Tetrapod World: early evolution and diversification (TW:eed) Project fieldwork: Consolidation of damp specimens for transportation using Primal WS - 2 4 and fabric bandages as field jackets

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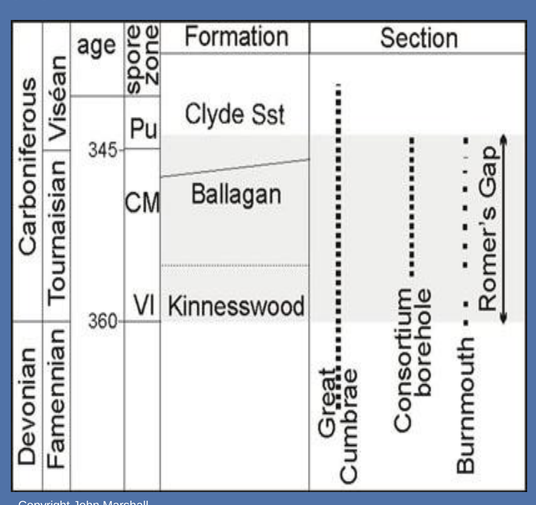
'One is accustomed these days to hear of sensational new fossil finds being made in [other] parts of the world. But to learn of a site in this country which must surely be counted among the most extensively explored, in geological terms is wonderful and exciting.'
Sir David Attenborough

The TW:eed Project (Tetrapod World: early evolution and diversification) is funded by the UK Natural Environment research Council (NERC). It is a major collaborative study of fossils and environments from the earliest Carboniferous (360-345 million years ago) when tetrapods (limbed vertebrates) were beginning to move from water onto land. Until recently little was known about this process due to a 15 million year period known as Romer's Gap from which very few tetrapod fossils had previously been found.

http://tetrapods.org/
http://www.nms.ac.uk/national-museum-of-scotland/whats-on/fossil-hunters/

Recently, a number of sites that fall neatly into Romer's Gap were found in Northumberland and the Borders Region of Scotland. The team has collected a wealth of fossils from many of these outcrops. These are not limited to tetrapods, but also include fishes, plants and arthropods. One of the sites was in the bed of the Whiteadder River near Chirnside and last summer a major excavation was undertaken as part of the TW:eed project..



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Part of the Whiteadder River was dammed and pumped out to allow access to the fossiliferous beds. Sedimentary logs, photographs, and a 3D laser scan of the dig site were conducted during all phases of the excavation. Jackhammers were used to clear the overlying sediments and to pry out large blocks of the fossiliferous. Hammers and chisels were used to split smaller pieces of rock and fossils thus exposed were consolidated. Some of the slabs from the potentially most significant areas were collected, wrapped and transported back to the museum as a whole to be examined and prepared in the lab rather than risk breaking them in situ. Smaller specimens were wrapped, given field numbers and packed into plastic crates.

Process used to build the jacket in the field:

•On extracting blocks of fossiliferous sediment from the river bed the matrix started to dry out very quickly. It was essential to consolidate the blocks immediately to prevent the fossils from crumbling. Primal WS24 (an acrylic copolymer colloidal diluted 10 to 15 parts water to one part liquid adhesive as supplied) was used to arrest disintegration.

•Fragile specimens were protected for transportation using the following procedure pictured above (1-9).

•The piece was initially consolidated with the adhesive, and then wrapped with bandages to keep all the pieces together. (1-2). Different concentrations of adhesive were used to reinforce the bandages and form jackets to protect the slabs in preparation for transportation to the lab.

•Protruding bones were protected as individual areas (3-5) and then also consolidated with bandages (6-9).

•Bandages rather than conventional jackets were chosen for a variety of reasons. Significantly no chemicals were required and therefore contamination of the trout and salmon river was avoided. Health and safety issues were also mitigated. We were able to recycle bandages which were out of date for medical purposes and it was faster and simpler to use bandaging on the large number of small rock specimens than to construct conventional jackets.

