A NEW GENUS OF ABROGRAPTID GRAPTOLOITE
FROM THE ORDOVICIAN OF SOUTHERN SCOTLAND

by ISLES STRACHAN

ABSTRACT. The new genus and species, *Metabrograptus scoticus*, of the family Abrograptidae is described from the Upper Ordovician (Glenkiln Shales) of southern Scotland. The new genus bears the same relationship to *Abrograptus* as *Dicranograpthus* bears to *Dicellograpthus*. The recognition of this further type in the family perhaps adds some weight to Finney’s (1980) reference of *Reteograpthus* to the Abrograptidae. Although there are problems of homologizing stipe structure, it is clear that the biserial retiolitoid condition in Ordovician forms can be derived in more than one way.

The Family Abrograptidae was erected in 1958 by Mu to accommodate his new genus *Abrograptus* and *Dinamagrapthus* Kozłowski, 1951. The family was characterized by the extreme reduction of periderm in forms with a modified dichograptid type of development and, in conformity with his views on trends in the evolution of graptolites, the family was seen as a different line from the Retiolitidae, although similarities with *Reteograpthus* were noted. In particular, Mu (1958, p. 265) mentioned that the ‘split specimen referred to *Reteograpthus geinitzianus* Hall by Elles and Wood (1908, p. 316, fig. 209c) resembles closely *Abrograptus* in general aspect’.

This specimen (BU1336b) is on a card from the Lapworth Collection with two other specimens. One of these (BU1336a) was figured by Elles and Wood (1908, pl. 34, fig. 7d) as ‘part of ventral lattice’ of *R. geinitzianus*, and the third specimen (BU1336c) I presumed was the counterpart of the first. When I had them photographed recently, however, it was clear that this was a second specimen with the stipes united proximally. The card is labelled in Lapworth’s writing as *Clathrograptus cuneiformis*.

In his detailed description and revision of Hall’s *Reteograpthus geinitzianus*, Finney (1980) pointed out the differences between *Reteograpthus* and the other members of the subfamily Archiretiolithinae, in particular the simple clathrial framework and sicular details in *Reteograpthus* which are very similar to those of *Abrograptus*. He therefore transferred the genus to the Abrograptidae which he emended to include biserial forms.

The genera *Parabrograptus* Mu and Qiao, 1962 (with a pair of threads from the sicular apex forming a third ‘branch’) and *Protobrograptus* Ni, 1981 (with the siculo lying along one stipe) have been added to the family, the former genus being also recorded from Canada (Jackson 1966). Mu and Qiao (1962) also described another new genus, *Jianshanites*, which has single filaments like *Dinamagrapthus* but which shows branching. Its siculo is much stouter than in other genera of Abrograptidae.

In the absence of fusellar details of the proximal end, it is difficult to decide on the developmental type present. Kozłowski (1951) regarded *Dinamagrapthus* as having dichograptid development in keeping with its simple structure and Arenig age. Mu and Qiao (1962) have added a second species, *D. sinicus*, which is of Caradocian age (*N. gracilis* zone), associated with *Abrograptus*. In their description of *Parabrograptus*, from the same horizon, they mention the occurrence of ‘an additional oblique filament in the crossing canal region’ which possibly indicates the presence of a second crossing canal as in isograptid or leptograptid development. The third ‘branch’ could then be interpreted as similar to that seen in a number of specimens of *Leptograpthus* (centribachiate

forms of Elles and Wood 1903, pls 14 and 15). Protabrograptus could similarly be interpreted as showing the position of the sicula seen in Dicellograptus exilis Elles and Wood (Strachan 1986). Finney regards Reteograptus as having isogaptid development since he recognizes two crossing canals but notes that 'it is peculiar because all proximal thecae grow upward' (Finney 1980). In the absence of fusellar structure, it would, I think, be difficult to prove that th₂₁ was derived from th₁₁ rather than th₂₁, i.e. that the development was isogaptid rather than diplogaptid or dicellograptid. Unfortunately, not enough is known about the development in various Dicellograptus and Dicranograptus to know how they relate to the diplogaptid story.

There is a further problem with Finney's (1980) placing of Reteograptus in the Abrograptidae. This relates to the nature of the lists of the stipes. Finney calls them ventral lists in Abrograptus but Bulman (1970) regarded them as dorsal, although lateral might be the best term since they are paired on each theca. At any rate, they are simple straight or slightly curved structures with the apertural loops separating off each section of the stipe. In R. geinitzianus, the ventral lists of Finney are curved or angular structures which are clearly not strictly ventral since the apertural loops occur in the middle of each curved list. The upper part of the curve, above the aperture, is a cross structure between the aperture and the succeeding transverse list, while the lower part below the aperture represents the lateral boundary between the thecae. This is clearly seen in his figure of the lectotype (Finney 1980, fig. 12c) where the thecal outline is preserved. It is therefore difficult to homologize the list structure in Abrograptus and Reteograptus.

The specimen figured by Elles and Wood (1908, p. 316, fig. 209c) shows the stipe characters of Abrograptus and cannot easily be regarded as a broken specimen of Reteograptus since there is no trace of the transverse or septal lists. Their illustration of this specimen unfortunately does not show the position of the sicula. In Abrograptus the sicula projects above the line of the stipes as in Dicellograptus but another specimen in the Lapworth Collection shows a proximal end with the sicula in the lower half exactly as in Dicranograptus irregularis Hadding where the biserial portion consists of only two or three pairs of thecae (Strachan 1986).

While checking through the collections of the British Geological Survey in Edinburgh, I was shown a partially exposed fragment identified as R. geinitzianus which matched the one on the Monograph plate. At my suggestion some matrix was removed by Peter Brand and a second stipe was revealed with the proximal end like a dicranogaptid. We thus have four specimens showing this character and it seems reasonable to consider them as a new genus of Abrograptidae paralleling Dicranograptus in the Dicranograptidae.

