Cytology of the Scrophulariaceae and Orobanchaceae

In a previous communication[1], the occurrence of prochromosomes and of size differentiation in the chromosomes of *Rhinanthus minor* Ehrh. were described. Further work has led to the conclusion that the small chromosomes are constant in occurrence and number in *Rhinanthus minor* Ehrh., and that the basic number for the genus *Rhinanthus* is probably $x = 11$. This is the same basic number as the related genus *Euphrasia*, which also possesses a prochromosomal resting nucleus. No evidence of any size differentiation in the chromosome complement of *Euphrasia* exists (P. Yeo, private communication). Other members of the *Rhinanthus minor* aggregate, including *R. borealis* (Sterneck) Marshall, and dwarf plants like *R. perrieri* Chabert (with fuscous spotted corollas) from Shetland, have been found to possess the chromosome number $2n = 22$. Fourteen large chromosomes and a number not yet determined of smaller chromosomes have been observed in *R. calcareus* Wilmott and *R. stenophyllus* (Schur.) Druce. Continental *R. major* Ehrh. has been found to possess chromosomes similar in number and size differentiation to those of the *R. minor* aggregate shown in Fig. 1. Fagerlind[2], in 1936, described the eight smaller chromosomes in the diploid complement of *Alectorolopus* (*Rhinanthus*) *major*, and gave the chromosome number as $n = 11$ for this species.

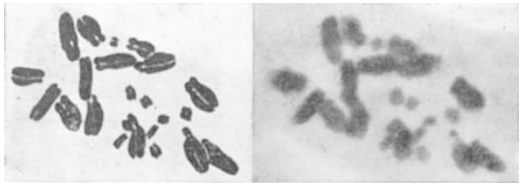

Fig. 1. Root tip chromosomes of *R. minor* Ehrh. at metaphase, showing size differentiation. × 1,500

Melampyrum cristatum L., a species morphologically related to *Rhinanthus* and *Euphrasia* (and like them a hemiparasite), has been examined cytologically. The resting nucleus of this species contains no prochromosomes, the chromatic material being contained in numerous small chromocentres. The diploid number for *M. cristatum* L. is $2n = 18$, which agrees with counts for other members of this genus. The chromosomes at meiosis appear to be of approximately uniform size.

Fig. 2. Mitotic metaphase in the sporogenous tissue of an anther of *Orobanche purpurea* Jacq. The chromosomes are large and the centromeres are distinctly visible at this stage. × 1,500

Note added October 7. *Parentucellia viscosa* (L.) Caruel, formerly known as *Bartsia viscosa* L., another hemiparasitic member of the Scrophulariaceae, has been found to possess $2n = 48$ chromosomes, that is, it has the same basic number $x = 12$ as *Bartsia alpina* L., which is recorded[3] as possessing $2n = 24$ chromosomes.

Species of *Orobanche* in Britain shown to possess $2n = 38$ chromosomes include *O. minor* Sm., *O. maritima* Pugsl., *O. elatior* Sutton., *O. reticulata* Wallr., *O. picridis* F. Schultz, *O. hederae* Duby, *O. rapum-genistae* Thuill and *O. caryophyllacea* Sm. The above species of *Orobanche* are members of the subgenus *Osproleon* Wallr. *O. purpurea* Jacq. from Norfolk has been shown to possess the number $2n = 24$, counts having been obtained in both mitotic (Fig. 2) and meiotic preparations. *O. purpurea* Jacq. has been placed in the subgenus *Trionychon* Wallr., members of which differ from the subgenus *Osproleon* in their possession of two prophylls in addition to each bract. It has now been shown that there are cytological as well as morphological grounds for this division of the genus *Orobanche*.

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[1] Hambler, D. J., *Nature*, 172 (1953).
[2] Fagerlind, F., *Hereditas*, 22 (1936).
[3] Clapham, Tutin and Warburg, "Flora of the British Isles" (1952).

Systematic Position of the Genus *Oscillospira*

The bacterial nature of the genus *Oscillospira* has been the subject of some dispute; Delaporte[1] considered the group to be Myxophyceae adapted to a parasitic mode of life, which had lost some algal characteristics, and Pringsheim[2] considered it truly bacterial. It has recently been shown to possess typical eubacterial nuclear structures[3]. Pringsheim[2] reported that Robinow had demonstrated flagella, but these structures have not previously been illustrated. It has also proved difficult to demonstrate the existence of true cross-walls between the component cells. These characters constitute one of the most important cytological distinctions between bacteria and Myxophyceae[4].

Fig. 1. *Oscillospira guilliermondii*. Kirkpatrick's flagella stain. Preparation made from guinea pig cæcal contents, with other micro-organisms adjacent. × 650