

Two new species of enid land snail from Sichuan, China (Stylommatophora: Enidae)

ZHONG-GUANG CHEN¹, YU-TING DAI¹, GUANG-LONG XIE², PING WANG³, JIAO JIANG⁴,
SHAN OUYANG¹ & XIAO-PING WU¹

¹ Jiangxi Province Key Laboratory of Watershed Ecosystem Change and Biodiversity, Center for Watershed Ecology, School of Life Sciences, Nanchang University, Nanchang 330031, P. R. China

² School of Life Sciences, Qufu Normal University, Qufu 273165, P. R. China

³ Sichuan Academy of Forestry Sciences, Chengdu 610081, P. R. China

⁴ Zhejiang Museum of Natural History, Hangzhou 310000, P. R. China

Corresponding author: Xiao-Ping Wu (xpwu@ncu.edu.cn)

Abstract. Two new species of enid land snail, *Dolichena wenchuanensis* n. sp. and *Holcauchen multicostatus* n. sp., are described from the dry-hot environment of Wenchuan, Sichuan, China based on conchological morphology. *Dolichena wenchuanensis* n. sp. can be easily distinguished from congeneric species by its smaller shell with fewer whorls, and *H. multicostatus* n. sp. can be easily distinguished from congeneric species by a ribbed post-nuclear shell. The two new species were found in a biological hotspot of the family Enidae. This discovery further enhances our understanding of the species diversity of Enidae in the dry-hot environment of China.

Key words. Conchology, taxonomy, new species, land snails

ZooBank identifier. urn:lsid:zoobank.org:pub:C4E92DAA-DD33-4E1B-9B0A-22EF028AF310

DOI. <https://doi.org/10.61733/jconch/4503>

INTRODUCTION

Wenchuan is situated on the southwestern edge of the Tibetan Plateau in China. It is renowned for its exceptional diversity of small, undescribed species of Enidae. However, very few studies have been conducted on this topic. For a long time small, elongate enids in Wenchuan were merely classified as *Holcauchen* Möllendorff, 1901 by shell collectors. On examination of some specimens of Enidae collected in Wenchuan in 2021 and 2022, it was discovered that they are comprised of at least two genera, *Dolichena* Pilsbry, 1934 and *Holcauchen*.

Dolichena is a monotypic genus and is characterized by its narrow, Clausiliidae-like shell with numerous whorls, a long, strong palatal tooth, and the absence of a columellar tooth (Wu 2018). It is endemic in the dry-hot valley located between Wenchuan and Maoxian, China, and it has rarely been mentioned in literature since its initial description (Pilsbry 1934; Wu 2018). *Holcauchen* is a group of small land snails which are characterized by the presence of two columellar teeth and, when present, one palatal tooth (Schileyko 1998; Wu 2018). Currently, it consists of 18 known

species and subspecies (Chen & Zhang 2000; Zhang *et al.* 2003; Wang & Wu 2012; Wu & Fang 2012; Wu 2018). These species are widely distributed across southern Gansu to eastern Tibet (Wu 2018). However, this area has not been thoroughly surveyed, and there may be other undescribed species present.

In this study, one new species each of *Dolichena* and *Holcauchen* are described from the same type locality in Wenchuan, China. The discovery of these new taxa contributes to our understanding of the high level of endemism of land snails in the dry-hot valley of Sichuan. A thorough survey of the region in the future may reveal additional enid diversity.

MATERIALS AND METHODS

All specimens were collected from Wenchuan County, Sichuan Province, China from September 2021 to August 2022. Measurements were taken with digital callipers to the nearest 0.1 mm. Whorls were counted as described by Kerney & Cameron (1979). Terminology follows Wu (2018). Photographs were taken under a Leica S9i stereoscope and edited in Adobe Photoshop CC 2015.

