

巫山龙骨坡似人下颌属于猿类

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摘要

本文将巫山似人下颌及其牙齿与东非早更新世人属, Dmanisi 直立人以及元谋的禄丰古猿等做了比较。结果发现巫山标本的尺寸比前二者都小得多, 而与后者很相符。巫山标本被有些人作为归属人属根据的那些特征大多是人和猿共具者, 其中前臼齿齿根分叉则是在人类罕见, 却是禄丰古猿的特征之一, 前臼齿前接触面位置和跟座比例则反映猿类特征。最接近巫山下颌者是禄丰古猿, 其间有否祖裔关系尚待更多标本来论证。

关键词 下颌, 猿类, 巫山龙骨坡

1985年起黄万波等在四川巫山县龙骨坡发掘出一批哺乳动物化石, 年代鉴定为大约196—178万年前。其中有一块下颌骨残片和一颗门齿, 被订为属于直立人(黄万波等, 1991)。后来Ciochon等介入其研究工作, 他们于1995年在英国“自然”杂志(Nature)发表文章(Huang *et al.*, 1995)。该文论及东非肯尼亚发现的能人OH7, OH13, OH16标本和匠人标本ER992, WT15000, 认为巫山标本与它们相近而与亚洲直立人相去甚远, 因此否定黄万波等原来定为直立人的主张。但是该文并未援引这些对比标本的很多具体资料。Larick及Ciochon(1996)又将其说成不能定种的人属成员。关于这件标本的归属除了没有见过标本的Wood和Turner(1995)联名在Huang等论文发表的同期杂志上著短文赞成外, 迄今所见的以研究人类化石为专业的学者都是持怀疑态度, 没有人著文赞同[Wolpoff(1996); Schwartz和Tattersall(1996); Etlar和Zhou(1998)指出禄丰古猿与巫山下颌有祖裔关系; Pope(1998)认为巫山下颌不属于人]但是所有这些文章也都未发表详细的论述。本文则以具体的数据及情况来论证巫山标本的归属。笔者在此附带申明: 我认为, 所谓匠人很可能只是直立人在非洲部分地区的亚种, 本文用匠人一词并不意味着承认它是一个种名, 以下从几个方面比较和讨论巫山下颌的归属。

1) 下颌的高度与宽度(或厚度)。黄万波等1995年在“自然”杂志中曾写道“(巫山龙骨坡下颌)在第一臼齿处的高度是21mm, 宽度是13.5mm。就所保存的有限的形态而言, 龙骨坡下颌体比起亚洲的直立人(周口店G1, H1, Sangiran1b, 9)是细小的, 却与早更新世东非的人属, 诸如KNM-ER15000, KNM-ER730(匠人)和OH13(能人)更加密切地相似”。本文的表1不但显示该文所举的这几件, 而且还包括更多的东非早期人属下颌骨标本在第一臼齿处的有关测量。

从这些数据可明显地看出巫山标本不但与该文所提及的几件标本谈不上密切接近,而是比它们以及更多的东非早更新世人属标本小得多。

2) 黄等在 1995 年文中说, 巫山下前臼齿颊舌径膨大, 与 ER 992 (匠人) 相似。表 2 显示巫山第二下前臼齿的长度与宽度以及由之衍生的数据与元谋的古猿以及东非能人和匠人的有关测量数据。

由表 2 可以看出, 现已发现的匠人和能人的有关材料已不可谓少, 巫山的下第二前臼齿却比所有东非早更新世人属标本的绝对值都小, 而且还不是仅仅稍小一点。反之却恰恰与元谋的禄丰古猿很符合。

表 1 下颌测量的比较 (单位: mm, 以下各表同)

Measurements of Mandibles		
	下颌体宽 (厚) Width	下颌体高 Height
巫山 (Longgupo)	13.5	21
OH7	23.0	-
OH13	18.1	26.5
OH37	20.1	30.3
ER730	19.0	32.3
ER817	18.0	29.0
ER992 左	20.0	31.0
右	20.0	32.0
ER1501	16.0	30.0
ER1802	23.0	38.0
WT15000 左	19.5	24.4
右	20.5	23.2

注: 巫山据黄万波等, 1991; WT15000 据 Walker and Leakey, 1993; OH 和 ER 编号的标本据 Tobias, 1991。

