

NOTES ON TINTINNOINEA FROM THE BAY OF AMOY

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In continuing the survey of the free-living Protozoa of the Bay of Amoy, made in the summer of 1932. The writer concentrated his attention particularly on the Group of Tintinnoinea during the period from July 8 to August 20, 1933, at the Station of the Marine Biological Association of China, Amoy. Seventeen species of the group, not recorded in the previous survey, have been reported in the following sections and five of them are described as new to science.

Family Codonellidae

Genus *Tintinnopsis* Stein 1867.

Tintinnopsis parva Merkle 1909.

(Fig. 1)

Lorica small somewhat olive-like in shape. 2.2-2.3 oral diameters in length; oral rim ragged; bowl a truncated cone (38°-40°) anteriorly; widest near its middle, 1.2-1.46 oral diameters in diameter with slightly convex sides; aboral region contracting rapidly to form an inverted cone (72°-85°); aboral end pointed; wall with coarse secondary structure.

Length: 52-60 μ

Oral diameter: 24-31 μ



Fig. 1. *Tintinnopsis parva* Merkle. $\times 330$.

Tps. parva differs from *Tps. turbo* Meunier in its smaller size and in the absence of a nuchal constriction. The occurrence of this species at Amoy is not very common.

Tintinnopsis major Meunier 1910.

(Fig. 2)

Lorica 1.7-1.8 oral diameters in length, globose; oral margin contracted and minutely ragged; bowl globose, expanding below the collar, widest 1.4-1.5 oral diameters at middle region, contracting posteriorly

into a slightly elongate subhemispherical aboral region; aboral end bluntly pointed; wall with scattered agglomerations.

Length: 45-55 μ

Oral diameter: 26-30 μ

Width of bowl: 40-52 μ



Fig. 2. *Tintinnopsis major* Meunier. $\times 330$. a, side view; b, oral view.

Tps. major seems to be closely related to the preceding species, however, it is distinguished from the latter by its more contracted oral rim and great transdiameter of the bowl. The occurrence of this species in Amoy is rare.

Tintinnopsis inflata sp. nov.

(Fig. 3)

Lorica stout globose, 1.6-2.0 oral diameters in length; oral margin greatly contracted and oral rim minutely ragged; bowl expanding abruptly below the oral rim to form a prominent shoulder, widest (1.97-2.14 oral diameters) at the level of the shoulder, slightly contracting aborally; aboral end flattened.

Length: 53-56 μ

Oral diameter: 28-32 μ

Width of bowl: 60-63 μ

This new species is characterized by that the width of the lorica being greater than its length. The presence of the prominent shoulder together with its flattened aboral end may also con-

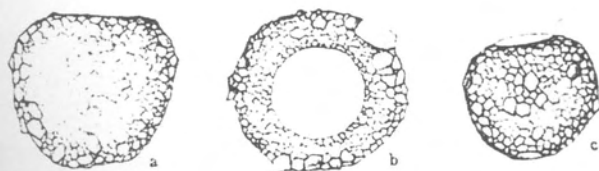


Fig. 3. *Tintinnopsis inflata* sp. nov. a and c, side view; b, oral view; a and b, $\times 390$; c, $\times 330$.

sidered as one of the important peculiarities. The occurrence of this species in Amoy is rather rare.

Tintinnopsis nitida Brandt 1896

(Fig. 4)

Lorica campanulate, with more or less conical aboral end, 1.8-2.3 oral diameters in length; oral margin flaring and slightly reflexed, forming a broadly rounded oral perimeter; bowl cylindrical at the upper third; wall not very thin, laid up of numerous highly refractive angular particles

Length: 52-71 μ .

Oral diameter: 30-32 μ .

According to Brandt, the type locality of this species is Karajak-Fjord in Greenland waters. It also occurs in Amoy in large numbers.



Fig. 4. *Tintinnopsis nitida* Brandt. $\times 450$;
a and b, side view; c, oral view.

Tintinnopsis turgida Kofoid
and Campbell 1929

(Fig. 5)

Lorica flask-shaped, 3.3 oral diameters in length; oral rim ragged; cylindrical or subcylindrical in its anterior half, expanding aborally to an extent as much as 1.45 oral diameters; aboral end broadly rounded or sometimes very feeble or slightly pointed.

Average length: 90 μ

Average oral diameter: 28 μ .



Fig. 5. *Tintinnopsis turgida* Kofoid and Campbell.
 $\times 330$.

Tps. turgida may be regarded as an intermediate form placed between *Tps. tubulosa* Levander and *Tps. pistillum* Kofoid and Campbell. It differs from the latter two species in its small size and rounded aboral region. The occurrence of this species in Amoy is rather rare.