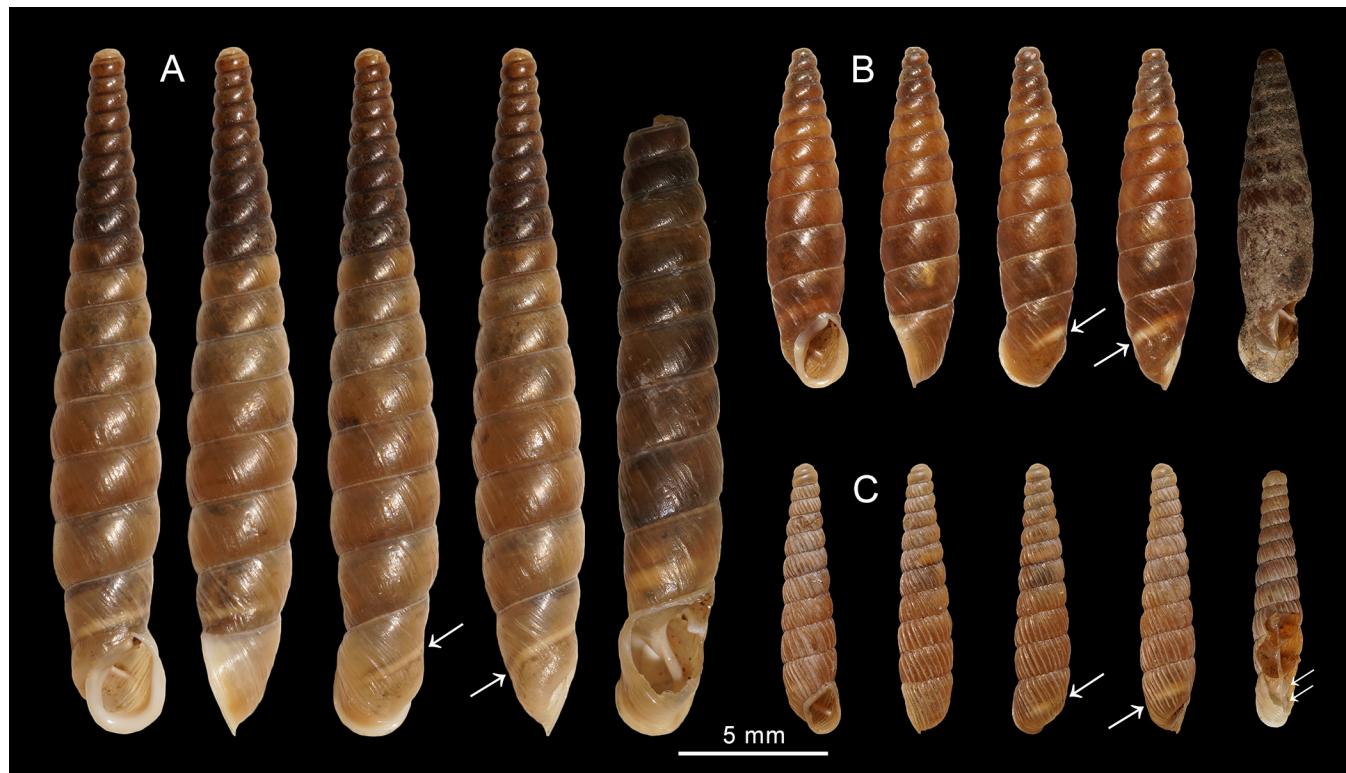


Figure 1. Three species of Enidae from Sichuan Province, China. A, *Dolichena miranda* (22_NCU_XPWU_DM01–02). B, *Dolichena wenchuanensis* n. sp., holotype (22_NCU_XPWU_DW01), paratype (22_NCU_XPWU_DW02). C, *Holcauchen multicostatus* n. sp., holotype (22_NCU_XPWU_HM01), paratype (22_NCU_XPWU_HM02). Arrows point to teeth.

Abbreviations.

NCU_XPWU: Laboratory of Xiao-Ping Wu, Nanchang University

SAU: Sichuan Agricultural University

WPC: collection of Ping Wang, Chengdu

自治州], Sichuan Province [四川省], China, 31°29'46"N 103°38'38"E, leg. Zhongguang Chen, July 2022.

Paratypes. 86 shells 22_NCU_XPWU_DW02–10, SAU 2207001–2207070, other information same as holotype; WPC 210901–210907, leg. Zhongguang Chen & Ping Wang, September 2021, other information same as holotype.

Measurements of adult shells. Height 13.4–10.9 mm, width 2.6–2.7 mm ($n = 80$).

