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A NEW PRIMATE FROM THE UPPER EOCENE PONDAUNG FORMATION OF BURMA

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INTRODUCTION

While studying an exceptionally fine collection of Eocene mammals from Burma, made by Barnum Brown in 1923, I had the good fortune to discover the specimen that forms the subject of this paper. It was associated with some other fossils, all of which were very fragmentary, and because of its small size and its rather unpromising appearance it seemingly had been overlooked, or at least its importance had not been realized, when the collection was catalogued.

This specimen, consisting of a fragmentary mandibular ramus containing a few teeth, would seem to be a primate, and as such constitutes an important addition to our knowledge of the upper Eocene Pondaung fauna of Burma. At the present time an extensive paper on the fossil mammals of Burma has been completed, a study based on the collection gathered by Dr. Brown in the Pondaung and the Irrawaddy formations, and naturally a consideration of the specimen to be described in this present contribution will be included in the above mentioned monographic study. In view of the fact, however, that the longer paper will not be published for some time, it seems advisable to bring out this preliminary description in order that some information about the new primate herein described will be available.

I wish to express my deep appreciation to Dr. William King Gregory for the invaluable aid and the numerous helpful suggestions that he has given me during the preparation of this paper.

The illustrations accompanying this description were made by Louise Waller Germann.

Simiidae (?)

Amphipithecus mogaungensis, new genus and species

TYPE.—Amer. Mus. No. 32520, a left mandibular ramus with P_{3-4}, M_1.

PARATYPES.—None.

HORIZON.—Pondaung, Eocene.

LOCALITY.—One-half mile northwest of Mogaung, Burma.

DIAGNOSIS.—A relatively small primate. Mandible very deep and heavy in

comparison with the size of the cheek teeth, with a very short, vertical symphysis and a heavy lingual torus. There is a pronounced pit on the posterior surface of the symphysis for the genioglossus muscle. Mental foramen beneath the fourth premolar, and placed about midway between the alveolar and the ventral borders of the jaw.

Dental formula seemingly $?-1-3-3$. Premolars very much compressed antero-posteriorly and transversely broad, due to the lingual extension of the postero-internal corner of each tooth. Crowns of premolars almost as high anteriorly and posteriorly as in the region of the central cone. Crown patterns very peculiar, consisting essentially of a central cone, from which run ridges anteriorly, posteriorly and internally, this last ridge joining at the postero-internal corner of the tooth with a posterior transverse ridge, to enclose a postero-internal fossa.

Molars brachyodont, with trigonid and talonid of subequal heights, narrower anteriorly than posteriorly. Protoconid and metaconid rather close together, hypoconid and entoconid farther apart and forming a part of a continuous rim around the well-developed talonid basin. Paraconid seemingly present but very small, hypoconulid incipient.

Roots of cheek teeth very long and vertical. P_4 with four roots, of which the antero-internal one is small. P_3 with three roots, there being no antero-internal root. P_2 with two roots, one internal and one external, but so fused as to form a single transverse root.

Canine root vertical, flattened, the internal surface being very flat and the external surface being rather convex. No appreciable diastema between canine and second premolar.

The generic and specific diagnoses are the same.

To reiterate in a detailed manner the information set forth in the foregoing diagnosis, the following description is presented.

As to size (on the basis of tooth dimensions), this new form is slightly larger than the Fayûm genus, *Propliopithecus*, and the American form, *Pelycodus*, and is more or less comparable to the bunodont artiodactyl, *Wasatchia*. It is at once distinguished, however, by its very heavy mandibular ramus and its short symphyseal region. The relationship between the depth of the ramus and the length of the first molar may be expressed in the following terms:

Length of M_1 = 6.3 mm. Depth of ramus = 19.5 mm.
Length of M_1/depth of ramus = 6.3/19.5 = 31/100.

In other words, the depth of the mandibular ramus is about three times as great as the length of the first lower molar. The mandibular symphysis is heavy and vertical, and its posterior border is opposite the second premolar. The ramus is thick, due to the well-developed lingual torus. The mental foramen is surprisingly high and in a posterior position, being beneath the fourth premolar.

Unfortunately the anterior portion of the mandible is broken away, so that no information is to be had about the incisor teeth. However, the vertical position of the canine root renders impossible a very marked alveolar prognathism of the incisors, and as this jaw is possibly that of a higher primate (as will be shown below) it probably had not more nor less than two incisors on each side. It would seem certain that there was a well-developed canine, three premolars (following the canine without any appreciable diastema) and probably three molars. The jaw is broken behind the first molar, so that the last two teeth are missing.

