



# Fossil *Scapanulus oweni* (Eulipotyphla, Mammalia) from the Shanyangzhai Cave, Middle Pleistocene, Qinhuangdao, China



Yong-xiang Li <sup>a, b</sup>, Ji Li <sup>c</sup>, Yun-xiang Zhang <sup>a, b, \*</sup>

<sup>a</sup> Institute of Cenozoic Geology and Environment, State Key Laboratory of Continental Dynamics, Department of Geology, Northwest University, Xi'an 710069, China

<sup>b</sup> State Key Laboratory of Loess and Quaternary Geology, Institute of Earth Environment, Chinese Academy of Sciences, Xi'an, 710061, China

<sup>c</sup> Research Institute for History of Northwest China, Northwest University, Xi'an 710069, China

## ABSTRACT

### Keywords:

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New materials of the mole, *Scapanulus oweni*, are described from the Shanyangzhai Cave deposits of Qinhuangdao in China, which have yielded many vertebrate fossil assemblages referred to the Middle Pleistocene. The materials including 8 isolated upper teeth, 5 broken left mandibles, 9 isolated lower teeth, 4 humeri, and 3 toe bones. The parastyle of M1 is quite weak. The trigonid basins of the lower molars are closed or semi-closed. The m2 is largest, while the lengths of m1 and m3 are subequal. For the humeri, the scalopinae ridge is weakly developed, the fossa brachialis is similarly deep, the humerus is markedly overall slender, and the teres tuberculus is longer. The fossil *Scapanulus oweni* was first reported from north China. The toe bones of this fossil mole are first reported.

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## 1. Introduction

Skoczeń (1980) identified some mole specimens from Podlesice as *Scapanulus agrarius*, and then transferred the specimens described as *Scapanulus agrarius* Skoczeń, 1980 to the genus *Parascalops* and the new species, *Parascalops fossilis* (Skoczeń, 1993; Rzebik-Kowalska, 2014). Mein and Ginsburg (1997) reported some isolated teeth of *Scapanulus lampounensis* from the MN4 of Thailand. The only report in China of fossil *Scapanulus* is the Early Pleistocene species *Scapanulus* cf. *S. oweni*, from the Renzhidong of Fanchang city, Anhui province, south China (Jin and Liu, 2009).

The modern Gansu (Kansu) mole (*Scapanulus oweni*) belongs to the monotypic genus *Scapanulus*. The first specimen of *S. oweni* was found by G. Fenwick Owen in 1911 in Gansu, China (Thomas, 1912). Because relevant reports of it are insufficient, the population and ecology of this species is barely known (Smith and Johnston, 2008; He et al., 2012). According to modern investigation, the Gansu mole is mainly distributed in Central and

Southwest China (Fig. 1), such as Gansu (southern part), Qinghai (Tongren), Shaanxi (southern part), Sichuan (western part), Hubei (western part) and Chongqing (southern part-Nanchuan) (Li, 1989; Wang, 1991; Zhang, 1997; Wang and Zhang, 1997; Wang, 2003; Zheng and Song, 2010).

Fossil *Scaptochirus* is abundant in China. The earliest fossil *Scaptochirus* is *Scaptochirus primitivus* from Choukoutien (Zdansky, 1928). Rich materials from Localities 1 and 3 at Choukoutien were reported by Young (1934) and Pei (1936). They classified these fossils in the living species, *Scaptochirus moschatius*, because they saw no essential difference between the collected fossils and the recent species. These fossils or similar materials have been discovered from many sites, including Locality 5 (Pei, 1931) and Locality 9 at Choukoutien (Teilhard De Chardin, 1936), the Upper Cave Fauna of Choukoutien (Pei, 1934, 1940), Yenchingkou near Wanhhsien (Young, 1935), the Koloshan near Chungking (Young and Liu, 1950), Gongwangling of Lantian (Hu and Qi, 1978), Jinniushan of Yingkou (Zhang, 1993), Luochuan (Liu, 1985), Weixian (Cai, 1987; Zheng and Cai, 1991), Sarah WuSu (Qi, 1975; Xie, 1995; Tong et al., 2008), Hexian (Zheng, 1983), Dingcun (Pei, 1958), Lishui (Li and Lei, 1980), Tianyuan Cave (Tong et al., 2006), Fanchang (Jin et al., 2000; Jin and Liu, 2009) and Yanshan Mountains Cave (Huang, 1981). New species from southern China include *S. jiangnanensis* and *Scapanulus* cf. *S.*

\* Corresponding author. Institute of Cenozoic Geology and Environment, State Key Laboratory of Continental Dynamics, Department of Geology, Northwest University, Xi'an 710069, China.

E-mail address: [yxzhang@nwu.edu.cn](mailto:yxzhang@nwu.edu.cn) (Y.-x. Zhang).

*oweni*, recently reported from the Fanchang of Anhui province (Jin and Liu, 2009).

There are more than two hundred pieces of fossil moles from the Middle Pleistocene Shanyangzhai fauna in Qinhuangdao, Hebei province (China). Most can be classified as *Scaptochirus moschatus* by the characteristics of teeth and limb bones (Zhang et al., 2010; Li, 2012). At the same time, some small specimens also can be separated from the known species by differences on teeth and limb bones, and classified as another species, *Scapanulus oweni*. This is the first report of this fossil species from north China. The discovery of new materials provides new evidence for us to understand the evolution of the Talpidae and the environmental changes during the Pleistocene in this area.

