

A PROBLEMATICAL FOSSIL OF PSILOPHYTALEAN ASPECT FROM THE UPPER PENNSYLVANIAN OF EASTERN KANSAS

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ABSTRACT

Naked, regularly dichotomizing axes have been found in abundance as compressions in Upper Pennsylvanian shales of north-eastern Kansas associated with such typically Pennsylvanian plant remains as *Pecopteris feminaeformis*, *Pecopteris arborescens*, *Neuropteris scheuchzeri*, *Alethopteris* sp., *Lepidophylloides* sp. and *Cordaites* sp. Specimens up to 14 cm. in length showing up to 5 very regular dichotomies, all in one plane, present a psilophytalean aspect which would unhesitatingly be identified as aerial stems if found in Devonian rocks. The specimens are assigned to the form genus, *Hostinella* (*Hostimella*) as a new species, *H. pennsylvanica* and reasons are discussed for the probable survival of Devonian plants into the Pennsylvanian Period.

INTRODUCTION

THE occasional occurrence of plants resembling those of the Devonian flora in strata of Middle and Upper Pennsylvanian age indicates that some of these more ancient genera may have survived essentially unchanged into the later geological period in the same way that such "living fossils" as *Equisetum*, *Selaginella* and *Lycopodium* seem to have persisted from the Pennsylvanian to the present. Then as now, however, they probably constituted a very minor element in relation to the more modern flora of the time and are very seldom encountered in the fossil record.

Two Pennsylvanian coal ball genera which have been suggested as possible Devonian type plants are *Microspermopteris* (Baxter, 1949) based on its leafless, flattened branch system and *Stelastellara* (Baxter, 1965) which, while unassignable to any known group of Pennsylvanian plants, shows in its stelar structure striking similarities to the branch and "rachis" of the Devonian *Actinoxylon* (Matten, 1968) and *Archeopteris* (Carluccio et al., 1966).

The present report deals with an assemblage of compression specimens from the Upper Pennsylvanian of eastern Kansas which also seems more similar to some of the Devonian psilophytalean genera than it does to the Pennsylvanian flora.

GENERAL DESCRIPTION

Over one dozen specimens have been found, those shown in Figs. 1 and 2 being representative of the assemblage. The specimen shown in Fig. 1 measures slightly over 9 cm. in length and shows four regular dichotomies all lying in a single plane so that the branching system is fan-shaped. It measures 2.5 mm. in diameter near the bottom, gradually tapering to less than 0.5 mm. at the top. The small size and rapid taper of the axis in these upper dichotomies probably indicates that this is a terminal portion of the branching system. The specimen is preserved as a carbonaceous film on the shale with a thickened, dark ridge running down the center of the axis, possibly representing the remnants of the central xylem strand. In the axil of one of the upper dichotomies (Fig. 1-a) the axillary area above the dichotomizing central strand has some resemblance to the "webbing" described by Høeg (1942) as occurring in the branch angles of some of the Devonian *Hostinella* (*Hostimella*) specimens. However, nothing similar to the associated "axillary buds" described by Høeg have been found in any of our specimens.

The specimen shown in Fig. 2 measures 13.5 cm. in length while only showing two dichotomies. The large size of the axis, which measures 4 mm. in diameter at the base with only a gradual tapering to 2.5 mm. at the upper end (along with the greater length between dichotomies) suggests that

it may represent a more basal part of the plant than that shown in Fig. 1. Indeed, since the 2.5 mm. upper diameter of this specimen equals the basal diameter of the fragment shown in Fig. 1, it is possible that they represent nearly contiguous parts of equivalent axes so that the total length of the dichotomous branch system could be estimated at at least 22 cm.

While the preservation of the specimen in Fig. 1 is in the form of a carbonaceous compression, the more basal fragments, as shown in Fig. 2, are frequently preserved as pyrite infiltrated casts which can be readily removed from the rock surface. Portions of the axis in Fig. 2 (and other similar specimens) were taken out, and polished and etched transverse and longitudinal sections prepared which were then observed at magnifications up to 80X in reflected light. While no cellular details were preserved, the central part of the axis was always occupied by an irregularly lobed strand of nearly pure iron-pyrite which characteristically, frequently seems to infiltrate the open xylem tissues in many coal ball plants.

DISCUSSION

The primary question regarding naked, dichotomizing axes such as the specimens just described, relates to whether they are properly identified as stems or roots. While they would probably be unhesitatingly identified as aerial stems if found in Devonian rocks, their unexpected presence in strata of Upper Pennsylvanian age will undoubtedly influence some to insist that they must represent dichotomously branched root systems of some of the more typical Pennsylvanian plants which are found in association with them.

