A new Classification for some Jurassic Brachyura (Crustacea: Decapoda: Brachyura: Homolodromioidea): families Goniodromitidae Beurlen, 1932 and Tanidromitidae new family

With 4 Tables and 6 Plates

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Abstract

The Prosopidae von Meyer, 1860, sensu lato as currently construed is too broad to be considered as a single family. A new family, Tanidromitidae, and two new genera, Sabellidromites and Tanidromites, are erected to embrace several Jurassic species of brachyurans from northern Europe, based upon their possession of a unique combination of orbital and dorsal carapace characters. These revisions have also resulted in 11 new combinations. The Goniodromitidae Beurlen, 1932, and the new family are placed within the Homolodromioidea. Members of the Tanidromitidae seem to have preferred sponge-dominated habitats and environments in which laminated limestones were deposited. Unlike other Jurassic members of the Homolodromioidea, members of the Tanidromitidae thus far have not been recovered from coral reef environments. The Tanidromitidae ranges from Middle to Late Jurassic in age and is known from Germany, Poland, and Britain. The Goniodromitidae ranged from the Jurassic to Cretaceous throughout Europe.

Key words: Prosopidae, Homolodromiidae, Oxfordian, Cretaceous, Podotremata, sponge biostromes, sponge bioherms

Introduction

Fossil brachyurans from the Jurassic Period have traditionally been viewed as a conservative group, almost all of whom have been referred to two subfamilies within a single family, the Prosopidae von Meyer, 1860 (Glaessner, 1969). This scheme of classification is overly simplistic and belies the true variation that is expressed by these organisms. Classification of these crabs has always been a vexing problem. A glance at the illustrations of family representatives by Glaessner (1969, figs 293 – 296) illustrates an amazing array of forms that are far too different from one another to be considered members of the same family. Attempts to resolve this problem has resulted in the elevation of the three subfamilies recognized by Glaessner, the Prosopinae von Meyer, 1860; the Pithonotinae Glaessner, 1933; and the Homolodromiinae Alcock, 1899, to family level. Stevčić (2005) maintained the Prosopidae as a family with three constituent subfamilies, the Prosopinae, Pithonotinae, and Glaessneropsinae Patrulius, 1959. However, with the exception of the Homolodromiidae, these other families continue to embrace a heterogenous assemblage of taxa. These taxa have variously been moved and synonymized, but the fundamental problems of their classification remain. It is the purpose of this work to establish the basis for a more
rational classification of the Prosopidae sensu lato and to illustrate its applicability by examining the basis for classification of genera and species within the family Goniodromitidae BEURLIN, 1932 (=Pithonotinae GLAESSENB., 1933).

When evaluating previous work on the Prosopidae sensu lato, it is clear that many of the taxa have been grouped together based upon gross morphological similarity. Many are characterized by having a transversely vaulted carapace on which the groove patterns extend onto the flanks; a generally rectilinear outline which may, or may not, taper posteriorly; a weakly ornamented dorsal carapace; and groove patterns that include generally well-developed cervical and branchiocardiac grooves. These characters are most frequently cited in descriptions and comparisons owing to the paucity of features that are typically exposed on the specimens due to a variety of intrinsic and extrinsic causes.

With regard to intrinsic factors, the majority of prosopids are very small, often less than 1 cm in carapace length, which means that they are extremely difficult to see if preserved in carbonate rocks. Most also have very thin cuticle which tends to exfoliate so that only the mold of the interior of the carapace is available for study. The interior of the cuticle tends to be somewhat smoother than the exterior so that some of the details of exterior morphology may be missing. The final intrinsic difficulty is that the carapace was apparently only weakly attached to the sternum and appendages, so that no specimens of authentic prosopids have been found that have ventral morphology available for study. Although many of the known specimens may have been molted remains, it is likely that some must have been corpses, and that the weak attachment of dorsal and ventral elements was fundamental to their architecture.

