Underwater census of epilithic fish along a depth gradient in the Western Mediterranean Sea

C. Dieter ZANDER

Zoologisches Institut, Zoologisches Museum, Universitat, HAMBURG (Germany)

The analysis of marine hard bottom communities is most successfull when observations and operations are made by means of SCUBA diving. Because traditional equipments of research vessels are uneffective on rocky bottoms, investigations with means of SCUBA even revealed several new fish species in the Mediterranean Sea during the last 25 years.

In 1990 an extensive underwater census was made off Banyuls-sur-Mer/F (near the Spanish border) which regarded the shallow hard substrates until a depth of 25 m. The aim was to get informations on densities of epilithic fish along a depth gradient. Special attention was focussed on the syntopic living small-sized species *Parablennius rouxi* (Cocco) and *Gobius vittatus* Vinc. which equal in their striking colourations: A dark brown band is running from head to tail on a whitish body (Fig. 1). This interrelationship is obviously a case of mimicry but is until now not yet clearly solved (ZANDER & HEYMER 1977, HEYMER & ZANDER 1978).

Fig. 1. Habitus and colouration of *Parablennius rouxi* (left) and *Gobius vittatus* (right). From ZANDER & HEYMER (1977).

Totally, 82 observations and counts were performed which comprised an area of 561 m^2. From 3 to 16 m depth the hard substrates along a fixed transsect at the Ile Grosse off Banyuls-sur-Mer was chosen which equals that of former investigations (ZANDER, 1990). Several counts in the coralligene habitat in 20-25 m depth were added which were compiled from different sites in the near of Banyuls : Cap Bear, Cap Castel and Cap Rederis. The respective rocky substrates were measured out with means of a measuring rope, the inhabiting fish counted and related to the areas.

The densities of 12 epilithic fish species are presented in Fig. 2. *Gobius vittatus* and *Parablennius rouxi* dominate in depths of more than 12 m, but *Gobius xanthocephalus* is very abundant at least in the coralligene. Only young specimens of a size of 3-4 cm are present on the islet which may cause a high total density of 2.3 N m^{-2} whereas the still higher density of 2.6 N m^{-2} in the coralligene is probably due to the extremely structured habitat. Only young *G. vittatus* are also found between the pebbles in 10-12 m (Fig. 2). Lower fish densities are counted in the shallow habitats above 12 m where *G. xanthocephalus* is found until 5 m. *Gobius bucchichii* Steindachner is only present from 0-3 m whereas the larger *G. cobitis* Pallas and *G. geniporus* Val. occur only sporadically on the rocky habitats until 9 or 16 m, respectively (Fig. 2). Among blennioids, *Tripterygion delaisi xanthosoma* ZANDER and HEYMER is present between 5 and 25 m whereas the other *Tripterygion* species have narrower limits. *Parablennius gattorugine* Brünnich is found in this study only sporadically. The fish predator *Scorpaena porcus* L. is in low abundance present in all depths whereas *Lepadogaster* sp. is concentrated in the pebble microhabitat (Fig. 2).

The results reveal that highest total density is found in the coralligene proper but also on the islet and the wall which show also some coralligeneous congregations. These microhabitats are highly structured in contrast to the more unique boulders and pebbles in the shallow areas where clear lower densities are found.

P. rouxi is present in still shallower habitats than observed here but these have to be more structured (HEYMER & ZANDER 1975). Its vertical distribution is wider than that of *G. vittatus* (HEYMER & ZANDER 1978). However, the abundance of *G. vittatus* turns out to be higher than of *P. rouxi* in the present study. Therefore, a third species may be involved in this possible mimicry of cleaning symbiont fishes. In this respect, strong evidence is given by the colouration of young *Coris julis* (L.) which is strikingly similar to those of *P. rouxi* and *G. vittatus*. This suprabenthic fish is distributed over all the depths in great abundances where the possible imitators occur. Further investigations should be focussed on this problem.

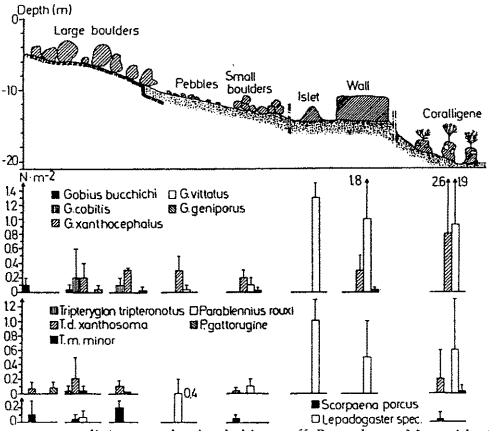

Fig. 2.- Transect regarding several microhabitats off Banyuls-sur-Mer with densities of epilithic fish species in Spetember, 1990.

Acknowledgements

Thanks to Heiko Blessin for help during the diving operations and to Monika Hänel who draw the figures.

V

REFERENCES

HEYMER A. & ZANDER C.D., 1975. - *Vie Milieu* 25, 311-333.
HEYMER, A. & ZANDER C.D. 1978. - *Z. zool. Syst. Evolut.-forsch.* 16, 132-143.
ZANDER C.D., 1990. - *Mem. Biospeleol.* 17, 57-64.
ZANDER C.D. & HEYMER A. , 1977. - *Biology of benthic organisms*, 621-630; Pergamon.