Of the canine, only a basal portion, deep in the mandibular ramus is preserved. This fragment serves to give some information as to the position and the cross section of the root of this tooth. Evidently the canine root was flattened, with a very flat inner surface and a convex outer surface, and its long axis was placed obliquely to the dental arcade. The position of the canine root and the preserved portion of the alveolus show that this tooth was vertical.

The premolars of this specimen are quite distinctive. They are characterized particularly by their rather high crowns and long roots, and by the peculiarity of their coronal surface patterns. Each premolar is very broad posteriorly and narrow anteriorly, and because of the short antero-posterior diameters of these teeth, this causes the postero-internal portion of each tooth to be extended lingually to a very considerable degree. Each tooth has a central cone, from which ridges extend anteriorly, posteriorly and internally. It is an interesting fact that the anterior and posterior ridges do not slope downward toward the base of the tooth to any appreciable degree, but instead they are almost as high as the central cusp. On the internal side of the tooth there is a very small anterior fossa or pocket, lying between the median transverse ridge and the anterior corner of the tooth, and a posterior fossa, lying between the median ridge and a posterior transverse ridge. These transverse ridges are not horizontal, but slope very strongly from the median to the lingual borders of the tooth, so that the fossae or pockets face obliquely upward and inward. The external or buccal side of each tooth is sculptured by a cingulum that runs in a semicircle from the base up to the anterior and posterior portions of the tooth, and by a central vertical ridge, extending up to the main cusp. All in all, the crowns of these teeth, though peculiar in their configuration and difficult to describe, are essentially similar to the bicuspids of some of the higher primates. The figure clearly shows their form.

The last premolar has four roots, two internal and two external. of

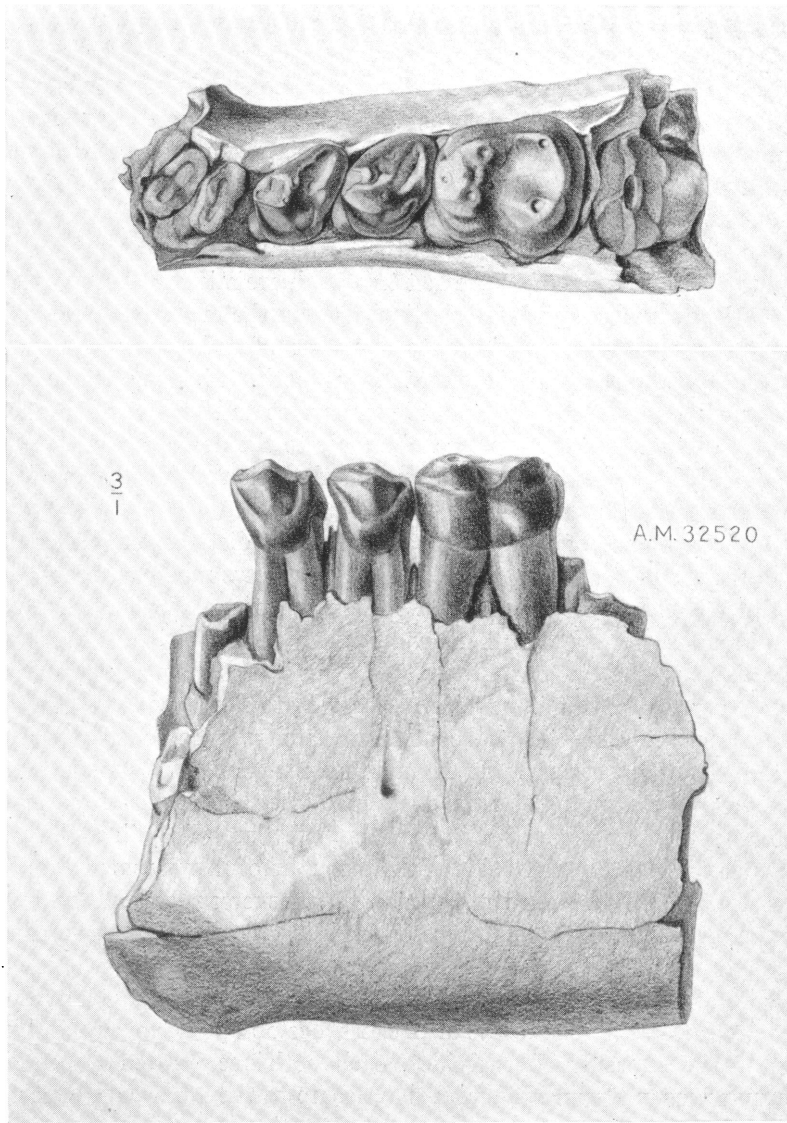

Fig. 1. *Amphipithecus mogaungensis*, new species. Type, Amer. Mus. No. 32520, fragment of left mandibular ramus with roots of canine and P_2 and P_3–M_1. Crown view above, external lateral view below. Three times natural size.

which the anterior internal one is very small. There are only three roots in the third premolar, for there is no antero-internal root. The second premolar, of which the crown is missing, would seem to have a single internal and a single external root, probably corresponding to the posterior roots of the fourth premolar, strongly fused to form one large transverse root. The roots of the cheek teeth are all extraordinarily long and vertical—a character typical of many of the higher primates.

