

A NEW SPECIES OF *Dryopithecus* FROM GANSU, CHINA

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In 1947—1948, Prof. Wang Yongyan of the Geological Department, Northwest University of China, collected an assemblage of fossil mammals and some other vertebrates near Longjiagou village in Wudu County, Gansu Province. The fossils come from the red sandy clay, overlying unconformably on the Late Paleozoic limestone or Jurassic sandy mud. On the basis of a preliminary analysis of the several hundred fossil mammals, the most common genera are *Hipparion*, *Chilotherium* and *Eostyloceros*, which suggests a paleoenvironment of woodland and grassland mosaic, with water courses nearby. Some additional specimens collected in the region a decade later were briefly reported by Qiu^[1], who assigned an age of the Late Miocene. Xue and Coombs^[2] described a new species of *Chalicotherium* from Wudu and presented a short faunal list. The total Wudu assemblage is a common one for the Late Miocene of Northern China, suggesting an age probably comparable with the European Turolian, the Nagri "zone" of the Indo-Pakistan Siwaliks or the Lufeng Miocene beds of Yunnan Province.

Among the specimens recovered by Prof. Wang, there is a partial mandible of a higher primate, part of whose dentition was damaged in cleaning. Previous cursory examination of the fossil suggested to several researchers that it was an early macaque-like cercopithecoid monkey^[3], but more detailed analysis has revealed it to be a small hominoid or early ape, representing a new species best assigned at present to the mainly European genus *Dryopithecus*. We here describe the specimen and diagnose the new taxon with brief comparisons with other contemporaneous species. A more detailed analysis will be given later.

I. SYSTEMATIC PALEONTOLOGY

Order: Primates Linnaeus, 1758

Infraorder: Catarrhini Geoffroy, 1812**Superfamily: Hominoidea Gray, 1825****Family: Hominidae Gray, 1825****Subfamily: Incertae Sedis****Genus: *Dryopithecus* Lartet, 1856**

Diagnosis. Medium-sized hominids which lack significant cingulum development on upper or lower cheek-teeth whose enamel covering is thin to moderately thick; relatively slender canines moderately dimorphic sexually and generally oval in cross-section; mandible with superior and inferior symphyseal tori distinct, corpus deep and moderately thick; maxilla with enlarged sinus, *Hylobates*-like subnasal/alveolar anatomy; and forelimb slightly modified in modern ape direction (broad, spool-shaped humeral trochlea, possibly reduced ulnar olecranon process). Differs from *Proconsul* in less cingulum, caudal rather than inferiorly directed inferior mandibular torus and elbow with more strongly developed lateral trochlear keel and medial epicondyle; differs from *Sivapithecus* in thinner molar enamel, less derived subnasal region and canine placement, less alveolar prognathism, shorter premaxilla; differs from *Kenyapithecus* in larger maxillary sinus, spatulate P², less elongate upper premolars and thinner molar enamel. (modified after [4—7]).

Type species. *D. fontani* Lartet, 1856***Dryopithecus wuduensis*, new species**

Diagnosis. Small *Dryopithecus* (molar row length ca. 28 mm) with strongly developed gnathic musculature, elongate P₄ (W/L 90%) and shorter P₃ (W/L 69%) with transverse talonid. M₃ apparently longer and narrower.

Holotype. A partial mandible. XD47Wd001.

Type locality and its horizon: Longjiagou valley, Wudu County, Gansu Province, China; 33°24'N, 104°55'12"E. Late Miocene (or earlier).

Etymology. From Wudu County.

Description. The type and only known specimen of *D. wuduensis* is a partial mandible preserving the left corpus and part of the ramus, the symphysis and the right corpus back to P₄ (Fig. 1). The corpus is moderately robust and of rather consistent depth, the buccinator channel large and a muscle scar present, anterior to the mental foramen; these features suggest strong development of chewing musculature and concomitant buttressing. The internal symphyseal contour presents a steep planum alveolare and two moderately developed transverse tori with only a slight genioglossal fossa.

