

A new *Aegistohadra* (Gastropoda: Camaenidae) from southwest China

Min WU

School of Life Sciences, Nanjing University, Nanjing 210023, CHINA.
E-mail: minwu1969@aliyun.com

ABSTRACT. A new camaenid *Aegistohadra baii* sp. nov., close to *Aegistohadra delavayana* but having smaller and more conical shell and anatomically different, was described from Yunnan, southwest China. *Helix seraphinica* Heude, 1889 was confirmed to be an *Aegistohadra* species based on structure of genital organs. *Cryptozona yunlongensis* Chen Y., Chen D. et Zhang, 1997 was transferred to *Aegistohadra* based on shell and genital characters.

Zoobank registration: urn:lsid:zoobank.org:pub:50E4A1BF-CD1C-4910-82C4-2A6FC328B319

[https://doi.org/10.35885/ruthenica.2023.33\(2\).2](https://doi.org/10.35885/ruthenica.2023.33(2).2)

Новый вид *Aegistohadra* (Gastropoda: Camaenidae) из юго-западного Китая

Мин ВУ

School of Life Sciences, Nanjing University, Nanjing 210023, CHINA. E-mail: minwu1969@aliyun.com

РЕЗЮМЕ. Новый вид Camaenidae, *Aegistohadra baii* sp. nov., описан из провинции Юньнань, юго-западный Китай. Он близок к *Aegistohadra delavayana*, но имеет более коническую раковину меньших размеров, а также отличается анатомически. На основании структуры половых органов подтверждено, что *Helix seraphinica* Heude, 1889 относится к *Aegistohadra*. *Cryptozona yunlongensis* Chen Y., Chen D. et Zhang, 1997 перенесена в *Aegistohadra* на основании строения раковины и гениталий.

Introduction

The large-sized camaenid *Aegistohadra* Wu, 2004 is characterized by the presence of dart sac apparatus, penial caecum, flagellum and proximal accessory sac near vagina, with the type species *Aegistohadra delavayana* (Heude, 1885) [Wu, 2004]. Recently, more *Aegistohadra* species were described as new or transferred to the genus from *Amphidromus* Albers, 1850 and *Camaena* Albers, 1850 [Jirapatrasilp et al., 2022; Lee, 2022]. Presently nine species are recognized in *Aegistohadra*, namely *Aegistohadra contractiva* (Mabille, 1889), *A. dautzenbergi* (Fulton, 1899), *A. delavayana* (Heude, 1885), *A. elata* (Bavay et Dautzenberg, 1909), *A. jiahei* (Yang, Fan, Qiao et He, 2012), *A. mirifica* (Bavay et Dautzenberg, 1909), *A. rara* (Wang et Parsons, 2021), *A. roemeri*

(L. Pfeiffer, 1863) and *A. zhangdaneae* Jirapatrasilp et Lee, 2022. The *Aegistohadra* species are distributed in a contiguous region of China and Vietnam and the monophyly of the genus was confirmed based on molecular data of few species [Jirapatrasilp et al., 2022].

In this work, a new *Aegistohadra* species is described from southern Yunnan, which is adjacent to northern Vietnam. *Helix seraphinica* Heude, 1889 [Heude, 1889; 1890] that shows a close shell morphology with *A. delavayana* is confirmed to be an *Aegistohadra* taxa based on anatomy of genital organs.

Material and methods

For fixation, the animal was directly put in 70% ethanol, which was replaced with ethanol of the same concentration after several days. The shells were measured with digital vernier calipers to the nearest 0.1 mm. Whorls were counted following Kerney and Cameron [1979] to the nearest 0.125 (= $1/8$) whorls. The penis was dissected at the opposite side of penial retractor insertion. Directions used in the general descriptions of genitalia: proximal = towards the genital atrium; distal = away from the genital atrium. Directions in describing dart sac apparatuses are indicated on Fig. 9A. The corresponding Chinese name for person, new species or locality is present only once in square bracket when necessary. The collected and studied material is stored in the Museum in Hebei University.

Abbreviations. AS – accessory sac; At – atrium; BC – bursa copulatrix; BCD – bursa copulatrix duct; DS – dart sac; DSC – dart sac chamber; Dt – love dart; DtC – a chamber containing love dart; EDC –

entrance of dart chamber; EOP – external opening of penis; Ep – epiphallus; EOV – external opening of vagina; FO – free oviduct; HBUMM – Mollusk collection of Museum of Hebei University (Baoding, China); MG – mucous glands; MGP – mucous glands entering papilla; P – penis; PC – penial caecum; PAS – proximal accessory sac, a blind sac on proximal dart sac (=DVM); MO – opening of mucous glands leading to dart chamber; OA – opening of accessory sac; PO – opening of proximal accessory sac leading to dart sac chamber or dart chamber; PR – penial retractor muscle; Va – vagina; VD – vas deferens.

Results

Family Camaenidae Pilsbry, 1895 Genus *Aegistohadra* Wu, 2004

Wu, 2004: 112; Jirapatrasilp *et al.*, 2022: 264.

Type species (by original designation): *Nanina delavayana* Heude, 1885; China.

Aegistohadra seraphinica (Heude, 1889) comb. nov.

Figs 1; 2 A–B; 4 A–C; 5; 6; 9B

Helix seraphinica Heude, 1889: 225; Heude, 1890: 141, pl. 38, fig. 11.; Wu, 2004: 118, fig. 33.

Helix (Camaena) seraphinica Pilsbry, 1890: 199, pl. 69, figs 6, 7.

Material examined. HBUMM08466a, a fully mature animal with repaired aperture; near 23°37.8'N 102°50.9'E, Jianshuixian [建水县], Honghe [红河], Yunnan Province, China; 2019, coll. Bai Hao-Chen [白昊晨] and a local collector.

General anatomy (Figs 4 A–C). Eversible head wart flat but distinct. Mantle lobe very broad, extending from mid line to lateral side, with posterior part developed and leave-shaped (Fig. 4A, arrowed). Suprapneumostomal lobes developed (Fig. 4B, arrowed). Body uniformly yellowish brown, without mosaic pigmentation. Sole creamy white. Jaw arcuate, with approximate 5 projecting ribs.