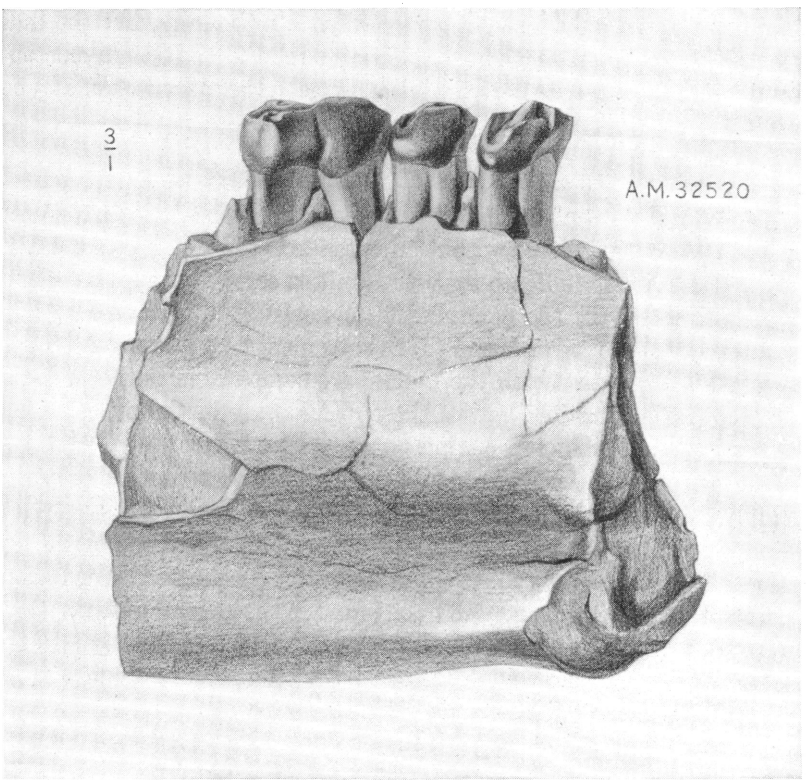

Fig. 2. *Amphipithecus mogaungensis*, new species. Type, Amer. Mus. No. 32520. Internal lateral view. Three times natural size.

The first molar is a somewhat elongated tooth, with a brachyodont crown and long roots. The trigonid is relatively low, so that it is not appreciably elevated above the talonid. The front portion of the tooth is somewhat narrower than the posterior portion, so that the protoconid and the metaconid lie closer to each other than do the hypoconid and the

entoconid. These cusps are essentially conical, but a low transverse ridge connects the anterior ones, while anterior and postero-transverse ridges from the posterior cusps form a rim around the basined talonid. In front of the metaconid is a flat facet, the center of which shows a small pit, evidently indicating the presence of a very small paraconid. There are well-developed cingula on the anterior portion of the tooth, both externally and internally, while at the back of the molar there is a very slight cingulum. At the external junction of this posterior cingulum with the talonid rim there is evidence of an incipient hypoconulid, but the indications of this cusp are so slight that it may be considered as non-existent. It would seem that we see here the initial stage in the formation of a hypoconulid.

DISCUSSION AND COMPARISONS

The relationships of this fragmentary specimen are difficult to determine with complete accuracy, but an extended study on a comparative basis would seem to indicate that its affinities certainly must lie within (a) the primates, (b) the condylarths (comparing it in this case with *Hyopsodus*), (c) the rodents, and (d) the artiodactyls. These are the only mammalian orders in which the molars are comparable to the molar of the specimen in question, and of these orders only in the primates are there to be found premolars comparable to its premolars.

Of these possibilities, the rodents and the condylarths may be pretty certainly eliminated. In the first place, the premolar pattern is quite unlike anything found in the rodents. Furthermore, the shape of the canine would preclude any rodent affinities for this specimen. Thus, about the only rodent resemblances are to be found in the general molar pattern (similar in a way to some of the Tertiary sciurids) and the depth of the mandibular ramus. But these are characters that can be duplicated in various other orders, to be considered below.

