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**New Genera and Species of Synceridae  
from Ponape, Caroline Islands**

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Studies made on operculate land shells of the central and western Pacific while I was a Bishop Museum Fellow in 1941 disclosed the new forms dealt with in this paper. The general structure and shape of the shells and the radulae place the genera and species under discussion in the family Synceridae. However, all possess multispiral opercula, a striking difference from the paucispiral opercula of the other genera in the family. This condition was known to von Möllendorff, for he placed his *Diadema* (= *Thaanumella*) *carolinarum* in Synceridae, making a note of the operculum. Thiele also examined the radula (Nachrichtsblatt Deut. Malak. Gesell. 26: 24, 1894) and stated that it belonged to the family Realiidae (= Synceridae). On the basis of the operculum, it seems best to include the genera in this family which possess a multispiral operculum in a new subfamily.

SUBFAMILY THAANUMELLINAE, NEW SUBFAMILY

The shells and radulae are similar to others in the family Synceridae, but the opercula are multispiral. The operculum is produced in a spiral so that in cross section, it appears as a series of nested plates, and, when pulled apart, it appears as a ramp built around a common axis. The type genus of this subfamily is *Thaanumella*.

Genus **Ponapella**, new genus

Shell characterized by strong periostracal processes or "hairs" and having a horny operculum composed of spiral layers, which, in cross section, appear as a series of nested plates.

Genotype: *Ponapella pihapiha* Clench.

**Ponapella pihapiha**<sup>1</sup>, new species (fig. 1, a-c).

Shell small, thin, and with a strongly developed hirsute periostracum. Whorls 5.25, rather strongly convex. Color amber brown with a decided golden sheen in high-lighted areas. Spire somewhat extended. Columella exists only as an inner margin of a nearly holostomatous lip. Aperture subcircular with the lip simple. Umbilicus narrow, but deep, extending within to the early whorls. Sculpture invested in the periostracum, which possesses long hairlike processes arranged in 8 to 10 spiral rows (body whorl). Between the rows are exceedingly fine axial threads. Nuclear whorls have only the little axial threads, but beyond the nuclear whorls the pilose character starts and increases in size on each succeeding whorl. Operculum horny, composed of five layers in cross section, though, in reality, it is an overlaid spiral. It is multispiral and deeply dished. Underside with a papilliform center (nucleus). Measurements<sup>2</sup>:

	Height	Width	Aperture
Holotype .....	4	2	1.5 × 1.3

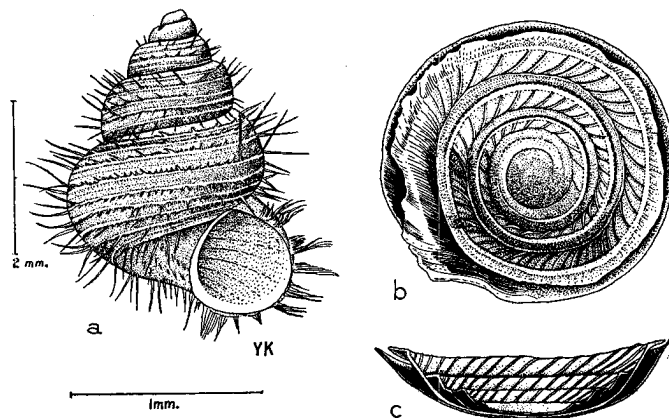


FIGURE 1.—*Ponapella pihapiha*: a, BBM 189003, holotype; b, outer surface of operculum; c, cross section of operculum.

Holotype: BBM 189003, Caroline Islands, Ponape, Mt. Tolotom, alt. 800 ft. Paratypes: BBM 154097 and MCZ 140577, from the same locality. Additional paratypes: BBM 154533-36, Mt. Nanalaut, alt. 1,900 ft.; BBM 157882-83, Palikir, Mt. Tamantamansakir, alt. 1,000 to 1,250 ft. All of the above collected by K. and Y. Kondo, February 1936.

*P. pihapiha* is a genus and species very distinct from any known from the Carolines. The elaboration of the periostracal "hairs" is remarkable, considering their length in proportion to the size of the shell. The lime in the shell appears to be limited and these processes may

<sup>1</sup> A fringe: a ruffle (Polynesian).