Genital anatomy (Figs 5–6; 9B). Terminal genitalia encapsulated with a thick layer of connective tissue. Penial sheath absent. Penis tube-shaped, distally with an elongate conical and terminally pointed penial caecum. Proximal 1/2 penis internally with two very thick smooth longitudinal pilasters, then each branching off and broken into several series of granules, which form a more or less transversal ridge, or a papilla, which partially separates the penis and the epiphallus and the distal part of which extends into the penial caecum. Penis-epiphallus chamber absent. In penial caecum pilasters come from those of both penis and epiphallus. Epiphallus much thinner than penis, internally with approximately 5 pilasters of the same thickness. Flagellum about as long as

epiphallus, slowly tapering; internally, one of inner folds forming a closed tube rather than an opened C-shaped pilaster towards terminal flagellum and opening at vas deference entrance. Penial retractor muscle attached at proximal 1/3 of epiphallus. Vas deferens of same thickness, opening at internal epiphallus by a valve-like entrance. Dart sac very developed, long, with an accessory sac between dart sac and vagina. Love dart one, fully calcified, somewhat twisted and asymmetric along the longitudinal axis, about 24.0 mm long, with cross section apically sharply two-bladed and then ovate (Fig. 6). Accessory sac large, sac-shaped and with median constriction, internally spongy, entering into distal dart chamber (Figs 5 A–C; 6A; 9B). Mucous glands as long as dart sac, tied tightly to the trunk of vagina, with two lobules that are extremely complicatedly branched. Two stalks of mucous glands merged into one that composed of many tubes (Fig. 5C), then entering chamber of accessory sac. A developed proximal accessory sac, in size less than 1/3 of dart sac, present at lateral middle on left side of dart sac apparatus (Figs 5A; 9B). Proximal accessory sac with a very thick muscular outer wall (Fig. 9B), opening to dart chamber between entrances of accessory sac and vagina. Vagina about 1/2 length of dart sac. Bursa copulatrix duct proximally thick and tapering. Bursa copulatrix oval.

Distribution (Fig. 1). Si-lin (西林 = today's Tianlinxian [田林县], the Guangxi Zhuang Autonomous Region; type locality); Jianshuixian [建水县, Yunnan Province].

Remarks. The shell of specimen HBUMM08466a is a fully mature one with a repaired aperture. The residual trace of the original aperture on the shell (Fig. 2A) suggests that the specimen has the same obliquity of the descending whorl near aperture as that in the paratypes of *Helix seraphinica* Heude, 1889. Furthermore, the specimen coincides with the paratypes of *H. seraphinica* on the coloration, banding, shell shape and measurement (compare Fig. 2A to fig. 33 in Wu 2004). Based on the genital anatomy (Fig. 5), this species has to be moved to *Aegistohadra*.

Aegistohadra baii sp. nov.

Figs 1; 2 C–D; 3; 4 D–E; 7; 8; 9 C–D

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Material examined. Holotype (dissected): HBUMM08465-spec.1, a fully mature animal with a sinistral shell; near 22°46.2'N 104°28.2'E, Maguanxian [马关县], Wenshan [文山], Yunnan Province, China; 04.10.2019, coll. Bai Hao-Chen. Paratypes: HBUMM08465-spec.1, a fully mature sinistral shell, same data as holotype; HBUMM08463, a fully mature animal (dissected) with a dextral shell,



FIG. 1. Distribution of *Aegistohadra* in China. Key: dark blue dots, *A. delavayana* (Heude, 1885); light yellow dot, *A. contractiva* (Mabille, 1889); purple dots, *A. dautzenbergi* (Fulton, 1899); light blue dot, *A. jiahei* (Yang, Fan, Qiao et He, 2012); pink dot, *A. mirifica* (Bavay et Dautzenberg, 1909); grey dot, *A. rara* (Wang et Parsons, 2021); light green dot, *A. roemeri* (L. Pfeiffer, 1863); orange dots, *A. seraphinica* (Heude, 1889); dark green dot, *A. yunlongensis* (Chen Y., Chen D. et Zhang, 1997); white dot, *A. zhangdaneae* Jirapatrasilp et Lee, 2022; red dot, *A. baii* sp. nov. *A. elata* (Bavay et Dautzenberg, 1909) is not mapped because of inexact locality in Guangxi.

РИС. 1. Распределение *Aegistohadra* в Китае. Обозначения: синие точки, *A. delavayana* (Heude, 1885); желтые точки, *A. contractiva* (Mabille, 1889); пурпурные точки, *A. dautzenbergi* (Fulton, 1899); голубая точка, *A. jiahei* (Yang, Fan, Qiao et He, 2012); розовая точка, *A. mirifica* (Bavay et Dautzenberg, 1909); серая точка, *A. rara* (Wang et Parsons, 2021); светло-зеленая точка, *A. roemeri* (L. Pfeiffer, 1863); оранжевые точки, *A. seraphinica* (Heude, 1889); темно-зеленая точка, *A. yunlongensis* (Chen Y., Chen D. et Zhang, 1997); белая точка, *A. zhangdaneae* Jirapatrasilp et Lee, 2022; красная точка, *A. baii* sp. nov. *A. elata* (Bavay et Dautzenberg, 1909) не обозначена на карте из-за неточного места распространения в Гуанси.

same data as holotype. Measurement of holotype: shell height 21.7 mm, shell major diameter 30.1 mm, aperture height 11.0 mm, aperture breadth 14.3 mm, umbilicus diameter 3.6 mm, protoconch whorls $1\frac{1}{2}$, whorls $5\frac{3}{8}$.

Diagnosis. Shell conical, dextral or sinistral. Body whorl peripherally rounded. A large proximal accessory sac on proximal dart sac. Flagellum proximally swollen then abruptly thinned down.

Shell (Figs 2C–D; 3). Shell dextral or sinistral, conical, thin but solid, with $5\frac{3}{8}$ – $5\frac{5}{8}$ convex whorls. Suture deeply impressed. Protoconch $1\frac{1}{2}$ whorls, with sculpture obscured by weathering or abrasion (Figs 2D; 3B). Growth lines fine or thick. Spiral grooves unevenly distributed. Body whorl peripherally rounded. Aperture oblique, broadly ovate,

suddenly descending in front. Peristome slightly expanded and reflexed except upper part. Columella oblique. Umbilicus small, approximately $\frac{1}{9}$ of shell major diameter, slightly covered by reflexed columella. Shell is pale yellow with chestnut bands: one broad, beneath periphery; two broad bands above periphery of which the lower one slightly overlaps periphery; and the most upper one much narrower and close to suture. The first $2\frac{1}{2}$ whorls faintly colored or banded.

General anatomy (Figs 4 D–E; 7G). Neither eversible head wart nor gland pit leading to internal body present. For the dextral individual, at left side a broad but shortly projecting mantle lobe present (Fig. 4E, arrowed); for the sinistral snail such lobe is present on the opposite side on mantle edge. Supra-



FIG. 2. A, B. *Aegistohadra seraphinica* (Heude, 1889), HBUMM08466a. A. Shell. B. Enlarged embryonic shell (not to scale). C, D. *Aegistohadra baii* sp. nov., dextral specimen, paratype HBUMM08463-spec.1. C. Shell. D. Enlarged embryonic shell (not to scale).

РИС. 2. А, Б. *Aegistohadra seraphinica* (Heude, 1889), HBUMM08466a. А. Раковина. В. Увеличенная эмбриональная раковина (не в масштабе). С, Д. *Aegistohadra baii* sp. nov., декстральный экземпляр, паратип HBUMM08463-spec.1. С. Раковина. Д. Увеличенная эмбриональная раковина (не в масштабе).

pneumostomal lobes normally developed (Fig. 4D, arrowed). Body uniformly yellowish brown, without mosaic pigmentation. Sole creamy white. Jaw articulate, with approximate 6 projecting ribs (Fig. 7G).