Tintinnopsis orientalis Kofoid and
Campbell 1929

(Fig. 6)

Lorica of *Codonella* in form but *Tintinnopsis* in structure, 2.8 oral diameters in length; collar flaring (about 100°), oral rim minutely ragged; bowl narrowest at the nuchal constriction, widest at or a little below the middle region; aboral end rounded; wall very thick, with rather coarse agglomerations.

Length: 95 μ in average.

The occurrence of this species in Amoy is not rare. The lorica reported here differs slightly from Kofoid and Campbell's original description of the type in its less flaring collar

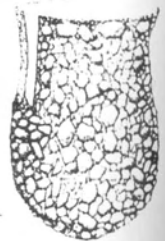


Fig. 6. *Tintinnopsis orientalis* Kofoid and Campbell. $\times 320$.

Tintinnopsis bütschlii Daday 1887.

(Fig. 7)

Lorica companulate, with a broadly expanding oral region and a convex conical or rounded bowl, its length 0.72 (0.7-0.78) oral diameter; oral rim ragged; suboral region somewhat slightly inverted conical, sometimes encircled by several very faintly spiral markings; bowl narrowest at the anterior half of the lorica, expanded posteriorly, its greatest transdiameter being 0.36 of the oral diameter in average; aboral end hemispherical; wall coarsely agglomerated.

Length: 75 (65-78) μ Oral diameter: 103.6 (93.7-112.5) μ

The presence of a broadly expanded oral margin serves to distinguish *Tps. bütschlii* from other species of genus. It should be mentioned, however, that, according to the descriptions and figures given by different previous authors for this species, the oral diameter of the lorica are smaller than that presently described. Such a variation in oral diameter is accounted here as a racial deviation, but not as a specific difference. The occurrence of this species in Amoy is very abundant.

Tintinnopsis dadayi Kofoid 1905

(Fig. 8)

Lorica companulate, consisting of a flaring oral region and an expanded bowl, its length being 1.13 to 1.32 oral diameters; oral rim ragged, conical, (about 95°); bowl slightly contracting at suboral region, and dilated posteriorly, 0.6-0.67 of the oral diameter in greatest transdiameter; aboral end hemispherical; wall thin with sparse agglomerations.



Fig. 8. *Tintinnopsis dadayi* Kofoid. $\times 330$.

Length: 63-85 μ Oral diameter: 56-70 μ

Tps. dadayi is very closely related to *Tps. bütschlii* Daday, but differs from the latter in its small size and sparse agglomerations. The occurrence of the species in Amoy is not very abundant.

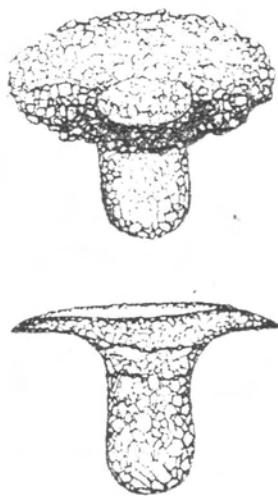


Fig. 7. *Tintinnopsis bütschlii* Daday. $\times 390$.

小. 5

Tintinnopsis amoyensis sp. nov.

(Fig. 9)

Lorica thistle-funnel shaped, 1.7-1.9 oral diameters in length, oral rim very roughened; collar flaring, inverted conical (about 60°); bowl subcylindrical anteriorly, convex conical at aboral region; aboral horn stout, short, obliquely or irregularly opened at the tip; wall thick and coarsely agglomerated.

Length: 45-50 μ Oral diameter: 25-27 μ

Tps. amoyensis is a small species of the genus and it seems to be more closely related with *Tps. meunieri* Kofoid and Campbell, however, the lorica of the present species is more slender in form and much smaller in size.



Fig. 9. *Tintinnopsis amoyensis* sp. nov. $\times 330$.

Tintinnopsis karajacensis Brandt 1906

(Fig. 10)

Lorica cylindrical, tube-shaped, 3.2 oral diameters in length; oral rim minutely ragged and not everted; bowl straight throughout, almost without changing in diameter; aboral end hemispherical; wall with angular, rather coarse agglomerations of various size.

Length: 144-152 μ Oral diameter: 45 μ

Tps. karajacensis differs from *Tps. lobiancoi* Daday in that the lorica is comparatively short but greater in diameter. Its tubular lorica is also more slender than that of *Tps. rotundata* Jörgensen. The occurrence of this species in Amoy is rather rare.



Fig. 10. *Tintinnopsis karajacensis* Brandt. $\times 330$.

Tintinnopsis radix (Imhof) Brandt.

