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A HORNTAIL TRILOBITE FROM McGREGOR, IOWA

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Plate I, figs. 2-4.

Recently an excellent specimen of the horntail trilobite was collected at McGregor by Miss Florence S. Chapin a member of the geology field class of the McGregor Wild Life School. This fossil is so rarely found in other than fragmentary condition in Iowa that any well-preserved specimen deserves to be recorded and illustrated. The specimen presents the dorsal shield, is unrolled, and retains the head, thorax and pygidium or tail shield. The right margin of the head, the right free cheek and the tips of the tail spines are missing. When found only a part of the axial lobe and the ends of the pustules on the middle pleural segments were exposed. Careful treatment with potassium hydroxide and cautious use of needles and brushes have removed the limy covering. This cleaning process requires considerable time especially when the surface of a fossil, such as this one, presents so much relief.

This trilobite, in scientific parlance, is called *Ceraurus pleurexanthemus* Green. Its common name, horntail, is derived from the fact that the tail shield bears two long curved borns. The generic name *Ceraurus* is Greek, *keras,* horn and *oura,* tail; and the specific name *pleurexanthemus* comes from *pleura,* a rib, and *exanthema,* pustulated or broken out; hence the entire scientific name means "the horntail with pustulated ribs," alluding to the prominent knobs on the angles of the thoracic segments. The scientific name was first applied to this trilobite in 1832 by Jacob Green, M.D. His description and discussion of this species and of about forty others appeared in a small ninety-three page volume, with a supplement of twenty-four pages, and one frontispiece plate bearing ten illustrations. The volume is entitled "A Monograph of the Trilobites of North America," and is one of the earliest treatises on paleontology in the new world. Since Doctor Green's original description is brief and is written in the customary scientific Latin of his day it may be of interest to copy it here in full.

Clypeo postice arcuato, angulo externo in mucronem valde

producto; oculis minimis remotis, post-abdomine in spinam arcuatam acutam utrinque extenso.

The writer is indebted to Professor F. H. Potter of the Latin Department of the University for a translation of the above which freely rendered runs as follows: "(Head) shield arcuate behind, the external corner very strongly extended into a point: the eyes are very small and far out, the post-abdomen is drawn out on each side into a sharp arched spine." Green supplements his Latin diagnosis with extensive and interesting observations which bring out the important features of his rather poorly preserved type specimen. It was so flattened in preservation "that a very thin lamen of the shale removed from the surface would destroy every vestige of its appearance." It belonged to the collection of the Albany Institute and had been found in a black shale of Trenton age at Newport, New York.

Ceraurus pleurexanthemus has figured prominently in another study of American trilobites, namely, the investigations made by sectioning trilobites in order to learn the character of the legs, mandibles, antennae and other appendages hidden beneath the dorsal shield. In 1870, Billings, a Canadian geologist, had discovered traces of ambulatory appendages in the trilobite *Asaphus platycephalus*. This was the first evidence of the presence of jointed limbs in the trilobite. The material was finally examined by Professor Louis Agassiz who became so enthusiastic over the possibilities that he inspired a young student in his laboratories to undertake the task of cutting sections of fossil trilobites. From the study of the rock slices he was to ascertain, if possible, the character of the appendages attached to the ventral surface and thus to settle the zoological affinities of this extinct group of animals.

The young man who undertook this task a half century ago was Charles D. Walcott, now the venerable Director of the Smithsonian Institution, and a world authority on trilobites as well as on early Paleozoic and Proterozoic life. Desirable specimens for the undertaking had to be obtained. Let us permit young Walcott to tell his own story:

> In the upper portion of the Trenton limestone at Trenton Falls, N. Y., a thin layer of dark, bluish-gray, fine-grained, partially impure limestone was found, that contained many very perfectly preserved trilobitic remains. On examination of these by cutting sections, it was ascertained that other parts of the animal besides the dorsal shell and the hypostoma were present.

> Specimens from all other localities and formations failed to afford more than the strong dorsal shell and hypostoma. This fact once established led to the extended working of the prolific stratum. The soil and rock to a depth of nine feet were removed, over a large area, to obtain the fossils scattered through the thin layer of limestone. From this area there were taken over 3500 entire trilobites: 2200 were in a condition to warrant sections being made of them. Comparatively few had the appendages well preserved, and now there are but 270 sections affording more or less satisfactory evidence of their preservation.[1]

Of the 270 sections which afford satisfactory evidence over three-fourths or 205 of them were furnished by *Ceraurus pleurexanthemus* and the remainder were cut from *Calymene senaria, Asaphus platycephalus,* and *Acidaspis trentonensis.* Thus did our species contribute to a work which "occupied much time and attention for seven years." Its pursuit demonstrated the presence of swimming and branchial appendages as well as of masticating parts and ambulatory legs. These discoveries settled the zoological position of the trilobites among the crustacea. Since then the study has been carried to further refinement by the later work of Walcott, of Beecher, and of others.

A detailed description and illustrations of *Ceraurus pleurexanthemus* appear in the current annual report, volume xxxi, of the Iowa Geological Survey, now in press. The paper is entitled "Paleozoic Crustacea of Iowa" and is the result of a study by Dr. Otto T. Walter.

The McGregor specimen was found loose in a mass of broken rock in Boyle's quarry near that place. The horizon is the Platteville limestone of the Middle Ordovician. Fragments of the test of *Ceraurus* are found at practically every horizon and outcrop of the Platteville in northeastern Iowa.

