Phasmoconus niederhoeferi (Gastropoda, Conidae), a new species from the East China Sea and notes on the *Ph. moluccensis* (KÜSTER, 1838) and *Ph. proximus* (SOWERBY II, 1860) complexes

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Plates 1 & 2

Key Words

Taxonomy, Conidae, *Phasmoconus niederhoeferi* new species, *Ph. moluccensis*, *Ph. proximus*, species complexes, East China Sea.

Abstract

Phasmoconus niederhoeferi (Gastropoda, Conidae) is described. This deep water species was collected by dredging in the East China Sea in the region of Taizhou, province of Zhejiang, China.

The new species is compared with the members of the *Phasmoconus moluccensis* and *Ph. proximus* complexes and also *Ph. kiicumulus* (AZUMA, 1982) and *Ph. ciderryi* (DA MOTTA, 1985). The new species is also differentiated from *Rhizoconus pertusus* (HWASS in BRUGUIÈRE, 1792).

Zusammenfassung

Phasmoconus niederhoeferi wird neu beschrieben. Diese Tiefwasserart wurde durch Dredgen im östlichen Chinesischen Meer in der Region von Taizhou, Provinz Zhejinag, China, gefunden.

Die neue Art wird mit Arten der *Phasmoconus moluccensis* und *Ph. proximus* Komplexe sowie mit *Ph. kiicumulus* (AZUMA, 1982) und *Ph. ciderryi* (DA MOTTA, 1985) verglichen. Darüber hinaus wird sie auch von *Rhizoconus pertusus* (HWASS in BRUGUIÈRE, 1792) unterschieden.

Systematics

Superfamily Conoidea
PONDER & WARÉN, 1988

Family Conidae FLEMING, 1822

Genus *Phasmoconus* MÖRCH, 1852

***Phasmoconus niederhoeferi* n. sp.**

(Plate 1)

Material

A summary of the studied specimens is given in Table 1 on the opposite page.

Holotype: The holotype is the specimen n°1. It is deposited in the Staatliches Museum für Naturkunde Stuttgart (SMNS) under the number SMNS-ZI 0074098. Measurements are given in the table below.

Paratypes: The specimens numbered 2 to 10 are the paratypes of the new species.

Description

Shell. The shell is of a medium size (from 31 to more than 43 mm.). It is moderately thick with a thin lip.

The spire is of moderate height with an average AH / L value of 0.88. Its outline is straight to convex with the exception of the first whorls which are pointed and concave. The average relative spire height (RSH) value is 0.12.

The position of the maximum diameter is of 95 % of the aperture height of the shell. The relative diameter of the last whorl varies from 0.51 to 0.60 (average RD = 0.56).

The paucispiral protoconch of one and a half whorl is small, rounded, white and smooth. The first teleoconch whorls are stepped with tubercules at the periphery. The other whorls have a narrow and shallow suture and a subangulate and irregularly undulate shoulder. The adult shell has more than eleven whorls. The sutural ramp shows three regularly spaced striae. The anal notch is moderately shallow and v shaped.

The shape of the last whorl is conical and slightly convex. The HMD / L ratio varies from 0.80 to 0.87 on the seven studied specimens. The

Table 1: Studied specimens (measurements in mm)

N°	Length L	Maximum Diameter MD	Heigth of Maximum Diameter HMD	Aperture Height AH	Relative Diameter of last whorl RD = MD/AH	Position of Maximum Diameter of last whorl PMD = HMD/AH	Relative Spire Height RSH = (L-AH)/L	Depositions
1	35.1	17.2	30.4	31.3	0.55	0.97	0.11	Holotype SMNS-ZI 0074098
2	37.3	18.7	31.8	32.6	0.57	0.97	0.13	Paratype 1 Coll. E.MONNIER
3	33.9	17.3	28.5	29.0	0.60	0.98	0.14	Paratype 2 Coll. F.LORENZ
4	43.4	21.1	34.8	37.8	0.56	0.92	0.13	Paratype 3 Coll. T.JOLY
5	39.2	20.7	33.1	35.6	0.58	0.93	0.09	Paratype 4 Coll. P.GRYSAN
6	32.4	16.4	26.7	28.6	0.57	0.93	0.12	Paratype 5 Coll. V.CRAYSSAC
7	31.5	14.3	26.4	27.9	0.51	0.95	0.11	Paratype 6 Coll. T. JOLY
8	38.2	18.0	31.5	34.0	0.57	0.97	0.18	Paratype 7 Coll. L. LIMPALAËR
9	38.0	19.5	32.2	34.2	0.51	0.94	0.10	Paratype 8 Coll. L. LIMPALAËR
10	43.0	21.0	33.5	35.5	0.59	0.94	0.17	Paratype 9 Coll. L. LIMPALAËR

last whorl may be sculptured with about thirty flat shallow ribbons that divide in their middle during the growth of the shell. However this character varies and one paratype is even smooth on the adapical half of the last whorl. The aperture is long and slightly widening towards the base. All known specimens have a thin lip.