The left premolars are the sole preserved teeth, although roots and crown fragments of the left molars and all anterior teeth are present. The canines would have been placed at an angle of about 45% to the cheek tooth row, perhaps rotated slightly toward the incisors medially. They are robust, as compared with the molar. The left P₃ is aligned nearly parallel to the canine's long axis. The protoconid is tall, the mesial flange projects just slightly below the alveolar plane, with a small wear

facet (for C^1) apicomesially. A crest leading inferiorly from the cusp apex suggests the presence of a small metaconid, but the lingual face of the tooth has lost an enamel chip in that region. Distal to this crest, the tooth is quite short, the fovea posterior being only a shallow groove. The shape of P_3 , especially the nonprojecting mesial flange and overall short crown, suggest that it may be female, but it is not possible to be certain with only a single individual.

The left P_4 is relatively narrow and worn, with a broken metaconid. Wear is very heavy on the left M_1 and mesially on M_2 . The buccal part of M_2 is broken away, but much of the entoconid remains; where it is chipped lingually, the remaining enamel is about 0.75 mm thick, after moderate wear. Faint grooves surround the entoconid mesially and buccally, and a small pit distally may represent the posterior fovea. Only part of the enamel margin of M_3 remains, but it can be seen to have been relatively long and narrow, with a narrow projecting hypoconulid. Measurements of 47 Wd001 and several specimens for comparison are given in Table 1.

The tooth row between M_3 and P_4 was rather straight, then curved gently through P_3 and C_1 toward the incisors. The arch probably formed a broad "U" shape, with slightly diverging postcanine rows. A radiograph shows a number of features which Dr. Steven Ward (personal communication) considers to be conservative retentions compared to *Sivapithecus*, e. g. mandibular canal inferior to root tips and roots of M_{1-2} similar in orientation and size, just slightly longer than those of P_4 .

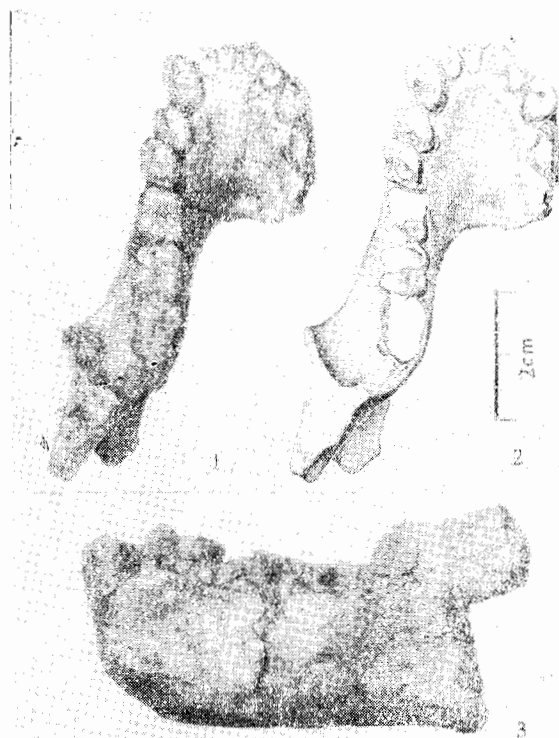


Fig. 1. Holotype mandible of *Dryopithecus wuduensis*, new species XD47 ↔ Wd001.
1, Occlusal photograph; 2, occlusal drawing; 3, left lateral photograph.

II. COMPARATIVE ANALYSIS

As indicated by its generic identification, the Wudu mandible appears clearly distinct from species assigned to *Proconsul*, *Kenyapithecus* or *Sivapithecus*. Even less likely is the possibility that it represents a large pliopithecid (e. g. *Laccopithecus*, *Pliopithecus* or *Dendropithecus*). In its combination of preserved features, it appears most similar to the group of species now placed within the poorly understood genus *Dryopithecus*. Most workers^[5,8] currently recognize two European species of this genus, the generic type *D. fontani* (including *Rudapithecus hungaricus*, *D. f.*