表 2 下第二前臼齿测量的比较

Measurements of Lower Second Premolars				
	长度 Length	宽度 Width	指数 Index	齿冠面积 Crown area
巫山 (Longgupo)	7.4	9.1	123.0	63.7
元谋禄丰古猿 (<i>Lufengpithecus</i> of Yuanmou)	7.6 (5.8- 10.1)	10.1 (7.8- 12.9)	约 132.9	-
OH4 左	大约 11.0	大约 12.0	91.7	132.0
OH7 左	10.3	10.1	98.1	104.0
右	11.1	10.7	91.5	118.8
OH13 左	9.6	9.7	101.0	93.1
右	9.5	9.8	103.2	93.1
OH16 左	10.8	10.9	100.9	117.7
右	11.1	11.1	100.0	123.2
ER1801	9.2	10.8	117.4	99.4
ER1802 左	11.4	12.0	105.3	136.8
右	11.3	12.1	107.1	136.7
ER992	8.5	11.1	130.6	95.4
WT15000 左	9.0	10.2	113.3	91.8
右	9.0	10.1	112.2	90.9

注: 巫山据黄万波等, 1991; 禄丰据刘武等, 1999; 编号为 OH 的标本和 ER992 据 Tobias, 1991; ER1802 和 WT15000 据 Brown 等, 1993; ER1801 据 Wolpoff, 1996

从表 2 还可看出, 东非早更新世人属标本此牙的长宽指数一般都较小, 比巫山标本的

指数小得多, 只有 ER 992 是唯一的例外。反之巫山标本的指数却与元谋的禄丰古猿的非常接近。我们自然首先应该认为巫山标本与禄丰古猿相近, 而不应强调它与东非的特例相近, 不应该忽略它与东非绝大多数标本相差很远而且在尺寸上更近禄丰古猿, 远离 ER 992。

虽然就牙齿宽度大于长度这个特点而言巫山标本与这些人科标本一致, 但是我国开远的森林古猿第二下前臼齿的宽度与长度之比两性分别是 11.5 与 10.8 (据吴汝康, 1957、1958 资料计算), 元谋禄丰古猿这个牙齿也是宽度大于长度。所以这个特点并不是人类专有而是猿类也有的特征, 不能以此证明巫山标本属于人。

3) 黄等在 1996 年的答辩文中以散点图的方式将巫山第一臼齿的长度与东南亚化石猩猩作对比, 以之来显示它比猩猩小, 不应归于猩猩。但是从表 3 可以明显地看出, 巫山第一臼齿与第二前臼齿一样无论长度或是宽度全都在元谋出土的禄丰古猿的变异范围内。

表 3 下第一臼齿测量的比较
Measurements of First Molars

	长度 Length	宽度 Width	齿冠面积 Crown area
巫山 (Longgupo)	11.1	10.1	112.1
元谋禄丰古猿 (<i>Lufengpithecus</i> from Yuanmou)	10.5 (8.4- 12.6)	9.3 (7.0- 11.6)	
OH7 左	14.8	12.2	180.6
	14.8	12.4	183.5
OH13 左	13.0	11.6	150.8
	12.9	11.6	149.6
OH16 右	14.8	12.7	188.0
OH37 左	13.2	10.7	141.2
OH30 左	17.5	14.4	252.0
WT15000 左	12.4	11.0	136.4
	12.7	11.1	141.0
ER730 左	大于 11.7	大于 11.7	大于 136.9
ER820 左	12.3	10.7	131.6
	12.2	10.8	131.8
ER992 左	12.0	10.9	130.8
	11.9	10.7	127.3
ER1502 右	13.4	11.4	152.8
ER1507 左	13.3	11.1	147.6
ER1801	13.1	13.3	174.2
ER1802 左	14.7	13.3	195.5
	14.6	13.2	192.7

注: 编号为 OH 的标本 ER 992, ER 806 均据 Tobias, 1991; WT 15000 和 ER 1802 据 Brown 等, 1993; ER 1801 据 Wolpoff, 1996。

由此可以看出巫山标本比能人与匠人标本都小得多, 却正好落在元谋出土的禄丰古猿

的变异范围内, 如果用元谋的原始数据计算长宽比例, 应能看出巫山与元谋禄丰古猿也会是很一致的。

4) 黄等 1995 年文中将巫山下第二前臼齿的齿尖与跟座的关系包括在其与东非早期人属相似的特征中。该文说其跟座凹既长又宽, 占据咬合面的三分之二, 可与 OH7 及 OH13 相比, 笔者现将有关标本跟座与齿冠长度的比例列表如下, 看看情况究竟如何。