In the absence of more diagnostic characters than are available to us there seems no way to settle the question conclusively, although the very regular dichotomies and undistorted, flattened fan-like growth are characters which seem more representative of aerial stems than they do of roots. Certainly none of the typical Pennsylvanian genera occurring in the same shale, such as *Pecopteris feminaeformis*, *P. arborescens*, *Neuropteris scheuchzeri*, *Alethopteris* sp., *Lepidophylloides* sp. and *Cordaites*

sp. are known to have such flattened spreading root systems.

Occasional swollen tips, suggestive of terminal sporangia have been found associated with the dichotomous axes, but since none were found attached it is unprovable that they are part of the same plant.

It is well known that our present flora includes genera which seem to have survived essentially unchanged from the Pennsylvanian Period to the present. Schlanker & Leisman (1969) have described a Middle Pennsylvanian *Selaginella fraiponti* which they consider almost indistinguishable from the extant *S. selaginoides* while *Lycopodites* is reported in the Devonian and *Equisetites* in the Upper Carboniferous (Banks *et al.*, 1967).

In view of the above, it seems not unreasonable to assume that occasional Devonian plants could have survived the considerably shorter interval (and what were probably less drastic climatic changes) from the Devonian to the Pennsylvanian.

Accordingly it is felt that the evidence justifies provisionally placing these dichotomizing axes in the form genus, *Hostinella* Barr. ex Stur 1882 emend. Potonie & Bernard, 1904 as delimited by Banks (1967) until the time that future collections from this area may further clarify its position.

Hostinella (Hostimella) pennsylvanica

sp. nov.