Genital anatomy (Figs 7 A–F; 8; 9 C–D). Penial sheath absent, except for some proximal connective tissue present near atrium. Penis tube-

shaped, distally with a penial caecum of the same thickness and terminally roundly blunted. Proximal approximately $\frac{1}{2}$ penis internally with two very thick smooth longitudinal pilasters, each branching off and broken into several series of granules, which form a more or less transversal ridge, or a papilla, which partially separates the penis and the epiphallus



FIG. 3. *Aegistohadra baii* sp. nov., sinistral specimens. A. Holotype, HBUMM08465-spec.1. B. Enlarged embryonic shell of holotype (not to scale). C. Paratype, HBUMM08465-spec.2.

РИС. 3. *Aegistohadra baii* sp. nov., синистральные экземпляры. А. Голотип, HBUMM08465-спец.1. В. Увеличенная эмбриональная раковина голотипа (не в масштабе). С. Паратип, HBUMM08465-спец.2.

and the distal part of which extends into the penial caecum. Penis-epiphallus chamber absent. In penial caecum pilasters come from those of both penis and

epiphallus. Epiphallus thinner than penis, internally with approximately 5 pilasters of the same thickness. Flagellum about as long as epiphallus, proximally

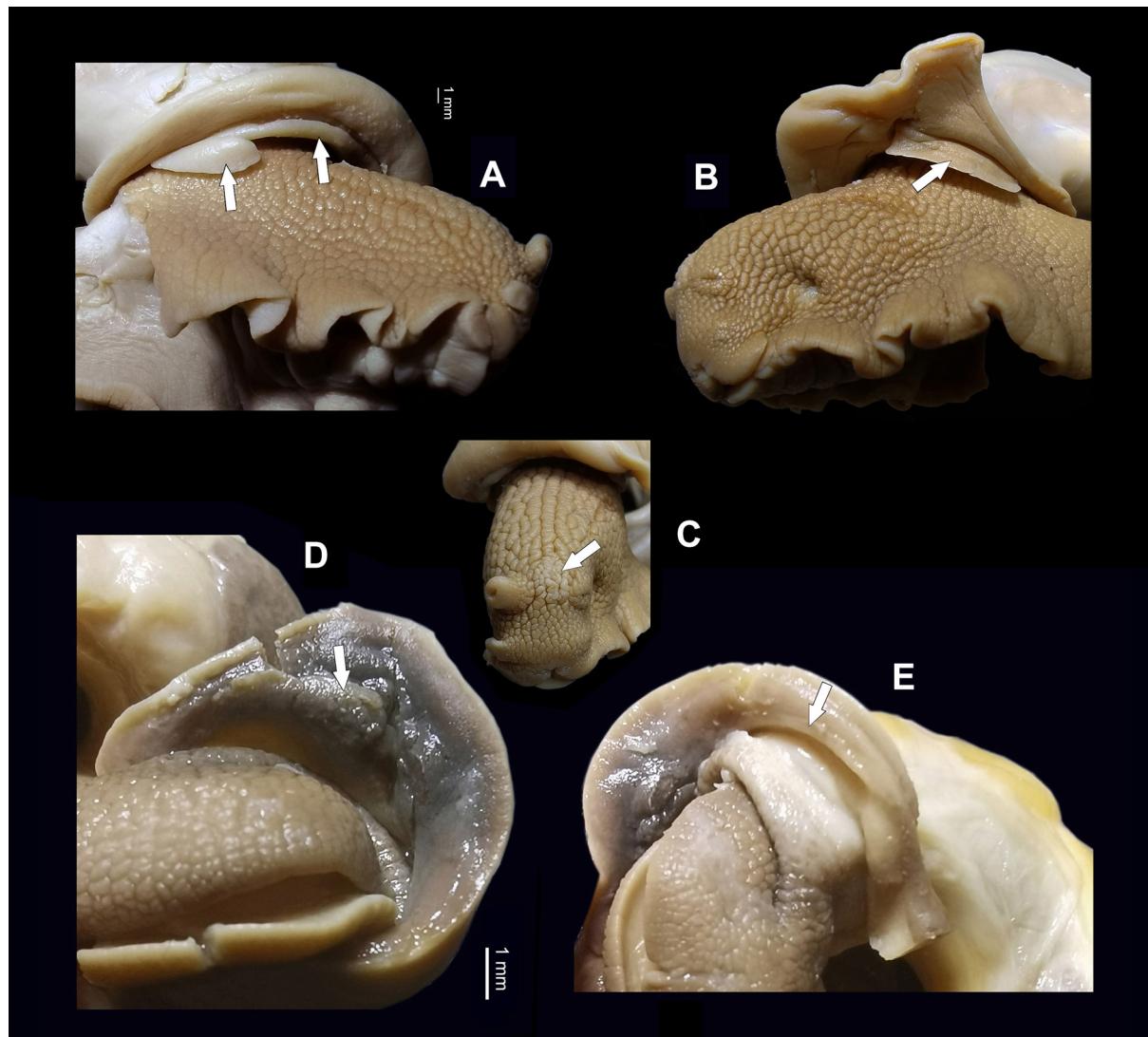


FIG. 4. A–C. *Aegistohadra seraphinica* (Heude, 1889), HBUMM08466a. A. Right side of mantle edge, arrows indicating mantle lobe. B. Left side of mantle edge, arrow indicating suprapneumostomal lobe. C. Head, head wart arrowed. D–E. *Aegistohadra baii* sp. nov., paratype HBUMM08463-spec.1. D. Right side of mantle edge, arrow indicating suprapneumostomal lobe. E. Left side of mantle edge, arrow indicating mantle lobe.

РИС. 4. A–C. *Aegistohadra seraphinica* (Heude, 1889), HBUMM08466a. А. Правая сторона мантийного края, стрелки обозначают мантийную лопасть. В. Левая сторона мантийного края, стрелки обозначают супраневмостомальную лопасть. С. Голова, стрелка обозначает головную пору. D–E. *Aegistohadra baii* sp. nov., параптип HBUMM08463-spec.1. Д. Правая сторона мантийного края, стрелки обозначают супраневмостомальную лопасть. Е. Левая сторона мантийного края, стрелки обозначают мантийную лопасть.

swollen but suddenly thinned down; internally, one of inner folds forming a closed tube rather than an opened C-shaped pilaster towards terminal flagellum and opening at vas deference entrance. Penial retractor muscle attached at median portion of epiphallus. Vas deferens of same thickness, opening at internal epiphallus by a valve-like entrance. Dart sac developed, with an accessory sac below. Love dart single, fully calcified, symmetric along the longitudinal axis, fairly straight, about 8.0 mm long, with cross section apically two-bladed and then ovate (Fig. 7F). Accessory sac large in size, pear-shaped, with spongy internal wall, entering into dart sac chamber rather than into dart chamber. Mucous glands as long

as dart sac, tied tightly to the trunk of vagina, with two lobules that are complicatedly branched. Two stalks of mucous glands merged into one, then entering chamber of accessory sac through a prominent papilla with several openings (Fig. 9C). A developed proximal accessory sac, in size about $\frac{1}{2}$ of dart sac, present proximally on dart sac apparatus (for sinistral animal on the left side, for dextral animal on the right). Proximal accessory sac with a very thick muscular outer wall, opening to dart sac chamber near entrances of accessory sac and vagina (Fig. 9D). Vagina shorter than dart sac. Bursa copulatrix duct equally thin, slightly thinner than vagina. Bursa copulatrix oval.

