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# MEIOTIC OBSERVATIONS ON SOME WEST HIMALAYAN MOSSES

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## ABSTRACT

**The present study provides cytological analysis of ten taxa of mosses belonging to seven genera included in two families, Calymperaceae and Pottiaceae.**

**Key words:** Calymperaceae, Pottiaceae, metacentric, m-chromosome, triads.

Of the taxa studied, five specimens, *Trichostomum uncifolium* Dix., *Oxystegus tenuirostris* (Hook. & Tayl.) Nork., *Hyophila perannulata* Ren. et Card., *H. rosea* Williams, and *H. spatulata* (Harv.) Jaeg., received cytological attention for the first time.

## MATERIALS AND METHODS

The materials were collected by the first author from the Western Himalayas, particularly from Dharamsala in the monsoon months of 1984, 1985, 1986 and 1987. Cytological studies were carried out on fresh materials. The spore mother cells were dissected out of capsules and squashed in 2% aceto-carmine. The slides were made permanent in euparol. The photomicrographs were taken at a uniform magnification of x1800. The voucher specimens are deposited in the herbarium of Department of Botany, Punjab University, Chandigarh (PAN).

## RESULTS AND DISCUSSION

Family: Calymperaceae.
*Syrrhopodon gardeneri* (Hook.) Schwaegr. n = 13 (Fig. 1).

The material (PAN 4001), collected from Dharamsala (Mcleodganj, alt. 2200 m) was found growing on the trunk of *Cedrus deodara*.

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The present study substantiates an earlier chromosome count n=13 [1, 2] based on two East Himalayan populations of this species. The 13-chromosome complement included two noticeably large bivalents but lacked m-bivalent. As judged from the morphology of the bivalents, four chromosomes were metacentric. The course of meiosis was regular resulting in normal tetrads.

Family: Pottiaceae
Subfamily: Trichostomoideae

*Hymenostomum edentulum* (Mitt.) Besch. n=13 (Fig. 2).

The material (PAN 4007), collected from Dharamsala (Mcleodganj forest, alt. 2200 m), was found to form dense mats on the soil gathered on rock surface.

The chromosome number n=13, confirms an earlier report [3] based on a Narkanda population of this species. The complement included one peripherally located conspicuously large, rod-shaped bivalent. The remaining bivalents did not show any noticeable difference in size.

Gangulee and Chatterjee [4] reported n=8 in another East Himalayan population of this species, which is a very unusual report in the genus.

*Trichostomum uncifolium* Dix. n=13 (12+m) (Fig. 3).

This taxon (PAN 4010), found growing in dense tufts, was gathered from Mussoorie (Mossy fall, alt. 1500 m).

Earlier, this species was not studied cytologically. The chromosome complement showed 13 bivalents at first metaphase. The smallest member of the set qualified as m-chromosome and showed premature disjunction into two half-bivalents. The remaining bivalents did not display appreciable differences in size. The course of meiosis was orderly, resulting in normal tetrads.

*Oxystegus tenuirostris* (Hook. & Tayl.) Nork. n=13 (Fig. 4, 5).

This taxon (PAN 4009), where meiosis was not studied earlier, was collected from Dharamsala (on way to Triund, alt. 2800 m, on damp soil).

The 13-chromosome complement included one large rod-shaped bivalent which was found on the periphery of the PMC. It did not display precocious disjunction. The remaining bivalents showed gradation in size. In about 5% of the sporocytes, triads (Fig. 5), resulting from the failure of second division in one of the two telophase nuclei or due to the fusion of two nuclei at one of the poles, were observed.

*Timmiella anomala* (B.S.G.) Limpr. n=14 (Fig. 6).

This taxon (PAN 3922) is endemic to the Western Himalayas.

The present chromosome count, n=14, based on a collection from Dharamsala (on way to Triund, alt. 2800 m), is at variance with the earlier reports of n=13 [5] and n=15 [1, 2, 6] for some other Himalayan populations of this species. The rapidly stained, well spread bivalents showed some gradation in their size. The morphology of the bivalents, as observed at late metaphase, suggested that at least 5-6 bivalents were metacentric. The course of meiosis was regular with normal tetrads at telophase II.

*Timmiella subintegra* Dix. n=13 (Fig. 7, 8).

This species, growing in loose tufts, shows restricted distribution in the Western Himalaya. The present material (PAN 3839) was collected from Dharamsala (on way to Triund, alt. 2800 m, on soil).

The chromosome number n=13 is in disagreement with the earlier study where n = 14 was reported [5]. The 13-chromosome complement, at MI showed one large, rod-shaped bivalent in the peripheral position. About 4-5% of the sporocytes, had delayed separation of bivalents (Fig. 8).

Subfamily: Pottiodeae
Tribe: Pleuroweisieae

*Anoectangium clarum* Mitt. n=13 (Fig. 9).

This taxon (PAN 4002) was collected from Shimla (Narkanda, alt. 3000 m, on wet soil).

The present chromosome count, n=13, supports an earlier report [7] based on other Himalayan population of this species. The largest bivalent, always located in the peripheral position, was rod-shaped and showed a tendency to disjoin prematurely. The remaining members of the complement did not show any significant difference in their size. The course of meiosis was normal.

Subfamily: Pottioideae
Tribe: Barbuleae

*Hyophila perannulata* Ren. et Card. n=13 (Fig. 10).

This taxon (PAN 4012), collected from Dharamsala (Mcleodganj forest, alt. 2000 m), was found growing on the trunk of *Cedrus deodara*.