The ground color of the shell is white with two very broad orange bands leaving two irregular uncoloured bands at the center and at the base. The spire is white with orange flammules irregularly scattered between some of the knobs.

The periostracum is thin yellowish and translucent.

Living animal. The soft parts and radular tooth are unknown to us.

Derivatio nominis

The new species is dedicated to HANS-JÖRG NIEDERHÖFER, former curator of Mollusca at the SMNS.

Type locality

The holotype was collected 300 km. offshore from Taizhou, in the East China Sea at a depth of 150 to 200 m.

Habitat

No supplementary information about the habitat is available.

Comparisons and discussion

This species has only reached collections recently and still remains very scarce. It is collected by chinese fishermen who brought to surface a great number of specimens of former rarities like the cowry *Perisserosa guttata* (GMELIN, 1791) during the last years.

The new species belongs to the "*Phasmoconus moluccensis*" and the "*Ph. proximus*" complexes. Within these groups it must be compared with *Ph. ciderryi* (DA MOTTA, 1985), *Ph. kiicumulus* (AZUMA, 1982), *Ph. moluccensis* (KÜSTER, 1838), *Ph. merleti* (MAYISSIAN, 1974), *Ph. vappereaui* (MONTEIRO, 2009), *Ph. marielae* (REHDER & WILSON, 1975), *Ph. proximus* (SOWERBY II, 1860), *Ph. cebuensis* (WILS, 1990), *Ph. alexandrei* LIMPALAËR & MONNIER, 2012, and *Ph. goudeyi* MONNIER & LIMPALAËR, 2012.

We also compare *Ph. niederhoeferi* n. sp. with *Rhizoconus pertusus* (HWASS in BRUGUIÈRE, 1792).

***Phasmoconus ciderryi* (DA MOTTA, 1985):**

This scarce species originates from the Straits of Taiwan according to DA MOTTA in the original description. The distribution was latter extended to Vietnam by RÖCKEL, KORN & KOHN (1995). This range extension appears to be based on shells belonging to another species as the specimen depicted in plate 34 fig. 24 of the "Manual to Living Conidae" has a very different shape. The shell morphometry (taken from RÖCKEL, KORN & KOHN, 1995) is identical with the figures obtained for the new species. They appear to be closely related.

The variability in the last whorl sculpture of the new species does not allow to separate it safely from *Ph. ciderryi*.

However *Ph. niederhoeferi* n. sp. differs from the former by the pattern structure. In *Ph. ciderryi* the spiral ribbons are alternatively uncoloured and painted with elongated yellowish brown or pinkish bars separated by white interspaces on a slightly darker background while the pattern of the new species is made of two irregular and broad bands of reddish colour. One specimen of *Ph. niederhoeferi* n. sp. (paratype 6) also shows an alternance of darker reddish and white bars upon the typical pattern.

The ground colour in *Ph. ciderryi* is pale and shows three bands of yellowish suffusions while in *Ph. niederhoeferi* n. sp. only two red orange bands appear.

The outline of *Ph. ciderryi* is straighter and more angulated than in the new species. The spire also appears to be more pointed.

***Phasmoconus kiicumulus* (AZUMA, 1982):**

This is an other rare species collected in deep waters of the southern Japan. It is not known to occur further South.

Conus kashiwajimensis SHIKAMA, 1971 was described as a subspecies of *Lithoconus suturatus* (REEVE, 1844). Its taxonomic status remains uncertain and it could possibly be the correct name for this species. However it is difficult to make a definite opinion from the available information. Therefore we prefer to retain the name "*kiicumulus*" as the valid one.

The smooth paratype n°2 of the new species shows the same last whorl sculpture than *Ph. kiicumulus*. We have not seen any sculptured specimen of the latter. The color pattern is made of axial streaks overriding two paler creamy yellow spiral bands at the middle and basal third of the last whorl. The pattern in *Ph. niederhoeferi* n. sp. is more solid and of a darker colour.

