

# AN IMPRESSIVE NEW CAMAENID, *ENTADELLA ENTADIFORMIS* GEN. & SP. N. FROM GUANGXI, CHINA (GASTROPODA: PULMONATA)

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*Abstract* An impressive, large bodied, new camaenid species, *Entadella entadiformis* Páll-Gergely & Hunyadi n. sp. is described from several localities in Guangxi Province (Southern China). The new genus, *Entadella* Páll-Gergely & Hunyadi n. gen. includes three species: *E. athrix* (Möllendorff, 1901), *E. cavaleriei* (Bavay, 1913), and *E. entadiformis* n. sp., and characterized by a large, nearly flat, brownish shell with rounded body whorl, smooth or finely tuberculated embryonic whorls and a very or moderately narrow umbilicus. The penial verge is small or middle-sized with lateral opening, the penial caecum is absent, the flagellum is short, and the vagina is very short. In order to provide basis for comparison of *Entadella* n. gen. with the type species of the genus *Camaena*, the reproductive anatomy, shell and radula of a *Camaena cicatricosa* specimen, collected from Guangxi, China, is also described.

*Key words* Anatomy, taxonomy, land snail, new species, new genus

## INTRODUCTION

Guangxi Province in southern China harbours abundant limestone habitats suitable for species rich land snail communities. In spite of this, the terrestrial snail fauna of this province is little known, mainly because malacologists working at the end of the 19<sup>th</sup> and beginning of the 20<sup>th</sup> century were rather focused on neighbouring areas (Hunan, Hubei Provinces, Tonkin=Northern Vietnam). The family Camaenidae Pilsbry, 1893 (including Bradybaenidae, see Wade *et al.*, 2006, 2007; Gittenberger *et al.*, 2012), which is a speciose group of large and often colourful land snails inhabiting various habitats, is also nearly unknown. Heude (1890) described only four species of the Camaenidae from Guangxi (Silin=Xilin county) and Yen (1939) reported only five species from that province.

In the past 10 years or so, several new taxa were described from Guangxi, mainly those belonging to the families Clausiliidae (e.g. Nordsieck, 2005, 2012; Grego & Szekeres, 2011), Plectopylidae (see Páll-Gergely & Hunyadi, 2013; Páll-Gergely & Asami, 2014) and Hypselostomatidae (see Jochum *et al.*, 2014; Páll-Gergely *et al.*, 2015). On the other hand, few recent publications have reported on the speciose Camaenidae (e.g. Ding *et al.* 2016). In this paper we describe a very large, conspicuous species of the Camaenidae based on

shell and anatomical characters. This new species cannot be included in any other camaenid genera. Therefore we diagnose a new genus for this new species and discuss its relationship with other anatomically known camaenids. Two additional species, *Chloritis athrix* Möllendorff, 1901 and *Helix (Chloritis) cavaleriei* Bavay, 1913 are also classified within the new genus.

## MATERIAL AND METHODS

Determination of the number of shell whorls (precision to 0.25 whorl) follows Kerney & Cameron (1979: 13). Animals were killed with boiling water and bodies were pulled out afterwards. Shells, radulae and jaws were directly observed without coating under a low vacuum SEM (Miniscope TM-1000, Hitachi High-Technologies, Tokyo). Individual buccal masses were removed and soaked in 2 M KOH solution overnight before extracting the radula, which was preserved in 70% ethanol.

The holotype of *Entadella entadiformis* n. sp. was collected when it was juvenile (approx. 3 whorls), but was raised in captivity by J.U. Otani. Both of the anatomically examined *Entadella entadiformis* n. sp. specimens were pulled out of the shell after boiling, and the spermoviduct and the bursa copulatrix were torn and remained within the shell, and therefore their morphology could not be examined. The ethanol-preserved

specimens were dissected under a Leica stereomicroscope, equipped with a digital camera. In the description of the reproductive system, we used the terms “proximal” and “distal” relative to the hepatopancreas.

The meaning of Chinese administrative units are the following: Xian=district, Shi=town region, Xiang and Zhen=community, Cun=village, Zizhixian=autonomous region.

*Abbreviations*

HA: Collection András Hunyadi (Budapest, Hungary)

HNHM: Hungarian Natural History Museum (Budapest, Hungary)

MNHN: Muséum National d’Histoire Naturelle (Paris, France)

OK: Collection Kenji Ohara (Nishinomiya, Japan)

PGB: Collection Barna Páll-Gergely (Mosonmagyaróvár, Hungary)

JUO: Collection Jamen Uiriamu Otani (Koka, Japan)

**SYSTEMATICS**

Family Camaenidae Pilsbry, 1893

Genus *Camaena* Albers, 1850

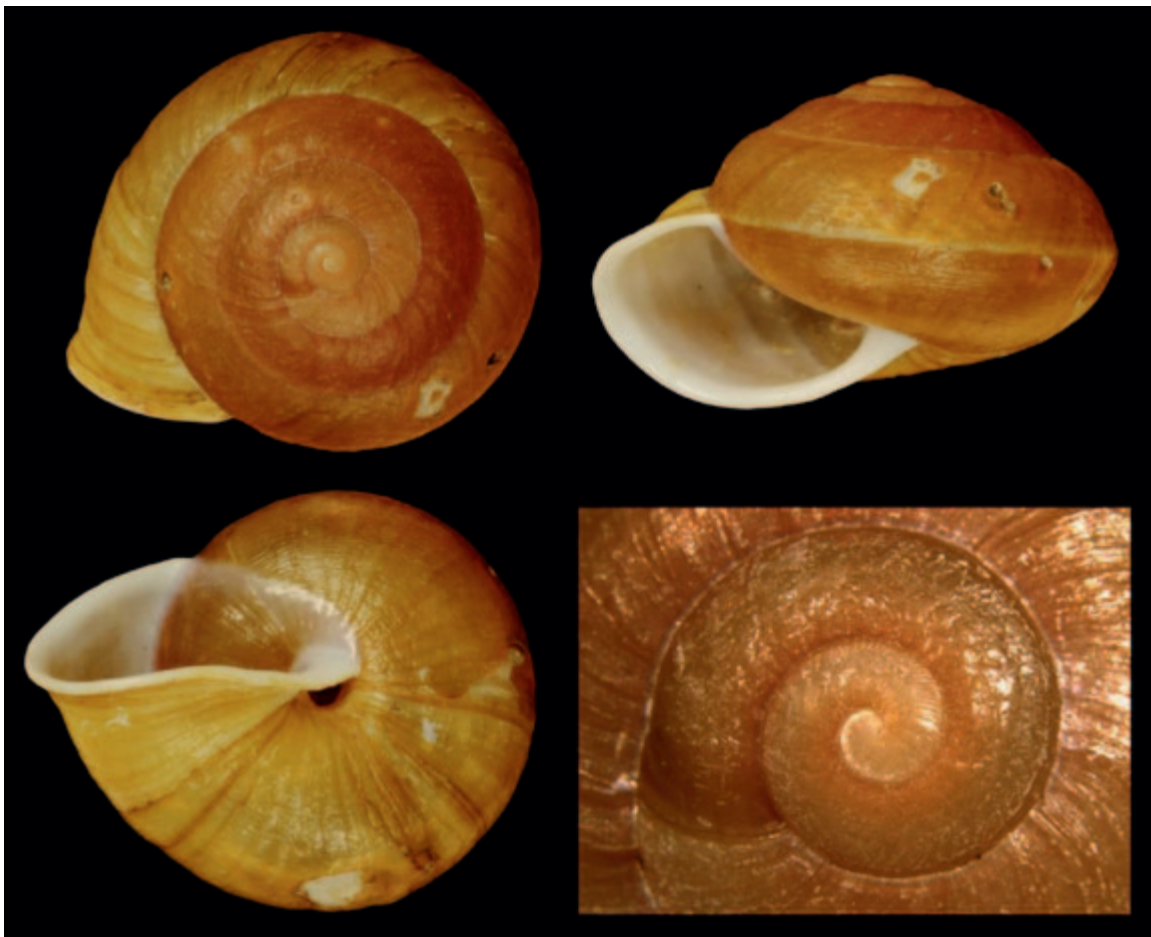
*Type species* *Helix cicatricosa* (Müller, 1774).

