

# TW:eed



## Tetrapod World: early evolution & diversification

### Newsletter No. 12, June, 2016

#### April fieldwork

In April, team members from the Universities of Leicester, Southampton, Edinburgh and Cambridge and the British Geological Survey in Edinburgh spent several days in the field, mostly at Burnmouth.

Emma Reeves, John Marshall and Carys Bennett were re-sampling some difficult, fine-grained sediments to study the plant spores they contain, and Carys was also looking for ostracods, bivalves and burrows.



Carys , surrounded by a lot of kelp! © Carys Bennett

Sarah Davies and Tim Kearsey were studying the complex sandstone units, and Tim Smithson and Tom Challands discovered some marvellous fish fossils which are now being studied at the Universities of Edinburgh and Cambridge.



A very low tide at Burnmouth. © Tim Smithson

They also investigated classic Ballagan Formation exposures at Pease Bay and Foulden, the latter being very hard to access, on a steep slope and overgrown with thorn trees, and Tim Smithson visited a new site on the banks of the River Tweed near Coldstream.

#### May Fieldwork

In May, Jenny and Rob Clack returned to the Borders for further fieldwork having not been free to go in April.

The first couple of days were spent exploring some small exposures of Ballagan Formation rocks on the north side of the Solway Firth. These proved somewhat disappointing, although a few impressions of fossils were found. At one of the sites it was clear there had been some volcanic activity and the rocks were extensively folded.



Solway Firth folded bedding. © Rob Clack



Stigmaria root impression. © Rob Clack

From there, they went to the Isle of Bute, to look for fossil fish. Elsa Henderson is a self-taught geologist who had found some fish fossils some years ago. These had been worked on at Bristol University. Elsa showed Jenny and



Bute fossil fish exposure. © Rob Clack

Rob her excellent photographs of the specimens and also took them to see where the fossils had come from. They were able to collect some fossil fish for themselves, and these are currently being studied at the Universities of Oxford and Cambridge.

The trip had been timed to coincide with some very low tides at Burnmouth on the east coast, and they were fortunate with the weather, which was warm and calm, with a high pressure system over the area. This meant the tides were further out than they had ever seen them before, exposing the target beds for much longer than usual.



Composite photo of Burnmouth. © Rob Clack

They met up with a volunteer who lives not far away, Kevin Bartlett, who had been a student at Newcastle University when Jenny was doing her PhD there. It was good to meet him, and they did some useful work there.

Rob flew a drone over the area to the north of the harbour, using a mapping app that runs on his phone to take a set of photographs with enough overlap to permit 3D modelling of the rocks. On this occasion the resolution was not really fine enough to be useful, and in any case, the amount of seaweed obscuring the rocks was excessive. He plans to come back in March next year, when there should be much less seaweed, by which time he hopes to have resolved the issue of the resolution of the photographs.

### NMS Arthropods Conference

At the end of April, National Museums Scotland hosted the 7th International Conference on Fossil Insects, Arthropods and Amber. Over 100 delegates attended from 25 different countries, including Australia and New Zealand. Andrew Ross gave a keynote lecture on the Palaeozoic Terrestrial Arthropods of Scotland including the millipedes and scorpions currently being studied for the Tw:eed project. There were two days of field-trips, including visiting Chirnside and Burnmouth, and a new millipede fossil was found at Burnmouth. A paper is being prepared for the conference proceedings volume due to be published in the Transactions of the Royal Society of Edinburgh.



Arthropods Conference field trip. © Yves Candela

### Carys Bennett et al, Early Mississippian Sandy Siltstones paper, 2016

In March 2016, Carys Bennett, Tim Kearsy, Sarah Davies, Dave Millward, Jenny Clack, Tim Smithson and John Marshall published a paper in the journal Sedimentology. The paper describes unique deposits containing tetrapods from Scotland, investigating why these particular successions preserve such abundant fossil evidence of the early terrestrial ecosystems. The study describes a particular type of sedimentary rock, sandy siltstones, as sites of tetrapod fossil preservation. You can read the abstract [here](#), and a laymans summary [here](#).

### Tim Kearsy et al, Terrestrial Landscapes paper, 2016

In early June, Tim Kearsy, Carys Bennett, David Millward, Sarah Davies, Mel Leng and John Marshall published a paper in the journal Palaeogeography, Palaeoclimatology, Palaeoecology. Subscribers to the journal can read the whole paper [here](#), while the rest of us will have to make do with the Abstract. You can read a short summary intended for the layman, on the project website [here](#).

### Project Exhibition at the NMS in Edinburgh

Our exhibition at the NMS in Edinburgh has been a great success, with over 37,000 visitors so far. There's still time to go, as it will stay open until 14<sup>th</sup> August. And it's free to enter, of course.

### Futures

- Jenny Clack will give a talk called 'Morphological Innovations in the earliest post-Devonian Tetrapods' at the International Congress of Vertebrate Morphology in early July and will then give a similar talk at the European Association of Vertebrate Palaeontology meeting in Haarlem in the Netherlands the following week.
- In late July, Sarah Davies, Carys Bennett, Dave Millward and Tim Kearsy will visit Nova Scotia, working with local expert Martin Gibling, comparing Tournaisian sediments there with those in Scotland.
- Tim Smithson will join Jenny in Haarlem and give a talk entitled 'Predicting the likely location of new early tetrapod sites: lessons from recent discoveries in Romer's Gap'. Many members of the TW:eed Team have contributed to it and the presentation will attempt to bring together what we have learned about the sedimentology, the environment and the distribution of the fossils in the Ballagan Formation in the Borders and how this may help us find new sites in the future.
- In August Tim is hoping to give a talk at the annual Symposium of Vertebrate Palaeontology and Comparative Anatomy being held in Liverpool this year on further discoveries of lungfish at Burnmouth. This presentation, co-authored with Tom Challands and other members of the team, will include some of the new material they collected in April.