

BOTANY

Better Cotton, Tobacco, New Berry Resulting From Drug

Colchicine, By Doubling the Number of Chromosomes, Juggles the Heredity and Produces Fertile Hybrids

BIGGER and better cotton, tobacco, berries and fruits, with new chemical-created heredities, are about to result from U. S. Department of Agriculture research through use of a powerful and poisonous drug, colchicine, in the most promising plant breeding experiments in years.

Fertile hybrids of economically important plants are being produced, successful plant crosses heretofore impossible are being achieved.

From pioneering experiments by Dr. Albert F. Blakeslee, Carnegie Institution geneticist several years ago, the application of colchicine, extracted from seeds of the wild meadow saffron and used sometimes as a gout remedy, promises to give farmers better plants to grow in their fields. (See *SNL*, Jan. 22, 1938)

The drug causes rapidly growing young plants to double the number of chromosomes in their cells, juggling the heredity in such a way that the new plant created breeds true and is not sterile as are most hybrids. Chromosomes are the carriers of heredity within the cells and seeds.

Crossing of valuable Sea Island cotton of the Asiatic variety and American upland cotton is being undertaken by Dr. J. O. Beasley of the Bureau of Plant Industry, working in North Carolina.

For the first generation this cotton cross produces a form which gives the typical long fibers of Sea Island cotton with the early maturity of the American upland cotton. This hybrid, however, while fertile, goes to pieces after the first generation cross and loses its desirable qualities.

Fertile Hybrid

The drug colchicine, by doubling the number of chromosomes in the cells of the plant, allows the production of a fertile hybrid of the cotton that will breed true.

To get a true-breeding strain depends on a freak of nature found commonly in Sea Island and at times in upland cotton. It is a twin embryo. Usually one of the embryos produces a shoot with only half the number of chromosomes

in one set instead of the regular two sets required for fertility. By doubling the chromosome number of this shoot with colchicine, the scientists hope to get a pure-line cotton with two sets of identical chromosomes which should breed true.

Dr. H. H. Smith at the Arlington, Va., U. S. Department of Agriculture Experimental Farm has obtained similar results with hybrid tobacco which, in some forms, has great value as an insecticide. This is especially true of wild tobacco of which one type contains nornicotine, an alkaloid related to nicotine but much more potent in killing insects.

Drs. Haig Dermen and G. M. Darrow, working at Beltsville, Md., have tried colchicine on berries and fruit trees and hope to produce a permanently-reproducing cross between Loganberries

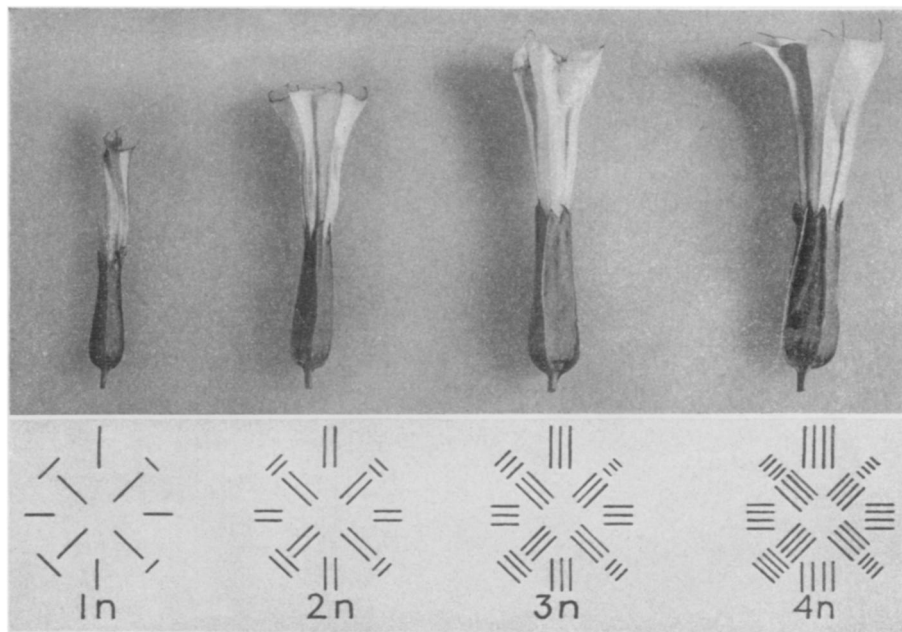
and ordinary blackberries. Crossing of red raspberries with other berries is expected to yield a variety that will grow in warm southern climates.

The work with peaches has only just been done. What its results will be cannot yet be determined because it will take a year or two to obtain fruit from the trees.

Treating a young seedling or a growing shoot of a plant with colchicine often results in doubling the number of chromosomes. When the drug is applied as a weak solution, normal cell division is halted. Ordinarily, the chromosomes split and the same number of chromosomes pass to the two daughter cells. The drug destroys the mechanism which normally causes the two sets of chromosomes to pass into the two daughter cells. In such a state, the chromosomes split although the cell division is not completed. When removed from the solution the cell again starts normal division in which the chromosomes split again to give the new cells twice the number of chromosomes.