Both species have paucispiral protoconches. The first teleoconch whorls of *Ph. kiicumulus* are more pointed than in *Ph. niederhoeferi* n. sp. They are tuberculated and stepped in five whorls in *Ph. kiicumulus* and only in three in the new species.

***Phasmoconus moluccensis* (KÜSTER, 1838) complex:**

This taxon as it was defined by RÖCKEL, KORN & KOHN (1995) is actually a complex of several species that needs further studies:

Phasmoconus moluccensis (KÜSTER, 1838), syn.? *Phasmoconus stainforthii* (REEVE, 1843)

Phasmoconus merleti (MAYISSIAN, 1974)

Phasmoconus vappereaui (MONTEIRO, 2009)

Phasmoconus marielae (REHDER & WILSON, 1975).

***Phasmoconus moluccensis* (KÜSTER, 1838)**

This species was formerly quite rare but is now regularly collected in various localities. Several populations show more or less distinct characters: in Okinawa, shells are smoother with a nice orange pinkish solid colour; in the Western Indian Ocean (Réunion Island) shells reach a bigger size that may exceed 60 mm; in the Philippines, the shells may be more granulose and have a warm red brown color with a flame pattern; in Papua New Guinea and Solomon Islands, shells are strongly sculptured, have a more angulose periphery and a whitish background colour.

We have not seen many intermediates between the shells belonging to the different populations but more material allowing DNA analysis and shells from other localities are needed to draw better conclusions.

In the case where several species should have to be recognized within this complex, naming them would become difficult as the type figures of *Phasmoconus moluccensis* (KÜSTER, 1838) in the Conchylien Cabinet (pl. 23 figs. 5 and 6) are not very accurate and the type shell is lost.

The figures of *Phasmoconus stainforthii* (REEVE, 1843) are better and seem to indicate that it could match with the Philippine shells. Unfortunately the type shells that were present in the STAINFORTH's collection are lost too and no locality was given in REEVE's description. Therefore a definite attribution of the name to an actual population is not possible. Moreover it is beyond the scope of this paper.

***Phasmoconus merleti* (MAYISSIAN, 1974):**

This species is mostly collected from New Caledonia but specimens from Kwajalein are known, and also probably from Queensland. The shells tend to be more slender and the pattern of a bright pink to violaceous (cool colours) instead of reddish brown to orange (warm colours) in all populations of *Ph. moluccensis* (KÜSTER, 1838). The last whorl is sculptured with about twenty very wide ribbons becoming narrower, more spaced, more raised and granulose in the anterior third of the last whorl. They are separated by narrow pitted striae. Some specimens are strongly sculptured and granulose on the whole body whorl. The shoulder tubercles are more pointed in *Ph. merleti.*

Considering the disjunct geographic distribution and the differences in pattern and sculpture we consider this taxon as a valid species.

MAYISSIAN first named it "*merletti*", it was later emended in *merleti* by FILMER (2001).

***Phasmoconus vappereaui* (MONTEIRO, 2009):**

This taxon was mistaken by RÖCKEL, KORN & KOHN (1995) for a form of *Ph. marielae* (REHDER & WILSON, 1975). It is a rare species living in French Polynesia. Some granulose shells from New Caledonia and Kwajalein may be similar. The shape and colouration is comparable to that of *Ph. merleti* but the sculpture is described as made of strong spiral cords separated by lamellate comma shaped spaces. We have not seen any granulose specimens. The shell of *Ph. vappereaui* is also slender.

***Phasmoconus marielae* (REHDER & WILSON, 1975):**

This species is endemic of the Marquesas islands. Its shape is more triangular than the other species of the complex. The sculpture on the last whorl is made of flat ribbons separated by deep unlamellate striae. The dense pattern is made of large pinkish red clouds forming three spiral bands. There are also darker dots on the ribbons. When RÖCKEL, KORN & KOHN (1995) ranked this taxon as a subspecies of *Ph. moluccensis*, they did so on the basis of the existence of elongated specimens collected in French Polynesia. These were indeed shells of *Ph. vappereaui*. The sculpture and pattern allow a safe separation of the two taxa. MOOLENBEEK, ZANDBERGEN & BOUCHET (2008) recognized a specific status to this species.

All the species in the "*Ph. moluccensis*" complex have a concave spire which is not seen in any known shell of *Ph. niederhoeferi* n. sp. The latter never shows a pitted or lamellate sculpture in the last whorl. The red-orange solid pattern is neither found in any of the above mentionned species. In *Ph. moluccensis* and *Ph. merleti* the protoconch has more tan three whorls against one and a half in the new species.

