usual leptosporangiate type and produce apparently functional motile sperms. The archegonia, however, are completely absent and have not been seen. The sporophyte arises apogamously as a bud from the gametophyte. The tracheidal mass formed in the interior of the apogamous bud may be connected with the tracheids of the prothallus but more often it remains quite isolated.

The gametophytes of *Pteris biaurita* Linn. and *Anisogonium esculentum* Presl. kept alongside the cultures of *A. lunulatum* showed no development of tracheids. The former resembles *A. lunulatum* in the complete absence of archegonia and the development of embryo by means of an apogamous bud. *Anisogonium esculentum*, however, has a normal prothallus.

It seems that the development of tracheids in the gametophyte of *Adiantum lunulatum* is not due to the effect of external conditions but depends probably on internal causes. Further cultural and cytological investigations are in progress.

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Lahore,
July 11, 1932.

A Short Note on the Structure and Development of *Petalophyllum indicum* Kash.

THE species was found for the first time by the writer in November 1925 and a brief systematic description was given by Prof. Kashyap in the *Journal of the Indian Botanical Society*.* The writer has worked out pretty fully the structure and development of the plant with the exception of earlier stages of the sporophyte. The midrib of the thallus is mycorhizous, the cells containing unseptate hyphæ. Enlargements of the hyphæ resembling oogonia have also been found in certain cells. Growth takes place by means of a three-sided pyramidal apical cell giving off two lateral and one ventral series of segments. The growing point is protected by 3-5-celled mucilage hairs and a few triangular scales.

The plants are diœcious. The scales which protect the antheridia become occasionally fused near the apex to form definite chambers in which the antheridia lie. The development conforms to the usual type of the Jungermaniales. A row of three cells is formed before the formation of a vertical wall. In one case a row of four cells was present without any vertical wall whatsoever.

The development of archegonium follows the usual Jungermaniales type. A few abnormal archegonia have been seen; in one case there were two eggs in the venter, in another the ventral canal cells were multinucleate. A careful investigation of the perianth proves it to be similar to the perianth of *Sewardiella tuberifera* described by Prof. Kashyap.* In the course of its development, there are free bracts in the early stages which are carried up by basal zonal growth to form the usual bell-shaped perianth. A few bracts are found attached to the inner and the outer surface of the perianth and a few are sometimes met with quite free inside the involucre near the base of the seta.

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Lahore,
July 11, 1932.

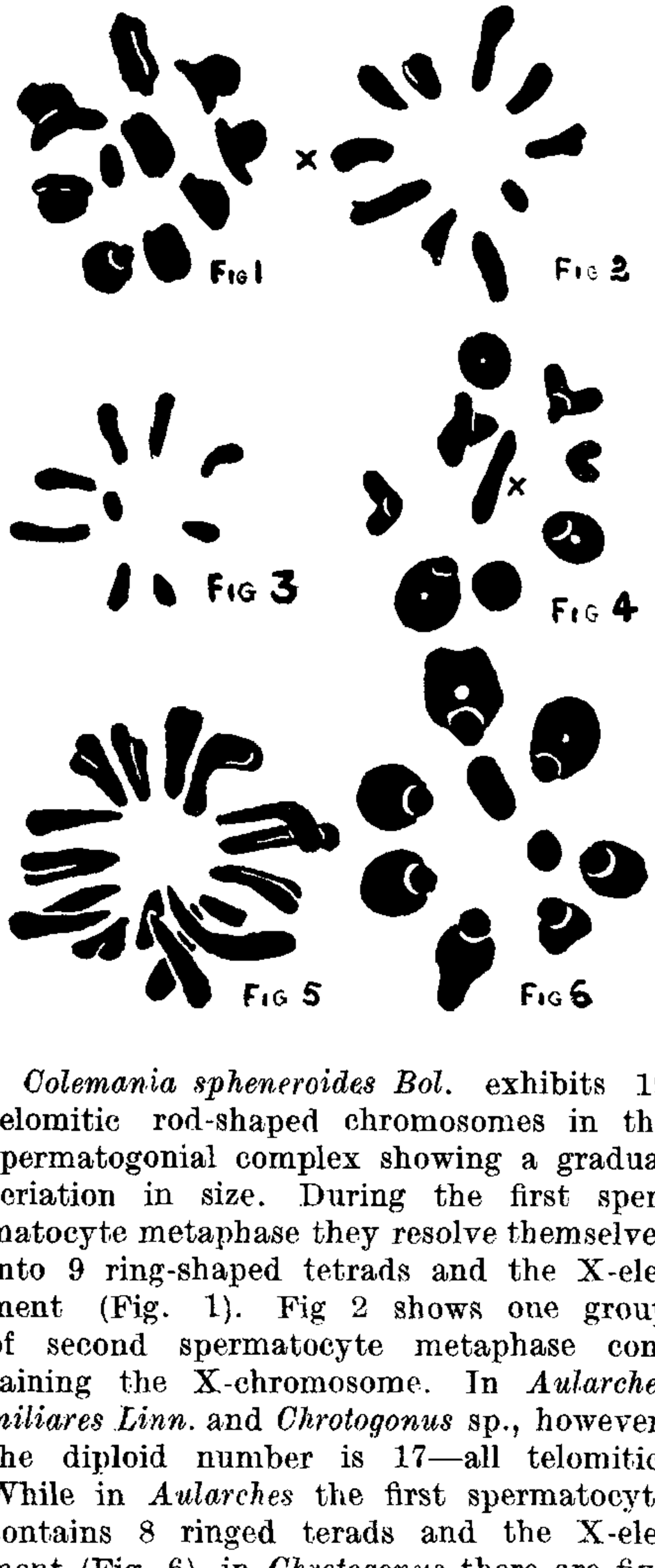
* *Jour. of the Ind. Bot. Soc.*, **6**, 14, 1918.

