

# 山西榆社上新世山羊类一新属

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**关键词** 山西榆社 麻则沟组 山羊

## 内 容 提 要

本文记述山羊族 (Caprini) 一新属种: 小型中国山羊 (*Sinocapra minor* gen. et sp. nov.)。化石产于山西榆社地区云簇盆地晚上新世麻则沟组中。它的主要特征是: 角心短小, 较直立于眼眶之上, 不旋转, 明显内外侧扁, 无稜脊, 角内中空或有窝; 角基部之间的额面高于眼眶面, 有一浅的角后窝存在。

中国科学院古脊椎动物与古人类研究所和美国纽约自然历史博物馆组成的联合科考队于1988年秋在山西榆社地区进行野外考察时, 在云簇盆地<sup>1)</sup>赵庄西南狼掌沟、晚上新世麻则沟组的一套黄色砂层中, 采集到一枚较完整的牛科动物的角心。在大小和形态上, 它极类似于 Teilhard de Chardin 和 Trassaert (1938, 53页, 图46) 描述为 *Antilope* gen. et sp. indet. 的三枚角心, 而不同于牛科中已知的任何类型。它代表了山羊亚科 (Caprinae) 一新属。尽管收集到的材料很少, 但这一发现丰富了我们对中国山羊化石类型的认识, 同时为探讨这一类动物在欧亚大陆上的演化进程提供了新的材料。

本文插图由陈培绘制。

## 一、标本记述

牛科 Bovidae

山羊亚科 Caprinae Gill, 1821

山羊族 Caprini Simpson, 1945

中国山羊(新属) *Sinocapra* gen. nov.

**模式种** *Sinocapra minor* gen. et sp. nov.

**已知分布** 华北, 晚上新世。

**鉴定特征** 一种小型至中等大小的山羊; 角心非常短小, 较直立于眼眶之上; 不旋转, 明显内外侧扁, 无稜脊, 角心内部中空或有窝; 角心基部之间的额面高于眼眶面; 有一浅的

1) 有关山西榆社地区云簇盆地的新第三纪古生物地层以及古地磁年代学测定请看邱占祥和 Dr. R. H. Tedford 即将发表的文章。

角心窝存在;眼眶稍向头骨外侧突出。

**小型中国山羊(新属、新种) *Sinocapra minor* gen. et sp. nov.**

(图 1)

1938 Antelope gen. et sp. indet. Teilhard de Chardin and Trassaert, P. 53, fig. 46.

**正型标本** 一个完整左角 (V 9546)

**归入标本** Teilhard de Chardin and Trassaert (1938) 描述的三枚角心: 一枚几乎完整右角(古脊椎动物与古人类研究所重新编号 RV 38050, 等于原北疆博物院编号 No. 22790), 一枚不完整左角 (RV 38051 = No. 22791) 和一枚角心 (=No. 22759)。

**产地与层位** 正型标本 (V 9546) 产于山西榆社地区云簇盆地赵庄西南约 1.5 公里的狼掌沟(野外编号: YS 78), 麻则沟组的一套黄色砂层中;晚上新世;根据 N. Opdyke 所提供的古地磁资料,这一段地层相当于高斯期,其绝对年龄为 3.4—2.47 百万年。

归入标本来自山西榆社地区赵庄。根据化石标本颜色和充填在角心内部的岩性判断,它们可能产自赵庄附近的麻则沟组中。

**种的鉴定特征** 同属。

**描述** 正型标本 (V 9546) 为一枚完整左角。在它的角柄基部附有极少部分的额骨、顶骨和眼眶部。左角心非常短小;位于眼眶之上,但稍靠近眶后部;直、不旋转;明显内外侧扁,内侧面平,外侧面稍凸;无稜;角心表面光滑,没有任何细小的稜脊和沟谷存在;角内中空或有窦;基部横切面呈前狭后宽的椭圆形或卵圆形,其长轴为前内—后外方向排列,这表明这种类型头骨上的两角心在它们基部的前端较它们的后端更为相互靠近;从角心基部至角顶角心横切面变小的速度很缓慢;前面观,角心向上向外侧倾斜程度小;侧面观,角心稍向后倾斜;依据角柄前面高度和后面高度大致相等推测,该角心可能较直立于额骨上。角柄非常短;与角心之间的界线不清楚。有一浅的角后窝存在。