Diagnosis. Adult shell small, <13 mm (vs >20 mm in *D. miranda*), with 11½–12 whorls (vs 16–17 whorls in *D. miranda*).

Description. Shell ovate-turriform with apex not abruptly pointed; shell most swollen (broadest) at penultimate whorl, dextral, small, slender, solid, semitranslucent, glossy, not speckled, not spirally grooved; whorls 11½–12 whorls. Whorls rather flattened, not shouldered. Protoconch smooth, polished. Post-nuclear whorls smooth. Growth lines indistinct. Suture normal, without narrow band beneath it. Body whorl gradually ascending towards aperture, rounded at periphery, with a medial spiral depression on last whorl corresponding to position of internal palatal tooth. Aperture in a plane, truncate-ovate, oblique, com-

RESULTS

Family Enidae Woodward, 1903

Subfamily Eninae Woodward, 1903

Genus *Dolichena* Pilsbry, 1934

Type species. *Ena miranda* Pilsbry, 1934, by monotypy.

Dolichena wenchuanensis Chen, Wang, Xie & Wu, n. sp.

Figure 1B

ZooBank identifier. urn:lsid:zoobank.org:act:228B0766-3547-4FA3-BBBC-A38508450E6F

Type material. Holotype. 22_NCU_XPWU_DW01, Kou-shan Village [芤山村], Wenchuan County [汶川县], Tibetan Qiang Autonomous Prefecture of Ngawa [阿坝藏族羌族

