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Observations on the flowering of *Lobelia cardinalis* and *Lobelia syphilitica*

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December 4th, 1901.—J. J. H. Teall, Esq., M.A., V.P.R.S.,
President, in the Chair.

The following communication was read:—

‘On a new Genus belonging to the Leperditiaæ, from the Cambrian Shales of Malvern.’ By Prof. Theodore Thomas Groom, M.A., D.Sc., F.G.S.

Forms referred to *Beyrichia* have long been known from the Cambrian beds of Scandinavia, Stockingford, and South Wales; and the writer has obtained from the lowest part of the Malvern Black Shales a species identical with the Stockingford form, which had been provisionally identified with the Swedish *Beyrichia Angelini*. The characters of these specimens serve to separate the species from those now placed under the genus *Beyrichia*, a conclusion in which Prof. T. Rupert Jones concurs. The specimens were obtained from Black Shales at the northern extremity of Chase End Hill, associated with *Acrotreta*, *Agnostus*, *Kutorgina pusilla*, and *Protospongia fenestrata*. The shales are nowhere actually exposed, and can only be reached by excavation. The specimens are frequently crushed and indented. The new genus appears to be most nearly related to those provided with broad lobes, such as *Klædenia*, *Beyrichia*, *Ctenobolina*, and *Tetradella*. Specimens obtained by Prof. Lapworth from the Oldbury Shales below the zone of *Sphaerophthalmus alatus* are also referred to the same genus and species. From Linnarsson's description of *Beyrichia Angelini* it would seem that this form may be related to the new genus, but it clearly belongs to a different species.

MISCELLANEOUS.

Observations on the Flowering of Lobelia cardinalis and Lobelia syphilitica. By THOMAS MEEHAN.

In my garden during the past year, 1900, I had some fifty plants each of *Lobelia syphilitica* and *Lobelia cardinalis* in rows side by side. They were so near each other that some of the flower-stems of the latter fell over and seemed to be blooming among the plants of the former. It surprised me one day to note that while numerous winged insects visited the blue-flowered species, none cared for the scarlet ones. This excited an interest that led to a continuous observation through the whole flowering-period. At no time did I see an insect-visitor on the cardinal flower, while every day the blue-flowered species had abundant attention. On one occasion I found a humming-bird, *Trochilus colubris*, at work on the cardinal flower, and the zest with which numerous flowers were examined by the bird attested to the presence of nectar, a fact which my own test subsequently verified. The bird is not numerous on my ground, and with an abundance of flowers of various kinds over many acres of ground, it may be inferred that it was not a frequent visitor to the cardinal flower. I observed it only on this occasion. It wholly neglected the blue-flowered species, that seemed so attractive to the insects. Toward the end of the season the foreman in charge, Mr. Hemming, captured specimens of all that were visitors to

Lobelia syphilitica during one day. These were identified by Mr. William J. Fox as follows:—*Xylocopa virginica*, *Bombus pennsylvanicus*, *Bombus fervidus*, *Bombus americanorum* var. *pallidus*, *Apis mellifera*, and a sand-wasp, *Scolia dubia*. It is worthy of note that the honey-bee did not visit the flowers till late in the season. About fifty yards away from these plants was a large bed of *Sedum spectabile*, which at the earlier stage of these observations were crowded by this well-known honey-gatherer. It may be inferred that as long as they lasted they collected all needed from these flowers. Honey-bees, at any rate, are not numerous in this vicinity.

At the end of the season no difference could be observed in the fertility of the two species. Every capsule seemed abundantly seed-bearing. The presence or absence of insect-visitors had no effect. Dissecting the flowers from time to time, and in various stages before and after anthesis, some original and interesting phenomena were observed. At the period when the anthers have reached their full development a rest is taken, apparently till the next day. Then the style elongates until it seems to be held fast by the united anther-cap. After a short rest it is again in motion, the anther-cells burst, and the pollen is ejected so forcibly through the crown as to sometimes cover the scarlet petals with powder. In the case of the blue-flowered species, bees occasionally get a portion of the pollen-shower.

Aside from the interesting fact in regard to the forcible ejection of the pollen, and the free fertility under self-fertilization—for, notwithstanding the freedom of insect-visitors, *Lobelia syphilitica* is absolutely self-fertilized—note may be taken of differing observations. Of *Lobelia fulgens*, which is essentially identical with *Lobelia cardinalis*, Mr. Darwin says, in his 'Cross and Self-fertilization in the Vegetable Kingdom': "This plant is never visited in my garden by bees, and is quite sterile; but in a nursery-garden at a few miles' distance I saw humble-bees visiting the flowers, and they produced some capsules." Mr. Darwin once stated that one might as well use organic dust as to endeavour to get seeds of *Linum perenne* by the aid of its own pollen. I found *Linum perenne* of our Rocky Mountains abundantly fertile with own-pollen, and said so in one of my papers. Mr. Darwin took this to be an attempt to discredit his observation, and naturally felt aggrieved. My thought is rather that plants and insects behave differently under different conditions, and that failure or facture in perfecting seeds should often be referred to phases of nutrition aside from the action of insects.

The facts here recorded afford a valuable lesson on this matter. *Lobelia syphilitica*, with its shorter and more open corolla, could be more easily rifled of its nectar, and as the flowers were in great abundance, and fresh flowers opened daily, the insects worked in the easiest lines. In the case of the *Sedum* it will also be noted that the bees continued their easier work on this, before seeking the more difficult *Lobelia*. The failure of Mr. Darwin's *Lobelia* to produce, while mine were fertile, is obviously due to nutritive conditions. He was mistaken in referring the failure to the absence of insects, but no one would for a moment discredit his observation.—*Proc. Acad. Nat. Sci. Philad.*, Feb. 1902, pp. 35, 36.