

### Distribution of Barnacles by Ships

THE recent establishment of the Australian cirripede *Elminius modestus* Darwin as a member of the British littoral fauna<sup>1</sup> has aroused great interest and speculation. Formerly one of the most geographically confined of all barnacles, it was first discovered in British waters in 1944, since when it has spread rapidly over a wide area of our southern shores<sup>2-4</sup>, and is also established on the Channel coasts of Holland<sup>5</sup> and France<sup>6</sup>. Further studies on ship fouling have revealed new and interesting localities for two other species of barnacle, *Balanus eburneus* Gould and *B. improvisus* Darwin.

*B. eburneus* has hitherto been recorded only from the east coast of America, where it ranges from Massachusetts to the Caribbean; but recently conclusive evidence has been obtained of its presence in the Mediterranean. Thus in 1947, living specimens of this barnacle were collected from the hulls of two vessels which had traded between the United Kingdom and the Mediterranean, and from two others returning via the Mediterranean from the Far East. It was evident from the itineraries of these ships that settlement had in all cases occurred in Mediterranean ports. This same species was later found on edible mussels obtained from a fishmonger in Paris; the mussels had been supplied from Marseilles. In each of these five records, *B. eburneus* was associated with *B. amphitrite* var. *denticulata* Broch, a variety of barnacle which is particularly common in the Mediterranean, and which until recently has received little attention<sup>7</sup>.

*B. improvisus* is widely distributed throughout northern temperate regions, but has not been previously recorded from the temperate zones of Australasia. Living specimens of this species have, however, been taken from a ship after its return from southern Australia, and the circumstances of the voyage are such that settlement must have occurred in this region. Further specimens were found on two other vessels the itineraries of which strongly suggest that settlement took place in the same locality. Thus it would appear from this evidence that the immigration of *Elminius modestus* to the northern hemisphere has been reciprocated by the establishment of *Balanus improvisus* in southern Australia. The variety *assimilis* Darwin of *B. improvisus*, which appears to be restricted to warm waters, has also been obtained from a new region, that of West Africa (Bathurst, Lagos and Freetown)<sup>8</sup>.

Darwin<sup>8</sup> was fully aware of the important part played by ships in the dissemination of cirripedes, and attributes the very wide distribution of many members of this sessile group to the influence of ship traffic. It is of especial interest that in 1854 he expressed surprise that the geographical distribution of *B. eburneus* had remained so restricted for so long. The barnacles considered here are all commonly found attached to ships in their respective geographical localities, and are hardy species which commonly survive such physical hazards as sustained rapid water flow and comparatively sudden changes of water temperature and salinity, which are peculiar to the fouling environment. A new record does not, of course, necessarily imply a new establishment, and Crisp and Chipperfield<sup>9</sup> have suggested that *E. modestus* may have escaped recognition on British shores for some years. The evidence, however, strongly supports the thesis that the establishment has been a recent one. There is no information from which the date of establishment of *B. eburneus* in the Mediter-

anean, or of *B. improvisus* in Australia, could be deduced; but I believe that the absence of *bona fide* records probably indicates that these immigrations have taken place within the past few years.

It is difficult to visualize what new combination of favourable conditions could encourage such recent establishments unless it be that these conditions have been created by war-time management of shipping. The accumulation of vessels into convoys, for example, would tend to increase the population density of larvæ of fouling organisms in a given locality at a given time. This, providing that environmental conditions were suitable, would lead to a higher settlement density, and the mutual associations so obtained between members of a species might well influence the success of an importation. Observations<sup>9</sup> suggesting gregariousness in the settling behaviour of certain barnacles give point to this possibility, and Crisp<sup>10</sup> has recently shown how such a factor may operate by postulating that populations of certain species of this sessile hermaphrodite group cannot stabilize themselves unless individuals are sufficiently closely packed for copulation and cross-fertilization to occur.

I am greatly indebted to the shipping firms who have assisted my investigations, and to the Marine Corrosion Sub-Committee for permission to publish this communication.

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<sup>1</sup> Bishop, M. W. H., *Nature*, 159, 501 (1947).

<sup>2</sup> Stubbings, H. G., *Nature*, 166, 277 (1950).

<sup>3</sup> Crisp, D. J., and Chipperfield, P. N. J., *Nature*, 161, 64 (1948).

<sup>4</sup> Jones, E. W. N., *Nature*, 161, 201 (1948).

<sup>5</sup> Boschma, H., *Nature*, 161, 403 (1948).

<sup>6</sup> Bishop, M. W. H. (unpublished records).

<sup>7</sup> Bishop, M. W. H., *Nature*, 165, 409 (1950).

<sup>8</sup> Darwin, C., "A Monograph of the Sub-Class Cirripedia", 2, Balanidae, 163 (London: Ray Society, 1854).

<sup>9</sup> Jones, E. W. N., and Stevenson, J. P., *J. Mar. Biol. Assoc.*, 29, 231 (1950).

<sup>10</sup> Crisp, D. J., *Nature*, 166, 311 (1950).

### The Fishes of Ein Feshkha, Palestine

THE Ein Feshkha area is a marshy stretch of the north-western coast of the Dead Sea. The fauna of the area, which has developed over a long period in total isolation, should have attracted zoologists, in view of the evolutionary problems as well as the special ecological aspects of a thermal-mineral-water fauna; but as no comprehensive account of these problems has so far appeared, the following points may be of interest.

The swamp is self-contained as there is no connexion with any other freshwater body. The shortest distance from the nearest freshwater, the River Jordan, is just 10 km. The area itself covers, roughly, 1 sq. km. The swamp is fed by a number of springs, situated within and on the land border of the area, and drains into the Dead Sea. The area is traversed by a network of channels, partly natural, partly artificial. In the southern part there is a compact group of springs (among them the most efficient ones of the area), Ein Feshkha proper, which discharge into an open basin of about 150-200 sq. m. surface area and at times 120 cm. deep. Temperatures in the springs vary partly with the changing seasons, but in some of the stronger ones it is sufficiently high (maximum 30° C.) to make the temperature in the open basin approximately 27° C. all the year round. Chemical analysis of the mineral components of the water at