Considering now *Hyopsodus*, it may be noted that the greatest resemblance is to be found in the general pattern of the molar. Even here, however, the resemblances are due mainly to the common convergence of patterns, in which the presence of four or five main cusps, a basined talonid and a rather low trigonid are essential features. Yet in spite of certain resemblances there are very apparent differences in the first molar, such as the anterior oblique ridge from the hypoconid and the presence of a hypoconulid in *Hyopsodus*. Furthermore, when other characters of the specimen are compared with *Hyopsodus* the differences become even more pronounced. This is to be seen particularly in the pro-

found dissimilarity between the two forms in the premolars and in the depth of the mandibular ramus.

The form now under consideration shows certain resemblances to some of the primitive bunodont artiodactyls in the construction of the molar. Thus the first lower molar of *Amphipithecus* is very close indeed to the same tooth of *Wasatchia*, a dichobunid from the Eocene of North America, particularly because of the essentially similar character of the cusps, the low trigonid and basined talonid, and the anterior narrowing of the tooth. Yet even in these two very similar teeth certain differences are to be seen, especially in the beginnings of a crescent with medially extending arms (an artiodactyl character) on the hypoconid of *Wasatchia*. And when other details in the two forms are compared, such as the build of the premolars and the configuration of the mandibular ramus, the differences between them are seen to be pronounced. Therefore the specimen is to be ruled out of the Artiodactyla.

This leaves the primates to be considered, and here the resemblances would seem to be close in the form of the jaw and of the teeth. The depth of the mandibular ramus and the abbreviation of the symphyseal region are characters of especial significance, for they approximate closely the condition to be found in certain Tertiary and later primates.

A comparison of *Amphipithecus* with the lemurs, either fossil or recent, shows so many differences that the Burmese form may at once be excluded from this group of primitive primates. Thus, the lemurs are characterized by the shallow mandibular ramus, the long mandible with a relatively horizontal symphysis, the generally cross-crested or crescentic-crested molars and the comparatively simple and usually conical premolars. All of these characters are in decided contrast to those of the form under consideration.

Nevertheless, certain lemuroid features are to be seen in *Amphipithecus*. The premolars, for instance, might be considered as showing a somewhat intermediate stage between some of the primitive lemuroids, such as *Pelycodus*, and some of the primitive anthropoids. These teeth in the Burma form are much closer to those of the anthropoids than they are to those of the lemuroids, showing that the new genus is definitely of anthropoid relationships, while it retains some of its primitive lemuroid heritage characters. Then again, the first lower molar of *Amphipithecus*, by its form and the arrangement of its cusps, might have been derived from a lemuroid molar similar to that of *Pelycodus*, but again this tooth is advanced to a position closer to the anthropoids than to the lemuroids by reason of its low trigonid and the loss of its sectorial characters.

Similarly, *Amphipithecus* may be excluded from the tarsioid group. For the tarsioids are characterized by the shallow, elongated mandible, the more or less sectorial molars, the conical or simple premolars, and the shallow, inclined symphysis with forwardly inclined incisors and canines, all of which characters are in decided contrast to the comparable features of *Amphipithecus*.

The presence of three premolars in *Amphipithecus* at once suggests the possibility of a relationship with the South American Cebidae. Not only the dental formula but also the deep mandibular ramus and the abbreviated symphysis are characters by which it resembles after a fashion the New World monkeys.

In the New World monkeys the second premolar is a large, well-developed tooth, considerably larger than the two premolars that follow it. In *Amphipithecus*, on the other hand, the second premolar was seemingly very small—evidently it was a structure that was disappearing. Consequently it would seem that the presence of a second premolar in this Burmese form may be merely the retention of a lemuroid or tarsioid character in a primitive anthropoid form.

It might be pointed out that there is a certain resemblance between the premolar patterns in this Burmese primate and in *Alouatta*, a resemblance that is shown in a graphic way by the accompanying figure. Yet this resemblance is not close enough to indicate any true affinity. It may be rather a parallelism in the development of these teeth.

Then again, the deep ramus and the abbreviated symphysis of some of the South American monkeys, although affording a superficial resemblance to the same features of the Burma form, are when critically examined seen to be of a secondary and independent origin.

All in all, it would seem that the main resemblance of *Amphipithecus* to the South American monkeys is to be found in the presence of a second premolar. And since the second premolar of the Burmese form is small, the evidence would seem to point to the fact that it does not constitute a character linking this new genus with the South American forms (in which the second premolar is quite large) but rather that it is a retained primitive feature in a true Old World primate.

