OCCASIONAL PAPERS
OF
BERNICE P. BISHOP MUSEUM
HONOLULU, HAWAII

Volume XX June 13, 1952 Number 18

A New Terrestrial Prosobranch Family (Tutuilanidae) from Samoa, with Descriptions of a New Genus and a New Species*

By BENGT HUBENDICK
RIKSMUSEUM, STOCKHOLM

Among some Pacific hydrobiids and similar forms on loan to me from Bernice P. Bishop Museum I found an aberrant form which cannot be included in any previously described genus, or even in any described family. In the following pages I describe the new species, its shell and some of its soft parts; give a diagnosis of the new genus and the new family; and, finally, discuss the taxonomic position of the new species.

As the material of *Tutuilana* available consisted of only two specimens which were fixed in alcohol, and as the breadth of the animals does not exceed 1.4 mm., I have not been able to work out their anatomy thoroughly. I have been able to recognize only the main features of the central nervous system and the most distal parts of the genitalia.

Tutuilana striata, new species (fig. 1, *a, b*).

Shell roughly globose with two and a half to three whorls. The whorls are well-rounded and separated by a rather deep suture. They increase gradually but rather rapidly in breadth. The apical whorl is worn off in both specimens, but the apex certainly seems to be obtuse. The aperture is roughly semicircular. The peristome is continuous. Its parietal portion is almost straight, is transverse over the umbilicus, and is closely pressed to the preceding whorl. The umbilicus is distinct but narrow. The shell has a very fine and regular sculpture of minute, rounded striae parallel to the peristome. The color of the shell is pale reddish brown, the parietal wall inside the aperture whitish. The horny operculum is spiral with an excentric nucleus.

In the type specimen, the shell height is 3.0 mm.; the maximum breadth, measured perpendicularly to the longitudinal axis of the shell, is 2.7 mm.; and the height of the aperture, measured parallel to the longitudinal axis of the shell, is 1.8 mm.

* Funds for the printing of this paper were contributed by the Charles M. and Anna C. Cooke Trust.

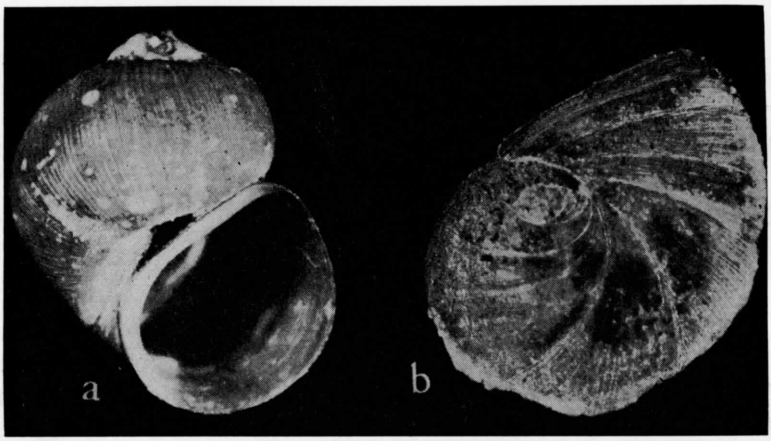

FIGURE 1.—*Tutuilana striata:* **a,** shell of holotype, about × 16; **b,** operculum, × 28.

The dirty gray animal has a comparatively short, broad foot (fig. 2, *c*). The tentacles are reduced to short, broad lobes directed laterofrontally (fig. 2, *b, c*). They almost meet one another medially. The eyes are situated within the basal portion of the lobes. The animal has an extremely short snout.

The mantle is thin and its cavity has a rather wide opening. There is no trace of a branch or an osphradium in the pallial cavity. Nor have I observed any pulmonary blood vessels. There does not appear to be a jaw. The radula (fig. 2, *e, f*) is taenioglossate with one central, two laterals, and four marginals in each transverse row. The length of the centrals is somewhat more than twice their width or breadth. The centrals are about rectangular in outline and have six cusps. There is, consequently, no middle cusp but three cusps on each side. They decrease in size in lateral direction. The laterals have three rather broad, rounded cusps on the frontal margin and two additional cusps frontally on their lateral margin. In addition, they have a well-developed crest running along almost the whole tooth. The first marginals are slenderer than the

---

FIGURE 2.—*Tutuilana striata:* **a,** central parts of nervous system, dorsal view, × 120; **b,** dorsofrontal view of frontal portion of animal, shell removed, approximately × 30; **c,** dorsolateral view of animal, shell and upper whorls removed and pallial cavity opened, approximately × 20; **d,** dorsal view of the bottom of pallial cavity (to left), roof of cavity turned over to right (arrow indicates frontal direction and position of median line), × 27; **e,** frontal portion of radular teeth from one transitional row, teeth removed from original mutual positions, × 900; **f,** radular teeth from one transitional row, teeth removed from the original mutual positions, × 330.

