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A new *Euprox* from the Late Miocene of Yuanmou, Yunnan Province, China, with interpretation of its paleoenvironment

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Abstract **The Yuanmou Basin of Yunnan Province is a hotspot for the research of early hominid evolution and its environmental background. During the implementation of the Program "Research of the Origin and Evolution of Early Man and Its Environmental Background" from 1998 to 2001, a huge quantity of hominoid and mammal fossils were collected. The present report systematically describes an *Euprox robustus* sp. nov. identified during the recent laboratory work on the collected material. *Euprox* is a group of earliest cervids with true antlers. The new species is the third one of the genus discovered in China. Judged by its morphologic characteristics, the new species feed on juicy and tender leaves of dicotyledon. It implies that the vegetation of its epoch in the Yuanmou Basin is a kind of southern subtropical evergreen forest and the climate is humid and temperate with evident seasonality. The latter is mostly influenced by the monsoon and secondly by the latitude.**

Keywords: ***Euprox*, Cervidae, Artiodactyla, Yuanmou, Late Miocene.**

Yuanmou Man, dated at 1.7 Ma, was considered for a long time as the earliest fossil man in China and even in Eurasia[1]. The research for the ancestor earlier than Yuanmou Man is the main aim of most paleoanthropologists and paleontologists. From 1987 to 1990, a joint team composed of Yunnan Museum, Chuxiong Cultural Relics Bureau and Yuanmou Man Museum carried out a preliminary excavation at Zhupeng, Xiaohe areas in the Yuanmou Basin, and unearthed a large quantity of hominoid and mammal fossils[2]. To understand better the human origin and evolution, the Program "Research of the Origin and Evolution of Early Man and Its Environmental Background" supported by the State Special Fund for difficult subjects within the 9th Five-Year Plan was launched at the beginning of 1998. Within the framework of this program, a joint team led by the Institute of Vertebrate Paleontology and Paleoanthropology of the Chinese Academy of Sciences, and composed of Yunnan Museum, Yunnan Archaeology Institute and Yuanmou Man Museum carried out a new series of excavations from 1998 to 2001 in the Yuanmou Basin and collected many new materials of hominoid and mammal fossils. These materials are very useful to the study of early human origin and evolution, as well as to the interpretation of the paleoenvironment and paleozoogeography. Because artiodactyls, especially those of herbivores, are very sensitive to the climatic and environmental changes, the study of this group is of great importance to the interpretation of the paleoenvironment. During the systematic study of the group, a new species of *Euprox* has been identified. In the previous records, only *Euprox* cf. *furcatus*[3] from Shanxi Province and *Euprox* sp.[4,5] from Tunggur and the Qaidam Basin were reported in China. The collected materials were rare or fragmental and related studies were not detailed. The discovery of the new species is very significant not only to the understanding of this genus, but also to that of cervid phylogeny and Yuanmou hominoid fauna. The new species is described and its environments were interpreted below. The anatomic terminology used in this report is based on that of Heintz[6], Janis and Scott[7] and Dong[8].

1 Systematic description

Mammalia Linnaeus, 1758
Artiodactyla Owen, 1848
Cervoidea Simpson, 1930
Cervidae Gray, 1821
Muntiacinae Pocock, 1923
Euprox Stehlin, 1928
Euprox robustus sp. nov.
1997: *Dicrocerus* sp. Pan[9]

Type specimen. A nearly complete right antler with complete pedicle and a small part of frontal (PDYV0875) collected from 9905T$_1$ of the Hominoid Locality at Leilao, Yuanmou Basin. It is housed at the Yunnan Archaeology Institute.

Included specimens. A right antler with complete main beam and broken brow tine and pedicle (PDYV0876); a broken base of shed antler (PDYV0381); a fragment of maxilla with PD^2—M^2 (PDYV1481); a right M^1 (PDYV1398); a left M^1 (PDYV1721); a right M^2 (PDYV1191); a fragment of left mandible with P$_3$—M$_3$ (PDYV1583); a fragment of right mandible with P$_4$—M$_3$ (PDYV1129). These specimens are collected from Locality 8603 of Baozidonqing at Zhupeng Village, Locality 8801 on the Butterfly Hill of Xiaohe Village and 9905T$_1$ of the Hominoid Locality at Leilao, all in the Yuanmou Basin. They are housed at the Yunnan Archaeology Institute.

