

PLATE 5.1. *Hipparion* cf. *hasamense*, Hadar Formation (Deneu Dora Member).  
 (A)  $M_2^2$ ; (D)  $P_3^3$ ; (H)  $P_2^2.P_3^3$ .  
*Hipparion hasamense*.  
 (B)  $M_1^1$  or  $M_2^2$  (KNM-ER 2923); (C)  $P_3^3$  or  $P_4^4$  (KNM-ER 2785); (E, F)  $M_1^1$  (KNM-ER 2768B); (G)  $P_1^1.P_2^2.M_1^1$  (KNM-ER 4080); (I, J)  $P_3^3.P_4^4.M_1^1$ .  
 $M_2^2$  (KNM-ER 2776, holotype); (K, L)  $P_2^2$  (KNM-ER 2768).

***Hipparion hasumense* sp. nov.**

- 1974 *Stylohipparion libycum*; Aguirre and Alberdi: 154  
 1975 *Hipparion primigenium* (partim); Hooijer: 17  
 1975 *Hipparion* aff. *sitifense* (partim); Hooijer, Plate 5,  
 Figs. 4, 5.  
 1976 *Hipparion* sp.; Eisenmann (1976a): 580

**Diagnosis.** Moderate to large-sized hipparion with rather caballine lower cheek teeth and deep vestibular grooves on moderately worn molars. Ectostylids probably present in most lower teeth of the species but taper apically and hence more prominent in worn specimens.  $P_3$  and  $P_4$  notably larger than  $M_1$  and  $M_2$ .

**Holotype.** KNM-ER 2776, associated right  $P_4$ - $M_2$  and fragments of very worn incisors from beneath the Hasuma Tuff in Area 204 (Plate 5.1, I, J); other specimens are known from zones B and C of the Kubi Algi Formation.

**Etymology.** The species name reflects the stratigraphic position of the type specimen in the succession east of Lake Turkana.

Specimens attributed to *H. hasumense* from east of Lake Turkana represent a species that has not hitherto been named at any other locality in East or South Africa. Similar specimens have, however, been retrieved from the Chemeron Formation of Kenya and from the Denen Dora Member of the Hadar Formation of Ethiopia.

Lower cheek teeth are listed with their measurements and localities in Table 5.2. I have explained above why upper cheek teeth of hipparions are of limited diagnostic value and it is with caution that I refer to *H. hasumense* the specimens listed in Table 5.1. Other specimens include an astragalus (KNM-ER 2789) from zone C of Area 117, an angular portion of mandible (KNM-ER 4059) from zone B of Area 116 (Eisenmann 1976a, Plate 5C), and two mandibular symphyses lacking incisors (KNM-ER 324 and 1221) from unknown levels south of the Koobi Fora Ridge and in Area 7 respectively (Eisenmann 1976a, Plate 7A, B).

The characteristic features of the lower cheek teeth have already been listed in the species diagnosis. Ectostylids usually reach the top of the crown (except in 5 specimens out of 26). Large and plicated upper cheek teeth that are found in zones B and C are provisionally referred to this species

although there is no known association of upper and lower cheek teeth from east of Lake Turkana.

Measurements of an astragalus are given in Table 5.8.

*H. hasumense* differs from the evolved hipparions (*H. cornelianum*, *H. steytleri*, *H. libycum*, *H. ethiopicum*) and in particular from *H. ethiopicum* in which the ectostylids are much bigger, the double knots typically caballine, the vestibular grooves shallow in at least some moderately worn molars and in which there is but little difference of size between  $P_{3-4}$  and  $M_{1,2}$ . *H. hasumense* differs also from the South African *H. namaquense* in which the ectostylids are inconstant and minute even at the base of the crown.

Regarding the comparison of *H. hasumense* with *H. afarensis*, one point must be made clear. If it had not been for the difference in size and shape between the muzzle and incisors of the *H. afarensis* type skull and the referred mandible on one hand and the muzzle and incisors of another individual of about the same ontogenetic age on the other, the question of two species in the Hadar Formation would not have arisen because the cheek teeth and limb bones may easily be assigned to a single species. As it is, the variability of the front dentition does not seem compatible with an intraspecific variation and the probability is that there are two species at Afar even if their cheek teeth cannot, for the moment, be told apart (the more so because the lower cheek teeth of the mandible referred to *H. afarensis* are not worn enough to be discussed).

There are some lower cheek teeth from the Hadar Formation referred to *Hipparion* sp. (particularly AL 155-6) that are closely comparable to those of the Kubi Algi Formation. The similarities of size, morphology of the  $P_2$  (Plate 5.1 H, K) and development of ectostylids on all the teeth suggest a very close relationship if not conspecificity. The main difference between comparable specimens from the two formations is that the Hadar teeth ( $M_1$  and  $M_3$  of AL 155-6) have shallow vestibular grooves; it is not apparent whether this is because the Hadar teeth are less worn or if they belong to a slightly more advanced stage of the same lineage. The lower cheek teeth of AL 155-6 were originally associated with incisors, upper cheek teeth and a nearly complete postcranial skeleton, and certainly astragali and upper cheek teeth of *H. hasumense* agree very closely in morphology with equivalent elements from Hadar (Plate 5.1A-D; Table 5.8).

