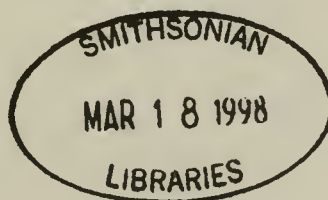


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**TRANSLATIONS OF RECENT DESCRIPTIONS OF  
CHINESE PITVIPERS OF THE  
*TRIMERESURUS*-COMPLEX (SERPENTES, VIPERIDAE),  
WITH A KEY TO THE COMPLEX IN CHINA AND  
ADJACENT AREAS**



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**SMITHSONIAN  
HERPETOLOGICAL INFORMATION  
SERVICE  
NO. 112**

1997

SMITHSONIAN  
HERPETOLOGICAL  
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## HISTORICAL PERSPECTIVE

The renewed interest in herpetological researches that occurred in the 1970's in the People's Republic of China (hereafter merely referred to as China) led to the descriptions of many new taxa. Between 1972 and 1995, 17 species and 14 subspecies of snakes were described as new, either by Chinese or foreign authors. All species are still considered as valid, whereas seven subspecies proved to be junior synonyms of other taxa. The majority of the new snakes occur in the mountainous areas of central and southern China and includes several taxa of venomous snakes.

The descriptions of new snakes published between 1975 and 1995 appeared in Chinese journals such as *Acta zoologica Sinica* (*Dongwu Xuebao*) and *Acta zootaxonomica Sinica* (*Dongwu Fenlei Xuebao*), and also in more regional publications, university journals, and in collected works. But most descriptions were published in specialized journals like *Materials for herpetological Research* (*Liangqi Paxing Dongwu Yanjiu Ziliao*) and *Acta herpetologica Sinica*, of which three series were published, respectively between 1979-1982 (Old series) (*Liangqi Paxing Dongwu Yanjiu*), during the period 1982-1988 (New series) (*Liangqi Paxing Dongwu Xuebao*), and from 1992 onwards (*Liangqi Paxing Dongwu Xue Yanjiu*). Nearly all articles in these journals were in Chinese, although most articles included a short, sometimes disappointingly brief, English summary. We refer the reader to ZHAO & ADLER (1993) and ZHAO & ZHAO (1994) for an overview of the Chinese herpetological literature.

The rich Chinese herpetofauna can be explained by a combination of geographical and climatic factors. This area, and especially the mountains of southern China east of the Himalaya, northern Myanmar and northeastern India, seems to be a center of dispersal for several reptile groups. This region is characterised by a high number of crotaline species. So, while preparing a monograph on the Asian pitvipers of the *Trimeresurus*-complex (Serpentes, Viperidae, Crotalinae), one of us (PD) had to refer to many Chinese publications. According to ZHAO & ADLER (1993), DAVID (1995), ZHAO (1995a, 1995b) and DAVID & INEICH (in press), the *Trimeresurus*-complex, namely the four currently recognized genera *Trimeresurus* Lacepède, 1804, *Ermia* Zhang, 1992, *Ovophis* Burger in Hoge & Romano Hoge, 1981 and *Tropidolaemus* Wagler, 1830, currently has 43 species, ranging from Nepal to southern India and Sri Lanka, to eastern China and Japan, and to eastern Indonesia. It is particularly well represented in central, eastern and southern China and Hainan, with a total of 17 taxa, 13 species and four subspecies, not including the nominal subspecies. Taiwan is the home of four species, all but one also occurring on the mainland.

The taxonomy of this group is far from perfectly known, and during the period 1977-1995, seven new forms of the genus *Trimeresurus*, namely four species and three subspecies, were described from continental China, including a very large species. At the same time, a subspecies described long ago and

another one described in 1977 were raised to specific rank. All these taxa are currently considered valid, although with some doubt for one of the subspecies (see below).

Translations of these original descriptions were purposely prepared by the second author (HT) of the present paper for our monograph on the *Trimeresurus*-complex. We wish to share them with herpetologists not fluent in Chinese language or not having easily access to Chinese literature so a larger audience has access to original descriptions and characteristics of these venomous snakes, which are still poorly known outside China. English translations of the original articles are reproduced here with explanatory notes.

## SYSTEMATICS

The seven taxa included herein were all described in the genus *Trimeresurus*. Two were subsequently reallocated to other genera, although ZHAO & ADLER (1993) were conservative and retained all these taxa in the genus *Trimeresurus*.

We provide below in chronological order of description the current names of these taxa, then the original name, bibliographic data, and, if relevant, the authorship of the new combination. For more information, see also GOLAY et al. (1993) and DAVID & INEICH (in press).

*Trimeresurus medoensis* Djao in Djao & Jiang, 1977

*Trimeresurus medoensis* Djao in DJAO & JIANG, 1977: 66, pl. 2: fig. 9-1 to 9-5.

*Ovophis zayuensis* (Jiang in Djao & Jiang, 1977)

*Trimeresurus monticola zayuensis* Jiang in DJAO & JIANG, 1977: 67, fig. 1: 1-3.

*Ovophis monticola zayuensis*: HOGE & ROMANO HOGE, 1981: 249.

*Ovophis zayuensis*: ZHAO, 1995a: 37.

*Trimeresurus xiangchengensis* Zhao, Jiang & Huang, 1978

*Trimeresurus xiangchengensis* ZHAO, JIANG & HUANG, 1978: 21.

*Trimeresurus tibetanus* Huang, 1982

*Trimeresurus tibetanus* HUANG, 1982: 116, fig. 1-5.

*Ermia mangshanensis* (Zhao in Zhao & Chen, 1990)

*Trimeresurus mangshanensis* Zhao in ZHAO & CHEN, 1990: 11, plate.

*Ermia mangshanensis*: ZHANG, 1992: 82; ZHANG, 1993: 56.

*Ovophis monticola zhaokentangi* Zhao, 1995

*Ovophis monticola zhaokentangi* ZHAO, 1995b: 109.

*Trimeresurus stejnegeri chenbihuii* Zhao, 1995

*Trimeresurus stejnegeri chenbihuii* ZHAO, 1995b: 110.

## SCOPE AND METHODS

We provide translations of seven articles in which descriptions of these taxa were published. Three articles are not translated in full, only their parts relevant to the *Trimeresurus*-complex. DJAO & JIANG (1977) include general remarks and a zoogeographical analysis of the herpetofauna of the Xizang Province; these are not included here. ZHAO et al. (1978) and ZHAO (1995b) contain descriptions of taxa in addition to the *Trimeresurus*-complex; these are not included. On the other hand, we give full translations of two articles relative to *T. xiangshengensis* (ZHAO et al., 1978; ZHAO, 1979). The first one is a preliminary, although valid, description; the second one is a more formal and thorough diagnosis of the species. All other species were described in dedicated papers (HUANG, 1982; ZHAO & CHEN, 1990). However, the original description of *T. mangshanensis*, based on two juveniles, lacks important data about adults and other salient features of this amazing species. So, we also give the translation of another article related to this species and published same year as the original description (CHEN, 1990). The translated articles are arranged according to the chronology of their date of publication and appear in the following order:

DJAO & JIANG, 1977.  
 ZHAO, JIANG & HUANG, 1978.  
 ZHAO, 1979.  
 HUANG, 1982.  
 ZHAO & CHEN, 1990.  
 CHEN, 1990.  
 ZHAO, 1995b.

Full references are given in "LITERATURE CITED". These publications require some explanations. First, the Chinese policy until early 1980 was to credit articles to institutions or laboratories rather than to individuals. So we reproduce in bibliography the author(s) as mentioned in the original paper. In the first article, footnotes on pages 64 and 70 clearly indicate that the actual authors are DJAO & JIANG, and the paper is cited in bibliographies under this authorship.

Second, we used titles as given in the English summaries or as provided in ZHAO & ADLER (1993). The Chinese titles are slightly different, and they are given in the "NOTES" section. Personal, vernacular and geographical names are transcribed according to the *pinyin* system. We combine transcribed Chinese characters when they form a single word, for example *zhuyeqing* in place of *zhu ye qing*, the bamboo-leaf green snake. We retained the spellings of the author's names as mentioned in the English summaries of the original papers. DJAO Er-mie is now spelt ZHAO Er Mi (or Ermi).

Third, names of the type localities and other places are transcribed from the main Chinese text and not from the English summary. Our reference for geographical names is SUN (1989).

Last, the reader should refer to the original articles for the drawings and plates and also for the references included in these articles, which are not included here.

When necessary, we annotated the translations; these comments are marked by an integer in square brackets. The annotations follow the last article. There are no personal notes within the translations. These translations follow the original texts in respect to the titles of their sections and subsections.

A SURVEY OF REPTILES IN XIZANG AUTONOMOUS REGION, WITH FAUNAL ANALYSIS AND DESCRIPTIONS OF NEW FORMS <sup>1</sup>

Herpetological Department, Sichuan Biological Research Institute

Description of new species and subspecies <sup>[1]</sup>

**Motuo zhuyeqing** <sup>[2]</sup> *Trimeresurus medoensis* Djao, sp. nov. (Plate II, fig. 9, 1-5) <sup>[3]</sup>

**Types:** Holotype male (Sichuan Institute of Biology Nr 73 II 5208, 3 August 1973, Xizang, Motuo, bridge Ani <sup>[4]</sup>, altitude 1200 m, collected by DJAO Er-mie and GAO Yuan); paratype male (Sichuan Institute of Biology Nr 73 II 5209, collected on the same day at the same place as the holotype, altitude 1400 m, collected by DJAO Er-mie and WU Xue-en). Deposited in the Sichuan Institute of Biology, Chengdu.