*Remarks* A recent paper revised the sinistral *Camaena* species of China including molecular phylogeny and genital anatomy (Ding *et al.* 2016). For comparative reasons we provide a brief description of the protoconch and the genitalia of the type species.

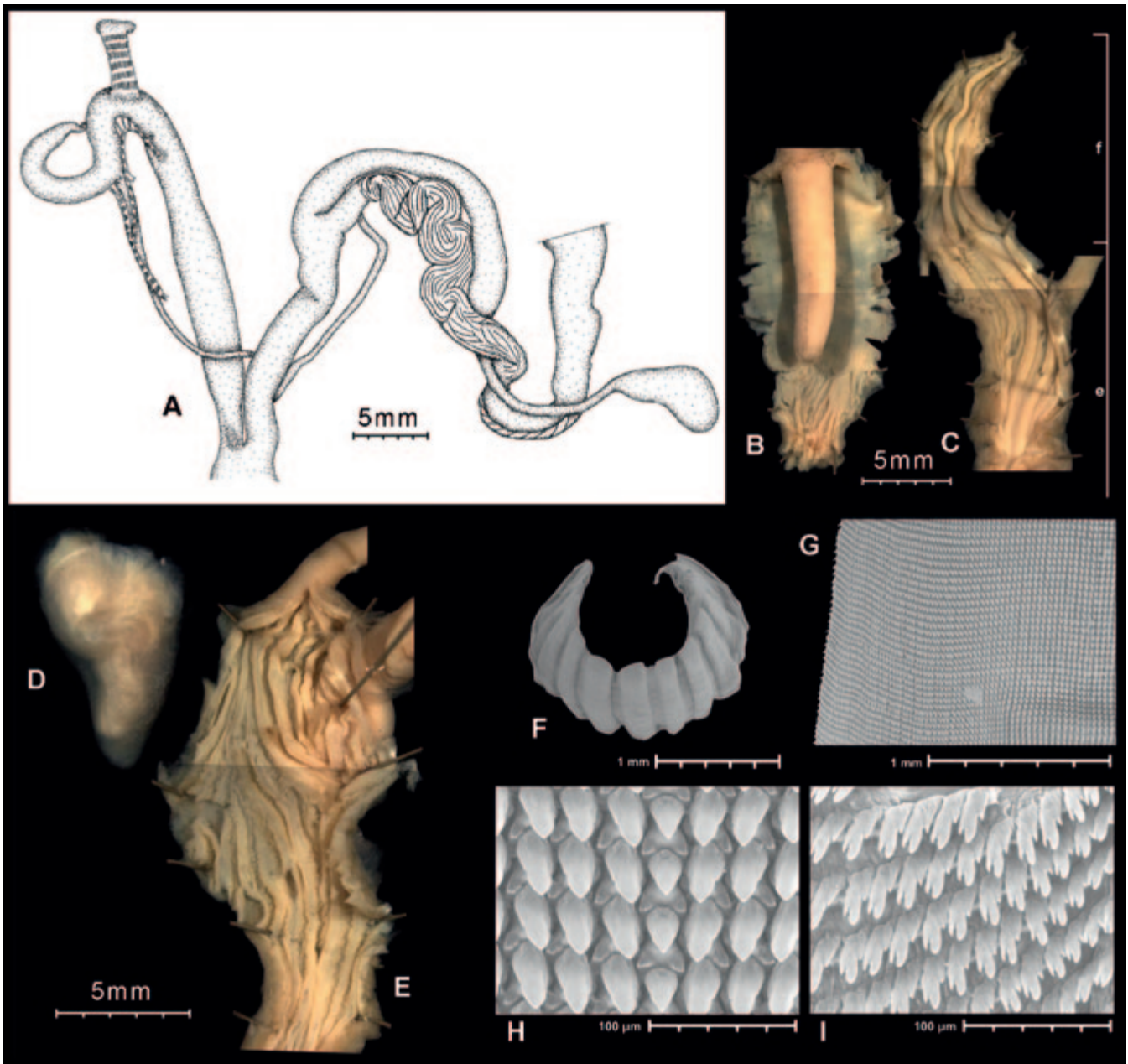
*Camaena cicatricosa* (Müller, 1774)

Figs 1–2.

*Specimen examined* China, Guangxi, Liuzhou Shi, Longtan Gongyuan, 200m a.s.l., 24°16.913'N, 109°24.568'E, leg. Nakahara, Y., Ohara, K., Okubo, K. & Otani, J.U., 11.11.2004., HNHM 99698 (shell), HNHM 99698a (body and prepared genitalia in ethanol), HNHM 99698r (radula on double faced adhesive tape).



**Figure 1** Shell and protoconch of the anatomically examined *Camaena cicatricosa* (O.F. Müller, 1774) specimen (HNHM 99698). D=43.8mm.