Since it would seem that *Amphipithecus* may be logically eliminated from the lemuroids, tarsioids and platyrrhine primates, the question of its affinities to the Old World primates, the catarrhines, may now be considered. In this connection some interesting comparisons may be made.

The obvious comparison is, of course, that between *Amphipithecus* and the supposed primate from the Pondaung beds, *Pondaungia*. This

latter genus, described by Pilgrim, is characterized by its very small size, its quinquetubercular upper molars and its seemingly quadritubercular lower molars. Unfortunately, no direct comparisons betwen *Pondaungia* and the new genus can be made, for the former consists of the first two upper molars and the last two lower molars, whereas only the first lower molar of *Amphipithecus* is known. But a comparison of a first lower molar against a second lower molar would seem to indicate that the two forms are quite unlike each other in their tooth characters. In *Amphipithecus* the molar is long, with a narrow trigonid and a broad, basined talonid; the metaconid is somewhat posterior to the protoconid and the entoconid is lingually placed as compared with the other cusps. In *Pondaungia*, on the other hand, the molar is more square in its outline, and the cusps would seem to be aligned transversely. Again, the mandibular ramus of *Pondaungia* is rather shallow, a decided contrast to the very deep ramus of *Amphipithecus*. Therefore, even though the points for a direct comparison between the two Burma specimens are few, the evidence would seem to be sufficiently strong to show that they are distinct, each from the other.

Some of the earliest catarrhines are known from the lower Oligocene beds of the Fayûm, Egypt. Three genera are of particular interest, namely, *Apidium*, considered by Gregory as a structural ancestor of the cercopithecoid monkeys, and *Parapithecus* and *Propliopithecus* (to be discussed below), forms seemingly ancestral to the higher anthropoids. In *Apidium* the last lower premolar is essentially conical, with only the beginnings of an internal cusp that might eventually lead to a bicuspid structure, while the lower molars are marked by the multiplicity of cusps, there being, beside the four main cusps, a hypoconulid and a small cusp at the anterior end of the crista obliqua. The mandibular ramus is comparatively shallow. All these points are in decided contrast to *Amphipithecus*.

Considering further the cercopithecoids, it is possible to make certain comparisons between *Amphipithecus* and some of the more advanced and geologically younger forms, such as *Mesopithecus*, a monkey from the Pikermi beds of Pliocene age. In *Mesopithecus* there is in the fourth premolar a high central external cusp with a cross-ridge running internally from it, and anterior and posterior basins. In the third premolar the main cusp stands up prominently, without any cross crest running inwardly from it. These teeth, by reason of the development of their anterior and posterior basins and the lingual projection of their posterointernal corners, resemble to some extent the premolars of *Amphipithe-*

cus. Yet there are so many differences in the premolars of these two forms that no close relationship between them is to be imagined. There should be noted especially the anterior and posterior height of the premolars in *Amphipithecus*, making the teeth flat across the top, rather

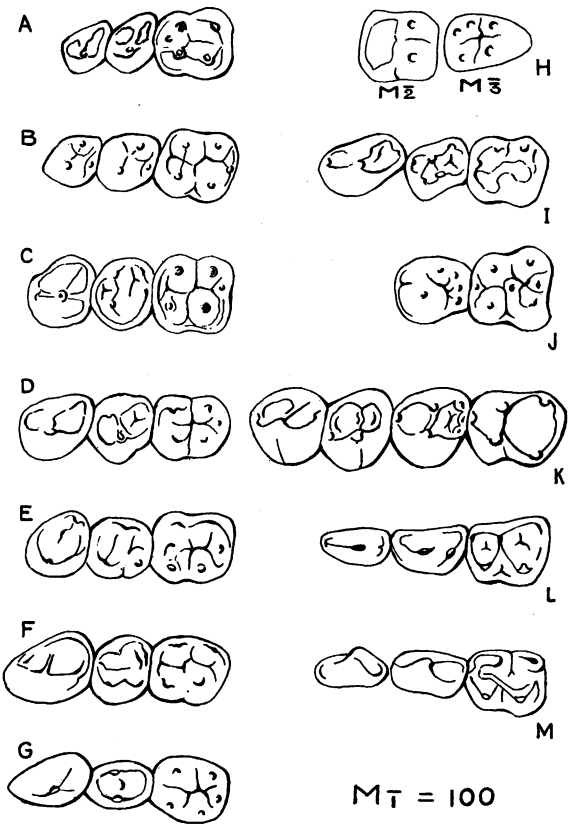

Fig. 3. Left P_{3-4}, M_1 of various primates and an artiodactyl. (H, M_{2-3}; K, P_{2-4}, M_1.)

