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Notes on the Pollination of Some Liliaceae and a Few Other Plants

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NOTES ON THE POLLINATION OF SOME LILIACEÆ AND A FEW OTHER PLANTS.

BY MARY C. ROLFS.

It will not be necessary in this connection to refer to the literature. This may be obtained from such works as Herman Mueller and Darcy W. Thompson. In the identification of insects help was obtained from Prof. Osborn and Miss Beach.

Erythonium albidum, Nuttall. This is the earliest of the *Liliaceæ* to come in flower, in fact one of the earliest of our spring flowers. Owing to numerous rains last spring it was difficult to study the species, and insect visitors were few. Flowers perfect. Nectar is secreted near the base of the inner divisions of the perianth. Two small beetles were found feeding near base of the perianth. Ants were found as incidental visitors often walking over stamens and pistil.

Visitors—HEMIPTERA—*Capsidae, Lygeus pratensis*, was also found in the flower. Mr. Charles Robertson reports twenty-two for Carlinville, Illinois.

Smilacina stellata, Desf. Found growing in low moist places. Flower perfect. Visited during early part of the day by flies feeding upon the pollen. The flowers opening in the early part of the spring, and are visited at first by *Diptera* almost entirely, but later its visitors were increased. The pistil has a three cleft stigma, ripens simultaneously with the stamens. They are of the same length. Insects in seeking the nectar, which is secreted at the base of the corolla, leave some of the pollen from another flower on the stigma.

Visitors— DIPTERA— *Muscidae: Musca domestica, Scatophago squalida, Tachina flavicaudla. Syrphidae:* Syrphus fly. *Bibionidae: Bibio albipennis Lyretta pipens* and *Mesograpta marginata* (feeding on the pollen), HYMENOPTERA *Apidae: Halictus albipennis, Halictus tegularia, H. zephyras. Nomada bisignata. Augochlora pura* and *Agapostemon radiatus* feeding on the nectar.

Polygonatum biflorum, Ell. Grows on shaded hillsides in large patches, perennial herb with simple curving stem, from creeping root stock. Flowers axillary greenish and nodding. Perianth cylindrical oblong, six lobed at summit. The six stamens are inserted on or near the middle of the segments of perianth, with introrse anthers. Style slender, obtuse, slightly three lobed stigma. Flower perfect. The perianth is about half an inch in length and the summit, or top of the tube, is filled by the anthers and pistil, thus warding off uninvited guests. The insect is guided to the flower by the odor and to the nectar by the slightly yellowish color near the base of the inner segments of the perianth. Insects feeding on the nectar alight on the flower and force their way to it by pushing aside the anthers; in so doing the pollen falls upon the insect, and, when it searches for food on some other plant, it comes in contact with the pistil and leaves some of the pollen. It is mostly visited by large insects, such as the bumble bee.

Visitors—HYMENOPTERA—*Apidæ: Bombus Americanus. B. vagans, Halictus coriaceus, H. fasciatæ, H. tegularia, Ceratina dupla. Stelis lateralis, Augochlora pura, Vespidæ: Odynerus foraminatus.* COLEOPTERA—*Capsidæ: Lygus pratensis*, feeding upon the pollen. DIPTERA—*Syrphidæ: Platycheirus hyperboreus*, feeding on pollen. LEPIDOPTERA—*Pamphila zabulun.*

Allium cepa. Flowers in umbels from a one or two-leaved spathe, which soon becomes dry. Flowers with a six parted perianth; segments white, with a single green rib or nerve. Stamens six, style slender with single stigma, which receives pollen from its own and neighboring stamens, but pollination is also often brought about by insects. The insects are attracted by color and the alliaceous odor which is peculiar to the plant.

Visitors—HYMENOPTERA—*Apidae: Bombus Americanus* hurriedly ran over several of the heads. *Megachile centuncularis* collected nectar and pollen. *Halictus coriaceus, H. gracilis* collecting nectar and pollen. DIPTERA *Muscidae Musca domestica. Tachina flavicaulda. Syrphidae:* Syrphus fly, with two or three other species, all feeding on pollen and aiding in pollination.

Asparagus officicinatis. L In flower during the latter part of spring and in the early part of summer, but it also blossoms later in the season in August and September, when it produces but one kind of flower, and consequently no seeds are formed. The flowers are small, green and axillary. Perianth six parted, spreading above, six stamens attached to its base, anthers turned inwards, style short, stigma three cleft. Flowers are of two kinds; that is, it has both staminate and pistillate flowers. Rudimentary stamens are found in the pistillate flowers, and rudimentary pistil in the staminate flowers. Flowers have a pleasant odor, and in spite of their green color they can easily be seen at a distance, the male flower being more conspicuous than the female. The insect is first attracted to the male flower, after which it visits the female, and leaves some of the pollen which has adhered to its body, on the pistil; thus the flower is pollinated.