**Figure 2** Reproductive anatomy (A–E), jaw (F) and radula (G–I) of *Camaena cicatricosa* (O.F. Müller, 1774) (HNHM 99698). A: whole genitalia; B: inner structure of the penis; C: inner structure of the epiphallus (e) and the flagellum (f); D: spermatophore; E: inner structure of the vagina; F: jaw; G: half of the radula; H: central and first lateral teeth; I: marginal teeth.

*Remarks on the shell* Shell large, sinistral, depressed globular; protoconch large with rough, irregular, but glossy surface (overall resembles to a rumped and smoothed metal foil).

*Description of the genitalia* (Figs 2A–E) One specimen was anatomically examined. Atrium short; penis relatively short, cylindrical, inner wall with irregular, fine, transversal wrinkles; penial verge opens terminally, extremely long, extends almost

to the distal end of the penis, cylindrical, becomes slightly slimmer towards its end; epiphallus approximately as long as penis, internally with roughly four longitudinal folds; retractor muscle short, thick, inserts approximately middle of epiphallus, and attaches on diaphragm; there are additional, weaker muscle fibres inserting on the epiphallus; flagellum nearly as thick as epiphallus, becomes slightly slimmer towards its end; flagellum internally with three low and one high

longitudinal fold; vas deferens enters epiphallus laterally; vagina approximately as long as penis, internally with several irregular, serrated longitudinal folds; bursa copulatrix with very long stalk and a thickened, club-like sac; an ovoid spermatophore with pointed end was found in the bursa.

*Description of the jaw and radula* (Figs 2F–I) Jaw odontognathous, with approximately 12 regular, very strong ribs; radula elongated but not very slender; central tooth present, unicuspid, slightly smaller than first laterals; laterals and marginals arranged in transversal, more or less straight rows; laterals 25, marginals at least 35, laterals unicuspid, gradually becoming bi- and tricuspid; marginals tricuspid, the endocone is the largest, with rounded tip. The number of laterals and marginals only estimated because the number and shape of cusp changes gradually.

*Remarks* Solem (1992) gave a detailed description of the anatomy of *Camaena cicatricosa* collected from Hong Kong. Our results largely agree with that of Solem (1992), but some differences were also found. First, the penial verge in our specimen is much longer than the specimen from Hong Kong, in which this organ looks as if retracted (Solem 1992, Fig. 2A). Second, the flagellum is very long, vermiform in the specimen examined by Solem (1992), but our specimen had a relatively short, thick flagellum. The anatomical description of Hwang (2011), which was also based on a specimen collected in Hong Kong, agrees with that of Solem (1992). Our results overall agree with the anatomy of *C. cicatricosa* published by Ding *et al.* (2016) with the exception of sculpture of the inner penial wall and the verge. Namely, the specimen we examined had both surfaces rather finely reticulated, whereas those of the specimen in Ding *et al.* (2016) was finely longitudinally striated.

Camaenid spermatophores usually possess a long tail. The spermatophore of the examined specimen was ovoid with pointed end, and looked complete, not decayed.

### *Entadella* Páll-Gergely & Hunyadi n. gen.

*Diagnosis* Shell large, discoid, nearly flat, with narrow or wide umbilicus, protoconch smooth or covered with small tubercles to various degree.

Penis relatively short; penial verge small to medium sized, with lateral opening; vagina very short.

*Type species* *Entadella entadiformis* n. sp.

*Species included* *E. athrix* (Möllendorff, 1901), *E. cavaleriei* (Bavay, 1913), *Entadella entadiformis* n. sp.

*Comparisons* *Entadella* n. gen. differs from *Camaena* Albers, 1850 by the penial verge with lateral opening, whereas that in *Camaena* it opens terminally. Moreover, the vagina of *Camaena* is much longer than that of *Entadella* n. gen. (for the anatomy of *C. cicatricosa* and related species, see Solem, 1992; Schileyko, 2003; Hwang, 2011; Ding *et al.*, 2016; and this study). Conchologically, *Camaena* species have a higher spire and generally a rather globular shell very often with dark bands. Moreover, the protoconch sculpture of *Camaena* is irregular (resembles to a battered metallic surface), whereas that of *Entadella* n. gen. is smooth, or ornamented with small tubercles. The radula and jaw morphology of *Camaena* and *Entadella* n. gen. shows no notable differences.

The anatomy of *Trichochloritis* Pilsbry, 1891 (see Schileyko, 2007), which is conchologically somewhat similar to the new genus, is very different from that of *Entadella* n. gen. Most importantly it lacks a flagellum, has a penial sheath, and the retractor muscle inserts on the curvature of vas deferens. *Camaenella* Pilsbry, 1893 has a nearly globose shell and a very large, elongated penial verge (Schileyko, 2003). *Neocepolis* Pilsbry, 1891 has a globose shell with an obtuse tooth on the columella and with a strong fold on the parietal wall (Sutcharit *et al.*, 2007). Moreover, the vagina of *Neocepolis* is much longer (Sutcharit *et al.*, 2007). *Trachia* Martens, 1860, which is widely distributed in Southeast Asia, also possesses a flat shell with rather narrow umbilicus, but many species have bands on the shell and they have less whorls than *Entadella* n. gen. The main difference between the anatomies of *Trachia* and *Entadella* n. gen. is that the former lacks a penial verge and has a long vagina, whereas the new genus has a small verge and possesses very short vagina (Schileyko, 2003, 2013).

*Moellendorffia* Ancey, 1887 (and related genera: *Trichelix* L. Pfeiffer, 1862 and *Moellendorffiella* Pilsbry, 1905) is similar to *Entadella* n. gen. by the granulated protoconch, the uniformly brownish colour, the short flagellum and short penial

verge, which is nevertheless bilobed in *Trichelix* and *Moellendorffia* (see Schileyko 2003). The shell of *Moellendorffia* differs from that of *Entadella* n. gen. by the prominently granulated and hirsute teleoconch and the presence of teeth (lamellae) in the aperture.

*Derivation of name* The shell of *Entadella* species resemble to the seed of the tropical liana belonging to the genus *Entada* (Fabaceae) in terms of size, shape and colour. *Entadella* is the diminutive form of *Entada*.

*Remarks* Based on shell characters, the genus *Entadella* could be classified in the family Helicarionidae and other related "limacoid" groups as well. The absence of a caudal horn and the odontognathous jaw clearly indicates that the new genus is a member of Camaenidae.

