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CONTRIBUTIONS TO THE STRATIGRAPHY AND FOSSIL INVERTEBRATE FAUNA OF THE PHILIPPINE ISLANDS

By WARREN D. SMITH

(From the Division of Mines, Bureau of Science, Manila, P. I.)

Twenty plates

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INTRODUCTION

This paper is intended to serve as an introductory contribution to the large subjects of the paleontology and stratigraphy of the Philippine Islands. Much more material than is given now awaits time for the necessary studies. I have been gathering this material during eight years of exploration in the Philippine Islands when most of my time has been spent in economic work; hence, I cannot claim to have done more than open the subject. The generally poor state of petrification as found in those specimens which have been obtained, the limited library facilities in Manila in this particular subject, and the fact that consecutive time has not been available for study will account for some of the more or less fragmentary discussions. Twelve new species and 2 new varieties are described. It might have been expected that a larger number of new species would have been described, but where there has been the least doubt I have referred the form to a species already described. I have included generic descriptions translated from Zittel,¹ and I have omitted specific descriptions of old species. I have done this for the following reasons: For the general student in paleontology

¹ Handbuch der Paleontologie. Munich (1876-1880), 2 and 4.

Lithophylliaceæ—Continued.	Madreporidæ.
<i>Caryophyllia</i> (?) <i>laogana</i> sp. nov.	<i>Madrepora duncani</i> Reuss (?)
<i>Flabellum australe</i> Moseley (?)	Astreaceæ.
<i>Odontocyathus coloradus</i> sp. nov.	<i>Prionastraea</i> (?) <i>vasta</i> Klz.
Lophoserinae.	Spatangidæ.
<i>Cycloseris decipiens</i> K. Mart.	<i>Schizaster subrhomboidalis</i> Herkl.
<i>Pachyseris cristata</i> K. Mart. (?)	Solenocoenæ.
<i>Ptychocyathus</i> (?) <i>incognitus</i> sp. nov.	<i>Dentalium tumidum</i> sp. nov.
Lithistidæ.	Vermetidæ.
<i>Chenendopora</i> (?) <i>major</i> sp. nov.	<i>Vermetus giganteus</i> K. Mart.
	Thalassinidæ.
	<i>Callianassa dijki</i> K. Mart.

DESCRIPTION OF SPECIES

GASTEROPODA

CONIDÆ

CONUS Linnaeus

Shell convolute, inverted, top shaped, sometimes quite cylindrical, spire short, conical; mouth long, narrow, without teeth or wrinkles, possessing anterior outlet; outer lip sharp, plain, sometimes with a gap posteriorly; operculum horny, narrow. *Conus* includes 526 recent and about 160 fossil species, principally distributed in the younger Tertiary formations. (*Zittel*.)

The genus *Conus* reaches its greatest development in the tropics, and the most valued living species, *C. gloria-maris* Hwass, was found in the Philippines. They are beach forms. This fact indicates that the formations containing fossils of this genus were laid down in shallow water.

Species of Conus found fossil in the Philippines.

- Conus sinensis* Sow. Semper collection (Le den).
(Conch. III., fig. 56.)
- Conus insculptus* Kien. Semper collection.
(Icon. Coq. Viv., Pl. 99, fig. 2.)
- Conus palembuanensis* K. Mart. Semper collection.
(Foss. v. Java, Pl. II, fig. 26.)
- Conus lorosisii* Kien. Semper collection.
(Foss. v. Java, Pl. III, fig. 52.)
- Conus acutangulus* Chem. (?) Bureau of Science collection.
- Conus odongensis* K. Mart. Bureau of Science collection.
- Conus sulcatus* Hwass var. *philippinensis* var. nov. Bureau of Science collection.
- Conus vimineus* Reeve. Bureau of Science collection.
- Conus hardi* (?) Bureau of Science collection.
- Conus djarianensis* K. Mart. Bureau of Science collection.
- Conus parvulus* K. Mart. Bureau of Science collection.

Conus sulcatus Hwass var. **philippinensis** var. nov. Plate II, fig. 1.

