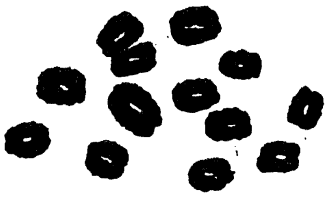
CHROMOSOME NUMBER IN *TINOSPORA*

WHILE examining the pollen mother-cells of *Tinospora cordifolia* Miers, in connection with certain studies on the chromosomes of dicecious plants, it was observed that the haploid number in this plant is $n = 13$, and not $n = 12$ as previously reported by Joshi and Rao.[1] This count was made by examining pollen mother-cells in acetocarmine and was confirmed by studying a very large number of flower buds from two male plants, while the observations of the above authors were made from fixed and sectioned material. If their observation is correct, it shows the presence of aneuploidy in this species. However, one might expect $n = 13$ as the more likely number in *Tinospora* as the related genus *Menispermum* has $n = 26$ Lindsay[2]). In that case the statement of



Chromosomes of *Tinospora cordifolia* at metaphase of rst meiotic division in pollen mother-cell. × 2,000. Note one large pair as observed by Joshi and Rao also.

Joshi and Rao regarding the presence of a progressive difference in the chromosome numbers of genera belonging to the Menispermaceæ, beginning with $n = 12$ in *Tinospora* and passing on through $n = 19$ in *Cocculus* to $n = 26$ in *Menispermum* is without any suggestive relation to Anderson's[3] speculation regarding the origin of the angiosperms, by wide crosses between some of the simpler members of the seven chromosomed and twelve chromosomed gymnosperms, followed by doubling of the chromosomes in the hybrid. Recent studies made in this laboratory by Kumar and Ranadive,[4] on the genus *Anona,* allied to the Menispermaceæ show that $n = 7$ is the haploid number for four species investigated by them. Further, it will be seen that the haploid numbers 12, as well as 7 and multiples of 7 are very frequently met with in Ranunculaceous genera (Gaiser[5]). In *Magnolia denudata,* Andrews[6] has noted $n = 48$, a multiple of 12, and unrelated to $n = 19$, which is found in some other genera of the Magnoliales. If the basic chromosome numbers of primitive dicotyledonous families would give any clue to the origin of the angiosperms, the cytologist can at present go no further than ask whether the angiosperms may not have had a common origin with the gymnosperms in some seven-chromosomed or twelve-chromosomed ancestral type (see Kumar and Ranadive).[4]

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June 11, 1942.

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PUCCINIA DROOGENSIS BUTLER ON *BERBERIS ARISTATA* D.C.

IN some collections of fungi made at Kodaikanal by the writer in 1940 was a rust on *Berberis aristata* D.C. (*B. tinctora*), which agreed with *Puccinia droogensis* recorded by Butler (1905) in the Nilgiri Hills, S. India. The telia were present in abundance, and associated with them were uredial and æcial pustules. Microscopic examination of the sections of the infected leaves revealed that pycnia æcia and uredia develop from the same infected patch. In another collection made in February 1942, pycnia and æcia were also observed in large numbers along with young uredia. It is manifest that all the spore forms occur on the same host, this being the first report on the occurrence of pycnial and æcial stages for the rust.

Pycnia are distributed on the leaves on slightly swollen patches. The infection spot is pinkish-red in early stages. Pycnia are subepidermal (Fig. 1), amphigenous, minute,

orange-yellow with well-developed ostiolar filaments. They measure up to 120 × 136 μ. Æcia are cupulate (Fig. 5) with incurved margins, and erumpent. Æciospores are yellow, polyhydral, binucleate (Fig. 2), measuring