*Entadella athrix* (Möllendorff, 1901)

*Chloritis athrix* Möllendorff, 1901: 73–74.  
*Chloritis (Trichochloritis) athrix*, — Zilch, 1966: 300, Plate 9, Fig. 22.

*Diagnosis* A medium sized, brownish or yellowish, nearly flat camaenid species with very narrow, but open umbilicus, semilunar aperture, and regularly growing whorls.

*Material examined* Tonkin, Lao Kay, probably leg. Messenger, NHMUK 1908.12.21.39–40; Region de Muong-Hum, Tonkin, MNHN-IM-2012–27112/12; Tonkin, Muong Hum, coll. Staadt, 1969, MNHN-IM-2012–27113/4; Muong-Hum, leg. Messenger, MNHN-IM-2012–27114/6; Phong-Tho, leg. Messenger, MNHN-IM-2012–27115/8; Phong-Tho, leg. Messenger, MNHN-IM-2012–27116/3; Phong-Tho, leg. Messenger, MNHN-IM-2012–27117/5; Muong Bo, leg. Messenger, MNHN-IM-2012–27118/3 (albinistic form); Muong Bo, leg. Messenger, MNHN-IM-2012–27119/6; Muong Bo, leg. Messenger, MNHN-IM-2012–27120/3; Tonkin, Région de Lao Kay, leg. Messenger, MNHN-IM-2012–27121/3; Tonkin, Lao Kay, leg. Messenger, MNHN-IM-2012–27122/3; Tonkin, Lao Kay, leg. Messenger, MNHN-IM-2012–27123/8; Tonkin, Région de Lao Kay, leg. Messenger, MNHN-IM-2012–27124/5; Tonkin, Région de Lao Kay, leg. Messenger, MNHN-IM-2012–27125/50; Tonkin, Pakhé, leg. Messenger, MNHN-IM-2012–27126/3; Pakhé, leg.

Messenger, MNHN-IM-2012–27127/9; Tonkin, Pakhé, leg. Messenger, MNHN-IM-2012–27128/3 (albinistic form); Tonkin, Pakhé, leg. Messenger, MNHN-IM-2012–27129/3; Tonkin, Pakhé, leg. Messenger, MNHN-IM-2012–27130/2; Muong Kong, leg. Messenger, MNHN-IM-2012–27131/2; Muong Kong, leg. Messenger, MNHN-IM-2012–27132/2; Muong Kong, leg. Messenger, MNHN-IM-2012–27133/2 (one adult and one juvenile shell); Muong Kong, leg. Messenger, MNHN-IM-2012–27134/3; Ta Phin (N. Vietnam), leg. Saurin, MNHN-IM-2012–27135/1; Tonkin, Bords de la Rein Nong (?), MNHN-IM-2012–27136/1; Tonkin, leg. Messenger, MNHN-IM-2012–27137/2; Muong Bo, Dinh Lu, leg. Messenger, MNHN-IM-2012–27138/3; Dinh Lu, leg. Messenger, MNHN-IM-2012–27139/1; Lang Léou, That Khé et Bac Kan, leg. Messenger, MNHN-IM-2012–27140/2; Tonkin, leg. Messenger, MNHN-IM-2012–27141/2; Tonkin, leg. Messenger, coll. Letellier 1949, MNHN-IM-2012–27142/1.

*Geographic range* (Fig. 9) *Entadella athrix* is known from a few localities in Northern Vietnam, along the Chinese border.

*Remarks* The anatomy of this species is unknown, but its shell is similar to that of *Entadella entadiformis* n. sp. (for differences, see under that species). Therefore, this species is classified to *Entadella* n. gen.

*Entadella cavaleriei* (Bavay, 1913)