**Diagnosis:** A form of *zhuyeqing*. The first supralabial is completely separated from the nasal scale; 8 supralabials, 8-9 infralabials; 17 (19)-17-13 dorsal scale rows, of which the 7th-11th median rows are slightly keeled; 148-149 ventral scales.

**Description:** The dorsal parts are entirely green on the whole body; the upper lips and the venter are white-yellowish; a bicolor red and white ventrolateral stripe on each side, made of the red inferior part of scales of the first dorsal row and of the white superior part of scales of the first dorsal row and inferior margin of the scales of the second dorsal row; the ventrolateral stripe extend beyond the corner of the mouth to the temporal region, where it is interrupted, and, rearward, it reaches the level of first subcaudal scales; upper part and tip of tail dark red.

Total length: 563 + 129 mm (holotype) and 509 + 115 mm (paratype).

The internasals are much larger than other scales on the upper part of the snout, they are in contact or separated by a small scale; the nasals are not divided nor constricted in their middle, and their posterior edge is slightly concave; they are completely separated from the first supralabials by a suture between the scales; second supralabial borders the anterior side of the loreal pit, the upper part of this second supralabial is separated from the nasal by a triangular prefoveal scale <sup>[5]</sup>; a loreal <sup>[5]</sup> between the nasal and the preocular scales; the left and right supraocular scales are separated by a transversal row of 6-9 small scales; 2 postoculars; 1 subocular in contact on its forward border with the subfoveal <sup>[5]</sup>; eyes moderate, with a vertical, oval pupil; 8 supralabials, the third being the largest, the fourth situated just below the eye; 8 infralabials on the left side, and 9 infralabials at right, of which the first pair is in contact behind the mental, and the first three pairs are in contact with the anterior chin shields. 17(19)-17-13 dorsal scale rows, of which the 7-11 median rows are slightly keeled; 148-149 ventral scales; anal entire; 58-59 pairs of subcaudals.

**Biology:** The holotype and the paratype were collected along a forest path, during a light rain. The holotype was crawling at 10:50 towards the collectors and, arrived in their vicinity, turned away from them. The paratype was found along a path at 13:50, and, when noticed, tried to escape into a pile of leaves and fallen vegetation at the bottom of the hill slope.

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<sup>1</sup>: Authors of new forms : Djao Er-mie and Jiang Yao-ming.

**Comparison and discussion:** About thirty species are known in this genus, of which eight are green, bearing ventrolateral stripes or not, and are called “bamboo-leaf green snakes”. The new species can be distinguished from the previously known forms by the following distinctive characteristics: 1) a reduced number of dorsal scale rows, 17(19)-17-13, which is different from all other species of the genus; 2) a relatively low number of supralabials, 8 on each side. The Large-scaled zhuyeqing, *T. macrolepis* Beddome<sup>[6]</sup>, also has between 7 and 8 supralabials, but in this species the numbers of scale rows at midbody and before vent are 12-15 and 9-10 respectively; 133-143 ventral scales; upper head scales are much enlarged, with a single large scale separating the supraoculars. All these characters are different from those of the new species.

Three female snakes of *zhuyeqing* collected by KAULBACK in the Namti Valley, northern Burma, with 17-17-13 dorsal scale rows, 143-149 ventrals and 57-60 pairs of subcaudals, were tentatively referred by SMITH (1943: 518)<sup>[7]</sup> to the species *T. stejnegeri* Schmidt. *T. stejnegeri* was described from specimens collected in Shaowu, Fujian Province, and its range includes southern China, northern Burma, and westwards it reaches Darjeeling in India. The examination of 196 specimens (90 males, 106 females) of *zhuyeqing*<sup>[8]</sup> originating from nine Chinese provinces gave the following results: dorsal scales behind the head on 21 or 23 rows (rarely 22, 24 or 25 rows; solely the specimen Nr 1 from Huili, Sichuan Province, has 19 rows), usually 21 scale rows at midbody (very few specimens have 23 rows, and solely the specimen Nr 2 from Huili, Sichuan Province, has 19 rows), 15 scale rows before vent (only the specimen Nr 3 from Lei Shan, Guizhou Province, has 13 or 12 scale rows), dorsal scales all keeled, with the exception of the two outer most rows, number of ventral scales 154-178 in the males (mean: 162.5), 154-173 in the females (mean: 160.7), 9-11 supralabials, sometimes 12, with only 1 specimen from Chongan, Fujian Province and one from Lei Shan, Guizhou Province, having 8 supralabials on each side, and a number of infralabials included between 10 and 14 (there is not any specimen with 9 infralabials). The differences between the new species and the *zhuyeqing*<sup>[8]</sup> are therefore very clear. We consider that if other characters of the specimens from northern Burma mentioned above are similar to those of the new species, these animals should be also referred to the *Motuo zhuyeqing*.

**Shan laotietou, Zayü variety<sup>[9]</sup> *Trimeresurus monticola zayüensis*<sup>[10]</sup> Jiang,  
subsp. nov. (Fig. 1, 1-3)<sup>[11]</sup>**

**Types:** Holotype male (Sichuan Institute of Biology Nr 73 I 5024, 22 July 1973, Xizang, Zayü, elevation 1800 m), cotype<sup>[12]</sup> female (Sichuan Institute of Biology Nr 73 I 5025, 30 July 1973, Xizang, Zayü, Bendui, elevation 2070 m), paratype male (Sichuan Institute of Biology Nr 73 II 5349, 1965, Xizang, Zayü).

**Diagnosis:** The new subspecies is separated from other known forms of *Shan laotietou*<sup>[13]</sup> by the following characters: in the the new subspecies, the largest supralabial is the third one, whereas in other subspecies it is the fourth one<sup>[14]</sup>; the number of ventral scales of the new subspecies is greater than 170, when it is less than 158 in other subspecies; the subcaudal scales are single in the new subspecies, with a few exceptions, whereas in other subspecies these scales are paired, only a few being single<sup>[15]</sup>.

**Range:** Xizang Province: Zayü and Motuo.



THREE NEW SNAKE SPECIES IN CHINA [16]  
(A SUMMARY)

ZHAO Er Mi    JIANG Yao Ming    HUANG Qing Yun [17]

3. Xiangcheng laotietou [18] *Trimeresurus xiangchengensis* sp. nov.

**Types:** Holotype male (CIB Nr 725049, 1972/10/17, Sichuan Province, Xiangcheng, altitude 3100 m), cotype [12] female (CIB Nr 725050, 1972/10/23, Sichuan Province, Xiangcheng, altitude 3100 m), paratypes 1 male, 5 females, 2 juveniles (CIB Nr 725048, 725050-725052, 725054-725057). The types are deposited in the Chengdu Institute of Biology, Academia Sinica.

**Diagnosis:** Some characters of the new species, such as 189-193 ventral scales, 7-8 supralabials, 11-13 infralabials and some scales on the head are similar to those of *T. elegans* (Gray) [19] from which it differs by: 1) in the new species, dorsal scales are on 25-27 rows on the neck, 25 rows at midbody, and 17 (15 in a few cases) rows before vent, versus respectively 27-33, 23-26 and 19-21 rows in *T. elegans*; 2) a low number of subcaudals in the new species, 50-66, whereas their range is 63-79 in *T. elegans*; 3) some characters of head scalation and color blotches are different.

A NEW SNAKE OF THE GENUS *TRIMERESURUS* FROM SICHUAN, CHINA [20]

ZHAO Er Mi

*(Chengdu Institute of Biology, Academia Sinica)*

About thirty species are recognized in the genus *Trimeresurus* Lacepède, 1804, which occur in the southern part of the Asian continent, mainly in southern and southeastern Asia, in southern China and in Japan (Ryukyus Archipelago). This genus is reported from the southwestern, southern and central regions of China as well as in the Indochinese part of the Oriental Region. In 1992, researchers of the Fifth Laboratory of our Institute collected ten specimens of *Trimeresurus* at Xiangcheng, in the Hengduan Mountains, western Sichuan Province. After examination, it proved to be a new species, which is described below.

**Xiangcheng laotietou** [18] *Trimeresurus xiangchengensis* new species (Fig. 1) [21]

**Diagnosis:** The new species is closely related to *T. elegans* (Gray) [19] from which it differs by 1) the presence of two loreals in the new species, against a single loreal in *T. elegans*; 2) the presence of a single scale row between third and fourth supralabials and the subocular in the new species, versus two rows in *T. elegans*; 3) the new species has 11-14 (mean: 12.3) infralabials, whereas *T. elegans* has 10-12 (mean: 10.5) infralabials; 4) 25 dorsal scale rows at midbody, with the two external rows smooth in the new species, whereas *T. elegans* has 23 or 25 rows at midbody, of which only the outermost row is smooth; 5) 17 scale rows before vent in the new species, instead of 19 rows in *T. elegans*; 6) the new species has 189-194 (mean: 191.5) ventral scales, versus 179-191 (mean: 185.5) in *T. elegans*; 7) the new species has 50-66 (mean: 59.3) pairs of subcaudal scales, versus 63-79 (mean: 71.7) pairs in *T. elegans*; 8) the color of the blotches are much different in these two species.