在正型标本 (V 9546) 上还保存了极少部分的额骨和眼眶部。额骨有窦;两角心基部之间的额面高于眼眶面;眼眶向头骨外侧突出;眼眶背面呈一从角基部向眼眶外缘倾斜的凸面;额顶缝在角柄基部之后缘处存在。

归入标本 No. 22759 角心下落不明;RV 38050 是一近于完整的右角;RV 38051 是一破损的左角。Teilhard de Chardin 和 Trassaert (1938, p53) 已经简单地描述它们。在大小上,后两者 (RV 38050 和 RV 38051) 比较接近,可惜的是左角心在角基部破损,不能给予它准确的测量。在形态上,这两者也极相似:短小而侧扁。它们可能是属于同一个体的左、右两角,不同之处在于左角心外侧面比右角心的稍凸和角心内部的窦更为发育。

**标本测量 (单位: 毫米)**

	V 9546	RV 38050
角心全长	84	104
角心基部纵径	40	52
角心基部横径	28	27

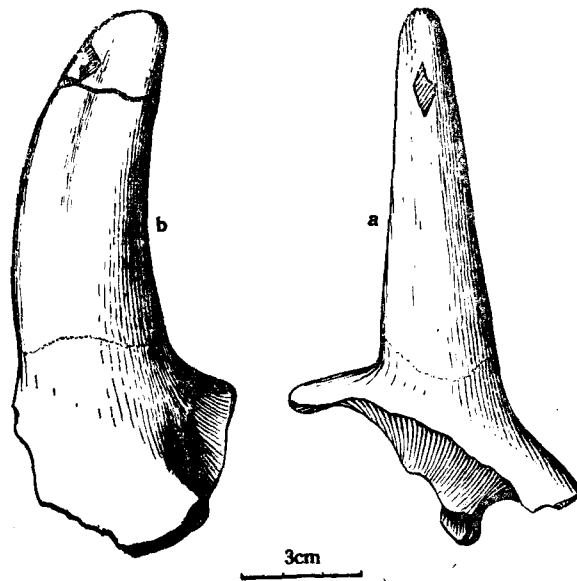


图1 小型中国山羊的角心 (V9546)

a 前面观                      b 侧面观

Fig. 1 *Sinocapra minor* gen et sp. nov. (V 9546)

a. anterior view. b. lateral view

## 二、比较与讨论

1938年, Teilhard de Chardin 和 Trassaert (看 53 页) 描述了来自山西榆社地区赵庄、层位不清楚的三枚角心。由于这些角心短小, 明显内外侧扁和被误认为角内实心, 因此, 它们的分类位置始终未能被确定。在重新观察和修理了保存在古脊椎动物与古人类研究所内的其中两枚角心 (RV 38050 和 RV 38051) 之后, 笔者发现它们在大小和形态上极类似于中美联合科考队于 1988 年在山西榆社地区赵庄西南狼掌沟采集到的一枚角心 (V 9546)。它们都具有短小, 不旋转, 明显内外侧扁, 外侧面稍凸和内侧面平, 无稜脊, 前缘稍向后弯曲, 后缘直或稍凹, 角内中空或有窠, 以及角柄短等特征。此外, 根据充填在 RV 38050 和 RV 38051 角心内部的岩性(紫红色或深黄色砂质粘土)判断, 它们所在的地层层位似乎与标本 V 9546 的相当, 即都产于晚上新世麻则沟组中。因此, 可以把 Teilhard de Chardin 和 Trassaert 描述为 *Antilope* gen. et sp. indet. 的三枚角心和标本 V 9546 看成是同一类型不同个体的代表。至于它们之间存在着某些细微差别, 例如标本 RV 38050 和 RV 38051 上的角心相对地比正型标本 V 9546 上的角心要大, 内外更为侧扁和角顶明显变尖等等, 应该视作种内的个体变异。