SIMIIDAE:—A. *Amphipithecus*—Eocene, Burma; B. *Parapithecus*—Oligocene, Egypt; C. *Propliopithecus*—Oligocene, Egypt; D. *Dryopithecus*—Miocene, Europe; E. *Pan*—Recent, Africa; F. *Gorilla*—Recent, Africa; G. *Hylobates*—Recent, Orient; H. *Pondaungia* (this family?)—Eocene, Burma.

CERCOPITHECIDAE:—I. *Mesopithecus*—Pliocene, Greece; J. *Apidium*—Oligocene, Egypt.

CEBIDAE:—K. *Alouatta*—Recent, Central America.

LEMURIDAE:—L. *Pelycodus*—Eocene, North America.

ARTIODACTYLA:—M. *Wasatchia*—Eocene, North America.

than pointed, a condition quite different than what is found in any of the cercopithecoids.

In *Mesopithecus*, as in other cercopithecoid monkeys, the molars are highly specialized as bilophodont teeth, and therefore offer a great contrast to the bunodont molar of *Amphipithecus*.

Parapithecus and *Propliopithecus* are generally considered as being very primitive anthropoids, and as such are of particular interest in this comparative study. In *Parapithecus* the mandibular ramus is relatively more shallow than it is in *Amphipithecus*, the symphysis is relatively less massive, and it would seem probable that the mandibular rami diverge to a greater degree than was the case in the Burma form. In these respects it may be said that *Parapithecus* shows more primitive characters than does the new genus from Burma. On the other hand, the molars of *Parapithecus* resemble, to a certain extent, the molar of *Amphipithecus*. In the Fayûm genus these teeth are brachyodont, with talonids broader than the trigonids. It should be noted, however, that the difference in height between the trigonids and talonids is greater than in *Amphipithecus*, and that a hypoconulid is present. The premolars of *Parapithecus* are more primitive than those of *Amphipithecus*, and they consist essentially of simple cones with low, posterior heels.

In many respects *Propliopithecus* shows more resemblances to *Amphipithecus* than does *Parapithecus*. In *Propliopithecus* the mandibular rami are less divergent (as was probably the case with *Amphipithecus*) than they are in *Parapithecus*, the mandible is heavy and deep, and the symphysis is strong. The molars are perhaps more advanced toward the anthropoid habitus than are the molars of *Amphipithecus*, for they are rather square, instead of being elongated. There is a well-developed hypoconulid. The form of the premolars, also, resembles to a certain extent the configuration of the premolars of *Amphipithecus*. Thus the fourth premolar of *Propliopithecus* has a high central cusp with a transverse ridge running inwardly from it, anterior and posterior fossae, and a somewhat lingually produced postero-internal border.

It was shown on a foregoing page that the length of the lower first molar is to the depth of the mandibular ramus in the ratio of 31/100. This may be compared with the ratios of molar length to mandibular depth in various primates as listed below.

	Ratio—length of M_1/depth of ramus
Amphipithecus	31/100
Mesopithecus	32/100
Propliopithecus	37/100

Proconsul	29/100
Dryopithecus frickae	38/100

Thus the relationship between the depth of the mandibular ramus and the cheek teeth is somewhat similar to what exists in certain anthropoid primates, and is quite apart from the shallow mandibular ramus found in the typical lemuroids and tarsioids.

An outstanding character of the jaw of *Amphipithecus* is the strong, well-developed lingual torus on the inner side of the ramus. In this respect the jaw of this specimen is most decidedly ape-like, since the presence of a heavy lingual torus is a typical feature of the higher anthropoids. The accompanying table shows the proportionate thickness of the mandibular ramus beneath the first molar to the breadth of the first molar in various genera of primates. From the ratios, it is at once apparent that *Amphipithecus* in this respect resembles most closely certain anthropoids, such as *Parapithecus*, *Propliopithecus*, *Dryopithecus* and *Gorilla*.

	Ratio—width of M_1 to width of ramus below M_1
Amphipithecus	66
Parapithecus	67
Propliopithecus	61
Pliopithecus	77
Mesopithecus	82
Dryopithecus	58
Gorilla	65
Hylobates	98
Ateles	94
Alouatta	85

Another very characteristic feature of the mandible of *Amphipithecus* is the presence of a deep pit for the insertion of the genioglossus muscle on the posterior mid-portion of the symphysis. The presence of such a pit is a diagnostic character in the advanced primates, and can be seen particularly well developed in many of the platyrrhine and catarrhine genera.

