FIRST EURYPTERID FROM ITALY: A NEW SPECIES OF ADELOPHTHALMUS (CHELICERATA: EURYPTERIDA) FROM THE UPPER CARBONIFEROUS OF THE CARNIC ALPS (FRUILI, NE ITALY)

JAMES C. LAMSDELL 1, LUCA SIMONETTO 2 & PAUL A. SELDEN 3

Received: January 8, 2013; accepted: February 20, 2013

Key words: Adelophthalmoidea, Eurypterida, Moslovian-Kasi­movian, Pennsylvanian, Italy.

Abstract. The first eurypterid known from Italy is described, as Adelophthalmus piussii n. sp. It comes from the Upper Carboniferous of the Carnic Alps (Friuli, NE Italy). Relationships with related species are discussed. Adelophthalmids are the commonest eurypterids of the late Palaeozoic, at which time the disparity of the order was waning. The new record enhances our knowledge of adelophthalmid distribution and diversity.

Introduction

Eurypterids form a group of extinct Palaeozoic aquatic chelicerates found in marginal marine, brackish and freshwater environments. Although globally widespread, eurypterids tend to be restricted to Konservat-Lagerstätten due to their unmineralized cuticle (Gupta et al. 2007). Despite having a fossil record from every continent with the exception of Antarctica, it is only with the amalgamation of the palaecontinents in late Devonian and early Carboniferous times that these animals gained a truly cosmopolitan distribution (Tetlie 2007, but see Lamsdell et al. 2013), with the radiation of hibbertopterid and adelophthalmid eurypterids following the extinction of every other major eurypterid group (Lamsdell & Bradly 2010).

Of the two eurypterid groups found in the Carboniferous, adelophthalmids are by far the commonest, with over 40 species currently recognized (Tetlie & Poschmann 2008), the majority of which are assigned to the genus Adelophthalmus Jordan in Jordan & von Meyer, 1854. Adelophthalmus reached its peak diversity in the late Carboniferous, although the earliest known species occurred in the early Devonian (Siegenian and Emsian in terms of Rhenish stratigraphy) of Germany (Poschmann 2006, 2012). Three other Devonian occurrences have been reported: a single specimen from the Frasian of Australia (Tetlie et al. 2004), material from North America that is most likely Famennian in age (Hall & Clarke 1888), and a series of poorly preserved specimens from the Middle Devonian of Russia (Shpinev 2012) which exhibit a number of bizarre characteristics that warrant further investigation and may suggest that their assignment to Adelophthalmus is erroneous. There is a dearth of specimens from the early Carboniferous, with a single species described from the Tournaissian of Russia (Shpinev 2006). Any occurrence of the genus is important for reconstructing the biogeography of post-Devonian eurypterids. Here, we report the first eurypterid known from Italy, describe the new species as Adelophthalmus piussii n. sp. from the Upper Carbo-
niterous of the Carnic Alps, and discuss its position within the genus.

Geological Setting

The specimen comes from the debris of a large loose block found in the gravel bank of a small creek, a tributary of Bombaso creek, near to Malga Tratte (Fig. 1). The site is located north of the village of Pontebba, on the main road (SP110) that leads to the mountain border post of Passo Pramollo-Naßfeld between Italy and Austria. It is preserved as a cast in a small slab of thin sandstone. In the block from which the slab originated is a thin level with several fragments of fossil plants, mostly fern-like foliage. A small piece of the slab was sent to Prof. Paola Pittau, Dipartimento di Scienze Chimiche e Geologiche, Cagliari University, for palynological analysis, but it was not possible to obtain accurate dating because of the poor preservation of the microfossils; only long-ranging microspores were found. Based on lithological features, and according to the geological setting of the area, it is most likely that the specimen comes from the upper part of the Meledis Formation (upper Moscovian-lower Kasimovian) (Venturini pers. com.), the oldest among the five formations of the Pramollo Group (upper Moscovian-Gzhelian, Upper Carboniferous) (Venturini 1990, 2002). The whole group is characterized by alternation of transgressive-regressive cycles related to glacio-eustatic control and tectonic activity (Vai & Venturini 1997). The result is a thick sequence of conglomerates and arkoses with high quartz content, from a fluvo-deltaic environment, intercalated with marine shallow-water carbonates and pelites. In the lower part of the Meledis Formation, the carbonate levels are intercalated with bioturbated siltstones with abundant ichnofossils and marine fossils, arranged in a transgressive sequence mostly driven by transtensive tectonics which produced several slumping episodes. Alternatively, the deposits of the upper part of the Meledis Formation reflect local transgressive tectonics which were responsible for a fluvo-deltaic environment, testified by channelized quartz-rich conglomerates and shoreface arenites. The specimen seems to be from this upper sequence.