Type Locality. Locality 9905T$_1$ of Leilao in the Yuanmou Basin.

Type Stratum. Lower part of Xiaohe Formation.

Etymology. The new species is very robust compared with the other species of the genus and so name the species by this character.

Diagnostic. A large *Euprox*. Its antler crown and

pedicle are robust. The pedicle is thick and long, inclines backward. The main beam and the brow tine sprout abreast from the burr but diverge from each other a little distance from the burr. The main beam and the brow tine are curved, but not strongly. The burr and antler decoration by longitudinal grooves and crests are developed. Cheek tooth crown is brachyodont. The precingulum, entocingulum and postcingulum are present and linked with each other. Neocrista and spur on upper molars are developed. The *Palaeomeryx* fold is absent on the lower molars.

Description. The type specimen PDYV0875 (Fig. 1(a)) is a nearly complete right antler with complete pedicle (see Table 1 for measurements). The pedicle is completely preserved, with a small part of frontal associated at its proximal end. Judged by the proportion of the pedicle, burr and antler crown, the specimen is of a young adult individual. The pedicle sprouts from the frontal and develops straightly. It inclines backward above the skull. The pedicle is relatively long and very thick. Its surface is generally smooth, and its proximal end prolongates on the frontal by a pedicle ridge. The proximal cross section of the pedicle is evidently oval, and the distal cross section is nearly circle. The anterior, posterior and medial parts of the burr are well preserved. But the lateral part is broken. The burr is composed of a series of developed bony nodes and appears as an oval cluster of pearl ring. The maximum diameter of the antler base is located medial-laterally; its minimum diameter anterio-posteriorly. The maim beam and brow tine sprout out abreast from the burr, and diverge from each other 23.4 mm above the burr. The main beam is long, and tapered. It grew laterally first and turned backward gradually. The brow tine is also tapered and curved, but less curved than the main beam. The decoration of the antler is developed longitudinal grooves and crests on the surface of the main beam and the brow tine.

The included specimen PDYV0876 is a right antler (Fig. 1(b)). Its main beam is well preserved, but the brow tine and pedicle are broken (see Table 1 for measurements). The pedicle is little preserved, only the part 7.3 mm from the burr is preserved, the rest of the pedicle is missing. The cross section of the pedicle at the end near the burr is nearly circle. The lateral part of the burr is well preserved, but the anterior, medial and posterior parts of the burr are missing. The burr was well developed before being broken. It was composed of a series of developed bony nodes and appeared as an oval cluster of pearl ring before being broken. It is impossible to measure its maximum and minimum diameters due to its broken state. The antler crown is simply composed of a main beam and a brow tine. The maximum diameter of the antler base is located medial-laterally and the minimum anterio-posteriorly. The main beam and the brow tine sprout abreast

