

* Named after Dr. M. G. George of Central Public Health and Eng., Alfred Road, Delhi-6, for placing the material at our disposal.

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OCCURRENCE OF *CURVULARIA TRIFOLII* (KAUFF.) BOED. ON *KHAS-VETIVERIA ZIZANIOIDES* STAPF.

AMONGST the plants being handled at the CIMPO Experimental Farms is *Vetiveria zizanioides* Stapf. whose roots on distillation provide the well-known oil of commerce called "Khas". During February 1965 in our Kodi Farm, a leaf-spot disease was observed on *V. zizanioides*. Tan to dark spots, oval in shape, appeared which later turned black while the rest of the affected leaves became pale yellow. A species of *Curvularia* was isolated from the infected spots and the morphological characters of the fungus on potato dextrose agar are as follows:

Mycelium septate, branched, subhyaline to dark brown, $2.5-3.5\mu$ wide. Conidiophores simple, brown, paler towards the tip, $3.5-4.5\mu$ broad, upto 310μ in length, geniculated. Conidia boat-shaped, sometimes straight, usually 3-septate, sometimes 2-4 also; slightly constricted at the septa; the second or mostly the third cell is larger, broader and darker than the other cells; the apical cell hyaline with obtuse tip, the basal cell crucible form, subhyaline with a distinct protruding hilum, measuring $26.4 (-38) \times 12 (-16)\mu$.

Subramanian (1953) described and illustrated some Indian species of *Curvularia* mostly on the lines adopted by Groves and Skolko (1945). He concluded that spore size is not a decisive character in differentiating the species. While he has recorded *C. lunata* (Wakker) Boed. and *C. trifolii* (Kauff.) Boed. from grass culms, there is so far no record of any *Curvularia* species on *Vetiveria*. Subramanian's identification of *C. lunata* and *C. trifolii* has since been questioned by Parmelee (1956). After a detailed study of *Curvularia* on *Gladiolus*, Luttrell (1956) and Parmelee (*loc. cit.*) came to the conclusion that *C. lunata* and *C. trifolii* are identical in all morphological characters except that the latter has a protruding hilum. Parmelee has even pointed out that Boedijn (1933) did not mention the character of the hilum in *C. trifolii* (Kauff.)

Boedijn. According to Boedijn (1953), only one species of *Curvularia*, viz., *C. andropogonis* (Zimmermann) Boed., bears a protruding hilum but it has now been established that *C. trifolii* also has a protruding hilum (Parmelee, 1956). The fungus collected and described in this note agrees with *Curvularia trifolii* (Kauff.) Boedijn and not with *Curvularia lunata* (Wakker) Boedijn. To the best of our knowledge this is the first record of *C. trifolii* on *Vetiveria zizanioides* Stapf.