Material and Methods

The single specimen (part only; Fig. 2) is preserved as a three-dimensional representation of the dorsal surface in a fine sandstone. It was studied under a Leica MZ605 stereomicroscope, drawn using a camera lucida attachment on the microscope, and photographed dry, in low-angle light, with a Canon 5D MkII digital camera and 50 mm macro lens. Note that, unconventionally, the lighting in Fig. 2 is directed from the SW in order to illuminate the specimen which would otherwise be in the shadow of higher rock matrix. The final drawing and photographs were prepared for publication using the Adobe CS6 software suite. All measurements are in mm; the > symbol indicates an incomplete article and hence a minimum measurement.

Systematic Palaeontology

Subphylum Chelicerata Heymons, 1901
Order Eurypterida Burmeister, 1843
Suborder Eurypterina Burmeister, 1843
Infraorder Diploperculata Lamsdell, Höggor & Selden, 2013
Superfamily Adelophthalmoidea Tollerton, 1989
Family Adelophthalmidae Tollerton, 1989
Genus Adelophthalmus Jordan in Jordan & von Meyer, 1854

Adelophthalmus piussii n. sp.
Fig. 2

Material. Holotype and only known specimen, number MFSNgp 31681, Museo Friulano di Storia Naturale, Udine.

Horizon and locality. Upper Moscovian-lower Kasimovian (Upper Carboniferous); from near Malga Trane, Bombaso valley, Pontebba, Udine.

Etymology. The species is named in honour of the collector, Stefano Piussi of Udine.

Diagnosis. Adelophthalmus with median furrow on carapace; carapace lacking expanded posterolateral corners; lateral margins of first opisthosomal tergite angled anteriorly; first opisthosomal tergite maintains constant width at lateral margins.

Description. Body length >37.89 mm. Carapace parabolic (sensu Tollerton 1989), 16.98 long, >18.53 wide, bordered by narrow marginal rim. Lateral eyes reniform, 2.88 long, 1.69 wide, located centrimesially 7.96 from carapace posterior border on outer margin of vaulted central portion of carapace. Ocellar mound located between lateral eyes at rear of median furrow 5.82 from carapace posterior border. Four partial prosomal appendages (IV–VI) preserved on left side, but no details discernible. Anterior seven opisthosomal tergites preserved; first reduced, with lateral margins converging slightly forwards. Opisthosomal tergite lengths/widths: 1 = 0.92/>17.36; 2 = 2.06/>19.66; 3 = 3.21/>20.08; 4 = 4.29/>21.24; 5 = 4.61/21.52; 6 = 3.47/>15.76; 7 = >2.35/>8.74. Slight epimera on all opisthosomal tergites. Cuticular ornamentation of lunate scales (preserved as impressions).

Remarks. The specimen is considered to belong to a new, undescribed species on account of its possession of a carapace median furrow combined with its lack of expanded posterolateral corners of the carapace.

Discussion

The genus Adelophthalmus is speciose, widespread, long-ranging, taxonomically old (being named in 1854), and the nominate form of a higher taxon (in this case the family Adelophthalmidae); it therefore meets every criterion for the identification of wastebas-
Adelophthalmus granosus

Glyptoscorpius seen on two figures (Kues suggesting that as many as 11 species may be species (Tetlie suffering simultaneously from under-splitting at the generic level and, paradoxically, over-splitting at the species level. The species now assigned to Adelophthalmus have previously been divided into five genera: Adelophthalmus, Lepidoderma Reuss, 1855, Anthracocrates Meek & Worthen, 1868, Polyzosterites Goldenberg, 1873, and Glyptoscorpius Peach, 1882. These taxa have all subsequently been synonymized into Adelophthalmus, which has priority, for reasons that appear valid for the type species in question (see Tetlie & Dunlop for a full review). It is possible, however, that Adelophthalmus may consist of two or more large clades that could be considered to be distinct genera; it is also uncertain how the Carboniferous genus Unionopterus Chernyshev, 1948 resolves in relation to the various Adelophthalmus species (Tetlie & Van Roy 2006).

