

# Three new clausiliid land snails from Tonkin, northern Vietnam (Gastropoda: Pulmonata: Clausiliidae)

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Key words: Mollusca; Gastropoda; Pulmonata; Clausiliidae; *Leptacme*; *Oospira*; taxonomy; South East Asia; Vietnam.

Three new species of the terrestrial, pulmonate family Clausiliidae are described from Vietnam, viz. *Leptacme cuongi*, *Oospira duci* and *O. smithi*.

## Introduction

There are good reasons to suppose that the country of Vietnam, with a surface of 332,000 km<sup>2</sup>, a large variety of habitats, and many different limestone 'islands', will have a diverse terrestrial molluscan fauna. Many species are known already from the area (Vermeulen & Whitten, 1998; Vermeulen & Maassen, 2003), but many still wait to be discovered and described. During two inventories in the northern part of the country, it turned out that from a total of 310 species only about 50% could be identified more or less with certainty. In particular among the small and inconspicuous snails, a high percentage of undescribed species is hidden. The medium-sized clausiliid species seem to be relatively well-known (Gittenberger & Vermeulen, 2001; Nordsieck, 2002a, b, 2003; Szekeres, 1969). Nevertheless, during three recent trips in northern Vietnam by Vermeulen in 1998, and the first author in 2001 and 2003, four new species of this family were discovered. Gittenberger & Vermeulen (2001) already introduced *Oospira (Attractophaedusa) pyknosoma*; the remaining three species are described as new below.

Abbreviations.— For shell characters: B, width; H, height. For collections: HN, H. Nordsieck, Aarbergen-Rückershausen (Germany); IEBR, Institute of Ecology and Biological Resources, Hanoi (Vietnam); JV, J.J. Vermeulen, Leiden (The Netherlands); MS, M. Szekeres, Szeged (Hungary); MD, W.J.M. Maassen, Duivendrecht (The Netherlands) (material to be deposited in RMNH); RMNH, National Museum of Natural History Naturalis (formerly Rijksmuseum van Natuurlijke Historie), Leiden. FFI stands for Fauna & Flora International (Cambridge, U.K.).

## Systematic part

Clausiliidae J.E. Gray, 1855  
Phaedusinae A.J. Wagner, 1922  
Megalophaedusini Zilch, 1954

Genus *Leptacme* Ehrmann, 1927. Type species: *L. sykesi* (Bavay & Dautzenberg, 1899).

Nordsieck (2005) introduced *Miraphaedusa* for *M. takagii* Nordsieck, 2005, which shares its general shape and the double peristome with the species described here. With neither anatomical nor molecular data available, we are not convinced that *Leptacme* and *Miraphaedusa* should be considered different genera, i.e. that the similarity in shell shape is due to convergent evolution. With many species still to be discovered, we prefer a conservative nomenclature. Discussions on the taxonomic relevance of details in the structure of the genital tract are considered premature for the same reason and because our data are incomplete as far as the important details of the male part are concerned (see Nordsieck, 1973). Anyway, it may be clear from the data presented below that *L. cuongi* spec. nov. differs substantially in its genital tract from what is known about *Oospira* species (Nordsieck, 1973).

Nordsieck (2002a: 89) suggests that in *Leptacme* the lowest palatal plica should be "connected with the lower one", which could not be confirmed by studying *L. sykesi*, in which these small plicae turned out to be separate.

It also remains unclear whether "a doubled peristome and a bipartite inferior lamella" (Nordsieck, 2005: 26) are separate characters indeed, or structurally linked in shells with a prominent lamella columellaris.

*Leptacme cuongi* spec. nov.  
(figs 1-5)

