

Habitat specialization by *Thia scutellata* (Decapoda: Brachyura) off Wales

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There are sporadic records of *Thia scutellata* from Carmarthen Bay, Cardigan Bay and off the north coast of Wales. Relative scarcity of this small burrowing crab is probably due to habitat specialization. It lives in loose very well sorted medium sand, as typically found in parts of sand waves.

The ‘thumbnail’ crab *Thia scutellata* (Fabricius) is encountered only sporadically when sampling nearshore and adjacent offshore sediments. The pattern of records around Welsh coasts (Figure 1) suggests that they are more specialized in their habitat preferences than implied by the usual statement that ‘they burrow into sand and mud’.

The recorded range of *T. scutellata* is from southern Sweden to the Gulf of Guinea (Ingle, 1980; Clark, 1986). It is indicative of their relative scarcity that when Clark (1986) prepared his north-east Atlantic crab atlas, he had records for just 29 grid rectangles of 20' latitude × 20' longitude in the broad geographical area between Ushant and Iceland. Most of them were in three clusters: the southern Bight of the North Sea, the eastern Irish Sea and the south-west English Channel. By contrast *Corystes cassivelaunus* was recorded in over 200 rectangles. *Thia scutellata* was also put in a ‘scarce’ seabed species category by Sanderson (1996), from the numbers of coastal 10 km National Grid squares for which records were then held in the Joint Nature Conservancy Committee, Marine Nature Conservation Review database, i.e. recorded from only 8 to 55 of 1546 squares within 3 miles of UK coasts.

In the eastern and southern parts of the Irish Sea off north and west Wales *T. scutellata* was encountered sufficiently often in the 1965–1999 period, to make inferences about their preferred habitat. During this period they were found in five main groups of surveys: (i) exploratory surveys, collecting and teaching trips, round North Wales from Tremadog Bay to the Great Orme, within 12 miles of the coast, primarily using dredges (180+ stations; 1965–1970); (ii) surveillance monitoring, by grabs, of anthropogenic influences in Liverpool Bay, covering most of the area inside lines drawn west from Blackpool (53°50'N) and north from the Great Orme (03°50'W) (140 stations, some worked 20 times; 1970–1995); (iii) extensive sampling of the southern Irish Sea, and north-eastern Celtic Sea by grabs, dredges and small mesh beam trawls (170 stations; National Museum of Wales BIOMOR project 1989 and 1991 (Mackie et al., 1995), and Wales/Ireland INTERREG project 1997 and 1998); (iv) Carmarthen Bay (62 grab stations, National Museum of Wales and University of Wales Swansea for Country-side Council for Wales; 1988); and (v) various diver sampling and grabs to ground truth RoxAnn surveys in southern Cardigan Bay and round Pen Llŷn (60+ stations for Country-side Council for Wales; 1995–1998).

Earlier published records of *T. scutellata* from the North Wales area and notes on cards at the Menai Bridge laboratories of University of Wales Bangor included Constable Bank and Menai Strait (Walker, 1886), Abersoch and Colwyn Bay, (Nevison, 1913) and 2 miles north of Puffin Island (1952 record card by E.W. Knight Jones). Several were also found in the stomachs of *Raia clavata* trawled offshore from Red Wharf Bay.

More recent Welsh records (Figure 1) came from locations with well sorted sand (British Geological Survey seabed sediment maps and personal experience). The cluster of records off north-east Anglesey are from an area where echo-sounders show obvious sand waves. Of ten grab samples taken here in November 1997 (two grabs at five loci on a mini-grid 0.45 km corner to corner), one at 53°22.39'N 04°03.46'W brought up four full grown *T. scutellata*, with none in the others. On visual appearance alone, that with crabs had slightly coarser and better sorted sand with fewer shell fragments. It had a median Phi diameter of 1.1, the others having 1.7–1.9. Although all would be classed medium sand, that with crabs had few particles over 1 mm and less in the very fine sand and silt/clay fractions. Such variation between adjacent samples is typical where there is a basement veneer of mixed sand and shell over lag gravel, with slightly different subpopulations of sand grains forming the isolated sand waves. Liverpool Bay also has groups of sand waves within the area covered by the scatter of records.

