

A new species of Conidae (Gastropoda) from the Philippines

By R. M. (MIKE) FILMER¹⁾, ANTONIO MONTEIRO²⁾, FELIX LORENZ³⁾
& ARMANDO VERDASCA⁴⁾

¹⁾ mike@mfilmer.fsnet.co.uk, ²⁾ a.j.a.monteiro@netcabo.pt, ³⁾ felix.lorenz@t-online.de,
⁴⁾ armando.verdasca@gmail.com

2 Tables, Plates 1-3

Keywords

Conidae, *Conus tisi*, *Conus kostini* new species, Philippines

Zusammenfassung

Conus kostini wird als neue Art von den Philippinen beschrieben und mit *Conus tisi* LAN, 1978 verglichen, mit der sie gleichgestellt wurde. Die neue Art unterscheidet sich durch ein schlankeres Gehäuse mit höherer, kuppelförmiger Spira, geringerem Gewicht und lebhafterer Zeichnung.

Abstract

Conus kostini is described from the Philippines and separated from *C. tisi* LAN, 1978 with which it has previously been associated. It differs by its more slender shape, taller and more dome shaped spire, lesser weight and more vivid colour pattern.

Introduction

Conus (Rhizoconus) tisi LAN, 1978 was described on the basis of only two dead specimens in very poor condition, which were dredged in Taiwanese waters from 120 meters. Later, its range was extended to Okinawa and the Philippines. The holotype of *C. tisi* measures 113×60.8 mm and is preserved in the Taiwan Museum of Geological Sciences (TMGS) in Taipei. The paratype measuring 154×75 mm formerly in the collection of the late Vice Admiral W. S. BITLER and then in the collection of the late A. J. DA MOTTA is now in the Staatliches Museum für Naturkunde (SMNS) in Stuttgart, Germany. In 1979 T. C. LAN (pl. 17 nos 34 & 35) illustrated the holotype and the paratype of *C. tisi* again.

In 1993, in a short article by LUIGI RAYBAUDI in *World Shells* (no.6, p. 97) titled “*Conus (Rhizoconus) tisi* LAN 1978” referred to the discovery of the species in the Philippines and

stressed that only about eight specimens had been found in three years. This report included

illustrations of four specimens indentified as *C. tisi*. One of them was a small juvenile and the three larger specimens also appeared on the back cover of the magazine. It is probable that two of these are the slender Philippine form.

In 1995 RÖCKEL, KORN & KOHN (no.111, p. 148, pl. 26, figs 20-23) described *C. tisi* and reported it from the Philippines; fig.21 shows a 98 mm specimen from Balut Island (in collection ARMIN SCHMID) which is the slender form.

In 1999 HIGO, CALLOMON & GOTO (p.334, no.G3939) listed *C. tisi* from southern Okinawa with the habitat 100 to 200 meters in sand.

In 2007 VERDASCA, MONTEIRO & FILMER published a note about *C. tisi* in *The Cone Collector* (no. 4 (October): 23). They mentioned the differences between *C. tisi* and some of the slender specimens from the Philippines.

In 2008 RAYBAUDI MASSILIA in POPPE (pl. 560) illustrated *C. tisi* from Aliguay Island and the slender form from Balut Island both in the Philippines.

In 2009 ROBIN (page 433, no.9) illustrated a 74 mm specimen of *C. tisi* from the Philippines.

Further examination of some of the Philippine *C. tisi* led us to conclude that two distinct species are involved and we therefore introduce the following new taxon (*Conus kostini* n. sp.).

We are not yet convinced of the procedure of splitting the genus *Conus* into a number of different genera as proposed by TUCKER & TENORIO in 2008. Because we have no information about the radula or DNA of the new species we prefer to maintain the genus *Conus* in this case.

Conus kostini n. sp.

(Plates 1 & 2)

Material studied

Conus kostini n. sp.

Specimens examined:

Holotype 97.80 × 45.30 mm in Muséum National d'Histoire Naturelle, Paris (MNHN).

Paratype no.1 104.80 × 48.80 mm in coll. F. LORENZ, Buseck, Germany.

Paratype no.2 115.25 × 51.80 mm in coll. A. VERDASCA, Lisbon, Portugal.

Paratype no.3 92.00 × 42.30 mm in coll. M. FILMER, Chobham, England.