Clarke reports [2] that the species has considerable vertical range being found in Minnesota from the lower part of the Middle Ordovician up through the Decorah and Galena beds into the Maquoketa shale of the Upper Ordovician; he adds that the species "does not differ materially from those of New York." The species has a wide geographical distribution but is limited to North Amer-

1 "The Trilobite: New and Old Evidence Relating to its Organization" by C. D. Walcott, Bull. Mus. Comp. Zool., Harvard College, vol. viii, no. 10, pp. 191, 192, 1881.

2 Geol. Minnesota, vol. iii, part ii, page 334.

Plate I.

Fig. 1. *Bilobites bilobus* (Linnaeus).

Brachial views of four specimens, greatly enlarged, photographed against a dark background. A fifth shell is attached by its brachial valve to a branch of the compound coral *Striatopora*.

Figs. 2-4. *Ceraurus pleurexanthemus* Green.

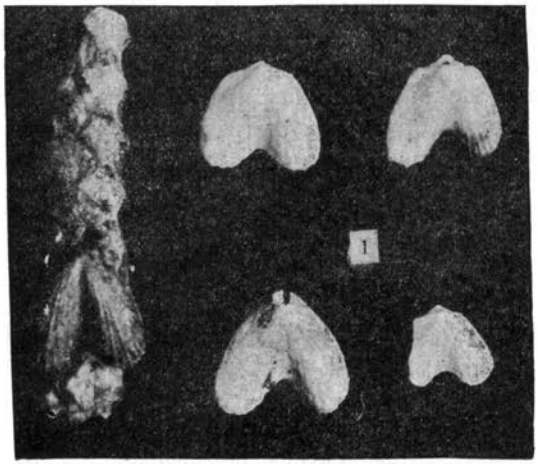
2. View of the trilobite from the right side showing profile.

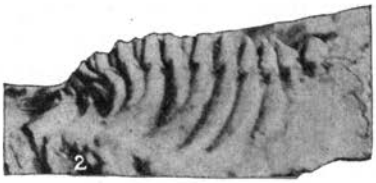
3, 4. Two views showing progress made in cleaning the glabella. Note the cheek and tail spines, the remoteness of the eye, the rows of pustules, and other features.

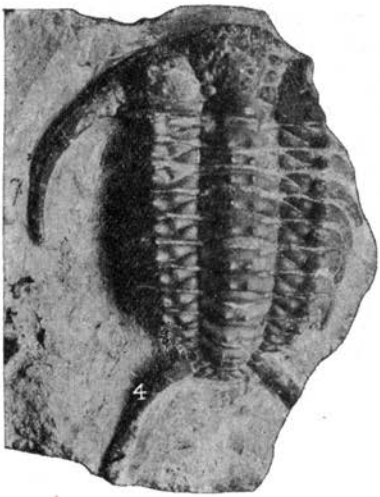
Figures natural size.

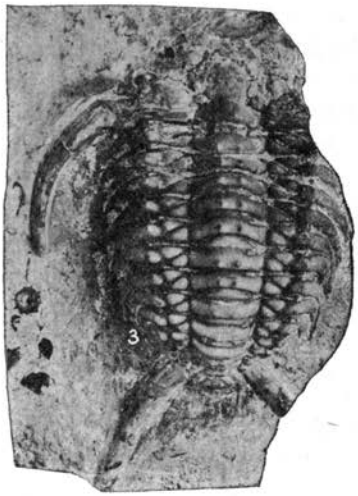
Boyle's Quarry, McGregor, Iowa; Platteville limestone. Collected by Florence S. Chapin.

Plate I.









ica being found according to Doctor Ruedemann in Baffin Land, in Manitoba and in east central United States.[3]

The writer wishes to acknowledge his indebtedness to Miss Chapin who is an enthusiastic student of the geology of the McGregor area for an opportunity to study this fine specimen. It has been deposited by her in the paleontological collection at the University and is museum number 9289.

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THE USE OF CONE-IN-CONE STRUCTURE FOR THE PURPOSES OF CORRELATION

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Recently the writer published, in conjunction with Dr. W. H. Twenhofel, a short paper [1] concerning certain Comanchean strata of Central Kansas. Because of the northern extension of these beds beyond the Kansas boundary it seems desirable to explain one of the criteria used in tracing the beds northward.

At certain definite horizons in the Kansas Comanchean cone-in-cone layers of calcite occur. They appear to be closely related to the stage during which the Windom member bearing a Washita fauna was accumulated. Intensive study over a large area shows that the cone-in-cone layers are more persistent than the shell beds; the latter often varying from a fossil coquina to a sandy lime barren of fossils in a distance of a quarter of a mile and less. Other criteria of correlation determined in the laboratory also serve as a check on the correlations based on the cone-in-cone layers. The presence of cone-in-cone, in the absence of fossils, in many cases determined the horizon as the Comanchean strata. These beds were traced into northern Kansas and Nebraska.

As the cone-in-cone structures are known to re-occur at other horizons and associated with other formations, extreme care should be used and the application of this principle should not be carried too far.

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3 Bull. 49, New York State Museum, p. 67, 1901.

1 Twenhofel, W. H. and Tester, A. C. New Data on the Comanchean Strata of Central Kansas: Bull. Am. Assoc. Petr. Geol., Vol. X, pp. 553-561, 1926.