CONTRIBUTIONS FROM THE MUSEUM OF PALEONTOLOGY
(*Continuation of Contributions from the Museum of Geology*)
UNIVERSITY OF MICHIGAN

VOL. V, No. 7, pp. 75–78 (1 pl.) OCTOBER 30, 1937

# OBSERVATIONS ON FOSSIL PLANTS FROM THE DEVONIAN OF EASTERN NORTH AMERICA

## III. *GILBOAPHYTON GOLDRINGIAE*, GEN. ET SP. NOV., FROM THE HAMILTON OF EASTERN NEW YORK

BY
CHESTER A. ARNOLD

UNIVERSITY OF MICHIGAN PRESS
ANN ARBOR

## CONTRIBUTIONS FROM THE MUSEUM OF PALEONTOLOGY

*(Continuation of Contributions from the Museum of Geology)*

## UNIVERSITY OF MICHIGAN

*Editor:* EUGENE S. MCCARTNEY

The series of contributions from the Museum of Paleontology was inaugurated to provide a medium for the publication of papers based entirely or principally upon the collections in the Museum. When the number of pages issued is sufficient to make a volume, a title-page and a table of contents will be sent to libraries on the mailing list, and also to individuals upon request. Communications with reference to exchange or purchase of copies should be directed to the Librarian, General Library, University of Michigan.

A list of the separate papers in Volumes II–IV will be sent upon request.

VOL. I. The Stratigraphy and Fauna of the Hackberry Stage of the Upper Devonian, by C. L. Fenton and M. A. Fenton. Pages xi + 260. Cloth. $2.75.

VOL. II. Fourteen papers. Pages xi + 240. Cloth. $3.00. (Parts sold separately in paper covers.)

VOL. III. Thirteen papers. Pages viii + 275. Cloth. $3.50. (Parts sold separately in paper covers.)

VOL. IV. Eighteen papers. Pages viii + 295. Cloth. $3.50. (Parts sold separately in paper covers.)

### VOLUME V

1. A Nothosaur from the Triassic of Wyoming, by E. C. Case. Pages 1–36, with 1 plate and 21 text figures. Price, $.50.
2. Observations on Fossil Plants from the Devonian of Eastern North America. I. Plant Remains from Scaumenac Bay, Quebec, by Chester A. Arnold. Pages 37–48, with 4 plates. Price, $.25.
3. Observations on Fossil Plants from the Devonian of Eastern North America. II. *Archaeopteris macilenta* and *A. Sphenophyllifolia* of Lesquereux, by Chester A. Arnold. Pages 49–56, with 1 plate. Price, $.20.
4. Some Fossil Species of *Mahonia* from the Tertiary of Eastern and Southeastern Oregon, by Chester A. Arnold. Pages 57–66, with 3 plates. Price, $.25.
5. *Productella waynensis*, a New Brachiopod from the New Providence Shale of Kentucky, by K. G. Brill, Jr. Pages 67–68, with 1 plate. Price, $.25.

*(Continued on inside of back cover)*

VOL. V, No. 7, pp. 75–78 (1 pl.) OCTOBER 30, 1937

# OBSERVATIONS ON FOSSIL PLANTS FROM THE DEVONIAN OF EASTERN NORTH AMERICA

## III. *GILBOAPHYTON GOLDRINGIAE*, GEN. ET SP. NOV., FROM THE HAMILTON OF EASTERN NEW YORK

By CHESTER A. ARNOLD

THE fossil plants described here consist of several impressions of spiny stems which were collected by the author from a sandstone quarry at Gilboa, New York, in 1926 and 1929. At the time of the last visit the only material available was scattered fragments which had escaped the attention of previous collectors. This quarry is the Riverside quarry, and is located along Schoharie Creek a short distance below the Gilboa dam. It is one of the three which yielded the sandstone casts of stumps of *Eospermatopteris* described by Miss Winifred Goldring in a bulletin of the New York State Museum.