Paratype no.4 71.70 × 33.50 mm in coll. M. FILMER, Chobham, England.

Pictures of *C. kostini* n. sp. examined include those from the Manual of the Living Conidae, World Shells, The Cone Collector and Philippine Marine Mollusks vol. II.

Conus tisii

Specimens examined:

Paratype 154.00 × 75.00 mm (coll. SMNS) from Taiwan.

Specimen 1 117.60 × 62.40 mm (coll. F. LORENZ) from Southern Taiwan, 250 meters.

Specimen 5 138.00 × 72.00 mm (coll. A. MONTEIRO) from Balut, Philippines,

Specimen 6 72.50 × 34.80 mm (coll. A. VERDASCA) from Japan.

Pictures examined:

Holotype 113.00 × 60.80 mm (coll. TMGS) from Taiwan.

Specimen 2 128.00 × 69.00 mm (Plate 560 in RAYBAUDI MASSILIA in POPPE).

Specimen 3 123.00 × 63.00 mm (Plate 26, no.20 in RÖCKEL et al).

Specimen 4 70.00 × 33.00 mm (Plate 26, no.23 in RÖCKEL et al).

Specimen 7 74.80 × 36.60 mm (Page 433, no.9 in ROBIN).

Distribution and habitat

The type locality of *C. kostini* n. sp. is Balut Island off Davao in Mindanao Province, southern Philippines. Specimens have been reported from elsewhere off Mindanao but these reports are unsubstantiated. The holotype and paratypes were collected in tangle nets in 200 to 400 meters. *C. kostini* n. sp. is so far known only from the Philippines.

Description

C. kostini n. sp. is a large lightweight shell with a relatively low dome-shaped spire and rather

straight tapering sides. The holotype is 97.80 mm in length with the largest paratype 115.25 mm and the smallest 71.70 mm.

The spire is low and slightly convex to almost straight in outline. The protoconch is raised and rather sharp although broken on the holotype and is cream to pale beige in colour. There are eleven spire whorls, the early five are granulate while the remaining ones are smooth. The outer six spire whorls are sloping and flat to slightly concave in outline and contain numerous fine regular spiral cords that are more pronounced on the inner two-thirds of each whorl. The sutures are very even and finely marked. The outer spire whorls are pinkish cream with strong irregular brown axially aligned bars and blotches.

The shoulder is subangulate, carinate and even. The body whorl is relatively straight in outline but slightly convex below the shoulder and slightly concave near the base. It has a dull shine and numerous very fine spiral grooves at the base which become, less observable fine striae further up the body whorl. There are also numerous irregular axial lines which appear to mark growth points. The colour is pale bluish-grey to beige and there are two or three vague bands of pale brown axially aligned and irregular bars and blotches.

The aperture is broad and rather straight widening only slightly at the base. The interior has faint bluish-grey hue. The anal notch is relatively shallow and somewhat "U" shaped. The lip is thin, sharp and straight except for at the base and shoulder where it is curved. The periostracum is pale beige-brown, smooth and thin to almost transparent (see paratype no.4). The animal is unknown.

There is very little variation among the specimens examined.

On our behalf ARMANDO VERDASCA undertook a statistical review of the morphometric parameters of *C. kostini* n. sp and *C. tisii*. In Table 1 are the parameters of *C. kostini* n. sp. and in Table 2 those of *C. tisii*. These characteristics lead us to the following conclusions:

1. Despite the fact we have only a small number of specimens to examine, the statistical hypothesis testing corroborates the assumption of separate species in the context of the different morphometric parameters obtained;

Table A
Conus kostini n. sp.