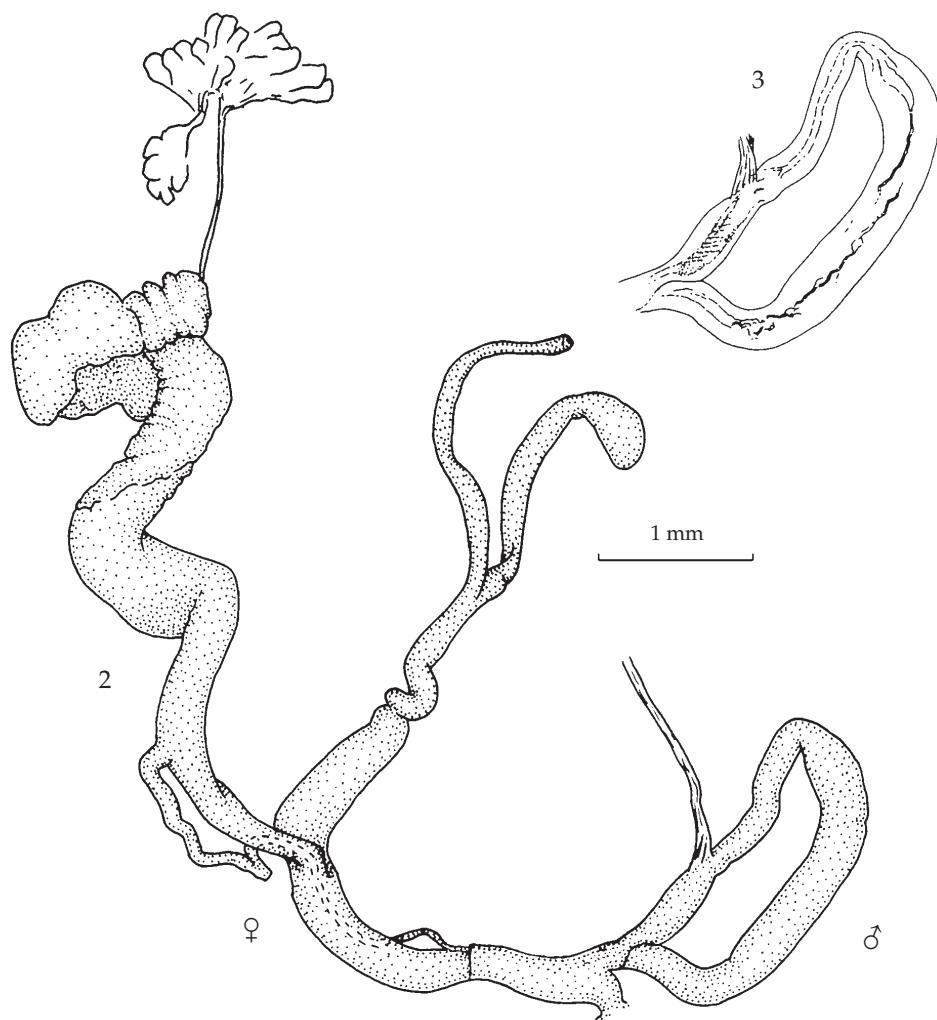
Material examined (holotype and paratypes).— Vietnam, Thanh Hoa Province, Pu Luong National Park, limestone hill near the native village Am, 20°27.39'N 105°13.65'E; 21.ix.2003 (RMNH 99273/holotype, 99274/25 [20 shells, 5 body whorls], 99275/2 alc 70%, 99276/2 alc 96%, MS/2, HN/2, IEBR/2, JV/2, MD/5); Pu Luong National Park, limestone hill behind rangerstation, 20°26.95'N 105°10.93'E; 22.ix.2003 (MD/2).

Shell.— Shell dextral, not decollate, light corneous, fragile, glossy and rather translucent; very slender, with a nearly cylindrical, narrow, upper third and a spindle-shaped lower part. The 12-15 moderately convex whorls separated by an indented, relatively deep suture. Protoconch glossy, teleoconch whorls with obtuse growth-lines, which are more rib-like on the more narrowly sculptured, cervical part of the last whorl. Peristome double; inner lip recognizable as a narrow ridge, contacting the body whorl and closing the umbilicus (visible in not fully grown specimens); outer lip very strongly thickened, with some prominent growth-ridges, tube-like protruding. Neck with a more or less clearly developed basal crest. Aperture obliquely pear-shaped to narrowed elliptical, with a sinulus bordered by the lamella parietalis and a knob on the peristome, whitish inside; peristome continuous, white, broadly reflexed. In frontal view, the prominent lamella parietalis (= superior), and the more inconspicuous lamella columellaris (= inferior) and plica principalis are seen, whereas the frontal end of the lamella subcolumellaris is usually discernible as a blunt denticle. The lamella parietalis is connected with the spiralis, which reaches as far as the lamella subcolumellaris inside, i.e. hardly further than the columellaris; there is no lamella inserta. Ventro-laterally, next to the plica principalis, there are four short, nearly parallel plicae palatales. Clausilial blade rather broad, curvature of its outer border dictated by the position of the short palatal plicae.

