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A further extension of *Elminius modestus* Darwin on the west coast of France*)

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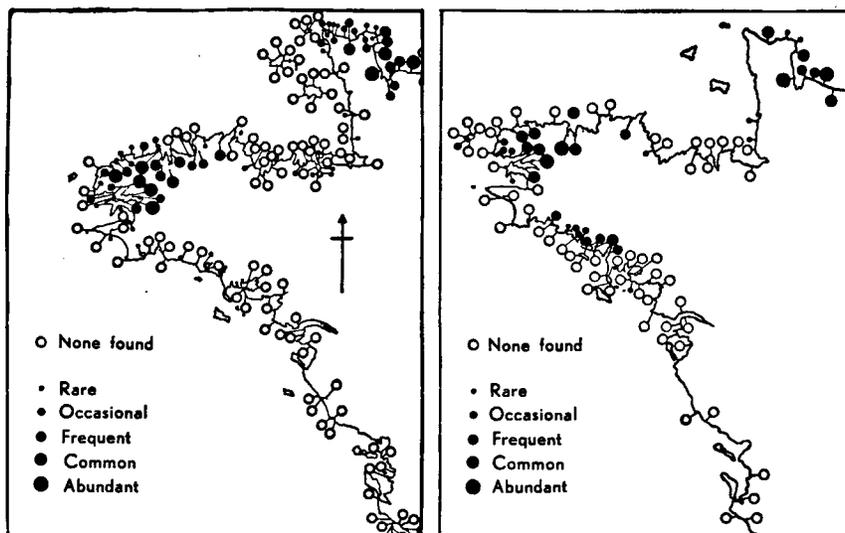
(Marine Biology Station, University College of North Wales)

In previous publications BISHOP & CRISP (1957, 1958) described the distribution of *Elminius modestus* on the coasts of France, based on surveys made in 1953 and 1954. Further information including some observations made in 1955 was given by BISHOP, CRISP, FISCHER-PIETTE & PRENANT (1957). *Elminius* was shown to be centred on three main areas; the Channel coast east of Cap de la Hague, the river systems of North Brittany, and the Rade de Brest. Further south scattered individuals only were to be found, nowhere in sufficient abundance to allow the majority to breed. BISHOP & CRISP (1957) pointed out that the scarcity of *Elminius* on this part of the Brittany coast was surprising, since there are numerous suitable estuaries and harbours and an abundance of fishing craft which might disseminate the species.

A further survey was made in August and September 1957. No significant changes had taken place along the coast of the Channel nor in the Rade de Brest itself. However in the vicinity of the important fishing ports of Concarneau and Lorient a marked increase in the population of *Elminius* had taken place between 1954 and 1957 (fig. 1). Established colonies were found in the harbour at Concarneau, and in the river systems of the Aven, Belon and Laita. The greatest abundance was found at the junction of the Scorff and Blavet near Lorient, while in the adjacent estuary of the Etel the species was quite common. Further south the only evidence of *Elminius* was a single specimen seen on the harbour wall at Point St. Jacques. No specimens were found anywhere in the inland sea of Morbihan, an area of sheltered water very suitable for this species, nor in the estuary of the Loire. Probably the very exposed Quiberon peninsula is for the time being a barrier to its further spread to the south.

Between Brest and Lorient there are several small ports which appear to offer suitable conditions yet have not acquired persistent settlements. For example, no specimens of *Elminius* were seen at Audierne, Pont l'Abbé, nor at Loctudy in 1957, though one or two specimens were found at these stations in 1954.

*) Received December 3, 1957.



The distribution of *Elminius modestus* in 1954 (left) and in 1957 (right) on the west coast of France.

Key: Rare, one or two only found. Occasional, up to 100/sq. metre in suitable habitats. Frequent, 100—1000/sq. metre. Common, 0.1—1.0/sq. cm. Abundant, 1.0/sq.cm.

The establishment of the centre at Lorient has therefore been brought about by shipping rather than by a process of continuous spreading along the coast.

The presence of *Elminius modestus* on certain of the offshore islands affords further evidence of the importance of shipping as an agent in remote dispersal. A sparse population of up to 20 individuals per square metre was observed in the harbour at Lampaul on Ile d'Ouessant, an island nearly 30 km north-west of the nearest breeding populations on the mainland at Le Conquet. Strong tidal streams running north and south, and prevailing westerly winds would make the natural transport of larvae from Le Conquet to Lampaul improbable. Moreover the only population of *Elminius* was found in the more frequently used harbour at Lampaul which faces away from the mainland; there was none in the equally suitable harbour at Stiff which faces east and is nearer the mainland.

A sparse population of *Elminius* was found also at Port Tudy on the Ile de Groix. This island lies only six kilometres from the mainland and twelve kilometres from the main stocks of *Elminius* at Lorient, hence larvae could reach it by natural means and have not necessarily been liberated by barnacles attached to ships (see CRISP & SOUTHWARD, 1953)

The presence of *Elminius* in the Bay of Gascony was confirmed by an isolated specimen found in the River Adur at Le Bouceau. None were seen at St. Jean de Luz where it had formerly been reported (BISHOP & CRISP, 1957). Evidently its occurrence in this area is only sporadic at the present time.

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