

On the Resin Ducts in the Leaf of *Picea brachytyla*, Pritzel.

BY

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With one figure in the text.

Picea brachytyla, Pritzel*, one of the flat-leaved Spruces of Western China, has now been in cultivation for a number of years; but, as all who have studied Conifers will admit, it is by no means an easy matter to identify specimens of this *Picea*, with any degree of certainty, by its vegetative characters alone. The difficulty of separating this species from *Picea complanata* is a case in point, and it is recorded that Franchet himself referred a specimen of the latter to his "*Abies brachytyla*."

This difficulty of accurately placing a non-fruited specimen is not confined to *Picea brachytyla* alone, but, if the unusual anatomical feature which has come under the observation of the writer, and which forms the subject of this note, should prove to be constant in the species, this problem of identification, in the case of *Picea brachytyla* at least, ought to be the more easily solved.

In the leaves of *Piceas*, belonging to the *Omorica* section, there are, as is well known, two laterally placed, marginal resin ducts, which extend from the base of the leaf throughout its whole length, terminating abruptly immediately behind the apex. These resin passages are in contact with, or may be partially enclosed by, the hypoderm of the under side of the leaf.

The more minute details of their morphology need not be discussed here, since the chief purpose of this paper is to call attention to the diagnostic feature referred to above, which has apparently been overlooked in the past, since no reference to it can be found in the literature appertaining to this species.

Some little time ago, while examining microscopic preparations of the leaves of *Picea brachytyla*, grown in the Royal Botanic Garden from seed collected in Western Hupeh by the Veitch Expedition in 1900, it was noticed that in transverse sections, cut from near the base of the leaf, there were four resin ducts visible,

* See *Plantae Wilsonianae*, vol. ii (1914), p. 33.

in place of the usual two, and that these were in pairs, occupying the normal position below the lower epidermis (Fig. 1a). The outer duct of each pair was slightly smaller than the inner one, and both were surrounded by moderately thick-walled cells, continuous with the hypoderm. These "twin" resin ducts gave to the leaf section a very striking appearance, forming a marked contrast to the normal arrangement found in all other flat-leaved Spruces.

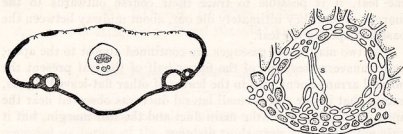


FIG. 1.—(a) Diagram of a transverse section of a leaf of *Picea brachytyla*, showing the paired resin ducts. \times about 30.

(b) Transverse section of a resin passage, showing the origin of the secondary ducts, the septum. \times about 100.

In order to test the constancy of this feature, and thereby form an estimate of its possible value as a specific indicator, similar preparations were made from the leaves of a herbarium specimen of a native plant of *brachytyla*, collected by Wilson in Western Hupeh, and bearing the number 1896. Here, as in the cultivated plant, a similar duplication of the resin ducts was observed. An examination of the leaves of a fruiting specimen grown in Ireland furnished additional evidence of the universality of the phenomenon, while indicating further that it is not confined entirely to the leaves of non-fruiting branches.

Unfortunately, it was not possible to extend the investigation to include the type and co-types of the species, as these were not available; but in the leaves of all plants that were examined, the doubling of the resin passages had taken place, forming an unmistakable feature of the transverse section.

The morphological origin of these secondary resin ducts is interesting and has been worked out in detail by means of serial sections. In those sections cut across the leaf immediately above its constricted base, only two resin passages were visible; but at a point about 1 or 2 mm. distant from the base, the outer, secondary ducts take their origin from the primary ducts by a process of division. The first indication of this division is the production of a partial septum, formed by the elements of the epithelial layer, which have extended inwards at two points. By the subsequent growth in length of the cells composing the two

portions of this incomplete septum, the projecting parts become united, and the division of the resin passage longitudinally is accomplished. This stage is represented in Fig. 1b.

The paired resin ducts, separated only by the septum, remain in close contact with each other, running parallel through the leaf for about one third of its length; but beyond this point, the secondary ducts diverge in a lateral direction, away from the parent ducts, and in successive sections cut through this region of the leaf, it is possible to trace their course outwards to the margin, where they ultimately die out, about midway between the base and apex of the leaf.

The two main resin passages are continued almost to the apex, and transverse sections of the upper half of the leaf present the normal arrangement seen in the leaves of other flat-leaved *Piceas*, except that in one case a small lateral duct was observed near the apex, midway between the main duct and the leaf margin, but it only extended for a very short distance.

Why the leaves of *Picea brachytyla* should possess this peculiar feature of paired resin ducts it is not easy to say; but it is a structural phenomenon which has every appearance of being constant in the species, and, so far as is known, it is not found in any other species of *Picea*.

While it is recognised that in many plants anatomical differences have a questionable taxonomic value, yet in the genus *Abies*, the position of the resin canals in the leaf is often made a deciding factor in the identification of a species, and it is suggested, on this analogy, that the unusual arrangement of the resin ducts in the leaf of *Picea brachytyla* might also be used with advantage as an aid to diagnosis in doubtful cases.