

SHORT COMMUNICATIONS

ON THE BREEDING SEASON OF *LIPOPHRYS PHOLIS* (PISCES: BLENNIIDAE) AT ARRÁBIDA, PORTUGAL

VITOR C. ALMADA, EDUARDO N. BARATA, EMANUEL J. GONÇALVES AND
RUI F. DE OLIVEIRA

Grupo de Estudos Eco-Etológicos, Instituto Superior de Psicologia Aplicada, Rua Jardim do Tabaco, 44,
1100 Lisboa, Portugal

Direct observations of egg masses on the shore indicates that *Lipophrys pholis* is a winter and spring spawner in Portuguese waters. The results are compared with those published for the British Isles.

Lipophrys pholis, Linnaeus, 1758, is a very common intertidal fish in the north-eastern Atlantic and in the North Sea. Considerable work has been published concerning its breeding season in British waters (Lebour, 1927; Qasim, 1957; Shackley & King, 1977). The breeding season of the species at the southern limit of its range is almost unknown, and Zander (1986) mentions the period from April to August for the whole species. Based on dates of first appearance of larvae in plankton collected in the Bay of Biscay, Villegas (1981) concluded that breeding should have begun as early as the end of December.

In this report we present data on the spawning season of this blenny based on direct observation of the presence of eggs and/or parental guarding males on the shore.

Data were collected at a site located at Arrábida (38°28'N, 8°59'W), near Setúbal, 50 km south of Lisbon, Portugal. In the course of behavioural observations on the breeding males of *L. pholis*, the area was visited at various intervals during the period 1986 to 1989. The nests were located intertidally in holes in vertical walls. On each visit, the presence of eggs and/or black males inside the nests was registered. Each nest was mapped for inspection in subsequent visits. The results are summarized in Figure 1.

It is clear that in our study area breeding begins as early as December, and has virtually ended in June. These results contrast sharply with those reported for Great Britain, and give support to one of the predictions of Orton's rule that "southern fishes will spawn in the cooler months of the year at the southern limit of their range" (Qasim, 1956). A species that in Great Britain breeds during spring and early summer, breeds in Portuguese waters from early winter to mid-spring.

Blennids are most numerous in the tropics, and most European species breed during spring and early summer (Zander, 1986). The majority of them, either extend their ranges to west Africa or are specially abundant in the Mediterranean Sea. In contrast to this pattern, *L. pholis* is virtually absent from the Mediterranean, and ranges from Norway to north Morocco (Zander, 1986). The centre of its range is located at a much higher latitude than that of all other European blennids, and it is probably a species adapted to cooler waters. Santos, R.S., Almada, V.C. & Santos, A.I., (communication presented at the Sixth European Ichthyological Congress, Budapest, 1988) also found that the breeding season of a population at Faial, Azores, is from December to February / March.

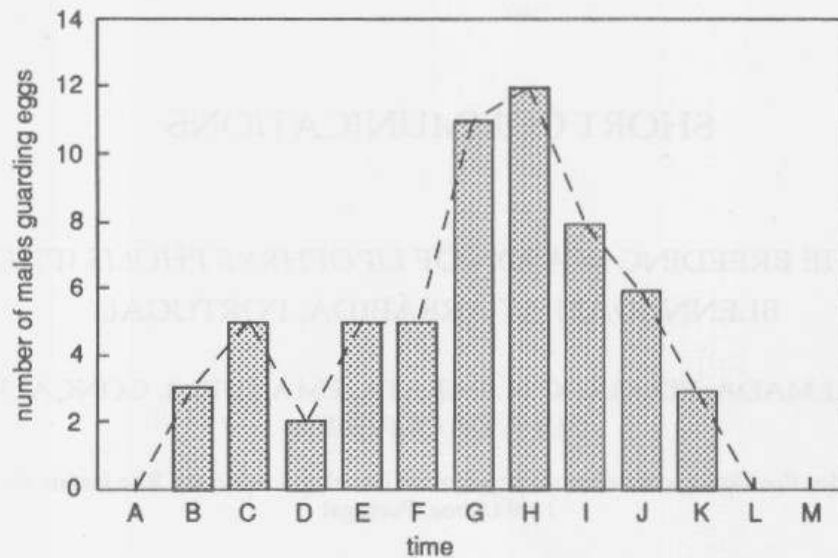


Figure 1. Number of males of *L. pholis* found guarding eggs. Data were collected from 1986 to 1989. The observations are sequenced by months; letters stand for dates as listed below. Vertical bars represent the absolute number of guarding males found at each visit. The number of holes checked at each visit (N) is provided after each date. A: 29.11.88 (N=28); B: 23.12.87 (N=19); C: 7.1.89 (N=10); D: 2.2.87 (N=19); E: 15.2.87 (N=19); F: 5.3.88 (N=19); G: 14.3.87 (N=19); H: 30.3.86 (N=12); I: 23.4.87 (N=19); J: 26.4.86 (N=12); K: 17.5.86 (N=12); L: 11.6.87 (N=19); M: 27.9.88 (N=19).

To what extent the difference in spawning seasons between Britain and Portugal reflects genetic differences between populations or are the result of different environmental conditions acting upon the same basic pattern of physiological responses is unknown.

Shackley & King (1977), investigated the possible roles of photoperiod, air and sea temperatures in the control of reproduction in *L. pholis*. They concluded that both photoperiod and temperature seem to affect the course of the annual cycle of gonadal maturation. Our results suggest that, either the population in our study area is adapted to different thresholds of these environmental parameters, or that temperature is a more effective factor than photoperiod in timing the onset of reproduction in this species.