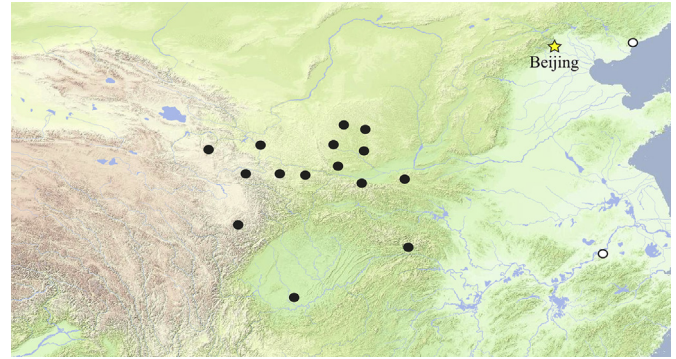


Fig. 1. Distribution of *Scapanulus oweni* from China. Hollow circle indicates fossil sites.

## 2. Systematic paleontology

Class Mammalia Linnaeus, 1758  
 Order Insectivora Bowdich, 1821  
 Family Talpidae Fischer von Waldheim, 1814  
 Genus *Scapanulus* Thomas, 1912.  
*Scapanulus oweni* Thomas, 1912.  
 Figs. 2 and 3; Tables 1 and 2

### 2.1. Materials

All of the specimens are kept at the Institute of Cenozoic Geology and Environment, Northwestern University, Xi'an, Shaanxi province, China. Two right P4 (NWUV 1402.195–196, the same below); two left and two right M1 (NWUV1402.197–200); one left and one right M2 (NWUV1402.201–202); one broken left mandible

**Table 1**  
 Measurements and comparison of teeth of *Scapanulus* (mm).

Element measure	n	1			2	3	4	5
		Min	Mean	Max	Mean	Mean	Mean	Mean
M1	BL	3	2.28	2.11	2.39	2.41		
	LL	3	1.05	1.20	1.33			
	AW	3	1.51	1.60	1.72	1.93		
M2	PW	3	1.58	1.60	1.68			
	BL	1		2.11		2.24		2.15
	LL	2	1.23	1.30	1.37			
Mandible	AW	1		2.28		2.41		2.44
	PW	2	1.93	2.04	2.14			
	H	3	2.03	2.10	2.16	2.07		
m1–m3	L	1		5.86		5.79	6.10	6.50
m1	L	5	1.84	1.93	1.97	1.79	1.90	2.29
	TrW	4	1.21	1.32	1.39	1.31	1.20	1.14
	TaW	5	1.45	1.56	1.71	1.59	1.50	1.33
m2								1.50
	L	4	2.11	2.17	2.24	2.07	2.20	2.41
	TrW	4	1.21	1.45	1.61	1.66	1.50	1.33
m3	TaW	4	1.11	1.44	1.61	1.55	1.60	1.32
	L	3	2.11	2.11	2.13	1.76	2.00	2.01
	TrW	3	1.18	1.27	1.32	1.38	1.40	1.05
	TaW	3	0.97	1.04	1.11	1.00	–	0.94

Abbreviations: BL, buccal length; LL, lingual length; AW, anterior width; PW, posterior width; Mandible H, height of mandible below m3 (medial side); L, length; TrW, trigonid width; TaW, talonid width. 1 *Scapanulus oweni* from Shanyangzhai; 2 Recent species of the *Scapanulus oweni* in China (measure on existing specimen in Shaanxi Institute of Zoology, No.01013-1); 3 *Scapanulus oweni* from Longyadong (Li et al., in press); 4 *Scapanulus* cf. *S. oweni* from Fanchang (Jin and Liu, 2009); 5 *Scapanulus lampounensis* from the Thailande (Mein, P. and Ginsburg, L., 1997).

**Table 2**  
 Measurements and comparison of limb bones of some moles from China (mm).

Element measure	n	1			2	3	4	5	6	7	
		Min	Mean	Max	Mean	Mean	Mean	Mean	Mean	Mean	
Humeri	L	2	13.00	13.00	13.00	12.30	14.50	14.00	19.00	11.83	11.40
	MaxW	2	7.80	7.90	8.00	7.50	11.90	11.80	15.00	7.43	7.71
	MinW	2	2.70	2.75	2.80	2.50	4.70	4.50	6.00	2.75	2.69
Fingertip	MaxW/L (%)			60.77		60.97	82.07	84.30	78.95	62.81	67.63
	L	3	3.50	3.70	3.80	5.50					
	W	3	1.10	1.10	1.20	1.70					

L, length. W, width. MaxW, maximum width. MinW, minimum width. 1 *Scapanulus oweni* from Shanyangzhai; 2 *Scapanulus oweni* (Hutchison, 1968; Skoczeń, 1993); 3 *Scaptochirus moschatus* from Shanyangzhai (Li, 2012); 4 *Scaptochirus moschatus* from Locality 1 at Choukoutien (Young, 1934); 5 *Scaptochirus moschatus*? from Lishui (Li and Lei, 1980); 6 *Yunosaptor scalprum* (Storch and Qiu, 1991); 7 *Yanshuella primaeva* (Storch and Qiu, 1983).

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