***Phasmoconus proximus* (SOWERBY II, 1860) complex:**

This is again a complex of closely related species that RÖCKEL, KORN & KOHN treated as a single variable species. We consider that it may contain four species:

Phasmoconus proximus (SOWERBY II, 1860)

Phasmoconus cebuensis (WILS, 1990)

Phasmoconus alexandrei LIMPALAËR & MONNIER, 2012

Phasmoconus goudeyi MONNIER & LIMPALAËR, 2012

The two first species were discussed by WILS (1996) in response to RÖCKEL, KORN & KOHN's opinion. The differences between these two taxa are sufficient to justify their elevation to specific level.

Ph. proximus lives in Papua New Guinea, Solomons and Fiji. The sculpture of the last whorl is made of wide low ribs. The ribs are only colored on the adapical and more elevated part with dark brown lines interrupted with white dots. All ribs are colored. The periphery is angulose and the sides almost straight. These features allow a clear separation from the new species.

In *Ph. cebuensis* the sculpture of the last whorl is made of low rounded ribbons. They have a complex color pattern of elongated brown bars containing white chevrons which cover the whole ribbon. Only one half of the ribbons are colored. This species is so far only known from the Philippines. The periphery and the sides are rounded.

Ph. alexandrei is generally confused with *Ph. cebuensis*. Its sculpture is almost absent and the coloration is made of reddish dashes without white chevrons in the adult specimens. There also are axial reddish orange mottlings on the last whorl. The spire outline differs from the previous species in being more concave. The tubercules are less numerous. It is found in the Philippines but also in other archipelagoes of the western and central tropical Pacific Ocean.

Ph. goudeyi is known only from New Caledonian waters (Nouméa, Bourail and Koumac). The shell is white and is coloured with long dark brown bars. Its sculpture is made of flat ribbons comparable with those of *Ph. alexandrei*. This species was also known under the invalid name of "*grondini*" which was introduced by P. LARUE in the magazine Xenophora. As this name is not accompanied by a description and a comparison and is only given conditionally in the text (without designated holotype) it cannot be accepted as available. This opinion was confirmed by PHILIPPE BOUCHET (pers. comm.).

All members of this complex have a pattern made of brown to reddish spiral dashes. This character is only visible in one of the shells of *Ph. niederhoeferi* n. sp. we could examine (paratype 6). The protoconchs of *Ph. proximus*, *Ph. cebuensis* and *Ph.* aff. *cebuensis* are all paucispiral with one and a half whorl. These observations place the new species closer to this complex than to the *Ph. moluccensis* one.

***Rhizoconus pertusus* (LINNAEUS, 1758):**

This species is superficially similar to the new one by the color and the size. However *Rhizoconus pertusus* has a projecting multispiral protoconch. Its first teleoconch whorls are yellow and the spire is distinctly convex and never undulated. *Ph. niederhoeferi* n. sp., in its turn, has a paucispiral stepped protoconch, white and tuberculate first teleoconch whorls and a straighter slightly sigmoid and undulated spire.

