Sivapithecus indicus* are different from the Çandır fossil, since they rise up erectly from their alveoli. In our fossil this tooth has primitive characteristics regarding the form and the way it rises up obliquely from its alveolus; a feature which is similar to the structure in *Dryopithecus.* The third and fourth premolars of the Çandır specimen are of the same height, but the third premolar teeth of *Sivapithecus sivalensis, Sivapithecus indicus, Ramapithecus* cf. *brevirostris, Ankara pithecus meteai* and *Oreopithecus bambolii* are higher than their fourth premolar teeth.

The fourth premolar of *Sugrivapithecus salmontanus* has two cusps (protoconid and metaconid). There is a fossa which runs along the mesio-distal diameter, dividing these two cusps (Lewis, 1934; Piveteau, 1957). This characteristic is not observed in the Çandır specimen. For this reason, it may be assumed that the Çandır specimen has a more advanced characteristic as compared to *Sugrivapithecus.* At the same time the Çandır fossil, which has four cusps in the fourth premolar, shows a closer resemblance to Humans. The premolar in the Çandır Anthropoid has a crista which links the protoconid and metaconid, but this crista is divided in the mesio-distal direction by a weak sulcus. This characteristic is seen in the fourth premolar teeth *of Dryopithecus fontani, Sivapithecus sivalensis, Sivapithecus indicus, Ramapithecus* cf. *brevirostris;* moreover, all these species have four cusps in the fourth premolar teeth. The worn condition of the talonid of this tooth is similar to the erosion observed in the representatives of *Sivapithecus* and the Çandır fossil. On the other hand, the talonid of this tooth in *Ramapithecus* and *Dryopithecus* has worn to a different shape from the Çandır specimen. The fourth premolar of *Oreopithecus bambolii* has four cusps which approaches it to our specimen from Çandır.

According to Genet-Varcin (1963), *Sivapithecns* and *Dryopithecus* differ from each other by the measurements of the P_4. He stated that the transversal diameter of the P_4 in *Sivapithecus* is longer than the mesio-distal diameter ot the same tooth, while *Dryopithecus* has not this characteristic. The characteristic given by Genet-Varcin for the P_4 of *Sivapithecus* is present in our Çandır Anthropoid (Table 1).

Molar teeth. — The first molar of *Ankarapithecus meteai* is square and the same tooth of the Çandır Anthropoid is also nearly square-shaped. According to Ozansoy (1970), the first molar teeth of *Sivapithecus* and *Dryopithecus* do not display this form. The worn condition of this tooth in the Çandır Anthropoid specimen is similar to the one of *Ankarapithecus meteai.* The hypoconid is well developed in both of these species. In addition, the molar teeth of these two fossils have a small post-fovea. According to Gregory and Hellman (1926), this characteristic reflects a human and anthropomorphic peculiarity. In the first molar of *Oreopithecus bambolii,* metaconid is situated in the middle part of the tooth. There is a sixth cuspid in this tooth and the first molar is very long. Because of these features *Oreopithecus bambolii* differs from the Çandır Anthropoid. We could not make a comparison between the anterior and posterior foveae of the M_1 of *Sugrivapithecus salmontanus* and the Çandır fossil because these two foveae are strongly worn in the Çandır Anthropoid and entoconid is situated behind the protoconid-hypoconid line. This peculiarity of the Çandır fossil is also observed in *Dryopithecus fontani, Sivapithecns sivalensis, Sivapithecns indicus, Sugrivapithecus salmontanus* and *Ramapithecus* cf. *brevirostris.* In addition to all these features, there is also an external cingulum which lies along the protoconid-hypoconid on the first molar only of the Çandır specimen. This characteristic feature is seen only as a trace on the external surface of the lateral part of the protoconid of the *M1* of *Dryopithecus fontani;* it is absent on the M_1 of the other species and genera. However, Genet-Varcin (1963) mentioned that *Parapithecus fraasi* has an external cingulum on the M_1.

Table - 1

Measurements of the lower teeth of the Çandır fossil Anthropoid

	Length		*Breadth*	*Height*	*Robustness value*	*Crown index*	$M_1 - M_3$
P_3	8.00	left	10.30	8.20	82.40	128.75	30.70
	—	right	—	—	—	—	30.80
P_4	6.70	left	8.00	7.70	53.60	119.40	
	6.80	right	8.00	7.20	54.40	117.64	
M_1	9.00	left	8.70	4.60	78.30	96.66	
	9.00	right	8.60	6.20	77.40	95.55	
M_2	10.00	left	9.80	5.20	98.00	98.00	
	10.30	right	9.80	7.00	100.94	95.14	
M_3	11.70	left	9.70	6.00	113.49	82.99	
	11.80	right	9.60	7.90	113.28	81.35	

In the Çandır fossil the M_1 are smaller than the M_2. A similar feature is observed in *Ankarapithecus meteai, Sugrivapithecus salmontanus, Sugrivapithecus gregoryi, Dryopithecus fontani, Sivapithecus sivalensis, Sivapithecus indicus* and *Ramapithecus* cf. *brevirostris* (Ozansoy, 1965, 1970; Genet-Varcin, 1963; Lewis, 1936; Gregory, Hellman & Lewis, 1938).

