In view of repeated statements that beet yellows virus is not transmissible through the seed, and having regard to the proportion of plants affected in the 1946 field crops of family 41, it had been tentatively assumed that the yellowing might be due to a genetical abnormality rather than to virus infection. However, it has now been established that the disease is transmissible from family 41 to healthy plants of sugar beet and spinach (*Spinacia oleracea* L.) by means of the aphis *Myzus persicæ* (Sulz.). Confining the expression of results to those obtained with plants of family 41 raised from seed in the glass-house, and thus protected from accidental infection, transmission has now been secured in three separate experiments involving sixty-eight sugar beet and thirty-four spinach seedlings as experimental hosts. Of these, 85 per cent and 76 per cent, respectively, developed yellows, the initial symptoms appearing in the lower leaves three to four weeks after inoculation by the insect vector. In parallel experiments, using as sources of infection field plants of commercial beet and mangold varieties showing typical yellows, a disease was obtained which appeared identical with that occurring in family 41. It is reasonable to assume, therefore, that an ordinary yellows virus was present in at least one of the parent plants of family 41, and that it penetrated the seed resulting from the cross. This new family is possibly unique in being thus susceptible to seed infection; but it is important to know that such a type can arise from the crossing of popular commercial sorts.

Incidentally, there appear to be two types of yellows disease occurring in commercial beet crops, for certain plants selected from the latter yielded a virus (or virus mixture) which invariably produced in the experimental hosts a clearing or superficial necrosis of the veins of the young leaves, this initial symptom being followed by acropetal yellowing as already described.

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Possible Significance of Free-living Nematodes in Genetic Research

THE free-living nematodes of the sub-order Rhabditina are widespread in the soil[1] and relatively easily cultivable[2-4] on nutrient agar in the presence of bacteria and have short life-cycles (3–7 days from hatching to sexual maturity), with adult sizes up to 3 mm. in length. They offer, in our estimation, certain very interesting possibilities for the study of basic genetic phenomena—morphological, cytogenetic and physiological.

The particular morphological significance of these forms is related to the phenomenon of cellular constancy, or eutely, which the phylum Nematoda (along with the other aschelminth phyla) exhibits for some or all somatic cells. Therefore, the free-living nematodes, containing at most a few hundred somatic nuclei in cells and syncytia, offer material in which mutations affecting structural components may well be interpretable in terms of cellular morphology, rather than only in terms of organ morphology and gross structure.

The cytology of the sex cells of various species of the genus *Rhabditis* Dujardin (1844) has been studied by a few workers[5-11], and has revealed some very interesting sex-patterns. Diploid numbers of 10–24 chromosomes are known for the females and hermaphrodites of different species; the males, where known, are the heterogametic sex with an *XO* sex-chromosome pattern. Some species are diœcious, usually with approximately equal numbers of males and females; others are composed of hermaphrodites of female form and much rarer males, or no males at all; and a few consist only of thelytokous females. Certain diœcious and many hermaphroditic species use their sperm only to initiate development; the sperm confers its centrosome, but not its nucleus, on the ovum[5,7,8]. In some of these species pairing and reduction of chromosomes nevertheless occurs in meiosis; the diploid number is reconstituted with the failure of a second meiotic division to occur. Sex-determination is apparently effected by an unusual regulation of *X*-chromosome behaviour in meiosis. With simple chromosome numbers these forms should be good cytogenetic material; and with their unusual sex-patterns a considerable versatility in the detection and manipulation of mutations should be possible.

Another important consideration is the possibility of studying physiological mutants. As a result of the work of Kidder and Dewey[12] it is now possible to grow at least one organism of animal nutrition (the ciliate *Tetrahymena geleii*) on an almost completely chemically defined medium (consisting of inorganic salts, glucose, vitamins, amino-acids, purines and pyrimidines, and one unknown growth factor). It seems certain that the near future will see a completely known synthetic medium for this form. Through the use of a chemically defined medium the possibility arises that the new concepts of physiological genetics developed by Beadle[13] may be tested on a differentiating organism. Kidder and Dewey's work suggests a valuable lead for the development of a chemically defined medium for species of *Rhabditis*.

We feel that, with eutely, good cytological features, and convenient sex patterns, together with promising cultural and nutritional aspects, the soil-dwelling nematodes offer attractive possibilities for a correlation and precise interpretation of the morphological and physiological genetics of a simple, differentiating organism. Such a simultaneous approach is being attempted in this laboratory. We are presenting the foregoing discussion in the hope of stimulating others to work on the same problem.

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