

opposite a point of meristele conjunction in the vascular system of the shoot; the bud stele ending blindly in the cortical parenchyma.

The potentiality for direct meristematic activity which was known to be present in detached meristems is thus seen to extend locally into the underlying cortical parenchyma also. So far as I am aware, bud regeneration from the cut surface of cortical parenchyma has not hitherto been recorded among the ferns, though a somewhat similar phenomenon has been observed in the genus *Lycopodium*. These ferns thus appear to afford unusually favourable materials for the investigation of meristematic activity and regeneration phenomena.

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¹ Wardlaw, *Ann. Bot.*, N.S., 7, 26 (1943).

² Wardlaw, *Ann. Bot.*, N.S., 7, 28 (1943).

A New Antigen of Salmonella

FOLLOWING the study of a new salmonella type (*S. hormæchei*: XXIX.Z30.—.) made by one of us (M.), which has a flagellar antigen not referred to before (Z30), we find it in *S. ballerup* (XXIX.(Vi).Z14.—.) and in other salmonella (LC54) isolated from Buenos Aires sewage; this new antigen has been named Z30.

Natural selection and artificial induction show that this "H" Z30 antigen occurs in *S. ballerup* with or without Z14. Only after careful selection is it possible to obtain Z30 or Z14 alone.

The salmonella type obtained from Buenos Aires sewage (LC54) presents the curious phenomena of a flagellar phase variation in a new aspect: Z30 \rightleftharpoons Z14. This can be demonstrated using the Sven Gard method of artificial induction of flagellar phases. We have named this variation the 'Zeta Variation'.

Another interesting phenomenon has been observed in the LC54 strain. When it has the flagellar antigen Z30, the somatic antigen observed is XXIX; but when Z14 is present, it is not found.

We are continuing the study of the subject, of which the above is a preliminary account of work we have been doing since September 1942.

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Production of Seed Potatoes in a Hot, Dry Climate

AFTER Maldwyn Davies's demonstration¹ that low temperatures and high relative humidities were needed to check the flight of the aphids that transmit potato virus diseases, it was widely accepted that these conditions were necessary for growing healthy seed potatoes. The absence of these conditions over most of South Africa, and difficulties in importing seed during the past few years, led to a review of the question, and it has been found beyond reasonable doubt that Davies showed only one side of the picture. Very high temperatures and low relative humidities are as effective as low temperatures and high humidities. At both ends of the scale there is

an extreme at which the potato will thrive, but aphids not; it is in intermediate climates that heavy infestations occur.

The first demonstration of the value of a hot, dry climate escaped recognition. Porter² showed that at Davis, in the hot Sacramento Valley of California, the spread of virus diseases in potatoes was slow provided that their planting was delayed until mid-summer; and making use of this fact he produced seed for three years which was both healthy and productive. In Australia, Norris and Bald³ noticed at Canberra that hot, dry weather reduced infestation, but the spells there seem to be too short to be of much use. The evidence in South Africa is that there is an optimum temperature for aphids at which infestation reaches a peak, and that rising temperatures above this optimum progressively reduce the population of aphids until a point is reached at which it virtually disappears. A similar suggestion of an optimum was made by Stepantzev⁴. From observations on the weather conditions favouring infestation of cotton fields in Uzbekistan, he concluded that numbers of *Aphis gossypii* Glov. and *A. laburni* Kalt. were greatest when the mean day and night temperatures were 20° C. (68° F.) and 18° C. (64.4° F.), respectively. Optimum temperatures of about the same order, or a little lower, seem to hold for the aphids *Myzus persicæ* Sulz. and *Macrosiphum solanifolii* Ashm. in potato fields in South Africa; but it is more to the point to determine how high the temperature must be before infestation practically ceases. This happens when the mean daily maximum temperature for the summer months is 32° C. (90° F.), which is the condition in dry, central South Africa around Kimberley. This must not be confused with the highest temperature at which aphids will grow and reproduce in the artificial state of a pure colony in a glasshouse. It refers to field conditions, and is strongly influenced by the host plant. In the field, *Myzus persicæ*, for example, will thrive on cabbages at higher temperatures than on potatoes. Very decidedly, high temperatures will not control all aphids on all crops.

Like high temperatures, very dry air is harmful to aphids, as Stepantzev also pointed out, and is important if seed potatoes are to be grown in hot climates. The Sacramento Valley is in a winter-rain-fall zone, and aphids flourish in the mild, moist weather of spring. Consequently, Porter was able to control the spread of virus diseases there only if potatoes were not planted before mid-summer. This allows only one generation a year, which in a hot climate is not enough to stop seed from becoming over-sprouted and stale between harvesting and replanting. At Kimberley, on the other hand, winter rains are negligible; with rising temperatures in early summer the air becomes so dry that aphids are held in check, and there is no dangerous interval between winter and summer. Two crops can be planted, one in August to emerge after the last frost, and one in summer, about January. Since potatoes ripen quickly in a hot climate, these intervals between plantings are enough to allow two generations in one year, with just sufficient time between to sprout the seed.

During the past three years, counts of aphids have been made on thousands of leaves in hundreds of acres of potatoes in all stages of growth at the Vaal Harts and Riet River irrigation settlements near Kimberley. The records are such as few of the world's seed areas apart from the west coast of Ireland could