The advanced hypoconulid of the second molar is situated towards the labial side both in the Çandır fossil and *Ankarapithecus meteai.* The post-fovea in both these fossils are small in relation to the dimensions of their teeth. The only difference is that the labial surface of the M_2 is flattened in the Çandır Anthropoid fossil, while the same surface of the M_2 in *Ankarapithecus meteai* is divided into clearly distinct convex lobes. There is an external cingulum on the. labial surface of this tooth in the specimen from Çandır, but it is absent on the similar tooth of *Ankarapithecus meteai.*

The cusps of the M_2 teeth of *Oreopithecus bambolii* resemble those on the M_1 but its M_2 is larger than its M_1; the M_2 has no external cingulum. The M_2 of *Oreopithecus bambolii* shows advanced characteristics and is different from the same teeth of the Çandır Anthropoid.

Relative to its dimensions, the post-fovea and hypoconulid of the M_2 of *Dryopithecus fontani* is smaller than that of the Çandır fossil. The external cingulum seen on the M_2 of the Çandır specimen is absent on the same tooth of *Dryopithecus fontani.*

In *Sugrivapithecus salmontanus* there is only a trace of the external cingulum on the labial surface of the second molar, while it is present in the Çandır fossil. In *Sugrivapithecus salmontanus* the sulcus situated between protoconid-hypoconid and hypoconid-hypocotoulid extend on the buccal surface of the M_2. Apart from this, there are a number of small cusps on the metaconid and entoconid on this tooth, while the M_2 of the Çandır Anthropoid does not have this feature. In *Sugrivapithecus gregoryi* the metaconid of the M_2 is higher than the other cusps. The same feature is observed also in the Çandır specimen. On the other hand, a buccal cingulum seen on the M_2 of the Çandır fossil is absent on the similar tooth of *Sugrivapithecus gregoryi.*

There are general similarities between the M_2 of *Sivapithecus indicus, Sivapithecus sivalensis* and the Çandır specimen, but in the case of *Sivapithecus indicus* and *Sivapithecus sivalensis* these teeth have no buccal cingulum. However, Lewis (1934) stated that the M_2 of *Bramapithecus thorpei* has a weak external cingulum; later (1937) he mentioned that the M_2 of this species has a square shape and a small hypoconulid. The Çandır fossil does not have these characteristics.

The M_3 of the Çandır fossil differs from that of *Ankarapithecus meteai.* According to Ozansoy (1965, 1970), in *Ankarapithecus meteai* the M_3 is smaller than the M_2. Although this characteristic is also seen in *Atlanthropus mauritanicus,* fossil and living humans, but it is not present in the representatives of Dryopithecinae. The third molar of the Çandır Anthropoid is wide at the anterior part, but is narrow and long at the posterior part; this tooth is longer according to biometrical mensurations than the second molar (Table 1). Moreover, one can see the buccal cingulum and the sixth and seventh cusps on the M_3 of the Çandır specimen, but they are not present in the similar tooth of *Ankarapithecus meteai.*

The longest molar of *Oreopithecus bambolii* is the third molar. This species is close to the Çandır specimen because of a similarity of the sixth cusp, but these two fossils differ from each other in other characteristics.

The M_3 of *Dryopithecus fontani* and of the Çandır fossil are larger than the M_2, and this point links these two fossils to each other. We observed that the M_3 of *Dryopithecus fontani* does not have an advanced buccal cingulum and its hypoconid is situated almost at the same level as its entoconid. Likewise, we studied the plaster model of *Dryopithecus fontani* and saw that it does

not have the sixth and seventh cusps on the third molar. However, according to Gregory, Hellman and Lewis (1938), *Dryopithecus fontani* has a small sixth cusp and a trace of an external cingulum on the third M_3. Because of all these characteristics, *Dryopithecus fontani* is different from the Çandır fossil. On the *Dryopithecus sivalensis* the hypoconulid is situated in the center of the M_3 and it has no cingulum (Lewis, 1934). However, on the similar molar of the Çandır fossil an external cingulum is present and the hypoconulid is situated towards the labial surface. There is a massive cingulum on the M_3 of *Dryopilhecus darwini,* which compares well with the similar tooth of *Pliopithecus antiquus* (Gregory, 1916). By this characteristic *Dryopithecus danvini* is close to the Çandır Anthropoid. Moreover, there is a sixth cusp on the M_3 of *Dryopithecus chinjensis,* a feature by which it resembles the Çandır specimen. According to Genet-Varcin (1963) the M_3 of *Parapithecus fraasi* has also a sixth cusp.