a.p., anal pore; *c.d.*, dextral cerebral ganglion; *c.p.c.d.*, dextral cerebro-pedal connective; *c.p.c.s.*, sinistral cerebro-pedal connective; *f.*, foot; *gl.*, gland; *g.p.* ♀, female genital pore; *m.r.*, pallial roof; *op.*, operculum; *p.c.*, pedal commissure; *pl.d.*, dextral pleural ganglion; *pl.s.*, sinistral pleural ganglion; *p.p.c.d.*, dextral pleuro-cerebral connective; *p.p.c.s.*, sinistral pleuro-cerebral connective; *p.d.*, dextral pedal ganglion; *p.s.*, sinistral pedal ganglion; *r.*, rectum; *s.*, snout; *v.*, verge; *v.c.*, visceral commissure; *v.d.*, vas deferens.

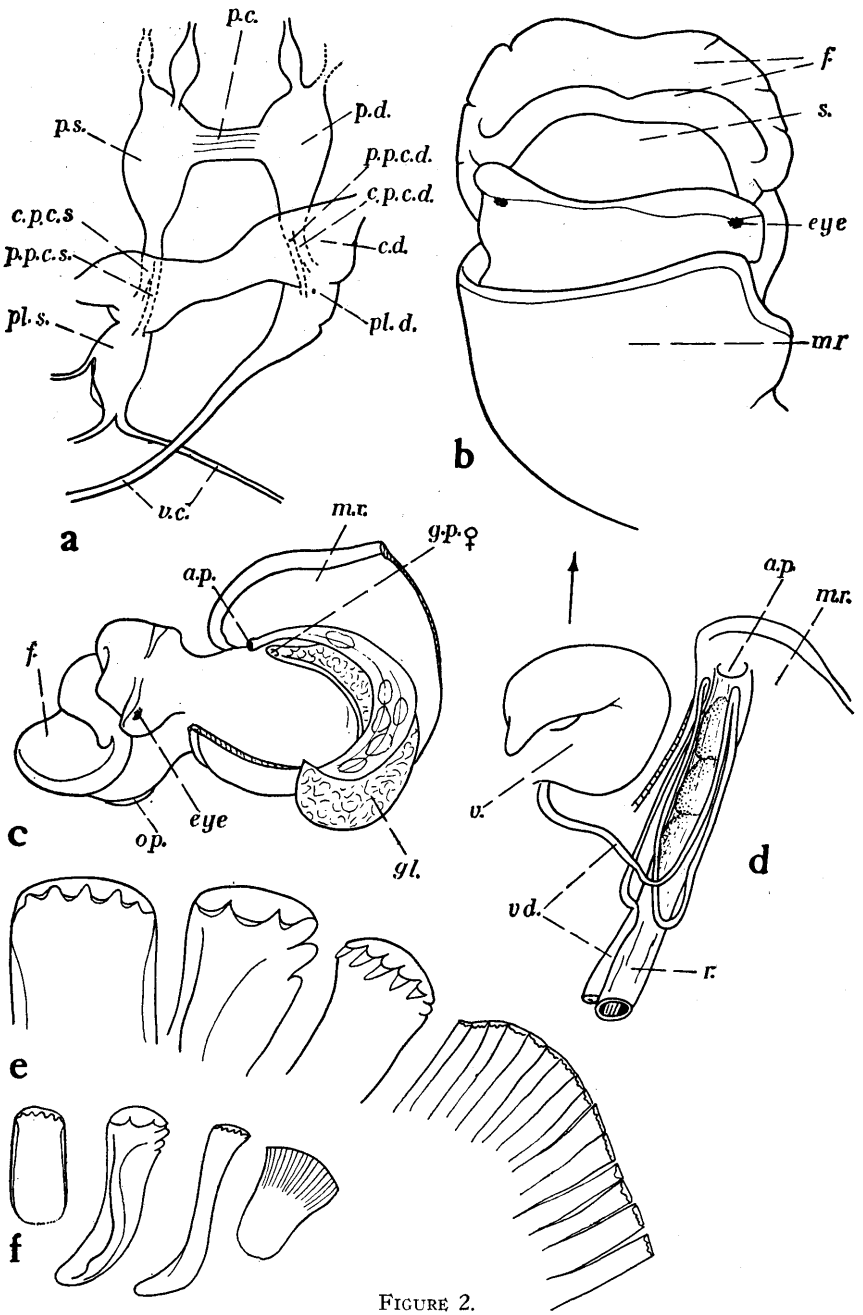
p.c.
p.s.
p.d.
p.p.c.d.
c.p.c.d.
c.p.c.s
c.d.
p.p.c.s.
pl.s.
pl.d.
v.c.
a
f
s.
eye
m.r.
b
m.r.
g.p.♀
a.p.
f.
eye
op.
gl.
c
a.p.
m.r.
v.
vd.
r.
d
e
f

FIGURE 2.

laterals and have five cusps on their frontal margin and one or two frontally on their lateral margin. The second marginals, finally, show a peculiar shape in being cleft frontally into about 15 stripes, each stripe ending in a small, serrated cusp.

