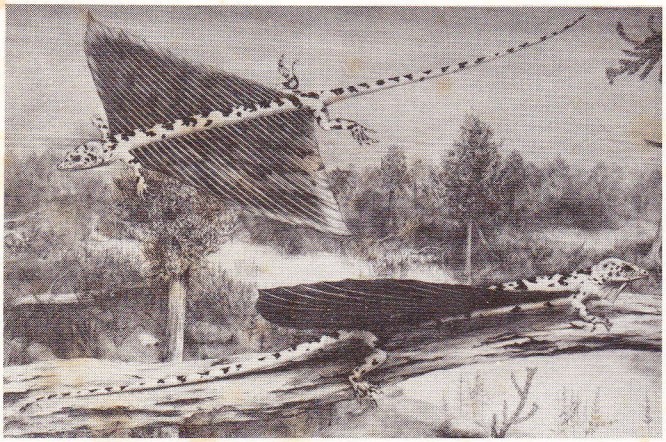
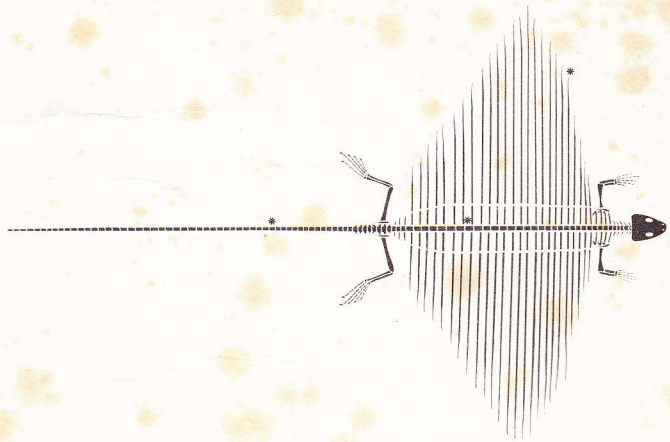
Tyne and Wear County Council Museums Service

The Hetton Gliding Reptile

Information Sheet



A reconstruction of ***Weigeltisaurus*** as it might have appeared in its habitat amongst the coastal vegetation of the Zechstein Sea. (Reconstruction by David Green based on research by Dr. Susan Evans).



A skeletal restoration of ***Weigeltisaurus*** with the elongated and jointed ribs fully extended. Restoration by Dr. Susan Evans.

In 1978 the skeleton of an unusual 240 million year old fossil reptile was discovered near Hetton-le-Hole in Tyne and Wear. The skeleton shows adaptations which probably enabled the living animal to glide from the trees in which it lived. An identical reptile, represented by three specimens, has been discovered in Germany. Three other specimens, representing a reptile closely related to the European species, have been found in rocks of about the same age in Madagascar. Together these reptiles of Upper Permian age represent the oldest known vertebrate animals capable of gliding flight. The Hetton specimen is on public display in Sunderland Museum.

The reptile's story

Approximately 240 million years ago, during the Permian Period, much of north-eastern England was submerged beneath the tropical Zechstein Sea. The coastline was probably situated to the west where the Pennines are today. Inland, and over much of Britain, under the influence of a hot semi-arid climate, desert conditions prevailed. it was only near the coast of the Zechstein Sea that a few plants, including some small coniferous trees, managed to grow. Amongst this sparse coastal vegetation several different kinds of small reptile lived. One species, no more than about 50 cm long, was very unusual in possessing two sets of enormously elongated ribs supporting two folds of skin. As the animal foraged amongst the vegetation for insects the ribs were folded back out of the way against the sides of its body. Sometimes, however, it would climb to the top of one of the conifer trees and extend its skin covered ribs to form primitive 'wings'. To become airborne it simply launched itself from the tree in a directed glide to a new feeding area.

Occasionally some of the reptiles accidentally fell into the Zechstein Sea. One such animal drifted a considerable distance from the shoreline until it eventually became waterlogged and sank to the sea bed. There the flesh rotted away but the skeleton was slowly buried in soft clay.

The clay remained hidden beneath newer rocks long after the Zechstein Sea had ceased to exist. Some 240 million years later, on the evening of the 11th July 1978, the reptile was discovered by Mr. D. Hall and a member of museum staff at Eppleton Quarry near Hetton-le-Hole still embedded in the clay which had entombed and preserved it on the ancient sea bed.