We did not compare the Çandır fossil Anthropoid with *Sugrivapithecus salmontanns* and *Sugrivapithecus gregoryi* because these latter species have no third molar.

The third molar teeth of the Çandır specimen and *Sivapithecus indicus* do not resemble each other. However, Gregory, Hellman and Lewis (1938) mentioned that there is a small sixth cusp and an external cingulum on a similar tooth of *Sivapithecus indicus.* On the other hand, there are some similarities between the Çandır fossil and *Sivapithecus sivalensis.* In both fossils the M_3 are larger than the M_2 and their mesio-distal diameters are longer than the transversal diameters. In addition, the hypoconid is situated in front of the entoconid on the M_3. An important peculiarity-separates the Çandır fossil and *Sivapithecus sivalensis* in so much as the former has a buccal cingulum but the latter has none.

Bramapithecus thorpei has a rudimentary hypoconulid on the M_3 (Lewis, 1937), while in the Çandır Anthropoid there is an advanced hypoconulid on the similar tooth. The M_3 of *Bramapithecus punjabicus* is long and round (Lewis, 1938). Our fossil, on the other hand, has not this characteristic.

Considering all the above characteristics of the Çandır fossil Anthropoid, it was accepted as a new species of *Sivapithecus,* a genus which we named *Sivapithecus alpani.*

SOME NOTES ON FOSSIL ANTHROPOIDS

A number of publications have appeared up to the present day and various theories have been proposed about the known Anthropoids. In 1916, W.K. Gregory, in his publication entitled «Studies on the evolution of the Primates» accepted Africa as the original birthplace of Primates. According to this author, the first examples of evolution of *Parapithecus* were found in the Lower Oligocene beds in Africa. G.H.R. Koeningswald (1962) also adhered to this idea and went on to say that in *Parapithecus* metaconid is situated in front of the protoconid and there is an external cingulum on the molar teeth of this genus, which we consider as a very interesting factor. In the advanced specimens the metaconid and protoconid are at the same level, and the external cingulum is absent. Again according to pregory (1916), the branch of *Propliopithecus,* which lived in Africa during the Lower Oligocene time, foreshadows Hylobatinae and Hominidae. However, L.S.B. Leakey (1960) mentioned that Hominidae constituted the principal branch from which issued Hylobatinae. He also stated that *Parapithecus* had separated from the main line at a much earlier time. *Propliopithecus* is a true representative of Hylobatinae. The line which branches out from *Propliopithecus* is the ancestor of *Limnopithecus* and *Pliopithecus.*

Pliopithecus, which is the representative of Hylobatinae, first lived in Europe from the Upper Miocene to the Lower Pliocene. It has an intermediate character between *Propliopithecus* and the modern gibbon (Gregory, 1916; Leakey, 1960). Some branches which are separated from Siminae group were developed differently. Gregory (1916) stated that *Palaeosimia* lived during the Upper Miocene in India and may be a descendant of Orangutan. The other line belongs to *Sivapithecus.* The representatives of this genus lived in India and Africa from Upper Miocene to the Lower Pliocene. Some characteristics of these specimens are similar to those of the Primates and some features are human. Leakey (1960) reported that the representatives of *Sivapithecus* which lived in Kenya displayed some important features approaching them to Humans.