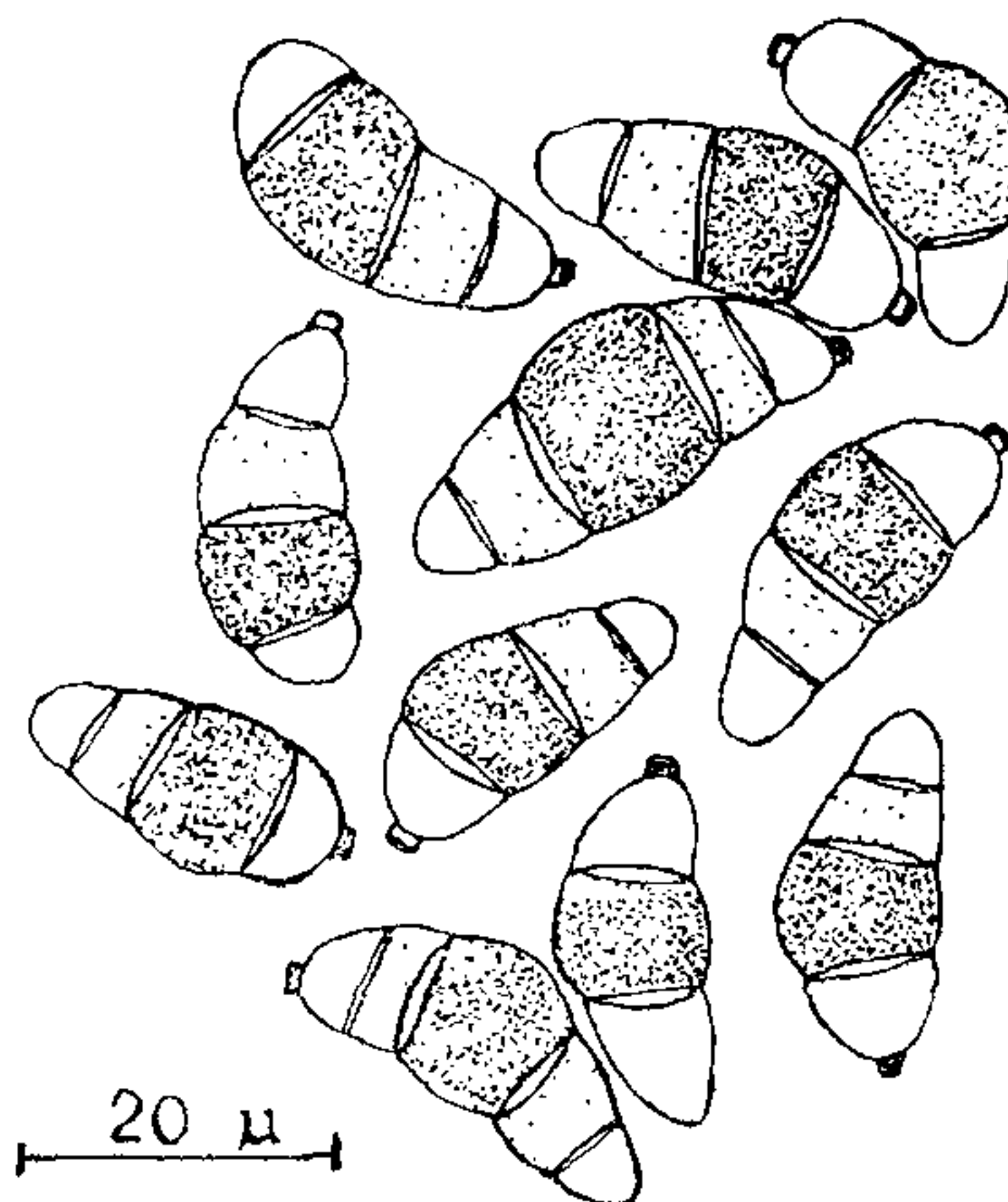


FIG. 1 Conidiospores of *Curvularia trifolii* (Kauff.) Boed.

