

A new species of *Diloma* Philippi, 1845 (Trochidae: Trochinae: Gibbulini) from the Samoa Islands (Mollusca: Gastropoda)

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ABSTRACT. A new trochoid species is added herewith to the Samoan fauna. It is compared with the closely related *Diloma radula* (Philippi, 1849). Radula morphology is compared with this of type species of *Austrocochlea* Fischer, 1885.

INTRODUCTION

Within the framework of an inventory of the Samoan molluscan fauna (Schwabe, 1998), we came across a trochid species closely related to *Diloma radula* (Philippi, 1849) - a species with a rather large distribution within the Pacific (from Japan to Samoa). Morphological differences, as well as differences in the radula, lead us to describe the species as a new species of *Diloma*. Close relationship was found between the radulae of *Diloma radula*, *Diloma samoensis* n. sp. and *Austrocochlea constricta* (Lamarck, 1822).

Abbreviations

DBC: private collection Don Barclay, Texas, United States of America

DSC: private collection Dirk Stratmann, Korschenbroich, Germany

IKC: private collection Ingo Kurtz, Bischofsheim, Germany

ZSM: Zoological State collection Munich, Germany

SH: Shell height (= shell length)

SW: Shell width (= shell diameter)

SYSTEMATICS

Family: **TROCHIDAE** Rafinesque, 1815

Genus: *Diloma* Philippi, 1845

Type species: *Turbo nigerrimus* Gmelin, 1791 (subsequent designation by Herrmannsen, 1846: 388)

Diloma samoensis n. sp.

Figs 1-9

Type material. 50 specimens from American Samoa, collected from the south coast of Tutuila Island between Pago Pago Harbour and Pago Pago

International Airport, 05. 2001, leg. Don Barclay. All specimens are fixed and conserved in 95 % ethanol and thus may be used for genetic analysis.

Measurements (SW x SH in mm). 8.8 x 7.8 (holotype deposited in ZSM 20020494); 9.3 x 9.0, 9.2 x 8.7, 9.0 x 9.0 (paratypes deposited in ZSM 20020495); 10.5 x 7.4, 8.0 x 4.7 (paratypes deposited in ZSM 20020496); 10.0 x 9.2, 9.5 x 9.8 (paratypes IKC 5253); 10.0 x 9.7, 10.4 x 9.7 (paratypes DSC 061684); remaining paratypes in the DBC (which will partly be deposited in other institutions)

Type locality. Tutuila Island, American Samoa, between Pago Pago Harbor and Airport.

Habitat. Middle to upper littoral zone, extending to bottom of supralittoral, on black basalt boulders exposed to breaking waves at high tide.

Distribution. At present this species is restricted to only one spot at Tutuila Island, so we prefer not to publish the exact type locality as over collecting might disturb or even destroy this population. The locality is, however, deposited with the type material and available to interested parties.

Description. Shell medium sized, thick, heavy, grey-blackish, low conical, nonumbilicated, iridescent aperture with aperture fold next to the columella, where a second fold occurs. Both folds inconspicuous.

Protoconch ocher to beige, 1.5 smooth whorls.

Teleoconch about 3 whorls, gently increasing in diameter, no periostracum visible. Suture shallow and rather wide. Whorls sculptured by strong remarkably granulated spiral cords (the so called primary cords, marked P1, P2, P3...- with P1 as the most adapical one). First teleoconch whorl sculptured

by 5 strong high-elevated spiral cords of the same size. They are beset by flat, elongate to round oval granules. Cord diameter wide as space between them. P1 and P2 of second teleoconch whorl coarser than the remaining 5. Granules on P1 and P2 more distinct than on other. P1, P2 and P11 are the most dominant cords on the last whorl. Their granules are merged towards the aperture and appear more lamellose than granular. There is a wide space between P10 and P11.

Aperture more or less round, with a thick lip. Base convex and smooth.

