# IRIS GENETICS

by A. H. Sturtevant

*Professor A. H. Sturtevant, Thomas Hunt Morgan Professor of Genetics, not only carries on an active research program with the famed Drosophila fly at Caltech, but manages to find time to carry out basic investigations on a very different form of living matter, irises. Actually, his scientific publications include investigations on heredity not only in flies and irises but also in moths, snails, evening primroses, rabbits, mice, race horses, and men.*

Several different groups of irises are widely grown as ornamental garden plants. In southern California many types are grown: the California natives, the Louisiana, the Dutch, the spuria, the stylosa or winter iris, and others. But here, as elsewhere, by far the most frequent type is the bearded iris—and it is with this group that I have been making genetic studies.

Iris genetics is slow. The minimum time from seed to seed is two years, and three or four years is not unusual. To one who has worked chiefly with Drosophila this requires patience; the difference between two weeks and two years is considerable! One may well ask—in fact many people *have* asked—why then would one study such an unfavorable organism?

Perhaps the real answer is that I like iris, and get a great deal of pleasure from the blooms that come in the spring. But I also have a few other reasons which are, I hope, more convincing to people who are not infected with the iris virus, as I am.

The old-fashioned "German irises" that our grandmothers grew were diploid bearded types—that is, they had 12 pairs of chromosomes. They were descended from complex crosses involving two wild species—the lavender *Iris pallida* and the yellow and red *I. variegata*, both from southern Europe.

Beginning about 1910 these garden diploids were crossed with a series of wild tetraploids (*I. cypriana*, *I. mesopotamica*, etc.) that had 24 pairs of chromosomes. These forms, all from the eastern Mediterranean region, were all purplish blue in color, and were taller, larger, and more susceptible to cold and other unfavorable conditions than the older diploids. The modern tall bearded irises of our gardens have been developed from these crosses. Nearly all of these are now tetraploid, and the range of colors and patterns is far greater than in the older types, and is being extended every year.

The complex origin of the modern forms has resulted in a complicated genetic situation. There are, for example, at least four genetically quite distinct types of whites, of which only one can be identified with reasonable certainty by its appearance. The genetics of the various patterns that occur is very sketchily known; and almost nothing is known about the inheritance of properties other than flower colors and patterns.

The long time between generations is a distinct disadvantage – but there are some compensating advantages. The flowers are only rarely pollinated naturally, but set seed freely when hand-pollinated. It is, therefore, unnecessary to remove the anthers and enclose the flowers in bags when making crosses —which makes it a lazy man's job to cross-breed them.

Irises are usually propagated by planting the underground stems, or rhizomes (often incorrectly called bulbs), which perpetuate the genetic composition of the original plant. It is, therefore, easy to keep parents indefinitely for comparison with (or crossing to) their descendants. I have one old diploid that was first offered for sale in 1844; and the common winter and early spring-blooming white iris in Pasadena is *albicans*—a nearly sterile hybrid that has been propagated through rhizomes for at least 500 years. It is an Arabian plant that has long been grown in Mohammedan graveyards, and it has escaped and grows like a wild plant from Spain to India.

I started crossing irises because I wanted to get first-hand familiarity with the genetic behavior of a tetraploid form, and this seemed to be a favorable plant to use, since both diploid and tetraploid forms are available and can be crossed to each other.

Since the mid-thirties, irises of another group from the eastern Mediterranean area have begun to be intercrossed with the tetraploid tall bearded. These are members of the *Oncocyclus* group. They are short-stemmed, large-flowered types, and they are very difficult garden subjects. However, they have added new colors, patterns, and shapes, and now some fertile and more easily grown hybrid types are ap-

*Dr. A. H. Sturtevant and his wife, Phoebe, maintain their experimental field of irises right on the Caltech campus, just west of the new Keck engineering building.*

pearing. These raise a whole series of new genetic questions—and are of interest in connection with the old problem of interspecific sterility.

A great many people are interested in crossing irises. It has been estimated that something like a million new seedlings are flowered each year in this country—many of them by amateurs, and nearly all of them by people whose knowledge of genetics is rather slight. There is widespread interest in the basic relations—which are in fact not yet well enough understood to make possible a coherent general account of the genetics of the iris.