表 4 下第二前臼齿跟座测量的比较

Measurements of Talonid of the Second Premolar

	跟座长 Talonid length	齿冠长 Crown width	跟座所占的比例% Ratio
巫山 (Longgupo)	约 5.0	约 7.4	约 67
OH7 左	3.7	10.3	35.9
右	3.4	11.1	30.6
OH13 左	3.3	9.6	34.4
右	3.2	9.5	33.7
OH16 左	3.5	10.8	32.4
右	3.7	11.1	32.3

注: 巫山据黄万波等, 1991 附图测算; 其余据 Tobias, 1991.

由上表可以看出能人标本的跟座长度都大约相当于齿冠长度的三分之一, 没有多大的变异范围, 而巫山标本却比它们大一倍, 黄等 1995 年文说巫山与 OH7 与 OH13 相似, 显然是很不合理的。

从关于 WT15000 匠人的专书中 164 页的图版还能明显地看出其跟座长度与齿冠长度之比也是大约 1 比 3 (Brown *et al*, 1993), 与能人基本一致, 与巫山相差很大。

总之, 巫山的跟座比能人与匠人的都大得很多。另一方面却与禄丰古猿比较接近, 后者的跟座凹的长度大约相当于齿冠长的一半, 甚至更长。禄丰的禄丰古猿雄性下颌和开远森林古猿雌性第二下前臼齿的跟座都大约占齿冠咬面长度的一半。在中新世到早更新世的人猿超科中, 大的跟座只见于猿类。黄等在答复 Schwartz 等的评论时曾承认巫山大的跟座是猿类的残留特征 (Huang *et al*, 1996)。但根据本文对诸多特征的分析, 与其说这是它从其猿类祖先继承来的残留的特征, 不如认为它正好表明此标本应归属猿类。

5) 黄等在 1995 年文内图 3 的注释中称巫山第一臼齿是低齿冠。笔者根据对其附图的测量, 按比例计算出其齿冠高约为 6.2mm, 与齿冠长的比例为约 0.56。而匠人 (WT15000) 的齿冠高为 7.6 (左) 与 7.7 (右) mm, 其与齿冠长之比为 0.61。

笔者按他们 1995 年文章中图 1 的比例测算, 其第二前臼齿的齿冠舌侧高约为 6.2mm, 而匠人 WT15000 的此径左右侧分别为 9.4 与 9.1mm, 能人 OH13 为 9.1mm。巫山的高长比为 0.84, 匠人与能人则分别为 1.04 (左)、1.01 (右) 与 0.95。从高宽比来看, 巫山为 0.68, 匠人为 0.92 (左)、0.90 (右), 能人为 0.94, 高长和高宽两种比例都比巫山的大得多。一般地人类齿冠较高, 猿类较低。在这一点上看, 巫山标本更可能属于猿而不属于人。

6) 黄等在 1995 年的文章 (277 页) 中将下第一臼齿釉质厚度列为巫山标本与东非早更新世人属相似的特征, 说巫山臼齿釉质“相对地较薄”, 而次年在对 Schwartz 等人的评论的答复中 (202 页) 却又强调该标本有“厚的釉质”, 并说是人科无可否认的衍生性状, 但是

他们并未提供具体的厚度数据。过去吴汝康等的研究报告曾明确指出, 禄丰的禄丰古猿牙齿“咬合面的釉质很厚”, 或“较厚”, 或“厚”(吴汝康等, 1985), 但它早已被排除出人科。发现于肯尼亚北部 Kalodir 和 Buluk 以及沙特阿拉伯早中新世(1700—1800 万年前)的非洲猿 (*Afropithecus turkanaensis*) 具有一些人和猿共具的特征, 其牙齿的釉质很厚。所以不管巫山的釉质是厚是薄都无助于将其归于人科。

