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Ten years of geology in Shropshire

Peter Toghill[1]

TOGHILL, P. (1990). Ten years of geology in Shropshire. *Proceedings of the Shropshire Geological Society*, **9**, 1–3. Summary of a talk to mark ten years of the Shropshire Geological Society's existence, by describing how the Society had been formed in the late seventies.

[1]*affiliation: one of the Society's founders and Vice-President, in October 1989*

ORIGINS

The talk began by describing how the Society had been formed in the late seventies. Interest in the subject generated by extramural classes which the author had run in Shrewsbury led to a field work project in the Shelve area funded by the NCC and subsequently to the idea of a Geological Society.

The first field meeting was held in the summer of 1979 with an inaugural meeting in September of that year. The author mentioned several very active founder members and showed slides of early field meetings; in particular a slide of a meeting at the Ludlow Anticline with John Norton who had become Honorary Curator for the Society. Dr Toghill paid tribute to John's work and expressed the Society's pleasure to learn that he was making a steady recovery after his recent heart attack.

GEOLOGICAL UNDERSTANDING

Turning to consider changes in the understanding of geology in the County over the last ten years, the author first discussed the stratigraphical boundary between the Precambrian and Cambrian, especially as shown in the Wrekin-Ercall Quarry. His slides showed Ercall Granophyre intruded into Uriconian Volcanics with both being overlain unconformably by the Wrekin Quartzite. The quartzite is Cambrian and includes acritarchs and other microfossils. As a result of detailed work on stratigraphical measurements, thin sections and absolute dating techniques, a consensus of opinion considers that the boundary is unconformable, even though there are few pebbles of the granophyre in the quartzite. Absolute dating on the volcanics and on the granophyre give 558 ± 16 Ma and 533 ± 13 Ma respectively.

As the base of the Cambrian is usually taken to be 570 Ma this places all these rocks in the Cambrian. However the volcanics and granophyre have hitherto always been considered to be Precambrian. Thus three options are available:

1. The absolute dates are wrong. This is not inconceivable as there are still problems with absolute dating.
2. The dates are right and there was igneous and volcanic activity in the Cambrian. This is a novel approach but there is no intrinsic reason why it should not be correct.
3. The base of the Cambrian should be moved to a younger date e.g. about 550 Ma.

This is an unresolved problem with Shropshire holding one of the key sites for its solution. The author favoured the third option.

He then brought attention to a second topic: work being done on the absolute dating of Ordovician and Silurian sediments through the study of "bentonites". These fossil ash bands contain minerals which are useful for radiometric dating and work on zircon in particular is promising. As the type sections for some of the Silurian series are in Shropshire it is important to be able to fix an absolute date on them.

The author's third topic for consideration was the recent work which has been done on the Church Stretton Fault and Pontesford-Linley Fault. It is now considered that these major fault zones have probably been the site of tens of kilometres of lateral movement as well as some vertical movement. The latter is shown by the presence of Silurian sediments in the Church Stretton Valley. The Precambrian Longmynd sedimentary sequence could be an exotic terrane separated, laterally, from any similar type of sequence. This terrane concept could also apply to parts of the Shelve Ordovician sequence. The Pontesford-Linley is considered to be more significant than the Church Stretton Fault and is described as a

lineament by Dr. Nigel Woodcock, who has recognised it in many places as a disturbance in sedimentary sequence or a change in facies rather than as a fault.

The author then considered a palaeogeographical topic: namely the Iapetus Ocean which has had a huge amount of work done in the 1980s.

It is accepted that Iapetus existed in the Ordovician and Silurian but when did it form? There are suggestions that in the late Precambrian it was formed by the splitting apart of the Baltic area from Scotland and Northern Ireland. The Durness Limestone was formed under tropical conditions in Cambrian times when England and Wales are thought to have been near Antarctica, attached to Gondwana.

In Tremadoc (latest Cambrian) times Gondwanaland is thought to have moved northwards towards Baltica. In early Ordovician (Arenig) times the Rheic Ocean opened and separated England & Wales, and S.E. Newfoundland from Gondwanaland. This landmass is known as Avalonia and, as a small micro continent, moved northwards during the Ordovician towards Baltica; thus Iapetus slowly closed.

At the end of the Ordovician Avalonia collided with Baltica and the whole landmass moved northwards towards Laurentia causing the Iapetus Ocean to come quite narrow – perhaps like the Mediterranean today – by Silurian times.

The climax of the Caledonian orogeny has been considered to be an end-Silurian event which is true in Scotland but not in southern Britain, e.g. Shropshire. On the southern side of the ocean the closing of Iapetus caused considerable volcanicity but little folding during the early and middle Ordovician. In Shropshire there was no folding until the end of the Ordovician when the Taconican orogeny formed the Shelve Anticline and Rytton Castle Syncline; late Ordovician rocks are absent. In Shropshire this is the most important period of earth movement between the Cambrian and Devonian. The Taconian orogeny in fact refers to a North American event which occurred the other side of the major ocean of the Iapetus. The author suggests that these Shropshire movements be called the Shelveian orogeny, occurring in Ashgill times. Folding was accompanied by late stage intrusions such as the Corndon dolerite, Squilver dolerite, and intrusions in Shelve and Breiddens. This Shelvian orogeny caused a major unconformity at the base of the Silurian in Shropshire, with considerable erosion before the deposition of the Llandovery sediments which overlie the Ordovician, Cambrian and Precambrian rocks. There was no tectonic event at the end of the Silurian in Shropshire - in fact no break in Shropshire sediments until the end of the lower Devonian, which was caused by suturing of Avalonia and Baltica with Laurentia.

There were faunal breaks – discordance – but no major break between Cambrian and Ordovician. The first major break is at the end of the Ordovician and then there is no break until the middle Devonian. On Brown Clee Carboniferous Coal Measures rest on Lower Devonian; on Titterstone Upper ORS rests on Lower ORS – all the middle ORS is missing due to the Acadian orogeny. *[The American term is accepted here as it refers to the same land mass.]* Thus the Caledonian Orogeny in Shropshire is two events: the Shelveian and the Acadian. Dating of Shap Granite gives 393 ± 3 Ma as an absolute date for final suture of Laurentia with southern Britain.

Turning to palaeontology, the author remarked that 1989 is the 150th anniversary of Murchison's *'Silurian System'* in which the Downton Series was included in the Silurian (where it has now been reinstated). A plaque has been put up at Ludford Corner to commemorate Murchison. Various new fossils have been found: new trilobite species from the Wenlock Shales on the new Ironbridge by-pass; new fish and plant remains from the ORS at Morville; and, last year, the construction of the Prees by-pass through the Middle Lias - the youngest bedrock in Shropshire.

The author referred to Darwin's contention that fossilisation is a rare process and our understanding will be improved as more fossils are found. However, much of our knowledge rests on the chance discovery of single specimens and is therefore very incomplete. This is particularly well shown by the discovery of a single claw which is our only evidence of the early Cretaceous dinosaur, *Baryonx walkeri*, and also the Grinshill footprints which, up until 1969, were the only evidence for the reptile *Chirotherium*. Thus Dr Toghill came to the Condover mammoths and described in detail how the discovery depended on the chance observation and alertness of Eve Roberts who is not a geologist and he urged members to be observant.

CONCLUDING REMARKS

In conclusion Dr Toghill said that his selection of topics was by no means exhaustive and he hoped that the Society would continue to thrive over the next ten years as it had done over the last.

ACKNOWLEDGEMENTS

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