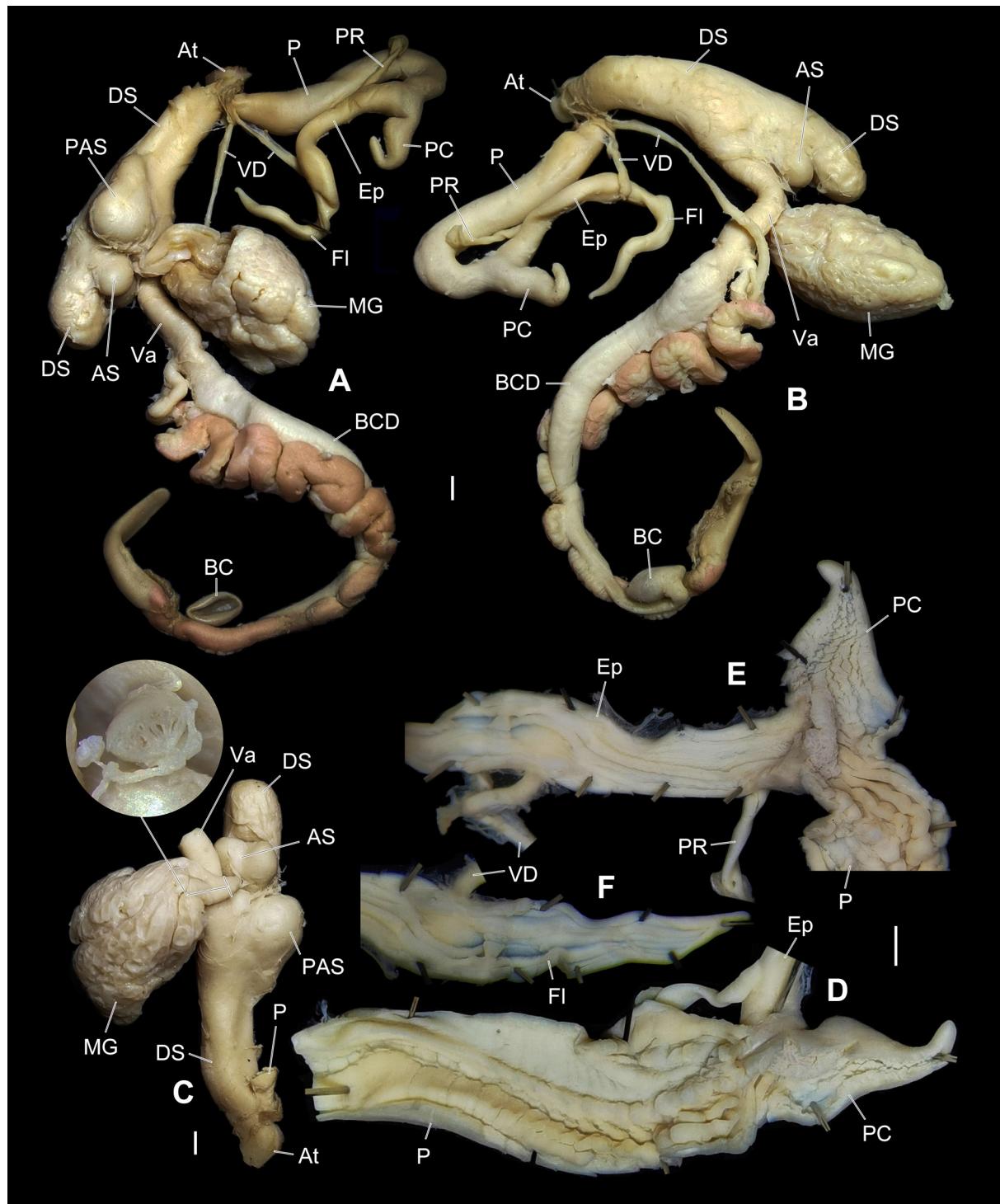


FIG. 5. *Aegistohadra seraphinica* (Heude, 1889), HBUMM08466a. A. Genitalia, left side. B. Genitalia, right side. C. Ventral side of dart sac apparatus, with cross-section of stalk of mucous glands enlarged (not to scale). D. Exposed penis. E. Exposed penile caecum and epiphallus. F. Exposed flagellum. All scale bars 2 mm.

РИС. 5. *Aegistohadra seraphinica* (Heude, 1889), HBUMM08466a. А. Половая система слева. В. Половая система справа. С. Вентральная сторона аппарата стиофора с увеличенным поперечным срезом стебелька слизистых желез (не в масштабе). Д. Вскрытый пенис. Е. Вскрытый цекум пениса и эпифаллус. Ф. Вскрытый флагеллюм. Масштаб 2 мм.

Ecology. The animals live in karst hill area, inhabiting limestone rocks thick with lianas.

Distribution (Fig. 1). *Aegistohadra baii* sp. nov. is currently known from the type locality.

Remarks. This new species shares many conchological and genital characters with *Aegistohadra delavayana* [Heude, 1885; Wu, 2004], including sculpture on shell surface, shell coloration, presence

