

- 2) On Isabela, San Cristóbal and Floreana, where guava has already spread over large areas, two experiments should be tried:
 - (a) Using controlled fire on a small scale;
 - (b) Cutting the stump as low as possible.

In both cases fast-growing endemic or other native species should then be planted to create shade and deny a come-back to the guava, which cannot grow without strong light.

THE REPRODUCTIVE BEHAVIOUR OF THREE BLENNOID FISH ENDEMIC TO THE GALAPAGOS ISLANDS

by

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“Blennies” are marine fish belonging to the suborder Blennioidei. Most are small (5-10cm) bottom-living species which lack a swimbladder. The suborder Blennioidei consists of 15 different families.

The blennies of the Galapagos Islands belong to the four families Blenniidae (3 species), Clinidae (8 species), Chaenopsidae (2 recognized species and 1 undescribed), and Tripterygiidae (1 species); nine of the 15 species are endemic to the islands (Wellington, 1975, McCosker pers. comm.). The behaviour of more than 50 species of the Blenniidae has been described, but little is known about the behaviour of the other three families (Breder, 1941, Stephens et al 1966, Wirtz, 1978). In a long-term study I am collecting records of behaviour patterns of blennioid fish. Such records can be compared and similarities and differences can be analyzed from either a taxonomic point of view or in search for rules guiding the evolution of different reproductive and parental strategies.

During six weeks in December 1981 — January 1982 I observed the reproductive behaviour of the three endemic species *Acanthemblemaria castroi* (Chaenopsidae), *Malacoctenus zonogaster* (Clinidae), and *Enneapterygius corallicola* (Tripterygiidae).

Acanthemblemaria castroi males and females (approximately 4cm long) live in empty tests of the barnacle *Balanus tintinnabulum*. From this shelter they feed on organisms floating past. Females occasionally move from one barnacle to another within their home range. Reproductively active males always return to the same barnacle; instead of the reddish brown colour of the females and the young males, they are dark grey with conspicuously white faces. Males court females by quickly projecting the body out of the barnacle test and then immediately withdrawing it again. During these movements, in which the body is held upright with the tail always remaining inside the shell, the mouth is half opened, the gill membranes are spread, and all unpaired fins are erected. The "jack in the box" movement can be repeated one to six times with a frequency of four movements per second. Females deposit eggs inside the barnacle occupied by the male. The male continues to court females, and thus eggs in up to four different stages of development were found in the same barnacle test. The same "jack in the box" movement has been observed in the closely related *Acanthemblemaria macrospilus* in the Gulf of California (Stephens et al. 1966).

Males of *Malacoctenus zonogaster* occupy territories of less than 50cm diameter on vertical or slightly overhanging open rock faces. They court females by changing colour from light brown to a conspicuous chocolate brown and white pattern and by swimming towards the female with spread fins. A female may enter the territory and slowly glide along the substrate with wriggling movements during which time she deposits the eggs. The male frequently swims into a position parallel and close to her and performs quivering movements with his whole body, presumably fertilizing the eggs at this moment. After spawning females leave the territory. The male guards the eggs from predators such as small wrasses and gobies and continues to court other females and to spawn with them on his territory.

Males of *Enneapterygius corallicola* occupy territories similar to the ones of *M. zonogaster*, but usually in darker places. Courting males change colour from the drab greybrown, also shown by females, to a brilliant orange. They erect the first dorsal fin, which is pitch black with two conspicuous yellow dots. On the territory the male's body forms a semi-circle in front of the female. The female adjusts her position so that her head is next to a conspicuous black dot at the base of the male's tail and performs slow wriggling movements to deposit eggs. There is no obvious fertilization movement of the male. Sperm may be carried to the eggs by a water current produced through pectoral fin beats of the male, or perhaps the male impregnates a patch of the substrate with a sperm suspension before guiding the female over it. After a few seconds the male moves to a different place in the territory and takes up the semi-circle position again. The female follows. This spawning pattern is different from the one shown by the Mediterranean tripterygiids, which spawn in a manner similar to *M. zonogaster* (Wirtz, 1978). After spawning, females leave the territory. The male guards the eggs and continues to court and attract other females.

In all three species, and in fact in all studied members of the families Blenniidae, Chaenopsidae, Clinidae and Trypterygiidae, the male is the only guardian of the eggs. In striking contrast, the male and female or only the female guard the eggs in the blennoid fish families Pholidae, Stichaeidae and Anarhichadidae. What could be the evolutionary reason for this difference?

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