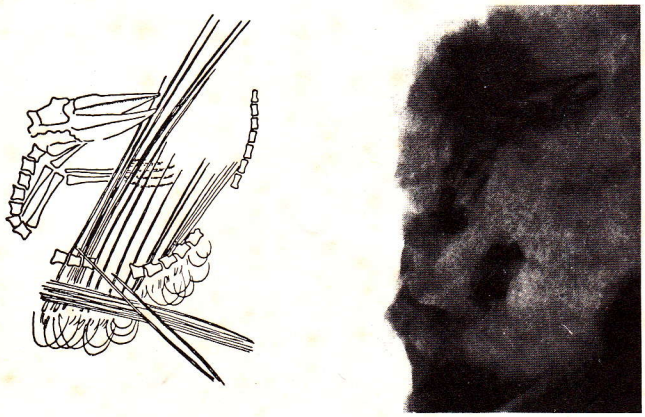
The mainblock of the Hetton specimen of ***Weigeltisaurus.***

Preserved in two parts the skeleton is incomplete; the skull, forelimbs and most of the tail are missing. The elongated ribs which enabled the reptile to glide are particularly well-preserved. These ribs are jointed near their attachment to the vertebrae of the backbone - a feature which is well shown on the right side of the skeleton where the ribs are partially extended. On the left side the ribs are tightly folded against the backbone.

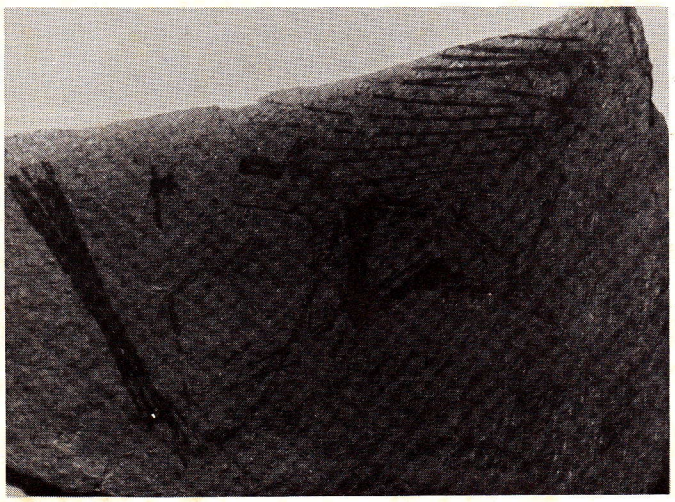
The Mansfeld specimen of ***Weigeltisaurus.***

The German gliding reptiles

So far the reptile from Hetton is the only British example known. The clay in which it was discovered is part of a rock unit called the Marl Slate. This extends beneath the North Sea and into Germany where it has been named the Kupferschiefer (Copper Shale) by German Geologists. The Kupferschiefer has yielded three specimens of gliding reptiles. One of these was discovered in the 19th century at Mansfeld. It features a well-preserved skull but the rest of the skeleton is fragmentary and disarticulated although the forelimbs are preserved. The characteristic elongated ribs show no connection to the rest of the skeleton.



The Wolfsberg specimen of ***Weigeltisaurus.***



The Cornberg specimen of ***Weigeltisaurus.***

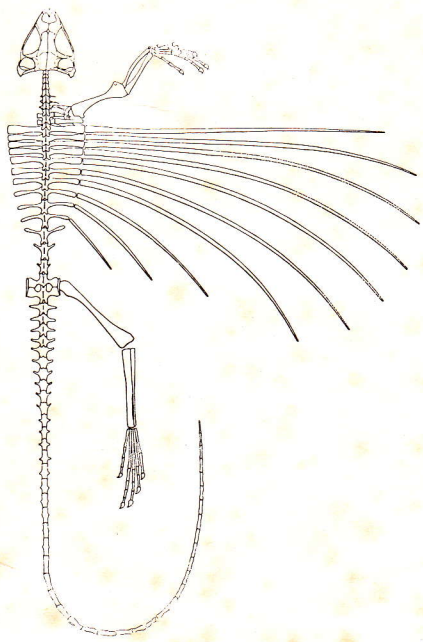
The two other specimens were discovered in the summer of 1975 at Wolfsberg and Cornberg. Although incomplete, both specimens possess elongated ribs but only the Wolfsberg specimen has the skull preserved.