It is known that *Dryopilhecns* lived during the Upper Miocene and the Lower Pliocene in India and Europe. There is some evidence to suggest that *Dryopilhecus* and *Sivapithecus* derive from the same branch. *Dryopithecus chinjiensis*—which is a distant descendant of the gorilla line—lived in India, and *Dryopithecus punjabicus* came from the line that is allied both to the gorilla and the chimpanzee (Gregory, 1916). *Dryopithecus darwini* lived in Europe in the Upper Miocene time. Although not definitely known, there is a theory that this species is somewhat related to *Pithecanthropus.* Likewise, *Dryopithecus fontani* also lived in the Upper Miocene time in Europe. *Dryopithecus fontani* is believed to be allied to *Dryopithecus chinjiensis* and the modern gorilla. *Dryopithecus rhenanus* lived during Lower Pliocene in Europe. Gregory (1916) reported that *Dryopithecus rhenanits* is situated between *Dryopithecus fontam, Dryopilhecus punjabicus* and Chimpanzee. Although according to Piveteau (1957), the characteristics of the chewing surface on the molar teeth of *Dryopithecus rhenanus* have also been attributed to Chimpanzee, in the general classification—as Lewis suggested—*Dryopithecus rhenanus* and *Dryopithecus fontani were* considered as *Sivapithecus.* According to Pohlig, Gregory and Schlosser the *Dryopithecus rhenanus* has some characteristics which resemble those of the ancestors of humans who lived in trees, but Piveteau did not accept this idea. According to Piveteau, *Sivapithecus* was placed in the human line by Pilgrim. However, Leakey (1960) stated that already at the beginning of Miocene the representatives of *Dryopithecus* had separated from the principal line and *Dryopithecus rhenanus, Dryopithecus pilgrimi* and *Dryopithecus punjabicus* appeared towards the Middle Miocene. According to Leakey, the other representatives of the *Dryopithecus* line are *Sugrivapithecus* and *Bramapithecus.* In his opinion the *Sivapithecus* branch separated from the main line in the Middle Miocene, and *Ramapithecus* represents a later type which developed from this branch. According to Leakey, the close relationship observed between *Ramapithecus* and *Bramapithecus* is due to the fact that both of these genera issue from the same main line. Indeed, *Paleopithecus,* which lived in India in Pliocene, came from *Dryopithecus* line and was attributed to Gorillas (Gregory, 1916). According to Gregory (1916), *Pithecanthropus*—which lived in the Upper Oligocene— shows a close relationship to *Dryopithecus* and *Sivapithecus,* as well as to *Homo,* and a line branching off from it developed into *Homo heidelbergensis.* The descendants of the *Homo heildelbergensis* line, on the other hand, evolved into *Homo sapiens.* Leakey (1960) considers that the *Pithecanthropus* branch appeared during Pleistocene and the Paleoanthropian group that is related to them had probably branched off from the main line in Upper Miocene. The Neoanthropian group that represents the main line, on the other hand, began evolving into the *Homo* genus during the Pleistocene time. Leakey includes *Homo heidelbergensis* into the Neanderthal group, although it has been considered as belonging to the Paleoanthropian group. However, Gregory, Hellman and Lewis (1938) stated that at least the representatives of *Ramapithecus* and *Australopithecus,* because of their known anatomical characteristics, may be the ancestors of humans.

On the other hand, the well-developed advanced characteristics of the Çandır fossil Anthropoid show that some Anthropoid groups—with features pointing to an advanced stage towards