Tryon, Man. Conchol. 6, Pl. 23, figs. 79a-81;

K. Martin, Foss. v. Java, 1, n. s., Pl. 1, figs. 11 and 12.

This is a very fresh looking and well preserved shell, 5 centimeters high and 2.5 centimeters wide. It is very closely related to both *C. sulcatus* Hwass, still living in Philippine waters, and to the variety *sonde* described by Martin from Java. The form figured here has only 1 fine thread-like ridge in the main sulcations instead of 2 or more as in the other varieties. This difference seems scarcely important enough to warrant even a varietal name, but one is given to show that there is a slight difference.

Locality: Punta Colorada, Aroroy, Masbate, No. 907.²⁰

Formation: Pliocene (?) marl.

Conus odengensis K. Mart. Plate III, fig. 2.

K. Martin, Foss. v. Java, 1, n. s., Pl. III, figs. 39-44.

The specimen figured here is a cast, and all casts are open to doubt, but it agrees with the form *C. odengensis* more nearly than with anything else it has been compared with.

Locality: Mount Mangilao, near Davao, Cebu, No. 272.

Formation: Miocene or Pliocene limestone.

Elevation: About 200 meters.

A form not greatly unlike this is *C. imperialis* Reeve living in waters near Bohol, specimen in Quadras collection, Bureau of Science, Manila.

Conus djarianensis K. Mart. Plate III, fig. 3.

K. Martin, Foss. v. Java, Pl. III, figs. 45-50.

This seems to be identical with Martin's species. It also resembles more or less closely *C. achetinus* Chem. and *C. arenatus* Brug., the latter living in the seas near Marinduque Island.

Locality: Raised beach, Bongao, Sulu Archipelago, No. 970.

Formation: Recent limestone.

Elevation: 5 meters.

Conus sp. Plate III, fig. 4.

This is a small specimen which I did not compare directly with the Javan species, but with a figure merely. I cannot be sure of the determination. It is about the size and shape

²⁰ These numbers refer to the localities where the fossils were collected; nearly all of these are shown on the locality map, Plate II.

of *C. parvulus*, but that species is lacking in the little tubercles on the spire which characterize this specimen.

Locality: Near Anda Island, Pangasinan, Luzon, No. 757.

Formation: Mio-Pliocene shale.

FUSIDÆ

FUSUS Lamarck

Fusus (Turbinella)

Shell spindle-shaped, mouth running forward in a canal, spire elongated, without cross furrows. Columella smooth with folds. Some 250 recent and at least 500 fossil species. Principal development in the Eocene and Miocene. The genus *Fusus* has been so split up by modern conchologists that Lamarck's name has quite disappeared from the literature. (Zittel.) Subgenera listed by Zittel, 15.

Species of Turbinella found fossil in the Philippines.

Fusus verbecki K. Mart.

Foss. v. Java, p. 85.

Turbinella ilocana sp. nov.

Fusus tjidamarensis K. Mart.

* Foss. v. Java, n. s., Pl. XIII, figs. 199 and 200.

Turbinella ilocana sp. nov. Plate III, fig. 8.

Hörnes, Foss. Mollus. des Tertiär Beckens von Wien, Pl. 31, fig. 2.

This corresponds very closely to *F. glomus* Gené, but is larger than the figured specimen of *glomus*. Some of the ribs in *T. ilocana* seem to be double and are closer together. Length, 51 millimeters; width of last whorl, 20 millimeters.

Locality: Cut in road between Pasuquin and Laoag. Ilocos Norte, Luzon, No. 356.

Formation: Recent marl.

Turbinella (Fusus) tjidamarensis K. Mart. Plate V, figs. 1, 2, and 3.

Foss. v. Java, Pl. XIII, figs. 199 and 200.

Fossils from the Cutch, India.