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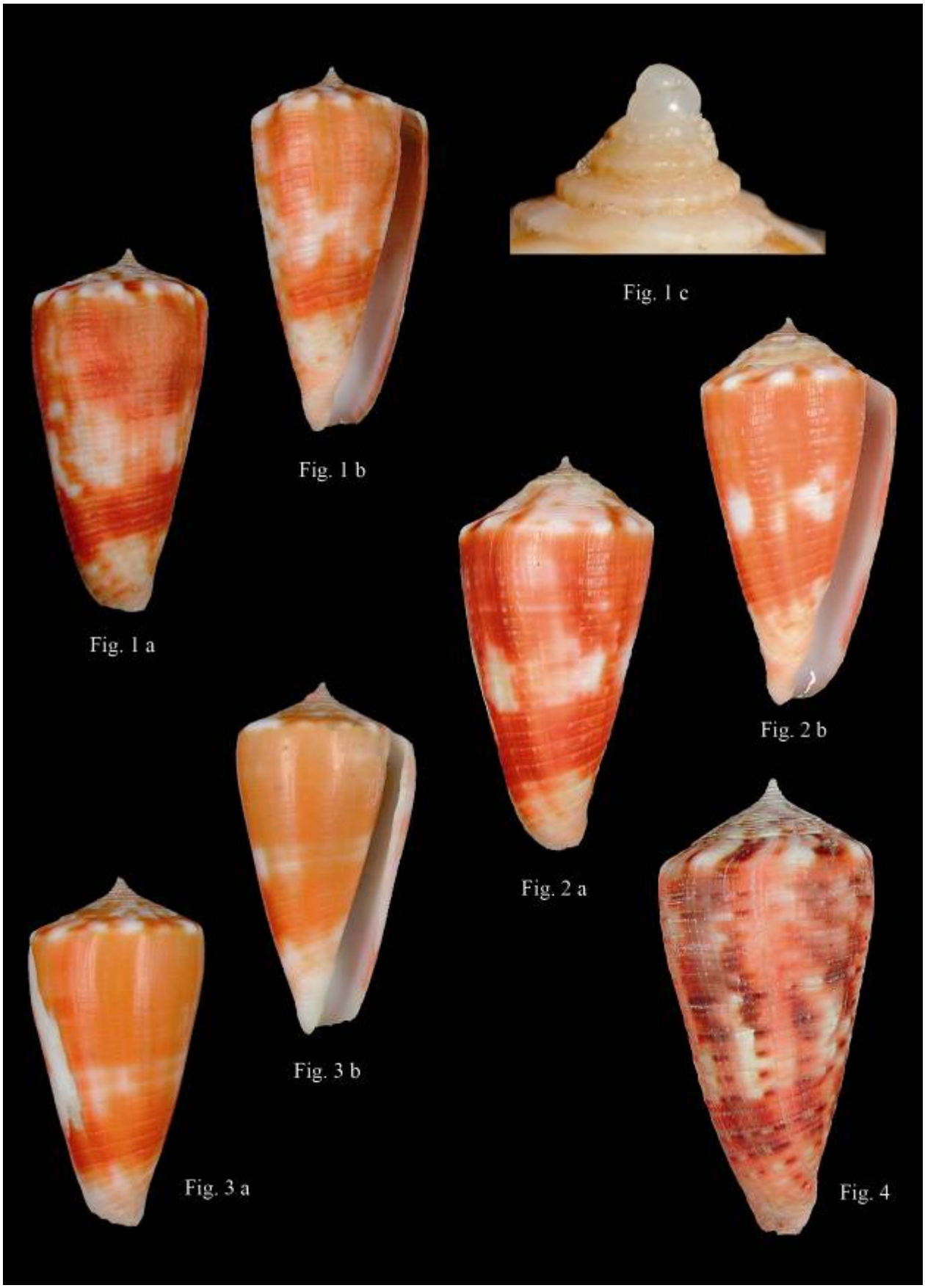
Plate 1



Explications of Plates

Previous page 33: **Plate 1**

Phasmoconus niederhoeferi n. sp., off Taizhou, China, East China Sea

Figs. 1 a-b: Holotype, 35.0 mm, SMNS-ZI 0074098

Fig. 1 c: Holotype, protoconch

Figs. 2 a-b: Paratype 1, 37.6 mm, Coll. ERIC MONNIER

Figs. 3 a-b: Paratype 2, 33.9 mm, Coll. FELIX LORENZ

Fig. 4: Paratype 3, 43.4 mm, Coll. THIERRY JOLY

Opposite page 35: **Plate 2**

Fig. 1: *Phasmoconus kiicumulus*, 39.7 mm, Japan, Coll. ERIC MONNIER

Fig. 2: *Phasmoconus moluccensis*, 46.5 mm, Philippines, Coll. ERIC MONNIER

Fig. 3: *Phasmoconus moluccensis*, 43.1 mm, Papua New Guinea, Coll. ERIC MONNIER

Fig. 4: *Phasmoconus merleti*, 54 mm, New Caledonia, Coll. ERIC MONNIER

Fig. 5: *Phasmoconus marielae*, 39.4 mm, Nuku Hiva, Marquesas, Coll. ERIC MONNIER

Fig. 6: *Phasmoconus goudeyi*, Paratype 1, 43.4 mm, Koumac, New Caledonia, Coll. ERIC MONNIER

Fig. 7: *Phasmoconus ciderryi*, Paratype 1, 39.0 mm, Taïwan, SMNS ZI 0091290 (ex coll. DA MOTTA)

Fig. 8: *Phasmoconus proximus*, 33 mm, Solomons, Coll. ERIC MONNIER

Fig. 9: *Phasmoconus alexandrei*, Paratype 3, 43.6 mm, Balut, Philippines, Coll. ERIC MONNIER

Fig. 10: *Phasmoconus cebuensis*, 36.1 mm, Balut, Philippines, Coll. ERIC MONNIER

Fig. 11: *Phasmoconus vappereaui*, 56.2 mm, Tahiti

Plate 2