A *THALASSINOIDES* BURROW CONTAINING THE CRUSTACEAN *GLYPHAEA UDRESSIERI* (MEYER) FROM THE BATHONIAN OF OXFORDSHIRE

by B. W. SELLWOOD

ABSTRACT. A *Thalassinoides* burrow from the White Limestone contains the macrurous crustacean *Glyphaea udressieri* (Meyer). The *Glyphaea* was probably the excavator of the burrow and a link is tentatively suggested between *Glyphaea* and *Thalassinoides* and the faecal pellet *Favreina*.

KENNEDY *et al.* (1969) recorded the faecal pellet *Favreina* within *Thalassinoides* burrows in the White Limestone and Forest Marble at Kirtlington, Oxfordshire. They suggested that the pellets were produced by crustaceans and favoured the palinuran *Mecochirus clypeatus* (Carter) as the producer. Recently, a specimen of *Glyphaea* has been found within a *Thalassinoides* burrow at the same locality. This occurrence suggests an association between *Thalassinoides*, *Favreina*, and *Glyphaea*. *Thalassinoides* is a largely horizontal burrow system showing Y-shaped branching patterns and has been figured by many authors (e.g. Häntzschel 1962, Farrow 1966, Kennedy 1967, Sellwood *et al.* 1970).

Stratigraphy and occurrence. The stratigraphy at Kirtlington (Ref. SP 494199) has been described by McKerrow *et al.* (1969). The specimen figured was obtained from beds not described in their paper, but some 2 to 2·5 m below Bed *a* in Profile 1 (op. cit., p. 58). These beds still belong to the White Limestone Group (McKerrow, pers. comm.). *Thalassinoides* is common with abundant moulds of disarticulated *Modiolus*, *Trigonia*, *Goniomya Pinna*, pectinids, lucinoids, and numerous veneroids. Brachiopods are absent. The majority of the bivalves are preserved in their current stable positions indicating considerable winnowing and sorting of the shells. Deposition is believed to have occurred in slightly deeper-water conditions than those envisaged by McKerrow *et al.* for the deposition of the remainder of the White Limestone (inter-tidal to sub-tidal). Limitations of the exposure make it impossible to define the relations of this facies to the rest of the White Limestone above. *Glyphaea* has been recorded from the same locality by Phillips (1871) and Dr. Gwyn Thomas has recently obtained three specimens from higher levels. However, it is not clear whether these specimens are within burrows.

The relationship between Glyphaea *and the burrow*. Plate 108 (lower half) shows part of a *Thalassinoides* burrow with the articulated remains of the macrurous (palinuran) crustacean *Glyphaea udressieri* (Meyer) lying on its left side at the bottom of the burrow. The left cheliped and three walking legs are visible but due to the hardness of the matrix, no further parts can be safely exposed. The matrix and the burrow-fill are of identical composition being lignitic and quartzose bio-microsparites. The burrow does not bear any crustacean scratch-marks, but the size of the crustacean is compatible with its being

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the burrow-excavator. Alternative explanations are that the animal was washed into the burrow, or that it was merely occupying a burrow constructed by another species. From the preservation and attitude of the fossil, the former is unlikely; the latter impossible to substantiate. On circumstantial grounds I prefer to regard the *Glyphaea* as the constructor of the burrow.

The relationship of Glyphaea *to* Favreina. The White Limestone at Kirtlington contains abundant *Thalassinoides* burrows identical to that figured and these are often filled with *Favreina*. However, the figured specimen is not associated with *Favreina* but in view of the similarity in the forms of the *Thalassinoides* burrows it is nevertheless likely that *Glyphaea* formed the faecal pellets. Other crustaceans which might well have been responsible are *Eryma*, recorded from the Great Oolite by Woods (1925–1931), and *Orhomalus*, associated with *Thalassinoides* (recorded by Dr. A. Kendall (pers. comm.)).

Remarks. Although crustaceans have been considered responsible for a variety of burrow-types, including *Thalassinoides*, the crustaceans themselves are but rarely preserved. Waage (1968) has figured an *Ophiomorpha* burrow with associated *Callianassa* debris, and Shinn (1968) has also figured part of a burrow system containing 'a shrimp, the presumed architect', both from the Cretaceous of North America. Ehrenberg (1944), who erected the ichnogenus *Thalassinoides*, noted its association with *Callianassa* in the Austrian Miocene, while Fiege (1944) suggested that either Glypheoids or Thalassinoids produced some *Thalassinoides* burrows in the Muschelkalk.

The rarity of crustacean remains in their burrows may be explained in several ways. Firstly, burrowing crustaceans often have thin and reduced skeletons (cf. *Callianassa*, *Alpheus*, and *Upogebia*) which would not readily be preserved. Only the chelipeds are strongly calcified and, as Bromley (1967) noted in the Chalk, these are the parts most frequently found. Secondly, when moribund, many burrowers move to the surface, where their chances of preservation are much reduced (Schäfer 1962). The preservation of this type of animal probably requires some form of catastrophe involving rapid burial (Bromley 1967), possibly by the whole burrow-system becoming almost instantaneously filled with sediment causing the death of the occupant.

Glyphaea is not a member of the Thalassinoidea but Glaessner (1969) regards them as having evolved from the Glypheoidae. Similarities in burrow-style in these groups may reflect their related histories.

Conclusions. *Glyphaea udressieri* (Meyer) is believed to have constructed a *Thalassinoides*-type burrow in a sub-tidal environment. Elsewhere, at the same locality, *Thalassinoides*, is associated with *Favreina*, thus suggesting that *Glyphaea* produced both the burrows and the pellets.

EXPLANATION OF PLATE 108

Fig. 3. Undersurface of part of *Thalassinoides* burrow with *Glyphaea udressieri* (Meyer) arrowed, ×0·5.

Fig. 4. Close-up showing left cheliped and parts of the carapace and three walking legs, ×3.

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