**Types:** Holotype male (CIB Nr 725050, 1972-10-17, Sichuan Province, Xiangcheng, Qianjinxiang, altitude 3100 m), cotype [12] female (CIB Nr 725049, 1972-10-10, Sichuan Province, Xiangcheng, Qianjinxiang, altitude 3200 m), paratypes 1 male, 5 females, 2 juveniles (CIB Nr 725048, 725051-725057, 1972-10-1-28, Sichuan Province, Xiangcheng, Qianjinxiang and Jiefangxiang, altitude 3000-3200 m). The types are deposited in the Chengdu Institute of Biology, Academia Sinica. [22]

**Description:** A triangular head, with a relatively sharp canthus rostralis; rostral slightly higher than wide, with only its top visible from above; upper surface of head covered with small scales, the supraoculars being the largest, followed in size by the scales on the top of the snout; the left and right internasals are separated by 1-4 (mean: 2.8) small scales in contact with the upper margin of the rostral scale; supraoculars longer than wide, their width being inferior to half of the distance between the left and right supraoculars, which are separated by 10-12 (mean: 10.8) small scales in a row; nasals relatively large, slightly constricted in their middle, sometimes each divided on its lower part into one anterior and one posterior scales; nostrils nearly rounded, located on the posterior margin of the posterior nasal and directed slightly obliquely backwards; eyes moderate, with a vertical, oval pupil; 7-8 (mean: 7.6) supralabials, of which the first one is completely separated from the nasal, the second is high and forms the anterior border of the loreal pit, the third is the largest, the third and fourth located just below the eye and separated from the subocular by a small scale row; the foveal [23] is separated from the nasal by 2-6 (mean: 3.5) small scales; the superior preocular is separated from the nasal by two loreals [24]; the temporals are smooth; 11-14 (mean: 12.3) infralabials, the first pair in contact behind the mental, the 2nd or 3rd anterior infralabials (sometimes the first) in contact with the anterior chin shields. The dorsal scales are rhombohedral or

elliptical, arranged in 25-27 rows behind the neck, 25 rows at midbody, of which the 21 medial rows are strongly keeled, and 17 rows before vent. Number of ventral scales: 191 and 189 in males, 190-194 (mean: 192) in females; anal entire; subcaudal scales: 66 and 61 pairs in males, 50-62 (mean: 57.6) in females; 3 subcaudals single at the base of the tail in specimen Nr 1, and at the tip of the tail in another specimen.

Specimen number	Sex	Dorsal scales	Ventrals	Subcaudals	Supralabials	Infralabials
725050	M	27-25-15	191	66	7	12/12
725048	M	25-25-17	189	61	7	13/12
725049	F	25-25-17	194	60	7	11/12
725051	F	25-25-17	194	55	8	13/11
725052	F	26-25-17	190	61	8	11/13
725053	F	27-25-17	192	50	8	12/13
725054	F	25-25-17	192	62	8	12/14
725055	F	27-25-17	190	—	8	12/14

Total length: male 741 + 124 mm (holotype), female 765 + 124 mm (cotype).

Light brown above, on each side of the back 1 or 2 rows of subtriangular, dark brown, grey-edged blotches alternating with one another, sometimes contiguous and giving a saw-tooth pattern or an irregular stripe. Belly light grey, in males and a part of females entirely spotted with brown with the exception of the neck, becoming densely powdered in the rear part of body. Head light brown above, with dark brown and light gray spots and streaks; upper lips whitish, sometimes marked with a few brown spots and a conspicuous, large dark brown spot under the loreal pit; a relatively wide temporal streak, wavy on its lower margin and light grey on its upper margin like the canthus rostralis, running from behind the eye up to the corner of the mouth; head whitish-grey below, with a few minute brown spots on infralabials in some specimens.

**Biology:** This species inhabits the Hengduan mountains above 3000 m. The adult snakes were found either in bushes or among grasses, or in wet places in forest, or in riparian areas along small streams. Two specimens were collected in a stone pile close to dwellings, one was caught inside a house. The air temperature was quite low when these snakes were found and these places were probably hibernation sites. Two juveniles were collected on banks of a river and a stream.

## A NEW SPECIES OF THE CROTALIDAE SNAKE FROM TIBETAN [25]

HUANG Zheng Yi

In May 1979, Mr. Wu Qian Hong, while working at the Xizang Normal High School, collected two specimens of *laotietou* [26] which belong to a new species described below:

Xizang zhuyeqing [27] (new species) *Trimeresurus tibetanus* Huang, sp. nov. (Fig. 1) [28]

**Types:** Holotype female (Faculty of Biology of the Fudan University [29] Nr 80001, 1979-5-5, Xizang Province, Nielamou District, Quekesumou [30], altitude 3200 m, collected by Sog Lang Jo Gar); paratype male (Faculty of Biology of the Fudan University Nr 80002, collected on the same day by the same person as the holotype). Deposited in the vertebrates collection of the Fudan University.

**Diagnosis:** A species of the *zhuyeqing* group of the *laotietou* [26] genus. Overall body color bright green, with irregularly shaped rusty-color patches on the back, without lateral stripes. Head large, triangular, very distinct from the neck. Upper-head surface covered with small scales, loreal pits present. Nasal completely separated from the first supralabial by a suture, 8-9 supralabials, 9 infralabials, 23-21-17 dorsal scale rows, of which the 15th-17th median rows are slightly keeled, 155 [31] (male) and 161 [31] (female) ventrals; tail short, 44 pairs of subcaudals.

**Description:** The main measurements and scalation characters of the paratype are summarized in Table 1. Dorsal parts entirely green, marked with dorsal rust-colored blotches from the neck to the tail [32]. Venter light green, ventrolateral stripe absent. Tip of tail green. The internasals are separated by a small scale, the nasal is not divided and is completely separated from the first supralabial by a suture; second supralabial forming the anterior border of the loreal pit; 1 loreal [33] between the nasal and the preocular; 10-11 small scales in a row between the supraoculars, 1 postocular, 1 subocular in contact with the subfoveal [34], the third supralabial is the largest, the fourth lies just below the eye; the first pair of infralabial separated by a groove. At midbody 15-17 dorsal scale rows slightly keeled. Anal entire.

Table 1

Types	Total length (mm)	Tail length (mm)	Dorsal scale rows	Ventrals	Subcaudals	Supralabials	Infralabials
Holotype	610	82	23-21-17	161 <sup>[31]</sup>	44	8-8	9-9
Paratype	570	58 (*)	23-21-17	155 <sup>[31]</sup>	28 (*)	8-9	9-9

(\*): truncated.

**Discussion:** Among the 34 known species in the *Trimeresurus* genus, nine species, known as *zhuyeqin*, are entirely green, with or without ventrolateral stripes. The main features which distinguish the new species from other forms are: 1) the low number of subcaudals, 44 pairs, whereas this number ranges between 51 to 80 pairs in other species; 2) a short tail, 82 mm long, when in adults of all other known species the tail is longer than 110 mm; 3) a relatively low number of supralabials, 8 scales on each side (the 8th left supralabial of the paratype is divided into two scales). The species *T. medoensis* Zhao and *T. macrolepis* Beddome also have respectively 8 and 7-8 supralabials, but the new species differs clearly from

the former species by others characters and tail length; see Table 2; 4) the new species is marked with rusty-colored dorsal blotches, and its tail tip is green.

Table 2

Species <sup>[35]</sup>	Midbody dorsal scale rows	Subcaudals	Ventrals	Tail length (mm)	Dorsal markings
<i>T. tibetanus</i>	21 rows	44	155 & 161 <sup>[31]</sup>	82 & 58 (cut)	rusty-colored
<i>T. medoensis</i>	17 rows	58-59	148-149	115-129	none
<i>T. macrolepis</i>	12-15 rows	53-58 (see note)	135-143 females 133-140 males	110-115	none

Note: one female with a number of subcaudals close to the new species.

We thank JIANG Zheng Kui for the preparation of the line drawings, and FU Wen Yu and ZHU Mei Ping for the photographs.

DESCRIPTION OF A NEW SPECIES OF THE GENUS *TRIMERESURUS* [36]

ZHAO Er Mi

(Chengdu Institute of Biology, Academia Sinica)

CHEN Yuan Hui

(Hospital of the Mangshan Bureau of Forestry, Hunan)

In the second half of September 1989, foresters of the Chenzhou area, Hunan Province, discovered on Mount Mang, Yizhang County, a snake den which contained 21 juveniles. While they were catching the youngs, two adults were discovered. All snakes were caught alive and kept in captivity. Mr. Chen gave two youngs to the CHENGDU INSTITUTE OF BIOLOGY for identification. It proved to be a new species of *laotietou*, described below from these two living juveniles.

Mangshan laotietou [37] *Trimeresurus mangshanensis* Zhao [38], sp. nov.  
(Figure on back cover) [39]

**Holotype:** ZS 8901, juvenile male, caught in Pingkeng District, Mt. Mang (Mangshan), Yizhang County, Hunan Province, altitude 700-900 m, by CHEN Guo Hua and TAO Yun Lin.

**Paratype:** ZS 8902, juvenile female, same dates, place of capture and collectors as the holotype.

**Diagnose:** The new species is similar to *Trimeresurus kaulbacki* Smith from northern Burma, and it differs from this latter species by: 1) the second supralabial is small and low, and it does not make the border of the loreal pit; 2) a lower number of ventrals; 3) different color of dorsal blotches.