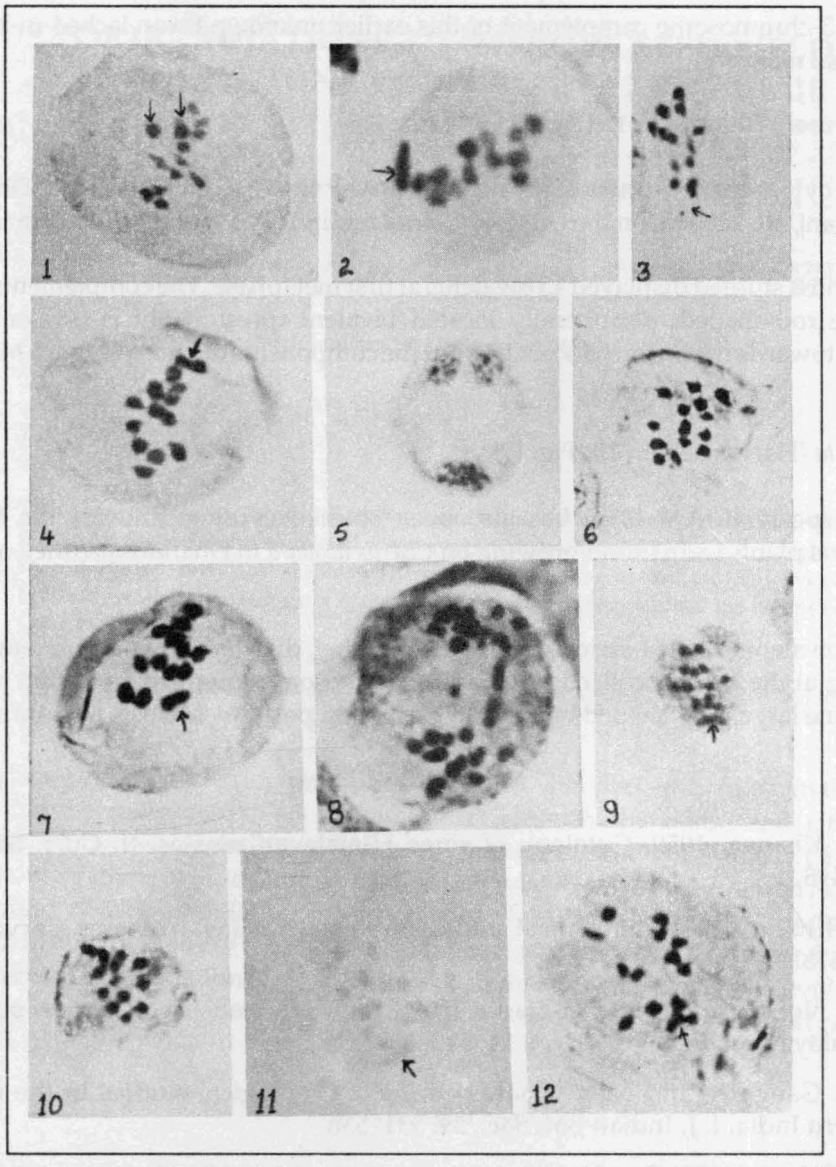


**Fig. 1–12.** Meiotic stages, x1800. 1) *Syrrhopodon gardeneri*, metaphase I showing 13 bivalents; 2) *Hymenostomum edentulum*, metaphase I showing 13 bivalents (note one largest rod-shaped peripheral bivalent); 3) *Trichostomum uncifolium*, metaphase I showing 13 bivalents (note precociously separated m-bivalent); 4 & 5) *Oxystegus tenuirostris*: 4) metaphase I showing 13 bivalents; 5) triad formation; 6) *Timmiella anomala*, metaphase I showing 14 bivalents; 7 & 8) *T. subintegra*: 7) metaphase I showing 13 bivalents (note one largest rod-shaped, peripherally located bivalent); 8) anaphase I showing laggards; 9) *Anoectangium clarum*, metaphase I showing 13 bivalents (note one largest rod-shaped peripheral bivalent); 10) *Hyophila perannulata*, metaphase I showing 13 bivalents; 11) *H. rosea*, metaphase I showing 13 bivalents (note one largest, rod-shaped peripheral bivalent); 12) *H. spatulata*, metaphase I showing 13 bivalents (note one largest rod-shaped bivalent).

The 13-chromosome complement of this earlier unknown taxon lacked m-bivalent. It had normal meiosis.

*Hyophila rosea* Williams. n=13 (Fig. 11).

This cytologically unstudied species (PAN 4013), collected from Dharamsala (Mcleodganj, alt. 2000 m, on the trunk of *Cedrus deodara*), was found growing in loose tufts.

The moss studied displayed 13 bivalents at first metaphase. The complements included one large rod-shaped, peripherally located bivalent (presumably H-bivalent), with a tendency towards precocious disjunction but the components did not fall apart. Meiosis was regular.

*H. spatulata* (Harv.) Jaeg. n=13 (Fig. 12).

This species (PAN 4014) has also been studied cytologically for the first time. Corticolous plants were found growing on *Cedrus deodara* in Dharamsala (Mcleodganj, alt. 2200 m).

The bivalents in this species showed clumping due to unfavourable environment prevailing at the time of collection. The 13- chromosome complement at first metaphase showed one large, rod- shaped bivalent in peripheral position. Meiosis was normal.

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