(Fig. 11)

Codonella radix Imhof, 1886.*Tintinnopsis radix* Brandt 1907

Lorica elongate, tubular, 7.3-10.7 oral diameters in length; oral rim ragged; bowl long, cylindrical throughout; aboral region gradually

tapering posteriorly into an aboral horn; aboral horn sometimes slightly bent or curved, with an irregular aboral opening; wall thinly agglomerated with foreign particles of various shape and size.

Length: 330-492 μ

Oral diameter: 40-46 μ

Tps. radix differs from *Tps. cylindrica* Daday in that the lorica is larger in size, but rather slender in proportion to the length. Individuals of the species were commonly found from the Bay of Amoy.

Family Codonellopsidae

Wangiella Gen. nov.

Codonellopsidae with lorica divided into a double collar and a bowl; collar set off distinctly from the bowl, narrower than the bowl, with 8 to 10 square windows in the outer collar and a number of prismatic flaps in the inner collar; bowl wider than the length, no aboral pedicel; wall firm, densely covered with agglomerated material.

Type: *Wangiella dicollaria* sp. nov.

Wangiella differs from *Stenosemella* in the presence of an inner collar and of larger windows on the outer collar. The genus is also distinguished from *Codonellopsis* and *Lauckmanniella* in that

the collar is very short and not marked with any annulations. At a glance, *Wangiella* may be grouped in the family Dictyocystidae on account of its large windows of the outer collar. But the collar is rather low and narrow in proportion as compared with the genus of the latter family. As the structure of the bowl is concerned, the new genus seems more suitable to be included in the family Codonellopsidae.

This new genus is named in honour of Dr. C. C. Wang, the president of the Marine Biological Association of China during the year 1933.

Wangiella dicollaria sp. nov.

(Fig. 12)

Lorica stout, pot-shaped, 1.9 oral diameters in length; collar low, about 0.19 length of bowl in height, double, with 8-10 square windows in the outer collar and 16-18 prismatic flaps in the inner one; each of the

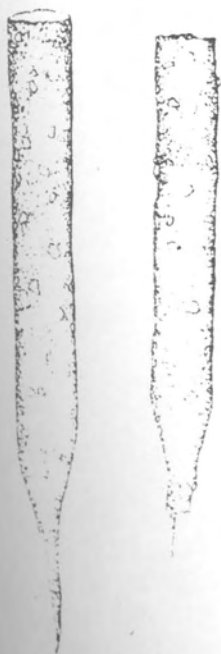


Fig. 11. *Tintinnopsis radix* Brandt. $\times 175$.

prismatic flaps being evenly arched at the top; bowl expanding greatly just below the collar to form a prominent shoulder, widest at the region a little anterior to the middle of the lorica, 1.9 oral diameters in trans-diameter; aboral region more or less acut; wall of bowl thick, with rather coarse agglomerated substances.

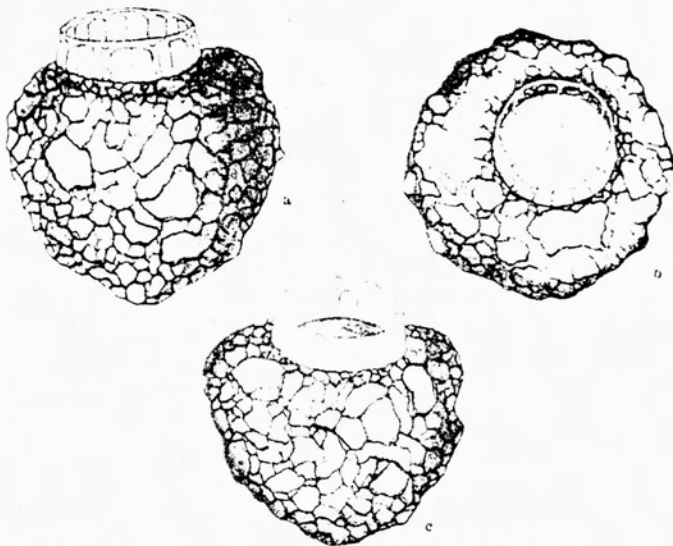


Fig. 12. *Wangiella dicollaria* Gen. nov., sp. nov. and b with 8 windows; a, side view; b, oral view and c, side view with 10 windows. $\times 750$.

Length: 48-50 μ

Oral diameter: 23-25 μ

The occurrence of this species in Amoy is common.

Family Coxiellidae

Subgenus *Protocochliella* Jørgensen

Coxiella annulata (Daday) Brandt.

