History, Montevideo, Uruguay; *Secretary-General,* Dr. Fernando Silveira, Institute of Education, Rio de Janeiro, Brazil. It was proposed by the delegation from Argentina that the Second South American Botanical Congress be held at the Institute Miguel Lillo at Tucuman, Argentina, in 1942. This was unanimously approved.

Brazil, famous for its generous hospitality, surpassed even this reputation as host to the delegates of the congress, and congratulations should be extended to Dr. Campos Porto and the Committee of Organization for a well-planned and well-executed program.

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SPECIAL ARTICLES

SEX MECHANISM IN POLYPLOIDS OF MELANDRIUM[1]

LAST spring a series of experiments designed to determine the effect of polyploidy upon sex in various dioecious plants was undertaken. A preliminary report on this investigation was given in December.[2] This present paper is a summary of work on colchicine-induced polyploids of a white-flowered race of *Melandrium dioicum.*

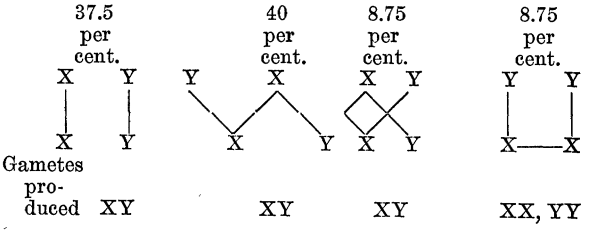
Fifteen out of 19 seed-treated plants examined proved to be entirely or partly 4n (8 XXYY males and 7 XXXX females). These plants were intercrossed and a second generation of over 100 3*n* and 4*n* plants was grown. There is enough difference in size between the sex chromosomes and autosomes and between the X and Y to determine the chromosomal constitution of a plant by cytological methods. The following is a tabulation of sex and chromosome constitution in second generation plants:

Type	Chromosomal constitution*	Number of plants and sex
2n (control)	2A + XX	17 ♀
	2A + XY	20 ♂
3n	3A + XXX	1 ♀
	3A + XXY	4 ♂; 1 ± ☿
4n − 1	4A + XXX	1 ♀
	4A + XXY	1 ♂
4n	4A + XXXX	3 ♀
	4A + XXXY	65 ♂; 3 ± ☿
	4A + XXYY	2 ♂
4n + 1	4A + XXXXY	1 ☿
	4A + XXXYY	3 ♂

* Irregularities in number of autosomes have been observed in plants in this table but for simplicity have not been indicated in the tabulation.

Among the 2n plants there are 20 males to 17 females. The preponderance of males among the 4n plants (67 to 3) is due to the fact that the XXXY individuals are very numerous, as Muller[3] and Westergaard[4] have predicted, and because XXXY plants are male. (Three XXXY male plants occasionally bear hermaphroditic (☿) blossoms; the 65 other plants of this genotype are vigorous, fertile males.)

Peculiar conjugation and segregation of the sex chromosomes is responsible for the large number of XXXY plants. The following types of association have been observed at MI in 80 P.M.C. of 2 of our XXYY males, in addition to 5 per cent. of infrequent types:



Ninety per cent. or more of the gametes produced by the original 4n males (XXYY), therefore, should be XY, and when these unite with the XX gametes from the female, the excess of XXXY individuals should result. Westergaard[4] has observed the X − X and Y − Y conjugation to be the most frequent type; he has not reported quadrivalent association.

In a state of nature the excess of the XXXY males would likely lead to their fertilizing a large majority of the 4n females. Since the XXXY males are completely fertile and produce XX and XY gametes, such hybridization should give rise to a population of equal numbers of 4n females of the constitution XXXX and of 4n males of the constitution XXXY (aside from occasional males with a few hermaphroditic flowers). Thus a new 4n race with approximate numerical equality of males and females should be possible. The conclusions of Muller[3] and Dobzhansky[5] that doubling of chromosomes could not be a factor in evolution of dioecious forms therefore appears unfounded.

In the plants with three sex chromosomes of one size and the fourth of a different size, the 3 similar chromosomes must be X, for it is impossible to obtain an

[1] This investigation has been supported in part by a grant from the Carnegie Corporation to the Carnegie Institution of Washington.

[2] H. E. Warmke and A. F. Blakeslee, *Genetics,* 24: 88, 1939.

[3] H. J. Muller, *Amer. Nat.,* 59: 346, 1925.

[4] M. Westergaard, *Nature,* 142: 917, 1938.

[5] T. Dobzhansky, "Genetics and the Origin of Species," Columbia Univ. Press, pp. 219, 1937.

XYYY individual from the cross XXXX by XXYY. It is thus possible in this material to measure the sex chromosomes *within a single cell* and determine accurately whether X or Y is the larger. In all our XXXY plants, the three similar chromosomes are small, and the single remaining one is large. Our findings agree, therefore, with those of Blackburn,[6] that the Y is the larger member of the sex pair, and disagree with the observations of Winge,[7] Meurman,[8] Breslawetz,[9] and Westergaard,[4] who report the X to be the larger. It is possible, of course, that our material may have a different chromosome constitution from the material investigated by these latter workers.