Extrinsic factors include conditions of discovery and preparation of the specimens. As indicated above, those specimens collected from reefal and bedded limestones tend to be tiny, have the same color as the surrounding matrix, and are firmly attached to the rocks so that extraction typically involves breaking as many or more specimens than are collected successfully. Laboratory preparation is also very difficult. Because the limestone matrix in most of the occurrences with which we are familiar is extremely hard, cleaning using hand tools is difficult. Modern preparation tools, such as various types of airscribes, can readily attack the rock but some damage to the specimens can still result. Many of the limestones are vuggy and the tiny vugs virtually explode when they are encountered by the airscribe. If they are adjacent to the fossil, part of the animal is certain to be lost.

A final array of difficulties arises as a result of the nature of museum collections housing collections of prosopids. Many of the type specimens, including nearly all of those named by VON MEYER, are lost. Some of the specimens were indicated as being in private collections (e.g., the WETTLER Collection of VON MEYER, 1860) and the whereabouts of those collections is typically not known. The depository of other types, for example many designated by VAN STRAELEN, was never indicated so that only a chance discovery will result in obtaining type material to confirm the concept of the species. Overprinted on these problems, of course, is the fact that a large number of prosopids were originally named for specimens collected in Europe and deposited in museums damaged by the World Wars. Absence of verified comparative material has elevated the possibility that considerable extension and modification of the original concept of the taxa has occurred.

Extensive collecting of Jurassic carbonates by us during the last three summers, coupled with examination of collections of prosopids in many of the major museums of Europe, has made it possible to identify some additional type material, recognize collections that were made during the mid-19th Century, and expand our understanding of the morphology of the group. The result has been that several points of comparison have emerged that have not been fully evaluated previously. One of the primary elements is the architecture of the orbital regions.

In a particularly eloquent passage, STENZEL (1945, p. 401) discussed the singular importance of structures surrounding the eyes that function as protective devices. Although his discussion was focused specifically on macrurans, his observations are no less true for the brachyurans. Despite the importance of the eye to the survival of the organisms, little or nothing has been said about the construction of the orbital region in the classification of the prosopids. The collection and preparation of new specimens of prosopids has permitted recognition of at least three types of orbital structures that are distinctly different from one another and that provide a useful basis for primary subdivision of the Prosopidae sensu lato.

Careful preparation of the anterior and anterolateral portions of prosopid fossils reveals that a few taxa have orbits that arise from beneath the rostrum, much in the manner of modern spider crabs. Others have orbits that are more or less circular and that are forward directed. Finally, there is a group that has orbits that are elongate, concave structures extending along part or nearly the entire anterior margin. In these forms, the eyestalk arises at the anterior end of the anterolateral margin and the concave region serves as a resting site for the eyestalk and corneal area as they fold backward against the carapace, much in the manner of modern goneplacids. It is this latter group that forms the subject of the present work. The other groups will be discussed at such time as types and other specimens can be studied.

Systematic paleontology

Institutional abbreviations: BSP, Bayerische Staatsammlung für Paläontologie und historische Geologie München (Munich), Germany; IG, Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium; IGUP/W, Institute of Geology and Palaeontology, University of Warsaw, Poland; BM In., The Natural History Museum, London; IU, Jagiellonian University, Institute of Geological Sciences, Muzeum Geologiczne, Kraków, Poland; KSU, Kent State University Decapod Comparative Collection, Kent, Ohio; LACM, Natural History Museum of Los Angeles County, California, USA; NHM-W, Geological and Palaeontological Department of the Natural History Museum Vienna, Austria; SM, Sedgwick Museum, Cambridge University, United Kingdom; SMF, Senckenberg Forschungsinstitut und NaturMuseum, Department of Paleontology and Historical Geology, Frankfurt, Germany; SMNS, Staatliches Museum für Naturkunde, Stuttgart, Germany; USNM, United States National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Synonymy: Synonymy lists for genera and species are based upon those synonymy lists verified by us. Synonymies based upon individual specimens (such as many of those listed in GLAESSENB., 1929, for example) or for literature we do not own are not included.