The position of the mental foramen beneath the fourth premolar and rather high up on the surface of the ramus is a feature that would seem to be peculiar to the genus now under consideration. That is, this foramen is more posteriorly and more highly situated than it is in any of the other primates. Thus in the tarsioids, it is far forward, beneath the second and third premolars or beneath the second premolar and the canine, and it is located near the inferior border of the ramus. The same is true of the lemurs, where there are often two or three exits for the mental ca-

nal. In the platyrrhines this foramen is beneath the second and third premolars while in most of the catarrhines it is beneath the third premolar. It is an interesting fact, however, that in certain of the advanced anthropoids, particularly the gorilla and the orang, the mental foramen is beneath the fourth premolar, as it is in *Amphipithecus*, although it is lower on the mandible. Thus again the new genus from Burma would seem to show its closest affinities with certain of the higher anthropoids.

Again, the abbreviation of the symphysis and the crowding together of the canine and the premolars are characters that would seem to link this specimen definitely with the primates. Here too, the resemblances are with the more advanced primates belonging to the great anthropoid group rather than with the lemuroids and the tarsioids, in which the jaw is longer and the symphysis more extended. In this same category are the long, vertical roots of the cheek teeth in *Amphipithecus*, constituting still another resemblance to the higher primates, particularly to the more advanced members of the platyrrhine and catarrhine groups.

The position of the canine root, as it is preserved, deep in the mandible, affords a resemblance to some of the anthropoids, such as *Parapithecus, Propliopithecus* and *Dryopithecus*. The position of the canine alveolus immediately in front of the second premolar, and without the intervention of an appreciable diastema, indicates that the canine was a strong, upright tooth, similar to the canines of the above mentioned forms, and not a forwardly inclined tooth, such as is typical of the tarsioids. No definite conclusions can be drawn as to the form of the canine except that it was rather flattened.

It has been stated in a preceding paragraph of this paper that the premolars and the molar of *Amphipithecus* are, generally speaking, somewhat intermediate between the teeth of certain Eocene lemuroids, such as *Pelycodus*, and the primitive anthropoids, and it was also pointed out that these teeth of *Amphipithecus* are closer to the teeth of the higher primates than they are to those of the primitive lemuroids. That is, the premolars of *Amphipithecus* are, supposing a certain amount of change consequent upon evolutionary specializations, derivable from relatively simple premolars like those of *Pelycodus*, but by reason of their specialized crown patterns they are more closely comparable to the premolars of *Mesopithecus, Propliopithecus, Dryopithecus* and *Gorilla*. It might be said that the premolars of *Amphipithecus* are truly primitive anthropoid bicuspids. On the other hand, these same specializations of the crowns in the premolars of *Amphipithecus* cause them to be different from the premolars of any of the above-mentioned forms, when close comparisons are made.

The first lower molar of *Amphipithecus* is similar in certain ways to this tooth in *Pelycodus*, particularly with regard to the arrangement of the cusps and the relatively broad talonid. On the other hand, this tooth in the Burma genus is specialized in many ways in the direction of the higher primates, such as *Parapithecus*, *Dryopithecus* and the gibbon. Thus in both *Amphipithecus* and the gibbon the tooth is narrower anteriorly than it is posteriorly and in both the tooth is somewhat elongated. Moreover, their general crown patterns are not dissimilar. But a close comparison will show many differences, so that in the final analysis the molar, as was the case with the premolars, is developed along a line of specialization that sets it apart from the molars of any other primates. Generally speaking, it may be said that the molar of *Amphipithecus* is much more primitive than are the premolars. That is, the molar shows by reason of its pattern, the development of the trigonid and talonid, and by its proportions, that it is about as close to the more primitive, generalized Eocene primates as it is to the more advanced forms.

These features of the cheek teeth are brought out in the accompanying illustration.

Amphipithecus Characters in common with:	*Pondaungia*	Lemuroids (*Pelycodus*, etc.)	Tarsioids	Cebids	Cercopithecids (*Apidium*, etc.)	Primitive anthropoids (*Parapithecus*, *Propliopithecus*)	Advanced anthropoids (*Dryopithecus*, etc.)
Size	X			X		X	
Depth of mandible				X			X
Lingual torus							X
Abbreviated, vertical symphysis							X
Geniohyoid pit				X	X	X	X
Position of mental foramen							X
Dental formula				X			
Premolar pattern		X		X	X	X	X
Molar pattern $\begin{cases} Pr^d \quad Hy^d \\ Pa^d \; Me^d \; En^d \end{cases}$		X				X	X
Low trigonid							X
Lack of hypoconulid							
Brachyodonty	X					X	X
Great posterior breadth of M						X	
Long, vertical roots				X	X	X	X
P_4—4 roots, P_3—3 roots [P_2—2 roots]				X	X	X	X
Canine upright				X	X	X	X
Canine root deep						X	
No diastema C–P_2				X			

CONCLUSIONS

From the foregoing remarks it may be seen that *Amphipithecus* is a primate. Although it may be compared in a general way with various genera, it does not seem to show any particularly close affinities with any known form.