| # | Specimen (1) | L | D | A | P | w | RD | RSH | PMD | RW | SFD | CED | SFDx CED |
|-----|--------------------|--------|-------|-------|-------|-------|------|------|------|------|------|------|----------|
| 1 | Holotype | 97.80 | 45.30 | 85.00 | 70.60 | 28.70 | 0.53 | 0.15 | 0.83 | 0.29 | 0.28 | 0.64 | 0.18 |
| 2 | Paratype 1 | 104.80 | 48.80 | 88.70 | 71.50 | 31.60 | 0.55 | 0.18 | 0.81 | 0.30 | 0.33 | 0.68 | 0.23 |
| 3 | Paratype 2 | 115.25 | 51.80 | 96.80 | 84.80 | 37.10 | 0.54 | 0.19 | 0.88 | 0.32 | 0.36 | 0.61 | 0.22 |
| 4 | Paratype 3 | 92.00 | 42.30 | 77.50 | 65.00 | 28.80 | 0.55 | 0.19 | 0.84 | 0.31 | 0.34 | 0.65 | 0.22 |
| 5 | Paratype 4 | 71.70 | 33.50 | 61.30 | 54.50 | 14.00 | 0.55 | 0.17 | 0.89 | 0.20 | 0.31 | 0.61 | 0.19 |
| n=5 | | | | | | | | | | | | | |
| | Average | 96.31 | 44.34 | 81.86 | 69.28 | 26.04 | 0.54 | 0.18 | 0.85 | 0.29 | 0.32 | 0.64 | 0.21 |
| | Standard deviation | 16.26 | 7.04 | 13.43 | 11.00 | 8.56 | 0.01 | 0.02 | 0.03 | 0.05 | 0.03 | 0.03 | 0.02 |

Table B
Conus tisi (Lan, 1978)

| # | Specimen (1) | L | D | A | P | w | RD | RSH | PMD | RW | SFD | CED | SFDx CED |
|-----|---------------------------|--------|-------|--------|--------|--------|------|------|------|------|------|------|----------|
| 1 | in Felix Lorenz coll. | 117.60 | 62.40 | 107.00 | 98.10 | 82.90 | 0.58 | 0.10 | 0.92 | 0.70 | 0.17 | 0.64 | 0.11 |
| 5 | in Antonio Monteiro coll. | 138.00 | 72.00 | 126.10 | 107.00 | 152.20 | 0.57 | 0.09 | 0.85 | 1.10 | 0.17 | 0.67 | 0.11 |
| 6 | in Armando Verdasca coll. | 72.50 | 34.80 | 62.60 | 57.50 | 22.50 | 0.56 | 0.16 | 0.92 | 0.31 | 0.28 | 0.61 | 0.17 |
| 7 | in Eric Monnier coll. | 74.80 | 36.60 | 64.60 | 61.40 | 23.20 | 0.57 | 0.16 | 0.95 | 0.31 | 0.28 | 0.60 | 0.17 |
| | in Eric Monnier coll. | 95.70 | 47.20 | 84.10 | 79.60 | 31.70 | 0.56 | 0.14 | 0.95 | 0.33 | 0.25 | 0.59 | 0.15 |
| | in Ex. Alain Allary coll. | 132.50 | 68.1 | 113.6 | 98.4 | 145.00 | 0.60 | 0.17 | 0.87 | 1.09 | 0.28 | 0.69 | 0.19 |
| m=6 | | | | | | | | | | | | | |
| | Average | 105.18 | 53.52 | 93.00 | 83.67 | 76.25 | 0.57 | 0.14 | 0.91 | 0.64 | 0.24 | 0.63 | 0.15 |
| | Standard deviation | 28.49 | 16.18 | 26.56 | 20.82 | 60.38 | 0.02 | 0.03 | 0.04 | 0.38 | 0.06 | 0.04 | 0.03 |

Comparative statistics and testing:

| Hypothesis (2): | H0: Hypothesis in study | H0: $x_i(A) < x_i(B)$ | H0: $x_i(A) = x_i(B)$ | H0: $x_i(A) > x_i(B)$ | H0: $x_i(A) < x_i(B)$ | H0: $x_i(A) = x_i(B)$ | H0: $x_i(A) > x_i(B)$ | H0: $x_i(A) < x_i(B)$ | H0: $x_i(A) = x_i(B)$ | H0: $x_i(A) > x_i(B)$ | H0: $x_i(A) < x_i(B)$ | H0: $x_i(A) = x_i(B)$ | H0: $x_i(A) > x_i(B)$ |
|--------------------------------------|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--------------------------|-----------------------|
| H1: Alternative hypothesis | | H1: $x_i(A) > x_i(B)$ | H1: $x_i(A) = x_i(B)$ | H1: $x_i(A) < x_i(B)$ | H1: $x_i(A) > x_i(B)$ | H1: $x_i(A) = x_i(B)$ | H1: $x_i(A) < x_i(B)$ | H1: $x_i(A) > x_i(B)$ | H1: $x_i(A) = x_i(B)$ | H1: $x_i(A) < x_i(B)$ | H1: $x_i(A) > x_i(B)$ | H1: $x_i(A) = x_i(B)$ | H1: $x_i(A) > x_i(B)$ |
| t-Student Statistic (abs) | | 4.18 | 2.72 | 2.61 | 2.25 | 2.02 | 2.02 | 2.02 | 2.61 | 2.25 | 3.36 | 0.35 | 3.52 |
| Critical Region (5% of significance) | | 2.02 | 2.02 | 2.02 | 2.02 | 2.02 | 2.02 | 2.02 | 2.02 | 2.02 | 2.02 | 2.57 | 2.02 |
| acceptation of H0? | | NO H0! | without conclusion w/H0! | NO H0! |
| Probability | | 99.57% | 97.91% | 97.92% | 96.31% | 97.92% | 97.91% | 97.92% | 97.92% | 96.31% | 98.99% | 25.90% | 98.16% |