榆社类型的下列特征足以证明它是山羊族 (*Caprini*) 的成员: 个体小, 额骨具窠, 两角心基部之间的额面高于眼眶面, 眼眶向头骨外侧方向突出和角心内部中空或有窠等等。概括起来, 山羊族的现生类型在欧亚大陆分为两大类: 真正的绵羊类和真正的山羊

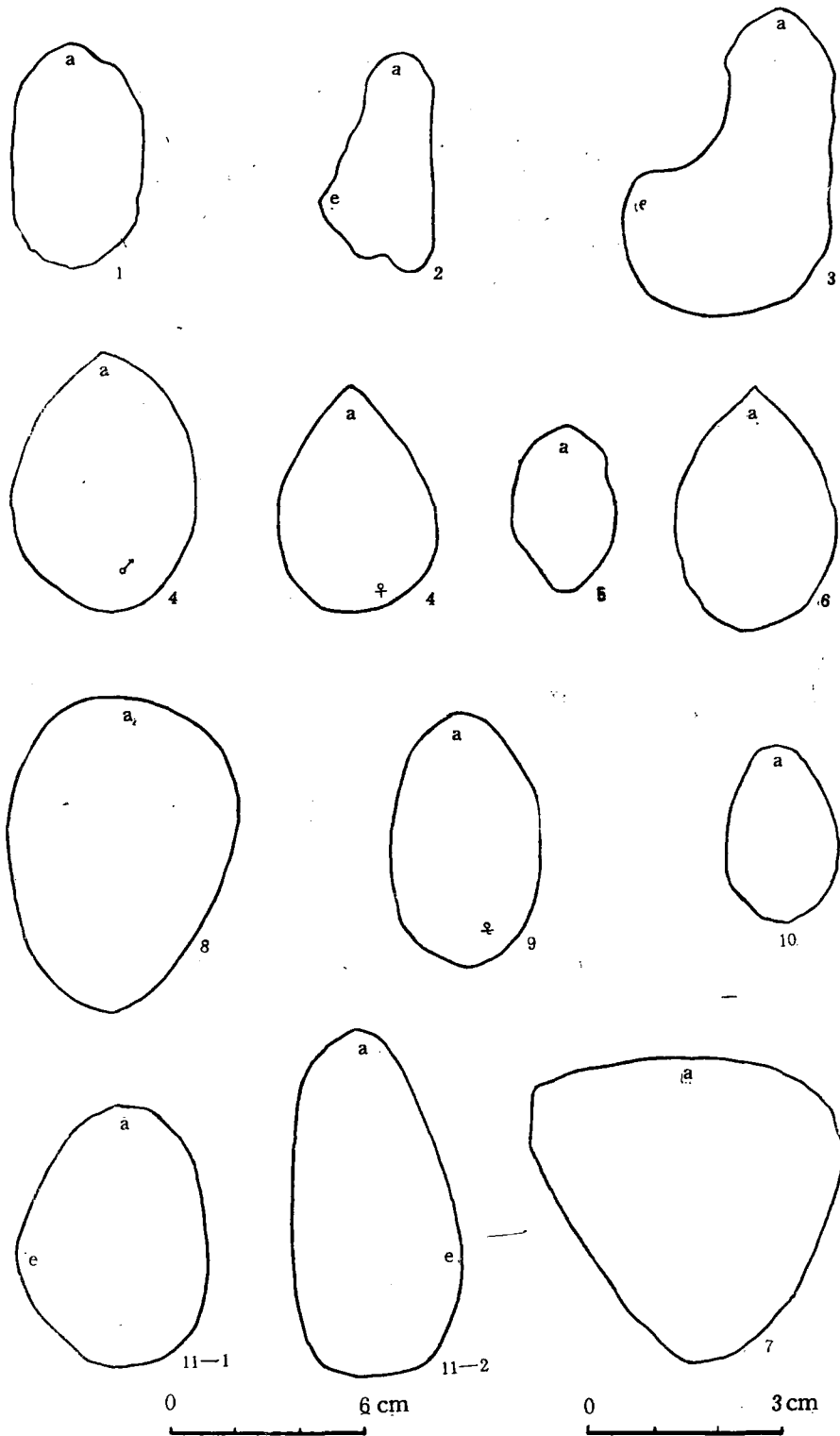


图1, 2, 3, 5, 7, 8, 10的比例尺      图4, 4, 6, 9, 11-1, 11-2 的比例尺

图2 角心基部横切面的比较

Fig. 2 Comparison of the cross-sections of the horncores at their bases.