In Figure 2, we present data on photoperiod, air and sea temperatures taken at the nearest meteorological stations (Forte do Cavalo and Setúbal, for sea and air temperatures, respectively). It is interesting to find that in Portugal, this blenny starts to breed when daylength, air and sea temperatures reach their lowest points, while in Britain breeding begins after several months of increasing daylength, with twelve or more hours of daylight.

In experiments with varying temperature and light regimes Papitsch *et al.* (1981) using *Salaria pavo* Risso, 1810, concluded that the temperature is slightly more effective than photoperiod in promoting the maturation of the gonads although only a combination of these two factors was effective in producing a substantial progress of maturation.

Two features are apparently similar in our population and those studied by Shackley & King (1977): (i) in both cases breeding begins after or at the minimum annual sea temperature; (ii) breeding ends at roughly the same sea temperature in the two areas. These findings suggest the hypothesis that temperature may play a role as a factor controlling the termination of the breeding season when it rises above a certain threshold value.

The abundance of *L. pholis* in the rocky coasts of western Europe and the ease with which nests can be checked, make these fishes an ideal species for comparative studies on the latitudinal variation in the effects of environmental factors on the control of reproduction.

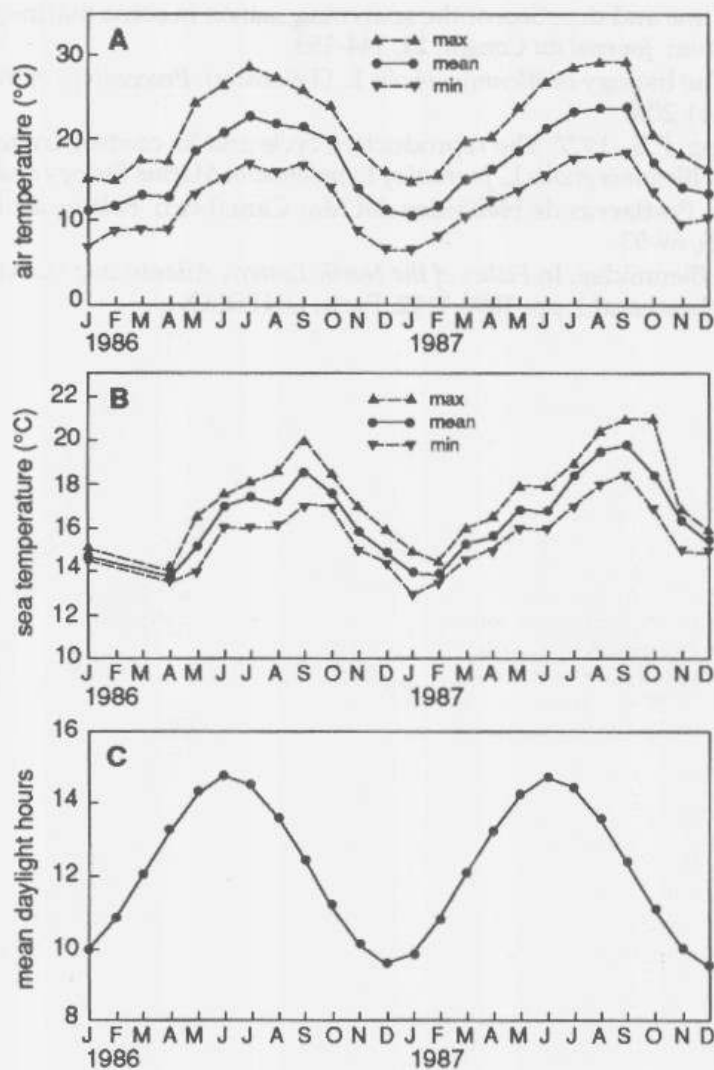


Figure 2. Annual variation of air (A) and sea (B) temperatures, and of photoperiod (C) from January 1986 to December 1987. Sea and air temperatures are given in °C, and photoperiod is expressed in mean daylight hours.

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REFERENCES

- Lebour, M.V., 1927. The eggs and newly hatched young of the common blennies from the Plymouth neighbourhood. *Journal of the Marine Biological Association of the United Kingdom*, **14**, 647-650.
- Papitsch, M., Patzner, R.A. & Adam, H., 1981. Effects of photoperiod and temperature on gonadal maturation of *Blennius* (= *Salaria*) *pavo* (Teleostei, Blenniidae). *Vie et Milieu*, **31**, 215-219.

- Qasim, S.Z., 1956. Time and duration of the spawning season in some marine teleosts in relation to their distribution. *Journal du Conseil*, **21**, 144-155.
- Qasim, S.Z., 1957. The biology of *Blennius pholis* L. (Teleostei). *Proceedings of the Zoological Society of London*, **128**, 161-208.
- Shackley, S.E. & King, P.E., 1977. The reproductive cycle and its control; frequency of spawning and fecundity in *Blennius pholis* L. *Journal of Experimental Marine Biology and Ecology*, **30**, 73-83.
- Villegas, M.L., 1981. Postlarvas de blénidos del Mar Cantábrico. *Boletín del Instituto Español de Oceanografía*, **6**(2), 69-93.
- Zander, C.D., 1986. Blenniidae. In *Fishes of the North-Eastern Atlantic and the Mediterranean*, vol. 3 (ed. P.J.P. Whitehead *et al.*), pp. 1096-1112. Paris: UNESCO.