If we can assume that *H. hasumense* is present in

the Denen Dora Member of the Hadar Formation (Aronson *et al.* 1977) it enables us to postulate an age of approximately 3 Ma for zone B of the Kubi Algi Formation. Moreover it provides us with a more complete understanding of the species through the additional information available from the Hadar skeleton. Thus we may infer that metacarpal III and metatarsal III were approximately 267 and 296 mm long respectively, and that the anterior and posterior proximal phalanges were 75 and 70 mm long. We may infer also that the incisors, though neither as large nor as crenulated as in *H. cornelianum*, may exhibit one 'advanced' feature, namely some reduction in size of  $I_3$ .

*H. hasumense* is perhaps also represented at other East African localities. Lower cheek teeth such as KNM-BC 1157 from the Chemeron Formation (Hooijer 1975, p. 26, Plate 5 Figs. 4, 5) are of similar size and morphology to the type of *H. hasumense*. The presence of *H. hasumense* in the Chemeron Formation is hardly surprising in light of the estimate of its age as 2–4 Ma (Bishop *et al.* 1971). The upper third molar KNM-BC 367(2) (not an  $M^2$  as described by Hooijer (1975, p. 17, Plate 6, Fig. 5) from locality JM 493 is rather similar to the  $M^3$  KNM-ER 2922 from the Kubi Algi Formation (Plate 5.2A) but the latter specimen is bigger with a larger protocone.

#### *Hipparion* sp. A

A second species of *Hipparion* may be represented by a damaged lower premolar (KNM-ER 2766, Plate 5.2M) from zone C of the Kubi Algi Formation in Area 203. The ectostylid of KNM-ER 2766 is more prominent than in *H. hasumense*, and its more or less triangular section suggests that its enlarged appearance results from the fusion of several ectostylids of different heights. Similar ectostylid fusion has been recorded in hipparions from the Shungura Formation (Eisenmann in press, Plate 2) and from Aïn Brimba (Arambourg 1970, Plate XVIII, Fig. 3). Although this isolated tooth appears to group with the *H. hasumense* cluster on a scatter diagram of ectostylid length versus occlusal length (Eisenmann 1977, Fig. 2), measurements made on a damaged specimen must be viewed with caution and I believe KNM-ER 2766 to be 'more advanced' than *H. hasumense*. The premolar also displays a peculiar double knot, with a very shallow lingual groove and a very oblique pedicule (stem of the double knot). This combination of characters is seen also in a  $P_3$  from the Sidi Hakoma Member of the Hadar Formation (Plate 5.2L), which is slightly older than the Denen Dora Member, but again also

in an isolated  $P_3$  from the Guomde Formation (Plate 5.2N), which overlies the Koobi Fora Formation at Ileret. Isolated teeth of similar morphology to KNM-ER 2766 are thus known from localities ranging in age from over 3 Ma to less than 1 Ma. These facts stress the caution with which one should use single teeth for establishing time correlations.

An associated molar and premolar, KNM-ER 673A and B, were collected during the early phase of the project from KF III. The molar is little worn and the ectostylid does not reach the occlusal surface. In the premolar the double knot and the size of the ectostylid are strongly reminiscent of those of the zone C and Sidi Hakoma Member specimens, but agree still better with a premolar from Member C of the Omo Shungura Formation (Omo 18-1969-91) which has been interpreted as between 2.4–2.6 Ma (Coppens 1975, p. 1571).

Measurements of these specimens together with that of another (KNM-ER 335B) from an unknown level in Area 7A are given in Table 5.3.

#### *Hipparion cornelianum* (Van Hoepen), 1930

- 1930 *Eurygnathohippus cornelianus*; Van Hoepen: 23, Plates 20–22  
 1942 *Stylohipparion* sp.; Dietrich: 97  
 1963 Chalicotheriidae gen. and sp. indet.; Ewer: 343  
 1965 *Hipparion* (*Stylohipparion*) *libycum*; Boné and Singer: 389  
 1965 *Stylohipparion* sp.; Leakey: Plate 20  
 1975 *Hipparion* cf. *ethiopicum*; Hooijer: Plates 3(8), 7, 11, 12, 13(2)  
 1976 *Hipparion* cf. *ethiopicum*; Eisenmann (1976a): 585  
 1978 *Hipparion libycum*; Churcher and Richardson: 399

*Diagnosis.* Species of *Hipparion* with well developed, mesiodistally flattened and crenulated  $I_1$  and  $I_2$  and with atrophied  $I_3$  placed just behind  $I_2$ . The arrangement of the incisors gives a rectangular aspect to the anterior part of the jaw in contrast to the usual rounded morphology.

*Holotype.* Mandibular symphysis with incisors from the Cornelia Beds, South Africa, described by Van Hoepen (1930, p. 23, Plate 20–22) and Cooke (1950, p. 423, Fig. 8).