Table - 2

	P_3				P_4				M_1				M_2				M_3			
	Length	*Breadth*	*Robustness value*	*Crown index*	*Length*	*Breadth*	*Robustness value*	*Crown index*	*Length*	*Breadth*	*Robustness value*	*Crown index*	*Length*	*Breadth*	*Robustness value*	*Crown index*	*Length*	*Breadth*	*Robustness value*	*Crown index*
Dryopithecus fontani, average of 3 specimens (from Siwalik) Gregory, Hellman & Lewis, 1938	—	—	—	—	—	—	—	—	10.1	8.9	89.8	88.0	11.3	10.3	116.3	90.0	11.7	9.7	113.4	83.0
Dryopithecus fontani Lewis, 1934	—	—	—	—	9.0	8.0	72.0	89.0	10.0	10.5	105.0	105.0	12.0	10.5	126.0	105.0	12.5	10.5	131.2	84.0
	—	—	—	—	—	—	—	—	10.0	9.0	90.0	90.0	11.0	9.5	104.5	86.0	11.5	9.5	109.2	83.0
Dryopithecus darwini (from Siwalik) Gregory, Hellman & Lewis, 1938	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	13.0	12.0	156.0	92.3
Dryopithecus darwini Lewis, 1934	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	13.5	11.8	159.3	87.0
Dryopithecus sivalensis (from Siwalik) Gregory, Hellman & Lewis, 1938	—	—	—	—	—	—	—	—	—	—	—	—	10.5	10.0	105.0	95.0	11.0	8.6	94.6	78.0
Dryopithecus cautleyi	—	—	—	—	—	—	—	—	10.8	9.8	105.6	91.0	—	—	—	—	—	—	—	—
Lewis, 1934	—	—	—	—	9.0	9.2	82.8	118.0	10.6	9.5	100.7	90.0	12.6	11.3	142.4	90,0	13,7	12,3	168,5	90,0
Dryopithecus frickae Lewis, 1934	—	—	—	—	8.2	10.2	83.6	113.0	11.5	11.0	126.5	95.0	13.5	12.4	167.4	92.0	14,0	12,7	177,8	83,0
Dryopithecus punjabicus Lewis, 1934	—	—	—	—	—	—	—	—	—	—	—	—	11.6	9.9	114.8	85.0	12.5	10.4	130.0	83.0
Dryopithecus chinjiensis Lewis, 1934	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	14.7	12.7	186.7	86.0
Dryopithecus giganteus Lewis, 1934	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	19.1	15.3	292.2	80.0
Dryopithecus pilgrim Lewis, 1934	—	—	—	—	7.8	8.7	67.8	111.0	—	—	—	—	—	—	—	—	—	—	—	—
Dryopithecus rhenanus	—	—	—	—	—	—	—	—	9.5	8.8	83.6	93.0	10.6	9.2	97.5	87.0	13.0	10.5	136.5	81.0
Lewis, 1934	—	—	—	—	—	—	—	—	11.2	9.5	106.4	85.0	10.0	8.4	84.0	84.0	11.8	9.8	115.6	83.0
Sivapithecus sivalensis (from Siwalik) Gregory, Hellman & Lewis, 1938	—	—	—	—	—	—	—	—	10.6	9.5	100.7	90.0	11.6	11.4	132.2	98,3	13,7	12,3	168,5	90,0
Sivapithecus indicus	—	—	—	—	—	—	—	—	11.5	10.6	121.9	92.0	13.0	12.3	159.9	95.0	—	—	—	—
(from Siwalik)	—	—	—	—	9.1	11.5	104.6	126.0	11.5	10.5	120.7	91.0	13.3	12.3	163.5	92.4	13.8	12.7	175.2	92.0
Gregory, Hellman & Lewis, 1938	—	—	—	—	8.5	11.2	95.2	132.0	12.4	11.8	146.3	95.0	14.5	13.7	198.6	93.0	15.8	13.6	214.8	84.8
Sivapithecus indicus Lewis, 1934	—	—	—	—	8.5	9.9	84.1	116.0	11.5	10.6	121.9	92.0	13.0	12.3	159.9	95.0	14.3	13.4	191.6	94.0
Sivapithecus middlemissi Lewis, 1934	—	—	—	—	—	—	—	—	—	—	—	—	12.9	12.3	158.6	95.0	14.4	13.2	190.0	92.0
Sivapithecus himalayensis Lewis, 1934	—	—	—	—	8.5	11.2	95.2	76.0	11.8	10.9	128.6	92.0	15.1	13.7	206.8	91.0	—	—	—	—
Sugrivapithecus salmontanus (from Siwalik) Gregory, Hellman & Lewis, 1938	—	—	—	—	—	—	—	—	11.0	9.1	100.1	82.7	12.6	10.5	132.3	83.0	—	—	—	—
Sugrivapithecus salmontanus Lewis, 1936	—	—	—	—	—	—	—	—	11.0	9.0	99.0	81.8	12.6	10.4	131.0	82.5	—	—	—	—
Sugrivapithecus salmontanus Lewis, 1934	—	—	—	—	7.2	8.4	60.4	117.0	11.0	9.0	99.0	81.8	12.6	10,4	131,0	82,5	—	—	—	—
Sugrivapithecus gregoryi (from Siwalik) Gregory, Hellman & Lewis, 1938	—	—	—	—	—	—	—	—	11.1	9.0	99.9	81.0	12.6	9.9	124.7	78.6	—	—	—	—
Sugrivapithecus gregoryi Lewis, 1936	—	—	—	—	—	—	—	—	11.1	9.0	99.9	81.0	12.6	9.9	124.7	78,6	—	—	—	—
Sugrivapithecus (?) gregoryi (607) (from Siwalik) Gregory, Hellman & Lewis, 1938	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12.8	10.2	130.5	79.0
Ramapithecus cf. *brevirostris* (from Siwalik) Gregory, Hellman & Lewis, 1938	9.5	5.4	51.3	56.8	6.0	6.9	41.4	115.0	9.1	8.1	73.7	89.0	10.2	9.0	91.8	89.2	—	—	—	—
Bramapithecus thorpei (from Siwalik) Gregory, Hellman & Lewis, 1938	—	—	—	—	—	—	—	—	—	—	—	—	10.0	10.6	106.0	106.0	11.1	10.5	116.5	95.0
Bramapithecus thorpei Lewis, 1934	—	—	—	—	—	—	—	—	—	—	—	—	10.0	10.6	106.0	106.0	11.1	10.8	119.8	97.0
Bramapithecus punjabicus (from Siwalik) Gregory, Hellman & Lewis, 1938	—	—	—	—	—	—	—	—	—	—	—	—	11.3	10.0	113.0	88.5	12.8	10.6	135.6	83.0
Bramapithecus punjabicus (609) (from Siwalik) Gregory, Hellman & Lewis, 1938	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	13.7	11.9	169.0	86.1
Palaeopithecus sylvaticus Lewis, 1934	—	—	—	—	7.5	10.0	75.0	75.0	10.1	—	—	—	12.0	11.2	134.4	93.0	12.7	11.6	147.3	91.0