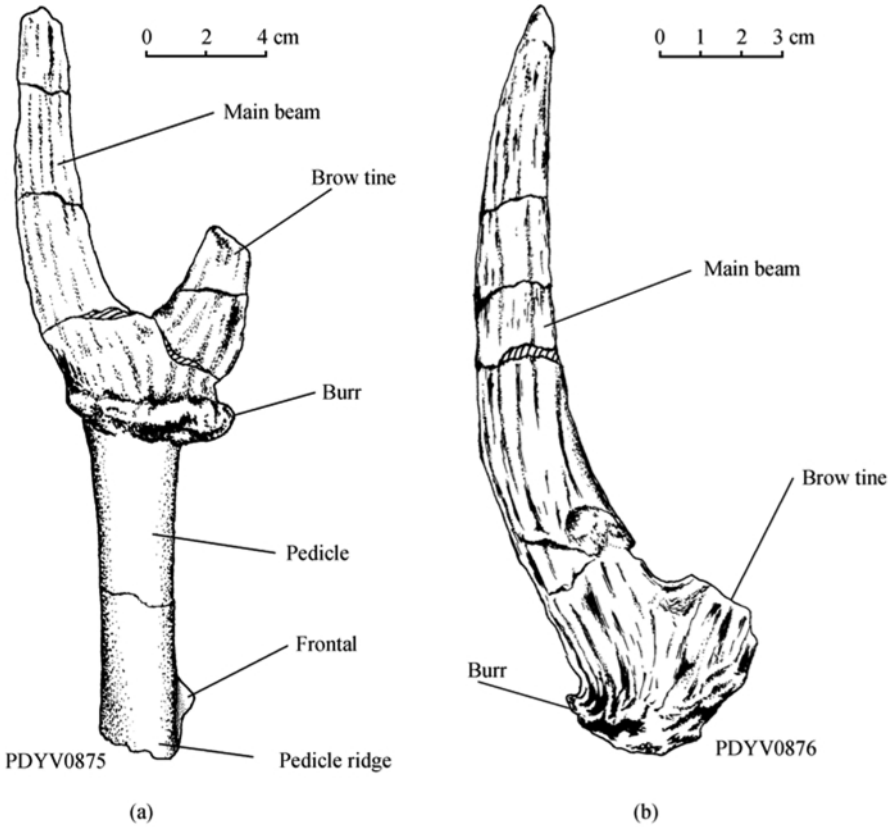

Fig. 1. The type specimen (a) and included specimen (b) of *Euprox robustus* sp. nov. from Yuanmou.

from the burr and diverge from each other at 30 mm above the burr. The main beam is nearly completely preserved. It is tapered, developed firstly laterally and turned backward and upwards gradually at about 64 mm from the burr. The brow tine is broken and missing. The decoration of the antler is of longitudinally distributed grooves and crests on the surface of the antler crown. It is well developed.

Another included specimen PDYV0381 is a broken antler base (see Table 1 for measurements). Because it is a shed antler, there is no association with pedicle. This specimen was subjected to hard transportation during preservation that all projected parts of the specimen are ground and worn. The anterior and medial parts of the burr are preserved but worn, and posterior and lateral parts of the burr are missing. Judged by the preserved parts, the morphological character of this specimen is the same as those two described above. The burr should be composed of a series of developed bony nodes and appears as an oval cluster of pearl ring in the well-preserved condition. It is impossible to measure the maximum and minimum diameters and the thickness of the burr due to its broken state. But it is possible to measure the maximum and minimum diameters of the pedicle on the shed surface associating the burr and the pedicle. The antler crown is simply composed of a main beam and a brow tine. The main beam and the brow tine sprout abreast from the burr and bifurcate at 21 mm from the burr. Both main beam and brow tine are broken off a little distance from their bifurcation.

Table 1 Antler measurements of *Euprox robustus* sp. nov. from Yuanmou (in mm)

	PDYV0875	PDYV0876	PDYV0381
Medial length of pedicle	64.2		
Lateral length of pedicle	104.7		
Maximum diameter of proximal pedicle	31.1		
Minimum diameter of proximal pedicle	24.2		
Maximum diameter of distal pedicle	32.5	30.4	33.2
Minimum diameter of distal pedicle	29.7	28.8	26.3
Thickness of burr	10.7	12.6	
Maximum diameter of burr	69.3		
Minimum diameter of burr	54.2		
Length of antler base	23.4	29.6	21.1
Maximum diameter of proximal antler base	56.8	45.2	44.7
Minimum diameter of proximal antler base	31.1	31.8	31.9
Length of the main beam	128.9	173.2	
Maximum diameter of proximal main beam	31.6	34.2	
Minimum diameter of proximal main beam	27.4	30.6	
Length of the brow tine	88.5		
Maximum diameter of proximal brow tine	28.1		
Minimum diameter of proximal brow tine	19.9		

As for maxilla material, only one broken right maxilla PDYV1481 is collected. Its associated teeth are DP^{2-4} and M^{1-2}. The dental morphology is described below (see Table 2 for measurements):

DP^2. The tooth is brachyodont. It is composed of anterior and posterior lobes. The anterior lobe is formed by protocone on the lingual side and paracone on the buccal side; the posterior lobe is formed by metaconule on the lingual side and metacone on the buccal side. The paracone and metacone are linked by their cristas. Entoflexus is well developed and separates the protocone and the metaconule.

DP^3. The tooth is composed of an anterior lobe and a posterior lobe or of four selenodont cusps. The anterior one is narrower and the posterior one is wider. The anterior lobe is formed by protocone on the lingual side and paracone on the buccal side; the posterior lobe is formed by metaconule on the lingual side and metacone on the buccal side. Entoflexus is well developed. The molarization of the tooth is significant.