Definitions (3):

Parameters:

L, cone Length.

D, Diameter.

A, the cone length from the end of siphonal channel (base) to the aperture.

P, the length where the diameter is maximum.

w = weight (in grams).

Relative Diameter (RD) : $RD = D/A$

Relative Spire Height (RSH) : $RSH = (L-A)/A = L/A - 1$

Position of Maximum Diameter (PMD) : $PMD = P/A$

new Spire "Flattening" Degree (SFD) : $SFD = RSH/RD = [(L-A)/A] / [D/A] = (L-A)/D$

SFD, refers to the flattening of the spire relative to the diameter of the cone (D). Note that raised values of SFD correspond to lesser flattening of the spire!

new Cone "Elongation" Degree (CED) : $CED = RD/PMD = (D/A) / (P/A) = D/P$

CED, refers to the elongation of the cone and gives a measure of the "gravity center" of the cone.

SFDx CED = RSH/PMD = (L-A)/P

(SFD x CED), is more appropriate to the ventricosely conical outline of *C. kostini*, in opposition to the most broadly conical outline of *C. tisi*, than using only the ordinary RKK parameters,

even of juveniles specimens of *C. tisi*, in presence of allometric problems. So we can hope more raised values of SFD x CED to *C. kostini* than to *C. tisi*.

Notes:

(1) - As ordered in Material Studied.

(2) - $x_i(A)$ [and $x_i(B)$], average of parameter i in table A [and B]

(3) - See also in Röckel D, Korn W, & Kohn A.-J., (1995), pp. 20-21. All measures are in millimeters (mm), except for the weight (w), in grams.

Tables A & B: Morphological data of *Conus kostini* n. sp. and *C. tisi* (LAN, 1978) for comparison.

2. All the assumptions formulated are proved to be correct from a statistical point of view:

2.1 *C. kostini* n. sp. weights less, absolutely and relatively, than *C. tisii*: (testing of parameters W and RW, *C. kostini* n. sp. weights 0.29 grams per millimeter on average, against the 0.64 grams per millimeter on average, of *C. tisii*). *C. tisii* weights about 125 % more than *C. kostini*.

2.2 *C. kostini* n. sp. has a taller spire (lesser flattened) and is more slender than *C. tisii*: (testing of parameters RSH, RD and SFD). *C. kostini* n. sp. has a spire that represents 18%, on average, of the aperture when compared to 14% in *C. tisii* (see RSH parameter), thus a 23 % taller spire). Furthermore *C. kostini* n. sp. has a taller spire relative to the diameter, representing 32% on average when compare to 24% in *C. tisii*: (see SFD parameter).

2.3 Although we cannot draw conclusions about the major gravity center of *C. kostini* n. sp. because we tested only the CED parameter, the measuring of PMD and SFD×CED confirms the ventricose conical outline of *C. kostini* n. sp. when compared with the more broadly conical outline of *C. tisii*. SFD×CED is about 28 % bigger in *C. kostini* n. sp. than in *C. tisii*: (SFD×CED equals 0.21 in *C. kostini* n. sp. against 0.15 in *C. tisii*).

Finally we are convinced that larger samples will confirm the above conclusions which justify the separation of the two species.

Etymology

The new species is named in honour of the late ANDREY KOSTIN whose wife MARINA kindly made available the holotype.

Discussion

C. kostini n. sp. superficially resembles *C. tisii* LAN, 1978 in size and general appearance. Both species are rare and the lack of sufficient comparison material has led to considering them one species in the past.

