

THE PHILIPPINE LAND MOLLUSKS OF THE GENUS OPISTHOPORUS

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In the Cyclophoridae, as in the Annulariidae, we find in some groups wonderful provision for breathing, even when the mollusk has tightly closed its shell with its operculum. One of these devices is characteristic of the genus treated in this paper—*Opisthoporus*. This genus is closely allied to the widely distributed and profusely specifically differentiated genus *Eucyclotus*, which it resembles in general form, in color pattern, and in the structure of the operculum. It is, however, at once distinguished from *Eucyclotus* by the presence of a breathing tube, a slender curved hollow horn open at its tip and at the shell end, which furnishes a breathing pore when the mollusk withdraws into its shell and closes its door with its operculum against undesirable visitors or enemies.

The type of the genus, *Opisthoporus biciliatus* Mousson, was described from the Botanic Garden at Buitenzorg, Java, whither it was transported with plants from Borneo. The genus seems centralized in Borneo. It extends north into the Philippines as indicated in the present paper and south into Celebes, Singapore, Sumatra, and Java.

The character of the breathing tube is shown in the illustrations of the various Philippine races on Plate 81 and the operculum in Figure 1. The relief map (pl. 82) figures the distribution of *Opisthoporus* in the Philippine Islands.

OPISTHOPORUS QUADRASI PALAWANENSIS, new subspecies

PLATE 81, FIGURE 5

1889, *Opisthoporus quadrasi* DOHRN, Nachrichtsbl. Deutschen Malak. Ges., p. 55, in part.

1897, *Opisthoporus quadrasi* KOBELT and MÖLLENDORFF, Nachrichtsbl. Deutschen Malak. Ges., vol. 29, p. 119, in part.

1898, *Opisthoporus quadrasi* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 185, in part.

Shell large, thin, semitranslucent, very depressed helicoid. The first two whorls pale chocolate-brown, the rest yellowish horn

colored, marked by numerous axial brown fulgurations, which are about as wide as the spaces that separate them: they extend to the peristome on the last whorl. The upper side of all the whorls is strongly rounded, and marked by rather strong incremental threads and closely spaced microscopic spiral striations where protected by the sutures. The whorls show numerous slender fine lines, which here are stronger than those in typical *Opisthoporus quadrasi* from Balabac. The siphon is about 4 mm behind the peristome and is directed forward in a curve. Periphery well rounded. Base openly umbilicated, showing all the whorls within. These whorls are strongly rounded and marked here as on the upper surface, but the sculpture is slightly finer. Aperture and operculum as in *Opisthoporus quadrasi quadrasi*.



FIGURE 1.—Operculum of *Opisthoporus*

Type.—U.S.N.M. No. 313010, from Iwahig, Palawan. It has 4.5 whorls, and measures: Height, 7.5 mm; greater diameter, 16.2 mm; lesser diameter, 11.7 mm.

Additional material.—Additional specimens examined yield the data given in the table below.

U. S. N. M. No.	Number of whorls	Height	Greater diameter	Lesser diameter	Locality
313011	4.5	Mm 7.8	Mm 17.4	Mm 12.9	Iwahig.
313012	4.3	7.8	16.8	12.9	Ulugan.
127157	4.5	7.7	17.2	12.6	Palawan.
127157	4.5	7.4	16.4	12.5	Do.

Remarks.—This subspecies differs from typical *Opisthoporus quadrasi quadrasi* in being larger and in having dark early whorls and stronger sculpture.

OPISTHOPORUS QUADRASI QUADRASI Crosse

PLATE 81, FIGURE 4

1888. *Opisthoporus quadrasi* (CROSSE) HIDALGO, Journ. Conch., vol. 36, pp. 59, 60, pl. 5, figs. 6, 6a, 6b.
1889. *Opisthoporus quadrasi* DOHRN, Nachrichtsbl. Deutschen Malak. Ges., p. 55, in part.
1896. *Opisthoporus quadrasi* ELERA, Catalogo sistematico fauna Filipinas, vol. 3, p. 689, in part.
1897. *Opisthoporus quadrasi* KOBELT and MÖLLENDORFF, Nachrichtsbl. Deutschen Malak. Ges., vol. 29, p. 119, in part.
1898. *Opisthoporus quadrasi* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 185, in part.