(Fig. 13)

Codonella annulata Daday 1886

Coxiella annulata Brandt 1907

Lorica tapering, goblet-shaped, 1.66 oral diameters in length; oral rim nearly entire; very slightly contracting in the anterior fourth, expanding posteriorly to the oral diameter again at 0.54 of the total

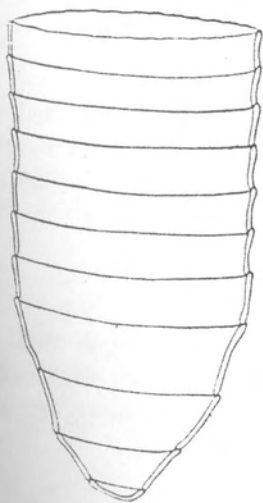


Fig. 13. *Corliella annulata* Jørgensen. $\times 390$.

length from the oral rim; posterior region convex conical; aboral end bluntly pointed; wall simple with faint and indistinct primary alveoli and 11-13 spiral turns, 8 and 9 in the widest.

Length: 150-165 μ

Oral diameter: 90-100 μ

Corliella annulata differs from *C. ampla* in its large size, more conical aboral end and more turns of spiral annulations. It occurs in Amoy, but not frequently.

Family Amphorellineae

Amphorellopsis acuta (Schmidt) Kofoid and Campbell.

(Fig. 14)

Amphorella acuta Schmidt 1901

Amphorellopsis acuta Kofoid and Campbell 1929

Lorica very transparent, trumpet-shaped, 2.6-3.0 oral diameters in length; oral margin entire, circular; collar a flaring funnel of 75°, its high 0.09 of the total length; bowl fusiform, subcylindrical in cross section anteriorly, triangular posteriorly, its greatest width 0.66-0.73 oral diameter at 0.6 of the total length; antapex acute.

Length: 96-110 μ



Fig. 14. *Amphorellopsis acuta* (Schmidt). $\times 330$.

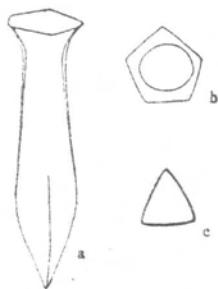


Fig. 15. *Amphorellopsis pentagona* sp. nov. $\times 330$. a, side view; b, oral view; c, cross section of the bowl.

Amphorellopsis acuta differs from other members of the genus in that the lorica is larger in size and triangular in cross section. The species commonly occurs in Amoy.

Amphorellopsis pentagona sp. nov.

(Fig. 15)

Lorica transparent, trumpet-shaped, 3.5 oral diameters in length; oral rim entire; collar a low pentagonal funnel, flaring about 62° ; bowl subcylindrical anteriorly, inflated below the middle region, triangular posteriorly; aboral region conical (45°); aboral end sharply pointed.

Length: 105-115 μ Oral diameter: 32 μ

This new species is very closely related to *A. acuta* (Schmidt). It differs from the latter chiefly by the pentagonal collar. The occurrence of this species in Amoy is rare.

Family Tintinnineae

Tintinus tenuis Kofoid and Campbell 1926.*n. tenuis*

(Fig. 16)

Lorica a long regular tube or a tapering segment of cone 2° - 3° , its length 4.6 (4.0-5.0) oral diameters; oral end flaring into a brim; aboral end without flare, 0.75 (.67-.82) of the oral diameter.

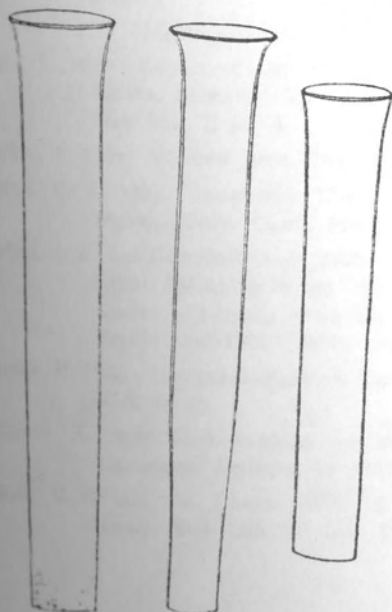


Fig. 16. *Tintinus tenuis* Kofoid and Campbell. $\times 330$.



Fig. 17. *Tintinus exigua* Hada. $\times 330$.

TINTINNOINEA FROM BAY OF AMOY

Length: 221 (190-245) μ

Oral diameter: 48 (45-56) μ

T. tenuis differs from *T. lusus-undae* Entz in that the lorica is more slender in proportion to the length. Individuals of the species were commonly found in the Bay of Amoy.

Tintinus exigua Hada 1932

(Fig. 17)

Lorica hyaline, a truncated cone of 3° - 4° , its length being 4.0 oral diameters; oral margin flaring into a brim; sides nearly straight; aboral end without flare.

Length: 150 μ

Oral diameter: 37.5 μ

T. exigua differs from *T. tenuis* Kofoid and Campbell in its smaller size. Its occurs in Amoy less abundantly than *T. tenuis*.

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