In the opinion of Van Hoepen (1930), '*Eurygnathohippus*', the 'horse with the wide jaw', had no third incisors at all. Cooke (1950, p. 423) correctly interpreted the teeth mistaken for canines by Van Hoepen as reduced third incisors and suggested that the 'horse' in question was probably not an *Equus*. It seems that Dietrich (1942, p. 97)

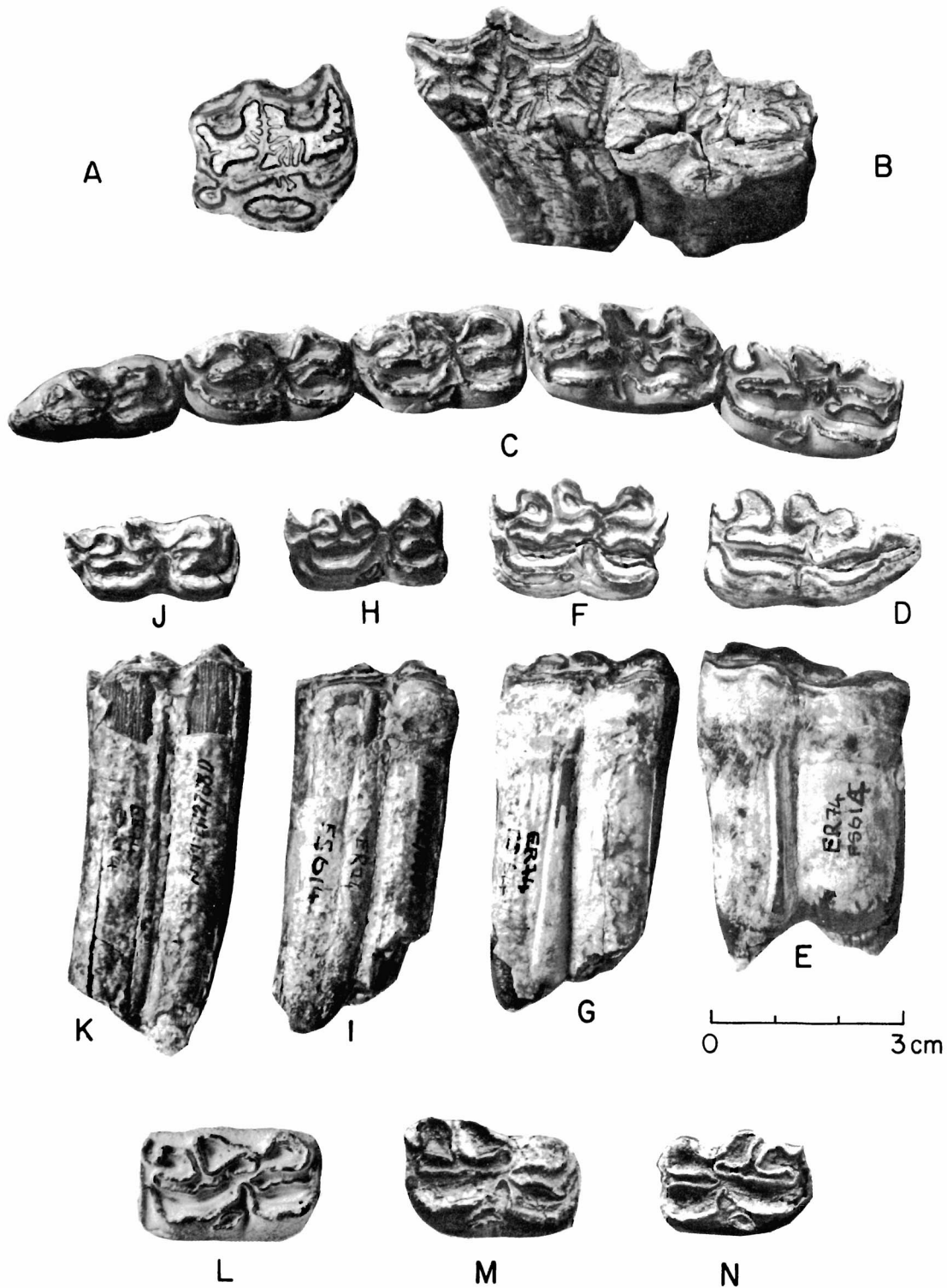


PLATE 5.2. *Hipparion hasumense*.

(A) sectioned M<sup>3</sup> (KNM-ER 2922); (B) associated (?) P<sup>2</sup> and P<sup>3</sup> (KNM-ER 2769); (C) P<sub>3</sub>, P<sub>4</sub>, M<sub>1</sub>, M<sub>2</sub>, M<sub>3</sub> (KNM-ER 4084); (D, E) P<sub>2</sub>, (F, G) P<sub>3</sub> or P<sub>4</sub>, (H, I) M<sub>1</sub>, (J, K) M<sub>2</sub> (KNM-ER 2788).

*Hipparion* sp. A.

(L) P<sub>3</sub> (AL 124-51, Hadar Formation, Sidi Hakoma Member); (M) P<sub>4</sub> or P<sub>1</sub> (KNM-ER 2766); (N) P<sub>3</sub> or P<sub>4</sub> (KNM-ER 1234).

was the first author to suggest a synonymy between *Eurygnathohippus* and *Stylohipparion*, followed by Boné and Singer. This hypothesis was proved true when similar specimens were found at Olduvai (Leakey 1965, p. 26), and in particular a skull of *Stylohipparion* with the anterior dentition. The Olduvai specimens were all referred to *H. cf. ethiopicum* by Hooijer (1975, p. 26); however it seems that more than one form of *Hipparion* may be present at Olduvai (Eisenmann in press). As we still do not know what kind of cheek teeth, upper and lower, incisors and limb bones belong together, and as *H. ethiopicum* is known only from lower cheek teeth, it seems best to attribute to *H. cornelianum* such specimens whose incisors fit with the Cornelia type, and to *H. ethiopicum* the lower cheek teeth which fit with the Omo type.