A number of species of Adelophthalmus have also been suggested to be synonyms, with Van Oyen (1956) suggesting that as many as 11 species may be junior synonyms of Adelophthalmus imbofi (Reuss, 1855). Many of these species are in need of restudy, however, and Van Oyen’s proposed synonomies have not been widely accepted, with three of the supposedly synonymous species resolving disparately in the phylogeny of Tetlie & Poschmann (2008). A number of characteristics used to define species are also suspect; the type species, Adelophthalmus granosus Jordan in Jordan & von Meyer, 1854, was originally described as lacking lateral eyes, something that is almost certainly a preservational artifact (Tetlie & Dunlop 2005), while Adelophthalmus luceroensis Kues & Kietzke, 1981, was described as possessing no median ocelli, however they can be clearly seen on two figures (Kues & Kietzke 1981 pl. 1, figs. 5 & 8). Ultimately only a redescription of museum specimens will resolve these issues, however until this is done the true number of true Adelophthalmus species currently known will remain uncertain.

The current specimen can clearly be distinguished as a novel species by the autapomorphy of a median carapace furrow and the unique character combination of the carapace lacking expanded posterolateral corners along with the lateral margins of first opisthosomal tergite being angled anteriorly and maintaining a constant width at its lateral margins. The morphology of the first opisthosomal segment also reveals close affinities to some other species of Adelophthalmus, with Adelophthalmus wilsoni (Woodward, 1888) possessing a first tergite with almost identical morphology (see Owens & Bassett 1976, pl. 29, fig. 5). Adelophthalmus luceroensis and Adelophthalmus dumonti (Stainier, 1917) also exhibit an anterior curvature of the lateral regions of the first tergite; however, Adelophthalmus dumonti also has extended posterolateral regions of the carapace that dorsally overlap the tergite. This configuration is also seen in Adelophthalmus moyseyi (Woodward, 1907) and Adelophthalmus granosus which, together with Adelophthalmus dumonti, resolved as a clade in the analysis of Tetlie & Poschmann (2008). Adelophthalmus piussii n. sp. exhibits slight posterolateral extension of the carapace margin but not to the degree seen in Adelophthalmus dumonti, with the lateral portions of the first tergite not being completely covered. Adelophthalmus piussii n. sp. thus appears to be an intermediate form between taxa with an anteriorly deflected first tergite such as Adelophthalmus luceroensis and the Adelophthalmus dumonti clade. It is also possible to polarize these characters, as the earliest known species, Adelophthalmus sievertsi (Sturmer, 1969), lacks both posterolateral extensions of the carapace and any lateral differentiation of the first tergite. The trend in Adelophthalmus thus appears to be one of increasing anterior deflection of the lateral regions of the first opisthosomal tergite followed by an expansion of the posterolateral regions of the carapace eventually resulting in the total dorsal overlap of the lateral regions of the first tergite. Adelophthalmus piussii n. sp., with its first tergite exhibiting marked lateral deflection, appears to show the onset of posterolateral carapace extension.

Acknowledgments. We thank Stefano Piussi, the collector of the specimens, for kindly presenting it to the Museo Friulano di Storia Naturale for study, Prof. Paola Pittau (Dipartimento di Scienze Chimiche e Geologiche, Cagliari University) for palynological investigations, and Prof. Corrado Venturini (Dipartimento di Scienze Biologiche, Geologiche e Ambientali, Bologna University) for helpful information on the stratigraphical position of the sample. Jason Dunlop (Museum für Naturkunde) and Markus Poschmann (Generaldirektion Kulturelles Erbe Rheinland-Pfalz) provided valuable comments during the review process that improved the manuscript.
REFERENCES


Goldenberg F. (1873) - Fauna Saraepontana Fossilis. Die fossilen Thiere aus der Steinkohlenformation von Saarbrücken. Erstes Heft. 26 pp., Chr. Möllinger Verlag, Saarbrücken.

Gupta N.S., Tetlie R.M. (1993) - Ueber die Crustaceen


Woodward H. (1888) - Note on Eurypters from the Car­boniferous. Geol. Mag., Decade III, 5: 419-421.