

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 6

March, 1904

No. 63

PARTIAL REVERSION IN LEAVES OF THE FERN- LEAVED BEECH.

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THE European beech, *Fagus sylvatica*, has produced a number of varieties, of which several are in cultivation. These forms have almost surely originated by sudden saltatory changes; that is, by mutation. The varieties differ from the species in one or more characters which — at least in several of the varieties — may be transmitted by seed. The well-known purple beech is one of these offshoots from the specific stock. The original tree was discovered in Germany between the middle and the end of the eighteenth century, according to some, and in Loudon's day was said to be still standing. According to Loudon all the purple beeches cultivated in Europe in his time had been produced from this tree either by seed or by grafting. The seedlings come up tolerably true. Other varieties are *F. s. pendula*, *F. s. cristata* — the leaves small and tufted, the wood dark and curiously grained — and *F. s. asplenifolia*. The last named form, upon which some observations are made below, according to De Vries may be propagated by seed. It differs from the species in having narrowly elliptical or lanceolate leaves, variously cut, while the leaves of the species are, as a rule, broad and almost or quite entire. This form has originated, with little doubt, by mutation from the older type. Such "sports" are of special interest to students of evolution for the light they may possibly throw upon evolutionary processes.

One of the chief problems to be solved in working out the origin of species is whether new races arise by the accumulation of slight variations, or whether the alterations are more violent and sudden, so that new species are abruptly created with differentiating characters

fully formed. It is certain that now and again new races do appear suddenly. Many of them come reasonably true to seed; and in this fact lies an argument for the stability of the new forms. Nevertheless the period during which such matters have been subjects of inquiry is not long. What the results of protracted breeding experiments may be is as yet problematical. Granting that the newly appearing, or as they are called *mutational*, characters have a certain force as hereditary factors, it is yet to be ascertained whether the races produced by mutation do not of themselves ultimately return to the "normal," or original, type. If we conceive that the change of outward characters which signifies the occurrence of a mutation is the visible expression of an inversion or derangement of the constituents of the complex substance controlling the development of form, and in reproduction serving as the vehicle of hereditary traits, then it seems possible that after a time these constituents may regain their previous, or normal, arrangement and in consequence the original external characters be restored.¹

The tendency of *Fagus sylvatica asplenifolia* to revert in certain parts is well known. De Vries speaks of frequent atavistic bud variation.² Carrière³ figures a young shoot on one side of which all the branches bore exclusively leaves of the specific form. A tree growing at North Easton, Massachusetts, has manifested a still further localized and restricted resumption of original characters. Atavism has appeared not in one branch, or one bud, but in a part of a leaf, in many instances. In most cases about one quarter to one third of the lamina was thus affected, usually in the proximal part, occasionally in the distal, on one side or other of the midrib. These leaves were unsymmetrically developed, as will be seen from the accompanying figure, through overgrowth of particular regions of the blade. The unusual portions had entire or at most somewhat dentate margins. When the blades were applied to blades of the same length taken from the species, so that bases, apices, and midribs coincided as nearly as possible, the margins of the overgrown parts

¹ Students of our native flora may render good service to science by reporting and describing aberrant forms and by cultural experiments. Careful notes contributed to botanical journals would be of much value. Careful and full records of how the new or unusual forms behave in prolonged vegetative reproduction, in propagation by seed after pollination by their own pollen and after cross-pollination with the normal forms, are especially desired.

² De Vries, *Die Mutationstheorie*, I: 488.

