NOTES.

TERATOLOGICAL PHENOMENA IN THE INFLORESCENCES OF FAGUS SYLVATICA.—While examining some specimens collected for class purposes, Mr. B. H. Bentley observed on the cupules of several of the female inflorescences of the Beech some small flowers approximating both in size and structure to the male flowers of the same tree. He pointed out the occurrence to the writer and at the same time very kindly suggested that a further examination might reveal some details of interest. Material was therefore collected from various parts of the Sheffield district, and the following observations were made in the course of the examination. It is possible that the phenomena here described have been noted before, but in the limited literature available only one relevant reference was found besides the description in Eichler's 'Blüthendiagramme', viz. a note describing a hermaphrodite flower of the Beech, by Schnizlein.¹

The whole of the material was gathered at the end of May and the commencement of June, from trees growing in soil overlying the Coal Measures and Millstone Grit.

The abnormalities observed may be grouped as follows:

1. Inflorescences wholly female, but bearing either a greater or lesser number of flowers than the normal.
2. Inflorescences (with either the normal or abnormal number of female flowers) bearing hermaphrodite and male flowers. (Androgynous.)
3. Inflorescences with no normal female flowers, and showing a marked tendency towards transition to male inflorescence structure. (Transitional.)

From four to six complete foliage leaves are found on the young shoots, whether these be laterally or terminally situated on the branch. The lowest two or three leaves of the shoot usually bear male, the next one or two leaves female, inflorescences in their axils. Higher leaves subtend foliage buds.

The following data may serve to indicate the frequency of the various abnormalities. The last (distal) inflorescence on the shoot is called terminal; the next lower down, lateral.

Of 100 terminal inflorescences gathered indiscriminately from 10 trees at Grindleford, 91 had normal structure, 1 bore only one female flower, 8 were androgynous.

Of 100 lateral inflorescences from the same trees, 75 were normal, 16 androgynous, 9 transitional.

Material from Ecclesall (terminals and laterals not kept separate).

¹ A. Schnizlein: Zwitterblüthen von *Fagus sylvatica*. Bot. Zeit., 1850.

Of 49 inflorescences from one tree, there were 30 normal, 15 with three female flowers per cupule, 2 with four female flowers per cupule, 4 androgynous.

Of 106 inflorescences from another tree, 99 were normal, 1 with only one female flower, 5 androgynous, 1 transitional. So that of 355 inflorescences examined, 17 per cent. were abnormal in some way. It will be noted that in the case where the laterals were kept separate from the terminals, 25 per cent. of the former bore male flowers as compared with 8 per cent. in the latter.

The extra female flowers of the first group are most commonly situated at, or slightly above, the level of the normal pair. They are of exactly the same structure

FIG. 1. 1, normal female flower; 2, rudimentary hermaphrodite flower with inferior ovary; 3, male flower with vestigial pistil, the latter having a superior ovary and two styler arms; 4, male flower with androecium only; 5, vertical section of androgynous inflorescence with rudimentary hermaphrodite flowers on inside lateral walls of cupule and male flowers terminally on same; 6, 7, 8, 9, diagrams of normal and abnormal female inflorescences showing relation of cupule segments to position and number of flowers (shaded); 10, vertical section of inflorescence whose diagram is represented in 9, taken through plane *xy*—vascular system as seen macroscopically, shaded; 11, diagram of theoretical inflorescence with seven possible flowers of dichasium present, see text. *o*. flower on upgrowth from centre of receptacle.

as these, although usually rather smaller in size. Regularly associated with the presence of one or two of such extra flowers is the further segmentation of the cupule. If three flowers are present the cupule is always five-partite, or with four flowers six-partite, as compared with the normal four segments.

From the diagrams 6, 7, 8, 9, Fig. 1, it will be seen that the place of fission of the cupule is to be correlated with the orientation of the flowers. It is usually the case that fission caused by the presence of an extra flower does not proceed so far towards the base of the cupule as do the normal four slits. In the normal inflorescence, however, the four fissures of the cupule do not extend to the same depth; the two situated in the plane of the axis seem invariably to extend the deeper. Whether this extra splitting of the cupule is a result of pressure on the part of the developing flowers, or whether it is due to some process of dialysis, remains obscure.

One isolated case was found, in a cupule with four flowers, in which the most centrally placed of these was situated on an upgrowth from the base of the cupule (see 9 and 10, Fig. 1). Here the distal portion of the upgrowth was continued laterally past the flower, giving rise to two structures of exactly the same nature as the exterior cupule segments. It may be stated here that all the flowers examined in the later stages proved to be abortive, although ovules were present, even in the rudimentary ones.