Visitors—HYMENOPTERA—*Apidae, Megachile centuncularis, Halictus tegularis, H. Cressonii, Agapostemon radiatus*, these are all the insects which I was able to secure or took note of. Hermann Mueller gives the following list: HYMENOPTERA—*Apidae: Apis mellifica, Osmia rufa, Prosopis ammilaris, Halictus sexnotatus*, collecting pollen and looking here and there in female flowers, and effecting pollination occasionally.

COMPOSITÆ.

Helianthus annuus, L. In Compositæ the flowers, being in such close proximity, it is not difficult for pollination to take place. The flowers of sunflowers are perfect, but proterandrous. The insect creeps over the head and thus causes pollination. It also, in its efforts to obtain honey, dusts some pollen on its head and thus carries it to another flower.

Visitors—HYMENOPTERA *Apidæ: Apis mellifica* collecting pollen and nectar. *Megachile centuncularis*, collecting pollen. *Nomada luteola. Perdita sp. Eucera sp.*

Helianthus tuberosus, L. Visitors—LEPIDIPTERA—*Chryspophanus thoe.* DIPTERA — *Bombylidæ: Bombylius.* HYMENOPTERA—*Apidæ: Nomada luteola*, gathering honey. *Halictus Leronxii. Melissodes perplexa*, gathering pollen and sucking honey. *Vespidæ: Odyneris foraminatus.*

Solidago speciosa. Nutt. Visitors—HYMENOPTERA— *Apidae: Bombus Virginicus*, sucking honey *Apis mellifica* sucking honey (quite abundant.) *Halictus coriaceus, Augochlora pura, Cilissa Americana, Caliopsis Andreniformis.*

Sphegidae: Crabro sp. *Ammophila conditor. Ichneumonidae: Tryphon* sp. *Lana montana (?) Coleoptera Meloidae: Epicauta Pennsylvanica* feeding on pollen. Hemiptera— *Phymata Wolfii. Diptera— Muscidae: Stomoxys. Mesograpta marginata.*

Cnicus altissimus. Willd. Var. *discolor*. Gray. Visitors. HYMENOPTERA— *Apidae: Bombus fervidus, B. Americanus, B. vagans. Megachile centuncularis Apis mellifica, Ceratina dupla, Melissodes bimaculata*.

MISCELLANEOUS PLANTS.

Polygonum acre. H. B. K. Small spiked flowers. Insects are attracted by its pinkish color. Flowers perfect.

Visitors—DIPTERA—*Muscidae: Calliphora vomitoria*. HYMENOPTERA— *Apidae; Halictus tegularis. Calliopsis andreniformis, Pimpla inquisitor. Sphegidae; Ammophila conditor*. HYMENOPTERA feed on honey secreted at the base of the corolla, while DIPTERA feed on both nectar and pollen.

Sedum Telephium, L. Flowers—compound cymes; petals white.

Visitors—HYMENOPTERA—*Apidae: Halictus tegularis, Sphegidæ; Ammophila conditor.*

Pontederia cordata L. Blue; spike dense, from a spathe-like bract. Perianth funnel form; two-lipped, three upper divisions united to form the three-lobed upper lip; the three lower ones spreading. The upper lobe of perianth is marked by a pair of yellow spots, which aid the insect in finding the nectar. Stamens six, the three anterior long, exserted; the posterior three with very short filaments unequally inserted lower down. Anthers versatile, oval and blue. Pistil one, with stigma turned upward.

Visitor—HYMENOPTERA—*Apidae: Halictus tegularis* feeding on nectar.

OBSERVATIONS ON THE POLLINATION OF SOME OF THE COMPOSITÆ.

BY MARY ALICE NICHOLS.

The brilliant appearance of our western roadsides and prairies from July to October, invites an extended study of the anatomy and physiology of the *Compositæ*. The wide distribution and rapid increase of this family naturally call attention to dissemination and pollination. Darwin, Herman Mueller, and others, have shown at length, the direct relation between special adaptations for cross-pollination and the race stability of plants. The question now arises, what are the opportunities for cross-pollination in *Compositae*, and to what extent is this agent a factor on the increase and distribution of the family? No attempt is here made to go into a discussion in full of these questions for the entire Family, but simply to present a few facts relative thereto, gathered from representatives of the subtribes *Helianthеae* and *Asterineae*.

A few observations on the common cultivated sunflower, *Helianthus annuus*, will apply equally well to all members of this conspicuous genus. First among these may be noted the mechanism of flowering. Immediately following the