However *C. kostini* n. sp. consistently differs from *C. tisii* in several characteristics (see plate 3). *C. kostini* n. sp. is a much more slender and lighter weight shell. In addition, the spire of *C. kostini* n. sp. is higher than that of *C. tisii*. Also, there are many more brown bars and blotches on *C. kostini* n. sp. and they are lighter in colour than are those on *C. tisii*. This is especially true of the markings on the spire which are pronounced on *C. kostini* n. sp., but extremely

sparse if present on *C. tisii*. Furthermore the ground colour of *C. kostini* n. sp. is darker and more beige than that of *C. tisii* which tends towards pale mauve. The periostracum of *C. tisii* is thicker and darker than that of *C. kostini* n. sp.. Finally *C. kostini* n. sp. appears to be restricted to the Philippines while *C. tisii* has a wider range from Okinawa, Taiwan and the Philippines.

C. kostini n. sp. could be compared with *C. pergrandis* IREDALE, 1937, which is a much heavier shell with a much high stepped spire and pronounced spiral grooves on the body whorl.

C. kostini n. sp. has some similarities to *C. kinoshitai* KURODA, 1956 (see plate 3) a smaller shell with a more convex outline. It has cords as opposed to grooves at the base of the body whorl and its shoulder is not carinate. It has a more marked and uneven suture and concave spire whorls. Its colouring is much more variable and the darker markings are smaller and much more frequent while the ground colour is pale purple or occasionally yellow. *C. tamikoeae* SHIKAMA, 1973 (considered by some to be a synonym form of *C. kinoshitai* and by others to be a valid species or a synonym of *C. bruuni* POWELL, 1958) is occasionally as large as *C. kostini* n. sp. and has straighter sides. Otherwise it differs from *C. kostini* n. sp. in the same ways as does *C. kinoshitai* (see plate 4).

C. kostini n. sp. differs markedly from *C. sugimotonis* KURODA, 1928 (form *vicdani* LAN, 1978) with which some dealers have confused *C. tisii*. *C. sugimotonis* (form *vicdani*) is a much broader shell with very sparse dark brown flecks on a pure white background and has fine spiral cords at the base and a much flatter spire with concave spire whorls.

Acknowledgements

We thank MARINA KOSTINA for donating the holotype of *C. kostini* n. sp., the late T. C. LAN for providing the picture of the holotype of *C. tisii*, Dr. ERIC MONNIER and ALAIN ROBIN for providing the dimensions of specimens, and Dr. MICHAEL A. MONT for editing the manuscript.

Bibliography

- FILMER, R. M. (2001): A catalogue of nomenclature and taxonomy in the living Conidae 1758-1998. – 388 pp.; Leiden, The Netherlands (BACKHUYS Publishers).
- HIGO, S. CALLOMON, P. & GOTO, Y. (1999): Catalogue and bibliography of the marine shells-

bearing Mollusca of Japan. – pp. 328-343; Yao City, Osaka, Japan (Elle Scientific Publications).

LAN, T. C. (1978): Two new cones from NE off Taiwan and the Philippines. – Bulletin of Malacology, Republic of China, **5**: 63-67.

LAN, T. C. (1979): Rare shells of Taiwan in color. – 144 pp., 63 pls.; Taipei, Taiwan (T. C. LAN).
RAYBAUDI MASSILIA, G. (2008): Conidae. – In POPPE, G. T.: Philippine marine mollusks, **II**: 504-731; Hackenheim, Germany (ConchBooks).

RAYBAUDI, L. (1993): *Conus (Rhizoconus) tisii* LAN, 1978. – World Shells, **5**: 18-21.