Accordingly, the immature cranium from the *Notochoerus scotti* zone in Area 105, previously described under the name of *H. cf. ethiopicum* (Eisenmann 1976a) is here attributed to *Hipparion cornelianum*. If it should eventually be decided that this cranium and the lower cheek teeth assigned to *H. ethiopicum* are conspecific, the South African taxon will have priority.

The immature skull KNM-ER 3539, the sole specimen to surely belong to *H. cornelianum*, has already been described and its main measurements given (Eisenmann 1976a, Table 1). Its most interesting features pertain to the muzzle, the face and the vomerine region. Although the specimen is immature, the first and second incisors were patently strongly developed and crenulated; there is however no room in the premaxilla for the third incisor, or at most, room for a very atrophied one. The face lacks the preorbital fossa and is relatively short (whereas the face/cranium ratio calculated on a photograph is 250 for *H. cf. baardi*, it is only about 200 for the Koobi Fora specimen). The vomerine ridge is peculiar (Plate 5, 3B) and the vomerine index is very high (150).

Some of the characteristic features of KNM-ER 3539 are also displayed by *H. afarensis* (Eisenmann 1976a, Plates 2 and 6: very large first and second incisors, face devoid of preorbital fossa, acute vomerine ridge and high vomerine index) but *H. afarensis* has a well developed I<sup>3</sup> and the relative length of its face cannot be estimated. It seems highly probable that *H. afarensis* is ancestral to *H. cornelianum*.

*H. turkanense* shares with KNM-ER 3539 the lack of preorbital fossa (Hooijer and Maglio 1974, Plate

1) and a rather high vomerine index. The face is relatively short. But there seems to be no acute vomerine ridge and the (damaged) incisors seem to have only moderate dimensions. In my opinion it is premature to postulate whether *H. turkanense* was or was not ancestral to *H. afarensis*.

Two skulls were recovered from Olduvai Bed II and described by Hooijer (1975, pp. 28 and 32). Both lack the preorbital fossa but only one is sufficiently preserved to show the large size of I<sup>1</sup> and I<sup>2</sup> and some reduction of the I<sup>3</sup> (Hooijer 1975, Plates 7, 8 and Fig. 2 of Plate 11). The length of the face and the vomerine index cannot be estimated nor have we any data on the shape of the vomer. It is very probable that the skull belongs to the *H. afarensis*—*H. cornelianum* group. The moderate reduction of its third incisors would indicate a closer relationship with *H. afarensis* if it had not been observed that lower incisors are in general more reduced than uppers (Hooijer 1975, p. 35); this enables us to suppose that upper incisors not very different from those of *H. afarensis* may be associated with lower incisors of the *H. cornelianum* kind.

Indeed, lower incisors of the *cornelianum* type are present at Olduvai and include two symphyses identical to the South African one and numerous isolated incisors (Hooijer 1975, pp. 35–8), but some of them, including four specimens collected in Lower Bed II (Hooijer 1975, Plate 13, Fig. 1), are perhaps smaller and less flattened at the root. This slight difference may be related to sexual dimorphism, different stage of wear, different evolutive stage or to mere individual variation without any significance. Anyway, one must note that different kinds of incisors are found together in other East African Plio-Pleistocene sites than Olduvai. In most of these cases the presence or absence of normal or reduced incisors remains unknown.

Lower incisors from the Hadar Formation belonging to individuals of about the same (young adult) age may be very large (*H. afarensis*: AL 363-18 and AL 177-21) or much smaller (*H. hasumense*: AL 155-6) whereas the associated cheek teeth have similar dimensions. Curiously, some degree of reduction is apparent in the *H. hasumense* third incisors, but not in the *H. afarensis* ones.

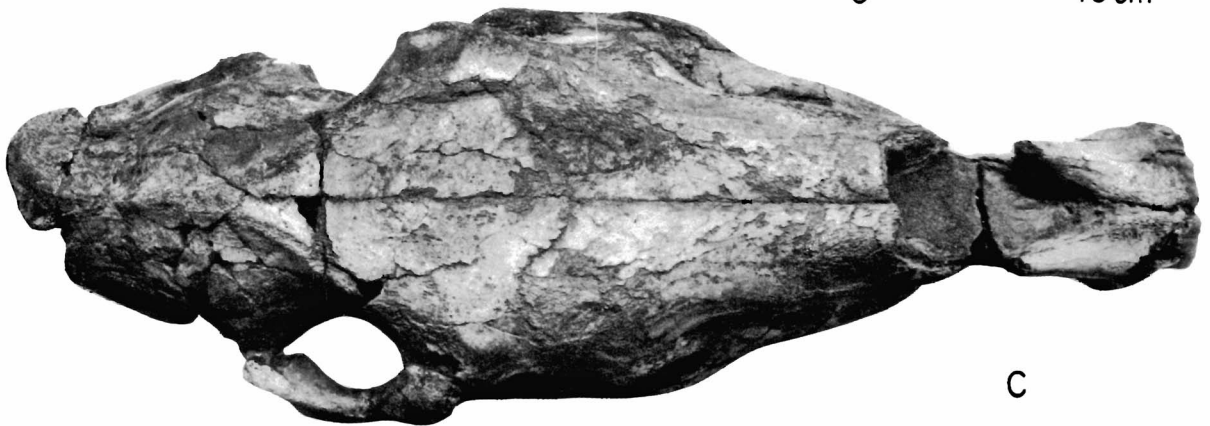
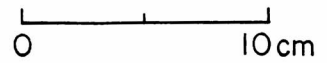
In the Shungura Formation, incisors of the *H. cornelianum* type (large, flattened and crenulated) have been retrieved from the Members D, E, F, G, and L (Hooijer 1975, Plate 3, Fig. 8; Eisenmann in press, Plate 1, Figs. 4–6), whereas smaller and less flattened ones were collected in Members C, F, and G (Hooijer 1975, p. 69: specimen L. 882–4;



