

# Anatomy of *Plicadomus sulcatus* and taxonomical structure of Mauritian Gibbinae (Gastropoda, Pulmonata, Streptaxidae)

Anatoly SCHILEYKO

A.N. Severtzov Institute of Ecology and Evolution RAS, Leninsky prospect 33, Moscow 119071, Russia. E-mail [asch0829@gmail.com](mailto:asch0829@gmail.com)

**ABSTRACT.** Gibbinae subfamily in the Mauritius Island is represented by four taxa of generic rank. The anatomy of the type species of three of them has been known previously. The description of the reproductive tract of the fourth – *Plicadomus sulcatus* (Müller, 1774) is presented. It is shown that under striking conchological differences the anatomy of members of all four taxa is very similar and differs in quantitative characters only (the ratio of the length of the separate elements: the vagina / free oviduct and the relative length of the penis.). On the basis of this fact it was concluded that Mauritian Gibbinae is represented by a single genus *Gibbus* Montfort, 1810 with four subgenera (*Gonospira* Swainson, 1840, *Plicadomus* Swainson 1840, *Gonidomus* Swainson, 1840, and *Gibbus* s. str.).

## Introduction

Peculiar species *Plicadomus sulcatus* (Müller, 1774) is an endemic of the Mauritius Island. Currently due to destruction of natural landscapes of the island nearly all biotopes where the species lived, are critically endangered [Griffiths, Florens, 2006]. It is possible that by now (2017) the species has already got extinct.

The anatomy of *Plicadomus sulcatus* was unknown until now; luckily, in the old (1906) collection of Naturhistorisches Museum Wien Mag. Anita Eschner has found alcohol material on this species and I got a possibility to study the inner structure of these snails.

## Material and methods

Five specimens in alcohol are housed in Naturhistorisches Museum Wien, No. 42669, with the label “Afrika; Mauritius, coll. Dr. Penther”. The exact date of collection is not specified, but in the registration book of the Museum “Sammlung der Mollusken Molluskoideen und Tunicaten, Dr. Penther

leg. et don., Acqu. Nos. 41421-50220” it is indicated that all material was collected in 1906.

The anatomical study was performed by manual dissection under the stereo microscope Olympus SZ.

## Description

Streptaxidae J. Gray, 1860  
Gibbinae Steenberg, 1936  
*Plicadomus* Swainson, 1840

Swainson, 1840: 332 (*Pupa* subg.); Thiele, 1931: 731 (pro sect. of subgen. *Gonidomus*, gen. *Gibbus*); Zilch, 1960: 565 (*Gonidomus* subgen.); Schileyko, 2000: 791 (pro gen.).

Type species – *Helix sulcata* Müller, 1774, by monotypy.

*Plicadomus sulcatus* (Müller, 1774)  
(Figs 1, 2)

*Helix sulcata* Müller, 1774: 108.

*Orthogibbus (Plicadomus) sulcatus* – Germain, 1921: 26 (full synonymy and bibliography).

*Plicadomus sulcatus* – Schileyko, 2000: 791, fig. 1032.

Type locality – not indicated (“In Museo Spengleriano”)

Shell ovate conic, rather solid, of about 7 flattened whorls. Summit obtuse. Color uniformly yellowish, light brown, or corneous. Embryonic whorls with delicate radial wrinkles, sculpture of later whorls of distinct, oblique, rounded ribs; on last whorl the ribs much smoothed. Aperture widely ovate, slightly oblique, with somewhat reflexed, thickened margins. Parietal wall smooth, without tooth or tubercle. Umbilicus closed. Height 20.5-33.0, diameter 11-19 mm (dissected specimen 21.0 and 11.8 mm correspondingly).



FIG. 1. *Plicadomus sulcatus*. Shell. Scale bar 1 cm.

РИС. 1. *Plicadomus sulcatus*. Раковина. Масштаб 1 см.

*Vas deferens* is evenly thin. Leaving the prostate, it goes down and penetrates under the upper edge of the penis sheath; inside the penis sheath the *vas deferens* forms an abrupt bend, after that it goes up along the penis and enters latter apically. Penis long, narrow, rather slender, forms a sharp curvature at proximal end. Internally, penis bears irregular longitudinal folds that anastomosing locally; at the very distal ends, the folds disintegrated into separate prismatic tubercles. On the ridges of the folds there are numerous small, almost black conchiolinous hooks. Penial retractor attached to the penis subapically. Penis sheath short, about 8 times shorter than penis. Vagina and free oviduct rather long, of about equal length. Spermathecal duct thin, voluminous reservoir does not attend albumen gland.

### Discussion

Subfamily Gibbinae in the Mauritius fauna is represented by four mono- or oligotypic (sub)genera: *Gonidomus* Swainson, 1840 (type species *Pupa pagoda* Férussac, 1821), *Plicadomus* Swainson, 1840 (type species *Helix sulcatus* Müller, 1774), *Gibbus* Montfort, 1810 (type species *Helix lyone-*

*tianus* Pallas, 1780) and *Gonospira* Swainson, 1840 (type species *Helix palanga* Férussac, 1821). All of them, excluding *Gonospira*, have by now got extinct (except for *Plicadomus sulcatus*?). Representatives of these taxa distinctly differ from each other conchologically, that is why they have been placed in different genera (subgenera).