**Description of the holotype:** Head subtriangular, tip of snout narrow and rounded with a sharp canthus rostralis. The rostral is subtriangular, the 2/3 inferior part slightly bent towards interior, the superior part slightly bent posteriorly on its upper part. Upper head-surfaces covered with small smooth scales among which the supraoculars are the largest; supraoculars separated on the middle by a row of 9 small scales; 1 pair of internasals, the second ones in term of size, widely in contact behind the rostral and not separated by a small scale; 2 relatively large scales on the canthus rostralis between the internasals and the supraoculars. Nasals squarish with their anterior and posterior margins slightly rounded and projected; rostrils shaped like a *mantou* [40], located in the middle of the nasals and open posteriorly; an oval-shaped nasal pore on the top of the posterior margin of the loreal pit; 1 relatively small loreal located between the 2 preoculars and the nasal. Presence of loreal pits, the prefoveal is relatively large and in contact forwardly with the nasal; the superior and inferior margins of the loreal pit are bordered respectively by a preocular and a subfoveal [41]. Eyes relatively small, slightly globulous; an oval, vertical pupil; 2 narrow, stretched preoculars, juxtaposed and bordering the superior margin of the loreal pit; the inferior margin of the pit is formed by the subfoveal; 2 very small postoculars at the superior corner of the eye, 1 lower, quite elongated subocular [42], which runs below the inferior margin of the eye from its lower posterior part towards the lower anterior border of the eye. 7 supralabials on each side of the head, first relatively enlarged, completely separated from the nasal, second the smallest and in contact at its superior margin with the prefoveal; third the largest, separated from the eye by 1-2 minute lacrimals [43]; fourth supralabial relatively large, in contact with third supralabial just below the eye; last three supralabials relatively low and slightly elongated. Mental triangular, pointed downwards, its anterior margin wide and straight, narrowing posteriorly and with a sharp tip inserted between the first infralabials pair. 1 pair of relatively large anterior chin shields, with, behind them, several pairs of smaller scales, separated from the first pair by a deep, well-defined groove. 16 infralabials on the left, 15 on the right, with the first pair quite large and

in contact with the mental, the 3 first pairs in contact with the anterior chin shields. Temporals relatively large, whereas posterior chin shields are small. Dorsals rhombohedral, keeled, arranged in 25 rows at 1-2 head length behind the head, 25 rows at midbody, 17 rows at 1-2 head length before vent, scales of the outer row smooth. Ventrals 189; anal entire. Tail laterally compressed, mainly at its posterior part; 63 subcaudals, the first 62 paired, the 63th single, their outer margin being bent downwards up to the middle of the tail; dorsal part of the tail covered with relatively large, regularly arranged scales on rows of which the number progressively decreases backwards from 9 rows to 7, down to 4 rows at the end of the tail. Tail spine squarish and hard.

Total length: 447 mm <sup>[44]</sup>, tail length: 65 mm.

Body entirely blackish brown marked with minute yellowish green or rusty spots which give a pattern similar to net meshes; along each side, a series of transversal bands made of about 40 yellowish green scales covering in width from 3 to 5 scale rows, evenly separated, confluent or slightly set off one from each other on the vertebral line. Ventrals also marked with minute spots like the back, and with larger subtriangular, yellowish green blotches. Upper surface of head blackish brown, with symmetrical yellowish green markings. Upper surface of the anterior part of the tail marked like the body, whereas the posterior tail part is very pale yellowish green or nearly white. Iris pale yellowish green. Adults have similar colors and patterns <sup>[45]</sup>.

Variations in paratype: 7 small scales in a row between the supraoculars, 3 postoculars at right, 15 infralabials at left, 14 at right, 195 ventrals, 60 paired subcaudals. Total length: 444 mm, tail length: 65 mm.

The types are deposited in the Chengdu Institute of Biology, Academia Sinica.

A NEW SPECIES OF SNAKE IN CHINA - *TRIMERESURUS MANGSHANENSIS* [46]

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A group of white-tailed snakes was caught last year by the Mangshan Bureau of Forestry, in the region of Chen Zhou, located in the Hunan Province close to the border between Hunan and Guangdong provinces. According to the famous snake specialist, Mr. ZHAO Er Mi, consultant in the Chinese Snake Society and vice-president of the Chengdu Biology Institute, Academia Sinica, they belong to a species not yet described either from China or from abroad, and formally named *Mangshan laotietou* [47].

These white-tailed snakes were caught in the second half of September 1989 by the Mangshan Forestry Bureau. At the time of capture, the dorsal parts of the two adult snakes were grass-green, marked with blackish brown producing a net-like pattern [48]. The coloration was then very vivid (but after a little more than one month in captivity, the overall color became darker, mainly blackish brown). The posterior part of the tail is white for about 10 cm, and it constitutes the main diagnostic feature of this species. Each snake weighs about 3 kg, measures about 1.85 and 2 m, and have tube-like fangs 2 cm long. The venom can be spit to a distance of 1.5-2 m [49]. These white-tailed snakes have a typical, triangular iron-like shaped head which is as large as a child's fist, provided with loreal pits. The body is as wide as a small bowl. The 21 juveniles caught along with the adults were similar in aspects and coloration to the larger snakes, but their body is only as wide as a thumb. The white-tailed snakes are oviparous, with eggs large like small hen eggs.

The capture of the Mangshan snakes was announced by the Chinese Central Television [50] and was termed as the discovery of a rare venomous snakes, which drew attention from Chinese snake specialists and other scientists. After consultation of Chinese and foreign literature, Professor ZHAO Er Mi believed that they belong to an undescribed *Trimeresurus* species of the family Viperidae, subfamily Crotalinae. It is also a rare large-sized species which would be one of the largest venomous snakes in China. There is no snake reaching such a size among the thirty some forms known in this genus [51], from which it differs by its body color and pattern. This species will be named *Mangshan laotietou* snake because it was discovered from Mangshan.

Prof. ZHAO Er Mi also considers the *Mangshan laotietou* to be of great economical and scientific value. It is a new snake species added to the herpetological fauna of our country, which does not occur elsewhere either in China or abroad, so it is a precious species. Prof. ZHAO Er Mi calls from concerned authorities for the application of protective measures to the special Mangshan natural area. He also suggests that this species should be classed as a protected species.

The Mangshan Forestry Bureau has donated specimens to concerned research units, and types were deposited in the Academia Sinica, Chengdu Institute of Biology which is carefully studying these animals.

We are indebted to Director, Mangshan Forestry Bureau, for its support in our studies and also for its action towards the designation of *Mangshan laotietou* as a protected species.



## INFRASPECIFIC CLASSIFICATION OF SOME CHINESE SNAKES [52]

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**Abstract.** - In this article, variations in scalation of four snake species are investigated. Methods commonly applied in the studies of infraspecific variations have been applied. Four new subspecies are described.

**Key words.** - Subspecific classification - Coefficient of difference - Mean value comparison - *Xenopeltis hainanensis jidamingae* - *Psammodynastes pulverulentus papenfussi* - *Ovophis monticola zhaokentangi* - *Trimeresurus stejnegerii chenbihui* [53]

The author of the present article, while preparing the chapter on snakes in the *Encyclopedia of Chinese Animals* for the National Foundation of Natural Sciences within the scope of the Eighth Five-year Plan, discovered that some populations of *Xenopeltis hainanensis*, *Psammodynastes pulverulentus*, *Ovophis monticola* and *Trimeresurus stejnegerii* are differentiated. Studies of meristic characters in connection with current methods used for differentiation of subspecies, such as the coefficient of difference (C.D.) and the mean value comparison (MAYR et al., 1965, translated by ZHENG Z. X.) have shown that these populations have reached a subspecific level.

### 3 The subspecies of the *Shan laotietou* [54]

*Ovophis monticola* is widely distributed from eastern Himalaya towards east up to Indochina and southern provinces of China. It was divided into five subspecies, among which *zayuensis* is distinct enough from other subspecies to deserve specific status and was renamed *Ovophis zayuensis* (ZHAO, 1995). Specimens from northern Vietnam have a lower number of ventral scales (129-138, mean: 134), and BOURRET (1935) created the subspecies *meridionalis* to accommodate them. The high number of dorsal scale rows (25-29, mean: 26 or more) in Taiwan animals led TAKAHASHI (1922) to define the subspecies *makazayazaya*. The subspecies *monticola* and *orientalis* (SCHMIDT, 1925) differ by the pattern of head spots, and, although the value  $V + Sc$  [55] is slightly inferior to the value accepted for separating subspecies, the mean value comparison corresponds to the value on which is based the distinction of subspecies (Table 3). Examination of specimens showed that specimens from the population de Gongshan, north of Pianma, Lushui County, Yunnan Province, have a relatively higher number of ventral and subcaudal scales and are clearly different from those of other populations (Table 3).

