A Survey of the Pennsylvanian Amphibia of the Linton, OH Lagerstatte

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Abstract

The Linton Lagerstatte of southeastern Ohio has been known since the 1800's and figures prominently in our understanding of Pennsylvanian tetrapods at a critical time in Earth history. Our goal is to present up to date faunal and floral lists to stimulate further interest in this highly important site that most professional paleontologists mistakenly believe ceased to exist in the 1920's. This work will be accompanied by following sections reviewing the reptiles, fish, invertebrates and plants found at Linton.

General Locality Information

The Linton Laggerstatte was first recognized in the mid 1800s by John Strong Newberry and other later researchers to preserve a variety of palaeoniscoids, a single species of coelacanth, three species of lungfish and orthacanthid sharks. In addition to the fish, there are a host of amphibian taxa ranging from primitive individuals to large, more derived taxa with some reaching the size of a small crocodile. The limited size of the blocks of cannel mean that most are found as fragments. Arthropods including "estheria" syncarids, uncommon pygocephalomorphs and several distinct millipede genera, including ones not yet reported from the site; are occasionally discovered.

Despite being a cannel coal deposit, which are typically composed of organic plant mater, identifiable plant fossils are rare. Few lycopods are known to have preserved at Linton. Otherwise little is known of Linton's plants. The locality is known to be unforgiving to collectors hoping to find reptile and amphibian fossils as most are exceedingly rare and often far from complete. At present, the locality is privately owned and access is strictly controlled.

Materials and Methods

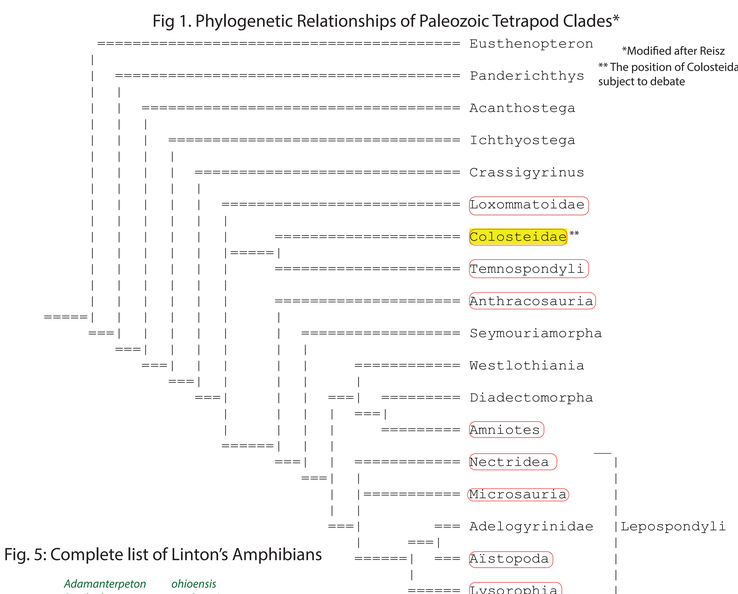
Materials:
The first basis for this research was the work of those scientists who came first. Edward Drinker Cope originally described Linton's Amphibia in 1874. Cope was followed by Romer, Wellstead and later by Hook and Baird. These early surveys were well done but over the years, they have become inaccurate due to taxa being synonymized and new taxa being described. The premise of this research was to gather the resulting lists of taxa from the previous surveys and cross-reference them with museum and private collections to confirm the identity and occurrence of each taxa previously stated. Collections and databases from The Carnegie Museum of Natural History, Field Museum, Yale Peabody Museum, Orton Geological Museum and Cleveland Museum of Natural History along with the Scott McKenzie collection were compared with previously published surveys.

Methods:
Specimens from Linton are collected in blocks of cannel coal. These blocks are then split in bright light using a thin metal tool to reveal the fossils within. Once a fossil is identified it is then cleaned with a soft brush and warm water to reveal the details. Further preparation with a small sized pick and magnification can be done if necessary. In order to make a peel of the fossils, an acid prepation must be done first. Later the fossils can be casted using latex peels.

Collaboration with Amateurs

Over three decades of digging and processing material from Linton was accomplished with the help of several non-professional people who spent long hours digging in hot sun, rain and snow to gather the cannel coal to produce the fossils. This was only the first step, as each block of cannel had to be washed, dried, split and carefully examined under direct sunlight or high wattage lamps. The rare discovery of a good fossil meant stopping the process and cleaning the fossil, transferring parts that did not quite split out and sometimes trimming the fragile slabs. Sharp vision and recognition of faint material (such as the difficult to recognize invertebrates) was part of the task. Some of the people mentioned in the acknowledgements section spent hundreds of hours and together with the authors have split over twelve tons of cannel to date. Most of the cannel held no fossil material, some had general pieces and parts of common organisms and a few held superb examples of unusual material. Some of these non-professionals have today gone on to be professional paleontologists while others maintain an avid interest from an amateur perspective. Science is best served by involving as many interested people as possible, amateur collectors are the foot soldiers of paleontology and they continue to be vital to the exploration of the Linton Lagerstatte.