As for *Microstrophia* Möllendorff, 1887 (the type species *Pupa clavulata* Lamarck, 1822), its anatomy has not been studied, but judging by the shell, it is a synonym of *Gonospira* or a subgenus of this genus.

Until now, the structure of reproductive tract has been studied for *Gonidomus pagoda* [Steenberg, 1936], *Gibbus lyonetianus* [Schileyko, 2000] and two species of *Gonospira* [*palanga* (Férussac, 1821) and *modiolus* (Férussac, 1821)] [Schileyko, 2000]; now there is a possibility to compare all four (sub)genera.

Thiele [1931: 731] accepted genera *Gibbus* with subgenera *Gibbus* s.str., *Gonidomus* (with section *Plicadomus*) and *Gonospira* (with section *Microstrophia* Möllendorff, 1887).

Zilch [1960: 564-566] accepted three genera – *Gibbus*, *Gonidomus* (with subgenera *Plicadomus*

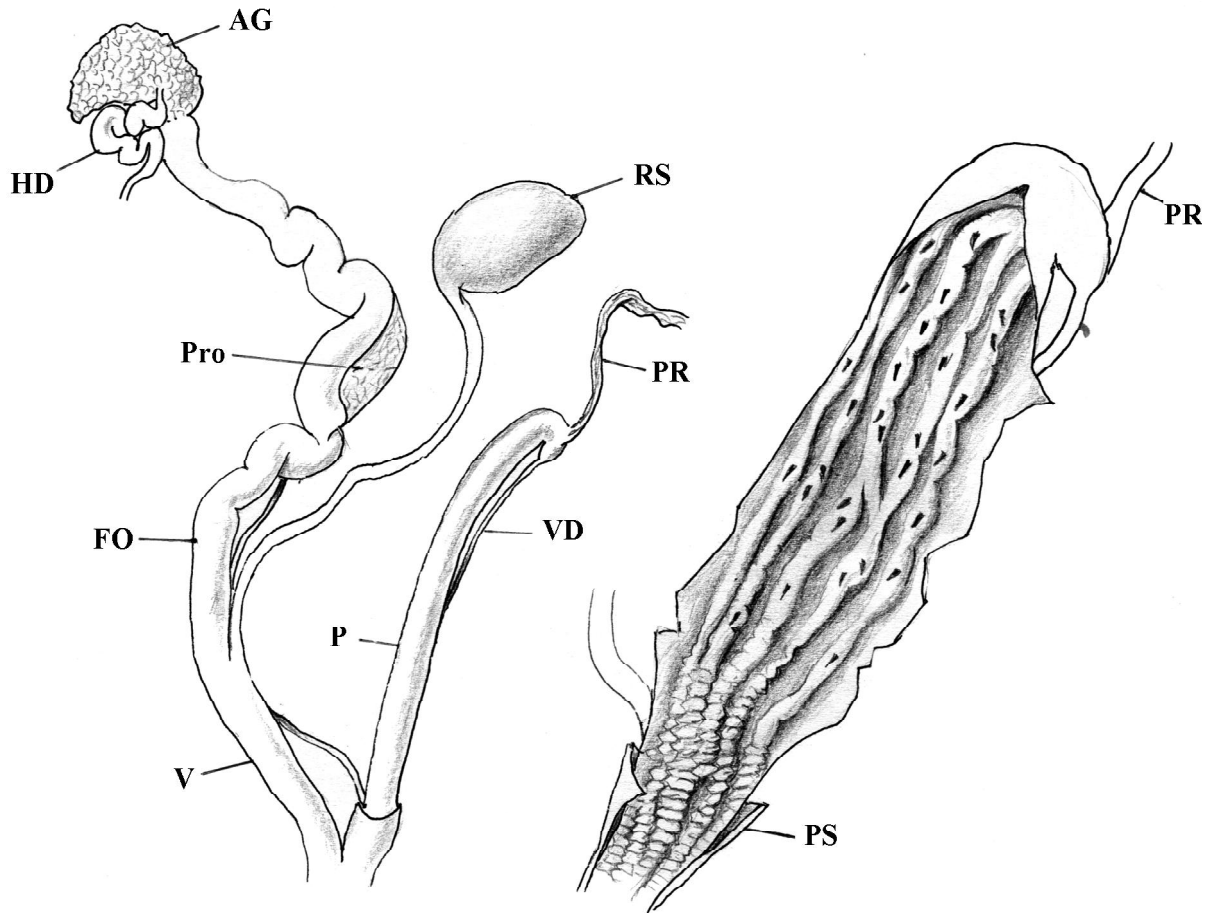


FIG. 2. *Plicadomus sulcatus*. Reproductive tract.

AG – albumen gland, FO – free oviduct, HD – hermaphrodite duct, P – penis, PR – penial retractor, Pro – prostate, PS – penis sheath, RS – reservoir of spermatheca, V – vagina, VD – vas deferens.