Laboratory Preparation:
When the specimen was dried in the lab, the bandages used as protection jackets were easily removed (1). It is important to use acetone to remove the adhesive which is no longer soluble in water. Peeling off the bandages is quite a straightforward process although has to be done very gently and slow (2) to be allow the acetone to penetrate into the fibre of the bandages (3). The muslin part of the bandage (4) has been used as separator between the matrix/fossil and the bandage. Some rock matrix is removed when the peel is removed too soon (5)

Materials used: Bandages, Primal WS24 (acrylic copolymer colloidal diluted 10 to 15 parts water to one part liquid adhesive as supplied). Primal (Rhoplex) WS24 - An acrylic colloidal dispersion in water. With a small particle size (approx 0.03 microns) for consolidating plaster, wall paintings, bones and material from archaeological sites. pH 7, solids content 36%, minimum film formation temperature less than 10ºF. WS24. It is not freeze- thaw stable but is an alkali re-dispersible.

Consolidated using different concentrations of the adhesive and reinforced with old bandages.

In the lab: bandages easily removed with acetone. Paraloid B72 at 10/90 w/w in acetone was used as an adhesive to consolidate the material after removal of the bandage. of the bandage
Acid-free paper, Plastazote® foam and bubble wrap were used to give extra protection and padding to the very important material for transportation.
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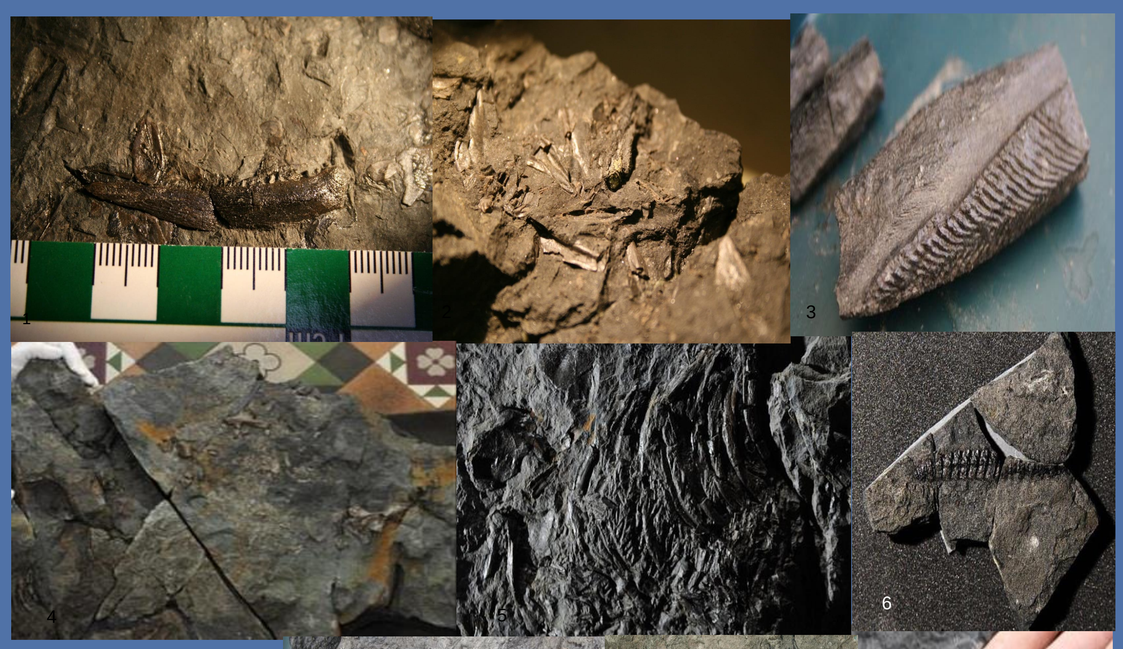
The specimens we have prepared so far include various tetrapod bones, plant fossils and a scorpion.
There are still nearly 1000 specimens to prepare.



•1. Lower jaw of a vertebrate
•2. Bone material
•3. Gyrocanth spine
•4. The tetrapod informally known as "Ribbo" tetrapod
•5. Close up of the prominent ribs of "Ribbo"
•6. Millipede
•7. Scales of a rhizodont fish
•8. Scorpion
•9. Tetrapod phalanx
•10-12 Plants