limits for the temperature of polluted rivers may, therefore, be too high.

These results are from work done in the Department of Zoology, King's College, London, while holding a British Celanese Postgraduate Studentship.

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## Chromosomes of the Potato Root Eelworm

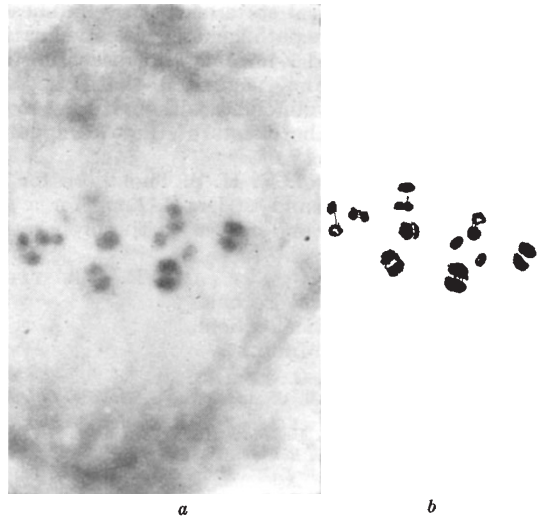
The systematics of the cyst-forming eelworms of the genus *Heterodera* are difficult, and in several cases distinctions between species depend largely on the host-range of the eelworms. In the taxonomy of the higher plants, chromosome numbers have often been useful in determining the limits of species and the relations between species in difficult groups. It was therefore thought that an investigation of the chromosomes of *Heterodera* species might be valuable. Details are given below of a technique that can be used for determining the chromosome number of the potato root eelworm, *Heterodera rostochiensis* Woll.

Females of *Heterodera rostochiensis* were examined at all stages from the time of their first emergence from the root, when they were white and flask-shaped, until they were much larger and spherical, with bright yellow cyst walls, and contained about a hundred eggs in egg cases. All came from potato seedlings infected in plant pots in the greenhouse from soil collected at Feltwell Fen, Norfolk. They were fixed in acetic-alcohol (1 : 3) for half an hour and afterwards placed in a drop of 2 per cent orcein in 45 per cent propionic acid on a microscope slide. The cyst walls were removed, and the contents of the cyst squashed under a cover glass.

Cell division was seen in cysts of all ages, principally in the long convoluted ovary, although mitotic divisions occurred elsewhere in other unidentified tissues. Metaphase of mitosis was only seen in side view, and no details of the chromosome complement could be distinguished, for the chromosomes are tightly retained on a hollow equatorial plate. At mitotic anaphase there is no convergence to the poles, the groups separating in parallel lines. Although the individual components of the groups can be seen more clearly than at metaphase, no cell was obtained in which the chromosome number could be counted.

Many phases of meiosis apparently occur together in the long ribbon of ovary, but the only clear stages at which the chromosomes could be examined were first metaphase and first anaphase. Judged by the frequency with which these stages were observed, meiosis takes place most vigorously in yellow cysts which already contain many developing eggs enclosed in membranes. It would seem, therefore, that eggs are still actively produced at this time, possibly to be fertilized by stored sperm.

At first metaphase of meiosis, nine pairs of chromosomes were present (Fig. 1), the complement consisting of three pairs of larger chromosomes and



*a* *b*

Fig. 1. (*a*) Photomicrograph, (*b*) drawing, of first metaphase of meiosis. × 2,500

six pairs of smaller ones. However, all the chromosomes are very small, the largest being about 1·2 μ in length at first metaphase, and are at the limits of resolution of most microscopes; thus detailed description is impossible. The partner chromosomes of each bivalent lie side by side, generally with each member of the bivalent orientated towards opposite poles. There was no evidence of undue lagging at anaphase, and anaphase and telophase were quite normal.

This preliminary examination shows that *H. rostochiensis* is cytologically distinct from an unidentified species of *Heterodera* and from a species of a related genus, *Meloidogyne incognita*, both of which have been reported to have 16 chromosomes[1]. Indeed, this evidence of differences in chromosome numbers suggests that cytological studies may be rewarding in defining the limits and relationships of eelworm species.

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Ralph Riley
Victor Chapman

Plant Breeding Institute,
Cambridge. May 4.

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## Structural Heterozygosity of *Cipura paludosa*, Aubl.

The genus *Cipura* of the Iridaceae is found in India both in the temperate and tropical regions of the Eastern Himalayas. *Cipura paludosa*, Aubl. is cultivated specially for its dainty white flowers. This species is a native of tropical America and can tolerate varying climates.

The cytology of this species has been studied by us in connexion with the detailed investigation on a number of iridaceous genera undertaken in this laboratory. The chromosome number of this species, as determined from the somatic and meiotic cells, is twelve. The present report deals with the chromosome behaviour of *C. paludosa* Aubl. and the observations show that this species is a structural hybrid.

Extreme stickiness of the chromosomes made the study of their structure by the usual methods of