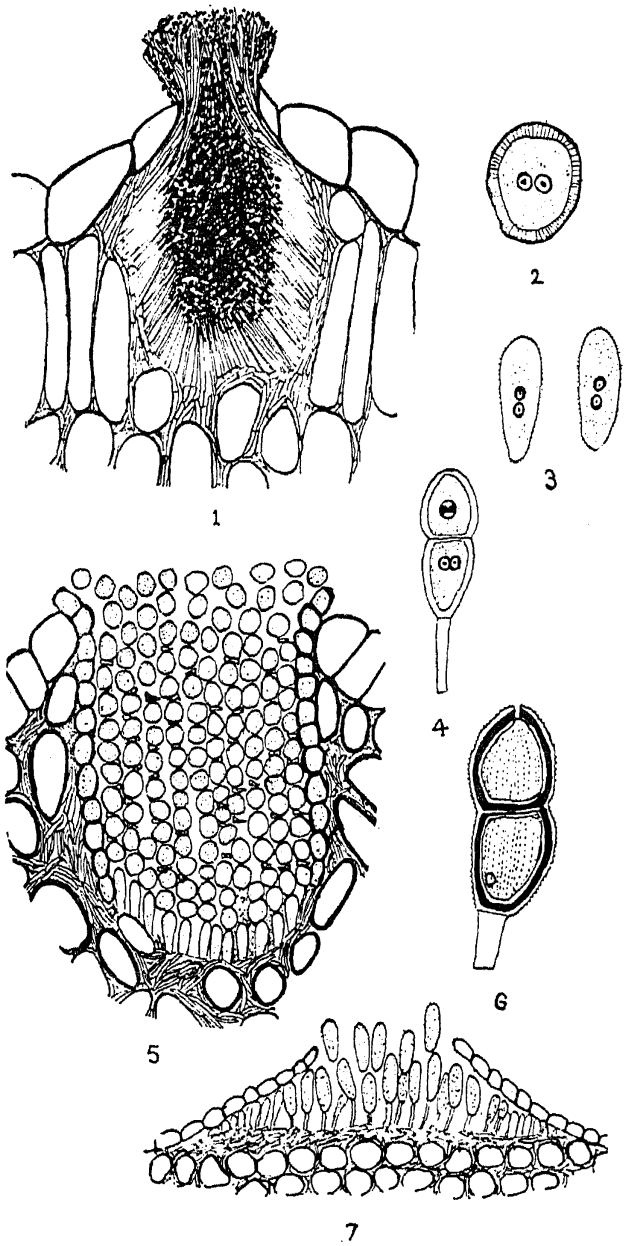

Fig. 1. Subepidermal pycnium × 426·6. Fig. 2. Binucleate æciospore ×533·33. Fig. 3. Urediospores showing verrucose exospore × 426·6. Fig. 4. Young teliospore ×533·33. Fig. 5. Section through an æcium showing chains of spores ×266·33. Fig. 6. Mature teliospore showing three wall layers ×533·33. Fig. 7. Section through an uredium × 106·6.

18-22 × 16·4-18 μ. The germ pores are indistinct and become apparent only at the time of germination. The peridial cells are larger in size, slightly angular, minutely verrucose, measuring 21·8-27 × 16·3-20 μ.

Uredial infections do not cause any hypertrophy. Uredia are subepidermal (Fig. 7), amphigenous, yellow, minute, aparaphysate and pulverulent. The urediospores are stipitate, clavate or ellipsoid (Fig. 3) and minutely verrucose, measuring 16-20 × 27-41 μ.

Telia are purplish-brown and amphigenous. The sori are erumpent and confluent in concentric rings. It was noted that the telia are formed within old uredia. Teliospores are two-celled (Fig. 6), stipitate, rounded at both ends, and constricted in the region of septa. Young teliospores are binucleate (Fig. 4) and the two nuclei fuse forming a syncaryon. There are three wall layers, the outermost being cuticular and covered with minute tubercles. These are arranged in longitudinal rows giving the spores a striate appearance. There is a single distinct germ pore in each cell of the spore, and this feature, in spite of the fact that there are three wall layers, clearly points out that the rust is *Puccinia*, and separates it from *Cumminsiella* recorded on other species of *Berberis* (Arthur, 1933). The teliospores measure 30-44 × 19-23 μ, and germinate within three days when placed in moist chamber.

The rust is an autoecious eu-form. *Æcidium montanum* Butler which is recorded on *Berberis Lycium* Royle, *B. Coriaria* Royle, and *B. aristata* D.C., causes witches brooms and extensive deformations of the host tissue. The æcia of *Puccinia droogensis* on the other hand do not cause such malformation, the sori being distributed on slightly swollen patches. Further the æciospores of *Æcidium montanum* measure 17-35 × 17-29 μ (average 19 × 23 μ), but those of *Puccinia droogensis* 18-22 × 16·4-18 μ. These characters differentiate *Æcidium montanum* from the æcial stage of *Puccinia droogensis*.

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