Deeply retracted operculum thin, corneous, multispiral with narrow growing edge. (Fig. 4)

Radula (Figs 5-6) rhipidoglossate. Rachidian tooth wide, rhombic with a single wide, triangular, slightly incurved dentate central cusp, with shallow tip. Lateral teeth 5 in number, unicuspid with serrated margins, rather short, with slender shaft and broad base. Inner marginal teeth slender, more than 30 in number, with very thin rounded tip, margins clearly serrated. Outer marginal teeth not clearly visible, but usually similar to the inner.

Ground body colour blackish fading to grey, foot underside light grey or white, cephalic tentacles black to dark grey, epipodial tentacles brighter.

Head of animal with cylindrical snout, rather thick smooth eye stalks but eyes not visible in the critical point dried animal (Fig. 1). Head without cephalic lappets. Roughly papillated cephalic tentacles. Neck lobes situated on head basal sides. Four pairs of epipodial tentacles both sides of foot (Fig. 3). Anterior largest (on right side), all others of nearly equal size. Space between last two epipodial tentacles wider than others. Snout with rough end and small, smooth, spoonlike pseudoproboscis (Fig. 2). Ctenidium not examined.

Remarks. If we compare the radulae of *Diloma samoensis* n. sp. and that of *Diloma radula* we found a close relationship between both species and the type species of *Austrocochlea* - a genus restricted to the Southeast Australian - Tasmanian region (Wilson, 1993; Hickman, 1998).

Hickman & McLean, 1990 (fig. 60 E *Austrocochlea constricta* & fig. 60 F *Diloma nigerrima*) have shown details of radulae of both genera.

Although Sasaki (2000) placed the species described by Philippi, 1849 as *Trochus (Diloma) radula* in the generally accepted genus *Diloma*, an examination of material from Okinawa has shown that radula morphology is more closely related to the genus *Austrocochlea* than to *Diloma* (as illustrated by Hickman & McLean).

Further investigations of radulae of such species as *Diloma piperinus* (Philippi, 1849) and *Diloma suavis* (Philippi, 1849) may verify the propriety of their recent generic assignment.

D. samoensis n. sp. differs from the closely related *D. radula* in several aspects:

- the general shell shape is much more globose in *D. samoensis* than in the more depressed *D. radula*. (Figs 10-12)

- the sculpture of *D. samoensis* is much stronger in the shoulder and basal spiral cords than in *D. radula*.

- the rachidian tooth of *D. samoensis* has a more slender and narrower shaft at the upper end, and the blade is broader and lesser forward-directed than in *D. radula*.

- *D. samoensis*, although reportedly living together with *D. radula* in the same geographical region, is restricted to isolated lava fields, where it lives very cryptically between the rocks and can only be found active late at night, whereas *D. radula* lives under and on stones and is active during the entire day.

Etymology. The species is named after the Samoan Islands, where it was first discovered.

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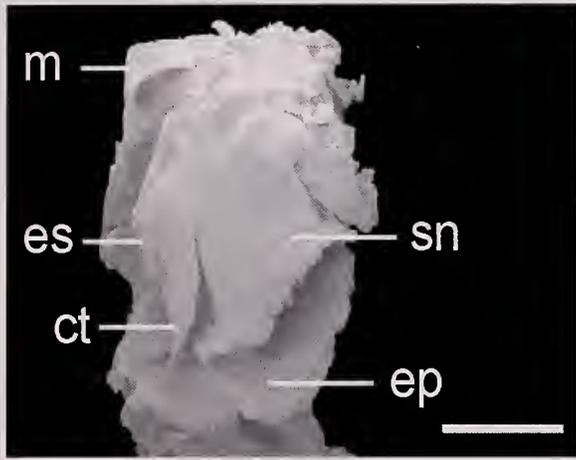
We also express our gratitude to Dr. H. Saito and Dr. T. Sasaki (National Science Museum, Tokyo) for providing specimens of *Diloma radula* for anatomical examination. We are grateful to Mr. C. Vilvens and Mr. R. Houart for critical reading the manuscript and for helpful comments.