The Javan and Philippine specimens of this species differ apparently only in the shape of the mouth opening. In the Javan form the outer lip stands out like an ear, while in the Philippine form it is compressed and hugs the body whorl. In the Bureau of Science collection are 2 specimens from the same

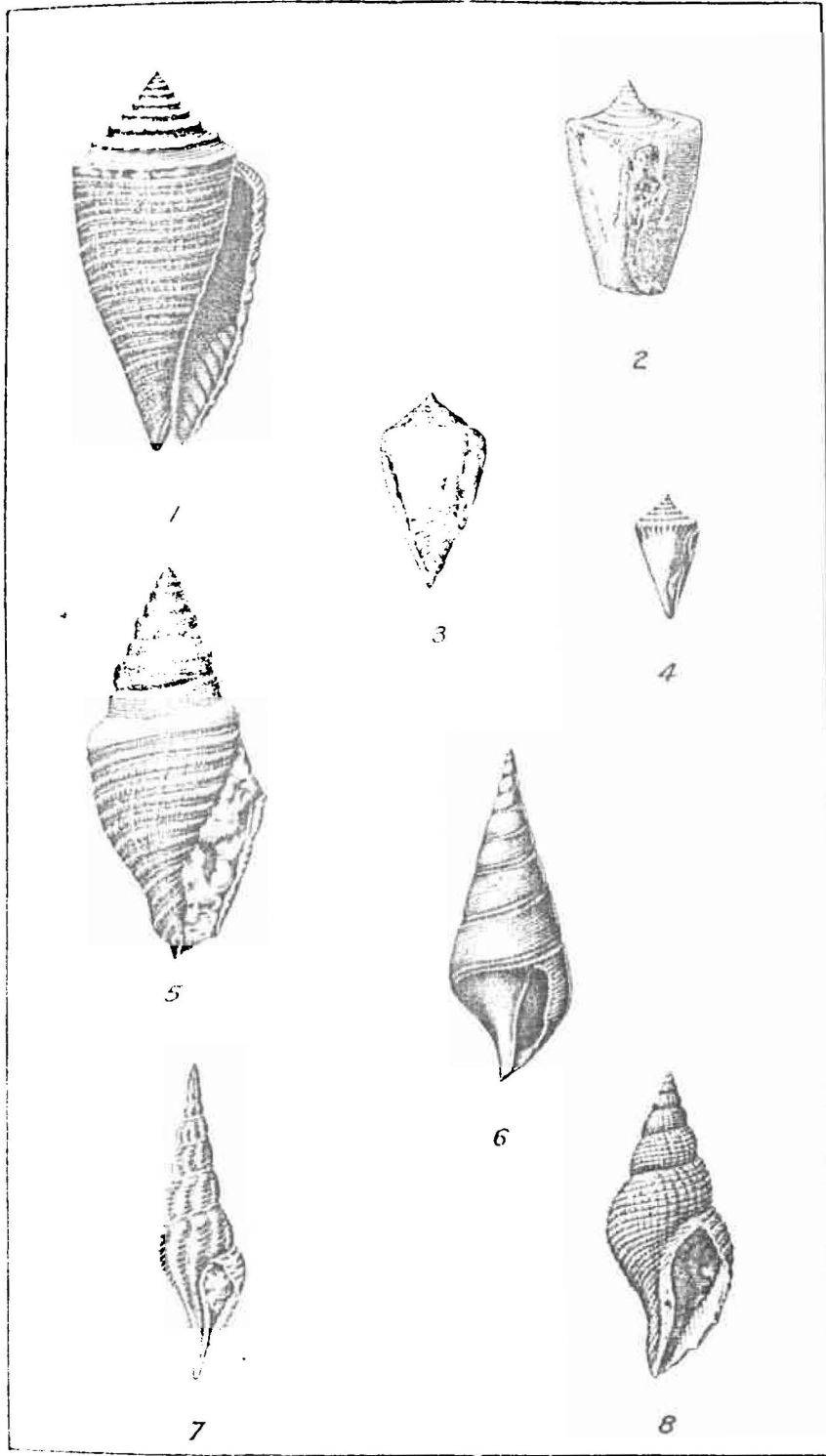


PLATE III.

Fig. 1. *Conus sulcatus* Brög. var. *philippinensis* var. nov. 2. *Conus odengensis* K. Mart. 3. *Conus djarianensis* K. Mart. 4. *Conus* sp. 5. *Turris* (*Pleurotoma*) *andaensis* sp. nov. 6. *Turris* (?) *aguana* sp. nov. 7. *Turris flavida* Lam. var. *sonde* K. Mart. 8. *Turritella* *ultrata* sp. nov.