

which was discovered by Mr. Jackson Dawson nine or ten years ago, was then the only one known in the United States or, indeed, on the continent. Up to this time the only contradiction to the current aphorism, "There are no heaths in America," came from Newfoundland, where *Calluna* was known to occur, although few botanists had ever seen specimens. It required some hardihood, as well as a clear conception of the causes which have ruled over the actual distribution of our species in former times, to pronounce that this Tewksbury patch of heath was indigenous. The discoveries, soon afterwards, in Nova Scotia and Cape Breton still left a wide hiatus. This was partially bridged over by the detection by Mr. Pickard, a Scotch gardener, of a similar very restricted station in Maine, on Cape Elizabeth, near Portland. We have now the satisfaction of recording a second station in Massachusetts, not far from the former one. Mr. James Mitchell, of Andover, is the present discoverer, and the station is in the western part of Andover, half a mile northeast of Haggett's Pond, and five miles north of the Tewksbury station. Mr. Mitchell accidentally met with this patch last summer, when berrying, and, being a Scotchman, recognized it, took home a sprig of it, and at a subsequent visit grubbed up one or two small plants, which a neighbor still has in cultivation. A fresh branch taken by him from the wild plants this summer is now before me. It proves to be of the green and smoothish variety of *Calluna*, precisely like the Tewksbury plant. Small as the new patch is said to be, "it will serve" to confirm the opinion long ago expressed; for a second station greatly diminishes the very small chance of its having been casually or in any way introduced through human agency. It should also be noted that this station, as I am informed by the Rev. Mr. Wright, is near by an extensive glacial moraine which traverses that district, and which he has traced for a great distance northward. — ASA GRAY.

HETEROMORPHISM IN *EPIGÆA*. — The May-flower, being more largely gathered and brought under our notice than any other wild blossom — at least in the Atlantic States — should be well known in all the details of structure. But it hardly is so. The structure of its stigma was first well described in the fifth edition of my Manual of the Botany of the Northern United States, and the likeness to *Pyrola* suggested. I suppose that this likeness is really one of relationship, but not of a near degree, as most other points of similarity are wanting. From the difference in the stigmas of different flowers, I was disposed to think that the five lobes lengthened and protruded with age, in the manner of *Pyrola*; but this does not prove to be the case. In all cases, however, the apex of the style is as it were hollowed out or extended into a ring, with a five-crenate border, to the inner face of which the five stigmas are adnate, each before one of the small teeth or lobes, and extending sometimes slightly beyond it, but remaining short and erect, sometimes much beyond and radiately expanded.



In Michaux's Flora is the note "Flores omnes in nonnullis individuis abortivi," and botanists are generally aware that fruit is seldom met with. The flowers have been said to be unisexual (dioecious); but all appear to have well formed ovary and ovules, although some individuals were known to want the stamens. Professor Goodale, knowing a station in Maine in which *Epigæa* year after year sets fruit, kindly procured from thence a large number of fresh specimens; and these I have now examined in regard to stamens and pistil. They show the following heteromorphous condition of things.

(1.) About ten per cent. of the specimens have a style considerably longer than the stamens, raising the stigmas a little out of the throat of the corolla, in which the anthers are included: the stigmas are cylindrical, radiate like the spokes of a wheel, half a line in length, therefore strongly projecting, moist and glutinous, and evidently in good condition for fertilization. The anthers in these flowers are slender, commonly withering without dehiscence, and containing few, yet perhaps well-formed, pollen-grains. The fruiting specimens gathered at the same station in former years all evidently belong to this form, as the persistent style and long stigmas show. One or two specimens of this form manifest a disposition to convert their anthers into petals; but this is occasionally seen in other forms.

(2.) A smaller number of specimens show the stigmas of the preceding on a shorter style, sometimes so short as to place the radiating stigmas as low as the middle of the tube of the corolla, sometimes bringing it nearly up to the throat. In one instance a short-styled flower was detected in a cluster of flowers otherwise of the character of No. 1. These short-styled blossoms, instead of having more conspicuous or higher anthers than in the long-styled, bear them either at the same proportional height and in the same condition, or bear mere rudiments of anthers, or not rarely none at all, and even the filaments are smaller, abortive, or occasionally altogether wanting. This sometimes happens in No. 1 also.

(3.) The larger number of flowers, perhaps three-fourths of the specimens under examination, have the long style of No. 1, an ovary equally well-formed and ovuliferous, but either rather smaller or not going on to grow; but the stigmas are short, only slightly projecting beyond the lobes of the cup to which they adhere, in all stages erect, and comparatively smooth and dry. Their tips, however, appear somewhat papillose under a strong lens, and grains of pollen placed thereon incline slightly to adhere, yet not so much as upon the surface of the style far below, which gets well covered with pollen from the contiguous anthers. The difference between these stigmas and those of the foregoing forms is striking and constant, no gradations between them having been detected. The anthers abound with pollen, and are dehiscent at or a little before the opening of the corolla.



(4.) A considerable number of such flowers have a shorter style, so that the stigma stands as low as the base of the five longer anthers, in one or two even lower than all the anthers; otherwise all is as in No. 3, of which this seems to be a mere variation. And here also, although not very definitely, there is a tendency to having lower instead of higher anthers in connection with the short style.

The flowers of *Epigæa* may therefore be classified into two kinds, each with two modifications; the two main kinds characterized by the nature and perfection of the stigma, along with more or less abortion of the stamens; their modifications, by the length of the style. The first is leading to dioicisism, the second points to dimorphism. I am not aware that either unisexual or dimorphous flowers are otherwise known in the *Ericaceæ*. Dimorphism (as exemplified in primroses, *Houstonia*, and *Mitchella*) may be regarded as the more perfect arrangement on the score of economy, as it secures cross-fertilization along with fertility of all the flowers. It would seem as if this had been attempted in *Epigæa*, but that the stamens did not respond with the requisite correlation to the long and short styles; and the same may be said of certain flowers in one or two other families. Of dichogamy, the other equally economical method, I find no indication in *Epigæa* blossoms. But they appear to be now falling back upon the remaining, less economical mode of securing the end, namely, by unisexual blossoms.

It would be interesting to know whether the small-stigma forms of *Epigæa* are ever fruitful, or fully so. It might not be difficult to ascertain the kind of flower in any case which has matured fruit; for the style and stigmas persist until the capsule is well formed in the fruit thus far known.

The æstivation of the corolla is that of the tribe, imbricated, but with a strong tendency to convolute; more commonly there is only one exterior and one interior lobe.

In reproducing from the *American Journal* this account in the NATURALIST, I have a special object, that of having search made this summer for fruiting specimens of all sorts. I should be glad to receive the fruit from various parts of the country, in order to ascertain, if possible, whether the short-stigma blossoms ever set seed, — as it seems likely they may, — and whether the seeds or capsules show any differences. In collecting and preserving fruiting specimens, care should be taken not to detach the style. — ASA GRAY.

BOTANICAL PAPERS IN RECENT PERIODICALS. — *Comptes rendus*, April 24th. Boussingault, On the Growth of Plants which have no Chlorophyll. Frémy and Dehérain, Researches in regard to the Sugar Beet. May 8th. Pasteur, Notes respecting Fermentation.

*Flora*, No. 14. Dr. Velten, The relation of Temperature to the Movement of Protoplasma. A. de Krempelhuber, Brazilian Lichens. No. 15. Dr. Chr. Luerksen, Notice of Wawra's Vascular Cryptogams. W. Nylander, New European Lichens.