DP^4. The tooth is composed of four main cusps in two lobes. The lingual cusps are wider than those of the buccal. The tooth is well molarized. But the accessory elements of the tooth such as neocrista, spur, entostyle, cingulum, etc. are absent.

M^1. The tooth is composed of four selenodont main cusps. The lingual main cusps are lower than those of the buccal, but wider and more curved. The neocrista and entostyle are present and evident, but not strong. The metaconule fold is absent. The spur (pli cabaline) is present and developed. The mesostyle is mediumly developed and protrudes buccally. The precingulum is present but very weak. The entocingulum is evident and appears on the base of the entostyle. Postcingulum is weak and appears as vestige on the posterior and lingual base of the postmetaconule crista. The trigon basin is wider than the talon basin.

M^2. The tooth is similar to M^1. The neocrista, entostyle and spur are all developed. Metaconule fold is absent. Mesostyle is developed and protrudes buccally. The precingulum is weak and appears on the anterior and lingual base of the preprotocrista. The entocingulum is present and appears on the anterior and posterior base of entostyle. Postcingulum is weak and appears as vestige on the posterior and lingual base of the postmetaconule crista. The trigon basin and the talon basin are similarly sized.

There are some other isolated M^1, M^2 and M^3, their

morphological characteristics are very similar to those of the M^1 or M^2 on the maxilla PDYV1481. All these teeth have cingula, and they are developed on some specimens (Fig. 2(a)).

The lower dentition is relatively well preserved on a left mandible (PDYV1583) with P_3—M_3 (Fig, 2(b)), but P_2 is missing. The teeth are described below:

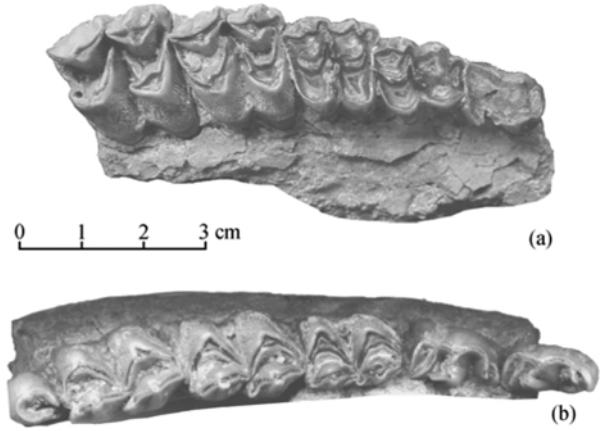

Fig. 2. Cheek teeth of *Euprox robustus* sp. nov. (a) Right PD^2—M^2 (PDYV1481), occlusal view; (b) left P_3—M_3 (PDYV1583), occlusal view.

P_3. The paraconid is completely isolated from the periconid. The paraflexid, trigonid basin, entoflexid and talonid basin are present and opened lingually. A metaconid is not large nor is it anteriorly or posteriorly extended, and consequently the trigonid basin is extremely large and broad. But hypoconid extends backward and tends to enclose the entoflexid. A "*Palaeomeryx* fold" is present but not large.

P_4. The periconid has a tendency to become fused with the paracone. The paraflexid, trigonid basin, entoflexid and talonid basin are present and opened lingually. Hypoflexid is present but not well developed. A metaconid is well developed and extends backward but does not enclose entoflexid. The entoconid is developed and extends backward and tends to enclose the trigonid basin. A "*Palaeomeryx* fold" is present.

M_1. It is composed of four main selenodont cusps. The buccal main cusps are more robust but more brachyodont than those of the lingual. The precingulid is present but not developed. The ectostylid is developed. The *Palaeomeryx* fold, ectocingulid and postcingulid are absent.

M_2. It is very similar to M_1, but its dimensions are evidently larger than those of the latter.

M_3. The tooth is composed of three lobes. The first and second lobes are relatively large, especially the first one. The third lobe is quite small and is composed of hypoconulid on the buccal side and entoconulid on the lingual side. The former is larger than the latter. The *Palaeomeryx* fold, precingulid, postcingulid and ectocingulid are all absent.

There is another fragment of right mandible with P_4—M_3 (PDYV1129) which are morphologically very similar to the above described teeth (see Table 2 for measurements).