7) 黄等 1995 年文中还用下第二前臼齿的齿根形态来论证其与东非早更新世人属相似 (Huang *et al.*, 1995)。该文说巫山下前臼齿齿根分叉, 与 ER 992 标本(匠人)相似, 这是他们说巫山标本与匠人密切相似的重要依据。但是他们却忽略了, 作为最重要的匠人标本的 W T 15000 的下第二前臼齿并非双齿根。ER 992 的双齿根更可能只是早更新世人科中的一个特例。他们还应该注意到, 在吴汝康等对禄丰古猿牙齿的研究报告中已写明其下第二前臼齿的“齿根也分为前后两支”(吴汝康等, 1985)。在开远的森林古猿, 此齿的齿根的颊侧也是分叉的(吴汝康, 1958)。尽管黄等在 1996 年的答辩文章中 (Huang *et al.*, 1996) 也承认前臼齿的双齿根可以是人猿超科的原始特征的残留, 却只将它与东非匠人特例的 ER 992 号标本拉上特别的关系。但是笔者认为, 考虑到此种特征在猿类和人类的分布频度以及地理关系, 似乎应该首先将巫山标本的双齿根与禄丰及开远的古猿相比。

8) 除了上面提到的以外, 黄等 1995 年文中还举出下第二前臼齿齿尖的配布, 第一下臼齿齿尖的数目与空间关系, 其表面构造, 他们提到的具体表现是下前臼齿二齿尖位于近中侧, 中间有矢状沟, 其后有大的跟座凹; 下臼齿有五齿尖, 下后尖大于下内尖, 下后尖最高。在这些方面并不能指出专属于人而不属于猿的特征, 这其实是无助于他们的结论的。

9) 巫山前臼齿还有一个十分重要的特征表现在齿冠近中面。Wolpoff 和 Etler 分别独立地观察到这个牙齿与第一前臼齿接触的小面不是位于近中面的中部, 而是偏于舌侧 (Wolpoff 个人通信)。人类第一下前臼齿形状比较对称, 前后轴与齿列基本平行, 所以第二前臼齿近中面上的接触小面在中部; 而猿类的下第一前臼齿呈扇形, 长轴倾斜, 因此第二前臼齿近中面上的接触小面向舌侧偏移。这是区分人与猿的十分重要的特征, 在这里巫山恰恰表现出了猿类的而不是人类的特征。

10) 1998 年 Y. Coppens 在粗粗看了标本后考虑到巫山标本是否可在尺寸上与前几年在格鲁吉亚 Dmanisi 发现的大约 160 万年前的直立人下颌骨相比较。笔者在下表以及下文中引用 Bramer (1996) 发表的有关牙齿数据将巫山与 Dmanisi 的下颌作比较。

表 5 巫山与 Dmanisi 牙齿测量的比较

Measurements of mandibular teeth from Longgupo and Dmanisi

	下第二前臼齿 P2			下第一臼齿 M1		
	长度	宽度	齿冠面积	长度	宽度	齿冠面积
	Length	Width	Crown area	Length	Width	Crown area
巫山 (Longgupo)	7.4	9.1	63.7	11.1	10.1	121.1
Dmanisi 左	7.8	9.7	75.7	12.4	12.5	155.0
右	7.8	9.8	76.4	12.5	12.6	157.5

由此可见巫山标本不但比 Dmanisi 小, 而且臼齿形状与之也很不同, 巫山的呈长方形, 长宽指数为 91; Dmanisi 接近方形, 长宽指数是 99。此外, 从发表的图版中可以很清楚地

看出, *Dmanisi* 的下第二前臼齿的跟座与齿冠长度的比例也小于三分之一, 与东非所有早期人类一致, 而与巫山的情况大不相同。

巫山的下颌与 *Dmanisi* 的也很不同。 *Dmanisi* 下颌骨在第一臼齿处的厚度为 20mm, 在颞孔处的高度为 28.5mm。由于破损无法测量在 M1 处的下颌体高度。但是能人和匠人的几件标本都显示下颌体在 M1 处比在颞孔处为低, 蓝田直立人下颌也如此。因此由 M1 处的下颌体厚度与颞孔处的下颌体高度求出的指数 (70.2) 可以作为估计 M1 处下颌骨粗壮指数时的参考, 即 *Dmanisi* 下颌的粗壮指数无论如何应大于 70.2 ($100 \times 20 / 28.5$)。而巫山的却小于 64.2。因此巫山与 *Dmanisi* 的下颌无论在尺寸上还是在粗壮指数上都是相差很大的。

