

A New Bivalved Gastropod, *Julia zebra* n. sp.

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In the previous report, a new bivalved gastropod, *Julia mishimaensis* Kawaguti and Yamasu, with thin, transparent valves bearing bright green radiating bands was introduced.¹⁰ There is another species which, especially in the living state, shows close similarities to *Julia mishimaensis* but is distinctly different not only from it but also from the previous 12 species of *Julia* that have been reported. It is closely related to *Julia exquisita* illustrated by Dall, Bartsch and Rehder 1938².

The following pages give a description of this species.

Classification

Class	Gastropoda
Subclass	Opisthobranchia
Order	Sacoglossa
Suborder	Tamanovalvida
Family	Tamanovalvidae Kawaguti & Baba 1959 ⁷
Genus	<i>Julia</i> Gould 1862 ⁵
Species	<i>Julia zebra</i> n. sp.

Julia zebra n. sp.

As a living shellfish, *Julia zebra* shows closely similar features to *J. mishimaensis* as is shown in Fig. 1. The general appearance and body structures are similar to those of *Julia japonica*⁸ and also *Tamanovalva limax*.⁷ The head has two comparatively large rhinophores and a pair of eyes. The body is green as a whole, ornamented with white and brown patches or bands. The brown coloring is remarkable along both sides of the dorsal head portion, anterior shell portions and umbonal area. In the umbonal area there is a milky white gourd-shaped form fringed with a chocolate brown band as is seen also in *J. mishimaensis*. Consequently, the general appearance of this living shellfish closely resembles that of *J. mishimaensis*. However, when the fresh valves are removed from

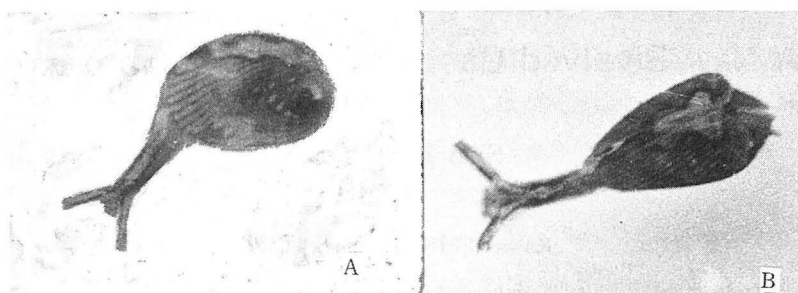


Fig.1. An active state of living *Julia zebra* n. sp. (A) showing a close similarity to *Julia mishimaensis* (B).

the living animal they show conspicuously different characteristics from those of *J. mishimaensis* as mentioned below.

The shell is small and thin, oval in shape with the anterior margin rounded and posterior margin deeply excavated at the umbo, with pointed posterior margin; the dorsal margin is markedly convex and the ventral margin slightly convex (Figs. 2,3). The specimen shown in Fig. 2 measures 2.7, 1.8, and 1.4 mm in length, height and breadth respectively.*

The largest one, collected in Mishima, Yamaguchi-Pref., reaches 4.1 mm in length. The protoconch measures about 150μ with about $1\frac{1}{2}$ whorls on the left valve. It is frequently damaged partly or completely in old shells.

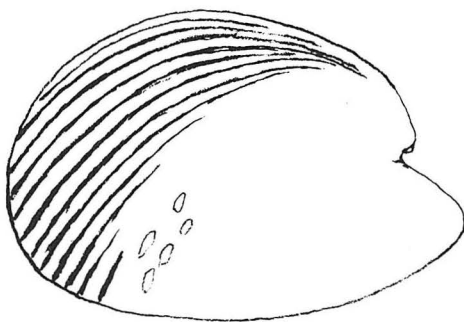


Fig.2. Side view of the left valve of *Julia zebra* from Tsunoshima, Yamaguchi Pref.

* The shell of this species, especially in a large specimen, is somewhat elongated in form, narrower in breadth, thicker in texture and heavier than that of *J. mishimaensis*.

The shell has a heavy hinge, with a cardinal tooth at the top of the hinge column on the right valve; it has a cardinal fossa with hinge column and para-tooth on the left valve (Fig. 4). The two valves are connected by a thin ligament which runs curved along the ascending anterior margin. There is a lateral tooth on the right valve near the proximal portion of the ligament. The shell is translucent or almost transparent in young specimens. The whole shell bears bright green coloration with about 10 brown radiating lines from near the umbo to the peripheral margin in the anterior portion.* White elongated dots of various dimensions are distributed in the mid portion running in the same direction as the radiating lines. Yellowish brown pigmentations appear at the proximal portion of each hinge column.