The German and English gliding reptiles are closely similar and occur in rocks of exactly the same age. There is thus little doubt that they represent four examples of the same species. The scientific name ***Weigeltisaurus jaekeli*** was given to the first specimen discovered at Mansfeld. The names are in honour of two German scientists; J. Weigelt, who first published a detailed description of the reptile, and O. Jaekels who purchased it for the geological collections at Greifswald University in East Germany. The two other German specimens, as well as the Hetton reptile are therefore all examples of ***Weigeltisaurus jaekeli.***

The best preserved specimen of ***Coelurosauravus.***

The gliding reptiles from Madagascar

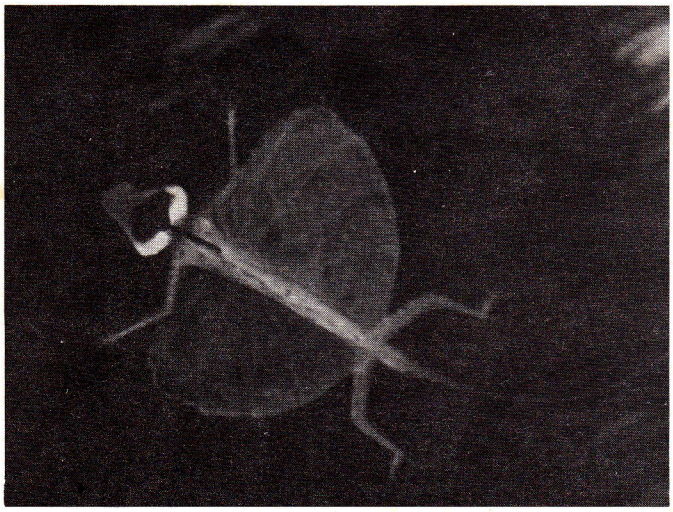
Three incomplete specimens, representing a gliding reptile very similar to the European forms, were collected in the early part of this century from rocks of the Lower Sakamena Formation near Mount Eliva, south-western Madagascar. These represent the single species ***Coelurosauravus elivensis***. The Lower Sakamena Formation is of Upper Permian age which means that ***Coelurosauravus*** lived at approximately the same time as ***Weigeltisaurus***. In spite of the considerable distance between the European and Madagascan reptilian occurrences they are remarkably similar implying a close evolutionary relationship.



Icarosaurus siefkeri. A restoration of a Triassic gliding reptile from New Jersey, America.

Gliding Reptiles of Triassic age

The Permian Period ended approximately 235 million years ago and was followed by the Triassic Period. Fossilized gliding reptiles, showing similar adaptations to the Permian forms, have been discovered in the Triassic rocks of England and America. These are ***Kuehneosaurus*** (from the Mendip Hills, England) and ***Icarosaurus*** (from New Jersey, U.S.A.)



Draco, a modern gliding reptile, in flight in the rain forests of south-east Asia. Photograph by courtesy of John K. MacKinnon.

Draco; a modern gliding reptile

Some idea of the habitat and mode of life of the fossilized gliding reptiles can be gained from looking at ***Draco***; a modern gliding reptile. ***Draco*** is a small lizard with five to seven pairs of elongated ribs which are usually folded but can be spread apart when the animal goes into a glide. Distance of up to 60 metres have been recorded from a starting height of 10 metres. ***Draco*** lives in the rain-forests of Indonesia and feeds on the trunks of the tall trees, hunting for ants. There are no features which indicate that there are ancestor/descendant relationships between the Permian and Triassic gliding reptiles and ***Draco*** but the resemblances provide an interesting example of convergent evolution.

The earliest known aerial vertebrates were reptiles equipped to glide on expanded membranes supported by elongated ribs leaving all four limbs free for landing or running about. These adaptations preceded by about 45 million years the first true flying reptiles (the Pterosaurs including the Pterodactyls) and by about 90 million years the first birds. Thus ***Draco*** shows how, some 240 million years ago, backboned animals such as ***Weigeltisaurus*** first took to the air.