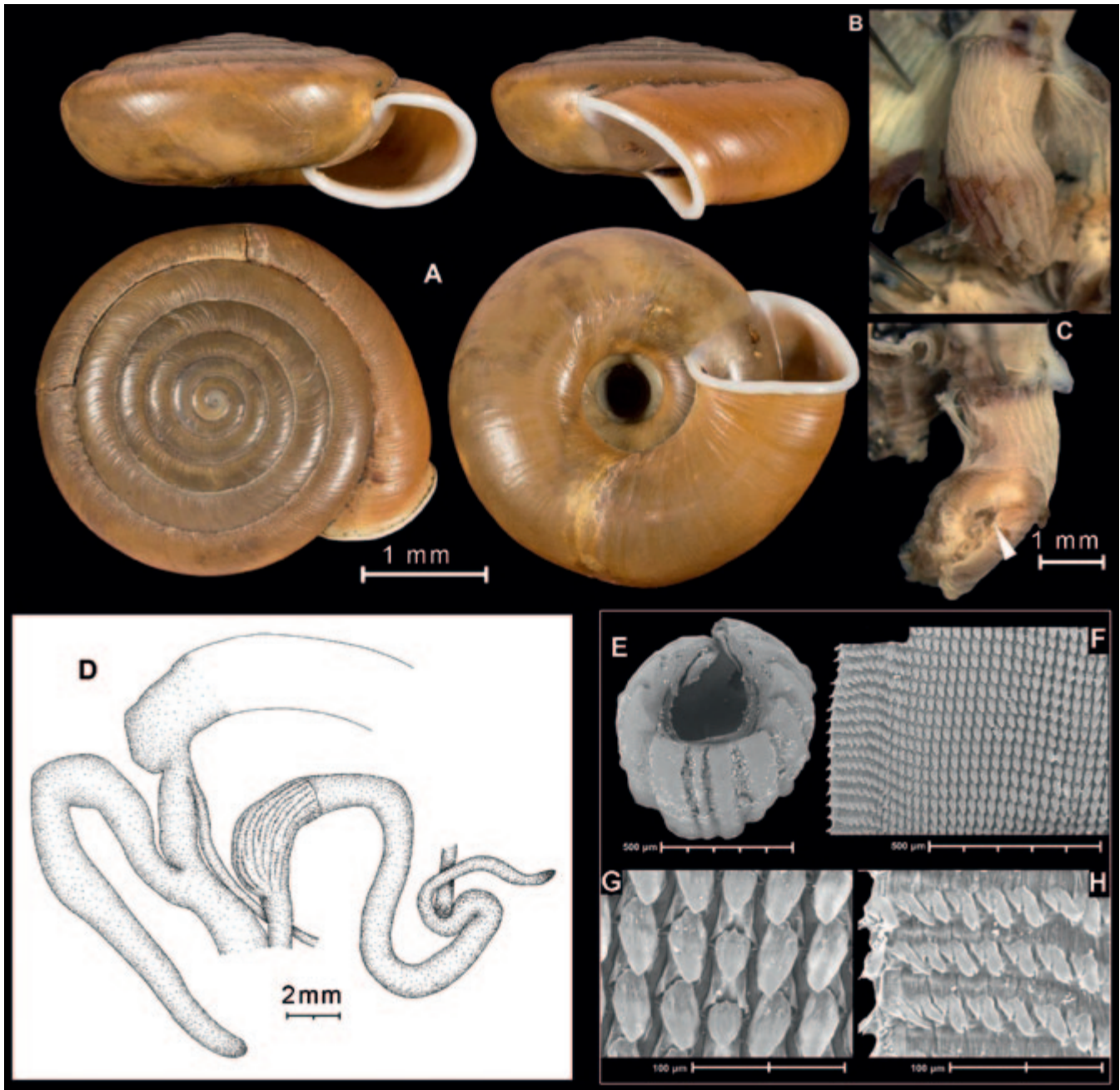
Fig. 3

*Helix (Chloritis) Cavaleriei* Bavay, 1913: 603–604, Plate 21.

*Diagnosis* A large, brownish, nearly flat camaenid species with moderately wide umbilicus and a semilunar aperture. Penis relatively short, thickened, internally with parallel folds and a medium sized, club-shaped verge with lateral opening; vagina very short.

*Material examined* San Chouen, Chine Meridionale, MNHN-IM-2000–31769 (holotype); Same data, MNHN IM-2012–27177 specimen in ethanol (anatomically examined).

*Description of the genitalia* (Figs 3B–D) One specimen was anatomically examined. This specimen was obviously part of the original series (collector and collection site agrees), but was not



**Figure 3** A, Shell of the holotype of *Entadella cavaleriei* (Bavay, 1913) (MNHN-IM-2000-31769). Reproductive anatomy (B–D), jaw (E) and radula (F–H) of another specimen (MNHN IM-2012-27177). B–C: penial verge from two different views (white arrow indicates the laterally positioned opening); D: whole genitalia (note that a retractor muscle might be present, but could not be examined due to the fragile condition of the specimen); E: jaw; F: half of the radula; G: central and first lateral teeth; H: marginal teeth.

mentioned in the original description, therefore it is not a paratype.

The whole body was very much fragile; only the outer part of the body (including the buccal mass, the sole and the posterior genitalia) could be examined. Penis relatively short, thickened, internally with dense, irregular, parallel folds; penial verge blub-shaped, middle sized, with

lateral opening; epiphallus cylindrical, longer than penis; epiphallus-flagellum region was extremely fragile, it broke even due to the slightest touch with the forceps, therefore a retractor muscle could not be observed; flagellum well-developed, shorter than epiphallus, pointed, rather slender; vas deferens cylindrical, relatively thick; vagina short and thick, inner wall

not examined; bursa copulatrix long, there is no distinct sac-shaped bursa.

*Description of the jaw and radula* (Figs 3E–H) Jaw odontognathous, with approximately twelve very strong, irregular ribs; radula elongated but not very slender; central tooth present, unicuspid, with slight indication of two additional side cusps; central tooth smaller than the first laterals; laterals and marginals are arranged in transversal, more or less straight rows; laterals 14–15, marginals at least 15 (the edge of the radula was twirled, so the outermost marginals could not be examined); laterals unicuspid, gradually becoming bi- and tricuspid; marginals tricuspid. The number of laterals and marginals only estimated because the number and shape of cusps changes gradually.

*Geographic range* This species is known from the type locality only (“San Chouen in China meridionali”), which could not be located on the map.

*Remarks* The shell of this species is similar to that of *Entadella entadiformis* n. sp. in shell size (D=34.1, H=15.1), shape and sculpture, especially the small tubercles near the suture of the protoconch. Therefore, it is classified in the genus *Entadella*.

*Entadella entadiformis* Páll-Gergely & Hunyadi  
n. sp.  
Figs 4–8.

*Holotype* China, Guangxi, Douanyaozu Zizhixian, Baoan Xiang, Nongjiao, 607m, 24°05.580'N, 107°46.971'E, leg. Ishibe, T., Ohara, K., Okubo, K. & Otani, J.U., 24.10.2011., HNHM 99699 (shell), HNHM 99699a (body and prepared genitalia in ethanol), HNHM 99699r (radula on double faced adhesive tape in ethanol).

*Paratypes* China, Guangxi, Douan Yaozu Zizhixian, Baoan Xiang, Nongjiao, 607m, 24°05.580'N, 107°46.971'E, leg. Ishibe, T., Ohara, K., Okubo, K. & Otani, J.U., 22.10.2011., JUO/1 paratype, OK/5 paratypes, PGB/1 paratype (ex coll. K. Ohara); China, Guangxi, Bama Yaozu Zizhixian, Jiaoyuetiankeng, 285m, 24°06.92707'N, 107°06.81754'E, leg. Nakahara, Y., Ohara, K., Okubo, K. & Otani, J.U., 15.07.2006., HNHM 99700 (1 paratype: shell, ethanol-preserved body, prepared genitalia, radula on double faced

adhesive tape), JUO/1 paratype, OK/3 paratypes; China, Guangxi, Dahua Yaozu Zizhixian, Qibainong Xiang, near bus stop at Nòngténg, 603m, 24°04.905'N, 107°41.100'E, leg. Ishibe, T., Ohara, K., Okubo, K. & Otani, J.U., 22.10.2011., JUO/2 paratypes; China, Guangxi, Heshan Shi, Beisi Xiang, Baxianyan, 120m, 23°49.510'N, 108°55.942'E, leg. Nakahara, Y., Ohara, K., Okubo, K. & Otani, J.U., 14.11.2004., OK/1 paratype; China, Guangxi, Laibin, leg. Takagi T., collection date unknown, OK/1 paratype (not exact locality, not indicated on the map); China, Guangxi, Laibin Shi, Wushan Xiang, eastern end of Xiaopingyang Zhen, 130m, 23°24.351'N, 109°10.029'E, leg. Hunyadi, A., 7.10.2009, HA/1 paratype; China, Guangxi, Hechi Shi, Duan Yaozu Zizhixian, Gaoling Cun, Dingfu Cun W 2km, 320m, 24°03.197'N, 108°01.290'E, leg. Hunyadi, A., 8.10.2009, HA/1 paratype; China, Guangxi, Nanning Shi, Longan Xian, Longhushan Senlin Gongyuan, Peri Hill, 140m, 22°57.485'N, 107°37.754'E, leg. Hunyadi, A., 11.10.2009, HA/5 paratypes; China, Guangxi, Hechi Shi, Bama Xian, cliffs near Jiaole Cun, 590m, 24°7.045'N, 107°7.847'E, leg. Hunyadi, A. & Szekeres, M., 10.09.2013, HA/12 adult paratypes +7 juvenile paratypes; China, Guangxi, Dahua Yaozu Zizhixian, prefectural border at Qibainong Xiang, 688m, 24°06.496'N, 107°41.466'E, leg. Ishibe, T., Ohara, K., Okubo, K. & Otani, J.U., 22.10.2011., JUO/2 paratypes.