A



B



C

PLATE 5.3. *Hipparion cornelianum* skull (KNM-ER 3539).  
(A) lateral view; (B) ventral; (C) dorsal.

Eisenmann in press); such a small incisor was figured by Joleaud (1933, Plate I, Fig. 12) among the teeth that served to describe *H. ethiopicum*. We do not know if the lectotype chosen by Hooijer for this species was or was not associated with this incisor but if it was, the question of the synonymy between *H. cornelianum* and *H. ethiopicum* should be reconsidered. Apart from one symphysis from Member C where the third incisor is not reduced, there is no information about the morphology of the third incisors.

Amongst the Koobi Fora material there is one mandible, KNM-ER 1626, collected in the same deposits as the skull referred to *H. cornelianum* (Area 105, *Notochoerus scotti* zone). The symphysis is notably smaller than the typical *H. cornelianum* one (minimal width 45 mm compared with 55 mm in Olduvai 52 no. 067/5344). The front teeth are all missing except the left  $I_2$  and the right canine. The  $I_2$  is smaller than the average *H. cornelianum* ones (17 mm mesiodistal length compared with 20–23 mm). The size of the  $I_3$  cannot be estimated. Mandibular fragments (KNM-ER 1456) from the *Metridiochoerus andrewsi* zone of Area 104 include one  $I_2$  measuring only 16 mm mediolaterally. If these specimens belonged to *H. cornelianum* (as represented at Koobi Fora by the immature cranium) its intraspecific variation would be surprisingly great. At present I prefer to attribute these fragmentary mandibles to *H. cf. ethiopicum* because of general similarities of the lower cheek teeth.

### *Hipparion ethiopicum* (Joleaud) 1933

- 1933 *Libyhipparion ethiopicum*; Joleaud: 7  
 1947 *Stylohipparion albertense*; Arambourg: 303  
 1965 *Hipparion (Stylohipparion) libycum* (partim); Boné and Singer: 389  
 1970 *Stylohipparion libycum* (partim); Arambourg: 84  
 1978 *Hipparion libycum* (partim); Churcher and Richardson: 399

**Diagnosis.** A species of *Hipparion* with rather large lower cheek teeth (Table 5.5); premolars and molars of nearly the same size. Double knot typically caballine with pointed metastylids. Ectostylids very large and pointed, sometimes accompanied by accessory pillars. Vestibular grooves may be very shallow on part-worn  $M_2$  and  $M_3$ . If the incisor figured by Joleaud (1933, Plate I, Fig. 12) belongs to the species, *H. ethiopicum* possessed incisors much smaller than those of *H. cornelianum*.

**Lectotype.** A right  $M_3$  (1951-4-127 in the collections of the Muséum National d'Histoire Naturelle, Paris)

from an unknown horizon in the Omo deposits (probably Shungura Formation). This  $M_3$  was figured by Joleaud (1933, Plate I, Figs. 2 and 6). In the same collections are a number of teeth that undoubtedly belong to the same individual: a right and left  $M_2$  (1951-4-130 and 131; Joleaud 1933, Plate I, Figs. 3–4 and 10–11), a left  $M_1$  (1951-4-129; *ibid.* Plate I, Fig. 8), a right  $P_3$  or  $P_4$  (1951-4-128; *ibid.* Plate I, Fig. 1; original lost but cast of the occlusal surface retained in the collections).

The species was described by Joleaud (1933) but the type material listed for the taxon was found to contain representatives of more than one species (Eisenmann in press); in particular there is no certainty about the lower incisor 1951-4-126 figured by Joleaud. In consequence *H. ethiopicum* must be considered as defined only by the lectotype chosen by Hooijer (1975, p. 66) and the associated lower cheek teeth mentioned above.

*H. ethiopicum* cannot be compared with *H. afarensis* because no lower cheek teeth can be safely ascribed to the latter. From the South African *H. namaquense* it differs by much larger ectostylids. The biometrical comparison with *H. hasumense* from the Kubi Algi Formation shows that: the premolars of *H. ethiopicum* have a similar occlusal width but a shorter occlusal length; the molars of *H. ethiopicum* have a similar occlusal length but a larger occlusal width; the ectostylid length/occlusal length ratio is much greater in *H. ethiopicum* than in *H. hasumense*.