РИС. 2. *Plicadomus sulcatus*. Репродуктивный тракт.

AG – белковая железа, FO – свободный овидукт, HD – гермафродитный проток, P – пенис, PR – ретрактор пениса, Pro – простата, PS – чехол пениса, RS – резервуар семеприемника, V – вагина, VD – семяпровод.

and *Gonidomus* s.str.) and *Gonospira* (with subgenera *Orthogibbus* Germain, 1919, *Gonospira* s.str., and *Microstrophia*).

Schileyko [2000: 788, 791] has considered *Gonospira*, *Microstrophia*, *Gonidomus*, *Plicadomus*, and *Gibbus* as independent genera.

The peculiarity of the fauna of the Mascarene Islands (in particular, the representatives of Gibbinae), which Godwin-Austin [1908: 432] drew attention to, consists in the fact that their evolution has gone in "... one direction, viz. the shell." Indeed, under sharp conchological differences, the reproductive tract of the members of the four taxa under consideration differs essentially only by the ratio of the length of the separate elements: the vagina / free oviduct and the relative length of the penis. Therefore I am inclined to believe that Thiele's [1931] view most correctly reflects the relationship of the taxa under discussion. Moreover, if to accept Thiele's point of view, *Gonospira* should also be considered as a subgenus of the genus *Gibbus*.

Thus, the taxonomic structure of Mascarene Gibbinae looks, in my opinion, is as follows:

Gibbinae Steenberg, 1936

Genus *Gibbus* Montfort, 1810

Subgenus *Gonospira* Swainson, 1840

?Subgenus *Microstrophia* Moellendorff, 1887 (an syn. of *Gonospira*?)

Subgenus *Plicadomus* Swainson, 1840

Subgenus *Gonidomus* Swainson, 1840

Subgenus *Gibbus* s. str.

### Acknowledgements

It is my pleasure to express my gratitude to Mag. Anita Eschner and Dr. Helmut Sattmann who gave me a lucky possibility to come to Naturhistorisches Museum Wien and to study the material. I thank also Dr. Zoltan Fehér who made the shell photographs.

## References

- Germain L. 1921. *Faune malacologique terrestre et fluviatile des Iles Mascareignes*. Paris, 495 pp.
- Griffiths O.L., Florens F.B. 2006. *A field guide to the non-marine molluscs of the Mascarene Islands (Mauritius, Rodrigues and Réunion) and the northern dependencies of Mauritius*, 175 pp.
- Godwin-Austen H.H. 1908. On the animals of genera and species of Mascarene land-mollusca belonging to the family Zonitidae, collected by Monsieur E. Dupont. *The annals and Magazine of Natural History*, 2, eight series: 422-436.
- Müller O.F. 1774. *Vermium terrestrium et fluviatilium seu animalium infusoriorum, helminthicorum, et testaceorum, non marinorum, succinct historia*. Volumen alterum. Havniae et Lipsiae, I-XV, 1-214 pp.
- Schileyko A.A. 2000. Treatise on Recent Terrestrial Pulmonate Molluscs. Pt. 6. *Ruthenica, Russian Malacological Journal*, Supplement 2: 731-880.
- Steenberg C.-M. 1936. Recherches anatomiques et systematiques sur le Gastropode Pulmone, *Gonidomus pagoda* (Férussac, de l'Île) Maurice. *Mémoiree du Musée royal d'histoire naturelle de Belgique*, II ser., fasc. 3: 115-148.
- Swainson W. 1840. *A treatise on Malacology; or the natural classification of shells and shell fish*. London, VIII+419 pp.
- Thiele J. 1931. *Handbuch der systematischen Weichtierkunde*. Zweiter Band. Jena, Verlag von Gustav Fischer, 377-778.
- Zilch A. 1960 (1959-1960). *Gastropoda Euthyneura*. In: Wenz W., *Handbuch der Paläozoologie*, Bd. 6, Teil 2, 834 S.

### Анатомия *Plicadomus sulcatus* и таксономическая структура маврикийских Gibbinae (Gastropoda, Pulmonata, Streptaxidae)

А.А. ШИЛЕЙКО

Институт проблем экологии и эволюции им. А.Н. Северцова РАН, 119071 Москва, Ленинский проспект, 33, РОССИЯ. E-mail: asch0829@gmail.com

**РЕЗЮМЕ.** Подсемейство Gibbinae на о. Маврикий представлено четырьмя или пятью таксонами родового ранга. Анатомия типовых видов трёх из них была изучена ранее. Приведено описание четвёртого – *Plicadomus sulcatus* (Müller, 1774). Показано, что при резких конхологических различиях строение репродуктивного тракта представителей всех четырёх таксонов различается лишь количественными признаками (длиной пениса и отношением длины вагины к длине свободного яйцевода). На этом основании сделан вывод, что маврикийские Gibbinae представлены одним родом *Gibbus* с четырьмя (пятью?) подродами (*Gonospira*, ?*Microstrophia*, *Plicadomus*, *Gonidomus* и *Gibbus* s. str.).