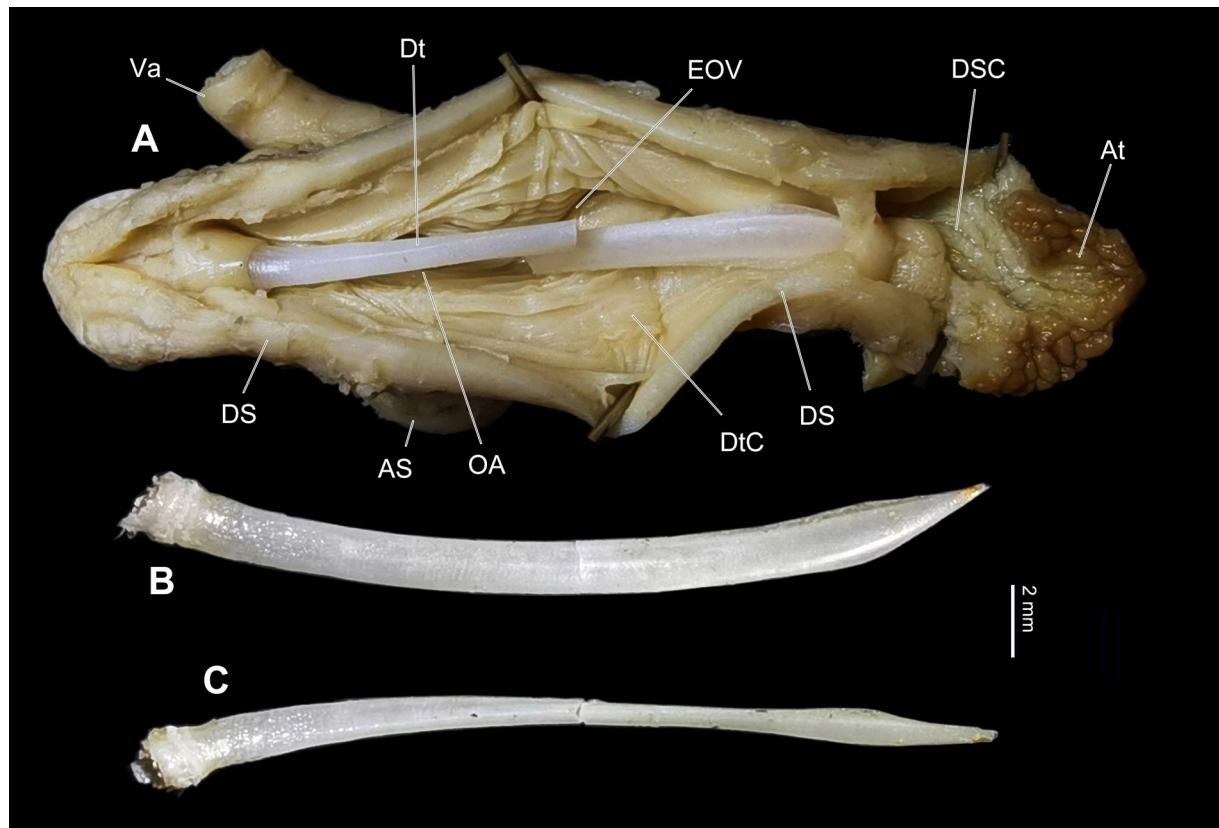


FIG. 6. *Aegistohadra seraphinica* (Heude, 1889), HBUMM08466a. A. Apically exposed dart sac. The love dart is centrally broken into two pieces. B. Love dart. C. Love dart, another view.

FIG. 6. *Aegistohadra seraphinica* (Heude, 1889), HBUMM08466a. A. Апикально вскрытый стилофор, Любовная стрела переломана посередине. B. Любовная стрела. C. Любовная стрела, вид с другой стороны.

of penial caecum, dart sac apparatus and flagellum. However, the new species can be immediately recognized by the smaller and more conical shell. In terms of genital the new species is characterized by having one large proximal accessory sac rather than two smaller proximal accessory sacs in *A. delavayana*. In addition, the shell shape and spiral bands of the new species (Figs 2 C–D; 3) fairly resemble those of *Aegistohadra seraphinica* (Heude, 1889) (Fig. 2 A–B) [fig. 33 in Wu, 2004], except that the former species has a relatively higher shell and a separate broad band around umbilicus.

Cryptozona yunlongensis Chen Y., Chen D. et Zhang, 1997, a dextral species known from Yunlong County of Yunnan Province [Chen et al., 1997], is undoubtedly a valid *Aegistohadra* species based on its shell morphology and anatomy of genital organs [partial opinion from Ding Yu-Tong, pers. comm.]. *A. yunlongensis* can be promptly distinguished from the sympatric *A. delavayana* by the different chirality, possessing carinate periphery and a tubular penial caecum. Conchologically, the new species differs from *A. yunlongensis* in the smaller shell size and the rounded periphery.

Most recently, the known distribution range of *Aegistohadra* was extended to Sichuan Province

based on the finding of *Aegistohadra delavayana* (HBUMM08485 spec.1–2) in Panzhihua, Sichuan Province by Mr Shen Yu-Han [沈榆涵] (Fig. 1).

Etymology. This new species is named after Mr Bai Hao-Chen, who collected the specimens and prepared the field data for this work.

Discussion

Aegistohadra is particular in Camaenidae for the presence of the penial caecum, dart sac apparatus and proximal accessory sac (= ‘sacs on vagina’ in Wu, 2004). The penial caecum is virtually located at the transition of the penis-epiphallus, where as showed in the new species a thick pilaster from penis serves as a part of the epiphallus papilla. Another camaenid genus that has the similar thick penial pilaster with the role of epiphallus papilla is *Eueuhadra* Wu, 2004 [fig. 36 B–C in Wu, 2004]. It must be mentioned here that *Xesta taibaishanensis* Lin, Zhou et Chen, 2007 that was described from Shaanxi Province [Lin et al., 2007] is a species of *Eueuhadra* and its shell is slightly smaller than that of *Eueuhadra gonggashanensis* Wu, 2004 [partial opinion from Ding Yu-Tong, pers. comm.].

