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Reproduction of *Patella* spp. on the Basque coast of Spain

Miguel Ibanez, Junkal Pena & Jaime Feliu
INSUB., Museo de Oquendo, Apartado de Correos 3.031, San Sebastian, Spain

Four species occur on the Basque coast: *P. lusitanica* (*P. rustica*) in the upper levels of exposed areas, *P. depressa* and *P. vulgata* throughout mid-levels, with the former the most abundant and showing much polymorphism, and *P. aspera* which is common only on the lower shore. Gonad indices were compiled from monthly samples of at least 50 individuals of each species taken from February 1983 until August 1985 at Fuenterrabia, San Sebastian and Zumaya.

P. lusitanica, at virtually its northern limit of distribution, has a short breeding period beginning in July, with first spawnings in Aug/Sept and gonads declining rapidly in Oct/Nov or Nov/Dec.

In *P. vulgata*, which reaches its southern limit in Portugal, the period of gonad activity has varied between three and five months over late spring/early summer. Gonad indices reached maxima in October and November, but also showed some evidence of re-ripening in Jan/Feb before final declines in March/May.

Bij contrast, *P. depressa* and *P. aspera* which are in the centre of their range show irregular, high levels of activity for most of the year. There is a tendency for least activity in June/July, this being the most marked in *P. aspera*. The irregularities in the indices suggest continuous development and frequent small spawnings.

These data for *P. vulgata* and *P. depressa* are similar to those of Miyares (1980) for the Asturian coast of Spain, and also to the Portuguese data (including *P. aspera*) of Guerra & Gaudencio (see this volume). They contrast strongly with data from Britain and Ireland (Orton & Southward, 1961; Thompson, 1979; Bowman, 1985; Bowman & Lewis, this volume) where gonad activity is of much shorter duration and usually confined to midsummer and/or early autumn.

The decreased duration northwards may reflect a minimum temperature requirement by gonads, and it is possibly significant that *P. lusitanica* has as short a breeding period here, at its northern limit, as *P. aspera* has at its northern limit in Britain. The time changes support the expectation of a latitudinal progression in breeding/recruitment from midsummer/early autumn in the north, to the colder half of the year in the south. Problems remain, however; does the year-round activity in *P. depressa* in Spain contract towards its southern limit? When, during the apparently extensive breeding period in Spain, is recruitment most successful?

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