11) 在奥都威峡谷发现的能人标本中, OH16 既有上内侧门齿又有下颊齿。其下第一臼齿与上内侧门齿齿冠面积的比例是 1.91; 其下第二前臼齿与上内侧门齿齿冠面积之比是 1.20。如果巫山这件下颌骨与 OH16 属于同一种生物, 按此二比例推算, 其上内侧门齿的齿冠面积应该很可能接近 58.69mm^2 或 56.27mm^2 。而元谋上那蚌附近发现的直立人上内侧门齿的齿冠面积是 92.34 (左) 与 98.9 (右), 比上述根据巫山标本推算出的数据大得多, 几乎大了一倍。巫山的年代据称约在 196-178 万年前, 与元谋相差只约 10-30 万年。在这样短的时间里人类门齿的尺寸能增大如此之快是难以想像的。反之, 元谋直立人的门齿长度 (左 11.4mm; 右 11.5mm), 倒是与 WT15000 (左 12.0mm; 右 11.5mm) 很一致, 与能人相差也很小 (OH16, 12.0mm; OH39, 10mm; OH5, 11mm; OH59, 11.5)。由此可见中国与东非虽然相距万里, 但是两地人属标本的变异范围并不大, 有如此惊人地相近的尺寸 (至少上门齿是如此)。由此似可反证巫山下颌骨与 OH16 及元谋直立人不属于同一类生物, 不应归入人属。巫山下颌不应代表直立人的祖先。

从另一方面考虑, 元谋的禄丰古猿上内侧门齿的长度和宽度的平均值分别为 9.2mm 和 8.2mm 其平均齿冠面积很可能接近 66mm^2 , 倒是与推算出的巫山上内侧门齿的可能尺寸很接近。

从本文上述分析可以看出, 黄等所据以下结论的那些特征或者是人和猿所共有的, 或者是在猿类比较恒定而在人类只是偶尔出现的罕见特例。至于尺寸, 巫山标本与东非大量早更新世人类标本差距之大, 与它和禄丰古猿正好符合, 更加构成十分鲜明的对比, 而且很难说是偶然的現象。因此从尺寸、形态以及地缘关系诸多方面考虑, 将巫山与禄丰古猿对比都要比将其与东非人类对比合理得多, 何况它还具有人类所无, 猿类却有的特征。

本文的论证已表明, 巫山下颌与格鲁吉亚的 *Dmanisi* 的直立人无论在下颌和牙齿的尺寸和形态方面都是很不同的。黄万波等 (Huang *et al.*, 1995) 也已一再论证过这个下颌不属于直立人, 但他们却企图从上述几个方面说它与匠人和能人密切相近。从我们的上述论证可以看出, 事实上它与匠人及能人都明显不同。从我们引用的对比材料的数量以及它们与巫山标本的差距的幅度来看, 这些差距是极难用正常变异来解释的。另一方面, 巫山标本还具有肯定地属于猿的特征, 在这种情况下, 对那些一般地不见于人类却常见于猿类的特征, 与其解释为猿类特征在人的残留, 不如更合理地看作是应该将它归于猿类的证据。

出土于元谋的禄丰古猿的牙齿比出土于禄丰同属古猿的为小 (Wu *et al.*, 1983a, b; 刘武等, 1999), 可能意味着由禄丰到元谋该属古猿渐渐变小。如果元谋与巫山二处的古猿有祖裔关系则巫山下颌可能应订名为禄丰古猿巫山种 (*Lufengpithecus wushanensis*), 二者之间牙齿尺寸可能变化不大。但是禄丰古猿多数有显著的前小凹, 而巫山似阙如, 如果将来

从巫山新发现的标本显出与禄丰古猿有更多更大的差别, 则不能不考虑将其定为与后者并列的一个新属, 比如巫山古猿或龙骨坡古猿。总之, 目前由于标本太少, 它在猿类中分类位置的最终确定还有待于发现更多的材料。但是就已有的标本而言, 它属于猿类已是没有疑义的了。在看本文校样时, 笔者注意到一篇Ciochon 最近报道安徽繁昌人字洞石制品的文章(Ciochon 2000)。他写道:“龙骨坡产出过吊人胃口的原狒狒和人属的化石。后者包括一件下颌骨断块, 带着两个磨蚀很深的臼齿。对一些西方科学家而言, 这些牙齿与东非最早的人属共有一些特征, 这引起我们建议这是在大约 200 万年前非洲人类向东亚“扩布”的一个直接环节。但是中国古人类学者们倾向于将这些原始特征看作是由亚洲的古猿衍生出来的, 并且建议直立人起源于亚洲当地。”值得注意的是, 虽然他在 1995 年将巫山的人类外侧门齿归入 200 万年前之列(Huang *et al*, 1995)但现在他已将它排除了。此外, 这段引文最后一句的前半不错, 后半却是不符实际的(参见Etlar and Zhou, 1998; 吴新智, 1999a, b; 吴新智等, 1999)。据我所知, 在中国的文献中建议不要草率排除人类起源于亚洲的潜在可能性者有之, 而直接或间接建议直立人起源于亚洲当地者则极为罕见。