The other two clusters of records on Clark's (1986) map were located where tidal currents are likely to produce mobile sand features. In the Southern Bight of the North Sea, offshore from the Rhine, Meuse and Scheldt Estuaries, *T. scutellata* was taken by Wolff & Sandee (1971) in medium sand beyond the 30 m contour where the water was less turbid. The species was included by Bergman & van Santbrink (2000) in a list of those for which estimates were made of mortality due to beam trawling on the Dutch offshore sandy grounds.

Clark (1986) quotes a correspondent from the Channel Islands who found *T. scutellata* living (at ELWS) in association with *Spatangus purpureus*, where both were living in a *Zostera marina* bed. Although *T. scutellata* has sometimes been found in the same samples as *S. purpureus* off Wales, records of it came from parts of Liverpool Bay closer to the estuary plumes than the echinoderm is usually found. The echinoderm is more widespread, frequently being found on more heterogeneous shelly veneer sands. This suggests that off Wales the two species occur together just where preferred habitats overlap.

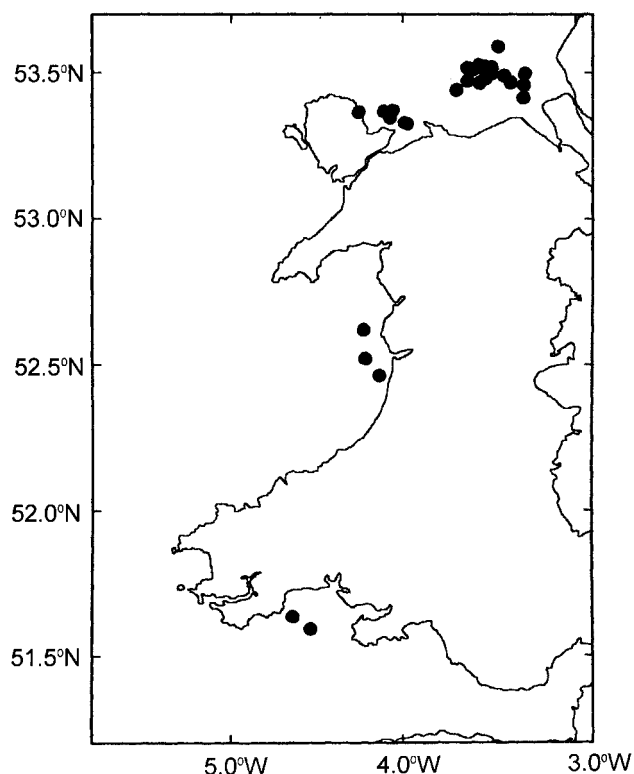


Figure 1. Distribution of records (1965–1999) of *Thia scutellata* off the coasts of Wales, UK.

Habitat descriptions routinely refer to *T. scutellata* as a burrowing species. Bouvier (1940) mentioned both sand and mud as their habitat, but without further explanation. Subsequent general marine invertebrate texts may have relied on this widely quoted taxonomic work by repeating that they burrow into both sand and mud. However, none of those who collected this crab themselves or, like Bell (1853) discuss the origin of specimens in detail, mention mud as a habitat.

Thia scutellata has a white or slightly nacreous translucent polished carapace and relatively short limbs. Superficially it shows convergent morphological features with the mole crabs *Emerita* spp. Freshly caught crabs readily re-burrow obliquely backwards into loose medium sand, taking about 10–15 s to be completely hidden. While *C. cassivelaunus* occupies a broader ecological niche in muddy sand and fine to medium sands, using linked antennae as a snorkel, *T. scutellata* seems to be confined to loosely packed medium sands where it can burrow easily and there is sufficient percolation through the sediment for respiration.

The contention here is that *T. scutellata* is a specialist species adapted to live as a 'mole' in loose well sorted medium sand (median diameter 1.1–1.3 phi). It is perceived as a scarce species because even within fields of sand waves the precise locations with the conditions they prefer are limited.

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