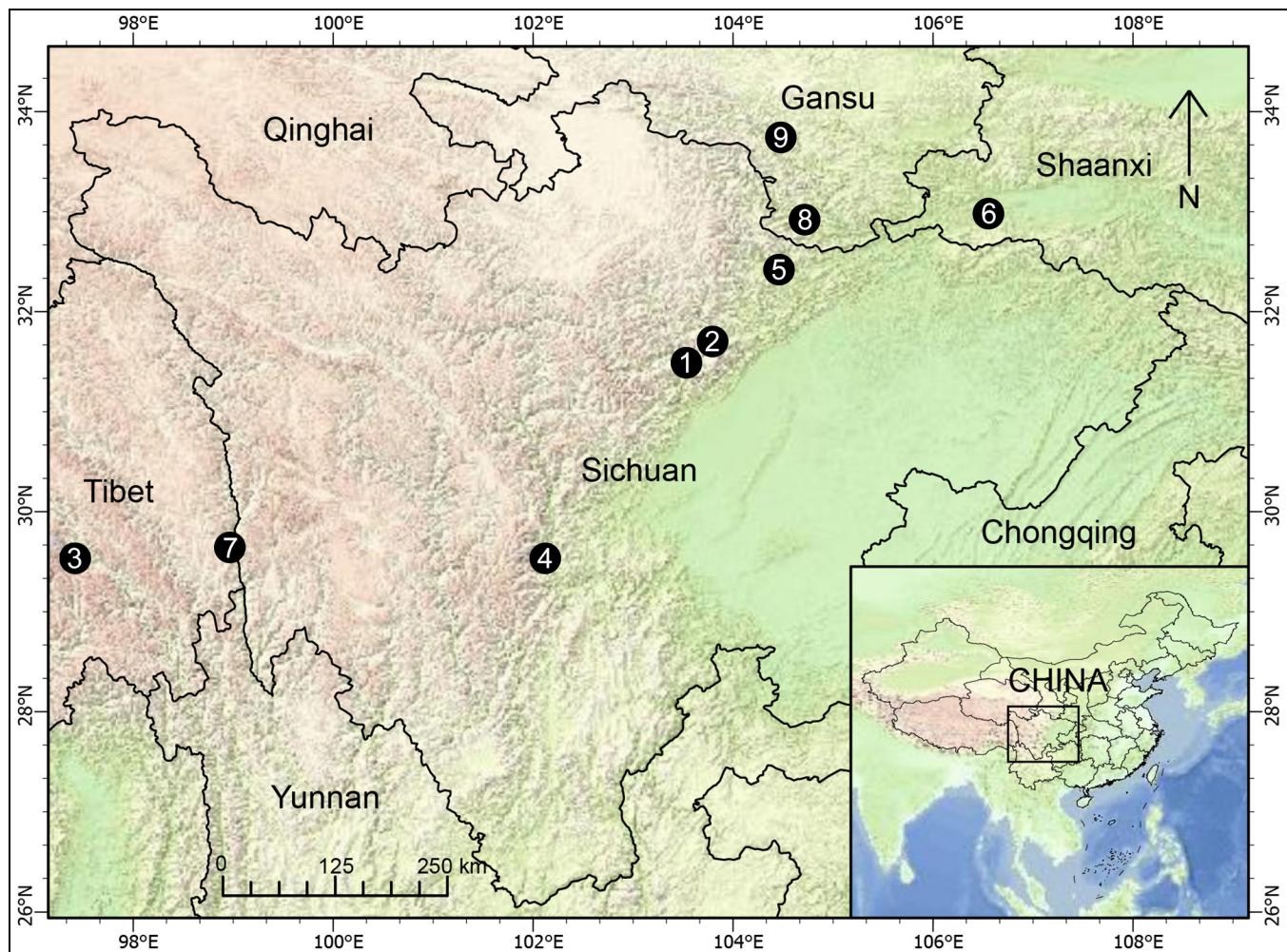


Figure 2. Distribution of *Dolichena* and *Holcauchen*. 1 = *Dolichena wenchuanensis* n. sp., *Holcauchen multicostatus* n. sp. 2 = *D. miranda*. 3 = *H. anceyi*, *H. gregoriana*. 4 = *H. brookedolani*, *H. entocraspedius*, *H. kangdingensis*, *H. micropeas*, *H. raphis*. 5 = *H. clausiliariformis*, *H. hyacinthi*, *H. rhusius*. 6 = *H. compressicollis*. 7 = *H. markamensis*. 8 = *H. rhabdites rhabdites*, *H. rhabdites aculus*, *H. stranglatus*. 9 = *H. sulcatus*.

pletely attached to body whorl, with tooth. Peristome yellowish white, thickened, slightly reflexed, without distinct cuff. Parietal callus distinct. Palatal tooth one, very long and strong. Columellar margin reflexed, without tooth. Umbilicus narrowly open. Shell uniformly brown. Colour of apex like the rest of the shell.

Etymology. The species is named after Wenchuan County, where its type locality, Koushan Village, is located.

Vernacular name. 汶川狭纳螺 (Pinyin: Wen Chuan Xia Na Luo).

Distribution and ecology. This species is known from only the type locality (Fig. 2). Empty shells were found in a pile of dead snail shells at the base of a cliff (Fig. 3). Other species in this pile were *Bradybaena haplozona* (Möllendorff, 1899), *Cathaica polystigma* Möllendorff, 1899, *Cathaica*

radiata Pilsbry, 1934, *Stenogyropsis chorismenostoma* Chen, Huang & Pál-Gergely, 2022, *Pupopsis huangi* Chen, 2020, and *Holcauchen multicostatus* n. sp. *Dolichena wenchuanensis* n. sp. may live beneath fallen leaves in the crevices of the cliff.

Remarks. The placement of the new species in *Dolichena* is supported by its shell morphology (presence of a long, strong palatal tooth and absence of the columellar and parietal teeth). *Dolichena wenchuanensis* n. sp. can be easily distinguished from *Dolichena miranda* by its smaller adult size (<13 mm vs >20 mm in *D. miranda*) and fewer whorls (11½–12 vs 16–17 in *D. miranda*) (Fig. 1). For a long time, *D. miranda* was the only known species of *Dolichena*. *Dolichena miranda* resembles a clausiliid shell, making it likely to be misidentified as a member of the Clausiliidae without careful observation. Convergence of shell forms, as observed between unrelated families, may be a result of