Dimensions (n = 15): H 10.4 mm (12 whorls)-14.0 mm (15 whorls), 11.9 mm on average; B 2.0-2.6 mm, 2.2 mm on average.

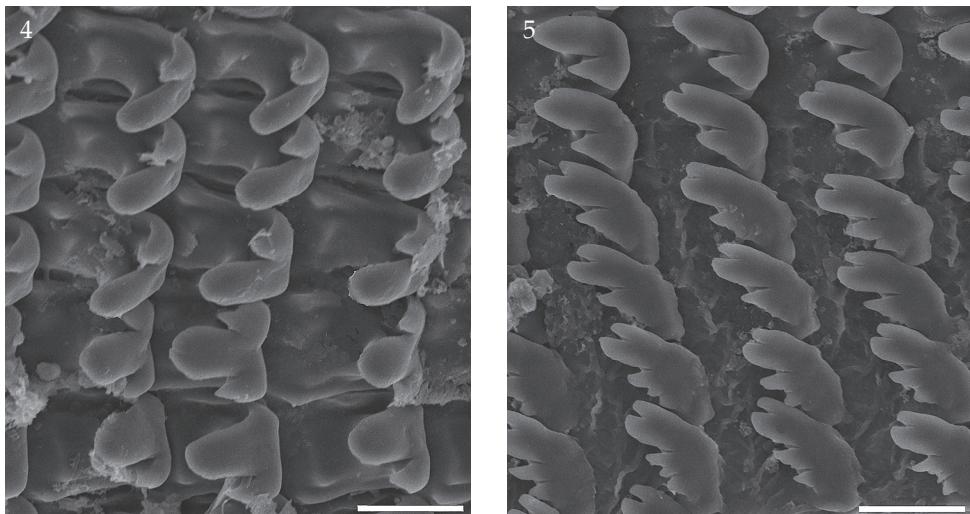


Fig. 1. *Leptacme cuongi* spec. nov., holotype (RMNH 99273). Vietnam, Thanh Hoa Province, Pu Luong National Park, limestone hill near the native village Am, 20°27.39'N 105°13.65'E; 21.ix.2003. Actual height 13.0 mm. Photographs: J. Goud, Leiden.



Figs 2, 3. *Leptacme cuongi* spec. nov., genital tract (2), with detail of the penial lumen after a transparent specimen (3). Vietnam, Thanh Hoa Province, Pu Luong National Park, limestone hill near the native village Am, 20°27.39'N 105°13.65'E; 21.ix.2003.

Genital tract ( $n = 2$ ; figs 2, 3).— Vagina more than twice the length of the oviduct. Oviduct about half as long as the proximal part of the pedunculus, which is longer than the distal part. Basally the pedunculus is much broader than the adjoining oviduct. The bursa of the bursa copulatrix is separate from the spermoviduct; it reaches hardly further than the diverticulum. Male part of the genitalia with a single retractor muscle, without flagellum or caecum. Penis tripartite (fig. 3) as far as can be judged on the basis of the transparent genital slides, forming a loop with a sharp curvature about halfway. Proximal half formed by (1) a short segment with a relatively simple luminal surface,



Figs 4, 5. *Leptacme cuongi* spec. nov., radula. 4, central tooth, with adjoining lateral teeth 1-3; 5, lateral tooth 7 and marginal teeth 1-5. Vietnam, Thanh Hoa Province, Pu Luong National Park, limestone hill near the native village Am, 20°27.39'N 105°13.65'E; 21.ix.2003. Scale bar 10 µm. Photographs: L.P. van Ofwegen.

followed by (2) a clearly broader and about three times longer part with some longitudinal ridges with zigzag borders. Distal half, with the insertion of the retractor muscle slightly distal from halfway, about as broad or little broader than the narrow part of the proximal half; penial segment (3) with a relatively simple luminal surface; epiphallus (4) with a vague pattern of small pustulae, most clearly seen at its distal end. Vas deferens, a short part of the penis and nearly as much as the proximal half of the vagina united by a common sheath.