<sup>2</sup> All measurements are given in millimeters.

offer considerable protection against the physical environment. These processes are quite stiff and springy. The operculum is remarkable also, because of the modification and complicated structure of the spiral plate.

Genus **Thaanumella**, new genus<sup>3</sup>

*Diadema* Pease 1868 (in part) (non *Diadema* Schumacher 1817; Boissduval 1832; Gray 1852), v. Möllendorff, Nach. Malak. Gesell. 29: 168, 1897.

*Garrettia* 'Pease' Paetal 1873 (in part) v. Möllendorff, Jour. Malac. 7: 118, 1900.

The shells are elongated with a thin and generally sculptured periostracum and with a strong basal keel which margins the umbilicus. The operculum consists of a spiral, each whorl overlaid on the other, which in cross section appears as a series of nested plates. The general structure of the operculum is similar to that of *Ponapella*.

Genotype: *Diadema carolinarum* v. Mlldff. (= *Omphalotropis angulosa* Ancey).

I have selected *D. carolinarum* von Möllendorff instead of *O. angulosa* Ancey only on the basis that I have examined a paratype specimen of *D. carolinarum*.

Both descriptions certainly appear to refer to the same species, though, unfortunately, neither description is accompanied by a figure. Von Möllendorff was probably misled by Ancey's referring his species to the genus *Omphalotropis*, a mistake natural enough on the basis of the remarkable similarity of the shells. The opercula of the two, however, are very different.

Von Möllendorff's reference of his two species (*carolinarum* and *soluta*) to *Diadema* (= *Garrettia*) was a peculiar error, inasmuch as he had examined the opercula of his new form. They are very different from those in the genus *Diadema* described by Pease from the Cook Islands.

**Thaanumella angulosa** Ancey (fig. 2, a-c).

*Omphalotropis angulosa* Ancey, Le Naturaliste 12: 11, 1890 (Ponape); Kobelt, Jahrb. Nassa. Verein Nat. 59: 55, 1906.

*Diadema carolinarum* v. Mlldff., Nach. Malak. Gesell. 29: 168, 1897 (Ponape).

*Garrettia carolinarum* v. Mlldff., Jour. Malac. 7: 118, 1900; v. Mlldff., Jahrb. Nassa. Verein Nat. 59: 139, 1906.

<sup>3</sup> Named for D. Thaanum of Honolulu.

Shell somewhat extended, rather thin, openly umbilicated and sculptured. Whorls 6 to 7, strongly convex and the last subcarinated. Color a reddish brown; occasionally specimens are found with a narrow, light brownish yellow band at the periphery. Spire extended and acute. Columella arched toward the umbilical area. Aperture subcircular, angled at base, a condition brought about by the termination of strong basal carina. Lip simple, parietal wall thinly glazed. Umbilicus rather broad and deep, margined by basal carina. Sculpture consisting of numerous fine spiral ridges with very fine axial growth-lines in the interspaces. A few specimens in any single locality may be smooth. Operculum circular, multispiral with a central nucleus, the spiral layer overlaid and in cross section appearing as a series of nested plates. Measurements:

	Height	Width	Aperture
Paratype .....	3.6	2.8	1.4 × 1.1
BBM 157581 .....	4	2.8	1.5 × 1.2

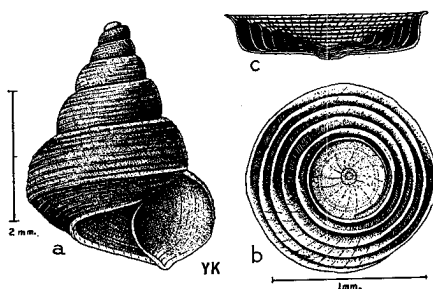


FIGURE 2.—*Thaanumella angulosa*: a, BBM 86252 (from a paratype of *carolinarum*); b, outer surface of operculum; c, cross section of operculum.

Type locality for both *angulosa* and *carolinarum*: Caroline Islands, Ponape.