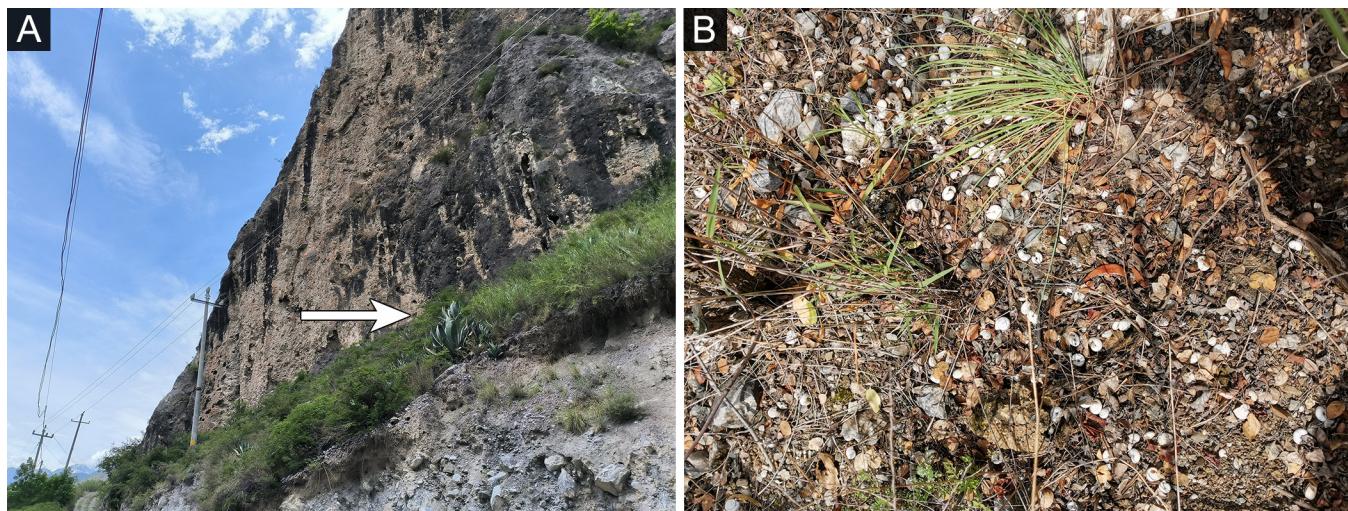


Figure 3. Habitat of *Dolichena wenchuanensis* n. sp. and *Holcauchen multicostatus* n. sp. in Wenchuan County, Sichuan Province, China. A, the cliff where the new species were found; the arrow points to the base of the cliff. B, the pile of dead snail shells at the base of the cliff, among which the new species were found.

adaptation to similar habitats. Unlike other enid genera that inhabit dry-hot environments and typically prefer to live on exposed, dry rock walls, soil walls, or bushes, *D. miranda* has only been observed living beneath wet, fallen leaves. *Dolichena wenchuanensis* n. sp. also has a shell resembling that of a clausiliid, but it is noticeably shorter than that of *D. miranda*. This difference may indicate that the two species have similar, but not identical, habitat preferences.

Genus *Holcauchen* Möllendorff, 1901

Type species. *Buliminus sulcatus* Möllendorff, 1901, by monotypy.

Holcauchen multicostatus Chen, Xie, Wang & Wu, n. sp.

Figure 1C

ZooBank identifier. urn:lsid:zoobank.org:act:0E1E5A0E-B945-42D9-A01F-B271DA0E0321

Type material. Holotype. 22_NCU_XPWU_HM01, Koushan Village [羌山村], Wenchuan County [汶川县], Tibetan Qiang Autonomous Prefecture of Ngawa [阿坝藏族羌族自治州], Sichuan Province [四川省], China, 103°38'38"E, 31°29'46"N, leg. Zhongguang Chen, July 2022.

Paratypes. 36 shells 22_NCU_XPWU_HM02–36, other information same as holotype; WPC 210908, leg. Zhongguang Chen & Ping Wang, September 2021, other information same as holotype.

Measurements of adult shells. Height 8.3–10.5 mm, width 1.9–2.0 mm ($n = 37$).

Diagnosis. Post-nuclear shell ribbed (vs smooth in all congeneric species).