Table
Measurements (in mm) on Mandibular Dentition and

Taxon	<i>Dryopithecus</i>				
	<i>wuduensis</i>	<i>simonsi</i>	<i>cf. simonsi</i>	<i>brancoi</i> (<i>"laietanus"</i>)	<i>fontani</i>
Sample	47Wd001	Sivalik ^[2]	P4-M1; Khaur ^{a)}	Spain/Germany /Austria	Cent. Europe
Source	original	Kay, 1982	M2; Hylopith. ^{b)}	original/cast	cast (f)
I1W-alv	5.0			(IPPS specimens	5.3
I1L-alv	3.1			sexed by Delson)	3.6
I2W-alv	5.9			7 2.18	
I2L-alv	2.7			(male) (feml)	
CW	5.8			6.9 5.3	5.7
CL-max	7.5			12.5 9.3	9.2
C W/L	77.3			55.2 57.0	62.3
P3 W	5.5	5.5		6.3 5.0	5.9
P3 Lmax	8.0	9.8		11.0e 8.3	9.9e
P3 FL	6.2				8.9
P3 W/L	68.8	56.1		57.3 60.2	59.6
P4 W	6.4	7.8e	8.0	7.4 5.7	7.2
P4 L	7.1e	6.2	6.9	8.0 7.3	7.5
P4 W/L	90.1	125.8	115.9	92.5 78.1	96.3
M1 MW	7.4e			6.8	8.1
M1 DW	7.5	8.1	8.9	7.2	8.1
M1 L	8.1e	8.8	9.7	8.9	9.6
M1 DW/L	92.6	92.0	91.8	80.9	84.8
M2 MW	8.0e	9.0	7.3	8.0	9.4
M2 DW	7.6e	9.0		7.8	8.9
M2 L	8.8	10.0	8.8	9.5	10.7
M2 MW/L	90.9	90.0	83.0	84.2	87.4
M3 MW	7.7e			7.6	9.3
M3 DW	6.6e			7.1	7.8
M3 L	11.3e	10.9e		9.7	11.0
M3 MW/L	68.1			78.4	84.5
C-M3 L	49.5	19.0e			54.5
C-P4 L	21.0	27.5e			23.4
M1-3 L	28.4			27.5	31.4
COR W (M2)	12.8	13.0		12.5	13.5
COR D (M2)	22.8	24.0		21.5	24.0e
CORW/D	56.1	54.2		58.1	56.3
COR W (M3)	18.0				16.0

Symbols and notes: e, estimate value due to damage; f, female; a), mandible in von Koenigsmen on casts or originals by Delson or from literature as cited. IPPS, Instituto Provincial de tology and Paleoanthropology, Beijing, China; GSP, Geological Survey of Pakistan, Quetta. width, usually perpendicular to L; alv, at alveolus; FL, flange length (apex of P3 mesiobuccal DW, distal width (as MW). C-M3. C-P4 and M1-3 L, tooththrow partial lengths. COR D, W: cor-

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Corpus of *Dryopithecus wuduensis* and Comparative Material

<i>Laccopith. robustus</i>	<i>Platodon. jianghuaiensis</i>	" <i>Sivapithecus</i> " <i>lufengensis</i>	" <i>Ramapithecus</i> " <i>punjabicus</i>
PA 881 (f?)	PA 870	PA 580	GSP 4622
Wu & Pan, 84	Gu & Lin, 83	cast	cast
		8.4	
		5.3	
4.0		5.7	
5.8		9.8	
69.0		58.2	
5.0		8.0	
6.4		10.5	
		9.5	
78.1		76.2	
5.0		9.2	
6.1		8.0	
82.0		115.0	
6.1		9.7	9.5
7.1		10.3	11.4
85.9		94.2	83.3
6.2		11.3	10.4
		10.9	10.6
7.5		11.7	12.2
82.7		96.6	85.2
	7.5	10.6	10.6
		10.1	99.3
	8.5	12.5	12.4
	88.2	84.8	85.5
		26.0	57.5e
			35.0
			15.5
			28.5e
			54.4
			21.0

wald, 1983; b), holotype isolated tooth of *Hylopithecus hysudricus* in Pilgrim, 1927. Other measurements: PA, Paleontology collection, Institute of Vertebrate Paleontology, Sabadell, Spain; PA, Paleoanthropology collection, Institute of Vertebrate Paleontology, Sabadell, Spain; PA, Paleontology collection, Institute of Vertebrate Paleontology, Sabadell, Spain; PA, Paleoanthropology collection, Institute of Vertebrate Paleontology, Sabadell, Spain.