Table 2 Dental measurements and hypsodont index of *Euprox robustus* sp. nov. (in mm)

Specimen	Tooth	Length	Width	Height	Hypsodont index
PDYV1481	DP^2	14.5	9.4	6.3	43.23
	DP^3	15.0	12.1	4.4	29.28
	DP^4	14.5	14.6	5.2	35.59
	DP^{2-4}	43.2			
	M^1	17.6	17.0	11.9	67.65
	M^2	19.1	20.1	13.6	70.95
PDYV1398	M^2	18.8	22.5	9.8	51.97
PDYV1721	M^1	18.6	23.7	9.0	48.22
PDYV1191	M^2	20.1	25.0	10.3	51.49
PDYV8603	M^3	19.8	24.0	14.0	70.58
PDYV1583	P_3	16.0	7.9	13.5	84.36
	P_4	16.4	8.3	12.6	77.26
	M_1	17.8	11.2	10.4	58.14
	M_2	20.0	13.8	12.6	62.84
	M_3	27.0	13.7	14.4	53.33
	M_{1-3}	67.6			
PDYV1129	P_4	17.2	10.4	10.4	60.44
	M_1	18.9	12.8	8.7	46.09
	M_2	19.5	15.3	11.1	5.64
	M_3		14.9	11.7	

2 Comparison and discussion

The above-described antlers are of some dicrocervine characteristics such as parallel outshoot of the main beam and the brow tine, the small distance between the bifurcation and the burr, fork-like antler crown, etc. They are similar to those of *Dicrocerus grangeri* from the Middle Miocene of Tunggur in Inner Mongolia[10], *Dicrocerus* cf. *elegans* from the Middle Miocene of Nanjing in Jiangsu Province[11] and European *Dicrocerus elegans*[12,13]. But their longer pedicle and especially developed burr, a new derived characteristic of muntiacine[14,15] show that these specimens are of characteristics of *Euprox* that can distinguish these specimens from those of the dicrocervines. They are therefore attributed to the *Euprox*. Compared with those of *Euprox* cf. *furcatus* from the Late Miocene in Shanxi Province[3], they are dimensionally similar to each other (Table 3), and they both have developed burr and antler decoration of longitudinal grooves and crests, but the pedicle of the Yuanmou specimens is longer and thicker, the main beam and the brow tine are

more robust and the angle between them is larger. Compared with the *Euprox* sp. from the Late Miocene of the Qaidam[5,16], the pedicle of the latter is much longer, and the Yuanmou specimens have more robust main beam and brow tine (Table 3). Compared with the *Euprox* sp. from the Middle Miocene of Tunggur in Inner Mongolia[4,10], the Yuanmou specimens are evidently more robust than the Tunggur specimens. Compared with the European *Euprox furcatus*[17,18], they all have developed burr, the position of bifurcation of the main beam and the brow tine and antler decoration are very similar, but again, the Yuanmou specimens are more robust.

Table 3 Comparison of average measurements of different species of *Euprox* (in mm)

	E. robustus	*Euprox* sp.	*E.* cf. *furcatus*
Medial length of pedicle	64.2	102.5	43.6
Maximum diameter of distal pedicle	32.0	25.0	24.3
Minimum diameter of distal pedicle	28.3	22.2	22.3
Thickness of burr	11.7	10.1	8.3
Maximum diameter of burr	69.3	53.0	47.2
Minimum diameter of burr	54.2	39.6	42.0
Length of antler base	24.7	26.7	31.0
Maximum diameter of proximal antler base	48.9	36.3	44.4
Minimum diameter of proximal antler base	31.6	23.1	34.0
Length of the main beam	151.1	141.0	136.2
Maximum diameter of proximal main beam	32.9	25.6	27.5
Minimum diameter of proximal main beam	29.0	19.6	19.0
Length of the brow tine	88.5	67.5	84.7
Maximum diameter of proximal brow tine	28.1	21.8	20.2
Minimum diameter of proximal brow tine	19.9	17.7	16.5