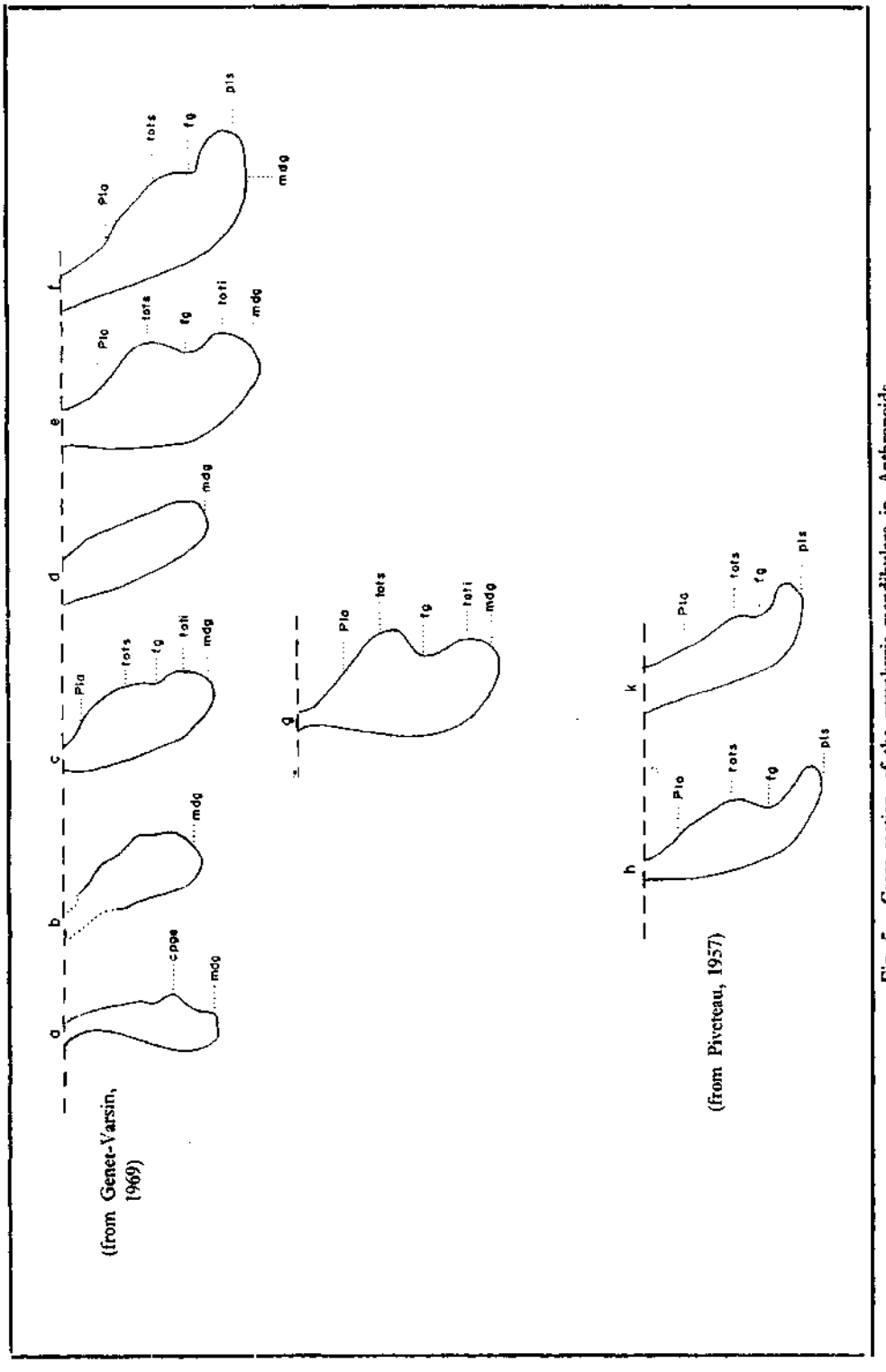

Fig. 5 - Cross section of the symphysis mandibulare in Anthropoids.

a - *Homo sapiens*; b - Neanderthal; c - Mauer; d - Sinanthropus; e - Paranthropus; f - Gorilla; g - Çandir fossil Anthropoid; h - Orangutan; k - Chimpanzee.

apge - apophysis; *mdg* - zone of insertion of the digastric muscle; *pla* - planum alveolare; *tots* - torus transversus superior; *fg* - glenoid fossa; *toti* - torus transversus inferior; *pls* - simian plate.

human development—lived in Anatolia already in the Middle Miocene period. This leads to a theory that the human development discussed by Gregory, Hellman and Lewis (1938) must have begun at a much earlier time with the representatives of other genera than previously supposed.