1. *Tossunnoria pseudibex*; 2. *Sivacpra sivalensis*; 3. *Sivacpra crassicornis*; 4. *Hemitragus stehlini*; 5. *Hemitragus bonali*; 6. *Hemitragus jemlahicus*; 7. *Ovis zdanskyi*; 8. *Ovis ammon*; 9. *Ovis polii*; 10. *Capra* sp; 11. *Sivacpra minor*. (11-1, V 9546, 11-2, RV 38050).

类。前者只包括一属：*Ovis* Linn., 1758, 后者有三个属：*Capra* Linn., 1758, *Hemitragus* Hodgson, 1841 和 *Pseudois* Hodgson, 1846。它们之间主要不同在于山羊类的角心内外侧扁、直或外转, 筛裂存在, 眶前窝缺失, 基枕部呈前狭后宽的长方形, 颊齿齿冠较低和炮骨短等等。榆社类型以它个体小, 角心内外侧扁, 直、不旋转, 较直立于眼眶之上, 向头骨外侧方向倾斜极不明显, 角基部横切面呈前狭后宽椭圆形和有一浅的角后窝存在等特征与绵羊属 *Ovis* Lin. 中各种不同, 后者包括我国华北地区晚上新世或早更新世的 *Ovis shantungensis* Matsumoto 和法国 Seneze 晚维拉方期的 *Ovis* sp.。它们代表了绵羊的早期类型。从角心的形状看, 榆社类型似乎与已归入山羊族的化石类型一样, 更接近于真正的山羊类。

*Tossunnoria* 是我国晚中新世(保德期)的一种山羊。它是 B. Bohlin 于 1937 年在记述我国青海柴达木盆地新第三纪哺乳动物时建立的, 只含有一种: *Tossunnoria pseudibex* Bohlin, 1937。它的正型标本为一破损头骨带两个不完整的角心。由于它的角心有一尖利的前稜, 内外侧扁和向后弯曲等特征, 这使许多古生物学者 (G. E. Pilgrim, 1939, 1947; Simpson, 1945; Sokolov, 1953; Gentry, A. W., 1970, 1971, 1978; E. Thenius, 1969) 认为它是现生山羊类, 尤其是现生塔尔羊 (*Hemitragus*) 的祖先类型, 也是山羊类的最早代表。榆社类型与之相比, 最明显不同在于它角心短小, 纤细, 无前稜; 角心较直立于眼眶之上, 向头骨外侧方向倾斜程度小; 角心内部中空或有窝; 角心与角柄之间界线不清楚; 有一浅的角后窝存在和额顶缝紧挨于角基部之后缘等等。由此看来, 把榆社类型归入 *Tossunnoria* 的做法是不可取的。

1984 年, A. W. Gentry 把非洲埃塞俄比亚下 Omo 盆地晚上新世 Shungura 组中产出的三枚角心放入到 *Tossunnoria* 属中。其地质时代可能与榆社标本所在层位麻则沟组的时代相当, 晚于 *Tossunnoria* 正型标本所在层位的地质时代。由于 A. W. Gentry 未能详细地描绘这三枚角心, 也无图版和图, 因此, 无法把榆社标本与它们进行对比。