Compared to the other dart sac-bearing camae-

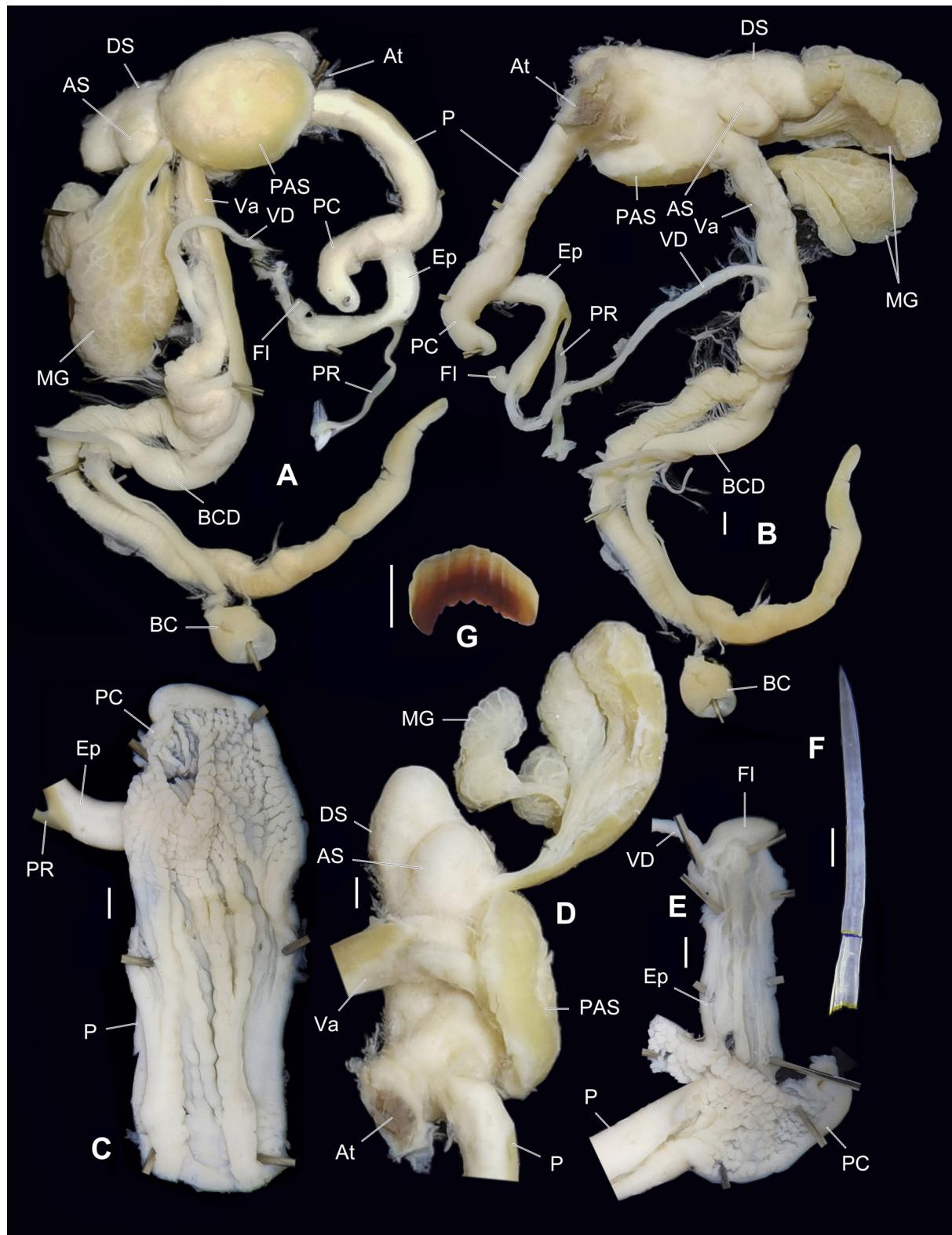


FIG. 7. *Aegistohadra baii* sp. nov., holotype, a sinistral specimen, HBUMM08465-spec.1. **A.** Genitalia, left side. **B.** Genitalia, right side. **C.** Exposed penis and penial caecum. **D.** Ventral side of dart sac apparatus, with half mucous glands removed. **E.** Exposed epiphallus and proximal part of flagellum which was lost by accident. **F.** Love dart, distally incomplete. **G.** Jaw. All bars 1 mm.

FIG. 7. *Aegistohadra baii* sp. nov., голотип, синистральный экземпляр, НВУММ08465-spec.1. **A.** Половая система слева. **B.** Половая система справа. **C.** Вскрытый пенис и цекум пениса. **D.** Вентральная сторона аппарата стилофора с половиной удаленных слизистых желез. **E.** Вскрытый эпифаллус, проксимальная часть флагеллюма отсутствует. **F.** Любовная стрела, отсутствует дистальная часть. **G.** Челюсть. Масштаб 1 мм.

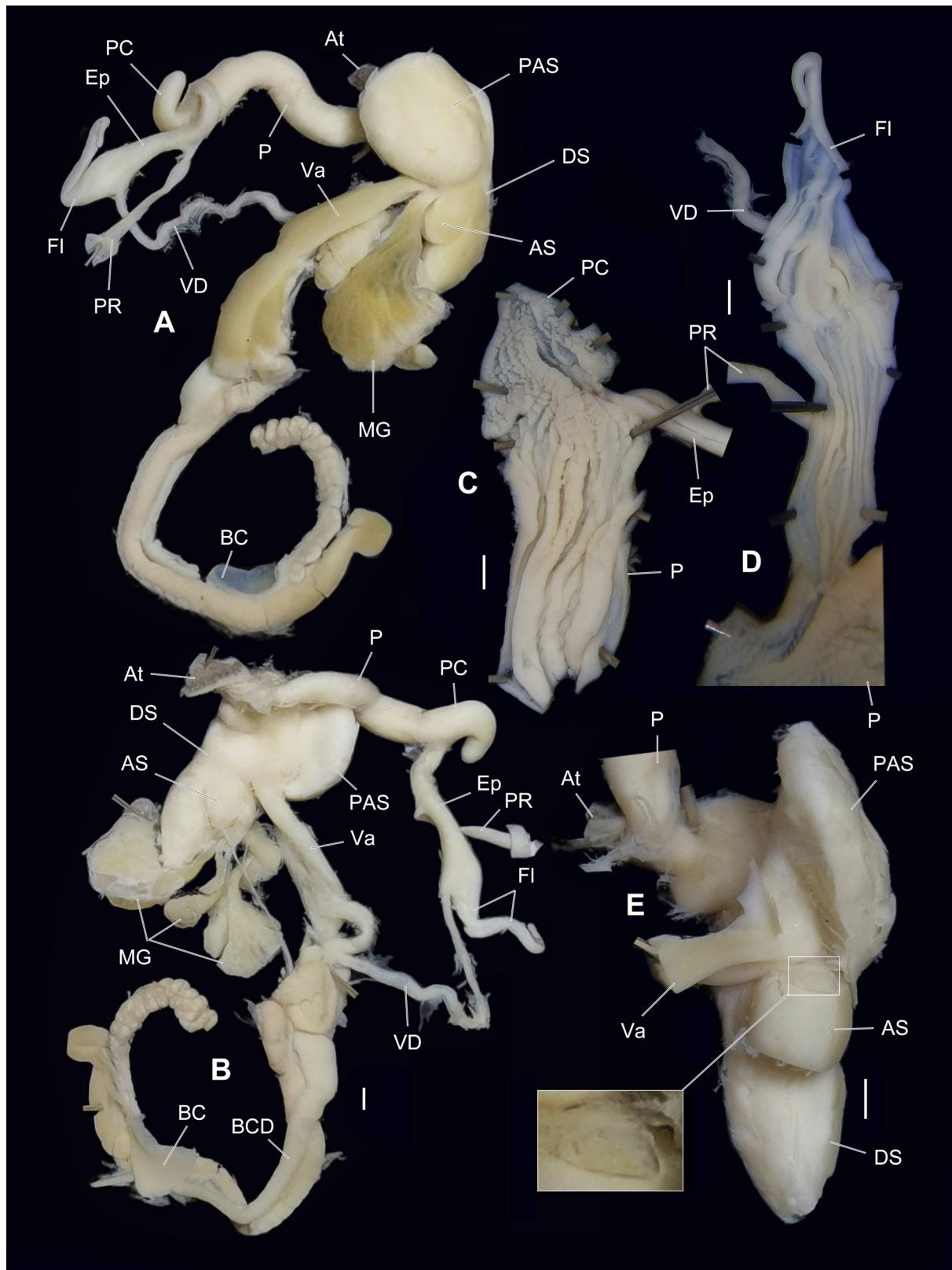


FIG. 8. *Aegistohadra baii* sp. nov., paratype, a dextral specimen, HBUMM08463-spec.1. **A.** Genitalia, right side. **B.** Genitalia, left side. **C.** Exposed penis and penial caecum. **D.** Exposed epiphallus and flagellum. **E.** Ventral side of dart sac apparatus, with mucous glands removed by trimming the stalk, whose cross-section is magnified. All bars 1 mm.