Based on the measurement, the ruminant selenodont cheek teeth from the Yuanmou Hominoid localities can be classified into four groups. The three of them are of smaller dimensions that can be attributed to tragulids, and the biggest one is evidently of a cervid. Due to the limits of the preservation status of the fossils, all cervid materials do not have the association between the antler, skull and mandible. There is no direct evidence to indicate which cervid teeth are related to which identified antlers. Fortunately, there is only one group of relatively big antlers, i.e. those of *Euprox robustus* sp. nov., the other antlers are evidently of smaller cervids. The attribution of cervid teeth to the big antlers of *Euprox robustus* sp. nov. is dimensionally logic. It is more practical to attribute the dimensionally matchable antlers and teeth from the same locality and same stratum to the same species than to attribute them into two different species according to the law of parsimony, although the possibility that they belong to two independent species, one represented by antlers and the other by teeth, still exists.

With regard to the morphological characteristics of the dental specimens from Yuanmou, it is remarkable that the precingulum, entocingulum and postcingulum are present on the upper cheek teeth, and these cingula are linked with each other along the lingual base of the tooth crown. The cingula are sometimes very evident (Fig. 3). There are no other particular morphological characteristics on the dental specimens of the new species from Yuanmou compared with those of other muntiacine species. There are no records of muntiacine specimens from the Siwaliks for comparison. Based on the above-mentioned comparisons, these Yuanmou specimens are very unique and represent a species never documented. It is therefore necessary to attribute them to a new species to supplement the knowledge of the cervids.

There are a nearly complete right antler, two fragmental antlers and some upper and lower cheek teeth (YV2537.1—45) unearthed from Locality 8603 at Baozidongqing of the Yuanmou Basin, Locality 8704 at the Butterfly Hill of Xiaohe Village[9]. They were identified as *Dicrocerus* sp. by the previous study on the Yuanmou Hominoid Fauna[9]. These specimens are morphologically the same as those of the new species and can be assigned to the same species.

Euprox was named by Stehlin[14] during his study on the cervids from Steinheim in Germany. He grouped the primitive cervids with two tined antlers into two genera: *Dicrocerus* and *Euprox*. The former has two tined antlers without evident burr, and the latter has the antlers with evident burr. According to the observation on the evolution of antlers, the antler evolved from non-deciduous to deciduous, and the burr is the result of seasonal replacement of the antlers and it is therefore regarded as an important derived characteristic in the phylogeny of cervids. It is also used to distinguish the primitive antlers and advanced antlers[19,20]. Based on the evolution of antlers, the *Dicrocerus* and *Euprox* should be closely related, or the former might be the direct ancestor of the latter, and the latter might give birth or evolve to *Metacervulus*.

3 Interpretation of the paleoenvironment of *Euprox* from Yuanmou

The existence of *Euprox* in China was first reported by Colbert[4] during his study on the mammalian material from Tunggur housed in American Museum of Natural History. Vislobokova[5] indicated that the genus was present in the Qaidam Basin in the Late Miocene. The other record of this genus is that of Zdansky's "*Dicrocerus* cf. *furcatus*" from the Late Miocene of Shanxi Province[3]. Because its antler has developed burr that should be attributed to *Euprox* cf. *furcatus*. Based on the comparison of the specimens from the Tunggur and the Qaidam, the

present authors think they can be attributed to the same species. This species is different from the *Euprox* cf. *furcatus* from Shanxi and the new species from the Yuanmou Basin by its peculiar long pedicles. The species from the Yuanmou Basin is therefore the third species of the genus discovered in China. The discovery of the new species from the Yuanmou Basin extends the geographic distribution of this genus from northern and northwestern China to southwestern China. It is worthwhile to indicate that the precingulum, entocingulum and postcingulum are evident and linked with each other on the upper molars in many specimens from the basin (Fig. 3). This primitive character implies that the age of the species is rather old, very likely of Late Miocene. This deduction is in accordance with the results of the study on micromammals from Leilao[21], and also similar to the geochronological distribution of the genus. The genus is present from MN6 to MN10 of Late Miocene in Europe[18], in Tunggurian of the Middle Miocene and Baodean of the Late Miocene in northern and northwestern China.