*Type locality* China, Guangxi, Douan Yaozu Zizhixian, Baoan Xiang, Nongjiao, 607m, 24°05.580'N, 107°46.971'E.

*Measurements* (in mm) shell diameter: 32.5–49.5, shell height: 14.9–20.9 (n=17, from different samples). See also Table 1.

*Diagnosis* A large, brownish, nearly flat camaenid species with very narrow, but open umbilicus, semilunar aperture and irregularly growing whorls. Penis relatively short, thickened internally with parallel folds and a small, triangular, pointed verge with lateral opening. Vagina very short with longitudinal wrinkles internally.

*Description of the shell* (Figs 4C–D, 5) Shell large, dextral, rather thin and light in face of its robust appearance, light chocolate brown to dark orange in colour; shell rather flat with slightly elevated spire; shell outline rather oval from dorsal view

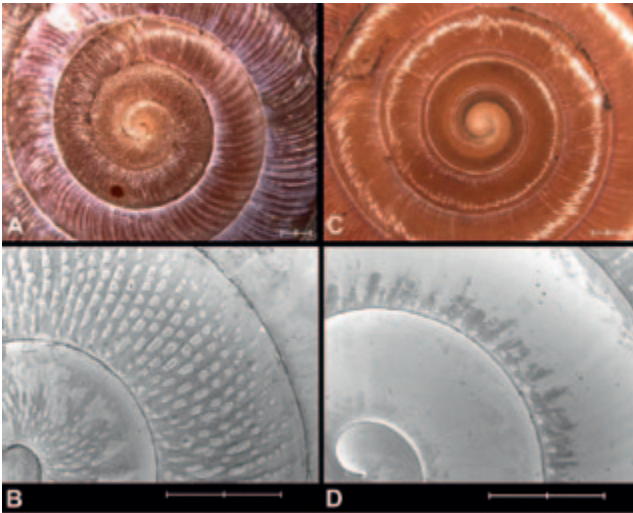


**Figure 4** Living specimens and shells of *Entadella entadiformis* Páll-Gergely & Hunyadi n. sp. **A:** Paratype from Jiaoyuetiankeng in its original environment; **B:** living holotype (HNHM 99699); **C:** holotype (HNHM 99699); **D:** paratype from Jiaoyuetiankeng (HNHM 99700).

due to the shape of the body whorl which is the widest on the opposite side of the shell than the aperture; in one specimen from Laibin the body whorl was the widest about a quarter whorl behind the aperture; body whorl rounded, somewhat shouldered by slightly depressed from ventrolateral direction; whorls 6.25–7.25, convex, separated by moderately deep suture; protoconch 2.25–2.5 whorls, covered with rough, elongated papillae which are arranged irregularly on the first approximately 1.5 whorls but

gradually become regular and arranged in radial rows; usually 8–10 tubercles stand in a single row; occasionally the first 0.5–1 whorl is irregularly wrinkled without tubercles; these tubercles cover the whole protoconch in only some populations (Qibainong Xiang and Nòngténg) in others the protoconch is nearly entirely smooth, only very few tubercles are visible near the inner suture; teleoconch sculpture dominated by radial wrinkles that are rather regular and simple at the beginning of the teleoconch (first