Fig 1. Phylogenetic Relationships of Paleozoic Tetrapod Clades*



*Modified after Reisz
** The position of Colosteidae is subject to debate

Fig. 5: Complete list of Linton's Amphibians

Adamanterpeton	*ohioensis*
Brachydectes	*newberryi*
Cocytinus	*gyrinoides*
Colosteus	*scutellatus*
Ctenerpeton	*remex*
Diceratosaurus	*brevirostris*
Erpetosaurus	*radiatus*
Eusauropleura	*digitata*
Isodectes	*obtusus*
Leptofractus	*obsoletus*
Limnogyrinus	*edani*
Loxomma	*lintonensis*
Macrerpeton	*huxleyi*
Megalocephalus	*lineolatus*
Molgophis	*macrurus*
Odonterpeton	*triangulare*
Ophiderpeton	*amphiuminum*
Phlegethontia	*linearis*
Platyrhinops	*lyelli*
Pleuroptyx	*clavatus*
Ptyonius	*marshii*
Stegops	*newberryi*
Tuditanus	*punctulatus*

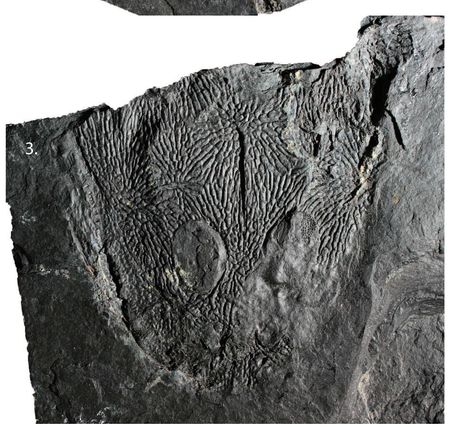


Fig. 2:*Diceratosaurus brevirostris* collected by Scott C. McKenzie
Fig. 3:*Erpetosarus radiatus* collected by John Spina
Fig. 4:*Pleuroptyx clavatus* collected by Scott C. McKenzie
Photos courtesy Andrew Wendruff

Discussion

The former site of the Linton Diamond Coal Mine proves to be an important fossil-bearing locality some ninety years after its closure. In the years since Newberry, nearly fifty different vertebrate species have been confirmed as occurring at the site. Among these are twenty-three genera of amphibians from fifteen different families. This type of early-amphibian diversity is not seen in any other Carboniferous lagerstatte, save for Nyrany of the Czech Republic, and as such it takes a prominent role in our understanding of these important animals. Of the twenty-three amphibian genera confirmed from the site, it was determined that four are found exclusively at Linton: *Adamanterpeton*, *Macrerpeton*, *Odonterpeton*, and *Pleuroptyx*. These four genera are accompanied by seven species that are, at present, not known frrom any other known localities. The species *Adamanterpeton ohioensis*, *Colosteus scutellatus*, *Ctenerpeton remex*, *Loxomma lintonensis*, *Macrerpeton huxleyi* , *Odonterpeton triangulare,* and *Pleuroptyx clavatus* are known only from this locality. It was found that some species previously described from Linton did not actually occur there. It was determined that *Kereterpeton galvani* does not occur at Linton despite previous works stating that it has been found there. Additionally, this list includes updated nomenclature and it synonymizes *Gephyrostegus bohemicus* with *Eusauropleura digitata* as it is most likely that his taxon, which has only been found at Nyrany, was misidentified at Linton. This name change has been attributed to an early misidentification of *Eusauropleura.* The labyrinthodonts *Spondylerpeton spinatum, Orthosarus sp. , and Eosarus acadianus* were disincluded in this list as no specimens from Linton could be confirmed. The diversity of amphibian genera at Linton has proven to be unique and invaluable to the field of paleontology.

Conclusions

In conclusion, the fossiliferous assemblage at the former site of the Linton Diamond Coal Mine should always be a point of great interests for scientists who study life in the Papennsylvanian. It preserved an extraordinary amount and variety of fossils. Linton is far from finished producing puzzles for scientists to decipher. Many fossils have been uncovered that have not yet been unidentified and there are still questions about those fossils that have been described. As mentioned in the abstract, this work will be followed by following segments outlining the remaining vertebrate groups as well as invertebrates. It is our hope that these works might illuminate readers to the diversity of fossilized organisms at Linton and to inspire others to love paleontology.

Acknowledgements

It is of upmost importance that we recognize Robert Hook and the late Donald Baird. Their work on Linton furthered the field of paleontology and provided the basis for this research, and undoubtedly all future research on the Linton lagerstatte.

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