

Adaptation of Red Sea Fish to the Eastern Mediterranean Environment

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The influx of Red Sea biota into the Mediterranean Sea via the Suez Canal (often termed Lessepsian migration) has fascinated scientists since the end of the last century. Until the last twenty years the study of Lessepsian fish was limited to monitoring and inventory. In order to reach a better understanding of the mechanism of the colonizers' adaptation to their new habitat, it was essential to conduct comparative research of the biology and morphology of the source population in the Red Sea and the colonizing population in the Mediterranean. The accumulation of such studies in the last two decades has enabled us to detect certain trends of Lessepsian fish adaptation.

In the present study we will summarize those characters in which recent research has revealed differences between the source and colonizing populations.

Feeding habits: Although, as expected, most colonizers retained their basic feeding habits, some differences were found that indicate adjustments of the colonizers to their new environment. The Mediterranean population of the two herbivore rabbitfish *Siganus rivulatus* and *S. luridus* show higher trophic selectivity than the source population in the Red Sea (Lundberg, 1980). Since selectivity generally increases with increased trophic abundance, it may be suggested that an "unsaturated niche" existed in the new habitat. A similar interpretation may be drawn from the case of the brownband goatfish *Upeneus pori* (known until recently as *U. asymmetricus* (Ben-Tuvia and Golani, 1989) who was found to prey upon larger-sized organisms in the Mediterranean.

Spawning season: Colonization of the Mediterranean resulted in temporal changes in the reproductive season of some species. In general those species, such as *Upeneus pori* (Golani, 1988), *Siganus rivulatus* and *S. luridus* (Popper, 1979), that live originally in shallower water and are therefore more prone to temperature fluctuation, retain their spawning season in the less stable environment of the Mediterranean. Those species inhabiting slightly deeper water (e.g., *Sargocentron rubrum* (Golani and Ben-Tuvia, 1985) and *Upeneus moluccensis*) shorten their reproductive period due to unsuitably cold temperatures prevailing in their new habitat throughout most of the year.

Morphometrics: Comparison of the colonizers and the source populations revealed that in certain species, the counts of some morphometric elements have changed in the new environment. The most pronounced changes are the decrease in the number of lateral line scales and vertebrae in *Sargocentron rubrum* (Golani, 1987) and number of anal fin rays in *Pempheris vanicolensis*. It has been suggested that this reduction resulted from the higher temperatures prevailing in the Mediterranean than in the Red Sea during the respective spawning seasons of these species. Since the number of meristic elements are correlated to locomotory performance in various viscosities, which change with temperature, it can be postulated that alteration of meristic elements increases the adaptivity of the colonizer to its new environment.

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