CONCLUSIONS

The characteristics of the mandible of the Çandır fossil Anthropoid are very interesting. In our specimen the height of the corpus mandibulae starts from underneath of the cheek teeth toward P_3 and M3. This characteristic is not observed in any other representatives of any fossil or living Pongidae excepting in *Sugrivapithecns salmontanus*. Moreover the dental part of the mandible in the Çandır specimen is horizontal, which shows that it is in a more advanced stage of development.

The morphological structure on the external surface of the symphyseal region of the Çandır specimen is at a much advanced stage, as opposed to *Dryopithecus fontani,* and is closer to the representatives of *Shapithecus* and *Sugrivapithecus*. The mentuni of the external surface of symphyseal region is absent in the representatives of the subfamily of Ponginae.

The inner surface of the symphyseal region (planum alveolare) in Dryopithecus fontani, is well-developed and slopes backwards. If this primitive characteristic is borne in mind, it will be seen that the peculiarities of the Çandır specimen point to an advanced stage of development. *Sivapithecus* and *Sugrivapithecus* have also the same characteristics. The torus transversus superior, torus transversus inferior and fossa mandibulare of the Çandır fossil Anthropoid closely resemble those of *Siigrivapithecus salinontanus*. These characteristics are well developed in our specimen, which is an indication of a primitive character. But these features are very weak in *Sivapithecus*.

Although the fossa alveolare in the root part of the incisive teeth of the Çandır specimen show[r] an advanced stage, the absence of crowns made it impossible to make a valid comparison between the Çandır specimen and the teeth of other fossils.

The canine tooth of the Çandır Anthropoid is missing. Only fossa alveolare corresponding to this tooth is present. The position of the fossa shows us that the missing canine was nearly erect. Moreover, the fossa is not deep, which suggests that this tooth was slightly higher than the level of the premolar and molar teeth, which reflects its similarity to Pongidae.

There is no diastema between any of the teeth in the Çandır fossil Anthropoid. This is an advanced characteristic peculiar to *Ankarapithecns, Sivapithecus, Ramapilhectts* and *Bramapithectis*.

The third premolar of the Çandır fossil has primitive characters regarding its form and the way it rises up in the alveolus, while the position of the third premolar tooth in *Oreopithecus, Sivapitliecus* and *Ramapithecus* species indicates an advanced stage. However, the third and fourth premolar teeth of the Çandır specimen are of the same height, while the third premolar teeth of *Dryopithecus, Oreopithecus, Aukarapithecuf, Sivapithecus, Ramapilhecus, Bramapilheciis* and *Sugrivapitheus* are higher than their fourth premolar teeth.

The fourth premolar of the Çandır Anthropoid has four cuspids, which shows an advanced characteristic over *Sugrivapithecus salmontanus* and points to a molarization in this tooth. The representatives of *Dryopithecus, Oreopithecus, Ankarapithecus, Sivapithecus, Ramapithecus,* and *Bramapithecus* have the same characteristics. In addition, all these fossils possess a crista which joins the protoconid and metaconid, which is also observed in the Çandır Anthropoid. The worn condition of the talonid on the tooth of the *Sivapithecus* species is similar to the state of wear observed in our specimen.

The first molar of the Çandır fossil is nearly square in shape and the cusps are well-developed. There is a post-fovea on this tooth; according to Gregory and Hellman (1926), this peculiarity reflects features characteristic of Anthropomorphs and Humans. However, the Çandır Anthropoid has an external cingulum which is a primitive characteristic. This primitive characteristic is seen as a trace on the external surface of the first molar in *Dryopithecns fontani*. In addition, this tooth is larger than the second molar of the Anthropomorphs including Humans.

Presence of an external cingulum on the second molar of the Çandır fossil is not observed in the *Dryopithecus fontani* and *Sivapithecus* species.

A characteristic feature of human teeth is a smaller M_3 in comparison to M_2. This feature is observed in *Ankarapithecus meteai* and *Sivapithecus indicus,* while it is not found in other Anthropoid representatives. However, this tooth being larger than the second molar in the Çandır fossil, points to a Pongidae characteristic. The external cingulum on the third molar of the Çandır Anthropoid is absent on the molar of *Dryopithecus fontani,* and there is only a trace of the external cingulum in *Sivapithecus indicus.* Moreover, the sixth and seventh cusps, observed on the M_3 of our Çandır specimen, are absent in *Dryopithecus fontani,* and as to *Sivapilhecus indicus* it has only the sixth cusp.