Of the primates, the lemuroids and tarsioids may be eliminated from among the groups to which *Amphipithecus* might show any close genetic affinities. There remain, consequently, the platyrrhine and the catarrhine primates, both of which groups contain genera in which certain features may show some resemblances to the form now under consideration.

Amphipithecus is like the platyrrhine monkeys in the presence of a second premolar. It shows resemblances to the cercopithecoids (particularly *Mesopithecus*) and to some of the anthropoids (particularly the gorilla) in the form of the last premolar. All in all, however, no very close comparisions can be made between the premolars of this new genus and any known primates, but generally speaking the greatest similarities are with the anthropoids. It shows resemblances to the gibbon, in a general way, in the form and structure of the first lower molar. On the other hand, this tooth in *Amphipithecus* is primitive, so that it resembles to some extent the same tooth in certain Eocene lemuroids. *Amphipithecus* resembles the higher primates, such as *Dryopithecus*, in the relatively great depth and thickness of the mandibular ramus and the brevity of the symphysis. It does not seem to resemble very closely any of the primates contemporary with it. It does not seem to be very close to *Pondaungia*, a supposed primate from the Eocene beds of Burma.

Thus it may be seen that the exact position of this new genus is difficult to define. It is probably an anthropoid primate, very possibly an early, in some ways specialized, relative of the higher anthropoids. It may in some way occupy a somewhat anomalous and separated position in the phylogeny of the anthropoid primates, but until further material is available, no definite conclusions can be made as to the precise affinities of this new genus.

As to the family relationships of *Amphipithecus*, two possibilities are evident. In the first place, this new genus might be placed in the family Simiidae because of its obvious affinities to *Parapithecus*, *Propliopithecus*, *Dryopithecus* and the other higher anthropoids. If this were to be done, however, the long established distinction of the anthropoids as primates having only two premolars would be broken down. For this reason the desirability of including *Amphipithecus* in the family Simiidae is questionable, even though the morphological details that characterize this genus make such a step a logical one.

In the second place, a new family or subfamily might be created to contain this single genus and species. But this would involve the founding of a new group of major taxonomic importance on very fragmentary evidence.

Measurements

		Amphipithecus A. M. 32520	*Pondaungia* G. S. I. D203	*Gorilla* A. M. CA501	*Hylobates* A. M. 70398	*Dryopithecus*[1]	*Pliopithecus* A. M. (cast)	*Propliopithecus* (After Schlosser)	*Parapithecus* (After Schlosser)	*Mesopithecus* A. M. (cast)	*Apidium* A. M. 13370	*Alouatta* A. M. 14169	*Ateles* A. M. 17218	*Pelycodus* A. M. 15624
P_3	Length	3.8		15.5	7.3		5.7	4.0	3.0	8.0		5.3	3.5	4.3
	Width	4.2		14.5	4.7		5.4	4.0	2.8	6.3		6.4	4.4	3.0
	Height (crown)	4.0		13.0	5.5		5.6	4.0	3.8	8.5		6.0	3.0	4.9
P_4	Length	3.6		12.0	5.3	9.0	5.4	4.0	3.3	6.0	3.8	6.1	3.7	4.5
	Width	4.6		13.5	4.6	10.2	5.8	4.2	3.0	6.0	2.9	6.2	4.8	3.6
	Height (crown)	4.0+		12.0	4.9	7.5	4.8	3.5	3.3	6.2	3.0	5.8	3.2	4.2
M_1	Length	6.3		15.0	6.4	11.5	6.1	5.2	4.0	7.0	3.9	7.7	5.3	5.2
	Width (ant.)	5.2		13.2	5.4	10.3	5.3	5.0	3.7	5.8	3.2	5.9	4.9	4.1
	Width (post.)	5.9		13.0	5.9	11.0				5.9	3.6	6.1	5.1	4.7
	Height (crown)	3.6+		10+	4.0	..		3.2	3.4	4.0	2.5	4.5	3+	3+
Depth of mandible—M_1		19.5	12.7	41.0	13.0	31.0		14.0	7.5	20.0	7.2	20.0	17.0	12.0
Thickness of mandible—M_1		9.0		20.0	6.0	19.0	6.9	8.2	5.5	7.2	3.9	6.5	6.0	6.5

[1] *D. frickae*

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