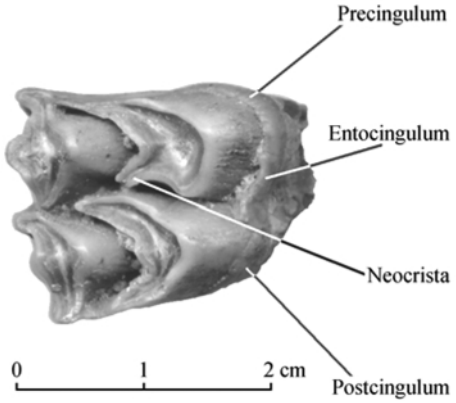

Fig. 3. Right M^1 of *Euprox robustus* sp. nov. (PDYV1398) from Yuanmou, occlusal view.

The new species has well-developed antlers, implying that they were well nourished. It implies in turn that its food and related minerals for developing antlers are abundant. Judged by its brachyodont cheek teeth and long cingula, the new species feed on juicy and tender leaves of dicotyledon. Such vegetation could only be developed in a humid and temperate climate, and it should be a kind of southern subtropical evergreen forest. The burr on the antlers of the new species is well developed (Fig. 1), it could infer that the climate of the epoch in the basin was evidently seasonal. The seasonal replacement of antlers made the burr become well developed. Based on the study of extant cervids, the replacement of antlers is controlled by the seasonal cycle of endocrine of the cervids. And this cycle is mainly influenced by annual difference of sunlight[19,20]. The Yuanmou Basin is located within 25°—26°N latitudes, very close to the tropic of Cancer. The annual difference of the sunlight irradiated on the earth's surface is much less than that in northern and northwestern China with much higher latitudes. Because the annual difference of sunlight irradiated on the earth's surface in the Yuanmou Basin is small, the seasonal climatic change in the basin during the new species' epoch should be influenced by some other factors. Due to the coverage of clouds, sunlight will be greatly reduced on the earth's surface during cloudy seasons. The distribution of the clouds is evidently influenced by the movement of humid air. It could infer that the annual difference of sunlight irradiated on the earth's surface in the Yuanmou Basin during that time was mainly influenced by the monsoon across the basin, and secondly by the altitude.

Because *Euprox robustus* is a big *Euprox*, its preyers should be large enough to succeed in hunting it. The carnivores unearthed from the Yuanmou Basin associated with *Euprox robustus* counted at least 21 species[22]. Among them, *Amphicyon* sp., *Indarctos sinensis*, *Martes* cf. *zdanskyi*, *Proputorius* sp., *Eomellivora* cf. *wimani*, *Trochotherium yuanmouensis*, *Vishnuictis* sp., *Vishnuictis yuanmouensis*, *Ictitherium hipparionum*, *Hyaena* sp., *Machairodus* cf. *maximiliani* etc. about 11 carnivorous species are capable of hunting *Euprox robustus*. Among these carnivores, *Machairodus* cf. *maximiliani* is the main preyer and natural enemy of *Euprox robustus*. Under such living conditions, it could survive only if it can escape well its preyers and feed itself well. *Euprox robustus* sp. nov. mainly feed on juicy and tender leaves of dicotyledon, it shares the southern sub-tropic evergreen forest with other herbivores of the Yuanmou Basin. When a herbivore is feeding leaves among bushes and shrubs, its eyeshot is greatly limited by the branches of trees and is vulnerable to the preyers under the coverage of jungles. The ruminants can browse quickly and store the food in the stomach, then go to some safer place to ruminate the stored food and carefully chew it while raising head supervising their territory with maximum eyeshot. This strategy makes the ruminants defense themselves more successfully from their preyers. *Euprox robustus* sp. nov. is a high ruminant, its viability is much stronger than that of non-ruminant browsers e.g. its accreting forest hipparions. The latter went extinct in the Pliocene but the ruminant browsers have survived to the present. The rumination is an important factor of their successful survival.

As mentioned above, the Yuanmou Basin in the Late Miocene is of southern subtropical evergreen forest with rich faunas, the climate is humid, temperate, seasonal and influenced by monsoon. The ecological environment in the basin is very similar to that of the Late Tertiary in East Africa. Liu and Wang[23] suppose such a monsoon influ-

enced environment in the Late Miocene of the Yuanmou Basin is also a probable cradle for the hominid origin, and it is a right location to search for early hominid traces. A great number of hominoid fossils have been collected in recent investigations[24] that give more and more clues to the study of human origin and evolution. With the development of such a research, the hypothesis that the Yuanmou Basin is a probable cradle for early hominid origin will be tested.

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