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FERTILE GREEN SHOOTS OF EQUISETUM ARVENSE

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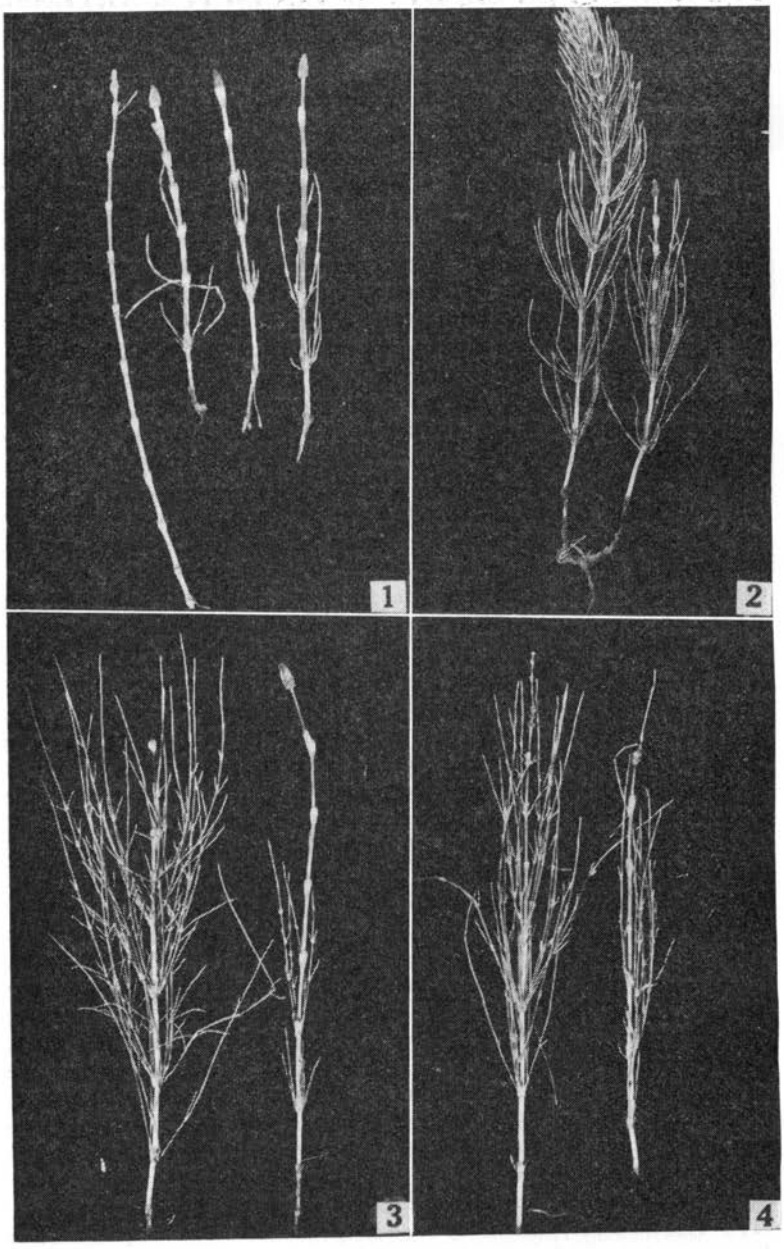
The common field horsetail, *Equisetum arvense* L., as is well known, produces in early spring fertile shoots almost destitute of chlorophyll. After shedding their spores, these quickly wither and are succeeded by the sterile, branched, vegetative shoots which persist until late autumn. Early in May, 1943, Mr. George Coffey, then a graduate student in botany in the State University, brought into the laboratory a shoot of what appeared to be this species with a green stem and whorls of green branches, but tipped by a small, but perfectly formed strobilus. It had been collected in a slough on the west side of the Iowa River within the city limits of Iowa City. Mr. Coffey revisted the locality in an attempt to find other similar shoots but was unsuccessful. Two or three weeks later, however, in a swamp on the east side of the river, I found a number of shoots displaying various modifications of the same peculiarity. These were collected on May 25 and June 1. By the latter date, the normal fertile shoots had almost disappeared and the few that remained were old and withering. The aberrant shoots, however, bore young and, in some cases, immature strobili. There can be no question of the identity of the species. The rhizome from which one of the aberrant shoots was arising was dug up and found to be bearing a perfectly typical sterile shoot a short distance away (Fig. 2). There was an almost continuous gradation from green fertile shoots without branches, through those bearing only a few whorls of branches (Fig. 1) to those in which the whorls were almost as well developed as in the completely sterile shoots (Fig. 3). In the latter case, some of the strobili were imperfectly developed and in some instances the strobilus had proliferated so that there were whorls of sterile branches both below and above it (Fig. 4). In some cases, the entire axis was green. In others, even in those in which the sterile whorls were very scantily developed, the main axis, except for the one to three nodes just below the cone, was green, and where proliferation occurred, the uppr portion was also green.

Our abundant herbarium material of *E. arvense* includes no similar specimens. Had such forms been common in this region, it is unlikely that so ardent a collector as Shimek would have overlooked them. Search through the literature available reveals only scanty reference to similar phenomena. Rydberg (Flora of the Prairies and Plains 18. 1932) notes in connection with *E. arvense*: "In the fall the sterile stems sometimes bear small cones 4-10 mm. long, mostly with sterile spores (*var. serotinum*)." This, of course, would not apply to our forms, which appear in late spring and in which the spores are entirely typical and presumably able to germinate. The only extensive discussion I have found is that of Marie-Victorin (Montreal Univ. Cont. Lab. Bot. No. 9. 1927). This author cites a key by Hy, based on European forms, recognizing three varieties. In his own key,



Equisetum arvense L.

Marie-Victorin recognizes but two forms: *f. irriguum,* in which the fertile shoot is at first without chlorophyll, later becoming green and developing green branches and *f. campestre,* in which the fertile shoot is entirely green from the first, proliferating and branching in the upper part as in the sterile shoot. Neither form agrees entirely with the Iowa specimens, since we have every variation from green fertile shoots without branches to fertile, abundantly branched, proliberating shoots, sometimes with and sometimes without colorless internodes below the strobili. Since the variation is continuous it seems unnecessary to burden the literature with an additional name.

A letter of inquiry to Dr. N. C. Fassett of the University of Wisconsin elicited the information that Mr. John C. Neess of Milwaukee, had observed similar forms at Whitefish Bay, near that city. From Mr. Neess' photographs and descriptions, which he has been good enough to send me, it seems clear that his forms correspond exactly with the Iowa collections.

Careful search in the slough where these specimens were abundant in 1943, revealed in 1944 only a single shoot. This suggests that the developments described are no more than a response to some unusual set of environmental conditions, but what such may be I am unable to say.

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