Radula ( $n = 1$ ; figs 4, 5).—The large main cusp of the central tooth is accompanied by prominent ectocones. The 7-8 adjoining lateral teeth in half a row have equally small ectocones. All these teeth have prominent basal plates with interrow support ridges. In the first marginal tooth, the main cusp is less symmetrical and the basal plate is less prominently developed. The following c.10 marginal teeth are increasingly more asymmetrical initially, with an endocone on the main cusp and ectones with two or three cusps in the teeth closer to the margin, which are irregularly comb-like when the main cusp with the endocone becomes relatively smaller.

Derivatio nominis.—Named after the first author's friend Mr. Duong Ngoc Cuong, working as biologist at IEBR, and counterpart during the survey in the Ha Long Bay Area 2003, as well as in Pu Luong National Park. Thanks to his enthusiasm the survey was successful.

Remarks.—The conchologically most similar species, *Leptacme eregia* Szekeres, 1969, can be distinguished from *L. cuongi* spec. nov. by its much larger shell (17.8 mm instead of 11.9 mm), its more rounded neck, i.e. without a basal crest, the lamella inferior which is situated more deeply inside, and the plica principalis, which ends less deep.



Fig. 6. *Oospira (Oospira) duci* spec. nov., holotype (RMNH 99272). Vietnam, Thanh Hoa Province, Pu Luong National Park, limestone hill near small native village Am, 20°27.39'N 105°13.65'E; 21.ix.2003 (RMNH 99272/holotype). Actual height 21.5 mm. Photographs: J. Goud, Leiden.

Genus *Oospira* Blanford, 1872. Type species: *O. (O.) philippiana* (L. Pfeiffer, 1847) (Burma).

Both *Oospira* and its alleged subgenus *Atractophaedusa* are ill defined (Nordsieck, 2001). It is for example impossible to make a difference between "only a weak tendency to develop a lunellar" (Nordsieck, 2001: 32), as in *Oospira*, and "a tendency to develop a lunella" (Nordsieck, 2005: 26), as in *Miraphaedusa*. Sometimes, differences are referred to, but are not specified in some detail, which makes their interpretation more difficult (Nordsieck, 2005: 26: "it differs by .. the development of the lunellar"). Nevertheless, for practical reasons we here use the generic and subgeneric names in the sense of the most recent literature, but not unreservedly.

See also the notes on *Leptacme*.

Subgenus *Oospira* s. str.

Peristome and lamella columellaris simple.

#### *Oospira (Oospira) duci* spec. nov. (fig. 6)

Material examined.— Vietnam, Thanh Hoa Province, Pu Luong National Park, limestone hill near small native village Am, 20°27.39'N 105°13.65'E; 21.ix.2003 (RMNH 99272/holotype).



Fig. 7. *Oospira (Atractophaedusa) smithi* spec. nov., holotype (RMNH 99271). Vietnam, Haiphong Province, Cat Ba Island, near entrance of the Trung Trang Cave, 6.iv.2001, 20°47.38'N 106°59.87'E. Actual height 22.3 mm. Photographs: J. Goud, Leiden.

Shell (fig. 6).— Shell dextral, decollate, rather large, more or less fusiform, solid, dark brown, not translucent; apical whorls not known. The decollated shell consists of five somewhat flattened whorls, separated by a slightly indented suture and increasing gradually in width; sculptured with distinct, regularly arranged ribs (5-8 per mm on the whorl above the aperture), somewhat fading above the aperture and hardly coarser in the cervical region. Neck without a crest. Aperture detached, obliquely pear-shaped, whitish inside. Peristome continuous, whitish, thickened and broadly reflexed; basal side more or less semicircular.

Lamella parietalis (= superior) connected with the spiralis, rather prominent, reaching the margin of the peristome, which forms an obtuse angle at that site. In frontal

view, the lamella columellaris (= inferior) is visible over a relatively long distance as a low, straight lamella ascending into the shell. Lamella subcolumellaris equally well visible in frontal view. Left laterally with six plicae palatales: plica principalis rather short, not visible in frontal view, at the end with five short, slightly curved plicae, somewhat diverging from the principalis and running parallel which each other. Since the single shell that was available has not been opened, details on the inside endings of the lamellae cannot be given.