The big pedal ganglia are situated ventrally and in a considerable degree frontally to the cerebral ganglia (fig. 2, *b*). Frontally to the pedal ganglia occur one or possibly two pairs of small ganglia, propodial ganglia, and possibly metapodial ganglia. The pedal ganglia are connected by a very broad commissure. Immediately behind the cerebral ganglia are the pleural ganglia. The cerebro-pleural connectives are very short, but the cerebro-pedal and the pleuro-pedal connectives are long and slender. I have not observed any free subintestinal and supraintestinal ganglia. I may have overlooked them. On the other hand, however, they may be fused together with the pleural ganglia. A small notch on the right pleural ganglion may indicate such a fusion. The visceral commissure is, at any rate, streptoneurous.

In the female, the genital and anal pores open out on the right side in the pallial cavity not far from the pallial opening (fig. 2, *c*). The female duct joins the distal end of a large glandular structure in the very neighborhood of the female pore. The male (fig. 2, *d*) has a well-developed verge situated medially on the base of the pallial cavity. The vas deferens runs in two long coils along the rectum. More proximally it forms a tangle of small coils.

The type population of *Tutuilana striata* came from near Fagatoa Reservoir, Tutuila, Samoa. Six specimens were collected there by E. C. Zimmerman on August 3, 1940 and were numbered 186519 in the Bishop Museum collection. The animals lived on a dripping wet, mossy cliff. (Holotype BBM 9719 ex 186519.)

Genus **Tutuilana,** new genus

Shell globose with obtuse apex, well-rounded whorls, a narrow but distinct umbilicus, and an almost semicircular aperture. The operculum is horny and spiral. The tentacles are reduced to blunt lobes. Branch, osphradium, and jaw are absent. The radula is taenioglossate. The centrals have no middle cusp but six symmetrically arranged cusps. The laterals have cusps also on the most frontal portion of the lateral edge and a longitudinal crest. The first marginals are somewhat similar to the laterals, the second marginals are frontally cleft into numerous stripes. The nervous system is streptoneurous. The female duct and a large gland opens out through a common pore on the right side in the pallial cavity near the anal pore. The male has a well-developed verge middorsally in the pallial cavity.

Genotype: *Tutuilana striata* Hubendick.

Family TUTUILANIDAE, new family

The family has the same characters as the genus *Tutuilana.* The structures of the tentacles and the radula are of the greatest importance as differentiating characters.

Taxonomic Position of Tutuilanidae

Tutuilanidae is evidently a prosobranch group. This is shown by the presence of an operculum, by the streptoneurous nervous system, and by the position and structure of the distal genitalia and their openings.

Some of the aberrant features are obviously due to secondary reductions. And the radula may be secondarily transformed, but the result of this transformation is very peculiar. Therefore the radula is important as a taxonomic characteristic. The general type of the radula is taenioglossate and thereby connects Tutuilanidae with such groups as Mesogastropoda, which have a taenioglossate radula. But the radula of *Tutuilana* shows some features which do not occur in Mesogastropoda or in any other group. The absence of a middle cusp in the centrals seems to be unique. The evolution of this structure, however, is easily explained. The original middle cusp has been cleft into cusps of equal size. Neither the absence of a middle cusp on the centrals nor the peculiar shape of the outer marginals gives any indication as to the exact relationship or origin of Tutuilanidae. The absence of the branch and the osphradium depends on a reduction process which has taken place in connection with the adaptation to terrestrial or possibly amphibious life. Such reductions are parallel in different groups and, therefore, produce no clue to the solution of the problem. The reduction of the tentacles seems to be unique among those groups which must be considered, hence this feature is of no further comparative value.

The central parts of the nervous system and the distal parts of the genitalia remain as the most useful comparative objects. The distal parts of the genital organs indicate a relationship to the superfamily Rissoacea. The central parts of the nervous system probably confirm this conclusion, or at any rate, do not contradict it.

The known morphological features of *Tutuilana* seem to indicate that Tutuilanidae represents an aberrant family belonging to or closely related to the Rissoacea. The family is characterized by specializations and reductions, some of which evolved in connection with adaptation to terrestrial or amphibious life.