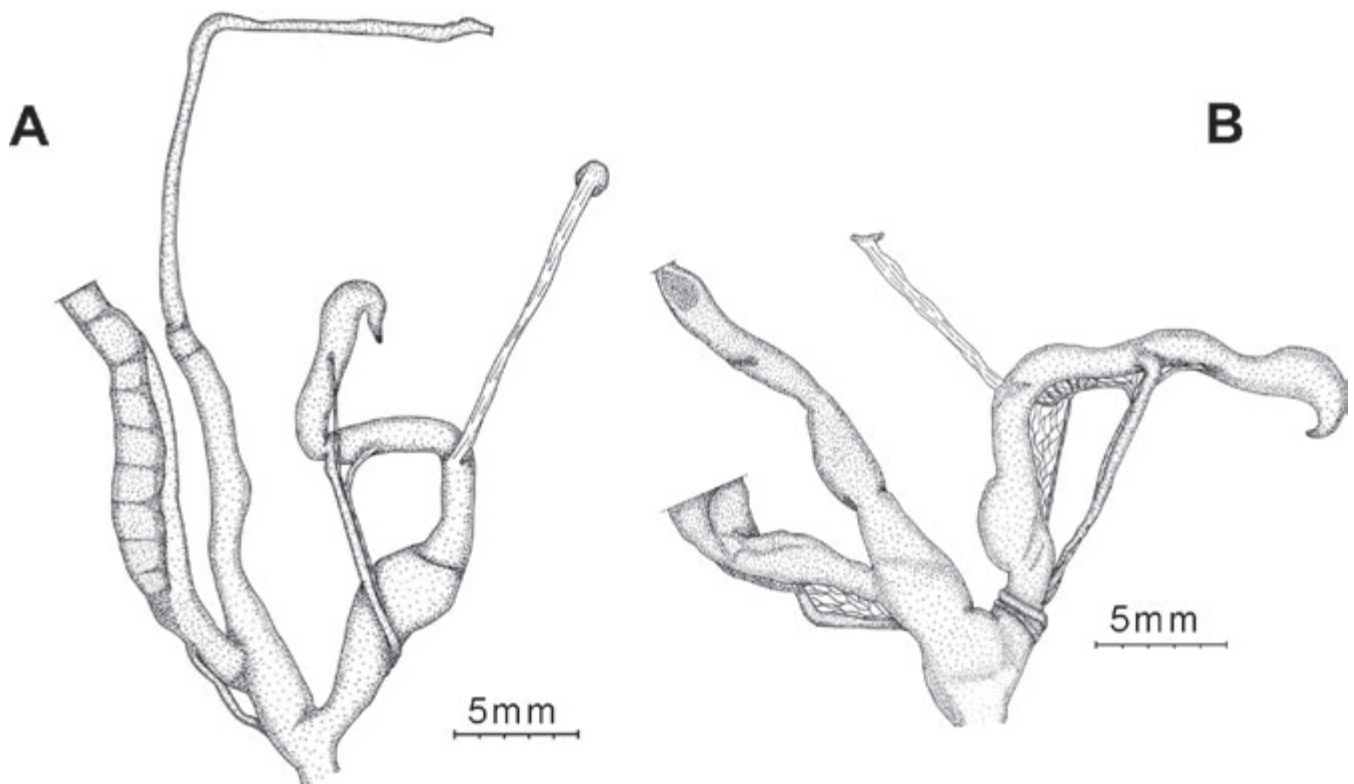


**Figure 5** Protoconch of *Entadella entadiformis* Páll-Gergely & Hunyadi n. sp. **A–B**: holotype (HNHM 99699); **C–D**: paratype from Jiaoyuetiankeng (HNHM 99700). Scales represent 1mm.

0.5–2 whorls, depending on populations), but become irregular and rugged gradually (there are several small nodes at the back side); some very fine, dense spiral lines are also discernible between ribs; ventral side nearly smooth, only very fine wrinkles and spiral lines are visible;

rough dorsal sculpture gradually changes on the body whorl to smooth ventral surface; umbilicus open but very narrow, its edge slightly covered by peristome; aperture semilunar, elongated in the direction of the umbilicus; slightly oblique to the shell axis from lateral view; no inner ribs, lamellae or teeth present; peristome lighter than the shell, it is somewhat thickened and slightly reflexed; callus absent, but there is a very fine calcium layer on the parietal shell wall which results in a very slightly lighter colour than the rest of the shell.

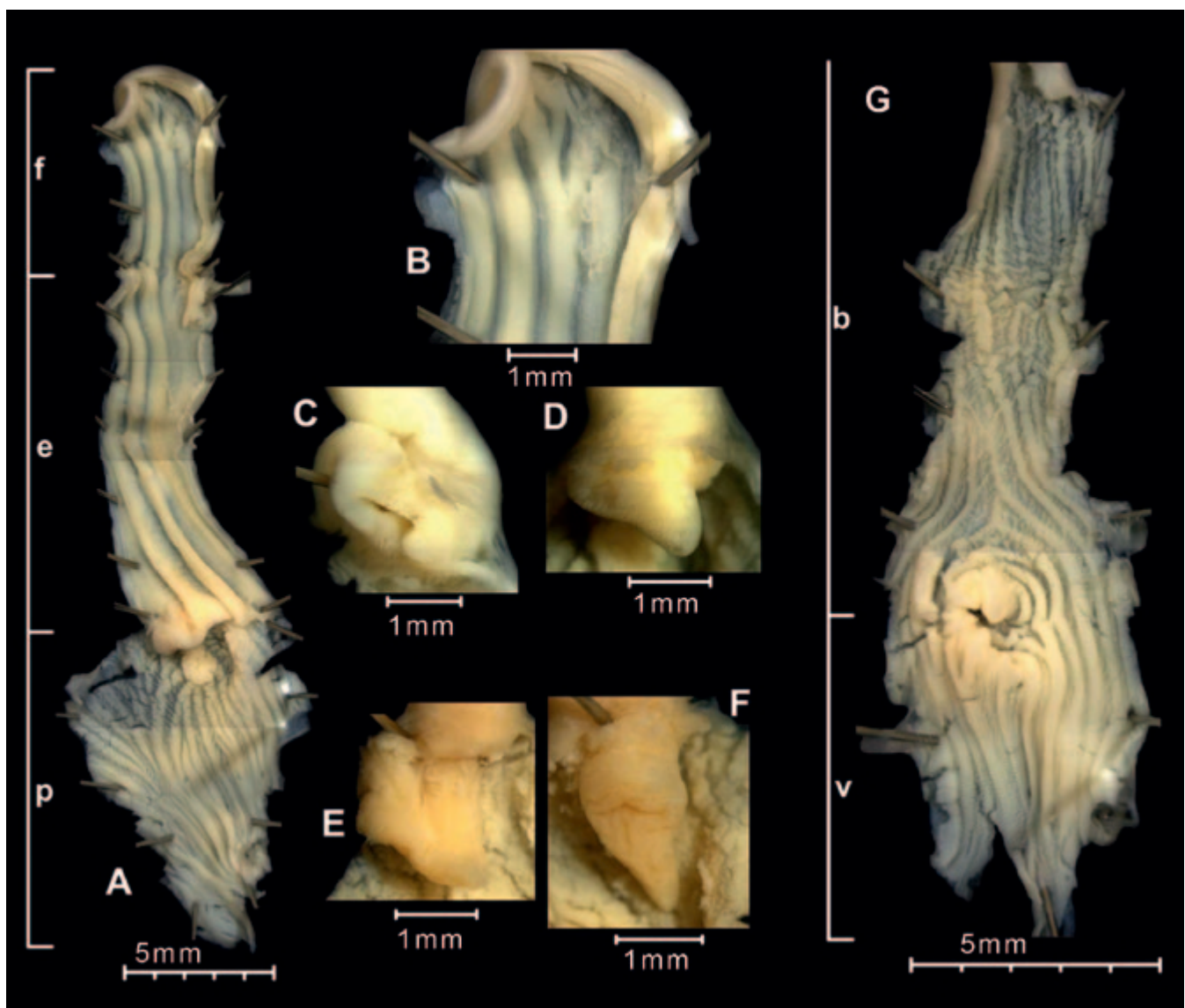
*Description of the body and the genitalia* (Figs 4A–B, 6–7) Body dark bluish grey; caudal horn and caudal foss absent; lateral zones of sole grey, central zone light, but not delimited sharply; extent of the white central zone variable in the two examined specimen; in the holotype the central zone only slightly wider than one of the darker lateral zones, whereas in specimen from Jiaoyuetiankeng the lateral grey zones are very narrow; tentacles relatively short; no head wart visible. Because of the absent apical whorls of the bodies of the anatomically examined specimens, the pallial complex could not be examined.