Paratypes: all BBM: 86252 Caroline Islands, Ponape, two specimens, paratypes from the original material of this species, were received as an exchange from the Senckenbergische Naturforschende Gesellschaft, Frankfurt a. Main, through Dr. Fritz Haas. BBM 157492, Mt. Nanalaut, alt. 1,000 to 1,500 ft.; 157534, Mt. Nanalaut, alt. 400 to 800 ft.; 157297, Metalanim, alt. 300 to 900 ft.; 157328-29, Sabalop, Mt. Majijo, alt. 200 to 500 ft.; 156752, Wone, Mt. Tolotom, alt. 900 ft.; 157581, Nanpilo; 157371, Mpomp, alt. 75 ft.; 157737-39, Palikir, alt. 450 ft.; 156931-32, road to Nanpilo, alt. 90 ft. All collected on tree trunks, shrubs and dead leaves during February and March 1936, by Y. Kondo and S. Ito.

*T. angulosa* is an abundant and widely distributed species on Ponape. It is surprisingly like an *Omphalotropis* in outline, but its operculum is multispiral. There is a great deal of variation in the general

outline of the shell, in the color, and the extent of the sculpture—variable characters which do not appear to be racial or geographic in their meaning.

**Thaanumella angulosa turita** v. Möllendorff (fig. 3, a-c).

*Diadema carolinarum turita* v. Mildff., Nach. Malak. Gesell. 29: 168, 1897.

*Garrettia carolinarum turrita* [sic] v. Mildff., Jour. Conch. 7: 119, 1900.

*Diadema carolinarum pyramis* v. Mildff., Nach. Malak. Gesell. 29: 168, 1897.

*Garrettia carolinarum pyramis* v. Mildff., Jour. Conch. 7: 118, 1900.

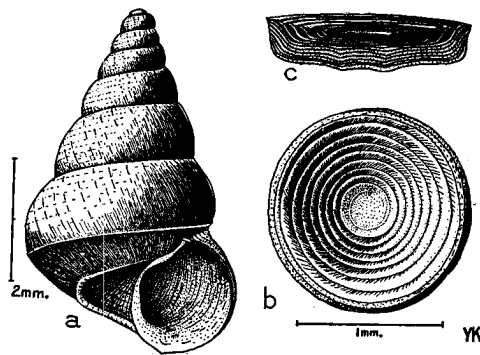


FIGURE 3.—*Thaanumella angulosa turita*: a, BBM 157876; b, outer surface of operculum; c, cross section of operculum.

This subspecies differs from typical *T. angulosa* in being a little larger, in having, as a rule, a little less sculpture, and in having the spire proportionately more extended. The figures of both these forms more or less represent the extremes in development, but many specimens are intermediate in their characters. The operculum is more compact but this may be only an age factor, as the figure of *T. angulosa* is based upon a young shell. The opercula of more mature shells are the same. Measurements:

	Height	Width	Aperture
BBM 157735 .....	5	3.5	2 × 1.5
BBM 157735 .....	5.2	3.4	2.1 × 1.5

Type locality: Caroline Islands, Ponape, Meitik (for *turita*); Naupilo [Nanpilo], Ponape (for *pyramis*), both listed by von Möllendorff in the 1900 report but not in the original.

All BBM: 154420, Mt. Kuporujō, alt. 1,600 to 1,970 ft.; 154492-93, Mt. Nanalaut, alt. 1,900 ft.; 157735, 157816, Palikir, alt. 450 and 600 to 900 ft.; 157578, 157612, Naupilo, alt. 350 to 400 ft.; 156654, Mt. Salabuk, alt. 600 to 900 ft.; 157876, Mt. Tamantamansakir, alt. 1,000 to 1,250 ft. Collected in February and March 1936 by Y. Kondo and S. Ito.

*Thaanumella angulosa turita* is exceedingly close to *T. angulosa* and may represent only an extreme variation of form. There appears to be no geographical significance to the distribution of this form, as it occurs independently and with the typical form over most of Ponape.

The variety *pyramis* seems to me to be an absolute synonym of *turita*.

#### Subgenus **Jokajia**, new subgenus

This subgenus differs from typical *Thaanumella* in having the operculum spiral suberect instead of built at a right angle, and in having a smaller nucleus. The shell differs in having a more restricted umbilicus.

Subgenotype: *Thaanumella (Jokajia) cookei* Clench.

