## EDUCATIONAL REVIEW

and railways. It is our earliest species and is well pictured in Figure 2.

The fertile stem A, the first to appear above the ground, is of a pale straw color, and clothed with several loose sheaths, each divided into several teeth, 8-12 for this particular species. These teeth are morphologically the same as the leaves of higher plants, though for this stem they perform no work of phstosynthesis. At the top of the stem is a cone-like structure made up of a number of small hexagonal shaped plates. E illustrates the structure of these parts. Note the stem of each and the several spore cases ranged around it. The spores of horsetails are rather curious when compared with those of ferns. At maturity the outer coat splits into four spirally arranged bands, the elaters, which are very sensitive to the humidity of the air. While damp, or in a moist atmosphere, they remain closely pressed against the spore, but upon drying they uncurl and sprawl themselves out like some odd looking animate form. This action of closing and opening is well seen as one watches them under a magnifying glass, and occasionally directs his breath upon them.

This movement of the elaters helps to scatter the spores.

The vegetative stem B is sterile, and appears just as the fertile stem is dying down. This is our only species in which the fertile stem dies at once after the spores are shed. In others it is either vegetative from the first or puts out side branches and becomes vegetative after sporulation. The vegetative stems grow throughout the summer. In appearance they are much like a miniature pine tree, and are often locally known as "pine top."

We have six species of Equisetum in which the upright stems are annual; and five, in which they are evergreen.

Equisetum scripoides is a curious little evergreen species. It is small, and filiform, and grows in tufts in damp situations. It is so much like tufts of grass and sedges in general appearance that one is very apt to overlook it. The stem is six-ridged and in cross section is solid at the centre, and provided with three small air spaces. Compare with the cross section of the stem of E. arvense, as shown in Figure 2.

Find these plants on your spring excursions, and study them in their natural surroundings. With what other plants are they associated? Explain how the fertile stem of E. arvense gets such an early start, and attains such a large growth. Why is this early start needed by the spore producing stem?

In your rambles watch for the plants that bloom early,— Alders, Willows, Maples, etc., etc., among those of larger growth, and Trilliums, Spring



Fig. 2. Common Horsetail (Equisetum arvenue

A, fertile stems, bearing cones rising from creeping rootstock; t, tuberous bodies which are reservoirs of reserve food material; v, young shown in B.

B, vegetative stem as it appears about three weeks after the fertile stems have shed their spores and died. C, a group of spores with their claters expanded. D, a spore with its elaters colled around it. E, two views of the spore leaves (sporophylis), showing the group of sporangia F. cross section of stem: a, air spaces; c, green tissues; r, rigid outer tissue.

Beauties, Billwort, Clintonia, Adder's Tongue, Violets, etc., etc., among the smaller forms.

Note the associations of each. Study the plants and let them help to answer the questions that come to your mind. They are living things, and move and feel, and have a voice too, and will tell you many wonderful stories if you but pause to learn their language and bend an ear to listen. (Cuts copied from Principles of Botany - Bergen & Davis, - by the kind permission of the publishers, Mesers. Ginn & Co., Boston.)

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