

4. *Aids to Fertilization*.—The following aids to fertilization may be referred to here:

(1) Wind. Such plants are usually crowded together, (grasses) unattractive, and some bloom before the leaves appear (soft-maple).

(2) Insects. Flowers aided in this way possess attractive colors, perfume, and supply shelter in some cases, and food (honey) in others.

(3) Birds. Especially in the case of the humming-bird.

(4) Water. This is in the case of some water plants whose pistillate flowers are in the upper part and float above, while the staminate are below. At the proper time the staminate ripen, rise to the surface and bear pollen to the pistillate through the agency of currents.

5. *Nature of Flowers*.—We shall now examine the form and nature of flowers, and see to what extent they seem favorable to cross-fertilization.

(1) Monœcious flowers. These have the staminate and pistillate flowers on the same plant. Staminate refers to those bearing stamens and pistillate to those with pistils. In some cases they are near each other, while in others (Indian corn) far apart. Good examples of monœcious flowers are seen in the begonia, corn and pumpkin. Many a one looking forward to securing a fine crop of pumpkins, has been much disappointed to find autumn come without the golden fruit. Had he examined the plants in flower, he would have seen that they were nearly all staminate flowers and hence useless to bear fruit. No plant is more liable to cross than corn, no doubt on account of its wealth in pollen and the elevated position it occupies at the summit of the stalk, while the silken threads (portions of the pistil), indicate the pistillate flowers below. It would seem that monœcious plants are naturally to a considerable extent favorable to cross-fertilization.

(2) Dicecious. In this group you have some plants on which all the flowers are staminate, and others on which all are pistillate, consequently the source of pollen (stamens) is much removed from the pistils, and it would seem that cross-fertilization must take place. Willows, poplars, and often in the soft maple we see trees of this character; some with none but staminate, others pistillate flowers.

(3) Hermaphrodite. Here we have flowers each having stamens and pistils, and apparently fitted for self-fertilization, but even in this case you will observe conditions that seem adapted to prevent self-fertilization and be favorable to cross-fertilization.

(a) Dimorphic flowers are such that the stamens are much longer than the pistils, or the reverse, and consequently not well adapted to supply the pollen of a flower to its own pistil. Examples: *Primula* (primrose), *Sinum* (flax), *Mitchella* (partridge berry) and *Houstonia*.

(b) Dichogamous flowers have the stamens of a flower ripen before the pistils of the same, or the pistils ripen before the stamens. Examples of *Protandrous*, those on which the stamens are matured before the pistils, and consequently the pollen of such can only be of use in fertilizing the pistils of other flowers mature at that time:—*Campanula* (bell), *Gentiana* (gentians), *Verbena*, *Lobelia*, *Epilobium* (willow-herb) and flowers in the orders *Compositæ* and *Umbelliferae*. *Protogynous*, those in which pistils mature first: *Plantago* (plantain), *Scrophularia* (knotted figwort), *Anthoxanthenum* (sweet vernal grass), the interesting plant *Aristolochia* and the apple.