

Notes on the Reproductive Behavior of the Wrasse *Thalassoma cupido*

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The labrid fish *Thalassoma cupido* (Temminck and Schlegel) is one of the common shorefish in southern Japan, and yet, with the exception of Kubo's (1939) description of the pelagic eggs, there seems to be little available in the literature on its reproduction.

Daily observations of the reproductive behavior of *T. cupido* were made with the assistance of the Tanaka Biological Station pomacentrid research team, between Aug. 24~28, 1973, in Igaya Bay, on the Island of Miyake (Lat. 34°5'N, Long. 139°30'E). No spawning was observed while working in the same area on Aug. 22. Reproductive activity occurred before 10 AM daily, decreasing noticeably in intensity and numbers of fish over the five day period. Repeated dives were made during these days, and there was no evidence of spawning during late morning and afternoon. Only a few widely scattered fish, appearing singly or in groups of two or three, were encountered in dives after 10 AM, and their behavior and movements were noticeably different than in the morning spawning sessions. Nakazono and Tsukahara (1972) observed a similar decrease in activity toward mid-day in the wrasse, *Halichoeres tenuispinis* (Günther), but this was normal diurnal behavior, and not related to reproduction. The breeding ground was in the same location each day. It covered an area of approximately 200 m², varying from 9 to 11 m in depth. The bottom at that location is covered with small volcanic boulders with frequent patches of red and brown algae and occasional outcroppings of coral. Water temperature remained a constant 27°C throughout the five day period, considerably warmer than the 22.6°C~23.9°C range reported by Kubo (1939).

At 9 AM, Aug. 24, we noticed swarms of *T. cupido* aggregating close to the rocks. They seemed to split periodically into three or four groups of close to 100 fish each. They showed unusual exaggerated bobbing motion and a

strange intensity of movements. Periodically, several fish would bunch together, milling around in rapid movements, as if excited by something. Suddenly, with a speed that was difficult for the eye to follow, one or more fish would dart about 1½ m over the bottom to deposit a cloud of gonadal products, returning with equal speed to the bottom. It seemed that the sudden reversal from ascent to descent snapped the reproductive materials from their bodies at the apex of their upward dash. Time did not permit more detailed observations on that day.

On Aug. 25, spawning was observed from 9:20 AM to 9:40 AM. The number of fish participating had decreased remarkably compared to the previous day. Two groups, comprising about 40~50 fish each, were found. All but three or four in each group were small 7~8 cm individuals. The few larger fish appeared to be about 10~13 cm in length, and were obviously the aggressors, appearing to initiate reproductive activity by herding the smaller fish into tight, milling bunches. The largest wrasse was particularly aggressive, chasing one after another small fish, until many were milling together in a bobbing excited group. Then, as in the previous day's observations, one would dash 30~40 cm above the rocks to deposit a cloud of reproductive material into the water. Once two clouds appeared simultaneously at the same level, but about two meters apart.

Observations on Aug. 26~27 concentrated on the behavior of the larger wrasses. It was noticed that in the process of herding smaller fish into concentrated, milling bunches, the larger ones often moved up 30~40 cm above the rocks, passed over the excited aggregation below, and then swam rapidly downward into and around the group. Shortly after, one or two small fish would dart upward to about 30~40 cm and snap out their gonadal products. Closer observations showed that the larger fish ejaculated a long, creamy stream of what appeared to be sperm as they passed over the smaller fish, at about the same level that the white cloud of reproductive material would be deposited seconds later. This creamy substance appeared quite unlike the white

clouds snapped out by the smaller fish on the apex of their upward dash. What actually elicited the upward dash of the smaller fish could not be determined.

By Aug. 28, reproductive activity had almost ceased. There were still small aggregates of about fifteen fish each milling around, but in ten minutes of observation, very little herding behavior and no clouds of reproductive materials were observed.

The intensive wrasse movements during the five days of reproductive activity seemed to attract the attention of at least two predators: the lizardfish, *Trachinocephalus myops* (Bloch and Schneider), and the grouper, *Epinephelus fasciatus* (Forsskål). Two attacks by the lizardfish were witnessed, both with great speed, but unsuccessful. Once a grouper failed in an attack. Evasive action varied from rapid upward or sideward movement by the entire aggregate of wrasses to an instant dive into the protection of the seaweed below. Two groupers appeared daily in the breeding ground. One was on territory, but the other had come from its territory in the coral plateau more than fifty meters to the south.

No pomacentrids were feeding on eggs, as reported by Hobson (1965) during similar spawning by *Thalassoma lucasanum* (Gill) in the Gulf of California. However, a single puffer, *Canthigaster rivulatus* (Temminck and Schlegel), hovered over the area throughout the Aug. 24 watch, and may have been feeding on eggs.

Randall and Randall (1963) noted that reproduction of *T. bifasciatum* (Bloch) seemed to occur "mostly within a period of a few days containing the full moon and to a lesser extent, new moon". Our observations of *T. cupido* began four days prior to the new moon and terminated on Aug. 28, the day of the new moon.

Discussion

Similar wrasse reproductive behavior has been described in Atlantic populations of *T. bifasciatum* and in the Gulf of California in *T. lucasanum*. Breder and Rosen, (1966: 512, citing a personal communication from H. Winn) noted the initiating role of large *T. bifasciatum*, which Winn identified as females. Randall and

Randau (1963), working with the same species, identified the larger fish as males, and further recognized two types of breeding behavior, involving both large blueheaded males and smaller "monophase" males. Hobson (1965) apparently did not notice larger fish involved in the spawning of *T. lucasanum*. All of the above authors noted rapid upward movement by all or several of the fish in each aggregate, quite unlike the case of *T. cupido*, where only one, or rarely two or three fish in each group dash up to discharge their reproductive materials.

Since there is no sexual dimorphism in this species, sexes of large and small *T. cupido* could not be determined, and no wrasses were collected for the purpose of examining their gonads. However, based on the similarities between the reproductive behavior of *T. cupido* and *T. bifasciatum*, it can be hypothesized that the larger fish are males, that at least some of the smaller fish—those depositing the white clouds of reproductive materials—are females, and that the clouds are therefore eggs.

Certainly detailed studies of the reproductive physiology of *Thalassoma cupido* are needed. Are both males and females included in the milling groups of small fish, as they are in *T. bifasciatum* and *T. lucasanum*? Are all large fish males? Does sex reversal occur?

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ニシキベラの産卵行動の海中観察

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1973 年 8 月 24 日~28 日に三宅島でニシキベラの産卵行動を観察した。産卵行動は毎日午前 10 時までに終了した。水温は 27°C であった。産卵に際しては岩の近くに多数の個体が群がり、海底から 30~40 cm ほどのところに泳ぎ上っては生殖物質を放出するのが観察された。

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