COMPLEMENTAL MALES IN THE BARNACLE *BATHYLASMA ALEARUM* (CIRRIPEDIA: PACHYLASMIDAE)

BRIAN A. FOSTER

Department of Zoology, University of Auckland

SUMMARY

Complemental males are described for the first time in this deepwater family of balanomorph barnacles. The males are usually lodged externally on the tergum, in the angle formed between the articular margin and the articular ridge. Sometimes they occur in the apex angle of the carina. Compared with similar-sized individuals attached to the outside of the parietal shell plates, the body of the male is dominated by testes and seminal vesicles, the latter packed with sperm, and the penis is 4 to 5 times longer. The sexual condition is compared with that in other barnacles, and the mode of sex determination is discussed.

Introduction

Most barnacles (Cirripedia Thoracica) are simultaneous hermaphrodites. A less common sexual condition of some barnacles first fascinated Darwin (1851), who described in the genera *Ibla* and *Scalpellum (sensu lato)* little individuals associated with either larger hermaphrodites or, more rarely, females. Darwin ascertained they were males of the same species and called them dwarf and complemental males respectively. Subsequently, such males have been described in two other species of *Ibla,* in numerous scalpellids, and in 4 species of archeobalanid barnacles (McLaughlin and Henry, 1972). This paper describes a new case of complemental males, of a different sort to those in the archeobalanids, and in a different balanomorph family.

Is the more common hermaphrodite condition or the rarer separate-sex condition primitive? Newman (1974, p. 444) was of the opinion that barnacles with separate sexes are primitive, which accords with the views of Broch (1922) that complemental males represent the last vestiges of ancestral dioeciousness prior to the establishment of the more prevalent hermaphrodite condition. However, this may not be so. Independent development of complemental males in diverse families of barnacles, from a more basic hermaphrodite condition, may have arisen to improve reproductive performance in sublittoral barnacles. Whereas a gregarious settling response (Knight-Jones, 1953) must improve the opportunities for cross-fertilisation of hermaphrodites, the advantage of complemental males possibly lies in the speeding up of reproduction of already mature individuals that the little males associate with. The abolishment of the male function of the larger partners in certain scalpellids and species of *Ibla* amounts to a restoration of a precirriped dioecious condition, but with female dominance. This theory is expounded in the discussion.

Material

Thirty-five free-living specimens of *Bathylasma alearum* (Foster), on a boulder collected by "Tangaroa" from New Zealand Oceanographic Institute Stn R6: 42° 29.2′S, 176° 06.3′E, 1568 m, northern Mernoo Slope.

Deposited: National Museum BS648.

These mostly disarticulated specimens range in size from 10 mm to about 30 mm basal rostrocarinal diameter. As well, 3 small specimens and two recently metamorphosed spat (Fig. 2a) were attached to the outside of the parietes of larger specimens. A total of 35 males were present on the terga of 21 of the hermaphrodites, the latter all more than 14 mm shell diameter; 8 hermaphrodites had males on both terga. Of the 29 individual terga with males, 24 had one male, 4 carried 2 males, and one had 3 males. In addition, 2 hermaphrodites bore a small male in the internal groove at the apex of the carina.