OBSERVATIONS ON THE DWARF MISTLETOE, ARCEUTHOBIUM PUSILLUM

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The genus Arceuthobium of the family Loranthaceae includes about a dozen North American and two Old World species which grow parasitically upon coniferous hosts. The number of species recognized depends upon the specific status of some obscure forms of which sufficient materials are lacking and also upon the standing specifically of one or two forms sometimes considered of but varietal rank. The characters by which the different species are distinguished are mostly obscure and identification is often made on the basis of the host attacked. Within proper limits this may be practicable; but, as Weir has shown by inoculation experiments, the host cannot always be relied upon for the identification of the parasite.

The plants of this genus are comparatively small, ranging in length from one or two millimeters in *Arceuthobium minutissimum* from the Himalayas to ten to twenty centimeters for *A. vaginatum* from Mexico. The plants are dioecious with inconspicuous flowers. The fruits, however, become comparatively large and prominent.

Infection by Arceuthobium produces a stimulus which results in the development by the host of numerous, small, slender branches often producing characteristic witches brooms. Several such "brooms" may be developed on one tree producing an appearance which is very striking and characteristic. The result of an infection is commonly fatal to the host.

The North American species are most abundant in the western coniferous forests where they are found from Alaska to Mexico. One species, *A. pusillum*, however, is indigenous to the coniferous forests of the northeastern United States and Ontario. During the past summer the writer had the opportunity of observing a considerable number of growths of this parasite in Mackinac and Chippewa counties in the upper peninsula of Michigan and between the Canadian "Soo" and North Bay, Ontario. This species ranges from Minnesota eastward through Michigan and Ontario to Maine, New Hampshire, Connecticut and New York. The hosts which have been observed or reported are chiefly the spruces (*Picea mariana*, *P. canadensis* and *P. rubra*). Tamarack (*Larix laricina*) has also been reported in a few instances. From observations made it would seem that the black spruce (*Picea mariana*), is the principal host in Michigan and adjacent Ontario as all specimens found were on that species. It does not appear that Larix is especially susceptable. In two places tamarack trees were found growing so close to infected spruces that their branches intermingled, but, while the spruces were badly infested, the tamarack showed no evidence of the parasite even where some of the branches were in contact with a "broom" on the spruce. Similar observation was made in the case of white cedar (*Thuja occidentalis*). This plant, however, has, so far as the writer knows, never been noted as a host for *Arceuthobium pusillum*. Young and old trees seem to suffer alike from the parasite inasmuch as plants of all ages were found attacked. The parasite is able to germinate only on the younger shoots. The stems of the parasite have been reported as developing only on the upper sides of the host branches, but, while this is true in some instances, they may develop

from all sides of the branch and in the plants observed showed no tropic curvatures except in older plants bearing fruit.

The plants of *Arceuthobium pusillum*, which are olivaceous or brownish in color, are the smallest of the American species, ranging in length from two to twenty millimeters. The stems are simple or bear very short branches. They never develop the tufted appearance so characteristic of the larger western species. The stems are four-angled (often obscurely so in fresh young plants) and bear very small, inconspicuous, opposite, connate and obtuse or slightly pointed leaves. The staminate plants are commonly smaller and less robust than the pistillate. The sessile staminate flowers are two millimeters or less broad and borne two at a node with two or three ovate, fleshy calyx lobes spreading from a triangular disc. The sessile, one-celled anthers, which open transversely, are borne near the middle of the calyx lobes. The laterally compressed pistillate flowers, which are about 1.5 millimeters long, are borne on very short pedicels which elongate and become somewhat reflexed in fruit. The ovary is enclosed by the calyx tube which is two-parted at the top. The stigma is globose-pointed. The ovoid fruit becomes about three millimeters long and is an attractively bluish color. The seeds of Arceuthobium are explosively discharged to a considerable distance. Peirce observed seeds discharged to a distance of fifteen feet in a western species and believed they might be thrown to a much greater distance under proper conditions. The seeds are enclosed in a gelatinous mass when discharged which enables them to adhere to the host.

Fig. 1—A witches broom produced by *Arceuthobium pusillum* on a young black spruce near Spanish river, Ontario.

Fig. 2—A black spruce badly infested with *Arceuthobium pusillum* found near St. Ignace' Michigan. Note the large "brooms" and the dying condition of the host.

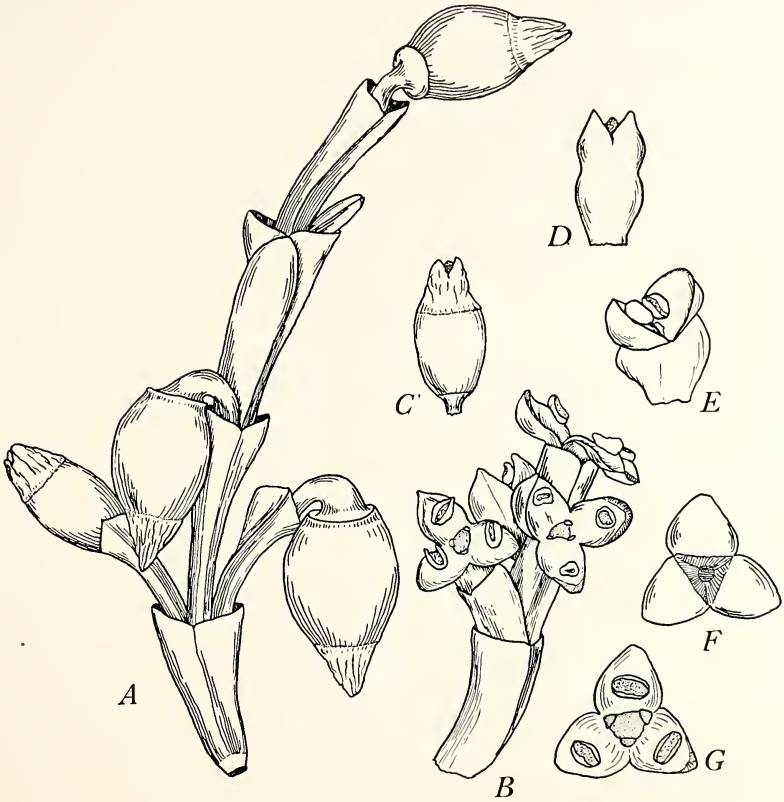

Fig. 3—*Arceuthobium pusillum* x5. A—fruiting plant; B—staminate plant; C—young fruit; D—pistillate flower; E—2-parted staminate flower; F—bottom view of staminate flower; G—top view of staminate flower.