The plant-bearing formation at Gilboa which yielded the fossils is now known to belong to the Middle Devonian (Hamilton), although it had always been considered Upper Devonian up to the time the discoveries were made and for a considerable time after. This correction of the age of these beds is of no mean significance with respect to our knowledge of the sequence of the earlier Paleozoic floras of North America because it demonstrates the existence of fernlike arborescent plants contemporaneous with early Devonian plant types in other parts of the world. Attention has already been directed by Dr. Kräusel to certain points of resemblance between *Aneurophyton* of the Middle Devonian Elberfeld flora and *Eospermatopteris*. By its close

similarity to *Drepanophycus*, which occurs in the Lower and Middle Devonian of both North America and Europe, the new plant to be described constitutes an additional link between the Gilboa types and the early Devonian flora of other places.

The possibilities of our ever again securing any quantity of plants from the Gilboa localities are exceedingly slight, since quarrying operations were discontinued several years ago. Most of the determinable plant material of which a considerable quantity has been collected is now in the possession of several museums.

The name **Gilboaphyton Goldringiae,** gen. et sp. nov., is chosen for the plant described here with reference to the locality from which it came, and in recognition of Miss Goldring, through whose studies our knowledge of the Gilboa fossils has been greatly increased. More than a dozen of the specimens of *G. Goldringiae* are in the Museum of Paleontology of the University of Michigan, and a large quantity of similar material is in the New York State Museum at Albany.

The specimens as they were found in the quarry consisted of fragments of stems in blocks of very hard massive sandstone. Some of the fragments were exposed along the bedding planes, but others lay in various positions throughout the sandstone mass. For this reason removal of large portions of the stems was difficult. The stems are completely flattened, and all the organic matter had been reduced to a thin crust of a rusty brown or black substance. As a result, practically nothing is shown of the internal structure. The fact that the stems lie in various directions is suggestive of deposition in water into which sand and plant débris had been carried by fairly rapid currents, but then allowed to settle undisturbed to the bottom.

The stem impressions range from 4 to 12 mm. in diameter, but average about 10. They are straight or slightly curved. One specimen (Pl. I, Fig. 2) is dichotomously branched. None of them show their terminal portions, nor do they give any indication of attachment to larger trunks or rhizomes. Also, no fructifications are present. Because of the absence of preserved vascular tissue or reproductive parts the exact status of *Gilboaphyton* in the plant kingdom is conjectural, and such con-

clusions as may be drawn concerning its affinities are those suggested by its geological age or its external morphology.

The most striking feature of these stems is the spinelike appendages, which show a very definite spiral arrangement (Pl. I, Fig. 3). Each spine is about 5 mm. long, taper-pointed, and expanded below into a broad conical base (Pl. I, Fig. 1). The slender pointed tips are bent forward. On the surface of the impression small scars can be seen where the slender tips had broken away from the broader basal portions, but there is nothing to suggest natural abscission such as is characteristic of the Lepidodendrales, nor is a definite foliar scar formed. The manner in which the spines project into the sandstone along the margins of the impressions indicates that the tips were permanently attached and rigid, and not flexible (Pl. I, Fig. 1). There is no evidence whatsoever of an expanded lamina.

The arrangement and the spacing of the spines may be distinctly seen along the surfaces of the impressions. The spines are in vertical rows, and those in adjacent rows alternate with each other. The rows are situated 2.5 mm. or less apart, but the expanded spine bases nearly touch. The distances between the individual spine tips along a single vertical row are about 5 mm., or approximately twice the distance between adjacent rows.