Table 3. Subspecific differentiation of *Ovophis monticola* (Günther, 1864)

Population		A	A-B	B	B-C	C	C-A
		S. W. China ( <i>monticola</i> )		Gongshan		S. E. China ( <i>orientalis</i> )	
n		40		6		25	
V+Sc	Range	172-203		215-225		169-182	
	M±S.D.	188.6±7.38		217.5±5.28		176±3.48	
ΔM			28.9		41.5		12.6
C.D.			2.28 (>1.28)		4.74 (>1.28)		1.16 (<1.28)
S.E.d			3.13		1.77		1.58
ΔM / S.E.d			9.23 (>3)		23.45 (>3)		7.97 (>3)

Table 3 shows that between the population from Gongshan, and *monticola* and *orientalis*, the coefficients of difference of the value V+Sc all are greater than 1.28, the ΔM values all are more than three times the value of S.E.d. It indicates that the population of Gongshan is a subspecies that is here called:

**Shan laotietou, Gongshan variety** <sup>[56]</sup> *Ovophis m. zhaokentangi* ssp. nov.

**Holotype:** KIZ 730093, adult male, collected on December 11th, 1973 at Bapo, Gongshan County, Yunnan Province, elevation 1400-1500 m.

**Cotype** <sup>[12]</sup>: KIZ 730018, adult female, collected on May 23rd, 1973, same locality than holotype.

**Paratypes:** KIZ 730096, male; KIZ 730024 and 730032, females, collected between May 29 and December 26, 1973, same locality than holotype. CIB 740003, male, collected on March 17th, 1973 at Pianma, Lushui County, Yunnan Province, elevation 1980 m.

Types are deposited in the Kunming Institute of Zoology (KIZ) and the Chengdu Institute of Biology (CIB).

**Diagnosis:** 159-169 ventral scales, mean 163.5; 49-63 subcaudals <sup>[57]</sup>, mean 54. Internasals left and right separated by 2 small scales. Pattern similar to the one of *monticola*.

**Distribution:** Gaoligongshan, north of Pianma, Lushui County, western Yunnan Province.

**Etymology:** The new subspecies is named in honour to Pr. ZHAO Ken Tang, of the Suzhou Railways Normal College, for his researches in the lacertilian groups *Phrynocephalus* and *Eremias*.

#### 4 Subspecific differentiation of the *zhuyeqing* <sup>[58]</sup>

*Trimeresurus stejnegeri* occurs in eastern Himalaya and from Myanmar to Thailand and Vietnam; in China, it is largely distributed in the southern provinces, as far north as Wenxian County, Gansu Province (33°N) in the west, and Changbai County, Jilin Province (41°20'N) in the east. Two subspecies were described. The form with 19 dorsal scale rows was raised to specific rank, *Trimeresurus yunnanensis* (ZHAO, 1995). We found that specimens from the populations of Hainan Island have 10-12 supralabials (mean 10.9), 12-14 infralabials (mean 13), 11-17 (mean 13.3) scales in a row between left and right supraoculars. All these values are higher than those recorded for other Chinese populations, especially the number of ventral scales which is clearly greater than those of other specimens from continental China and Taiwan (Table 4).

Table 4. Intraspecific differentiation of *Trimeresurus stejnegeri* Schmidt, 1925

Population	A	A-B	B	B-C	C	C-A
	Hainan Is.		Continental China		Taiwan Is.	
n	18		175		26	
V+Sc	Range	236-256	199-246		213-236	
	M±S.D.	245.9 ± 5.54	229.3 ± 6.86		227.5 ± 5.71	
ΔM		16.6		1.8		18.4
C. D.		1.34 (>1.28)		0.14 (<1.28)		1.64 (>1.28)
S. E. d		1.67		1.42		1.73
ΔM / S. E. d		9.94 (>3)		1.27 (<3)		10.64 (>3)

According to Table 4, the coefficients of difference of the value V+Sc between populations from Hainan and those from Fujian, Zhejiang, Anhui, Hubei, Guizhou, Guangxi, Yunnan, Sichuan, Jiangsu, Jilin and Taiwan are higher than the value distinguishing subspecies, and the value of ΔM is much more than three times the value of S.E.d. A new subspecies is created for the Hainan population.

#### 4.1 Zhuyeqing, typical form *Trimeresurus s. stejnegeri* Schmidt, 1925

Diagnosis: Ventral scales in males 154-170, mean 162.6; in females 154-172, mean 162.

Distribution: Provinces of continental China and Taiwan.

#### 4.2 Zhuyeqing, Hainan variety *Trimeresurus s. chenbihuii* ssp. nov.

Holotype: CIB64 III 5599, adult male, collected on June 6th, 1964 at Diaoluoshan, Lingshui County, Hainan Province, elevation about 250 m.

Cotype [12]: CIB64 III 5945, adult female, collected on June 11th, 1964, same locality than holotype.

Paratypes: CIB64 III 5906, 5944, 5978-9, 6013, 6043-44, 6069, 6101, 6104, 6107, males; CIB64 III 5600, 5735, 6014, females, collected between June 6 and 15th, 1964 at Diaoluoshan, Lingshui County, Hainan Province, elevation 225-290 m. CIB64 III 5110, 5181, 5261-2, males, collected between April 23rd and May 12th, 1964 at Wuzhishan, Qiongzong County, Hainan Province, elevation 500 m.

Types are deposited in the Chengdu Institute of Biology (CIB).

Diagnosis: Ventral scales in males 169-178, mean 172.6; in females 168-174, mean 172 [59].

Distribution: Hainan Island.

Etymology: The new subspecies is named in honour to Prof. CHEN Bi Hui, who dedicated his researches to the endangered Yangze alligator.

## TRANSLATORS' NOTES

*Trimeresurus medoensis*

- [1]: The description of the new taxa begins on the middle of the page 66. We did not translate pages 64-66 nor 68-69.
- [2]: *Zhuyeqing*, meaning literally “bamboo-leaf green [snake]”, is the Chinese general vernacular name for green pitvipers occurring in this country (*T. albolabris*, *T. medoensis*, *T. stejnegeri*, *T. tibetanus* and *T. yunnanensis*). The *zhuyeqing* proper is *T. stejnegeri*, whereas *T. medoensis* is called “*Motuo zhuyeqing*”. The Chinese text widely uses this vernacular name rather than the scientific name, and we here follow this custom.
- [3]: On plate II, the figure 9 is black-and-white photographs of the preserved holotype which depict respectively:  
 Photograph 9-1: general view from above.  
 Photograph 9-2: close-up view from the top of the head.  
 Photograph 9-3: close-up view from the underneath of the head.  
 Photograph 9-4: close-up lateral view of the head.  
 Photograph 9-5: close-up view of the body side.
- [4]: Ani qiao [qiao = bridge], written “A-nie” in the English summary. We considered the pinyin transcription of names as mentioned in the Chinese text. On the other hand, the city of Motuo is also known as Mêdog (see SUN, 1989).
- [5]: We follow PETERS (1964) for the terminology of head scales in pitvipers. So, any small scale lying between the nasal, the loreal, the scale bordering the pit (the foveal proper) and supralabials is a prefoveal scale. The scale bordering the lower margin of the pit is a subfoveal, but as, in case of pitvipers of the *Trimeresurus*-complex, it also borders the anterior margin of the eyes, it is often considered as the lower preocular. We take this position here. The foveal is usually united with the second supralabial in the genera of Asian pitvipers, and is not considered in itself. Last, the term of loreal is restricted only to scale(s) in contact both with the nasal and the preocular. Any scale located between the posterior margin of the nasal and any scale other than a preocular is a prefoveal or foveal.
- [6]: A *Trimeresurus* species endemic to the hills of Southern India, and not related to the group of *T. stejnegeri*. The head scalation in this species is atypical in the genus by the much enlarged head scales.
- [7]: See below for the complete references of this major work for Southern Asia.
- [8]: Namely *Trimeresurus stejnegeri* proper; in this paper, the authors do not distinguish *T. stejnegeri* *stejnegeri* Schmidt, 1925 and *T. stejnegeri yunnanensis* Schmidt, 1925 (now *T. yunnanensis*).

*Trimeresurus monticola zayuensis*

- [9]: A name formed from the words *shan* = mountain, *laotie* = iron (the domestic apparatus, not the metal) and *tou* = head, the vernacular name means literally “mountain iron-head [snake]”. The present “variety” is therefore the “Zayü mountain iron-head snake”. The name *laotietou* is given to terrestrial species of Chinese species of the *Trimeresurus*-group, such as *T. mucrosquamatus* (the *laotietou* proper), *T. xiangchengensis* and *T. jerdonii*. The name *shan laotietou* is given to *Ovophis monticola*.
- [10]: According to the Art. 32 (c) and (d) of the *International Code of Zoological Nomenclature* (I. C. Z. N., 1985), a species group-name published with a diacritic mark is an incorrect original spelling

which must be corrected. Accordingly, the subspecific name must be written *Trimeresurus monticola zayuensis*.

Subsequently, this taxon was given a specific rank by ZHAO (1995a), as *Ovophis zayuensis*, because of important morphological differences with *O. monticola*. According to this author, the differences between *O. monticola* and *O. zayuensis* are as follows (unmodified from ZHAO's article):

	<i>O. zayuensis</i> (n = 4)	Other subspecies of <i>O. monticola</i> (n = 78)
Largest supralabial scale	third	fourth
Infralabials of the first pair	not in contact each other	in contact each other
Ventral scales	175 - 176	132 - 169
Subcaudals	single, only a few paired	paired, only a few single
Nasal scales	quite small, the left and right ones separated by 1 to 3 small scales	quite large, left and right ones in contact or separated by 1 to 3 small scales
Second supralabial	tall, constituting the prefoveal scale	entering or not the loreal pit

[11]: Figure 1, located on page 67, is made of line drawings depicting respectively:  
drawing 1: close-up view from the top of the head.  
drawing 2: close-up view from the underneath of the head.  
drawing 3: close-up lateral view of the head.