Shell small, moderately thick, depressed helicoid, yellowish horn colored. All but the first one and one-half whorls are marked with numerous fulgurations of brown on the upper side, which are a little wider than the light areas separating them. These fulgurations extend almost to the peristome. The upper surface, except the smooth nuclear portion, is marked by closely spaced incremental threads and almost obsolete incised spiral lines. The siphon is about 4 mm behind the peristome. It points forward and is marked by rather coarse annulations. Periphery well rounded. Base with an open funnel-shaped umbilicus, showing all the whorls within, with the sculpture a little finer than that of the upper surface. Operculum with eight spiral lamellae, which are marked by oblique raised threads. The depressed center of the operculum is smooth.

The specimen described and figured (U.S.N.M. No. 303075) comes from the type locality, Balabac Island. It has 4.4 whorls, and measures: Height, 7.8 mm: greater diameter, 14.7 mm: lesser diameter, 11.3 mm.

Remarks.—The Balabac species resembles *Opisthoporus quadrasi turturinganus* most nearly in size, but it differs in being more elevated, in having the whorls more inflated, in being less openly umbilicated, and in being fulgurated on the upper surface. The sculpture, too, is finer.

OPISTHOPORUS QUADRASI BUSUANGENSIS, new subspecies

PLATE 81, FIGURE 3

1896. *Opisthoporus quadrasi* ELERA, Catalogo sistematico fauna Filipinas, vol. 3, p. 689, in part.
1897. *Opisthoporus quadrasi* KOBELT and MÖLLENDORFF, Nachrichtsbl. Deutschen Malak. Ges., vol. 29, p. 119, in part.
1898. *Opisthoporus quadrasi* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 185, in part.

Shell moderately large, thin, depressed helicoid. The first one-half turn light horn colored, the succeeding two dark chestnut-brown,

the rest pale yellowish horn colored with axial fulgurations of brown. The fulgurations terminate about one-fifth of a turn behind the peristome, but this area shows irregularly distributed axial bands of brown of varying width. The nuclear whorls are smooth, the rest marked by slender threadlike incremental lines and exceedingly fine, almost obsolete spiral threads. The siphon is about 0.4 mm behind the peristome. It is curved forward and marked by numerous slender annulations. Periphery well rounded. Base open, forming a funnel-shaped umbilicus, showing all the turns within sculptured like the upper surface, but less strongly. The fine hair-like sculpture remaining in the suture of the umbilicus is short and very slender. The aperture is typical. There are 10 lamellae on the operculum.

Type.—U.S.N.M. No. 303076, collected by Quadras at Busuanga. It has 4.4 whorls, and measures: Height, 8 mm; greater diameter, 16.1 mm; lesser diameter, 12 mm.

Remarks.—This race is very close to *Opisthoporus quadrasi palawanensis*, but can be readily distinguished from it by the fulgurations, which do not extend to the peristome.

OPISTHOPORUS QUADRASI TURTURINGANUS, new subspecies

PLATE 51, FIGURE 2

Shell small, thin, very depressed helicoid. All but the last turn and a quarter chocolate-brown, the last part yellowish horn colored. The first turn is well rounded, smooth, and glassy. The succeeding whorls are also well rounded and are marked by closely spaced incremental lines, which are raised into slender lines. On the upper surface fine, closely spaced, incised spiral lines cut the axial thread and lend the surface a silky luster. The siphon is situated about 4 mm behind the peristome at the suture, the tube being bent obliquely forward or forward and downward. It is marked by numerous incremental threads. Periphery well rounded. Base with open funnel-shaped umbilicus, showing all the whorls within marked like the upper surface of the shell but a little less strongly so. Here and there on the whorls within the umbilicus exceedingly fine short hairs are present. Aperture circular; peristome double; the inner lightly exerted and very slightly reflected, the outer thin, translucent, slightly expanded on the columellar edge, a little more so on the basal and outer lip and forming a moderately strong auricle at the posterior angle of the aperture. Operculum with a smooth flat inner plate, concave edge, and slightly concave outer surface. The outer surface shows at least 10 closely coiled whorls with an inner smooth nuclear portion. These whorls are marked by numerous obliquely placed threads, which are of varying strength.

Type.—U.S.N.M. No. 313013, from Turturingan, Palawan. It has 4.3 whorls, and measures: Height, 7 mm; greater diameter, 15.1 mm; lesser diameter, 11 mm. The operculum measures: Thickness, 0.6 mm; diameter, 4.7 mm. A topotype, U.S.N.M. No. 313014, has 4.3 whorls, and measures: Height, 6.4 mm; greater diameter, 13.9 mm; lesser diameter, 10.6 mm.

Remarks.—This species is nearest in size to typical *Opisthoporus quadrasii quadrasii*, but differs from this by the absence of fulgurations and in having much stronger axial and spiral sculpture.