*Sivacpra* 是印度西瓦利克晚上新世 (Pingjor Stage) 的另一种化石类型的山羊。它是 G. E. Pilgrim 于 1939 年依据种 *Capra sivalensis* Lydekker, 1878 建立的属。它也只有一种, *Sivacpra sivalensis* (Lydekker, 1878)。正型标本为一头颅部带两个不完整的角心。一方面由于它具有 *Tossunnoria* 的一些特征和更为进步的性状, 如角心内外侧扁, 脑颅狭, 枕面宽和低, 听泡大, 基枕面呈次三角形, 个体大, 额骨变短和基枕部具中纵沟等; 另一方面由于它在角心的位置和其形状上更接近于现生塔尔羊 (*Hemitragus*), 这一特征曾使 Lydekker (1892) 一度把它归入后者, 因此, Pilgrim (1939, 1947) 认为 *Sivacpra sivalensis* 是 *Tossunnoria* 和 *Hemitragus* 之间一种过渡类型的山羊。榆社类型与之相比, 尽管地质时代相当或稍早, 但两者之间的不同却是如此之大, 以致很难把它们看作是同一属的成员。首先, *Sivacpra* 的角心相当长, 粗壮, 有尖利的前稜和后内稜, 基部横切面呈次三角形, 两角心相互靠近, 几乎平行向上, 角心强烈地向后弯曲, 并稍有旋转; 其次, *Sivacpra* 的角心与角柄之间界线清楚; 第三, 角后窝不存在; 第四, 在 *Sivacpra* 中眼眶向头骨外侧突出更明显和额顶缝在颅顶上的位置更靠后等等。

有意思的是榆社类型在角心的大小和形态上极类似于欧洲奥地利 Hundsheim 中更新世的 *Hemitragus stehlini* Freudenberg, 1914 和法国 Ceon 谷中更新世的 *Hemitra-*

*gus bonali* Harle et Stehlin, 1913。后两者的角心也都短小,内外侧扁。外侧面稍凸,内侧面平,不旋转,角内中空或有窝,斜置于额骨之上和角基部横切面呈前狭后宽的椭圆形等等特征(图 2)。但是,榆社类型不具有包括上述化石种在内的现生塔尔羊 *Hemirragus* 属的鉴定特征:角心有一尖利的前稜;两角心在角基部前端相互靠近或接触,向上两角心分开程度逐渐增大;角心明显向头后方向伸展,几乎与脸面轴方向处于同一平面中;角心位于眼眶之后;无角后窝;和额顶缝位于较后的脑颅顶上。这些不同表明榆社类型也不可能是 *Hemirragus* 属的成员。

从角心的特征看,榆社类型似乎远离 *Tossunnoria-Sivacpra-Hemirragus* 这一演化线。

1971年, A. W. Gentry 把原属于 Hippotragini 的两属 *Protoryx* Major, 1891 和 *Pachytragus* Schlosser, 1904 并入到山羊族 (Caprini) 中,认为它们也是山羊类的早期代表,而且后者有可能是现生山羊属 *Capra* Lin. 1758 的祖先类型。N. Solounias(1981) 的观点是 *Pachytragus* 是 *Protoryx* 的同属异名,它们可能是 Hippotragini 和 Caprini 的共同祖先。无论它们的分类位置如何,榆社类型在角心内外侧扁,较直立于眼眶之上,角基部之间额面高于眼眶面以及有一浅的角后窝存在等特征方面类似于它们。但是, *Protoryx* 和 *Pachytragus* 以个体大、角心非常长、角内实心和在一种中有尖利的前稜等特征与榆社类型区别。同样,晚中新世欧亚大陆的 *Pseudotragus* Schlosser, 1904 也不同于榆社类型。

现生类型的山羊属 *Capra* Linn., 1758 主要分布于欧亚大陆的高山地区。它包含四个现生种。已知它最早的地质记录在欧洲更新世地层中。在我国已报导的只有一种,即杨钟健(1936)描述的河南安阳殷墟全新世属于家养的 *Capra* sp。山羊类的角心呈多种多样,甚至同一种中雌雄两性或同性不同个体的角心形状也不完全一致。然而它们以下列的一些基本特征与榆社类型区别:角心非常长,明显向后弯曲或外转;有尖利的前稜和后稜;角基部横切面形状各不相同:透镜状,梨状,三角形状等等;无角后窝;额顶缝在颅顶上的位置靠后等等。

上述比较表明,榆社类型以它角心非常短小,较直立于眼眶之上,不旋转,无稜脊,角内中空或有窝,浅的角后窝等特征与已知归入山羊族的化石类型和现生类型区别,它可能代表山羊族中一新属。在这里把它命名为小型中国山羊 *Sinocapra minor* gen. et sp. nov。关于它的系统演化关系,有待找到完整头骨材料才能予以讨论。