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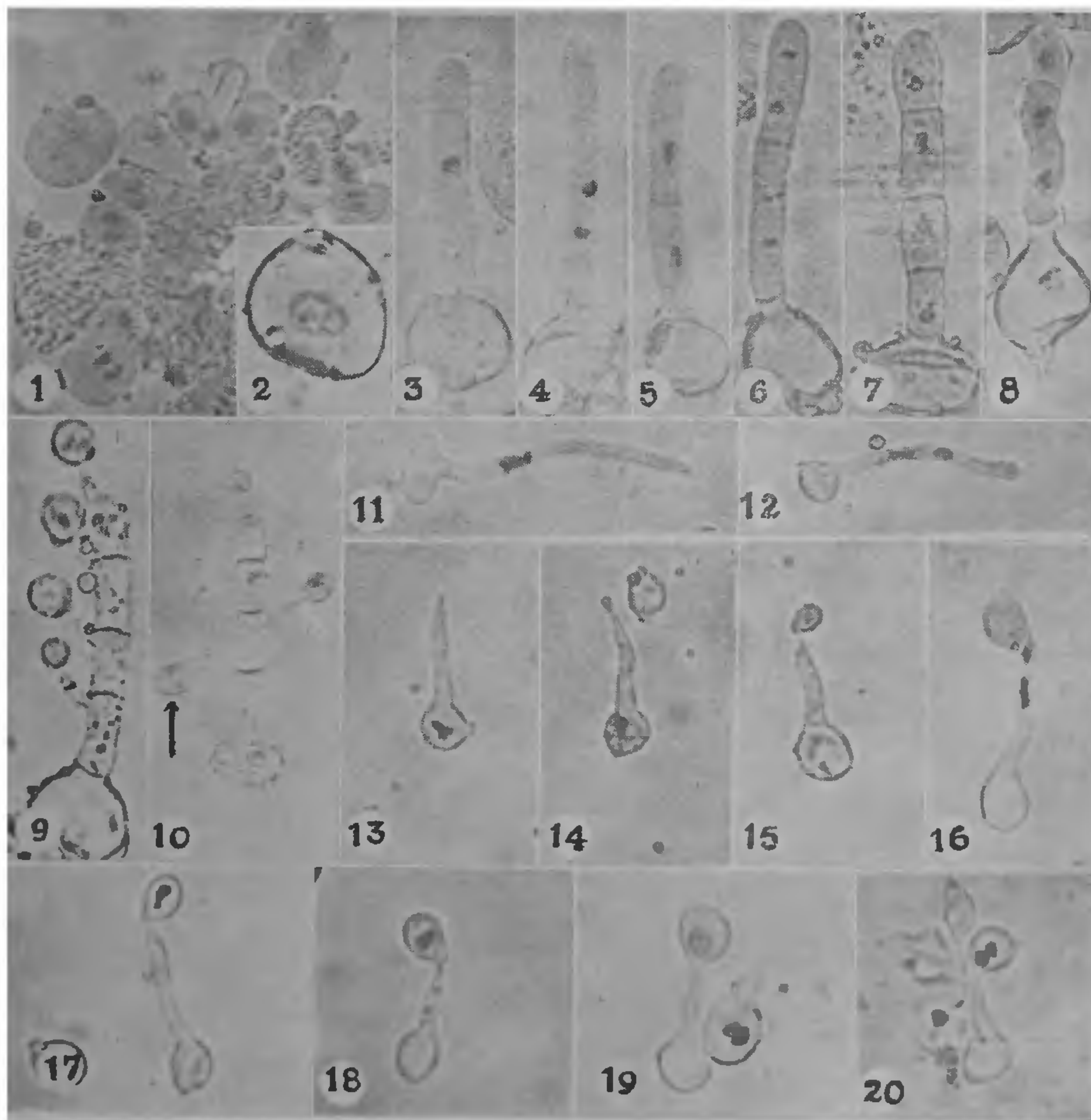
SECONDARY SPORIDIA IN *HEMILEIA VASTATRIX*

DURING the dry period from January to March profuse production of teliospores were observed on *Coffea arabica*, *C. canephora* and *C. excelsa* growing at Central Coffee Research Institute. The spores were noticed to have germinated

in situ. Cytological studies on the germinating teliospores are being carried out and a detailed account will be published elsewhere. In the present note the formation of secondary sporidia in *Hemileia vastatrix* recorded during the course of study is reported.

The teliospores which arise in the uredosori amidst the uredospores are binucleate (Fig. 1).

Prior to germination karyogamy occurs in the teliospore (Fig. 2). Meiosis starts in the teliospore and with the germination of the spore the entire cell contents along with the division nucleus migrate into the promycelium. A septum may be formed at the base of the promycelium. At metaphase I the chromosomes clump together and orient themselves near



FIGS. 1-20. Fig. 1. A sorus with binucleate uredospores and teliospores. Fig. 2. Teliospore with fusion nucleus. Figs. 3-6. Promycelia with metaphase I, anaphase I, telophase I and late anaphase II nuclei. Fig. 7. Four-celled promycelium. Fig. 8. Three-celled promycelium. Fig. 9. Promycelium with four sporidia. Fig. 10. Promycelium with three sporidia. Note a sporidium with two nuclei indicated by an arrow. Figs. 11-12. Germinating sporidia with persistent uninucleate and binucleate condition. Figs. 13-20. Development of secondary sporidia. Fig. 16. Nuclear migration to the secondary sporidium. Fig. 18. Uninucleate secondary sporidium with a septum. Fig. 20. Binucleate secondary sporidium with a septum. All except Figs. 1, 2 and 10, $\times 500$.