OPISTHOPORUS QUADRASI, subspecies ?

PLATE 51, FIGURE 1

U.S.N.M. No. 130872 contains three specimens said to have been collected by Osborn on the island of Panay. These seem so far out of the regular range of distribution that I refrain from commenting upon them further than to say that they resemble quite closely the shells here described as *Opisthoporus quadrasii palawanensis*. It is possible that specimens may have been transferred with cultural plants, as in the case of *Opisthoporus biciliatus* Mousson.

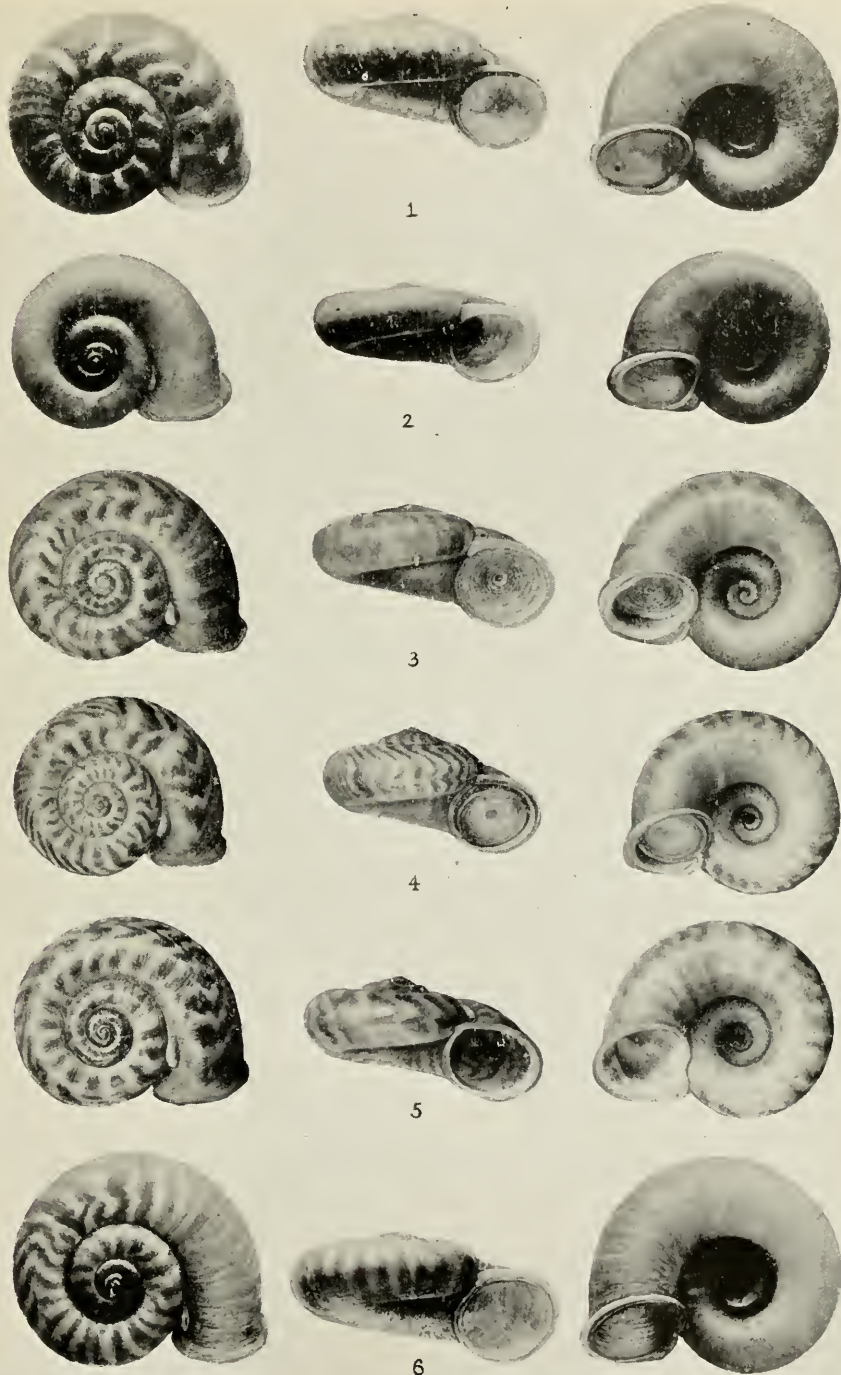
OPISTHOPORUS QUADRASI, subspecies ?

PLATE 51, FIGURE 6

U.S.N.M. No. 201071a contains the specimen that I have here figured from Palo Leyte. It was donated to the National Museum by Walter F. Webb.