Dimensions: H 21.5 mm; B 7.0 mm.

Derivatio nominis.— Named after Mr. Le Thien Duc, project biologist for FFI, one of the counterparts during the Pu Luong Survey. Thanks to his knowledge of the area some interesting localities could be sampled.

Remarks.— *Oospira (O.) miranda* Loosjes & Loosjes-van Bemmel, 1973, is the conchologically most similar species. However, the shell of *O. (O.) miranda* is light corneous, more or less smooth, i.e. with only some faint, irregular striae. Its topwhorls increase more rapidly in width, which gives the shell a more fusiform shape, and the lamella subcolumellaris is not visible in a frontal view.

Subgenus *Atractophaedusa* Ehrmann, 1927. Type species: *O. (A.) rhopaloides* (von Moellendorff, 1901) (Tonkin).

Peristome doubled, lamella columellaris bipartite.

#### *Oospira (Atractophaedusa) smithi* spec. nov. (figs 7-12)

Material examined (holotype and paratypes).— Vietnam, Haiphong Province, Cat Ba Island, near entrance of the Trung Trang Cave, 6.iv.2001, 20°47.38'N 106°59.87'E (RMNH 99271 / holotype, 87196/35 [21 shells, 14 body whorls], 87209/4 alc 70%, 87215/2 alc 96%, HN/2 [1 shell, 1 body whorl], IEBR/4, MD/4 [2 shells, 2 body whorls]), MS/2 (1 shell, 1 body whorl); Cat Ba Island, near entrance of the Trung Trang Cave, 25.ix.1998, 20°47.47'N 106°59.41'E (VS/6 [5 shells, 1 body whorl]); Cat Ba Island, near entrance of the "Medical Cave", 7.iv.2001, 20°46.15'N 107°01.25'E (RMNH 87195/10 [3 shells, 7 body whorls]).

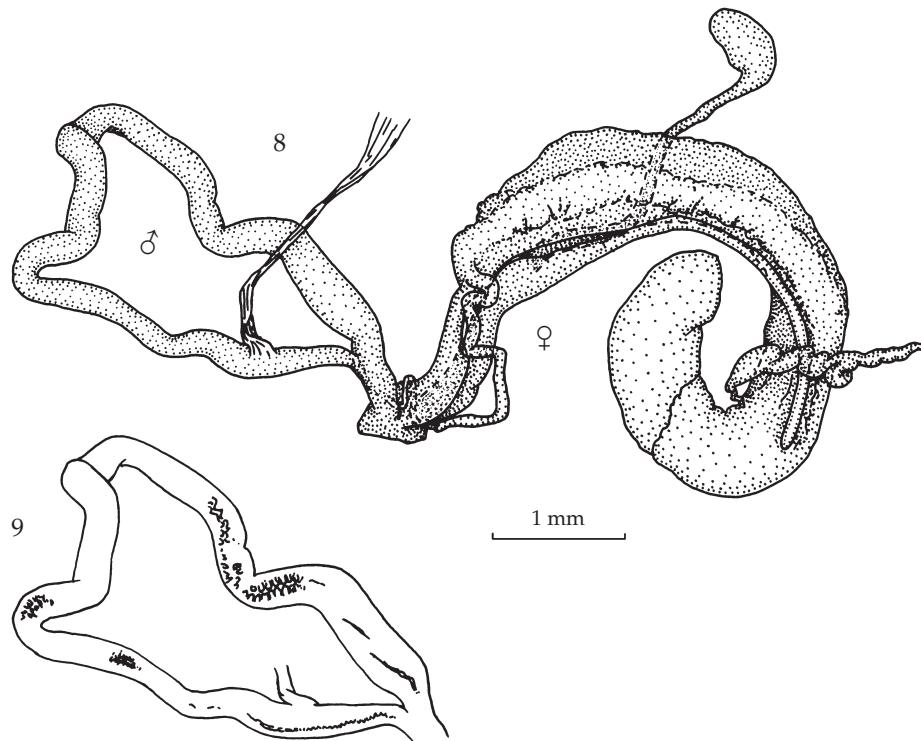
Shell (fig. 7).— Shell sinistral, not decollate, rather large, fusiform, solid, dark-brown, not translucent. Apical whorls relatively broad when compared with the following ones. With 8-9 whorls, changing from apically moderately convex to somewhat flattened; apical whorls very finely, spirally punctated, the remaining ones with very fine, regular striae. The striae are rather faint above the aperture and not coarser on the neck. Suture slightly indented. Neck without a crest. Peristome continuous, whitish, broadly reflexed and detached; basic margin more or less semicircular.