*H. ethiopicum* is thus characterized by large molars, relatively small premolars, large anteroposterior development of the ectostylid (high ectostylid index), a great vestibulo-lingual development of the ectostylid (great occlusal width). In addition, the ectostylids are complicated, with accessory pillars and some molars have shallow vestibular grooves; this last feature may be considered as an evolved one (Eisenmann 1977, p. 74). The lower row figured by Hooijer (1975, Plate 14, Fig. 2) from Bed II of Olduvai shows most of the characters mentioned. Some of these characters are present in hipparions from the *Notochoerus scotti* and *Metridiochoerus andrewsi* zones from east of Lake Turkana; accordingly the Koobi Fora material will be provisionally assigned to *Hipparion cf. ethiopicum*; no difference was found between the material collected in the two zones.

### *Hipparion cf. ethiopicum*

- 1972 *Hipparion cf. albertense*; Maglio: Table 1  
 1976 *Hipparion cf. ethiopicum* partim; Eisenmann (1976c): 234  
 1978 *Hipparion cf. ethiopicum* partim; Harris: 44

Upper cheek teeth are listed with their measurements and provenances in Table 5.4 and figured in Plate 5.4, B-F and H; lower cheek teeth in Table 5.5 and Plate 5.4, J-K, and Plate 5.5, A-C and F-O. There are in addition two fragmentary mandibles (Eisenmann 1976a, Plate V, B and D) already discussed in the section on *H. cornelianum*; one very worn upper incisor (Plate 5.4, D); six astragali (Table 5.8); three distal ends of lateral metapodials (Plate 5.4, L-N); a distal fragment of tibia (Table 5.9) and two distal fragments of metatarsal III (Table 5.9).

As in *H. ethiopicum*, the lower molars are of similar size to those of *H. hasumense* but the premolars have shorter occlusal lengths. The Koobi Fora teeth differ from those of *H. ethiopicum* by being narrower. The ectostylids are large (Eisenmann 1977, Fig. 2) but in general not as wide as in *H. ethiopicum*; in most of the teeth, ectostylids reach the top of the crown. The  $M_3$  may have shallow vestibular grooves (Plate 5.5H,L, N) but in contrast to *H. ethiopicum* moderately worn  $M_1$  and  $M_2$  generally have deep vestibular grooves coming in contact with the lingual grooves (Plate 5.5B,C).

No upper cheek teeth were associated with the lectotype of *H. ethiopicum* and it is difficult to assess which, if any, of the upper dentitions recovered subsequently from the Shungura Formation could or should be attributed to this species. Only a few upper cheek teeth from the Koobi Fora Formation are here referred to *H. cf. ethiopicum*. Of these specimens  $P^{3-4}$  are notably smaller than those of *H. hasumense*; in contrast  $M^{1-2}$  are only slightly smaller or of similar size. The premolar/molar ratio would be similar to that of *H. ethiopicum* lowers, namely relatively large molars and relatively small premolars.  $M^3$  is smaller than in *H. hasumense*.

The six astragali have similar dimensions, noticeably smaller than KNM-ER 2789 from the Kubi Algi Formation which is assigned to *H. hasumense*, and than AL 155-6 from the Hadar Formation referred to *H. cf. hasumense* (Table 5.8). One distal end of lateral metapodial from the *Notochoerus scotti* zone has an anteroposterior articular diameter of 19 mm; two others, from the *Metridiochoerus andrewsi* zone, are smaller: 14 and 16 mm. Two distal ends of third metatarsals from the *Met. andrewsi* zone have similar dimensions to metapodials from Oued el Hammam (Eisenmann 1980a) and from the Shungura Formation Members F (Eisenmann in press) and G (Hooijer 1975, p. 71).

As I have stated elsewhere (Eisenmann in press), fossil material retrieved by recent French expeditions to the Omo Basin does not include lower cheek teeth that are exactly similar to the type material of *H. ethiopicum*. The recently collected specimens that come closest in their morphology to the lectotype and associated lower cheek teeth were collected from the base of Shungura Member G; these specimens exhibit similar morphology of the ectostylids but have a deep vestibular groove on the  $M_2$  (Eisenmann in press, Plate 2, Figs. 12-16). Material figured by Hooijer from Olduvai Gorge includes a lower series which shows the same features—large and complicated ectostylids and deep vestibular groove on the  $M_2$  (Hooijer 1975, Plate 14, Fig. 2). We shall come back later to the problem of the molar vestibular grooves, but if I am right to consider the shallowness of these grooves as an evolved character (Eisenmann 1977, pp. 74-5), and if we persist with the diagnosis of *H. ethiopicum* as combining large and complicated ectostylids, molars and premolars with nearly similar occlusal length and shallow vestibular grooves on  $M_3$  and  $M_2$ , then some of the *Hipparion* material from east of Lake Turkana, Olduvai, and the recent French collections from the Omo may be assigned to *H. cf. ethiopicum* but not to *H. ethiopicum*.

Several small specimens in the East Turkana collections could represent one extreme of a single species highly variable in size or a second smaller one. They will be referred to *Hipparion* sp. B.