The plants 4A + XXXY (male) and 4A + XXX (female) differ genetically only in the absence of a Y chromosome in the latter. We may therefore conclude that the Y chromosome carries male-determining elements, contrary to the situation in *Drosophila*[10] and *Rumex*,[11] where the Y chromosome has been shown to play no role in primary sex determination. In the 3A + XXY and 4A + XXXY types, one Y is usually sufficient to outweigh the 2X or 3X chromosomes and to produce maleness. One Y apparently can not completely outweigh 4 X's in the XXXXY individual, however, and a hermaphrodite results.

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BROAD PROTECTIVE ACTION OF RABBIT ANTIPNEUMOCOCCUS SERUM IN RATS

FOLLOWING the work of Tillett (1927), who showed non-type-specific pneumococcus active immunity in rabbits, increasing attention has been paid to this problem, notably by Bailey (1931–1933), Day (1935), Harley (1935) and Dubos (1938).

During the past year we have prepared various type-specific antipneumococcus sera in rabbits, as Goodner and his associates have described. We have also used, in addition to the S forms, an R form known as DRI, as well as certain Forssman and other control antigens.

In view of the possible value of heterophile antibodies in rabbit antipneumococcus serum, it appeared advantageous to use white rats as test animals for the determination of the protective efficacy of the various sera.[1]

Passive protection tests were conducted by injecting suitable dilutions of antiserum and culture together intraperitoneally into white rats of from 90 to 100 grams weight. Varying doses of serum were used, each serum dose being tested against a series of chilled decimal dilutions of broth culture which had been incubated for six hours.

While more complete details will appear in a later report, certain preliminary observations should be reported. They are:

(1) Combined horse and rabbit antipneumococcus serum is not as effective as rabbit serum alone, even though the combined serum contains as many as five to ten times the heterophile antibody titer of the rabbit serum.

(2) Type specific rabbit sera show considerable heterologous protection—notably types II and V.

(3) Rabbit serum prepared from a rough variant of a type I strain—DRI—gives marked protection against at least seven types of pneumococci.

TABLE 1

PNEUMOCOCCUS RAT PROTECTION TESTS

Pneumococcus culture (cc.)	DRI rabbit antipneumococcus serum B–4651 against pneumococcus types: I				II				V				VIA				VII				VIII				XIV			
	0.1 cc. serum	0.01 cc. "	0.001 cc. "	Control	0.1 cc. serum	0.01 cc. "	0.001 cc. "	Control	0.1 cc. serum	0.01 cc. "	0.001 cc. "	Control	0.1 cc. serum	0.01 cc. "	0.001 cc. "	Control	0.1 cc. serum	0.01 cc. "	0.001 cc. "	Control	0.1 cc. serum	0.01 cc. "	0.001 cc. "	Control	0.1 cc. serum	0.01 cc. "	0.001 cc. "	Control
10^{-1} ..	S	S	D	D	S	D	D	D	S	D	D	D	D	D	D	D	D	D	D	D	S	D	D	D	D	D	D	D
10^{-2} ..	S	S	S	D	S	D	D	D	S	D	D	D	S	D	D	D	S	D	D	D	S	D	D	D	S	D	D	D
10^{-3} ..	S	S	S	D	S	S	D	D	S	S	D	D	S	S	D	D	S	D	D	D	S	D	D	D	S	S	D	D
10^{-4} ..	S	S	S	D	S	S	S	D	S	S	S	D	S	S	D	D	S	S	D	D	S	D	D	D	S	S	S	D
10^{-5} ..	S	S	S	D	S	S	S	S	S	S	S	D	S	S	S	D	S	S	S	D	S	S	D	D	S	S	S	D
10^{-6} ..	S	S	S	S	S	S	S	S	S	S	S	D	S	S	S	D	S	S	S	D	S	S	S	D	S	S	S	D
10^{-7} ..	–	–	–	S	–	–	–	S	–	–	–	D	S	–	–	D	S	S	S	D	–	–	–	S	S	S	S	D
10^{-8} ..	–	–	–	–	–	–	–	–	–	–	–	D	–	–	–	S	S	S	S	D	–	–	–	–	S	S	S	D

S = survival; D = dead; – = not tested.

[6] K. B. Blackburn, *Br. Jour. Exp. Biol.*, 1: 413, 1924.
[7] Ö. Winge, *C.R. Trav. Lab. Carlsberg*, 15, Nr. 5, 1923.
[8] O. Meurman, *Soc. Sci. Fennica Comment. Biol.*, 2, Nr. 3, 1925.
[9] L. Breslawetz, *Planta*, 7: 444, 1929.
[10] C. B. Bridges, *Amer. Nat.*, 56: 51, 1922.
[11] T. Ono, *Sci. Rep. Tohoku Imp. Univ.*, 10: 41, 1935.

[1] We are indebted to Dr. J. Bronfenbrenner, Washington University School of Medicine, St. Louis, for the suggestion that white rats are more appropriate test animals for antibody of rabbit origin than rabbits, as used in our former experiments.