Androgynous Inflorescences.

In these a floral series may be present leading from normal female flowers on the one hand, through hermaphrodite forms with reduced androecium and a more or less rudimentary inferior ovary, to typical male flowers with or without a vestigial superior ovary and the full complement of stamens on the other (Fig. 1, 1, 2, 3 and 4). As described by Eichler,¹ the male flowers may or may not have such a vestigial pistil present within the perigone, and when it is present may vary in structure from the less reduced type, with three stylar arms and a slightly enlarged base representing the ovary, to the extremely reduced condition with two stylar arms and scarcely any enlargement of the basal ovarian portion. The degree of approximation of the extra flowers to the normal male or female type can be correlated with their position on the cupule. Thus one may say broadly that the higher the insertion of the flower on the cupule segment, the closer does it approach normal male structure. Fig. 1, 5, is a somewhat diagrammatic representation of an androgynous inflorescence with one female flower in the normal position: of the two rudimentary flowers on the lateral walls of the cupule, one is hermaphrodite, while terminally on the segments there are present several male flowers. The one on the right hand, although having a perigone and vestigial pistil, is destitute of stamens. No extra flowers were found on the outside lateral walls of the cupule in any of the material examined. The anthers of these flowers were all in the post-dehiscence stage at the time of examination, but they appeared to be of the normal build.

Transitional Inflorescences.

Fig. 2, 1, is a vertical section of a specimen with eighteen male flowers situated peripherally on the much-reduced cupule. The latter was unsegmented and the slight peripheral upgrowth surrounded a shallow depression in which were situated one hermaphrodite and one female flower, both being poorly developed. A curious stage is shown in Fig. 2, 2. The much-attenuated stalk, scarcely thicker than that of a normal male inflorescence, divided distally into two short arms, each of which terminated in a flower with a rather large perigone (*sic*) but entirely destitute of androecium and pistil. Numerous male flowers were clustered on each of the two arms (only a few of these are shown in the drawing).

FIG. 2. 1 and 2, transitional inflorescences; 3, weakly developed male do.

¹ Blüthendiagramme.

The chief points of interest resulting from the observations described above seem to be :

1. The frequency of the abnormalities ; whether this is peculiar to a particular year or to the locality in question remains to be seen.

2. The greater frequency of androgynous and transitional inflorescences in the lateral position. This seems to show that although normally the male and female zones of the fertile shoot are sharply delimited, yet there is frequently a tendency for the two to overlap, with, especially in the intermediate region, a consequent reversion of one or more of the inflorescences borne thereon to the probably original androgynous condition.

3. The presence of the flowers on the apices of the cupule segments. Worsdell¹ says that adventitious flowers are rare, and that their occurrence as enations from a leaf surface is entirely unknown. If the cupule segments of the Beech are to be considered as modified bracts or bracteoles, the presence upon them of adventitious flowers offers a parallel to the case of the Nepaul Barley, *Hordeum trifurcatum*, where flower rudiments arise on the inferior or superior paleae of the spikelet.²

4. The orientation of some of the extra flowers in the cupule may perhaps be correlated with the position of certain of the flowers of the original dichasium. Fig. 1, II, shows the possible arrangement of the flowers in a cupule with seven flowers of the dichasium present. Comparing the diagrams 6, 7, 8, and 9 with this, it will be seen that in diagram 7 the position of the extra flower may be correlated with that of flower No. 4, while the two extra ones of diagram 8 may be homologous with Nos. 4 and 5. The interpretation of the arrangement in diagram 9 is doubtful.

¹ Worsdell : Principles of Plant Teratology.

² Loc. cit.

L. W. COLE.

DEPT. OF BOTANY,
SHEFFIELD UNIVERSITY.

Cole, L. W. 1923. "Teratological phenomena in the inflorescences of *Fagus sylvatica*." *Annals of botany* 37, 147–150.

<https://doi.org/10.1093/oxfordjournals.aob.a089831>.

View This Item Online: <https://www.biodiversitylibrary.org/item/270686>

DOI: <https://doi.org/10.1093/oxfordjournals.aob.a089831>

Permalink: <https://www.biodiversitylibrary.org/partpdf/319074>

Holding Institution

New York Botanical Garden, LuEsther T. Mertz Library

Sponsored by

BHL-SIL-FEDLINK

Copyright & Reuse

Copyright Status: Public domain. The BHL considers that this work is no longer under copyright protection.

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.