#### *Hipparion* sp. B

- 1975 *Hipparion* ?aff. *sitifense*; Hooijer: 22  
 1978 *Hipparion sitifense* (partim); Churcher and Richardson: 394

*Diagnosis.* Small to middle-sized hipparion with caballine lower cheek teeth and ectostylids.

Specimens of this species have been referred to *H. ?aff. sitifense* by Hooijer and to *H. sitifense* by Churcher and Richardson. The true North African *H. sitifense* is smaller and has hipparionine lower cheek teeth lacking ectostylids (Eisenmann 1980a); the synonymy proposed by Churcher and Richardson does not seem justified.

Upper and lower cheek teeth referable to this small hipparion are listed in Tables 5.6 and 5.7 together with their measurements and places of collecting. Some of them are certainly too small to belong to *H. cf. ethiopicum* (the lowers KNM-ER 336, 1268,



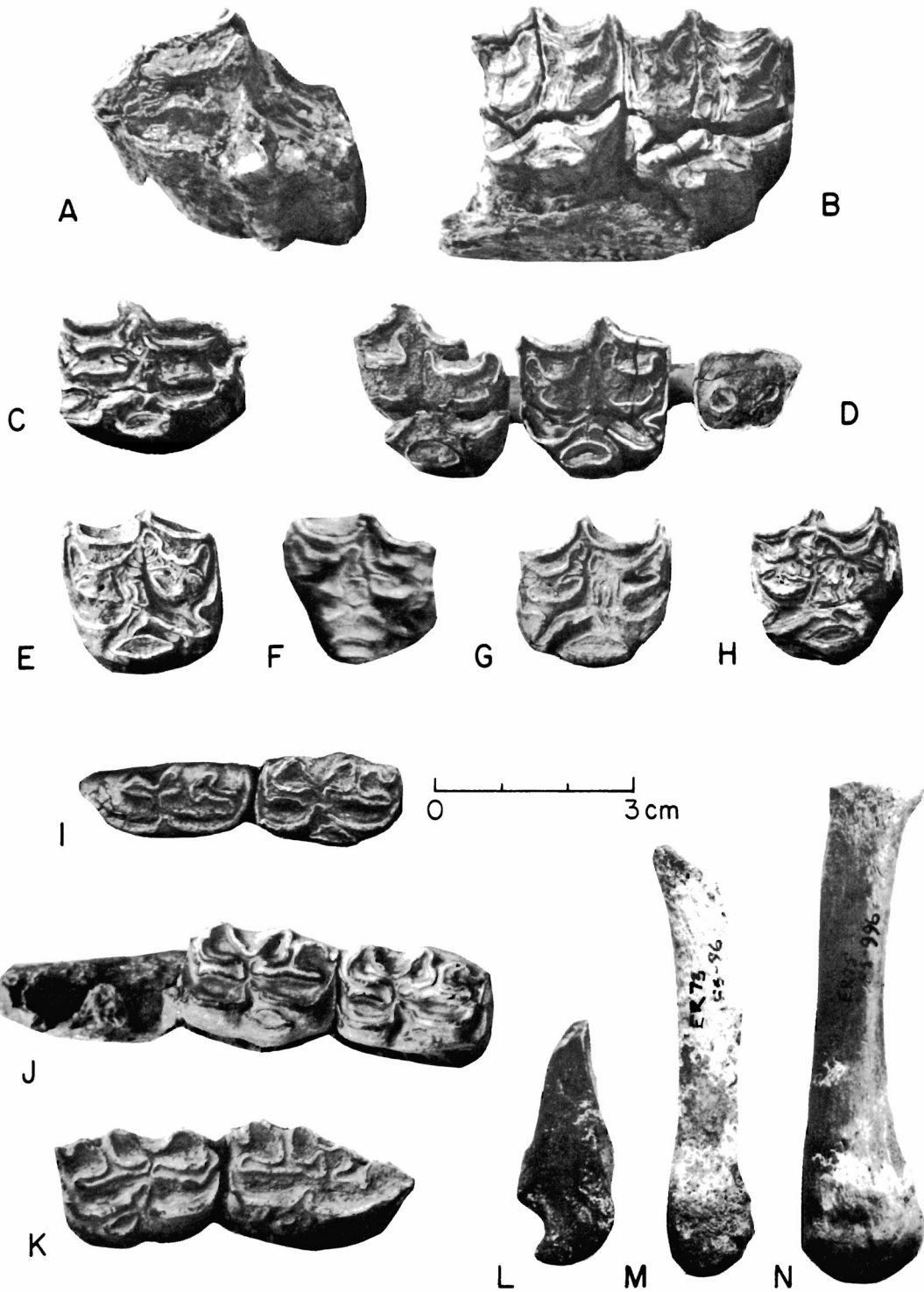


PLATE 54. *Hipparion hasumense*.

(A) P<sup>2</sup> (KNM-ER 1771).

*Hipparion* cf. *ethiopicum*.

(B) P<sup>4</sup> M<sup>1</sup> (KNM-ER 1230); (C) P<sup>2</sup> (KNM-ER 2668); (D) associated upper P, M, I (KNM-ER 4091); (E) M<sup>1</sup> or M<sup>2</sup> (KNM-ER

2072); (F) M<sup>1</sup> or M<sup>2</sup> (KNM-ER 2070); (H) M<sup>1</sup> or M<sup>2</sup> (KNM-ER 1278); (J) P<sub>3</sub> P<sub>4</sub> (KNM-ER 1456); (K) P<sub>2</sub> P<sub>3</sub> (KNM-ER 4082).

