How is this helical lengthening brought about? Electron photographs are usually taken at the helical stage and show disorderly masses of submicroscopic wavy fibrils lying around and across bacterial bodies; no straight tail has yet been electron-photographed in the electron microscope.

The transition from straight tail to lengthened helix would seem to necessitate molecular transformations. Such helical rearrangements in the tail might well create tensions or liberate forces capable of setting up the anomalous transient whirling movements described above.

The helix in some bacteria can be seen to split suddenly into a number of thinner similar helices; these may stay terminal, or float about and become distributed over the surface of their own or other bacterial bodies. In this way the so-called monotrichous, lophotrichous and peritrichous types of flagellation are seen to arise. Their common origin is the straight tail, the structure primarily associated with normal motility and which therefore seems entitled to some of the attention so far bestowed on its more elegant curly derivatives.

These observations were all made with the sunlight dark-ground microscopy described previously[2].

ADRIANUS PIJPER

Institute for Pathology,
University of Pretoria. Nov. 10.

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Use of Snail Stomach Cytase in Plant Cytology

DURING a study of the large New Zealand fern genus *Blechnum*, it was found virtually impossible to obtain somatic chromosome counts by orthodox methods. This aspect of the problem was about to be abandoned when a paper by Fabergé[1] on the use of snail stomach cytase for maceration in cytology was discovered. There appears to be a general lack of knowledge of this method and its advantages. Manton[2], for example, makes no mention of it.

Well over a thousand root-tip preparations were made by aceto-carmine squash methods with various modifications; but no really satisfactory results were obtained. Fabergé's technique with certain refinements gave outstanding results, almost every preparation yielding good counts (see Fig. 1). Previously adequate spreading had been impossible. The method has been applied to other groups of plants and is showing considerable promise.

Fabergé mentions the possible use of species of snail other than the edible *Helix pomatia* which he utilized. In New Zealand the only snail available in sufficient quantity is the considerably smaller but cosmopolitan species *Helix aspersa* Mueller. With large snails the crop and stomach contents only are used: with small specimens, however, these whole organs are removed and pulverized in a little water. To the extract from about two dozen snails, about 15 ml. of distilled water is added. This is followed by centrifuging at 4,000 r.p.m. for 5 min. The clear brown supernatant liquid is then ready for use. A sample of enzyme if stored in a refrigerator remains effective for at least three batches of root tips. Between uses, any stray cellular material from tissue

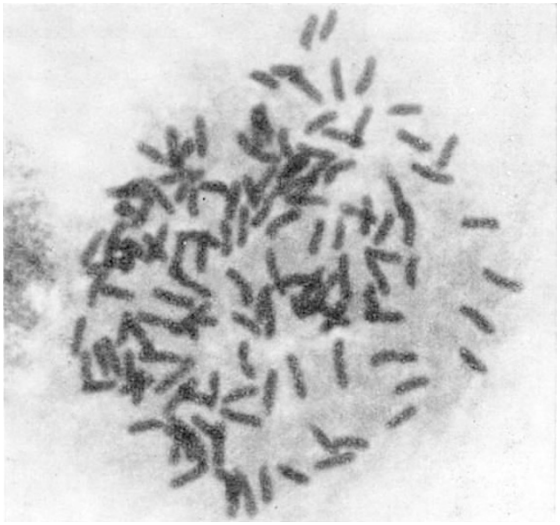

Fig. 1. Root tip preparation from a tetraploid race of *Blechnum fluviatile*, somatic number = 132

previously treated must first be removed by centrifuging. Preliminary tests have shown that the activity of the enzyme complex has a wide temperature-range. The root-tip material is prefixed in a saturated aqueous solution of *p*-dichlorobenzene and then fixed in alcohol – acetic acid (3 : 1 mixture). Before being placed in the enzyme the root-tips are given two changes of a few minutes each in water. Blotting between changes is essential. Over-night treatment in cytase at room temperature is satisfactory (or 3–4 hr. at 25° C. is sufficient). A longer period in cytase tends to make staining more difficult, and the outlines of the chromosomes become diffuse. Lengthy treatment may be useful in studies on coiling, as the coils become more apparent. A rinse in tap-water followed by at least a minute in 45 per cent acetic acid assists the aceto-carmine staining.

It is believed that this method has advantages which deserve wider recognition among cytologists.

T. C. CHAMBERS

Botany Department,
Auckland University College,
New Zealand. Oct. 6.

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Selective Fertilization following the Use of Sperm Mixtures in the Mouse

ARTIFICIAL insemination has been carried out in the mouse using mixtures of sperm from a number of inbred lines each containing a suitable genetic marker. The lines are *REB* (containing the dominant hair structure gene rex, *ReRe*), *G* (coat colour and pattern tan, $a^t a^t$), and C_3H (coat colour agouti, *AA*); all possible combinations of these genes are phenotypically distinct in the offspring. The first two lines are derived from inbred lines *A* and *CBA* respectively. Sperm is obtained from the vas deferens of killed males and the density of each sample estimated by hæmocytometer counts. Sperm mixtures were made with equal numbers of spermatozoa from each donor; the donor males for each mixture were of approximately the same age. Four types of sperm mixture