Measurement abbreviations: L, mesiodistal length (maximum, if "max"); W, buccolingual flange to most mesial extension; MW, mesial width, maximum for mesial half of molar crown; pus depth or thickness (at tooth indicated). All ratios in percent (e. g., MW/L = 100*MW/L).

carinthiacus and probably *Udabnopithecus garadziensis*) and *D. brancoi* (including *Hispanopithecus laietanus*, *Sivapithecus occidentalis* and *Rahonapithecus sabadellensis* (a nomen nudum)). *D. wuduensis* differs from *D. brancoi* in wider P_3 and narrower P_4 ; from *D. fontani* in smaller size and wider P_3 (and possibly narrower P_3). Kay^[9] recently named a new species, *Sivapithecus simonsi*, based on two fragmentary mandibles from the Indian Siwaliks. This species may best be assigned to the genus *Dryopithecus* as here diagnosed. It would also be important to make detailed comparison with two other Siwalik mandibular specimens. The tooth fragment GSI D-200, which Pilgrim^[10] named *Hylopithecus hysudricus*, is comparable in size to *D. simonsi* (Table 1) and might be conspecific. A corpus fragment with P_4 - M_1 described by Koenigswald^[11] is somewhat larger, but has a similarly shaped premolar and could be a male of the same taxon.

As can be seen from Table 1, *D. brancoi* fossils identified as probable males are larger, but females (especially IPPS 2, the type of *H. laietanus*) are comparable in size to Wudu, while the two jaws of *D. simonsi* have slightly larger molars and quite differently proportioned premolars. In all these fossils, the talonid of P_3 is quite long, and most show a broad P_4 , often wider than it is long in direct opposition to 47 Wd001.

Several new Chinese "hominoid" taxa have been described recently as well. The Shihuiba locality in Lufeng County, Yunnan Province yielded three species: *Ramapithecus lufengensis* Xu et al., 1978; *Sivapithecus yunnanensis* Xu and Lu, 1979; and *Laccopithecus robustus* Wu and Pan, 1984^[13,14]. Examination of the original fossils through the courtesy of Prof. Wu Rukang combined with numerous further descriptions^[15] leads us to the view that the first two taxa are in fact conspecific. As one of us has noted^[16], the elongated incisors and rather *Pongo*-like molars of this species are derived, while its apparently wide interorbital region is conservative, as may be its subnasal morphology. This combination of features suggests placement either as a distinctive subunit of *Sivapithecus* (with which it shares basic molar and mandibular morphology) or a closely related genus. No decision between these alternatives is made here, pending further analysis. The much larger size and thick enamel of "*Sivapithecus*" *lufengensis* separates it from the Wudu specimen. *Laccopithecus* originally was classified in the Hylobatidae^[17], but may be a pliopithecid. It is slightly smaller than the Wudu jaw, and although the P_4 - M_2 are somewhat narrower, the P_3 is quite broad, as is M_3 . It is thus even more extreme in these proportions than *D. wuduensis*. Further comparison would be useful, but it is unlikely that there is a close relationship between this taxon as represented at Wudu.

Less complete remains of moderate-sized Chinese hominoids are known from the Middle Miocene. Two sets of teeth from the late Middle Miocene Xiaolungtan coalfield in Kaiyuan County, Yunnan were named "*D. kaiyuanensis*" by Wu^[18,19]. They are larger and probably thicker-enameled, and P_3 is elongate. The even older *Platodontopithecus jianghuaiensis*^[20] from Shihong has an M_3 which is of similar width but much less length than that of the Wudu jaw, as yet, it is too poorly known for further comparison.

III. SUMMARY AND IMPLICATION

Dryopithecus wuduensis appears to be the most northeasterly representative of (Late) Miocene Hominidae. It is distinguished from other known taxa by its premolar proportion and small size, but seems most closely related to species of *Dryopithecus*. These are known from Spain through Hungary and perhaps the Georgian SSR, as well as from the Siwaliks. *D. wuduensis* is the farthest extension of the range of this genus. If the Wudu and Siwalik species turn out to share derived character, the specimens of *Dryopithecus* from eastern Asia may turn out to require generic separation.

In addition to adding to the known variability of the Late Miocene hominids, the Wudu mandible helps clarify the systematic position of *Ramapithecus*. *R.* is small and may be the female *Sivapithecus*.

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