[12]: A cotype is now considered as a paratype. We retained the terminology adopted by the authors.

[13]: Namely *Ovophis monticola* proper.

[14]: This statement is obviously incorrect, as the largest supralabial is also the third in the nominal subspecies, *Ovophis monticola monticola* (Günther, 1864), from India, Nepal and Myanmar and extreme west of Yunnan Province, and *Ovophis monticola convictus* (Stoliczka, 1870), the southern subspecies. The largest supralabial is the fourth in the Chinese subspecies *Ovophis monticola makazayazaya* (Takahashi, 1922), from continental China and Taiwan, and in *Ovophis tonkinensis* (Bourret, 1934), from Vietnam and Hainan Island.

[15]: They are also single in *Ovophis tonkinensis*. Both this latter species and *O. zayuensis* have single subcaudal scales, whereas all are paired (or paired except a few single scales in some specimens) in all other other subspecies of *O. monticola*.

### *Trimeresurus xiangchengensis*

[16]: This short article, which has no English summary, gives a brief description of three new snake species: *Opisthotropis guangxiensis*, *Plagiopholis unipostocularis*, two colubrid snakes, and *Trimeresurus xiangchengensis*.

[17]: Authorship of separate species description is not given; so we consider that the authorship of *T. xiangchengensis* include all three authors.

[18]: A name meaning “Xiangcheng iron-head snake”; see note [9].

[19]: A species endemic to the Yaeyama archipelago, southern Ruykyus Archipelago, Japan. The authors did not compare their new species with *Trimeresurus mucrosquamatus*, a species widely distributed in China to which it is closely related.

[20]: The literal translation of the Chinese title should read as “A new species of *Laotietou* snake from Sichuan”.

- [21]: Figure 1, located on page 423, has a line drawing depicting the side of the head and a black-and-white photograph showing the living animal.
- [22]: Peculiarly, the collection numbers of the type specimens mentioned in this article and their dates of capture are differ from those given in the preliminary description of the species (ZHAO et al., 1978)! This latter publication is considered the valid, original description of the present species, and the name-bearing type and other specimens in the type series, are those mentioned in this article:

Holotype: CIB Nr 725049, collected on 1972-10-10

Paratypes: CIB Nr 725048-725057.

- [23]: Namely the second supralabial; see note [5].
- [24]: Two loreals consecutively arranged, not superposed.

### *Trimeresurus tibetanus*

- [25]: The literal translation of the Chinese title reads as “A new species of Crotalidae from Xizang”. In the English summary, the authors uses the word “Tibetan”.
- [26]: The name *laotietou* is here used as a collective name for the genus *Trimeresurus*. The Chinese text used this vernacular name rather than the scientific name, hence its regular appearance.
- [27]: A name meaning “Xizang bamboo-leaf green snake” see note [2].
- [28]: Figure 1 contains five elements, noted (1) to (5) and is divided into two parts, as follows: elements (1) and (2), on page 116: black-and-white photographs showing respectively an overall view of the holotype and a close-up dorsal view of the head; elements (3), (4) and (5) on page 117: line drawings of parts of the holotype showing respectively a lateral view of the head, the general arrangement of dorsal scales at midbody and of color spots, and a ventral view of the tail.
- [29]: The FUDAN UNIVERSITY is located in Shanghai City.
- [30]: The type locality is given in the English summary as “Naylam, Chokesumo”; we recommend the *pinyin* transcription of the names given in the Chinese text. The city of Nielamou is also known as Nyalam (see SUN, 1989).
- [31]: Our own counts, according to DOWLING's method, give respectively 152 (male) and 159 (female) ventrals.
- [32]: According to Mr WU of the Fudan University, the dorsal head surface of the types was also marked with faint rust-colored marks or lines.  
He gave also us some ecological data. The type specimens were collected in low dense, luxuriant vegetation inside a shallow valley having a subtropical climate in spite of the altitude.
- [33]: The description of the types are partly erroneous. We (PD) examined both types in the Fudan University, and a more complete description is in preparation. The paratype has 1 loreal on the left side and 2 consecutive loreals on the right side; the holotype has 1 loreal at right and 2 consecutive on the left side; figure 1 (3) is erroneous on this point. Moreover, fig. 1 (3) suggests that, in this species, the third supralabial is in contact with the subocular. This is true on the left side of the holotype, whereas they are separated by a small scale on its right side; the third supralabial is in contact with the subocular on the right side of the paratype but separated on the left side. Last, there are 3 differentiated supraoculars in the holotype, respectively 3 supraoculars on right side and 2 on left side in the paratype.
- [34]: Namely the lower preocular.
- [35]: The author used Chinese names of these species, respectively *Xizang zhuyeqing*, *Motuo zhuyeqing* and *Dalin zhuyeqing*, the latter one meaning “large-scaled bamboo-leaf green snake”. For convenience, we used scientific names in the translation.

*Trimeresurus mangshanensis*

- [36]: The literal translation of the Chinese title should read as “A new species of *laotietou* snakes - The *Mangshan laotietou* snake”. The authors use the vernacular names, *laotietou* and *Mangshan laotietou*, rather than the scientific names.
- [37]: A name meaning “Mangshan iron-head snake”.
- [38]: Although the article is signed by ZHAO & CHEN, the specific description is clearly attributed to ZHAO only. Accordingly, this species must be referred to as *T. mangshanensis* Zhao in Zhao & Chen, 1990.
- [39]: The back cover of this issue of the *Sichuan Journal of Zoology* is a color photograph of the living juvenile snakes.
- [40]: A *mantou* is a Chinese steamed bread, made from wheat, popular in northern China. Its shape is broadly like a crude hemisphere. So, this scale has a semicircular appearance, broadly similar to the  $\cap$  figure.
- [41]: This subfoveal is also the lower preocular.
- [42]: The authors call the subocular “the postero-inferior-ocular”.
- [43]: According to PETERS (1964: 182), it seems that this term is here improperly used.
- [44]: It is unfortunate that the description of this species is based on two juveniles, because it does not do justice to the formidable size and weight reached by larger adults. This is really a giant pitviper. CHEN (1990), also translated here, gives a description of the adults and mentions a size of about 2 m, for a weight of 3 kg. Mr. CHEN Yuan Hui kindly supplied (*in litteris*, October 1993) further data about the species, of which follows a short summary. This species is currently known only from a forested area of a few tens of square-kilometers between 700 m and 1300 m, where it is regularly encountered by peasants, although in low number. One specimen weighed about 4 kg, and another one slightly more than 5 kg, and local residents suggest that much heavier animals were caught. Another specimen had a total length of 203 cm, an head length of 85 mm and a body diameter of 50 mm. This snake feeds on insects, mammals and frogs. It is oviparous, depositing from 13 to 21 eggs (diameter about 30 mm). See also note [51] below. In the *Trimeresurus*-complex, solely *Trimeresurus flavoviridis*, of the Ryukyu Archipelago, Japan, reaches a larger size with a known maximal total length of 2.41 m (Anonymous, 1993), but it is much lighter, as this specimen weighed only 1.35 kg; the second largest known specimen was long of 231.5 cm and weighed 2.4 kg (MISHIMA, 1980).
- [45]: According to published photographs, the pattern, and especially the edges of the transversal bands, are much more contrasted in juveniles, which look like being banded. In adults, the pattern is quite obscure.
- [46]: The literal translation of the Chinese title should read as “Discovery of a new snake species in China - The *Mangshan laotietou* snake”. This article has no English summary.
- [47]: It seems that this paper was written before the formal description of the species. However, as it does not include any binominal latin name, there can not be any dispute concerning the true authorship of this species.
- [48]: In our opinion, this description is more appropriate than the one given in ZHAO & CHEN (1990). The species is mostly yellowish-green, marked with large, more or less squarish dark brown or dark violaceous dorsolateral blotches, as wide as the yellowish-green ground color, which are paired or alternating, forming irregular cross bands or a chequered pattern; scattered brownish spots between the dorsolateral blotches; below these dark dorsal blotches, a series of irregular lateral blotches of the same color. The dark color becomes dominant in larger adult. Upper head surfaces of the same color than the body, marked with symmetrical brownish figures. End of tail whitish.

[49]: No other member of the *Trimeresurus*-complex has ever been reported for spitting venom. This noteworthy particularity was confirmed by Mr. CHEN (*in litteris*, October 1993), who writes: "These snakes do spit venom indeed, I have observed myself the phenomenon. When they spit venom, they produce a strong hissing. The venom is projected at a distance up to 1.5-2 meters away. The spitting occurs only when snakes are strongly aroused". We did not examine the fangs of this species and we have no further data.

[50]: CCTV channel.

[51]: The Japanese *Trimeresurus flavoviviridis* may be longer; see note [44].

### *Ovophis monticola zhaokentangi*

[52]: The literal translation of the Chinese title should read as "Subdivision of some Chinese snake species". The text relevant to *Trimeresurus* group begins on page 108, with description of new taxa beginning on page 109. Other pages are not translated here.

[53]: Key words mention the Chinese names of these species. In this translation, we give scientific names for convenience.