about the middle part of the promycelium (Fig. 3). At anaphase I a septum is formed after the two groups of chromosomal complements have moved and at metaphase II the two nuclei divide further followed by formation of septa (Figs. 4-6). Thus a four-nucleate promycelium is formed either with four or three septa (Figs. 7, 8). Following the formation of four-celled promycelium four sterigmata are formed and at the tip of each, a single sporidium develops (Fig. 9). Each sporidium gets a daughter nucleus and these nuclei may undergo another division when the sporidium becomes binucleate (Fig. 10).

Both uninucleate and binucleate sporidia are seen in abundance and persistence of both the conditions are observed even after germination (Figs. 11, 12). Apart from the normal germination of the sporidia frequent cases of formation of secondary sporidia are noticed. The sporidium puts forth a germ tube, on the tip of which a spore is formed (Figs. 13-15). The entire cell contents in the primary spore migrate into the secondary one and rarely a septum is formed (Figs. 16-20). The secondary sporidia are usually smaller in size than the primary ones. They are either uninucleate or binucleate depending on the number of nuclei in the primary sporidia. Both types of spores are seen frequently produced under natural conditions. The significance of these secondary sporidia in *Hemuleia vastatrix* is unknown.

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OCCURRENCE OF B-CHROMOSOMES IN THE GENUS *CLEMATIS*

A NUMBER of plant and animal species have been reported to contain chromosomes additional to their normal complements.¹ These extra chromosomes, which presumably exert no significant influence on the external morphological features, are variously called B-chromosomes, accessory chromosomes or supernumerary

chromosomes. B-chromosomes are of different kinds, some being heteropycnotic while others are not. In some plant species supernumerary chromosomes are found in almost all tissues, whereas in others they are seen only in meocytes. Usually, supernumerary chromosomes are smaller than the smallest chromosomes of the complement. However, there are some exceptions to this, as in *Sorghum purpureo-sericeum*² and *Clarkia*,³ where the supernumeraries are as large as normal chromosomes.

The present note is a preliminary report on the occurrence of B-chromosomes in the genus *Clematis*, not previously recorded, so far as the author is aware. However, the occurrence of B-chromosomes in other genera of Ranunculaceae has been reported, as for example in *ficaria*⁴ and others.

The genus comprises some 230 species, of which several shrubs and climbers are of horticultural interest. Eleven species of *Clematis* growing in the garden of the Department of Botany, University of Exeter, were subjected to cytological scrutiny. Somatic metaphase chromosomes were examined from leaf-tips fixed in 3 parts of alcohol and 1 part of propionic acid, the latter having been previously saturated with ferric acetate. After about 24 hours the fixed leaf-tips were hydrolysed in 9 parts of 0.75% acetocarmine and 1 part of normal HCl by heating over a flame in a watch-glass. Later they were cooled and washed in pure acetocarmine.

Of eleven species examined cytologically, one was found to be tetraploid and the other ten diploid with a basic chromosome number of 8. In all the diploid species, the haploid complement was found to consist of 5 chromosomes with median or submedian primary constrictions and 3 with subterminal primary constrictions, one of these being satellited. Similar observations have been made in several other species of *Clematis*.⁵ However, 2 diploid species, *C. orientalis* and *C. hatherliensis* (*C. orientalis* × *C. tangutica*) (unpublished) were found to contain 0-2 B-chromosomes in addition to the normal diploid complement of 16. Ten plants in *C. orientalis* were examined. Of these, 1 plant was found to contain 2 B-chromosomes (Fig. 1), 3 plants were found to contain 1 B-chromosome (Fig. 2) and the others none. In *C. hatherliensis*, of 10 plants examined it was found that only one plant had 2 B-chromosomes (Fig. 3), 4 plants had 1 B-chromosome (Fig. 4) and the rest possessed none.