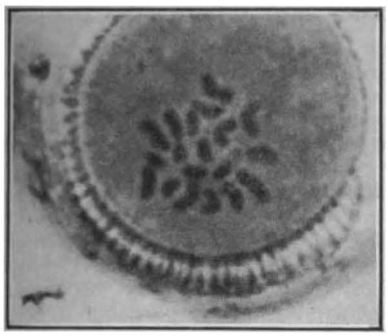
Genetic Classification of Brassica Crops

LAST May we were asked by Messrs. Carter whether there was any danger of intercrossing between kales and swedes. No precise information was available and classification by morphology offered little help for, as Bailey[1] remarks, the "*Brassica* group is indeed perplexing, excepting *Rubus* the most bewildering I have attempted". Indeed, in Brassica, we find it less confusing to use the English rather than the Latin names. To add to the confusion the kale concerned, Hungry Gap, was itself reputed to be a cross between widely different types. Therefore, we examined as many types of kale as we could obtain to find whether the chromosome number would throw any light on the situation.

Our results show that the kales are of two types, as follows :

	$2n = 38$	
Late Rape Kale	Hungry Gap Kale	Asparagus Kale
	$2n = 18$	
Dwarf Scotch Kale	Cottager's Kale	Perpetual Kale
Hearting Kale	Thousand-headed Kale	Marrow-stemmed Kale
Russian Kale	Curly Kale	Ragged Jack Kale

The swede has already been shown to be an allotetraploid, $2n = 38$, the result presumably of a cross between a cabbage type $2n = 18$, and the turnip $2n = 20$ [2,3]. We now see that three of the kales have the same chromosome number as the swede and they have no doubt originated by a process parallel to that of the swede, for example, by polyploidy following a cross between the 18 and 20 chromosome forms.



Pollen grain mitosis in Hungry Gap Kale showing haploid complement of 19 chromosomes

It may be concluded that the kales with 38 chromosomes will readily cross with each other and with swedes, while those with 18 chromosomes are only expected to cross readily among themselves and with cabbages, Brussels sprouts and other European forms of the 18 chromosome group.

Hitherto, the chromosome number in rape kale has been reported as $2n = 36$ [4]. As shown in the above table it is $2n = 38$. The swede rape also has the same number. The Hungry Gap kale is reputed to be a cross between late rape kale and curly kale. Since curly kale belongs to the diploid group it cannot well have been one of the parents. Hungry Gap must rather be derived from crossing within the tetraploid group.

P. T. THOMAS.
M. B. CRANE.

John Innes Horticultural Institution,
Merton, S.W.19. Sept. 15.

[1] Bailey, L. H., *Gentes Herbarum*, **2**, 212 (1940).
[2] Nagai, K., and Sasaoka, T., *Jap. J. Genet.*, **5**, 151 (1930).
[3] Howard, H. W., *J. Genet.*, **35**, 383 (1938).
[4] Catcheside, D. G., *Ann. Bot.*, **48**, 601 (1934).

Sulphanilamides and Experimental Tuberculosis

A NUMBER of workers have claimed that sulphanilamide[1], sulphapyridine[2], prontosil soluble[3], and sulphathiazole[4] in high concentrations may modify the course of experimental tuberculosis in guinea pigs. Promin, *p,p'*-diaminodiphenylsulphone-N,N'-didextrose sulphonate, has also been found effective in animal experiments[5]. However, no positive clinical results have been secured with the first-mentioned sulphanilamides, while promin is at present being tested.

It has been claimed that the lack of activity is perhaps partly due to the fact that the sulphanilamides used do not adequately penetrate the lipoid layer of the bacteria ; and consequently an attempt has been made to achieve better results by introducing lipophilic radicals into the sulphanilamides. This theory appears reasonable, in view of the fact that *Mycob. tuberculosis* is an acid-fast bacillus rich in lipoids. On this basis, N^1-dodecanoylsulphanilamide has been prepared[6] and tested experimentally, without, however, consistent success[7,8]. Sulphanilamide derivatives of chalmoogric acid—of additional interest since this acid in itself has a certain activity against *Mycob. leprœ*, which is related to the tubercle bacillus—and of other lipophilic acids have also been prepared and tested in animal experiments against leprosy and tuberculosis, but without effect[8]. On the ground that sulphathiazole is considerably more active than sulphanilamide against most of the bacteria investigated, the introduction of a lipophilic substituent in the heterocyclic part of the first-mentioned compound has also been tried. A series of alkyl sulphathiazoles[9] (amyl, heptyl, nonyl, etc.) as well as several alkyl sulphathiodiazoles[10] have been prepared in order to test them against the tubercle bacillus.

Thus, the results secured so far can scarcely be called uniform. Even if theoretically it would appear that lipoid-solubility should increase the contact between a chemotherapeutically active compound and the tubercle bacillus, this has not been proved. Furthermore, 'lipoid-solubility' is a comprehensive term, and in this case rather specific conditions may be involved. We therefore decided to attempt in other ways to obtain affinity for *Mycob. tuberculosis* while retaining the fat solubility.

The facts that *Mycob. tuberculosis* is able to form compounds of a vitamin K nature[11] and that the closely related *Mycob. paratuberculosis* (Johne's bacillus) requires such substances as growth factors[12], suggested an investigation of the chemotherapeutic effect of sulphanilamides which are substituted with naphthalene derivatives, of the same nature as the antihæmorrhagic compounds (vitamin K activity is found only in the series of 1,4-naphthoquinones or among compounds supposed to be convertible into such quinones in the organism ; further, the effect is due to the methyl group at the 2-position ; in the 3-position there must be no or only a certain kind of substitution[13]). We therefore synthesized a series of sulphanilamides which at the amido nitrogen, N^1, are substituted in this manner. The following examples may be mentioned : 2-sulphanilamido-1,4-naphthoquinone (1), melting point 227° ; 2-methyl-1-sulphanilamidonaphthalene (2), melting point 248° ; and 2-methyl-1-hydroxy-4-sulphanilamidonaphthalene (3), which melts with decomposition at 209°. (Further details will be published in the near future.)