

## THE PSEUDO-MONOCLINISM OF CHIONANTHUS VIRGINICA.

ALFRED REHDER.

SOME years ago *Chionanthus virginica*, which though not native to New England is often cultivated for its ornamental qualities, attracted my attention by some peculiarities in its fruiting and flowering. I noticed that the shrubs in bloom presented noticeable differences in their appearance and that some shrubs bore fruit abundantly, while others had no fruit at all. An examination of the flowers of several shrubs showed some difference in their structure and as I could not remember any notice of it in botanical literature, I decided to make a closer investigation. I examined carefully the flowers of all the shrubs of the species growing in the Arnold Arboretum, of which 14 were planted in one group together, while one shrub was standing solitary some distance away from that group. I marked them all with numbers and took notes on the structure of the flowers of each one of the shrubs; besides those I observed two shrubs standing solitary in private gardens. As the chief difference between the flowers I found that one part had well developed stigmas and smaller anthers which did not open, but fell off still closed with the fading corolla, while others had a rudimentary stigma, though the ovary and the style seemed to be normal, and larger anthers shedding pollen freely; occasionally, however, I found among the first kind of flowers a few anthers which opened and discharged their pollen. Only four plants of all those observed belonged to the second kind and these four plants, as I found in comparing again my notes with the plants, when the fruits were ripening, bore not a single fruit, though all other shrubs surrounding them were loaded with fruits. The three solitary plants, which all belonged to the first kind, had only a few fruits; a small part of the flowers apparently had been fertilized by the occasionally appearing fertile anthers; the number of fruiting panicles in these plants was comparatively small and each panicle bore only 1 to 3, rarely more fruits, while the shrubs in the group mentioned above, which were growing side by side with pollen-bearing plants, had a very large



number of fruiting panicles and each one bore from 5 to 12 and occasionally even to 20 fruits.

The chief differences which show, however, intergradations between the staminate and the pistillate flowers, as they may be called, though the latter are not perfectly monoclinous, are the following —

*Pistillate flowers*: calyx with ovate to lance-ovate sepals, shorter than or as long as the style, petals generally smaller and narrower, usually about 20 mm. long; filaments elongated, about half as long as the anthers, these narrower, distinctly apiculate, exceeding the corolla tube, the anther-cells remaining closed; pistil with well developed stigma (fig. 2).

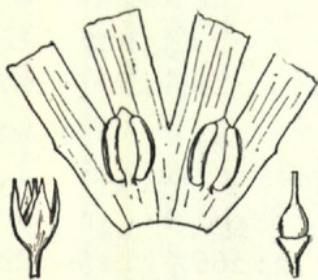


Fig. 1.

*Staminate flowers*: calyx with lanceolate sepals, longer than the style, petals generally longer and broader, attaining 28 mm. in length, stamens occasionally 3 or 4, filaments very short, anthers short-apiculate, 1.5–2 mm. long, not or slightly exceeding the corolla tube; pistil somewhat smaller with imperfectly developed stigma (fig. 1).

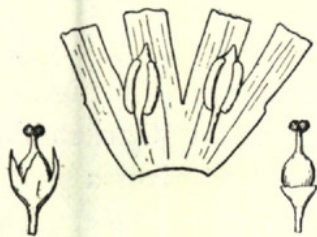


Fig. 2.

The ovary of the staminate plant, though somewhat slenderer, hardly differs from that of the pistillate plant and contains apparently well developed ovules. The anthers of the pistillate flowers also have the appearance of normal anthers, though somewhat narrower, and are filled with numerous pollen cells, but these differ from the normal ones in being somewhat smaller and nearly subglobose and I could not distinguish the granular struc-

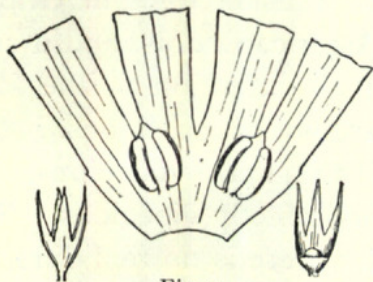


Fig. 3.

ture of the extine which can be observed in the normal ovoid anther cells.

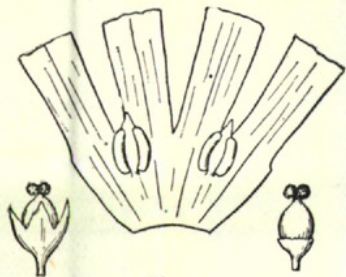


Fig. 4.

The panicles of the staminate plants are usually larger and more floriferous, and as the individual flowers have generally longer and broader petals, the staminate plants are more showy in bloom and therefore superior as an ornamental plant.

In the second species of the genus, *Chionanthus retusa*, Lindley &



Paxton,<sup>1</sup> the polygamy was observed by Maximowicz; the differences in this species are much more pronounced, because in the staminate flower the pistil is reduced to a small subglobose body, otherwise they are of the same character, as the accompanying illustrations (fig. 3 and 4) show. Also the anthers in the pistillate flowers seem to remain closed as far as can be judged from herbarium specimens.

In the literature of systematic botany I failed to find any reference to the polygamy of *Chionanthus virginica*; in the generic descriptions which include *C. retusa* the genus is characterized as having perfect or polygamous flowers, while *C. virginica* is always described with perfect flowers. The polygamy, however, has been observed before and the first notice of it I found in the Horticulturist of 1857 (12: 266), where Th. Meehan in an article on trees and shrubs with ornamental fruits makes the following remarks about the Fringe-tree: "Many trees do not bear and others imperfectly . . . for though it is classed . . . with the perfect flowering plants, it is in reality polygamous, as much so as the Ash." A similar statement in an unsigned note, probably also by Th. Meehan, appeared in the Gardeners' Monthly of 1885, (27: 228). Two years later Meehan<sup>2</sup> gives a short account of his observations on the polygamy in *Chionanthus virginica*, accompanied by two figures showing the different styles, and he remarks that Gray notes in "the later edition of his Manual" that *Chionanthus* is occasionally polygamous. I could, however, find no allusion to it in Gray's Manual nor in any of the more recent American floras, and it seemed to me therefore not useless to draw again attention to the fact that the flowers in *Chionanthus virginica* are not monoclinal, but are, what probably would be the best term for it, andro-dioecious, though they could be called perhaps as well imperfectly dioecious. These terms will apply to the whole genus, for there is no real difference between the two species in this respect, only the Asiatic species represents a more advanced state of dioecism.

ARNOLD ARBORETUM.

<sup>1</sup> Brit. Fl. Gard. 3: 85, f. 273 (1853).

*C. chinensis*, Maximowicz, Bull. Ac. Sci. St. Petersb. 20: 430; Mém. Biol. 3: 393 (1874).

<sup>2</sup> Proceed. Acad. Nat. Sci. Philad. 1887: 280 (1888).



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