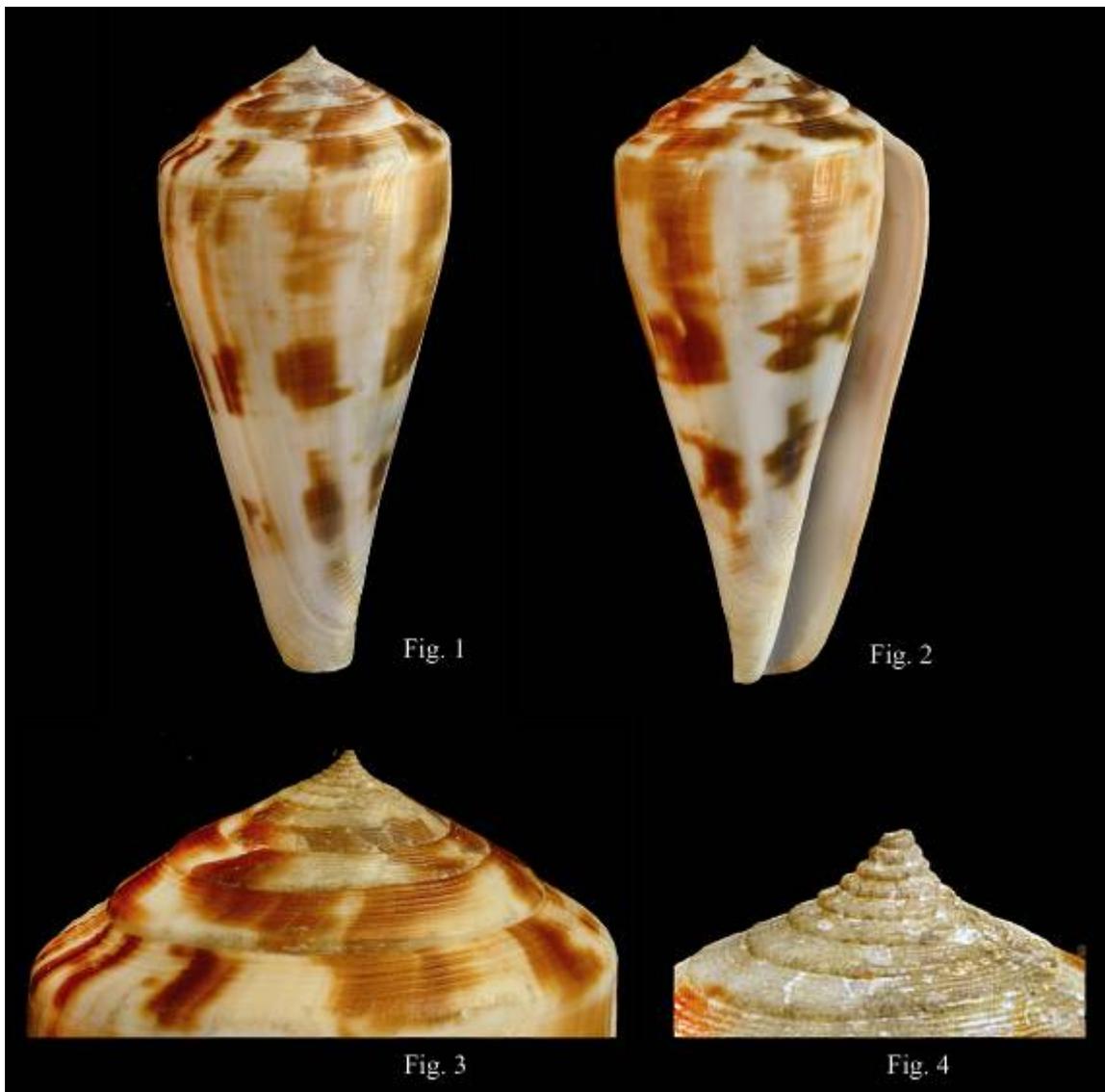
ROBIN, A. (2008) Encyclopedia of marine gastropods. – 480 pp.; Paris, France & Hackenheim, Germany (Xenophora & ConchBooks).

RÖCKEL, D, KORN, W, & KOHN, A. J. (1995): Manual of the Living Conidae, vol.1, Indo-Pacific region. – 517 pp., Wiesbaden, Germany (Verlag CHRISTA HEMMEN).

VERDASCA, A., MONTEIRO, A. & FILMER, M. (2007): The TC mystery. – The Cone Collector, **4**: 23-27. Website: www.seashell-collector.com/theconecollector/TheConeCollector4.pdf