(L, M, N) distal ends of lateral metapodials: L: KNM-ER 2242, M: KNM-ER 2053, N: KNM-ER 4081.

*Hipparion* sp. B.

(G) M<sup>1</sup> or M<sup>2</sup> (KNM-ER 2073); (I) P<sub>2</sub> P<sub>3</sub> (KNM-ER 4054).

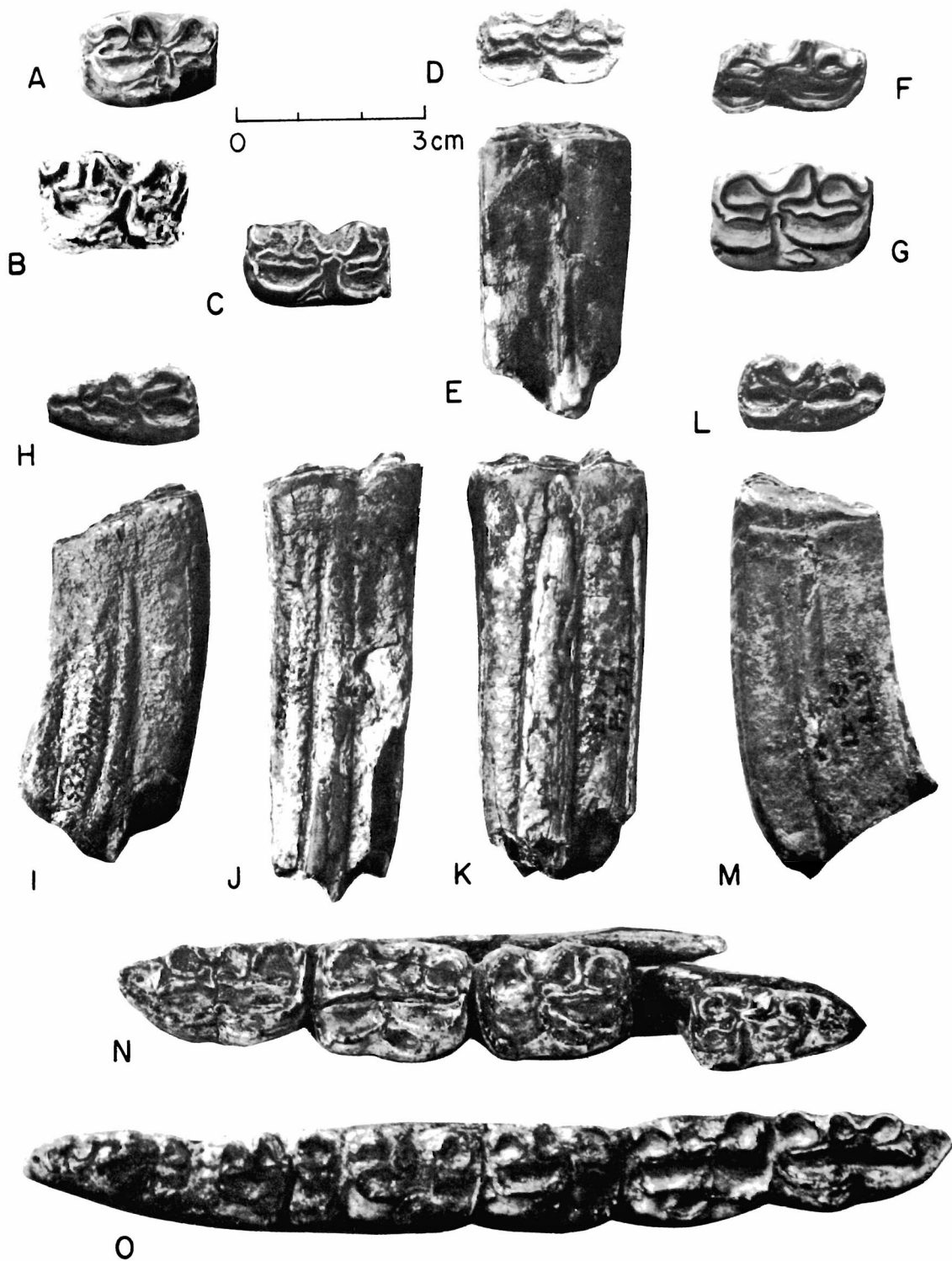


PLATE 5.5. *Hipparion* cf. *ethiopicum*.

(A)  $M_1$  or  $M_2$  (KNM-ER 5354); (B)  $M_1$  or  $M_2$  (KNM-ER 1770); (C)  $M_1$  or  $M_2$  (KNM-ER 4053); (F)  $M_1$  or  $M_2$  (KNM-ER 2069); (H, I)  $M_3$ ; (J)  $M_1$  or  $M_2$ ; (K)  $P_3$  or  $P_4$  (associated, KNM-ER 2751); (L, M)  $M_3$  (KNM-ER 2656); (N, O) lower cheek teeth KNM-ER 1626).

*Hipparion* sp. B.

(D, E)  $P_3$  or  $P_4$  (KNM-ER 4096).