

THE OLDEST LAND ANIMALS: SILURIAN MILLIPEDES FROM SCOTLANDPaul Selden¹ & Helen Read²

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When the record for the oldest known terrestrial animals in the world gets broken you would expect an announcement to be splashed across the front pages of natural history magazines, or at least appear in one of the prestigious journals Nature or Science. Instead, when the record for the oldest land animals was pushed back by a few million years in 2004, it appeared buried in the pages of the Journal of Paleontology in a paper describing a collection of new fossil millipedes (Wilson & Anderson 2004).

For most of the last century, the oldest recorded land animals were arachnids and other arthropods from the celebrated locality at Rhynie, Aberdeenshire, in rocks dated to around 400 million years old (early Devonian). These had been discovered by palaeobotanists in the 1920s who were describing the then earliest known land plants beautifully preserved in the translucent flint-like chert rock which cropped out in a field close to this small village. Whilst some of the Rhynie arachnids are strikingly modern (e.g. mites), others belong to extinct groups (e.g. trigonotarbid). Their book-lungs are preserved in great detail, which proves their terrestrial lifestyle. No myriapods were known from Rhynie, however, until fairly recently (Anderson & Trewin 2003).

In 1990, new terrestrial arthropods were described from Ludlow, Shropshire, in rocks of late Silurian age (approx. 419 million years old) by Jeram *et al.* (1990). These included trigonotarbid arachnids and myriapods. These became the oldest known terrestrial animals and pushed the record back, by about 20 million years, for the first time since the 1920s.

Myriapod fossils were known to occur in rocks exposed at Cowie Harbour, near Stonehaven, also in Aberdeenshire; however, the preservation of the fossils was poor and the age of the strata was considered to be younger than those in Shropshire. More recently, new and better preserved specimens have turned up and, coupled with this, the age of the Stonehaven beds has now been determined more precisely using fossil spores as middle Silurian (about 423 million years old).

The millipedes at Stonehaven consist of three genera, all belonging to the extinct superorder Archipolypoda within the subclass Chilognatha. Wilson & Anderson (2004) erected the genus *Cowiedesmus* (named after Cowie Harbour), which forms the type and only genus of a new family, Cowiedesmidae, belonging to the new order Cowiedesmida. Many millipede orders can be distinguished by which leg is modified in some way, e.g. as gonopods; in Cowiedesmida it appears to be the posterior leg of trunk segment 8. The monotypic species *Cowiedesmus eroticopodus* (“erotic leg”) derives its name from the male gonopods which are preserved in the fossil. Only the anterior part of the animal is preserved, from the head to trunk segment 10.

The other two fossils from Cowie Harbour do not have modified appendages preserved so could not be placed in any order. *Albadesmus almondi* was named after the gaelic name for Scotland: Alba, and in honour of John Almond who did much unpublished description of these fossils for his PhD thesis. The nearly twenty preserved trunk segments of *Albadesmus* show a tuberculate ornament on the tergites and paranota; paramedian pores can also be seen on some segments.

Although only known from a trunk section of six segments with tuberculate tergites, *Pneumodesmus* is a most interesting fossil because spiracles can be seen on the lateral parts of the sternites. These spiracles are direct evidence of air breathing, and represent the oldest evidence of a terrestrial animal. The monotypic species *Pneumodesmus newmani* was named in honour of its collector, Michael Newman, a local amateur palaeontologist who found the specimen while hunting for fossil fish.



Figure 1: Reconstruction of *Pneumodesmus newmani* at the National Museum of Scotland, Edinburgh. Photo: Stonehaven Fossil Group

The holotype of *Pneumodesmus newmani* is kept in the National Museum of Scotland, Edinburgh, but a reconstruction of it (Figure 1) has become the highlight of an exhibition at the Tolbooth Museum in Stonehaven. The exhibition was prepared by the Stonehaven Fossil Group to raise awareness of the geology of the area, and the 30 cm model millipede, made by Stephen Caine of New Aberdour, takes pride of place. The model helps to give visitors a better idea of what the animal would have looked like and allows the details of it to be seen more clearly. As well as the main exhibit there is a smaller mobile exhibition which visits schools and local groups, and an information board has also been set up outside at Cowie. The Tolbooth Museum, Stonehaven, is open afternoons (except Tuesdays) between 1 May and 31 October.

ACKNOWLEDGEMENTS

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REFERENCES

- Anderson, L. I. & Trewin, N. H. (2003) An Early Devonian arthropod fauna from the Windyfield chert, Aberdeenshire, Scotland. *Palaeontology* **46**: 467–510.
- Jeram, A. J., Selden, P. A. & Edwards, D. (1990) Land animals in the Silurian: arachnids and myriapods from Shropshire, England. *Science* **250**: 658–666.
- Wilson, H. M. & Anderson, L. I. (2004) Morphology and Taxonomy of Paleozoic millipedes (Diplopoda: Chilognatha: Archipolypoda) from Scotland. *Journal of Paleontology* **78**: 169–184.