[54]: Namely *Ovophis monticola* Günther, 1864. In this article, ZHAO considers *Ovophis monticola orientalis* (Schmidt, 1925) a valid subspecies, distinct from the Taiwanese *O. monticola makazayazaya* (Takahashi, 1922), to the contrary to ZHAO & ADLER (1993) who consider both subspecies to be synonymous. Data published in the literature and unpublished data (P. David) tend to support the validity of both subspecies (see characters in the KEY). However, a thorough revision of the *monticola*-complex is required.

[55]: V+Sc designating the total number of ventral and subcaudal scales. According to ZHAO, the total number V+Sc ranges from 169 to 182 in *O. monticola orientalis*. However, we examined specimens for which this value is 186; according to WU et al. (1985), it may attain 193 in specimens from southern China referable to *O. monticola orientalis*.

[56]: A name meaning "mountain iron-head [snake]" (see also note [9]). The present "variety" is therefore the "Gongshan mountain iron-head snake".

[57]: In the English summary (p. 111), the diagnosis is given in a slightly different way: "This new subspecies has higher ventral plus subcaudal counts, 215-225 (mean  $217.5 \pm 5.28$ ), than that of all other known subspecies. The coloration of head is similar to the nominate species." Other meristic data about this subspecies are as follows (ZHAO, pers. comm., based on six specimens): subcaudals all paired; 8-9 supralabials, of which the 4th is the largest; 8-9 cephalic scales in a row between supraoculars; 2nd supralabial bordering the anterior side of the loreal pit.



*Trimeresurus stejnegeri chenbihuii*

[58]: Namely *Trimeresurus stejnegeri* Schmidt, 1925 (see note [8]).

[59]: In the English summary (p. 112), the diagnosis is given in a slightly different way: "This new subspecies has higher ventral counts, 169-178 (mean 172.6) in males and 168-174 (mean 172) in females; while the nominate subspecies has 154-170 (mean 162.6) in males and 154-172 (mean 162) in females."

Thanks to the courtesy of Mr. CEN Jian Qiang of the Shanghai Natural History Museum, we examined seven preserved specimens of *Trimeresurus stejnegeri* from Hainan Island. Ventral scales counts, obtained according to the DOWLING's method, are as follows:

Museum Number	Sex	Ventrals
SNHM 2042	Male	174
SNHM 2043	Female	169
SNHM 2154	Female	166
SNHM 2158	Female	167
SNHM 2160	Male	163
SNHM 2161	Male	160
SNHM 2458	(Juvenile)	156

The DOWLING's method gives ventrals counts lower by one or two scales compared to the total number of ventrals. Nevertheless, it is obvious that Hainan Islands specimens have a lower number of ventrals than indicated by ZHAO (1995b). The validity of this subspecies seems questionable.

## ICONOGRAPHY

The iconography of these recently described taxa is limited, and we give below bibliographic data of published illustrations referring to these forms. We believe it complete to January 1st, 1996. Figures and illustrations published in the original descriptions, mentioned above, are repeated below for the sake of completeness. Species are listed below according to their chronological order of description and under their currently valid name. *Ovophis monticola zhaokentangi* and *Trimeresurus stejnegeri chenbihuii* have not been illustrated.

*Trimeresurus medoensis*

DJAO & JIANG (1977): pl. II: fig. 9-1 to 9-5 (preserved holotype; black & white photographs).

HU & ZHAO (1979): fig. 2-8, p. 68 (living animal; black & white photograph).

TIAN et al. (1986): pl. XIX: fig. 66-68 (preserved holotype; black & white photographs).

*Ovophis monticola zayuensis*

DJAO & JIANG (1977): fig. 1, p. 67 (line drawing of head).

*Trimeresurus xiangchengensis*

ZHAO (1979): fig. 1, p. 423 (line drawing of head - living animal; black & white photograph).

TIAN et al. (1986): pl. XIX: fig. 72 (living animal; black & white photograph).

ZHANG & ZHAO (1990): fig. 6-4, p. 84 (line drawing of skull).

*Trimeresurus tibetanus*

HUANG (1982): fig. 1 & 2, p. 116 (preserved holotype; black & white photographs); fig. 3-5, p. 117 (various line drawings).

ZHAO & ADLER (1993): pl. 44: fig. C (living animal; color photograph).

*Ermia mangshanensis*

ZHAO & CHEN (1990): back cover of the issue (living animal; color photograph).

CHEN (1990): p. 41 (black & white photographs of living juvenile, adult animals, and biotope).

*Journal of Snake*, 2, 1990, (4): back cover (living animal; color photograph).

ZHAO & ADLER (1993): pl. 44: fig. A (living animal; color photograph).

A KEY TO THE *TRIMERESURUS*-COMPLEX IN CHINA AND ADJACENT AREAS

In recent years, three keys have been published that are relevant to the *Trimeresurus*-complex in China and including at least one of the recently described taxa. The first one can be found in SICHUAN BIOLOGICAL RESEARCH INSTITUTE (1977); an English translation, covering the snakes and lizards was subsequently prepared (YANG & INGER, 1986). The most recent and complete key to Chinese snakes, to the subspecific level, was published in TIAN et al. (1986: 132-133). ZHAO & ADLER (1993: 67-92) give keys to the generic level. But no key including all currently recognized members of the *Trimeresurus*-complex is available.

We provide an up-to-date key to the sixteen species and subspecies of the *Trimeresurus*-complex inhabiting China (including Hainan and Taiwan islands, Hong Kong and Macau), and to five taxa occurring in its immediate vicinity, namely *Ovophis monticola convictus* (Stoliczka, 1870) and *Trimeresurus cornutus* Smith, 1930, both known from northern Vietnam, *Trimeresurus kaulbacki* Smith, 1940, from northern Myanmar, *Trimeresurus albolabris septentrionalis* Kramer, 1977 from Nepal and India, and *Trimeresurus erythrurus* (Cantor, 1839) and *Trimeresurus popeiorum* Smith, 1937, both known to occur in Sikkim and northeastern India within 100-200 km of the Indian-Chinese border. We did not include the insular species living in the Japanese Ryukyu archipelago, clearly differentiated by their geographic range. We follow ZHAO (1995a) for raising to a specific rank *Ovophis monticola zayuensis* and *Trimeresurus stejnegeri yunnanensis*, and ZHAO (1995b) in considering *Ovophis monticola orientalis* (Schmidt, 1925) distinct from *O. monticola makazayazaya* (Takahashi, 1922).

This key is both drawn from literature and the examination of preserved specimens belonging to most mentioned taxa. We used our unpublished, preliminary data for the members of *Ovophis monticola*-group (DAVID, in prep.). We tried to produce a key based on external features that will work as well with preserved animals as with living snakes. However, we had to refer to hemipenial shape for distinguishing *T. popeiorum* from *T. stejnegeri*.

According to the current status of our knowledges, the following taxa are present in continental China [C], Hainan Island [I], Hong Kong [H], Macau [M] and Taiwan [T]:

- Ovophis monticola* (Günther, 1864) [C, H, T]
- Ovophis monticola monticola* (Günther, 1864) [C]
- Ovophis monticola makazayazaya* (Takahashi, 1922) [T]
- Ovophis monticola orientalis* (Schmidt, 1925) [C, H]
- Ovophis monticola zhaokentangi* Zhao, 1995 [C]
- Ovophis tonkinensis* (Bourret, 1934) [I]
- Ovophis zayuensis* Jiang in Djao & Jiang (1977) [C]
- Ermia mangshanensis* Zhao in Zhao & Chen, 1990 [C]
- Trimeresurus albolabris* (Gray, 1842) [C, I, H]
- Trimeresurus albolabris albolabris* (Gray, 1842) [C, I, H, M]

- Trimeresurus gracilis* Oshima, 1920 [T]  
*Trimeresurus jerdonii* Günther, 1875 [C]  
*Trimeresurus medoensis* Zhao in Djao & Jiang (1977) [C]  
*Trimeresurus mucrosquamatus* (Cantor, 1839) [C, H, T]  
*Trimeresurus stejnegeri* Schmidt, 1925 [C, I, T]  
     *Trimeresurus stejnegeri stejnegeri* Schmidt, 1925 [C, T]  
     *Trimeresurus stejnegeri chenbihuii* Zhao, 1995 [I]  
*Trimeresurus tibetanus* Huang, 1982 [C]  
*Trimeresurus xiangchengensis* Zhao, Jiang & Huang, 1978 [C]  
*Trimeresurus yunnanensis* Schmidt, 1925 [C]

Taxa not recorded in China but occurring close to its border and considered in our key:

- Ovophis monticola convictus* (Stoliczka, 1870)  
*Trimeresurus albolabris septentrionalis* Kramer, 1977  
*Trimeresurus cornutus* Smith, 1930  
*Trimeresurus erythrurus* (Cantor, 1839)  
*Trimeresurus kaulbacki* Smith, 1940  
*Trimeresurus popeiorum* Smith, 1937

Mobile maxillary fangs; loreal pits present, upper head surface covered with small, irregular shields: *Trimeresurus*-complex.