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## A NEW GENUS OF CAPRINI (BOVIDAE, ARTIODACTYLA) FROM UPPER PLIOCENE OF YUSHE, SHANSI

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**Key words** Yushe, Shansi; Mazegou Formation; Caprini

### Summary

In the present paper a new caprine, *Sinocapra minor* gen. et sp. nov. is erected on the basis of several horn cores. The type specimen was collected by the Sino-American Palaeontology Expedition from the Upper Pliocene, Mazegou Formation, of Yunzhu Subbasin, Yushe Basin, Shansi province in 1988. All the other ones referred to the new genus were described and identified by Teilhard de Chardin and Trassaert (1938, p. 53, fig. 46) as *Antilope* gen. et sp. indet. They also came from Zhaozhuang, Yunzhu Subbasin and it is likely that they might be gathered from the same Formation as the type specimen judging by the yellow sandy clay filling into the horn cores. Magnetostratigraphic studies by Prof. N. Opdyke of the Yunzhu Subbasin indicates that this stratigraphic interval only includes the Gauss one, approximately 3.4 to 2.47 Ma. Accounts of the biostratigraphy and dating of Yunzhu Subbasin are given by Dr. R. H. Tedford and Dr. Z. Qiu in another paper.

### Family Bovidae

#### Subfamily Caprinae Gill, 1821

#### Tribe Caprini Simpson, 1945

#### *Sinocapra* gen. nov.

**Type species** *Sinocapra minor* gen. et sp. nov.

**Diagnosis** A small to medium sized caprine. Horn cores inserted above the back of the orbit, being short, compressed strongly medio-laterally, slightly divergent and oval in cross section, without torsion and keels, and with sinuses in it; the frontal between the horn cores higher than the orbital rims; a shallow postconual fossa present.

#### *Sinocapra minor* gen. et sp. nov.

(fig. 1—2)

1938 *Antilope* gen. et sp. indet. Teilhard de Chardin P. and M. Trassaert, p. 53, fig. 46.

**Type** A complete left horn core (V 9546), from lungzhuanggou (YS 78), near Zhaozhuang, Yunzhu Subbasin, Yushe Basin, Shansi province; Mazegou Formation, Upper Pliocene.

**Referred specimens** A nearly complete right horn core (RV 38050=No. 22790), a fragmentary left horn core (RV 38051=No. 22791) and a horn core (=No. 22759), all des-



cribed by Teilhard de Chardin and Trassaert in 1938, from Zhaozhuang, Yunzhu Subbasin; probably collected from Mazegou Formation.

**Diagnosis** as for the genus.

**Description** The type specimen V 9546 comprises a complete left horn core and a little part of the frontal and the left orbit. The horn core is very short, nearly straight and strongly compressed medio-laterally. The medium side is flat, the lateral one slightly convex. In side view, it is recurved slightly backwards and outwards; in anterior view, it diverges slightly. Its cross section is oval, without keels and grooves. There are sinuses inside it. The horn core is inserted above the back of the orbit and tapers gently from base to tip. The horn pedicel is not well developed. A shallow postconual fossa is present. The frontal between the horn cores is higher than the orbital rims and possesses sinuses. The left orbit on the specimen V 9546 is very incomplete, but its roof is obviously expanded laterally. A frontal-parietal suture is visible just behind the posterior edge of the horn core base.

RV 38050 is a nearly complete right horn core. RV 38051 is a fragmentary left one. As described by Teilhard de Chardin and Trassaert (1938, p. 53), they are very short, compressed medio-laterally and recurved backwards, but not solid. The sinuses are present in them. In comparison to the type specimen V 9546, they are slightly large, stronger compressed and rapidly tapering near the tips. On the specimen RV 38051, the lateral side of the horn core is more convex than that of the type specimen V 9546 and RV 38050.

**Measurement** (mm.)

	V 9546	RV 38050
Antero-posterior horn core diameter at base	40	52
Latero-medial horn core diameter at base	28	27
Total length of horn core	84	104

**Remarks** The three horn cores described by Teilhard de Chardin and Trassaert (1938) under the name of *Antilope* gen. et sp. indet. from Zhaozhuang, Yushe Basin are very similar in size and in morphology to the type specimen V 9546. It is probable that they may belong to a same form, although they have some minor differences from each other.