Unpaired Chromosomes

This doubling of chromosomes has, where successful, resulted in making sterile hybrids fertile. As an example, Asiatic cotton has two sets of 13 chromo-



MORE CHROMOSOMES: BIGGER FLOWERS

This photograph from SNL, January 22, 1938, shows flower sizes in strains of Datura, arranged in order of the number of chromosomes as shown in the diagrams below. These range from haploid (half-normal) on left, through diploid (normal) and triploid to tetraploid (twice normal). The changes in chromosome numbers were induced by colchicine. The photograph is used through courtesy of the Journal of Heredity.

somes. American upland has two sets of 26 chromosomes. A cross between the two has one set of 13 chromosomes from the Asiatic and one set of 26 from the upland, or a total of 39 chromosomes. Such a hybrid has two good reasons for being infertile. In the first place the chromosomes from the Asiatic are not sufficient in number to pair with those of the upland. The behavior of unpaired chromosomes in dividing cells is irregular. In the second place a 39-chromosome plant cannot distribute 39 chromosomes equally to form reproductive cells.

By doubling the chromosome number with colchicine this hybrid then has 78 chromosomes or two times 39. It has two sets of 13 and two sets of 26, or the same number as both parents. In this way each chromosome is provided with a mate from its own set thereby restoring regularity of chromosome distribution.

Science News Letter, August 12, 1939

BOTANY

Former Remedy for Gout Aids Sugar Plant Growth

GIANT stalks of sugar cane, with diameters two or four times that of ordinary cane and with greater sugar content, promise to result from treatments with the drug colchicine in experiments by D. M. Weller, plant cytologist of the University of Hawaii and of the Hawaiian Sugar Planters' Association.

Among 10,000 seedling sugar cane plants treated, many giant stalks resulted. But Mr. Weller cannot yet state positively whether the larger stalks are the result of colchicine treatment or whether they are freaks of nature.

The drug colchicine has been applied to buds, seeds, and shoots of plants by

scientists in the past few years with surprising results. The size of ears of corn has been increased and the vitamin con-

tent improved. Flowers of large size have also resulted from colchicine treatment.

Science News Letter, August 12, 1939

AERONAUTICS

Germany Abandons Airships Because They Lack Helium

Airline Formed in Germany to Operate Commercial Air Routes Using Airships Has Been Disbanded

GERMANY has completely abandoned the construction of airships and the famous factory at Friedrichshafen, out of which came the Graf Zeppelin, the ill-starred Hindenburg and more than 100 other lighter-than-air craft, is being converted into a conventional airplane factory, it is reported.

Failure to obtain helium, the safe lifting gas of which the United States has a virtual monopoly, or to develop a non-inflammable form of hydrogen, is blamed for the abandonment of the giant ships.

The Deutsche Zeppelin Rederei, formed to operate commercial air routes using airships, has also been disbanded and its personnel scattered throughout other branches of industry.

The decision was seen in U. S. aeronautical circles as possibly a "death blow" to the future of lighter-than-air craft. Germany and German technicians have been at least nine-tenths responsible for their development during the 40 years since Count Zeppelin first started experimenting with the cigar-shaped aerial vehicles.

Following the destruction of the Hindenburg when its hydrogen lifting gas

caught fire as it came in for a landing at Lakehurst, N. J., on the evening of May 7, 1937, the German government attempted to purchase helium. A law permitting its export, for non-military purposes only and subject to the approval of the Munitions Control Board was rushed through Congress. But sale of the gas has been consistently blocked by Secretary of Interior Ickes, a member of the board.

The German embassy declared the abandonment of airship construction, reported by a British aeronautical journal, *Flight* (July 20) "is news to us."

The abandonment of the airship indicated also that reports of discoveries of helium in Germany are either untrue or do not involve enough helium to make airship operation independent of American supplies of the gas.

The destruction of the three largest U. S.-built airships, the Navy's Shenandoah, Akron and Macon, has almost killed interest in them in the United States. A bill authorizing construction of a new lighter-than-air craft for the Navy was passed by Congress, but bids submitted under it were rejected by the Navy Department.

Germany has indicated previously that experiments with the lighter-than-air craft would be dropped unless a safe substitute for the inflammable hydrogen could be found or secured.

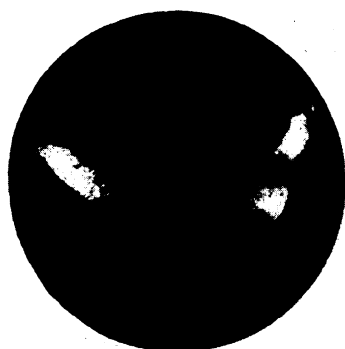
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HISTORY

Blackbeard The Pirate, Public Enemy Number 1

BLACKBEARD the Pirate was public enemy number one in the news of 1718. This antiquarian find is reported by the National Park Service, which has been "digging" into early American news files.

You will hear more about this old-style public enemy, since the scene of his capture at Ocracoke Inlet, North Carolina, is in the new Cape Hatteras Na-



BIGGER SUGAR CANE

At the left is an untreated shoot of sugar cane, at right is an enlarged shoot produced by treatment with colchicine.