РИС. 8. *Aegistohadra baii* sp. nov., парапит, декстральный экземпляр, HBUMM08463-spec.1. **А.** Половая система справа. **Б.** Половая система слева. **С.** Вскрытый пенис и цекум пениса. **Д.** Вскрытый эпифаллус и флагеллом. **Е.** Вентральная сторона аппарата стиофора, слизистые железы удалены перерезанием стебелька, поперечный срез которого увеличен. Масштаб 1 мм.

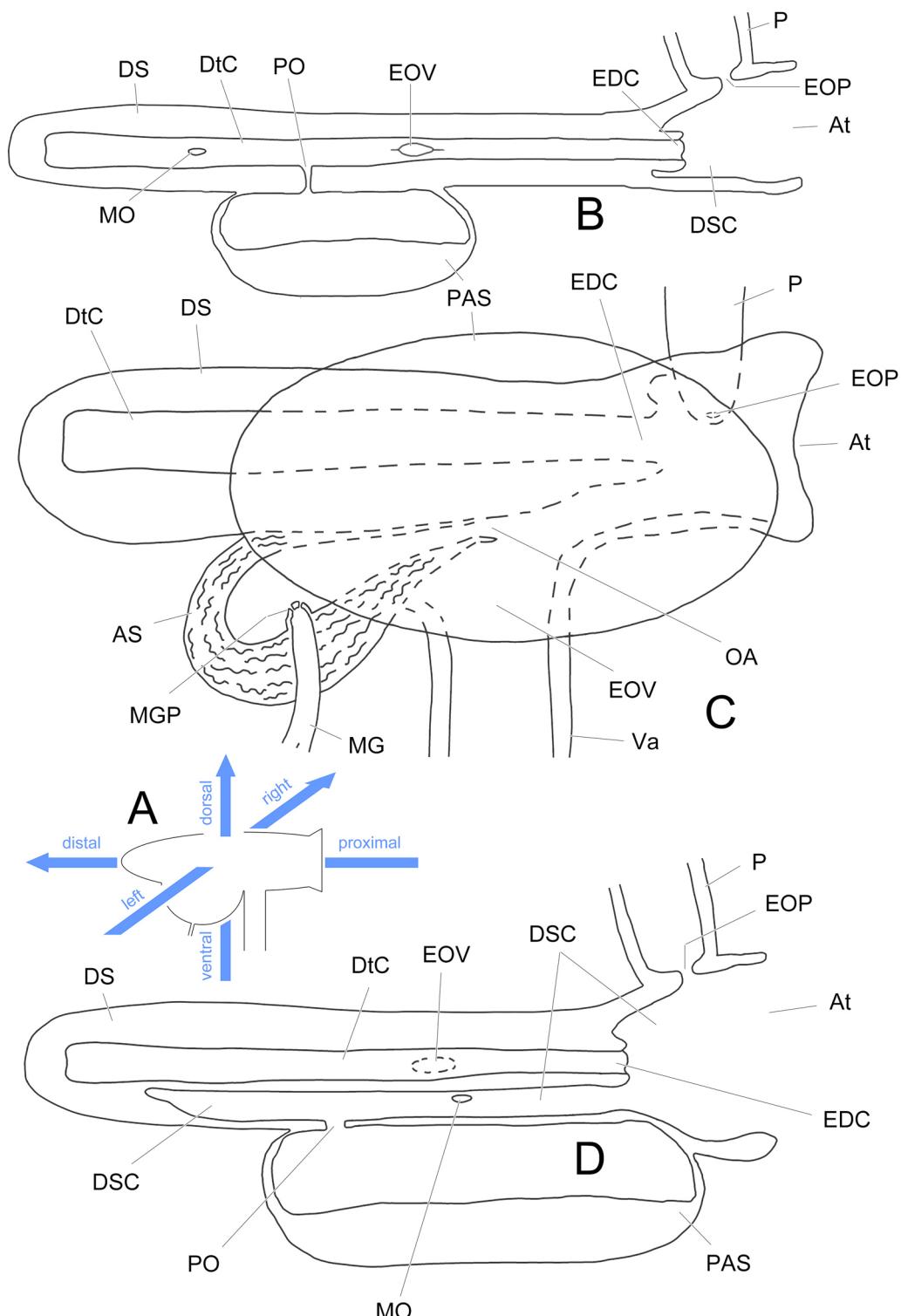


FIG. 9. A. Directions in describing a dart sac apparatus. B. Scheme of terminal genitalia of *Aegistohadra seraphinica*, in dorsal view. C–D. Scheme of terminal genitalia in a sinistral-shelled animal of *Aegistohadra baii* sp. nov. C. Left side of dart sac apparatus. D. Dorsal view of dart sac apparatus. Neither love dart nor fleshy septum inside dart sac chamber are shown.

РИС. 9. А. Обозначения направлений, использованных при описании аппарата стилофора. В. Схема терминальных гениталий *Aegistohadra seraphinica*, вид с дорсальной стороны. С–Д. Схема терминальных гениталий синистрального экземпляра *Aegistohadra baii* sp. nov. С. Левая сторона аппарата стилофора. Д. Вид с дорсальной стороны аппарата стилофора. Любовная стрела и септа внутри камеры любовной стрелы не показаны.

Table 1. Comparison of characteristics of terminal genital among Chinese camaenid genera [Schileyko, 2003; Hwang, Wu, 2018; Wu, 2019; Wu, Chen, Zhang, 2019; Wu, Chen, Zhu, 2019; Chen *et al.*, 2021; Jirapatrasilp *et al.*, 2022; this study]. Key: AS – accessory sac; DVM – membranous sac surrounding terminal genitalia; EpC – epiphallus caecum; EpP – epiphallus papilla; Fl – flagellum; MG – number of mucous gland ducts; MGP – the papilla on inner wall of accessory sac, distally leading to mucous glands; PAS – proximal accessory sac, a blind sac on proximal dart sac and opening into dart sac chamber or not; PS – penis sheath.; ● – present, ○ – absent, ◎ – present or not, ? – unknown, N/A – not applicable.