Chromosome Number in Pyrgomorphinæ (Acrididæ).

THE chromosome number in the males of the majority of Acrididæ (Acridinæ, Oedipodinæ and Tryxalinæ) has been established to be 23 including 11 euchromosomes and a single X-chromosome. A few occasional variations occur but are of a nature not to invalidate the numerical constancy in the group. But in the subfamily Pyrgomorphinæ, as alluded to by McClung casually in a foot-note to his paper on the Synopsis of Mecostethus,† the chromosome numbers exhibit definite departure from the above rule. The writer has been engaged for some time past on a comprehensive study of the chromosome behaviour in the male germ cells of Pyrgomorphinæ and preliminary to the preparation

* *New Phytologist*, **14**, 1915.
† *Jour. Morph.*, **43**, 2, 1927.

of a detailed account he desires to record in these columns the chromosome numbers of three genera of the group.



Colemania spheneroides Bol. exhibits 19 telomitic rod-shaped chromosomes in the spermatogonial complex showing a gradual seriation in size. During the first spermatocyte metaphase they resolve themselves into 9 ring-shaped tetrads and the X-element (Fig. 1). Fig 2 shows one group of second spermatocyte metaphase containing the X-chromosome. In *Aularches miliares Linn.* and *Chrotogonus* sp., however, the diploid number is 17—all telomitic. While in *Aularches* the first spermatocyte contains 8 ringed terads and the X-element (Fig. 6), in *Chrotogonus* there are five rings and 3 V-shaped tetrads beside the X-element (Fig. 4). Fig. 3 is a second spermatocyte metaphase plate of *Chrotogonus* and Fig. 5 the spermatogonial metaphase plate of *Aularches*. Similar studies of a number of other Pyrgomorphines are in progress.

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The First Spark Spectrum of Arsenic.

IN a recent communication by the writer,* the chief triplet and singlet terms of AsII, due to the configurations $4s^24p^2$, 4p5s and the ^3D and ^1D terms of 4p 4d, were identified and reported. With a view to extend the analysis into the visible and the near infra-red regions, the spectrum of the discharge through pure arsenic vapour, contained in capillary tubes, has been photographed with a glass littrow spectrograph, using varying intensities of discharge. With our knowledge of the intervals of the $5s^3P$ terms ($5s^3P_1 - 5s^3P_2 = 2380$ cm^{-1} and $5s^3P_0 - 5s^3P_1 = 397$ cm^{-1}) and with the aid of these recent experiments it has been possible to establish the chief triplet terms due to the 4p 5p configuration. These are shown in Table below.

There are still some strong and diffuse groups of lines in the visible and the quartz regions which have to be ascribed to the singly-ionised atom of arsenic. It was suggested in the previous paper that these diffuse groups of lines might be due to the transition $4d \rightarrow 4f$, of the series electron, giving rise to multiplets of the type $^3D^3F$, $^3F^3G$, $^3D^3D$, etc. Since the previous work was completed, the $4d^3F$ and the $4d^3P$ terms have been identified. A knowledge of the intervals of the $4d^3D$ and the $4d^3F$ terms has led to the assignment of these groups of lines as being due to the combinations $4d^3D - 4f^3F$, $4d^3D - 4f^3D$ and $4d^3F - 4f^3G$. Besides these, the ^3P and the ^3D terms due to the configuration $4s\,4p^3$ have been discovered. The $4p^3$ ^3D terms are found to give strong combinations with the $5p^3D$ and the $5p^3P$ terms.

The hyperfine structure of some of the important lines between 6000A and 4000A

*Proc. Phys. Soc., 44, 243, 343.