There are some local variations in the form and pigmentation of shells. Samples from Ishigaki Island (Fig.3) are smaller and more translucent than those Tsunoshima, Yamaguchi Pref. Their brown lines are broader but a little fewer in number, around

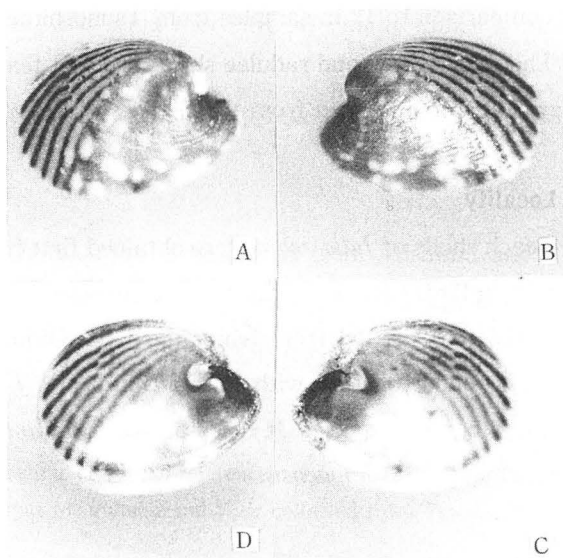


Fig.3. Photographs of side views (A, left valve; B, right valve) and inner views (C, left valve; D, right valve) of *Julia zebra* from Ishigaki Island. The shell measures 2.0, 1.5, and 1.2 mm in length, height and thickness respectively.

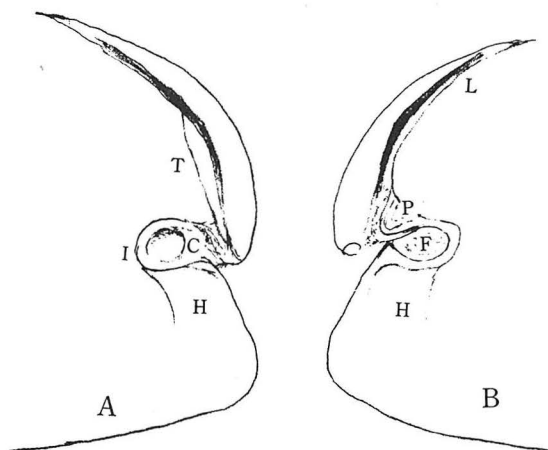


Fig.4. Hinge structures of *Julia zebra*. A, right valve; B, left valve. C, cardinal tooth; F, cardinal fossa; H, hinge column; L, ligament; P, para-tooth; T, lateral tooth.

* These pigmentations are partly or almost completely bleached in weathered shells. Brown lines first turn yellowish, then green and finally bleach away.

8 in comparison to 12 in samples from Tsunoshima.

The radulal row and radulae show different features from those of *Julia japonica*, *J. burni* Sarma and even from those of *J. mishimaensis*.

Locality

Beach shells of *Julia zebra* were obtained first from Mishima, Hagi City, Yamaguchi Pref, in 1961. Living specimens were collected from Tsunoshima, Yamaguchi Pref., from 1965 to 1969 and from Ishigaki Island, Okinawa Pref. in 1980 and 1981. This species is found together with *Julia japonica* and *J. mishimaensis*, but is rather rarer than the other two species. It feeds on *Caulerpa ambigua* Okamura as reported for *J. japonica*⁹ and *J. mishimaensis*.

Remarks on *Julia zebra*

Julia zebra differs markedly from all recent and fossil species of *Julia*. It has been examined so far in comparison with living specimens of *J. japonica* and *J. mishimaensis* and with descriptions of recent species, *J. borbonica* (Deshayes 1863)³, *J. cornuta* (De Folin & Perier 1868)⁴, *J. exquisita* Gould 1862⁵ and *J. burni* Sarma¹⁴ 1975, and also to fossil species.

It may come close to *J. exquisita* as described and illustrated by Dall, Bartsch and Rehder 1938,^{2*} whose report distinctly differs from Gould's description⁵ and from the illustration made by Johnson⁶ in 1964. That is, Dall, Bartsch and Rehder's specimens may be a different species which is closely related to *J. zebra* or a local variation of *J. zebra* itself.

Following A.A.Olsson's suggestion, Keen¹¹ proposed to amalgamate both *J. exquisita* and *J. equatorialis* into *J. thecaphora* (Carpenter 1857). It is surprising to know that A.A.Olsson was one of the authors for *J. equatorialis*.

Most previous species of *Julia* have been described on the basis of a single beach valve, usually the "right" one, or on a single pair of valves. Thus some of the confusions in the classification of *Julia* probably arise because of incomplete specimens and also because our understanding of cardinal characteristics of valves and of all animals is also still incomplete. The present author is embarrassed to admit that even

* In 1962 Boettger¹ in his review on the bivalved gastropods pointed out this fact, and proposed that Dall, Bartsch and Rehder's shell may be close to or even identical with *J. equatorialis* Pilsbury & Olsson 1925.¹³

after more than 20 years study of *Julia zebra* there are still many things he does not understand about it.

Comparative studies on several species of living *Julia* will be given elsewhere.

Summary

A new bivalved gastropod, *Julia zebra*, is described from Mishima and Tsunoshima, Yamaguchi Pref., and also from Ishigaki Island, Okinawa Pref.. It is found in the same habitat as *Julia japonica* and *J. mishimaensis*, but is rarer than they.

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