The characters of the specimens in question, which coincide with these of Caprini are following: small to middle in size, the horn cores inserted above orbits, possessing sinuses in the frontal and in the horn cores, the frontals between the horn cores higher than the level of the orbital rims, and the orbit projected moderately. The living Caprini from Eurasia is generally separated into two forms: Sheep and Goats. The former includes only one genus, *Ovis* Linn. 1758 and the latter comprises three genera, *Hemitragus* Hodgson, 1841 and *Capra* Linn. 1758 and *Pseudois* Hodgson, 1846. The Goats is distinguished from the sheep mainly by the horn cores, which are more compressed and which are twisted from inside to outside; by the presence of the ethmoidal fissure; by the basioccipital being narrower in front than behind; by the less high-crowned teeth; and by the shorter cannon bones. The Yushe caprine may be much closer to the goats, like the extinct form of Caprini, rather than to *Ovis* Linn in the horn cores which are strongly compressed. Besides, the Yushe form differs from *Ovis* in its small size and in the horn cores being much shorter and slender, nearly straight, slightly divergent, oval in cross section, without keels and in having a shallow postconual fossa.

*Tosunnoria* Bohlin, 1937 from the Late Miocene of Tsaidam Basin, Qinhai province, China is one of the earliest form in Caprini and has been considered to be ancestor of the goats, especially to *Hemitragus*. It differs from the Yushe caprine by its absence of the postconual fossa and by the horn cores which are solid, larger, more divergent in anterior view,

recurved backwards in side view, and with a sharp anterior keel. Another goat, *Sivacapra* Pilgrin, 1939 from the Late Pliocene (Pinjor Formation) of Siwalik, India was regarded as a transitional form between the genus *Tossunnoria* and the living genus *Hemitragus*. It differs from the Yushe form by its large size; by the lack of the postconual fossa; by the more projecting orbits; and by the horn cores being much robuster, slightly spiraled, recurved backwards in side view, triangular in cross section with an anterior keel, a posto-internal one and a lateral groove. The Yushe form is similar in size and in shape of the horn cores to the extinct species of *Hemitragus*, *H. stehlini* Freudenberg, 1914 and *H. bonali* Harle et Stehlin, 1913 from the Middle Pleistocene of Europe. However, it does not show the following essential features of the living genus *Hemitragus*: the horn cores with a sharp anterior keel are inserted behind the orbits, they are much more inclined backwards, not upright above the orbits like that of the Yushe form, their bases are much more approximated in front, even contact, the parieto-frontal suture is far from the posterior edge of the horn base and the postconual fossa absent.

In 1971, Gentry, A. W. separated the genera *Protoryx* Major, 1861 and *Pachytragus* Schlosser, 1904 from Hippotragini and placed them into Caprini. He considered that they should represent the earliest forms of the goats and that *Pachytragus* may be ancestor to the living genus *Capra* Linn. 1758. Solounias N. (1981) thought that *Pachytragus* was congeneric with *Protoryx* and they might be a common ancestor to both Hippotragini and Caprini on basis of the characters in skull and horn cores. Anyway, the Yushe form is similar to them in its strong medio-laterally compressed horn cores which are inserted above the orbits, its frontal between the horn cores being higher than the level of the orbital rims, in the slightly projecting orbits and in a shallow postconual fossa. But *Protoryx* and *Pachytragus* are distinguished from the Yushe form mainly by their solid and much longer horn cores with a sharp anterior keel.

In comparison with the living genus *Capra* Linn. 1758, the Yushe form is small in size, its horn cores are shorter and nearly straight, and without any anterior and posterior keels. Its postconual fossa is present and the parieto-frontal suture is just behind the posterior edge of the horn base.

Undoubtedly, the Yushe form is independent of all the previously known genera of Caprini. Therefore, it may represent a new caprine. Here the name *Sinocapra minor* is assigned to it. Because of the rare material, the phylogeny of the new form could not be discussed.