Description. Shell turreted with apex not abruptly pointed; shell most swollen (broadest) at penultimate whorl, dextral, small, slender, solid, opaque, sub-glossy, not speckled, not spirally grooved; with 11½–12 whorls. Whorls rather flattened, not shouldered. Protoconch smooth; polished. Post-nuclear whorls ribbed. Growth lines indistinct. Suture normal, without narrow band beneath it. Body whorl gradually ascending towards aperture; rounded at periphery; with a medial spiral depression on last whorl matching position of internal palatal tooth. Aperture in a plane; truncate-ovate; oblique, completely adnate to body whorl, with tooth. Peristome light brown, thickened, slightly reflected, without distinct cuff. Parietal callus distinct. Palatal tooth one, very strong and long. Columellar margin reflected, with two small teeth. Umbilicus narrowly open. Shell uniformly light brown. Colour of apex region like rest of shell but usually lighter due to wear.

Etymology. The specific name is derived from the Latin *multi* (many) and *costatus* (ribbed) and alludes to the many ribs on the shell.

Vernacular name. 多肋沟颈螺 (Pinyin: Duo Lei Gou Jing Luo).

Distribution and ecology. This species is known from only the type locality (Fig. 2). Empty shells were discovered in a pile of dead snails that included *D. wenchuanensis* n. sp. and other land-snail species (see above for a list of species); these shells were at the base of a vertical cliff (Fig. 3). It is speculated that the species may live beneath fallen leaves in the crevices of the cliff.

Remarks. The placement of the new species in *Holcauchen*

is supported by its shell morphology: the presence of a palatal tooth and two columellar teeth and the absence of a parietal tooth. Only two species of Chinese Enidae have a ribbed shell: *Clausiliopsis clathratus* (Möllendorff, 1901) and *Clausiliopsis senckenbergianus* Yen, 1939. *Holcauchen multicostatus* n. sp. can be easily distinguished from them by the absence of the parietal tooth which is present in these two other enid species. *Holcauchen multicostatus* n. sp. can be easily distinguished from congeneric species by its long, strong palatal tooth and ribbed post-nuclear shell. This discovery expands the known geographic distribution of the genus *Holcauchen* and bridges the gap between the distributions of other *Holcauchen* species in southwest China.

ACKNOWLEDGEMENTS

We thank Mr Zheng-Ping Liu (Chengdu) and Mr Qi-Shi Li (Chengdu) for assistance in collecting specimens, and Dr Shi-Jun Yang (Sichuan Agricultural University) for assistance in photo editing. Editors Anna Holmes and Robert Forsyth, as well as two anonymous reviewers, are thanked for their helpful comments on the manuscript. This study was supported by the National Natural Science Foundation of China under grant no.31772412 and no. 32360132.

REFERENCES

- CHEN DN, ZHANG GQ. 2000. A new species of the genus *Holcauchen* from China (Gastropoda: Stylommatophora: Enida). *Acta Zootaxonomica Sinica* **25** (4): 369–372.
- SCHILEYKO AA. 1998. Treatise on Recent terrestrial pulmonate molluscs. Part 2. Gastrocoptidae, Hypselostomatidae, Vertiginidae, Truncatellinidae, Pachnodidae, Enidae, Sagdidae. *Rutherfordica Supplement* **2**: 129–261.
- KERNEY MP, CAMERON RAD. 1979. *A Field Guide to the Land Snails of Britain and North-West Europe*. Collins, London, 288 pp, 24 pls.
- PILSBRY HA. 1934. Zoological results of the Dolan West China Expedition of 1931. Part II. Mollusks. *Proceedings of the Academy of Natural Sciences of Philadelphia* **86**: 5–28.
- WANG D-B, WU M. 2012. A new species of the genus *Holcauchen* from the south Gansu, China (Stylommatophora: Enida). *Acta Zootaxonomica Sinica* **37** (4): 718–721.
- WU M. 2018. *Mollusca, Gastropoda: Enoidea. Fauna Sinica, Invertebrata Vol. 58*. Science Press, Beijing, 298 pp.
- WU M, FANG YX. 2012. A new species of the genus *Holcauchen* from the north Sichuan, China (Stylommatophora: Enida). *Acta Zootaxonomica Sinica* **37** (3): 546–549.
- ZHANG WH, CHEN DN, ZHANG GQ. 2003. On the genus *Holcauchen* Möllendorff and a new species from China (Gastropoda: Stylommatophora: Enida). *Acta Zootaxonomica Sinica* **28** (2): 228–231.