Figures 1-6

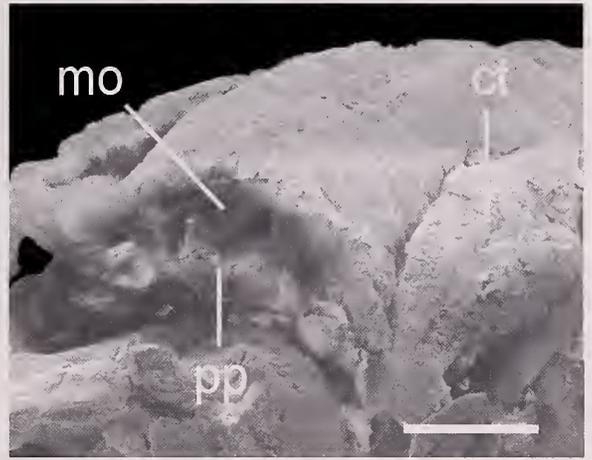
Diloma samoensis n. sp., SEM pictures of dissected paratype (ZSM 20020496), 10.5 x 7.4 mm.

1. Critical point dried animal, frontal view (scale bar 1 mm); 2. Close up of mouth region (scale bar 500 µm); 3. Close up of right side epipodial tentacles (scale bar 200µm); 4. Dorsal view of multispiral operculum (scale bar 1mm); 5. Anterior portion of radula (scale bar 100 µm); 6. Close up of radula to show details of rachidian tooth, lateral and inner marginal teeth (scale bar 50 µm).

ct – cephalic tentacles, ep – epipodium, ept – epipodial tentacles, es – eye stalk, m – mantle, mo – mouth, pp – pseudoproboscis, sn – snout



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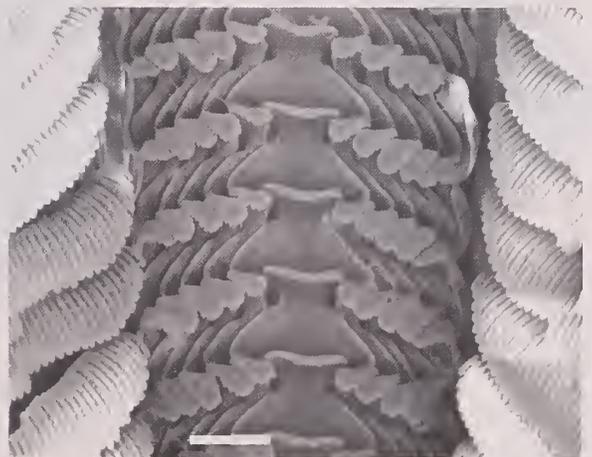
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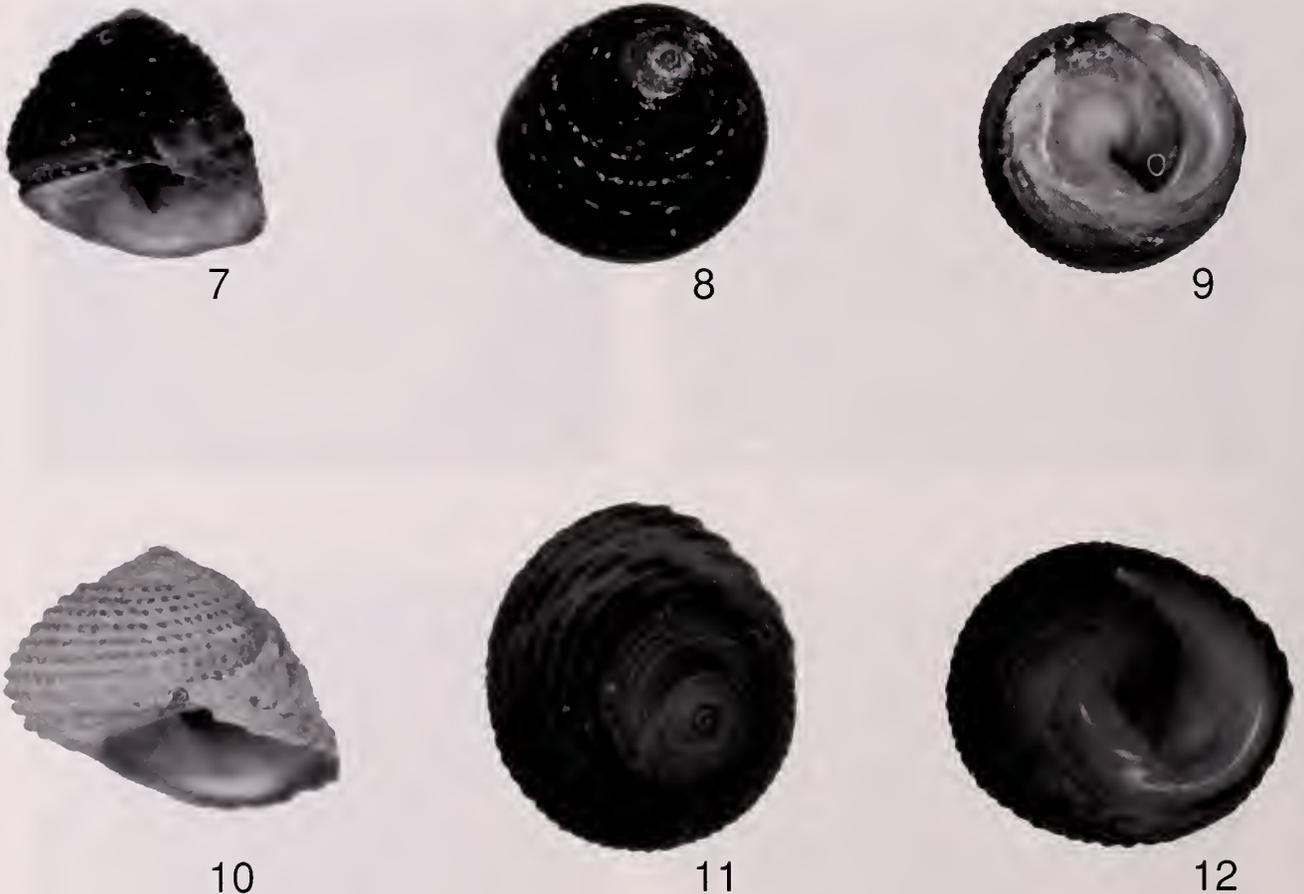
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REFERENCES