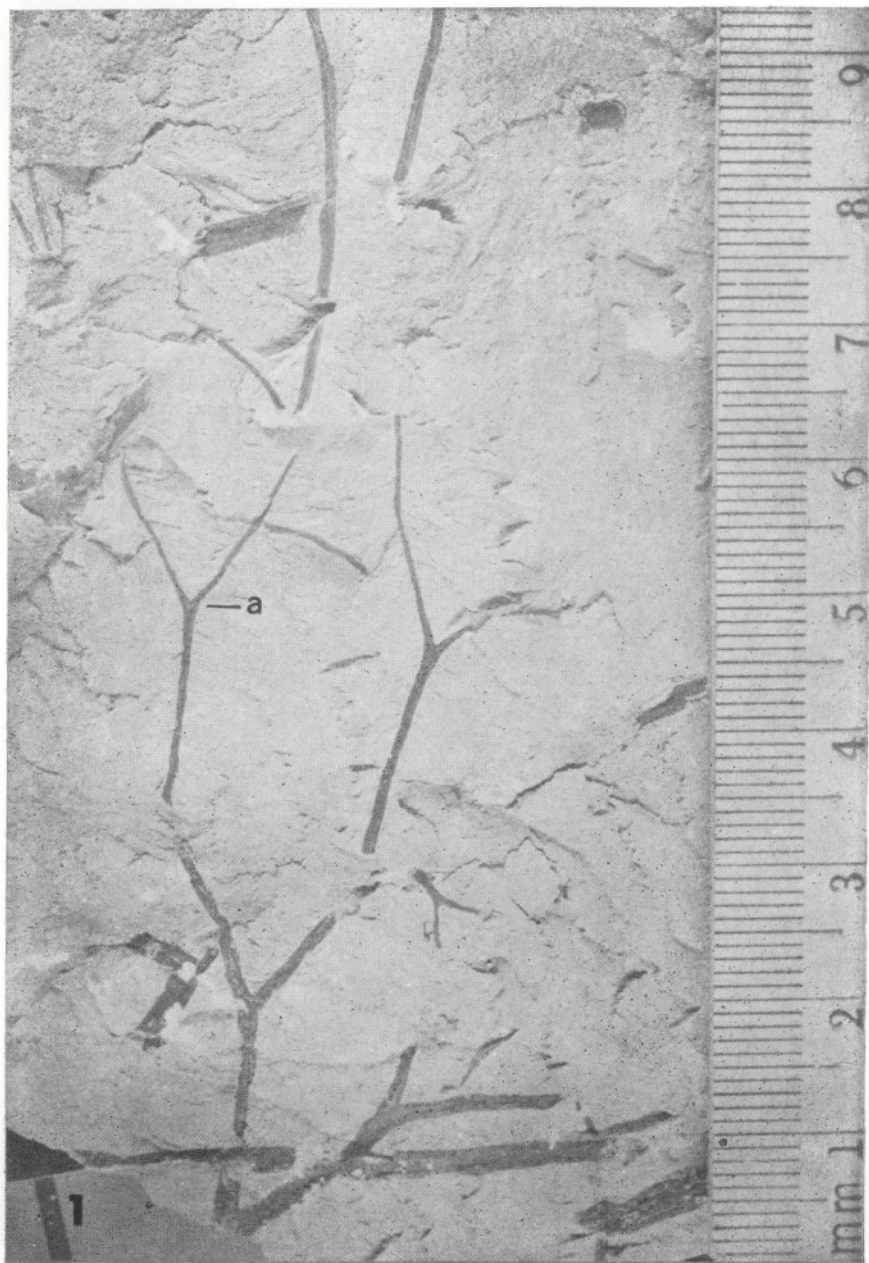
Pls. 1 & 2

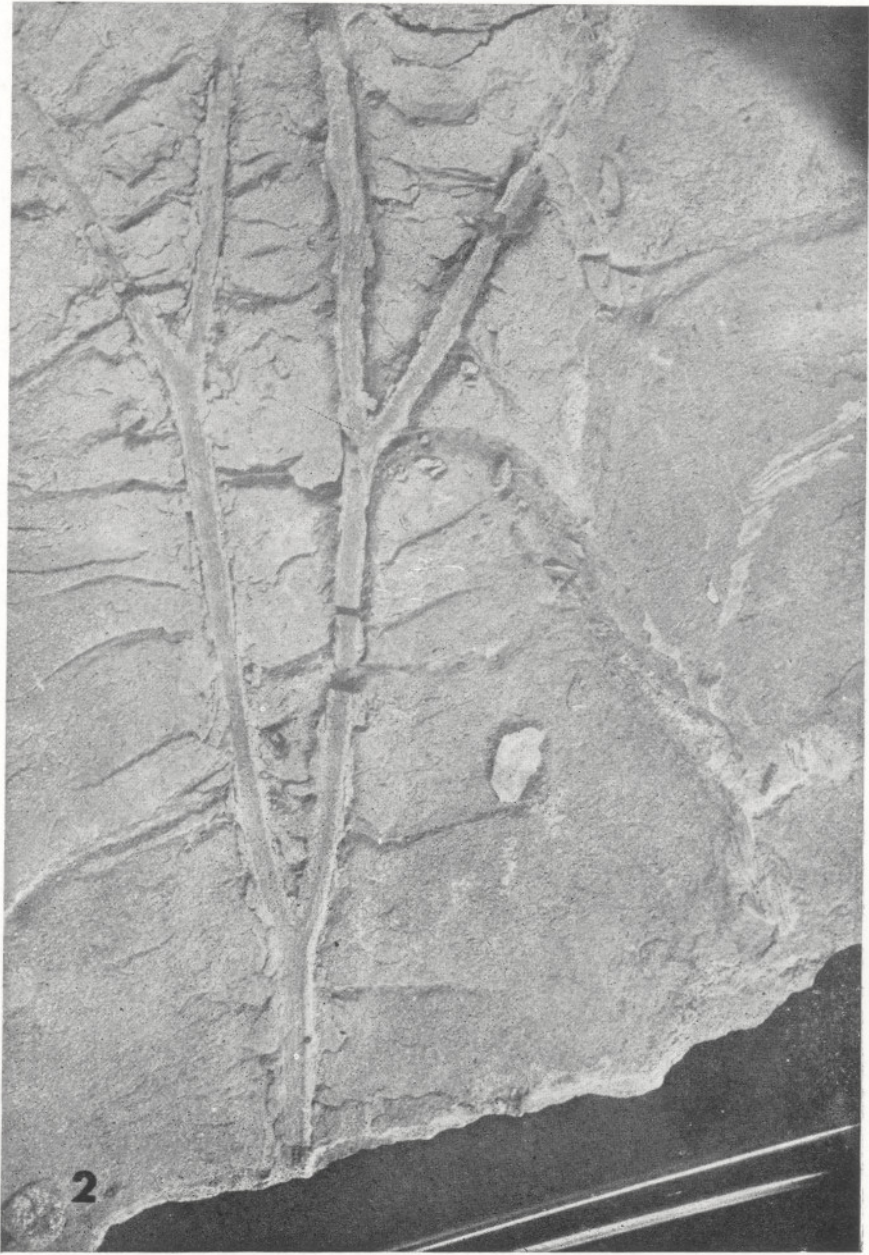
Diagnosis — Naked, regularly, dichotomizing axes up to 22 cm. or more in total length with all of the branches in a single plane. Axes gradually tapering from a basal diameter of 4 mm. to 0.5 mm. near the apex.

Holotype — Specimen numbered No. 1449 in the University of Kansas paleobotanical collections. Fig. 1.

Horizon — Severy shale, Wabaunsee group, Virgilian stage, Upper Pennsylvanian of Kansas, U.S.A.

Locality — Severy shale outcrop above railroad tracks approximately 1/4 mile south-east of Valley Falls, Kansas.





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