Peristome double; inner lip recognizable as a narrow ridge, contacting the body whorl and closing the umbilicus (visible in not fully grown specimens); outer lip protruding, forming a small, free tube. Aperture pear-shaped, whitish inside, with a sinus which is not defined at the palatal side. Lamella parietalis (= superior) very prominent, reaching the margin of the peristome, which is conspicuously curved at that site; its inner end merging into the lamella spiralis. Inside the shell, the lamella columellaris reaches somewhat further than ventrally, whereas both the lamella subcolumellaris and the spiralis are slightly shorter; without a lamella inserta. In frontal view, the lamella

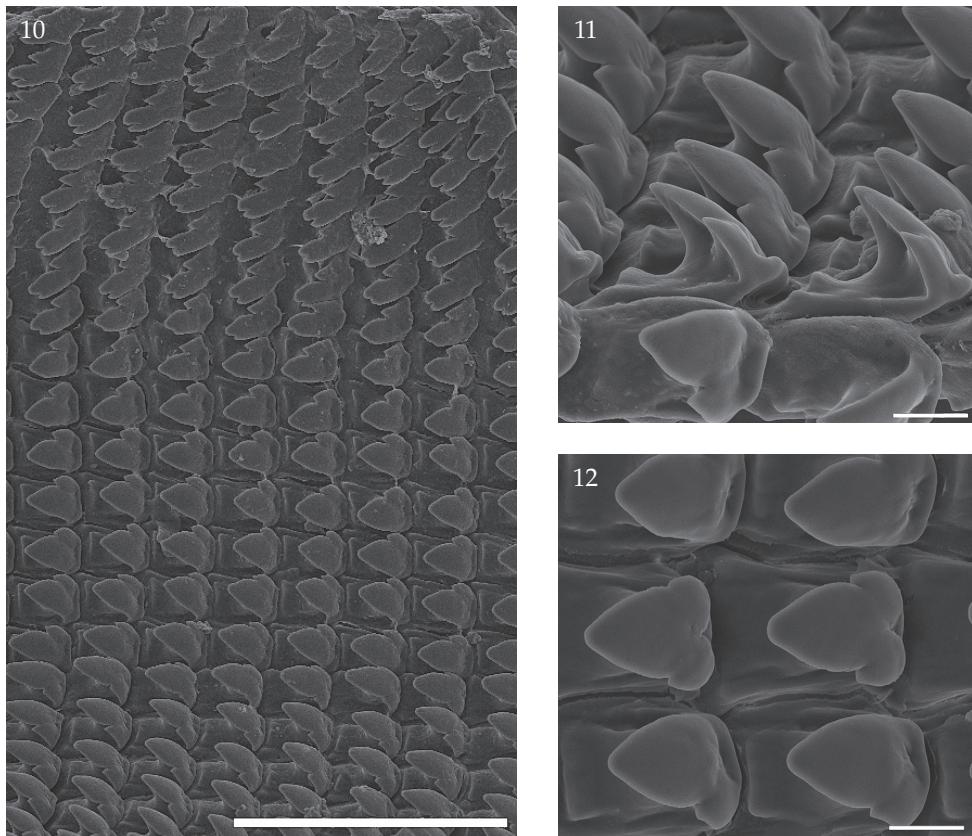
columellaris is visible as a low, nearly straight lamella, not reaching the margin of the peristome, whereas the lamella subcolumellaris reaches the margin of the peristome in most specimens. With six plicae palatales: plica principalis, shortly visible in frontal view, ventro-laterally accompanied by five short, somewhat curved plicae, increasingly diverging from the principalis and nearly running parallel which each other, so that the lowest one runs most obliquely. Inside the body whorl, the plicae are connected by a lunella-like ridge of callus. Clausilial blade simple, ending with a sharp angle.