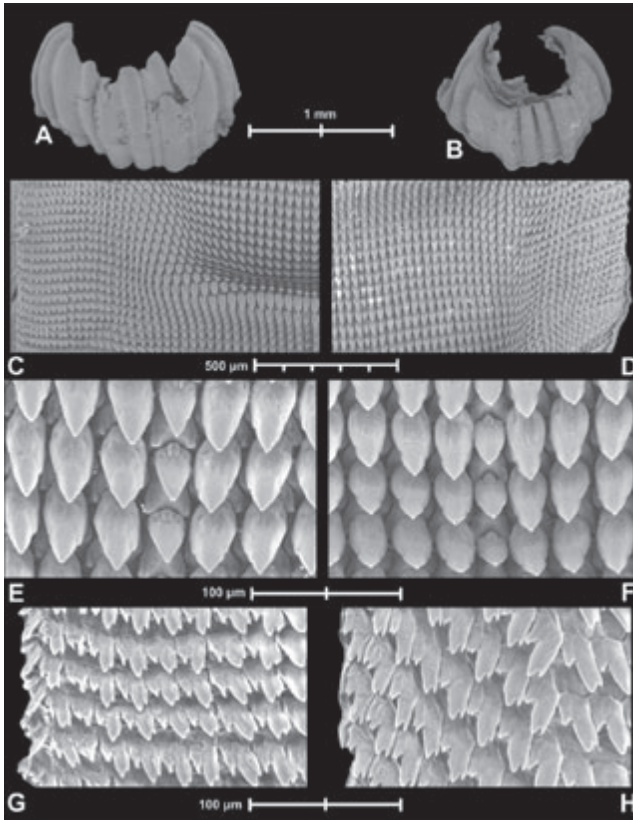
**Figure 6** Genital anatomy of *Entadella entadiformis* Páll-Gergely & Hunyadi n. sp. **A**: holotype (HNHM 99699); **B**: paratype from Jiaoyuetiankeng, (HNHM 99700).

**Table 1** Measurements of *Entadella entadiformis* n. sp. from different localities.

Locality name	Shell diameter (in mm)	Shell height (in mm)	no. of measured specimens
Nongjiao	38.6–49.5	16.9–20.4	8
Jiaoyuetiankeng	38.2–43.3	17.3–19.8	5
Qibainong Xiang	45.1–47.3	20.7–20.9	2
Nòngténg	39.6–39.8	18.6–18.7	2
Laibin	33.2	16.7	1
Baxianyan	32.5	14.9	1
Jiaole Cun	33.2–37.7	15.8–17.3	4
Xiaopingyang Zhen	33.5	17.6	1
Dingfu Cun	44.8	spire broken	1
Peri Hill	35.4–38.3	17.2–20.4	5



**Figure 7** Inner structure of the reproductive organs of *Entadella entadiformis* Páll-Gergely & Hunyadi n. sp. Figs A–D and G show the holotype (HNHM 99699), Figs E–F show the paratype from Jiaoyuetiankeng (HNHM 99700). A: penis (p), epiphallus (e) and flagellum (f); B: flagellum; C–F: penial verge; G: vagina (v) and the stalk of the bursa copulatrix (b). Figs C–D and E–F show the verge from two different views.



**Figure 8** Jaw (A–B) and radula (C–H) of *Entadella entadiformis* Páll-Gergely & Hunyadi n. sp. Figs A, C, E, G: holotype (HNHM 99699); Figs B, D, F, H: paratype from Jiaoyuetiankeng (HNHM 99700). Figs C and D show the half of the radula, Figs E and F show the central and first lateral teeth, Figs G and H show the marginals.

Two specimens were dissected belonging to different populations. Right ommatophoral retractor crosses the male and female genitalia; penis relatively short, thickened, internally with irregular, parallel folds, some of which join together to form a single fold; the folds run into a circular wart-like structure which is situated at the proximal end of the penis, just under the penial verge; penial verge rather triangular, pointed, with lateral opening; epiphallus cylindrical, longer than the penis, with a strong retractor muscle attached around the middle; epiphallus internally with 4–5, strong, parallel longitudinal folds; flagellum well-developed, slightly shorter than epiphallus, with a pointed and curved apical part; the parallel fold on the inner wall of epiphallus continues inside flagellum; vas deferens cylindrical, relatively thick; an additional retractor muscle runs together with it; the two branches of the muscle attach on the epiphallus and flagellum; vagina

short and thick, internally with parallel, irregular wrinkles and some fine transversal structure between the folds; this inner structure continues in the stalk of the bursa copulatrix, which is very long.

*Description of the jaw and radula* (Fig. 8) Jaw odontognathous, with approximately ten very strong, irregular ribs. Radula elongated but not very slender; central tooth present, unicuspid, smaller than the first laterals; laterals and marginals are arranged in transversal, more or less straight rows; laterals 19, marginals at least 16; laterals unicuspid, gradually becoming bi- and tricuspid; marginals tricuspid, but the outermost cusp can be also divided; the endocone is the largest, it is rather pointed. The number of laterals and marginals only estimated because the number and shape of cusps changes gradually.

*Derivation of name* The name of the new species refers to the similarity of the shell to the seeds of *Entada* spp.

*Geographic range* (Fig. 9) This new species is known from Guangxi Province, China.

*Comparisons* *Entadella athrix* is smaller and less depressed (shell diameter: 24.6–30.2, shell height: 13.6–16.5), has fewer (5–6) whorls, and a yellow corneous shell. Moreover, its aperture is less oblique from lateral view, the growth rate of the whorls is more regular, its dorsal sculpture much weaker, and the protoconch is smooth, matt, without obvious tubercles. *Entadella cavaleriei* has much wider umbilicus, comparatively smaller aperture, and slightly more angled body whorl.

The weak constriction of the last whorl and the brown shell is superficially similar to *Stegodera angusticollis* (Martens, 1875) and *Traumatophora triscalpta* (Ancey, 1881). The former species is sinistral, the last whorl is distorted and crowded against the preceding whorls, and there is a longitudinal depression (sulcus) on the last whorl. The latter species has three longitudinal lamellae in the aperture, corresponding to longitudinal depressions of the outer surface of the body whorl.

The combination of the large, brownish, flat shell and the narrow umbilicus distinguishes



**Figure 9** Distribution of *Entadella entadiformis* Páll-Gergely & Hunyadi n. sp. (filled circle) and *E. athrix* (Möllendorff, 1901) (empty triangle).

*Entadella entadiformis* n. sp. from all known camaenid snails from southern China and Northern Vietnam.

**Habitat** *Entadella entadiformis* n. sp. inhabits limestone rich primarily and secondary forests, but does not seem to be associated with limestone rocks strongly. It is relatively abundant in its natural habitat.

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