- Herrmannsen, A. N. 1846-1849. *Indicis generum Malacozoorum primordia. Nomina subgenerum, generum, familiarum, tribuum, ordinum, classium, adjectis auctoribus, temporibus, locis systematicis atque literariis, etymis, synonymis*. 2 Vols. (Cassel, Fischer) Vol. 1 (1846): i-xxvii, 1-637.
- Hickman, C. S. 1998. Superfamily Trochoidea. pp. 671-692. In: Beesley, P. L., Ross, G. J. B. & Wells, A. (eds) *Mollusca: The Southern Synthesis. Fauna of Australia. Vol. 5*. CSIRO Publishing: Melbourne, Part B: viii, 565-1234.
- Hickman, C. S. & McLean, J. H. 1990. Systematic revision and suprageneric classification of Trochacean Gastropoda. *Science Series* (35) of Natural History Museum of Los Angeles County: i-vi, 1 - 169.
- Rafinesque, C. S. 1815. *Analyse de la nature, ou tableau de l'univers et des corps organises*. Palermo, 224 pp.
- Sasaki, T. 2000. Trochidae. pp. 54-83. In: Okutani, T. (ed.) *Marine Mollusks in Japan*. Tokai University Press, Tokyo.
- Schwabe, E. 1998. Die Mollusken-Fauna von Western Samoa. *Club Conchylia Informationen* 30 (4-6): 93-106.
- Wilson, B. 1993. *Australian Marine Shells. Prosobranch Gastropods*. Odyssey Publishing, Kallaroo, Western Australia. Part 1. 408 pp.



Figures 7-12

7-9. *Diloma samoensis* n. sp., holotype (ZSM 20020494), 8.8 x 7.8 mm; 10-12. *Diloma radula* (Philippi, 1849), specimen (University Museum, University Tokyo) from Okinawa, Zatsuu, Kumingami, 5.8 x 6.5 mm.