- |    |   |                                      |
|----|---|--------------------------------------|
| 1A | Overall dorsal color chiefly bright green or bluish green in life, green or blackish in preservative, with or without small dark markings and a ventrolateral stripe .....  | 2                                    |
| 1B | Overall color brownish, greyish or dull dull greenish, always with well defined large blotches, usually darker, or lighter with dark edges .....  | 10                                   |
| 2A | First supralabials fused with nasals or incompletely separated by a groove .....  | 3                                    |
| 2B | First supralabials totally separated from nasals by a suture (two independant scales) .....   | 5                                    |
| 3A | Upper head scales flat, smooth and imbricate; temporals smooth or feebly keeled; usually 21 (rarely 23) dorsal scale rows at midbody .....  | 4                                    |
| 3B | Upper head scales granular or tuberculate and juxtaposed; temporals strongly keeled; usually 23-25 (very rarely 21) dorsal scale rows at midbody .....  | <i>T. erythrurus</i>                 |
| 4A | Side of head below eyes yellow, white or pale greenish, much lighter than the remaining part of the head; total length of females up to 104 cm; from southern China to Darjeeling area, Myanmar and farther south ..... | <i>T. albolabris albolabris</i>      |
| 4B | Side of head below eyes green or blue green, barely lighter than the remaining part of the head; total length of females up to 75 cm; Nepal and northern India .....  | <i>T. albolabris septentrionalis</i> |
| 5A | 17 scale rows at midbody; less than 150 ventrals; 8 supralabials .....  | <i>T. medoensis</i>                  |
| 5B | 19-23 scale rows at midbody; more than 150 ventrals; 8-11 supralabials .....  | 6                                    |
| 6A | Less than 50 subcaudals; 8-9 supralabials; 21 dorsal scale rows at midbody; 2 or 3 supraoculars; rusty markings on dorsal parts and upper-head surface; Xizang Province and Nepal .....                                 | <i>T. tibetanus</i>                  |
| 6B | More than 50 subcaudals; 9-11 supralabials; 19-21 (rarely 23) dorsal scale rows at midbody; 1 single supraocular; no red markings on the back .....   | 7                                    |

- 7A 19 scale rows at midbody; Yunnan and adjacent areas ..... *T. yunnanensis*
- 7B 21 (rarely 23) scale rows at midbody ..... 8
- 8A Hemipenis short, rounded, spinose; base of tail much enlarged up to about 15-20 subcaudals in males; iris reddish in males; temporals usually smooth; canthus rostralis moderate ..... 9
- 8B Hemipenis long, slender, without spines; base of tail moderately enlarged up to 20-25 subcaudals in males; iris yellow or golden in both sex; temporals more or less keeled; sharp canthus rostralis ..... *T. popeiorum popeiorum*
- 9A Ventrals 154-170 in males and 154-172 in females; continental China and Taiwan .....  
..... *T. stejnegeri stejnegeri*
- 9B Ventrals 156-178 in males and 166-174 in females; Hainan Island ..... *T. stejnegeri chenbihuii*
- 10A Several erect supraoculars forming a horn ..... *T. cornutus*
- 10B Supraoculars usually single, flat, not erected ..... 11
- 11A Body clearly elongated, head long, massive, with a narrow snout and a sharp canthus rostralis; subcaudals always paired; usually more than 160 ventrals; dorsal pattern made of irregular dorsolateral markings giving a wavy or zigzag pattern, or cross-bands, or rhombohedral dorsal blotches, or a speckled pattern ..... 12
- 11B Body rather short and stout; head short with a rounded snout; dorsal pattern made of dorsolateral dark squarish blotches, usually darker, or lighter with dark edges, confluent on the vertebral line, bordered below by other squarish blotches on the sides; subcaudals paired or single; less than 160 ventrals in specimens having paired subcaudals ..... 16
- 12A 2 consecutive, small, rectangular loreals between the nasal and the higher preocular; 10 or more cephalic scales in a row between the supraoculars; dorsal color greyish or light brown; pattern made of irregular or triangular dorsal blotches giving a wavy, zigzag or sawteeth-like appearance ..... 13
- 12B 1 large, squarish loreal; 10 or less cephalic scales in a row between the supraoculars; dorsal color either mostly dull greenish, with dorsal rhombohedral blotches, or speckled with black, or brownish with yellowish green transverse bands ..... 14
- 13A Usually more than 195 ventrals and more than 75 subcaudals; 9-12 supralabials; 25-31 (rarely 23-33) dorsal scale rows at midbody; usually 13-16 (rarely 11-18) scales in a row between the supraoculars; 2 or 3 scale rows between supralabials and the subocular; pattern made mostly of irregular dorsal blotches giving a wavy appearance ..... *T. mucrosquamatus*
- 13B Less than 195 ventrals and less than 72 subcaudals; 7-8 supralabials; 25 dorsal scale rows at midbody; 10-12 scales in a row between the supraoculars; 1 or 2 scale rows between supralabials and the subocular; pattern made mostly of triangular, downwards pointed, dorsal blotches giving a saw-like appearance ..... *T. xiangchengensis*
- 14A 2nd supralabial high, bordering the anterior side of the loreal pit; pattern not made of irregular cross-bands ..... 15
- 14B 2nd supralabial low, not bordering the anterior side of the loreal pit; dorsal pattern made of irregular, contiguous or more or less alternating blackish brown dorsolateral blotches giving the appearance of irregular cross bands on a yellowish-green background ..... *E. mangshanensis*

- 15A 21 (very rarely 19, rarely 23) dorsal scale rows at midbody; less than 195 ventrals; internasal very large; 4th supralabial nearly as large as the 3rd one; two different patterns: either dull green above, with large, oval, reddish, black-edged dorsal blotches, or almost entirely blackish, heavily speckled with yellow spots ..... *T. jerdonii*
- 15B 25 dorsal scale rows at midbody; 200 or more ventrals; internasals very large; 4th supralabial smaller than the 3rd one; dorsal surfaces dull greyish green in life or in preservative, with blackish, rhombohedral dorsal blotches separated or united to one another; smaller spots on the sides; symmetrical yellow lines on the head ..... *T. kaulbacki*
- 16A 19 (rarely 21) scale rows at midbody; 2nd supralabial not bordering the loreal pit; endemic to Taiwan ..... *T. gracilis*
- 16B 23-27 (very rarely 21) scale rows at midbody ..... (*Ovophis monticola*-group) 17
- 17A Subcaudals single (or rarely only a few paired) ..... 18
- 17B Subcaudals paired (or rarely a few single) ..... 19
- 18A More than 160 ventrals; 10 supralabials, the 3rd the largest; 2nd supralabial high, bordering the anterior side of the loreal pit; 3-5 scales on the upper surface of the snout between a line connecting anterior borders of the eyes and the internasals; Xizang Province ..... *O. zayuensis*
- 18B Less than 140 ventrals; 8-10 supralabials, the 4th the largest; 2nd supralabial bordering the anterior side of the loreal pit or not; 5-7 scales on the upper surface of the snout between a line connecting anterior borders of the eyes and the internasals; Vietnam and Hainan Island .....  
..... *O. tonkinensis*
- 19A 4th (sometimes the 5th) supralabials the largest ..... 20
- 19B 3rd supralabials the largest ..... 22
- 20A 10-12 (exceptionally 8, rarely 9) supralabials; internasals usually in contact; less than 160 ventrals; total number of ventrals plus subcaudals 169 to 204 ..... 21
- 20B 8-9 supralabials; internasals separated by 2 small scales; 159 or more ventrals; total number of ventrals plus subcaudals 215 to 225; western Yunnan ..... *O. monticola zhaokentangi*
- 21A 23-25 (exceptionally 21 or 27) dorsal scale rows at midbody; 132-154 ventrals, 33-48 subcaudals; total number of ventrals plus subcaudals 169 to 193; continental China ... *O. monticola orientalis*
- 21B 25-29 dorsal scale rows at midbody; 144-155 ventrals, 39-54 subcaudals; total number of ventrals plus subcaudals 188 to 204; endemic to Taiwan ..... *O. monticola makazayazaya*
- 22A 23-25 (rarely 21) dorsal scale rows at midbody; 135-156 ventrals, 33-62 subcaudals; 8-9 supralabials; Himalaya eastwards up to western Yunnan, India, Bangladesh, Myanmar .....  
..... *O. monticola monticola*
- 22B 21-23 (very rarely 25) dorsal scale rows at midbody; 127-152 ventrals, 22-54 subcaudals; 7-9 (exceptionally 10) supralabials; Vietnam, Thailand, Malaya, Sumatra .....  
..... *O. monticola convictus*

## ACKNOWLEDGMENTS

We are much indebted to Dr. Ivan INEICH, of the Laboratoire de Zoologie (Reptiles & Amphibiens), Muséum National d'Histoire Naturelle, Paris, Mr. Gernot VOGEL, of the Society for Southeast Asian Herpetology, Heidelberg, and Dr. George ZUG, of the Division of Amphibians and Reptiles, National Museum of Natural History, Smithsonian Institution, Washington, for their careful reading of the manuscript and their helpful corrections and suggestions.

We are grateful to Dr. ZHAO Er Mi, Sichuan Institute of Biology, Chengdu, for providing us with otherwise unavailable Chinese literature and unpublished data about *Ovophis monticola zhaokentangi*, and Mr. CEN Jian Qiang, Shanghai Museum of Natural History, for his assistance in the examination of preserved specimens and his friendly help.

Last, we also thank Miss TU Xiao Hua (Paris) for her assistance in the search of Chinese literature and additional translations.

The cover artwork was kindly realised by Miss Agathe RAVET, of the Muséum National d'Histoire Naturelle, Paris. Her skill and friendship are here warmly acknowledged.

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