NOTES.

NOTE ON AN ABNORMAL PROTHALLUS OF *PINUS MARITIMA*, L.

—A large number of Pine prothalli were collected during October and November, 1911, with the object of making a comparative study of certain fixing agents, and of various methods of treating fixed material prior to embedding. Only a small part of this material has at present been sectioned, but in clearing it was noticed that one prothallus was quite different in structure to all the rest. This was embedded separately.

Externally, this prothallus was of about the normal size, but instead of showing the usual terminal group of two or three archegonia, there were two lateral groups of two archegonia each. The two groups were only slightly separated, and were almost, but not quite, in the same longitudinal plane.

In sectioning, great care was taken in orienting the material so as to get a median longitudinal section of the prothallus which should pass as nearly as possible through the median plane of each archegonium. For it to do so exactly was impossible, owing to the arrangement of the archegonia as described above, but the accompanying drawing was made almost entirely from one section, the details of the lower archegonia, however, being filled in from adjacent sections.

The prothallus was fixed on Nov. 5, 1911, in the following solution:

Picric acid, saturated solution in 50 per cent. alcohol, 100 c.c.

Glacial acetic acid 5 c.c.

Mercuric chloride 5 grammes.

washed in 50 per cent. alcohol, and embedded through cedar-wood oil.

The structure of the prothallus, as seen in section, is sufficiently explained by the drawing.

As far as the writer is aware, no case is recorded of a prothallus of any of the Abietineae which bears only lateral archegonia. The nearest is that figured and described by Miss Ferguson in *Pinus montana uncinata*, which formed archegonia *not only at the top*, but also along the sides of the prothallus, so arranged as to suggest a cock's comb.

The case here described, however, differs fundamentally from Miss Ferguson's in the *entire absence of apical archegonia*. Its chief interest lies in the resemblance to certain other groups—Araucarineae, Sequoiineae, and Callitrineae—in which lateral archegonia are the rule, and terminal archegonia entirely absent, except in Araucarineae, where they may apparently occur as well, especially in *Araucaria*. The resemblance is not a very close one, since in these tribes the archegonia may be, and often are, deep-seated; but this condition is paralleled in other recorded cases in the Abietineae. Here, however, there is no tendency for the archegonia to become embedded, each of

Section of Abnormal Prothallus of *Pinus maritima*, L.

the four being, in fact, less deeply sunk below the surface than in an average terminal archegonium of the same age, the neck being only a few microns from the megaspore membrane. The megaspore membrane seems to be fairly uniform over the whole of the prothallus, instead of being thinner over the apex as is normally the case, and is seen to be stretched over the depressions leading to the necks, instead of following the cell outlines.

The question naturally arises whether this lateral position of archegonia in *Pinus*, perhaps the most stereotyped of all Conifers in the details of its development, is to be regarded as a reversion to an ancient type, a new departure of the nature of a 'freak' or 'mutation', or a pathological condition induced by injury. As regards the last suggestion, it may be dismissed at once. Collections were only made from properly grown and uninjured ovules in healthy-looking cones, and neither before nor after sectioning was any trace seen of injury at or near the apex of the prothallus. The slight crushing seen in and near the two lower archegonia was almost certainly caused in dissecting out the prothallus for fixing. Between the two remaining alternatives it is not easy to decide. Most of the workers on the genera of Conifers with normally lateral archegonia (including the present writer) have regarded this feature as an ancient or 'reversionary' character, but the evidence is perhaps not very conclusive. In the only Cycad with lateral archegonia, the genus in which they occur appears in some other respects the most specialized member of the group.

Of all groups of plants the Conifers are probably the most puzzling in the apparent association of both 'ancient' and relatively 'modern' characters in the same plant, and it must not be hastily assumed, because lateral archegonia are associated in Araucarians with some undoubtedly ancient characters, anatomical and otherwise, that they therefore constitute a primitive feature. The discovery of wholly lateral archegonia in another tribe of Pinaceae may probably be best regarded in the present instance as rather of the nature of a 'mutation' than a 'reversion'; if so, it lends support to the view that the condition is a modern specialized one. This view certainly does not simplify the already rather complicated problem presented by the Araucarians, but if applied to the Callitricheae, it brings this character into better agreement with the reduced cones and male gametophyte, and other 'modern' characters which need not be further specified. In *Sequoia* the other evidence is also conflicting and therefore does not largely affect the problem one way or the other.

The view suggested is put forward tentatively, but in any case it seems clear that the abnormal prothallus, here described, must be taken into consideration as one link in a chain of evidence, not yet completed, which will eventually settle the question of the 'primitive' or 'specialized' nature of lateral archegonia in Conifers. Further investigation of the Araucarineae on the one hand, and of the Callitricheae on the other, is likely to shed considerable light on the problem.

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