#### **Thaanumella (Jokajia) cookei**, new species (fig. 4, a-c).

Shell extended, deeply umbilicated, rather thin and faintly sculptured. Whorls 7, slightly convex. Color a dull brownish red, a little deeper along the suture. Spire acute and extended. Columella thin and inwardly arched, formed only as the inner or parietal lip. Aperture subcircular to subovate with a small and narrow angle at its base, which is the termination of the umbilical carina. Umbilicus deep, margined by a very strong carina. Sculpture generally present and in the form of very fine spiral threads. Operculum horny, multispiral and with a central nucleus. The spiral coil produced at a little less than 45 degrees. As in other species in this genus, in cross section it appears as a series of nested plates. Measurements:

	Height	Width	Aperture
Holotype .....	6.8	4	2.5 × 2
Paratype .....	6.7	4	2.6 × 2

Holotype: BBM 189004, Caroline Islands, Ponape, base of Peipalap Peak, Jokaj Islet, alt. 10 to 30 ft., Y. Kondo, February 1936. Paratypes: BBM 157009-19, MCZ 140590, same locality; BBM 157712-19, MCZ 140591, from the top of Peipalap Peak, alt. 300-600 ft.

This species is remarkably similar in shell outline to the genus *Omphalotropis*. The operculum of *T. cookei*, however, is multispiral, whereas *Omphalotropis* has a paucispiral operculum with an excentric nucleus which is considerably different from the multispiral and central nucleus of the present form.

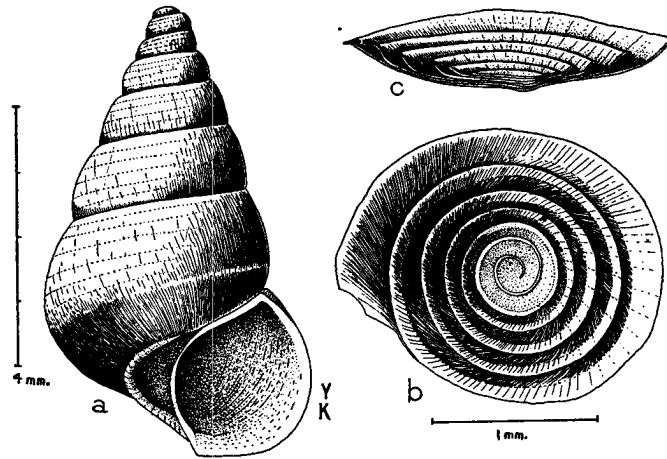


FIGURE 4.—*Thaanumella cookei*: a, BBM 189004, holotype; b, outer surface of operculum; c, cross section of operculum.

***Thaanumella cookei ponapensis*, new subspecies.**

A single specimen of what appears to be a subspecies of *T. cookei* was collected by Kondo near the top of Mount Tolotom. It is similar in general shape and opercular characters to *cookei*, but is much smaller and has a nearly circular aperture. There is also a strong peripheral angle developed on the body whorl. It is devoid of sculpture. Measurements:

	Height	Width	Aperture
Holotype .....	4.5	2.6	1.5 × 1.4

Holotype: BBM 154096, Caroline Islands, Mt. Tolotom, south side of Ponape, alt. 800 ft., Y. Kondo, February 1936.

It seems best at this time to include the several species reported upon in this paper under a new subfamily, *Thaanumellinae* in the

family Synceridae. Future studies may indicate that these several species along with those in the genera *Rapanella*, *Garrettia*, *Fijanella*, and *Quadrasiella* may be equal to full family rank. At present the multispiral operculum is the only radically different character, though the radula of *Thaanumella* shows at least a significant difference from the radula of *Syncera* s.s. On the other hand, the opercula of *Thaanumella* and *Ponapella*, developed in the form of a spiral ramp, are remarkably like the opercula found in *Pupina* (Pupinidae), the radulae, however, are very different. (See figure 5.)

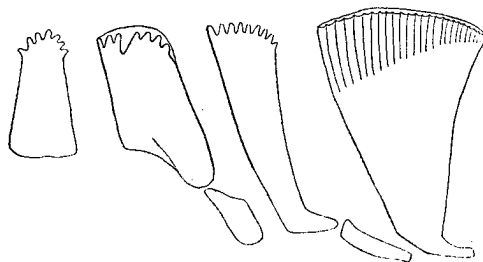


FIGURE 5.—Radula of *Thaanumella angulosa*, MCZ 140585.

Drawings: figures 1 to 4 by Yoshio Kondo, figure 5 by R. T. Abbott.