Letter to the Editors

The editors have received the following communication from J. Maletz.

Late Castlemainian (Ca 4, Arenig) graptolites from the Ballantrae Complex, SW Scotland

Sirs — Graptolites of Arenig age have been discussed repeatedly from the Ballantrae Complex (Stone & Strachan 1981; Stone & Rushton 1983, 2003; Rushton et al. 1986; Rushton & Stone 1988). The inferred biostratigraphic ranges were estimated to be from the basal Arenig Tetragraptus approximatus Biozone to the early Yapeenian. As the exact dating of the graptolite faunas in this sequence has some important implications for the interpretation of the tectonic development of the region, precision is relevant to the question.

The discovery of Arenig isograptid faunas in the North Ballaird borehole (Stone & Strachan 1981; Stone & Rushton 2003) thus was of crucial importance for the determination of the timing of the collisional event initiating the Grampian Orogeny. Stone & Rushton (2003) described the fauna in detail and discussed a possible early Yapeenian age, but were not able to exclude a late Castlemainian (Ca 4) age. The fauna represent the best preserved and richest isograptid fauna found so far in Britain. British isograptids in general are poorly known from few scattered records (Jenkins 1982) and their use for a detailed biostratigraphy was limited due to tectonic distortion and ambiguous identifications.

Isograptid faunal successions are well established from Australasia (Cooper 1973; Cooper & Ni 1986) and eastern North America (Williams & Stevens 1988). Their taxonomy and evolution is known in great detail (Maletz & Mitchell 1996; Maletz & Zhang 2003). Therefore, they are regarded as of high potential for biostratigraphic purposes and inter-continental correlation (Maletz et al. 2003). The illustrations by Stone & Rushton (2003) to support their interpretation of a Yapeenian age of the fauna are excellent and show the material to be well preserved. Therefore a detailed assessment of the fauna is possible.

Faunal remarks

Specimens identified as Isograptus caduceus australis Cooper (Stone & Rushton 2003, fig. 7) show the typical shape of an isograptid of the Parisograptus caduceus group (see Maletz & Zhang 2003) with V-shaped to U-shaped rhabdosome and variably reclined to scandent and even parallel-sided stipes. The deep indentation invariably present in all specimens between the sicula and th1 indicates that the specimens should be identified as Parisograptus imitatus (Harris). P. caduceus australis (Cooper) shows a very short indentation between sicula and th1 and a distinctly shorter supradorsal part of the sicula (Cooper 1973, text-fig. 16). P. imitatus is common in the Ca 4, but does not reach the Yapeenian (Cooper 1973), whereas P. caduceus australis (Cooper) appears to be confined to the Yapeenian. However, this species has been identified without doubt only from Australasia so far. Williams & Stevens (1988) described a number of different species under the name P. caduceus australis. The Newfoundland succession is currently under revision (see Maletz et al. 2003) and the preliminary results show that P. caduceus australis is not represented.

Specimens referred to the Isograptus victoriae group by Stone & Rushton (2003, fig. 8a–d) are poorly preserved. They clearly show the distal widening of the stipes typical for the younger members of the Isograptus victoriae group and may belong to I. v. maximus.

A serious problem is set by the identification of Isograptus gibberulus. The type material (Rushton 2000) shows it to be a slender member of the Isograptus victoriae group, even though it was referred to the P. caduceus group by Jenkins (1982). The species comes from the Didymograptus hirundo Biozone, a rather long time interval, subdivided in Scandinavia into a number of shorter intervals (Maletz 2004). The species was described from the Bogo Shale of Norway (Schmidt-Gündel 1994), but does not appear to be widely distributed or recognized outside Britain.

Stone & Rushton (2003) figured a few pseudisograptid specimens as Arienigraptus gracilis. They show the relatively simple thecal style of Arienigraptus, but a high manubrium and an extremely long sicula. The specimens are here referred to the late Castlemainian (Ca 4) species Pseudisograptus initialis (Maletz 2001).

The genus Maeandrograptus makes a surprising appearance in the Ballantrae Complex. The specimen was described as Tylograptus sp., but the thecal style of the specimen clearly indicates its relationship to Maeandrograptus. Maeandrograptus is known from a number of species in Scandinavia (M. schmalenseet, M. mobergi, M. leptograptoides: Skevington 1965). They show a highly variable stipe width and thecal overlap. In M. leptograptoides the thecal overlap increases distinctly distally (Monsen 1937), and it does so even more in the Ballantrae Maeandrograptus. Similarities can be seen to material described as Paradidiymograptus by Wang (1975) from China, here also referred to Maeandrograptus. Wang’s material shows a strong widening of the stipes along the first few thecae, similar to the specimen figured by Stone & Rushton (2003). Prothecal folds are common in Maeandrograptus, but the expression of these is variable. A relationship of the
Ballantrae specimen to the Darrwilian (Da 1 – Da 3) genus Tylograptus (‘Syn of Holmograptus) cannot be supported. Tylograptus shows a much more complex thecal style with genicular and apertural elaboration, as well as very characteristic shape of prothecal folds (Zhang & Fortey 2001).

Yutagraptus, v-deflexus was indicated to be restricted to the Yapeenian and early Darrwilian by Vandenber & Cooper (1992). However, the species is common in the Isograptus victoriae maximodivergens Biozone of western Newfoundland (Williams & Stevens 1988: identified as Xiphograptus declinatus), extending its range downwards. Thus, it cannot be taken as in indication of a Yapeenian age. The species ranges into the Darrwilian Undulograptus austrodentatus Biozone at least, as it was found in the Bogo Shale of the Trondheim region, Norway (Schmidt-Gundel 1994).

The age

The revision of the faunas described by Stone & Rushton (2003) indicates that all faunal elements are consistent with a Ca 4 age. Main faunal elements of the Yapeenian as Pseudisograptus manubriatus group, Exigraptus/Apiograptus and Oncograptus/Cardiograptus (see Vandenber & Cooper 1992) are not present and the common isograptids can be referred to typical Castlemainian forms. The presence of Pseudisograptus initialis in the fauna may indicate the usefulness of this species to identify the latest Castlemainian. Macandrograptus is found in Scandinavia from the late Bendigonian to the late Castlemainian, with the typical Macandrograptus schmalensei now referred to the Ca 3 (Maletz 2004). The presence of Macandrograptus supports the age determination, especially as the Holmograptus group (including Tylograptus) only appears with Holmograptus bovis in the early Darrwilian Undulograptus austrodentatus Biozone (Maletz 1997; Williams & Stevens 1988).

References


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