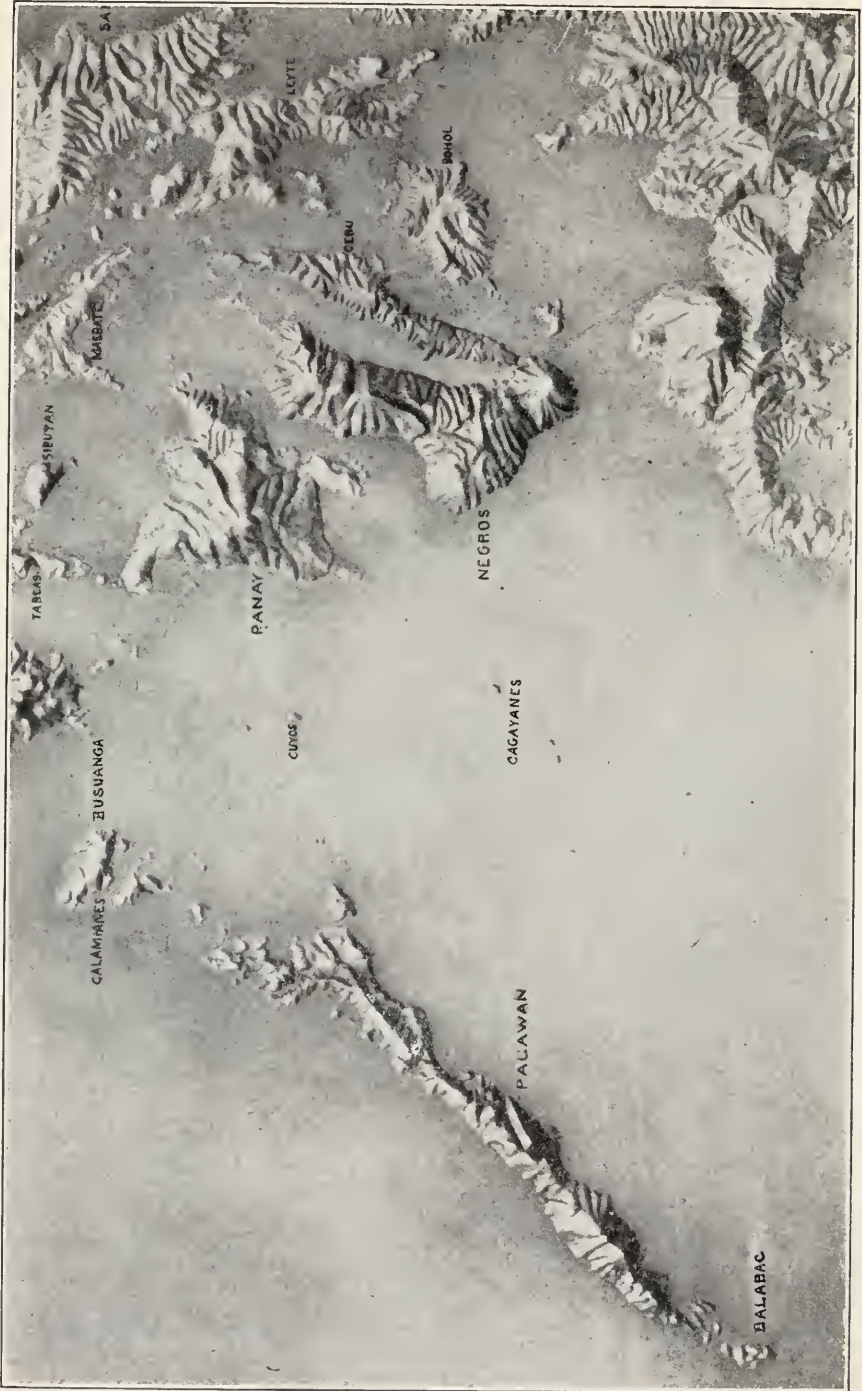
The remarks under the last apply here as well.





THE PHILIPPINE SPECIES OF OPISTHOPORUS

- 1, *Opisthoporus quadrasi*, subspecies ?; 2, *O. q. turturinganus*, new subspecies; 3, *O. q. busuangensis*, new subspecies; 4, *O. q. quadrasi* Crosse; 5, *O. q. palawanensis*, new subspecies; 6, *O. quadrasi*, subspecies ?.



RELIEF MAP SHOWING THE DISTRIBUTION OF OPISTHOPORUS IN THE PHILIPPINES