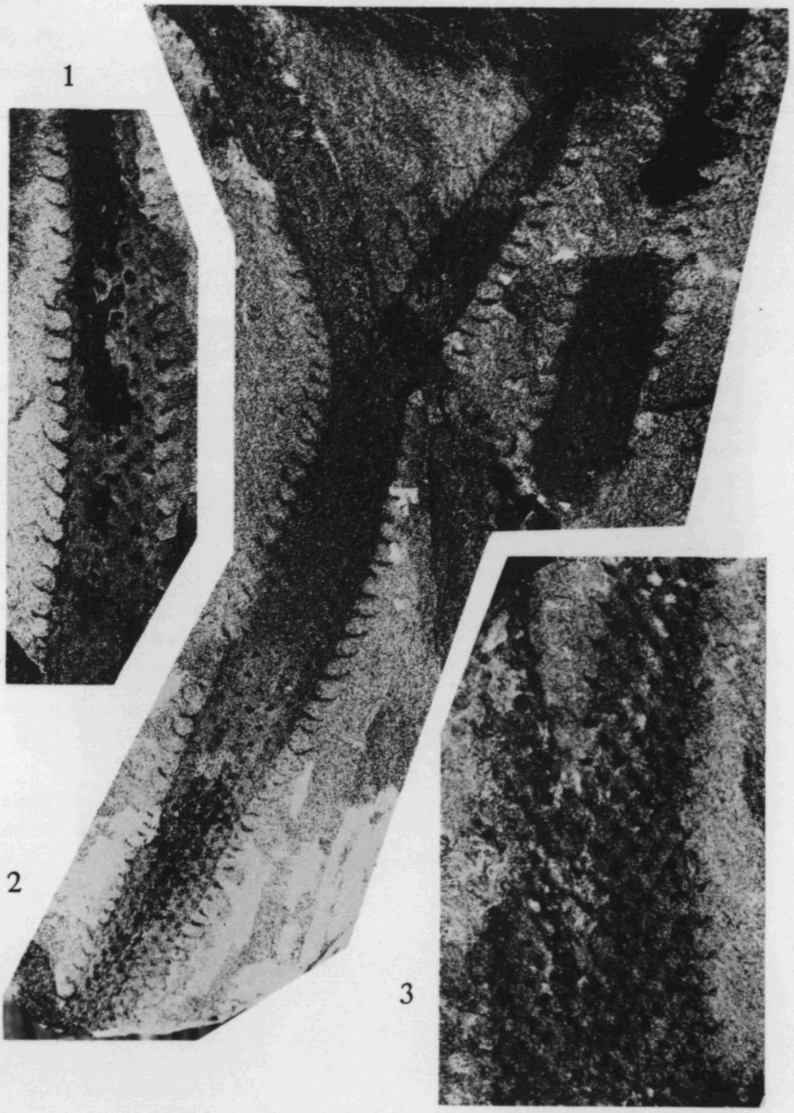
Whether *Gilboaphyton* belongs to the Psilophytales or to the Lycopodiales is only inferable since vascular tissues and reproductive structures are lacking, but the plant appears quite similar to *Drepanophycus* (*Arthrostigma*), and it is altogether possible that it is an atypical species of that genus. However, one hesitates to refer it definitely to *Drepanophycus* because Kräusel and Weyland [1] have recently shown that the supposed spines of the latter are essentially foliar organs with a vascular supply and bear sporangia with short stalks on the adaxial surface. A careful examination of the spine bases of *Gilboaphyton* reveals evidence faintly suggestive of a vascular strand, but no positive statement can be made as to the actual presence of such. Another point of distinction is that the appendages of *Drepanophycus* only some-

[1] Kräusel, R., und Weyland, H., "Neue Pflanzenfunde im rheinischen Unterdevon," *Palaeont.*, Vol. 80 (B), pp. 177–184. 1935.

times show a definitely spiral arrangement, whereas in *Gilboaphyton* this feature is quite constant. Both forms agree in being dichotomously branched. At first glance one is inclined to look for the relatives of *Gilboaphyton* among the Devonian lycopods of the *Protolepidodendron* or *Archaeosigillaria* type, and the latter is resembled by the vertical alignment of the spines. On the other hand, the very obvious fact that these structures are rigid rather than flexible leaves open the possibility of affinity with the Psilophytales, to which *Drepanophycus* was supposed to belong until a more thorough knowledge of the morphology of the so-called spines and the position of the sporangia showed otherwise. Kräusel and Weyland now consider *Drepanophycus* a true lycopod. If *Drepanophycus* and *Gilboaphyton* are closely related — and there is no genuine reason to doubt they are — they probably represent a primitive lycopodiaceous group retaining certain characteristics of the Psilophytales but essentially members of the Lycopsida.

Very little can be said concerning the habit of *Gilboaphyton*, and it is not known whether its branches grew from rhizomes or upright trunks. The former seems more probable, and the fragments are suggestive of a procumbent herb which produced dense mats or tufts of vegetation upon the forest floor among the larger trees. In habit it may be compared to certain living species of *Lycopodium*.

# PLATE I




*Gilboaphyton Goldringiae* Arnold, gen. et sp. nov., from the Hamilton (Middle Devonian), Gilboa, Schoharie County, New York, showing the spinous branches, No. 11765 U.M. Cotypes.

(*Continued from inside of front cover*)