Plate 1

Conus kostini n. sp., Holotype, Balut Island, Philippines



Figs. 1-2: Dorsal and ventral view

Fig. 3: Spire

Fig. 4: Protoconch and early whorls

Plate 2

Conus kostini n. sp., Paratypes, all from Balut Island, Philippines

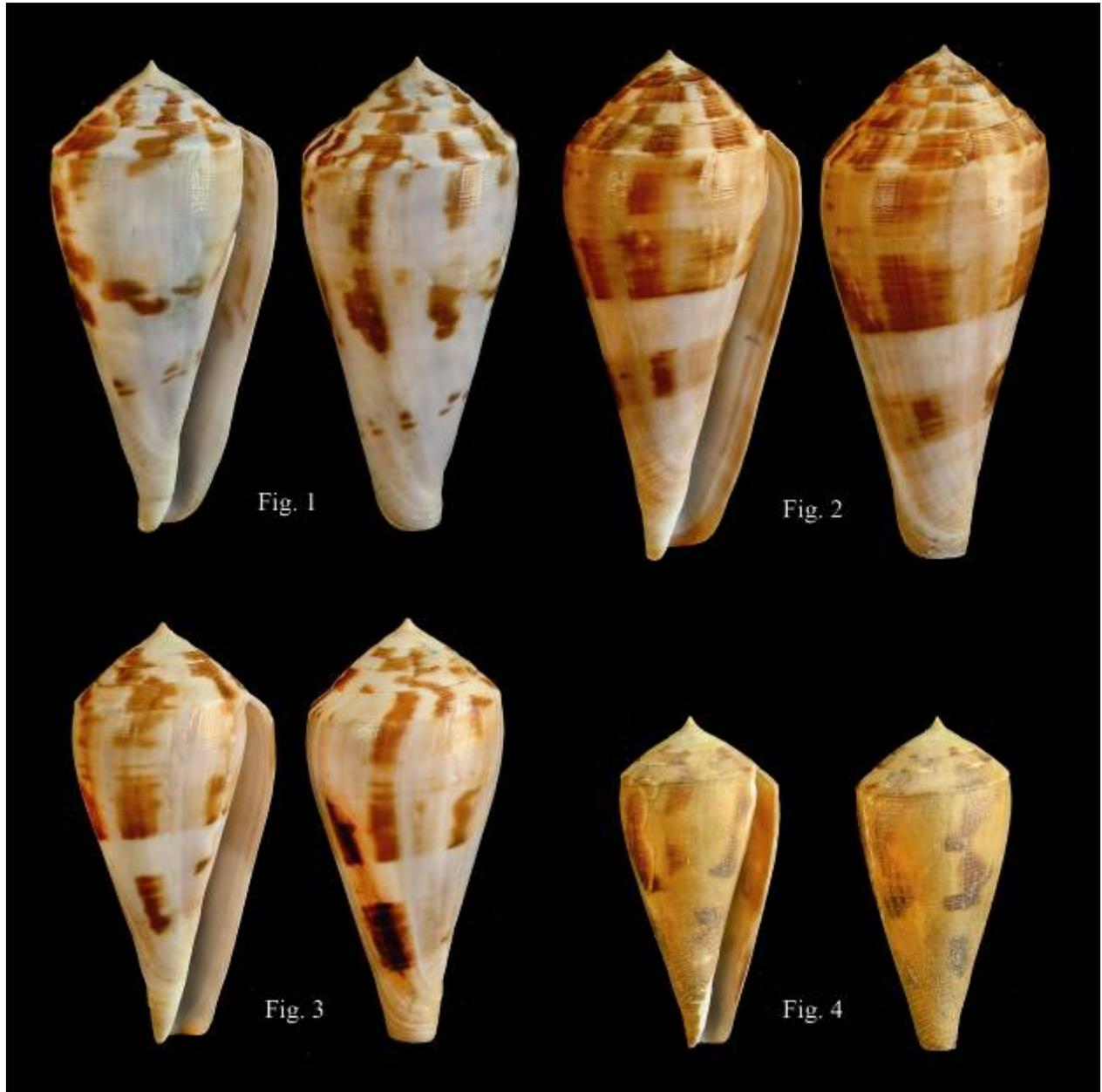


Fig. 1: Paratype no.1 104.80 × 48.80 mm

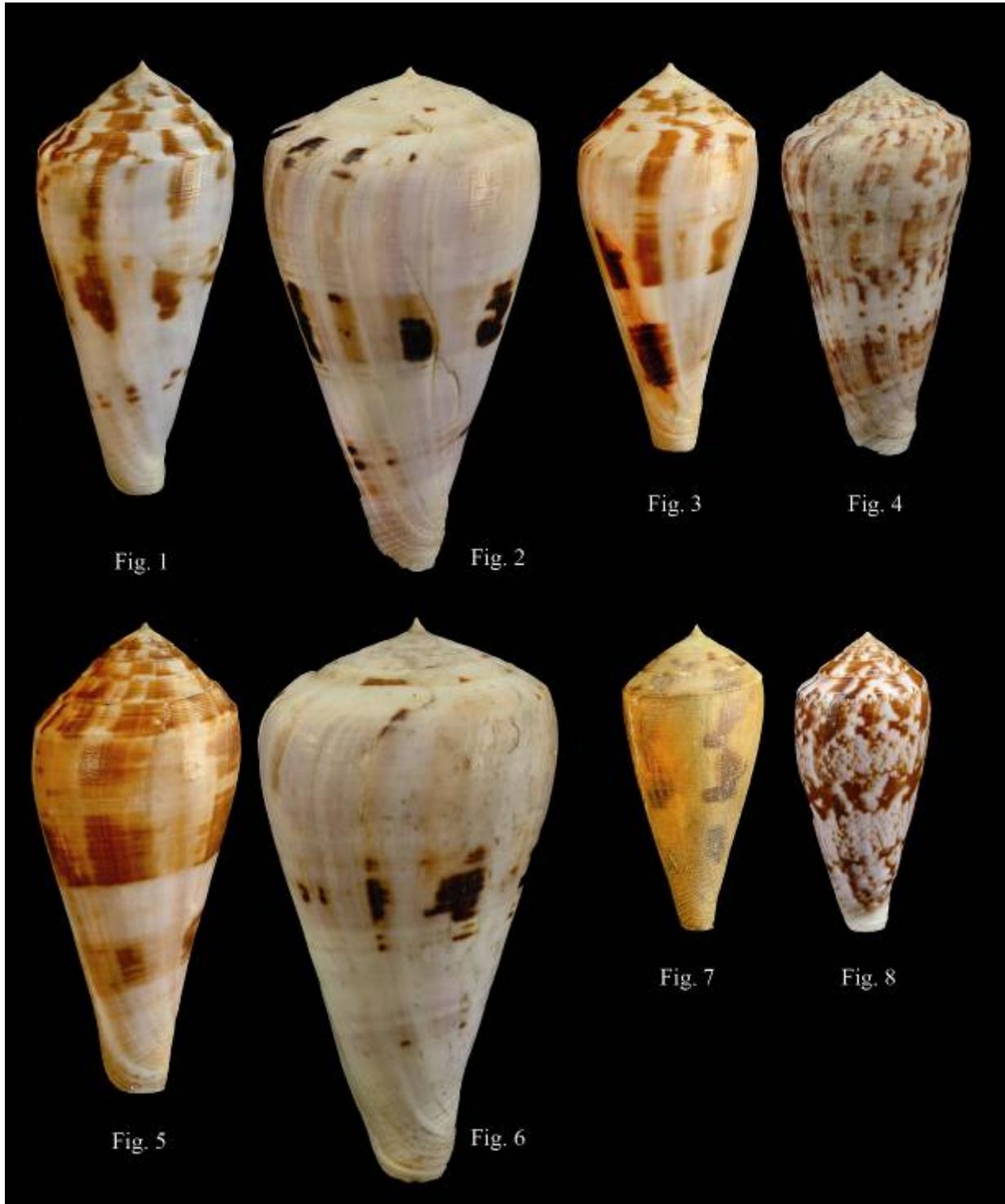
Fig. 2: Paratype no.2 115.25 × 51.80 mm

Fig. 3: Paratype no.3 92.00 × 42.30 mm

Fig. 4: Paratype no.4 71.70 × 33.50 mm

Plate 3

Comparisons with *Conus kostini* n. sp.



Figs. 1 & 2: *C. kostini* n. sp., Paratype no.1 with *C. tisii*, 117.60 × 62.40 mm, southern Taiwan

Figs. 3 & 4: *C. kostini* n. sp., Paratype no.3 with *C. tamikoe*, 93.45 × 45.90 mm, East China Sea

Figs. 5 & 6: *C. kostini* n. sp., Paratype no.2 . with *C. tisii*, 138.00 × 72.00 mm, Balut Id., Philippines

Figs. 7 & 8: *C. kostini* n. sp., Paratype no.4 with *C. kinoshitai* 70.45 × 32.00 mm, Panglao Id., Philippines