Табл. 1. Сравнение признаков терминального отдела половой системы у родов Camaenidae из Китая [Schileyko, 2003; Hwang, Wu, 2018; Wu, 2019; Wu, Chen, Zhang, 2019; Wu, Chen, Zhu, 2019; Chen *et al.*, 2021; this study]. Обозначения: AS – дополнительный мешок; DVM – тонкостенный мешок, окружающий терминальный отдел гениталий; EpC – цекум эпифаллуса; EpP – папилла эпифаллуса; Fl – флагеллюм; MG – количество протоков слизистых желез; MGP – папилла на внутренней стенке дополнительного мешка, ведущая в дистальной части к слизистым железам; PAS –proxимальный дополнительный мешок, слепой мешок на проксимальной части стилофора и открывающийся или нет в полость стилофора; PS – чехол пениса.; ● – присутствует, ○ – отсутствует, ◎ – присутствует или отсутствует, ? – неизвестно, N/A – неприменимо.

Genus	PS	EpP	PC/EPC	Fl	PLS	DVM	AS	PAS	MG	MGP
<i>Acusta</i> Martens, 1860	●	○	○/○	○	○	○	●	○	2	●
<i>Aegista</i> Albers, 1850	●	●	○/○	●	●	○	●	○	2	○
<i>Aegistohadra</i> Wu, 2004	○	○	●/○	●	○	○	●	●	1	◎
<i>Armandiella</i> Ancey, 1883	●	○	○/○	○	○	●	●	○	2	○
<i>Amphidromus</i> Albers, 1850	○	●	○/○	●	N/A	N/A	N/A	N/A	N/A	N/A
<i>Bradybaena</i> Beck, 1837	●	○	○/○	○	●	●	○	○	2	○
<i>Camaena</i> Albers, 1850	○	●	○/○	●	N/A	N/A	N/A	N/A	N/A	N/A
<i>Cathaica</i> Möllendorff, 1884	●	○	○/○	○	●	○	●	○	>2	○
<i>Coccoglypta</i> Pilsbry, 1895	○	?	○/○	○	?	○	●	○	2	?
<i>Dolicheulota</i> Pilsbry, 1901	●	●	○/○	●	?	○	●	○	>2	?
<i>Eueuhadra</i> Wu, 2004	○	○	●/○	●	○	○	●	○	>2	○
<i>Euhadra</i> Pilsbry, 1890	●	●	○/○	●	○	◎	●	○	>2	◎
<i>Ganesella</i> Blanford, 1863	?	?	?	?	?	N/A	N/A	N/A	N/A	N/A
<i>Karaftohelix</i> Pilsbry, 1927	●	○	○/○	○	○	●	●	○	>2	○
<i>Laeocathaica</i> Möllendorff, 1899	●	○	○/○	○	○	○	●	○	>2	○
<i>Landouria</i> Godwin-Austen, 1918	○	●	○/○	●	N/A	N/A	N/A	N/A	N/A	N/A
<i>Mastigeulota</i> Pilsbry, 1895	●	○	●? /○	○	●	○	●	○	>2	○
<i>Mesasiata</i> Schileyko, 1978	●	○	○/○	○	○	○	●	○	>2	○
<i>Metodontia</i> Möllendorff, 1886	●	○	○/○	○	●	○	○	○	2	○
<i>Nesiohelix</i> Kuroda et Emura, 1943	○	○	◎/○	●	○	○	●	○	>2	●
<i>Pancala</i> Kuroda et Habe, 1949	○	?	○/○	●	N/A	N/A	N/A	N/A	N/A	N/A
<i>Plectotropis</i> Martens, 1860	●	●	○/○	●	●	○	●	○	2	○
<i>Pliocathaica</i> Andreeae, 1900	●	●	○/○	○	○	○	●	○	>2	○
<i>Ponsadenia</i> Schileyko, 1978	●	○	○/○	○	○	○	●	○	1	○
<i>Pseudaspasita</i> Möllendorff, 1901	●	?	○/○	●	●	○	●	○	2	○
<i>Pseudiberus</i> Ancey, 1887	●	○	○/○	○	○	○	○	●	>2	○
<i>Pseudobuliminus</i> Gredler, 1886	●	○	○/○	○	○	●	○	○	2	○
<i>Pseudostegodera</i> Wu et Chen, 2021	●	○	○/○	●	N/A	N/A	N/A	N/A	N/A	N/A
<i>Satsuma</i> A. Adams, 1868	○	●	◎/◎	●	N/A	N/A	N/A	N/A	N/A	N/A
<i>Sinochloritis</i> Wu et Chen, 2019	○	●	○/○	●	N/A	N/A	N/A	N/A	N/A	N/A
<i>Sinorachis</i> Wu et Chen, 2019	●	○	○/○	○	●	○	●	○	1	?
<i>Stegodera</i> Martens, 1876	●	○	○/○	●	○	○	●	○	>2	●
<i>Stilpnodiscus</i> Möllendorff, 1899	●	○	○/○	○	○	○	●	◎	≥2	○
<i>Traumatophora</i> Ancey, 1887*	●	○	○/○	●	○	○	●	●	>2	●
<i>Trichobradybaena</i> Wu, 2003	●	○	●/○	○	○	●	●	○	2	○
<i>Trichocathaica</i> Gude, 1919	●	○	○/○	○	?	●	●	○	>2	?
<i>Yakuchloritis</i> Habe, 1955	○	?	○/○	●	N/A	N/A	N/A	N/A	N/A	N/A

nids, *Aegistohadra* have a much more developed accessory sac, in which the thickened internal spongy tissue and mucous glands entering papilla may be present. The only one mucous glands stalk in *Aegistohadra* that is virtually composed of several connective tissue-covered thinner stalks of mucous glands, as revealed by its cross section and the multi-openings of the papilla that leading to the accessory sacs, differs from those with two mucous glands (e.g. in *Aegista*) or with more than two mucous glands (e.g. in *Cathaica*) (Table 1, modified from table 1 in Wu, 2019).

Aegistohadra seraphinica and *Aegistohadra baii* sp. nov., both ground-dwelling, have calcium carbonate love dart in the dart sac. In comparison, the arboreal *Aegistohadra* active in the tree canopy have corneous love darts, e.g. in the species described by Jirapatrasilp *et al.* [2022], in which all the mantle lobes were not observed, unlike in the ground-dwelling species described in this work. The difference in the love darts suggests that the calcium intake/metabolism of snails might differ between the species of different habitats.

The dextral and sinistral specimens of the new species were found simultaneously at the same field site, thus suggesting that they might belong to a population of polymorphic chirality. However, considering that mating between snails of opponent chirality seems to be more difficult than mating between snails of the same chiral type [Arthur, 2011], strictly speaking, the sympatric individuals of different chirality could not be treated as one species unless virtual copulation and successful reproduction between snails of different chirality is observed.

Acknowledgements

I am grateful to Mr Bai Hao-Chen and Mr Shen Yu-Han for the collection the specimens for this work. This work is supported by the National Natural Science Foundation of China (NSFC 31872196). I thank Dr Yuri Kantor and an anonymous reviewer for their very helpful comments.

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