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LONGGUPO HOMINID MANDIBLE BELONGS TO APE

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Abstract

The Longgupo mandible was identified as belonging to *Homo erectus* by Huang *et al.* (1991) and was suggested to be close to *Homo ergaster* by Huang *et al.* (1995). The hominid status has been challenged by Wolpoff (1996), Schwartz and Tattersall (1996), Pope (1998) as well as Etler and Zhou (1998) who indicated an ancestor/descendant relationship between *Lufengpithecus* and the Longgupo mandible. But there is no detailed discussion in these literatures. The present author would like to present a series of comparisons between the Longgupo mandible and various East African early *Homo* as well as the mandible from Dmanisi to discuss the attribution of the Longgupo mandible.

Table 1 shows that the width and height of Longgupo mandible is much smaller than those of East African early Pleistocene hominids including ER992 and WT15000 which are considered as belonging to *Homo ergaster* by some scholars including Huang *et al.*

Huang *et al.* (1995) indicated that the bucco-lingual expansion of the lower fourth premolar makes Longgupo mandible similar to the *Homo ergaster* ER992. Table 2 shows that the Longgupo premolar is much smaller than the East African early Pleistocene hominids, while the dimensions of Longgupo premolar is just within the variation range of that of *Lufengpithecus* found in Yuanmou, Yunnan (some one identified it as *Lufengpithecus yuannanensis*).

That the width is longer than the length of the premolar crown is not only shown in Longgupo premolar and that of *Lufengpithecus* but it is also shown in *Dryopithecus kaiyuanensis* in which the ratios of width to length of the crown of fourth premolar in two individuals are 11.5 and 10.8.

From Table 3 it is obvious that the dimension of Longgupo molar is concordant very well with that of *Lufengpithecus* found in Yuanmou and quite smaller than that of all early Pleistocene hominids in East Africa.

Huang *et al.* have indicated that the Longgupo premolar has large talonid basin which occupies 2/3 of the total area of the occlusal surface. On the basis of the figure printed in the article written by Huang *et al.* (1991) the present author estimated the ratio of its talonid length to the length of the tooth being about 67%. Table 4 shows that the ratio of talonid length to the length of the tooth in fourth premolar is around one third in all compared East African early Pleistocene hominid premolars, so the Longgupo specimen is quite different in this feature from the latter specimens. From the figure in page 164 of the article written by Brown and Walker (1993) it appears that the ratio of this kind in

WT15000 is close to one third. On the other hand, in *Lufengpithecus* and *Dryopithecus kaiyuanensis* found in Yunnan, the ratio of this kind is about $1/2$ or even larger. It is more reasonable to consider the large talonid of Longgupo fourth premolar suggesting its affinity with apes rather than being a retention of ape feature in humans as Huang *et al.* (1996) suggested.

Huang *et al.* (1995) mentioned that the crown of Longgupo molar is low but had not given the measurement. The present author estimated the crown height of both molar and premolar are 6.2mm on the basis of the figure provided in their article. In comparison with the crown height of WT15000 (left, 7.6mm; right, 7.7mm for molars; 9.4mm and 9.1mm for the fourth premolars of both sides) and OH13 (9.1mm for premolar), the fourth premolar and first molar of Longgupo mandible are very low. The ratio of crown height to crown length in Longgupo molar and premolar are 0.56 and 0.84 respectively. These are quite lower than those in WT15000 which are 0.61 for first molars of both sides and 1.04 and 1.01 for premolars of both sides respectively. The ratio in Longgupo is also lower than that in *Homo habilis*.

Huang *et al.* (1996) mentioned in page 202 that the Longgupo teeth have thick enamel and emphasized that this is a derived character of hominid. In their article published in 1995 (page 277) they mentioned the enamel of Longgupo molar is relatively thin, but they have not provided the measurement of the enamel thickness in both papers. Wu Rukang *et al.* (1985) had reported that the *Lufengpithecus lufengensis* has thick and very thick enamel. The enamel of *Afropithecus trukanaensis* is also very thick. Therefore whether the enamel is thick or not is of no help to attribute Longgupo specimen to hominid.