SYSTEMATIC PALAEONTOLOGY

Specimens numbered BU are housed in the School of Earth Sciences, University of Birmingham, the GSE specimen is in the British Geological Survey, Murchison House, Edinburgh.

Genus Metabrograptus gen. nov.

Diagnosis. Rhabdosome small, represented only by clathrial framework of a biserial proximal part (of 4 or more thecae in the type species) and two uniserial stipes diverging at 80 to 110°; sicula sclerotized normally.

Type species. Metabrograptus scoticus gen. et sp. nov.

Derivation of name. Meta (Greek – with) and Abrograptus as other new genera in the family bear Greek prefixes. The specific epithet indicates the country of origin.

Stratigraphical age and distribution. Upper Ordovician, Glenkiln Shales, probably Nemagraptus gracilis Zone, latest Llandeiloian – earliest Caradocian, from the south of Scotland.
**Remarks.** This genus bears the same relation to *Abrograptus* as *Dicranograptus* does to *Dicellograptus*, that is, *Metabrograptus* has a short biserial portion whereas *Abrograptus* does not.

*Metabrograptus scoticus* gen. et sp. nov.

Text-fig. 1a–d, f

v 1908 *Reteograptus Geinitzianus* Hall; Elles and Wood (pars), p. 316, pl. 34, fig. 7d, fig. 209c.

**Diagnosis.** As for genus.

![Diagram](image)

**Text-fig. 1. A–D, F, Metabrograptus scoticus* gen. et sp. nov.; A, holotype, BU1336b; B, BU1336c; C, GSE14649; D, BU2150a; F, reconstruction of proximal end. E. *Reteograptus geinitzianus* Hall. Young growth stage, redrawn from Finney 1980, fig. 16i. All figures approximately ×5, except f which is ×8.

**Types.** Holotype, BU1336b, figured Elles and Wood, 1908, p. 316, fig. 209c. Glenkiln Shales, Birnock. Paratypes, BU1336c, same locality and horizon as holotype; BU2150a, b, locality unknown, Glenkiln Shales; GSE14649, Glenkiln Shales, Portlogan.

**Description.** The rhabdosome is quite small, the length of the biserial portion being 1–0 to 1.5 mm, and the stipes up to 8 mm long. The sicula appears to be normally sclerotized but details of the proximal end are poor in all specimens although they can be matched to some extent with Finney's (1980) figures of young stages of *Reteograptus* which supports its interpretation as biserial. The sicula is about 0.4 mm long. There is no distinct trace of a separate nema. The stout thread from the apex of the sicula forms part of the clathrial framework and ends at the level of the axil. A single strand from about the aperture of the sicula apparently represents the ventral line of the first theca and passes into an apertural loop. A second shorter strand connects the loop to the apex of the sicula. Above the loop, there are a pair of threads marking the lateral walls of th2. On the opposite side of the sicula, a thread arising a short distance above the sicular aperture represents the ventral wall of the second theca and its apertural loop is connected on the obverse side by a short thread to the 'nema' and on the reverse side by a longer oblique thread to the centre of the axil. Above the loop there are again a pair of threads marking the walls of th2.

The uniserial stipes consist of a pair of longitudinal threads divided into curved segments with apertural loops (appearing mainly as cross-bars) between the segments. The largest specimen has nine thecae on one of the stipes. The thecal spacing is 9–10 per cm. The stipes diverge at 80–110° from a broad axil which is clearly defined by paired threads in all specimens, thus differing from *Abrograptus* and *Parabrograptus* where there is only a single thread. The breadth of the axil varies from 1.4–1.6 mm, the narrower axil of BU1336c (1.1 mm) being due to oblique compression.

**Remarks.** Although the biserial part is badly preserved in the specimens available, comparison with Finney's (1980) growth stages of *Reteograptus* shows some strong similarities. A basic pattern of
four unequal meshes seems likely, ending in a pair of threads forming the axil which in one specimen at least can be divided into three subsections. The position of the thecal apertures is obscure but it is likely that the second pair of apertures is at the base of the uniserial stipes. An attempted reconstruction is given but much of it is speculative.

The curvature of the thecal lists shown in BU2150 is only hinted at in the Chinese figures of abrogaptids which mainly show what are scalariform views of the stipes with the apertural lists appearing as cross bars. Similar views are seen in the Birnock specimens. The Portaslogan example appears to be very heavily sclerotized although fragmentary but shows the same sort of contrast with the other specimens as is shown by Finney's old and young growth stages of Retegrapthus (Finney 1980, cf. figs 13r and 16).

The four specimens appear to be conspecific although they are from different localities. They are all clearly abrogaptid in their uniserial stipe characters and distinct from previously described forms in the stout proximal end. Thus a new generic name is justified since the difference is paralleled in the Dicranogaptidae. Whether the Abrogaptidae should include fully biserial forms as Finney has advocated remains I think open to question. While the proximal clathrial structure which he has demonstrated in Retegrapthus agrees well with that in Abrogaptus, there is the problem that functionally when the periderm is reduced to a simple series of lists there is little scope for variation if the lists have a supporting function.

Associated fauna. The Birnock specimens are associated with a young specimen of Cryptograptus tricornis (Carruthers) and a slender stipe probably of Nemagrapthus. The other Lapworth specimen, which is labelled Coenograpthus (Nema.) perienius, has slender stipes presumably of this form as well as Orthograptus cf. apiculatus Elles and Wood, Dicellograpthus exilis Elles and Wood, Hallograpthus cf. mucronatus (Hall) and Corynoides calcularis Nicholson, indicating a horizon in the Glenkiln Shales.

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REFERENCES


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