Dimensions (n = 15): H 18.6 mm (8 whorls)-22.3 mm (9 whorls), on average 20.5 mm; B 5.0 (8 whorls)-5.7 mm (9 whorls), on average 5.4 mm.

Genital tract (n = 2; figs 8, 9).—Vagina short to very short. Oviduct measuring about 2/3 of the length of the proximal part of the pedunculus, which is clearly shorter than its much narrower distal segment. Proximal part of the pedunculus about as broad as the proximal half of the oviduct, which is twice as broad as the distal half; the much narrower diverticulum reaches somewhat further than the bursa of the bursa copulatrix, which is separate from the spermoviduct. Male part of the genitalia forming a loop because the vas deferens and a short, most proximal part of the penis are united by a common sheath; with a single retractor muscle, inserting rather close to the beginning of the vas deferens, without a flagellum or caecum. The luminal structure, as far as vis-



Figs 8, 9. *Oospira (Atractophphaedusa) smithi* spec. nov., genital tract (8), with detail of the penial lumen after a transparent specimen (9). Vietnam, Haiphong Province, Cat Ba Island, near entrance of the Trung Trang Cave, 6.iv.2001, 20°47.38'N 106°59.87'E.



Figs 10-12. *Oospira (Atractophaedusa) smithi* spec. nov., radula. 10, central tooth, with lateral and 8 marginal teeth; 11, lateral teeth 3-7; 12, central tooth with adjoining lateral teeth 1. Vietnam, Haiphong Province, Cat Ba Island, near entrance of the Trung Trang Cave, 6.iv.2001, 20°47.38'N. 106°59.87'E. Scale bars 100 µm (10) and 10 µm (11, 12). Photographs L.P. van Ofwegen.

ible in the transparent genital slides, enables the distinction of three segments: (1) a short broadest part with a relatively simple, longitudinal, luminal structure, (2) a much longer part, with a more complicated luminal surface of many protuberances that very gradually decrease in size towards segment (3), which has a wall structure with very small, irregular protuberances and changes into the epiphallus near the insertion site of the retractor muscle, without an obvious boundary.

Radula ( $n = 1$ ; figs 10-12).—The large main cusp of the central tooth is accompanied by very small ectocones. The 7-8 adjoining lateral teeth in half a row have equally small ectocones. All these teeth have prominent basal plates with interrow support ridges. In the first marginal tooth, the main cusp is less symmetrical and the basal plate is less prominently developed. The following 12 (at least) marginal teeth are increasingly more asymmetrical initially, with an endocone, which increases in prominence towards the radular margin, whereas the ectones remain unicuspis or bicuspis at most.

Derivatio nominis.—Named after Mr Jady Smith, Project Manager for the Vietnam

Programme of FFI, as thanks for funding the survey in Ha Long Bay World Heritage and in Pu Luong National Park, and for mental support.

**Remarks.**— Among the species in the subgenus *Atractophaedusa*, this species is most similar to the recently described *O. (A.) antibouddah* Nordsieck, 2003. The other consubgeneric species, viz. *O. (A.) kebabica* (von Moellendorff, 1901), *O. (A.) pyknosoma* Gittenberger & Vermeulen, 2001, and *O. (A.) rhopaloides* (von Moellendorff, 1901), all have decollated shells when fully grown. Our species differs from *O. (A.) antibouddah* (of which a population was discovered at Vietnam, Quang Ninh Prov., Ha Long Bay area, unnamed island in Dau Moi Temper area, 13.ix.2003, 20°55.69'N 107°09.40'E – so far this species was only known from its type locality “Vietnam, Tonkin, 4 km from Cam Pha”) by the more slender shell, with a clearly visible lamella subcolumellaris, and by the shorter plicae palatales.

### Acknowledgements

Our thanks are due to M. Szekeres, for comparing *Oospira cuongi* with *Oospira egaria*, to H. Nordsieck, for comparing and identifying the entire Vietnamese material and for constructive comments, and to J. Goud and L.P. van Ofwegen, who produced the photographs. We also thank most cordially Mr. Jady Smith, project manager for the Vietnam Programme of FFI in Hanoi, Mr. Duong Ngoc Cuong, biologist at IEBR and Mr. Le Thien Duc, project biologist for FFI in Hanoi.

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