

BISPORANGIATE INFLORESCENCES IN PSEUDOTSUGA.

E. W. LITTLEFIELD,

New York Conservation Department, Albany, N. Y.

In June, 1926, while examining some Douglas fir trees, (*Pseudotsuga taxifolia*, Britton) about fifteen years of age, on the grounds back of the State Capitol at Albany, N. Y., the writer noted, on one, some inflorescences which, although growing in normal position among other pistillate flowers, had an abnormal appearance. Specimens were accordingly collected and examined more closely with regard to the arrangement and structure of the various parts.

The strobili in question bore normal, ovulate scales, with bracts, on the upper portion, and staminate structures on the lower half of the axis. They were not so well developed as the normal pistillate flowers found on the same and neighboring trees, the largest measuring only 25 mm. in length, of which the lower 10 mm. were occupied by the stamens.

The sporophylls, both macro- and micro-, at the upper and lower extremities respectively, of the axis, appeared entirely normal in size and structure. Along the mid-section of the axis, however, sporophylls were found which apparently constituted transitional structures. In some cases there were normally shaped ovuliferous scales which, however, bore ovules that were distorted and apparently abortive; in others, the entire sporophyll was abnormal, with a scale-like structure at the base, surmounted by a poorly developed stamen, with an elongated spur.

During the past few years, as time permitted, the writer has examined the literature on this subject, without finding any previously recorded observation of this kind relative to *Pseudotsuga*. Similar occurrences in the case of a number of other conifers, however, have been reported. Dickson (1) described such inflorescences for *Picea Abies*. Bisporangiate cones on *Sequoia* were reported by Shaw (2). Fisher (3) observed abnormal cones on *Pinus laricio* which, though in the normal position of the staminate flower, had staminate structures only on the lower four-fifths of the axis, with pistillate

on the remainder. Kirkwood's (4) description of bisporangiate flowers on *Larix occidentalis* is almost parallel to the condition described in this paper on *Pseudotsuga* except that in the former, the abnormal cones were as large as the normal ovuliferous ones. Dallimore and Jackson (5) mention the occurrence of bisexual cones in the case of *Pinus thunbergii*, though not giving a specific authority for the observation.

The writers cited above agree for the most part in their interpretation of the phenomenon of bisexuality in conifers, namely, as exemplifying the homology of the stamen with the bract of the carpellate cone. Kirkwood cites Coulter and Chamberlain's well-known work on "The Morphology of Gymnosperms" in this regard. Fisher (loc. cit.) goes further and takes up the discussion relative to the homology of the ovuliferous scale. In this he favors the theory that the scale is a secondary structure developed as a ligulate or chalazal outgrowth of the carpellate bract, citing a previous paper by Bessey in support of this attitude.

More recently, Schaffner (6) has discussed in considerable detail the matter of sexual reversal in monoecious inflorescences. Although this writer does not touch directly upon conifers, the paper cited has some bearing on the principles involved in the occasional development of bisexual cones in the Coniferæ and is of still further interest by reason of a description which is given of a bisexual catkin of *Salix amygdaloides*. Although this was considered as being essentially a staminate catkin, the arrangement of the organs was the same as found in similar inflorescences among the conifers, the pistillate appearing on the upper and the staminate on the lower part of the axis with various transitional structures between. A more complete description of the finding of this and other sexual phenomena in *Salix* is given by the same author in a previous paper (7).

- (1) Trans. Edin. Bot. Soc. 6: 418-422, 1860.
- (2) Bot. Gaz. 21: 332-339, 1896.
- (3) Ohio Nat. 6: 396-397, 1905.
- (4) Bot. Gaz. 61: 256-257, 1916.
- (5) Handbook of Coniferæ: 466, London, 1923.
- (6) Ohio Jour. Sci. 21: 185-200, 1921.
- (7) Ohio Jour. Sci. 19: 409-416, 1919.