Huang *et al.* (1995) indicated that the Longgupo premolar is close to the East African early Pleistocene hominids because of the bifurcation of the root shown in both Longgupo and ER992. But the roots of fourth premolar of *Lufengpithecus* and *Dryopithecus kaiyuanensis* are also bifurcated, while it is not bifurcated in WT15000.

As Wolpoff *et al.* (personal communication) has pointed out that the anterior contact facet of the fourth premolar of Longgupo mandible is situated lingually rather than centrally on the mesial surface of the tooth. This is an important feature of ape rather than hominid.

Table 5 shows that the Longgupo dentition is much smaller than that of the Dmanisi mandible and the molars of these two specimens are quite different in shape as shown by the length-width index. Dmanisi mandible is 20mm thick at the level of first molar. It is 28.5mm high at the level of the mental foramen. Its mandibular height at the level of first molar can not be measured because of damage. But we could estimate that the mandibular height at M1 level could be lower than that at the level of mental foramen in reference to the cases in both East African early Pleistocene hominids and Lantian *Homo erectus*. So it is reasonable to suppose that the robustness index of Dmanisi mandible at M1 level is probably larger than $70.2 (100 \times 20/28.5)$. This is quite different from that of Longgupo mandible which is 64.2.

OH16 is the East African early Pleistocene hominid which preserved both upper

incisor and lower cheek teeth. In this specimen, the ratios of crown areas of first upper incisor to first lower molar and fourth lower premolar are 1/1.91 and 1/1.20. If Longgupo mandible belonged to a creature similar or close to East African early Pleistocene hominid, the crown area of its first upper incisor could be supposed as close to 58.7 square mm or 56.3 square mm based on the calculation on the basis concerning to the molar and premolar respectively. But the crown areas of *Homo erectus* first upper incisors found at Yuanmou, Yunnan are 92.3 square mm (left) and 98.9 square mm (right). According to the published data available the Yuanmou incisor is later than Longgupo mandible by about 100-300 thousand years. If Longgupo mandible is the predecessor of Yuanmou *Homo erectus*, the incisor of Longgupo should enlarge extraordinarily rapidly as such in so short time. It seems that the process of enlargement as such is unlikely. So the Longgupo hominid could not be ancestral to *Homo erectus*.

As the author has analysed in the present paper, the features on which the conclusion of Huang *et al.* (1995) are based are composed of features shared by both hominids and apes, the features seldomly present in hominids but commonly existing in apes, and features unique for apes but not present in early Pleistocene hominids. As to the dimensions and shape indices Longgupo mandible and teeth are much smaller and different from those of East African early Pleistocene hominids and Dmanisi mandible, but it is concordant with those of *Lufengpithecus* found at Yuanmou, Yunnan. The difference between Longgupo and the African hominids is very difficult to be explained by normal variation. Although it is not sure whether there was an ancestor/descendant relationship between *Lufengpithecus* and Longgupo mandible because of the fragmentary state of it, but it is no doubt to attribute it within the circle of ape instead of hominid.

In a recent paper Ciochon wrote: "For some Western scientists the teeth (pre-molar and molar of Longgupo hominid mandible, noted by the present author) share features with earliest *Homo* in East Africa—leading us to suggest a direct link, a "dispersal" of African hominins to East Asia about 2 million years ago. But Chinese paleoanthropologists tend to see these primitive features as deriving from Asian apes and suggest a local Asian origin for *Homo erectus*" (Ciochon, 2000). But what happened in China is, paleoanthropologists who see these primitive features as deriving from Asian apes, such as Zhou (Etler and Zhou, 1998) and the present author (Wu, 1999a b; Wu *et al.*, 1999) do not suggest a local Asian origin for *Homo erectus* but suggest to expel the Longgupo mandible from the human circle and attribute the mandible to Asian ape. Indeed, there are a few Chinese literatures suggesting not to completely exclude the potential possibility of the Asian origin of hominid and encouraging people making efforts to search for reliable fossil evidence, but this does not imply to suggest the local origin of *Homo erectus*. In fact, only very few Chinese researchers misinterpreting the available fossil data advocate the local origin of *Homo erectus*.

Key words Mandible, Ape, Longgupo