NOTES ¹.

CHANGES IN THE SEX OF WILLOWS.—In the genus *Salix* flowers of both sexes are occasionally present in the same catkin, and one sometimes finds that the sexual organs are intermediate in structure between stamens and carpels. By using the published records, and by availing myself of the large accumulation of material for study in the Herbaria at Kew, Cambridge, in the British Museum, and at the Jardin des Plantes, Paris, I have gathered together a number of facts which may be of interest.

Firstly, it is obvious that these abnormalities, though widely distributed in the species of *Salix*, are much more common in some sections than in others. The section *Capreae* yields by far the greatest number; and second to it comes the section *Fragiles*. In dwarf willows they seem to be very rare, and in the section *Glaciales* I have only found one abnormal catkin.

Secondly, we notice that, though the two-staminal willows yield most freely these abnormalities, those in which the male flowers possess more than two stamens sometimes show them. I can instance *S. pentandra* and *S. humboldtiana*.

That the male organs or the female organs are produced from the same rudiments is extremely probable; and in the normal *Salix* we have an unisexual flower, which cannot, as in most Phanerogams, be shown to have had an origin from a hermaphrodite flower by abortion of one sex. In these abnormal willows, while we readily follow the change of the two stamens of one of the *Capreae* or *Purpureae* into the two carpels, it is not so easy to say what happens when five or more stamens have to be replaced by two carpels.

¹ These Notes are abstracts of papers read before Section K of the British Association, at the Bristol Meeting, September, 1898.

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Lastly, of the several theories thus far proposed to account for the occurrence of the abnormalities, none is capable of wide application.

Sometimes the abnormalities reappear year after year; sometimes they prove inconstant. Had we a fuller knowledge, some explanation, partial or complete, might be forthcoming; for frequently, both in their distribution in the catkin and on the branch, the changes in sex show a tendency to arrangement. At times the male is above the female; at times the reverse is the case. Rarely there are three or four belts of flowers on one catkin, male succeeding female, and female male, in definite order.

ROYAL GARDENS, KEW.

I. H. BURKILL.

THE ANATOMY OF THE STEM OF SPECIES OF LYCOPODIUM.—Ten species of *Lycopodium* have been examined; among these two types may be distinguished.

1. Type of *L. clavatum* (L.). The oval stelic arrangement is marked by a considerable amount of xylem, broken up into patches by bands of phloem. Centrally these bands are strap-shaped, but at the ends of the long axes the areas of phloem are external, and occur as curved and flattened wedges. Large cells without contents, sieve-tubes, appear in the centre of the strap-shaped bands. Protophloems and protoxylems are external, forming a continuous ring, as figured by Hofmeister; so that, using De Bary's terminology, the arrangement of the bundles is radial. Pericyclic and the so-called endodermal cells occur in concentric zones, 1-3 cells broad. The former swell up, especially in glycerine or glycerine-jelly; the latter are generally considerably lignified. The cells of the cortex lying just external to the endodermal cells are thickened and lignified, forming a third concentric zone several cells deep. To this type conform *L. alpinum* (L.), *L. Phlegmaria* (L.), *L. dendroides* (?), and *L. cernuum* (L.).

2. Type of *L. squarrosum*. The type which contrasts most markedly with the former is found in *L. squarrosum* (Forst.), *L. dichotomum* (Jacq.), and *L. nummularifolium* (Blume). The phloems occur as islands in the sea of xylem, or as inserted peninsulas. The phloems are centrally built up, with the apparent sieve-tubes in the centre. Protoxylems are well marked, and lie externally, but protophloems are not to be distinguished. Endodermal cells and pericycle are found as in the previous type. The sclerenchymatous sheath is wanting, or very slightly developed.

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