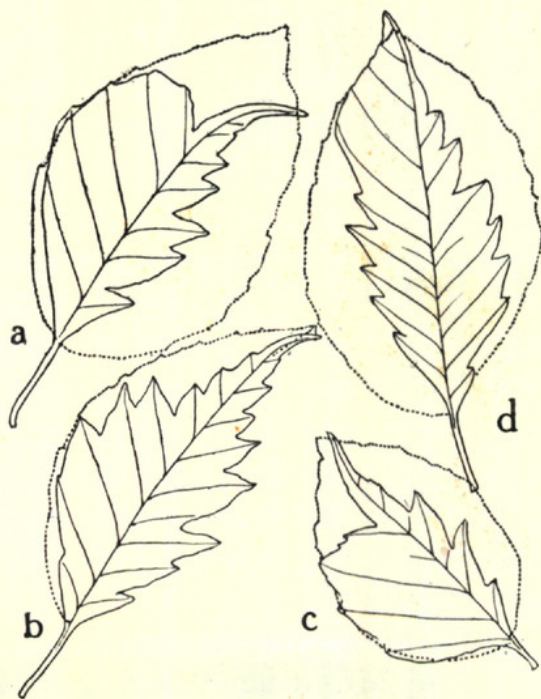
³ Carrière, *Production et Fixation des Variétés* (Paris 1865), p. 49.

of the varietal laminae very nearly coincided with the margins of the corresponding parts of the specific laminae. In lateral extent, in the angle between margin and midrib, and in the character of the margin, the parts in question agree nearly with parts similarly situated in leaves of the original type. There is therefore no doubt that we are here dealing with a reversion.

In the Figure — the original drawing for which was traced from the leaves themselves — the abnormal leaves of the variety are delineated in continuous line, the applied specific leaves in broken line. In the specimens as placed the right side of the lamina is true to the varietal type, showing the somewhat fern-like margin to which the variety owes its designation, *asplenifolia*. Specimens *a*, *b*, *c* have the proximal half or more of the left side extended to the limits habitual in the specific form, while the remainder is contracted in the manner of the variety. In specimens *a* and *c* the transition from one character to the other is abrupt; in *b*, gradual. In specimen *d* the region of disturbance is distal and includes not more than one eighth of the entire blade; in this part, however, the margin of the ancestral form is exactly matched except at the very apex of the blade, where the attenuation characteristic of the variety appears.

The sudden transition seen in specimens *a* and *c* is especially interesting and noteworthy.

It is to be observed that, as a close examination of the figure will show, the restoration of the original form is in no case perfect. While the old — the specific — predominates in a remarkable degree, the new is evidenced in some way in each atavistic section, either at the apex, as in *d*, or at the base, as in *a-c*, or throughout, as in *b*.



Both old and new form-giving factors are present and operative at once in the same field, and the actual figure imparted is a resultant. Whether reversions ever reproduce past and now relinquished structures with entire exactness is at least questionable.

Many leaves of the tree mentioned were of the same dual character as those here figured. In each blade as a whole the varietal character predominated, while partial atavism when present was shown in various degree. The examples found were not confined to a few branches but were well scattered, and occurred without any apparent rule.

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NOTEWORTHY PLANTS OF SOUTHEASTERN CONNECTICUT,—IV.

C. B. GRAVES.

Sisyrinchium intermedium Bicknell. This species is represented in my herbarium by two collections: Ledyard, near Pine Swamp, June 7th, 1897, and New London, field near Ocean Beach, June 28th, 1902. The specimens differ from material at the Gray Herbarium, named by Mr. Bicknell, only in the color of the spathes which are greenish rather than purplish.

Sisyrinchium albidum Raf. A single plant of this species was collected May 27th, 1889, by Miss Ellen Coit, of New London, in a field near the New London-Waterford line. It was probably a stray individual, introduced perhaps in seed. The plant was given to me in the fresh state, and since then has lain in my herbarium. Its identification has been verified by comparison with material at the Gray Herbarium.

Salix longifolia Muhl. This species was first reported from Connecticut by Mr. C. H. Bissell, who found it near Glastonbury beside the Connecticut River (RHODORA, IV, 99). It may be of interest also to note its occurrence farther down the river at Selden's Cove, where it is frequent on the sandy levels bordering the creek.

I am informed by Mr. M. L. Fernald that in the Herbarium of the Royal Gardens, Kew, there are two sheets of *S. longifolia* collected



Leavitt, R G . 1904. "PARTIAL REVERSION IN LEAVES OF THE FERN-LEAVED BEECH." *Rhodora* 6, 45–48.

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