In the light of the latest revisions dealing with the presence of both pirimitive and advanced characteristics of mandibles and teeth, the Çandır fossil Anthropoid may now be considered as a new species of the *Sivapithecus* genus, which we name *Sivapithecus alpani. Sivapithecus alpani* has some primitive characteristics of the representatives of *Pliopithecus* and *Parapithecus.* Moreover, it has also some human peculiarities. Because of the advanced characteristics, *Sivapithecus alpani* can be considered as belonging to an Anthropoid group which displayed somewhat human features and lived in the Middle Miocene in Anatolia. It may be assumed that the human development began in the area with the representatives of this Anthropoid group very early in time.

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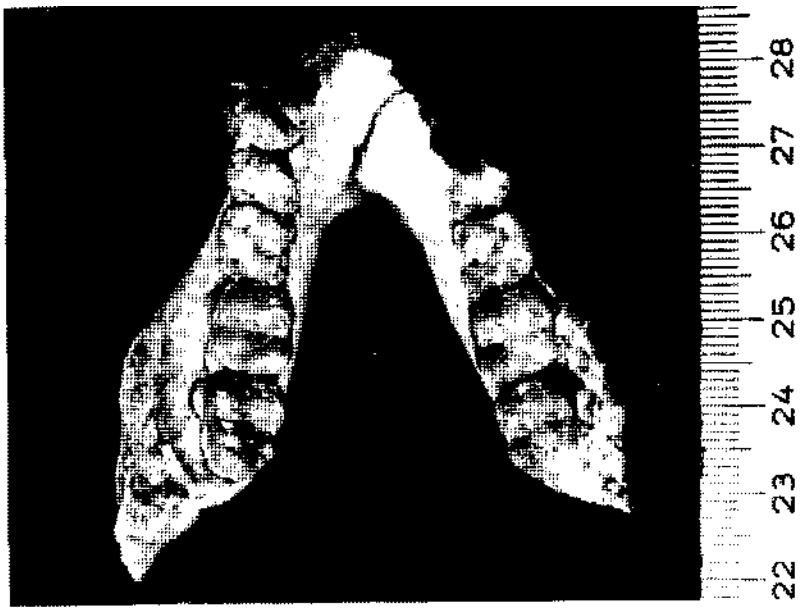

Fig. 1 - View of the torus transversus superior, torus transversus inferior and fossa mandibulare of the inne surface of the symphysis of the Çandır Anthropoid fossil *(Sivapithecus alpani* n. sp.).

Fig. 2 - Lateral view of the teeth of the Çandır Anthropoid fossil *(Sivapithecus alpani* n. sp.).

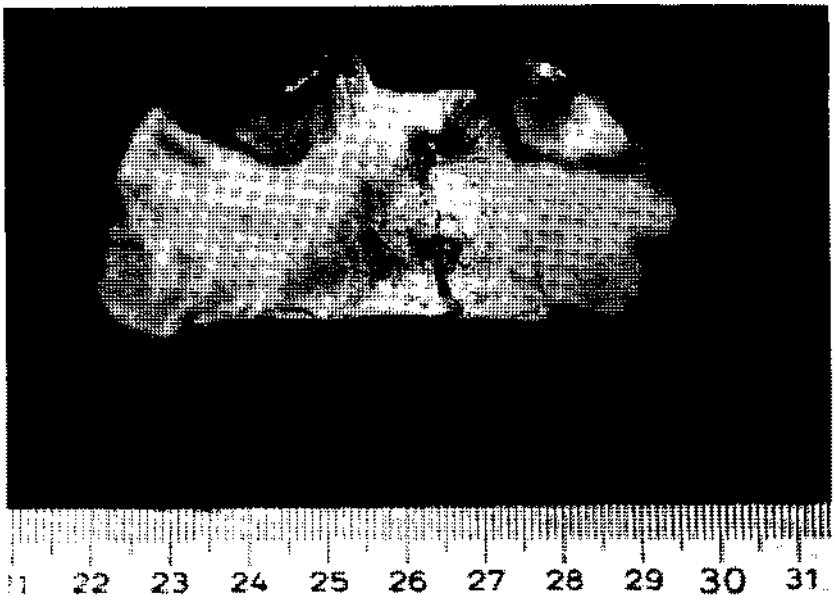

Fig. 1 - Occlusal view of the teeth of the Çandır Anthropoid fossil *(Sivapithecus alpani* n. sp.).

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