

# DIFFERENTIATION OF THE GENUS *TARGIONIA* L. IN INDIA—II\*. THE EAST HIMALAYAN AND SOUTH INDIAN COMPLEX AND DESCRIPTION OF A NEW SPECIES OF *TARGIONIA*

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## ABSTRACT

In eastern Himalayas the genus *Targionia* exhibits two distinct morphoforms as in the western Himalayas, i. e. one referable to *T. hypophylla* L. *sensu stricto* and the other to *T. indica* sp. nov. A similar pattern is also discernible at Pachmarhi in Madhya Pradesh. The south Indian complex, however, is referable to *T. lorbeeriana* Müller and *T. indica* sp. nov. In this region *T. hypophylla* L. *sensu stricto* has not been encountered so far. *T. indica* sp. nov. has clearly defined distinctive features. The genus shows maximum differentiation and proliferation in the country with its three species. Distinctive sporoderm pattern together with some other features differentiate the three taxa convincingly.

## INTRODUCTION

In an earlier contribution (UDAR & GUPTA, 1981) it had been shown that the populations of *Targionia* in the western Himalayas show two distinct morphoforms separable into two clear taxonomic categories referable to *T. hypophylla* L. *sensu stricto* and *T. sp.* It was then stressed: "The problem of assigning clearly defined status to *T. sp.* plants is postponed for a later date when the east Himalayan and south Indian plants have been fully investigated. In the latter territory, in particular the differentiation of the genus has occurred along very different lines." It has now been possible to investigate populations of *Targionia* from a number of localities in eastern Himalayas as well as hills of Madhya Pradesh, Maharashtra and Tamil Nadu. A critical study of these plants has shown that the east Himalayan territory shows similar differentiation pattern of the genus as encountered in the west Himalayan populations but there is a dominance of plants of *T. hypophylla* in the former territory and of *Targionia* sp. in the latter. The plants at Pachmarhi in Madhya Pradesh also show similar differentiation. However, at several sites in Maharashtra (Khandala, Lonavala, Panchgani, Mahabaleshwar, etc.) only *T. sp.* is found to form conspicuous element of terrestrial and saxicolous liverwort vegetation. The plants described by MAHABALE AND MAHAJAN (1955) from this territory as *T. hypophylla* actually deals with this taxon. In Tamil Nadu neither *T. hypophylla* nor *T. sp.* have been encountered but so far *T. lorbeeriana* Müller forms dominant population (see UDAR & GUPTA, 1980; 1981a). It is now certain that *T. sp.* is a genetically stable taxon and has wide distribution in the country. The plants have been described in this paper as *T. indica* sp. nov.

## DESCRIPTION

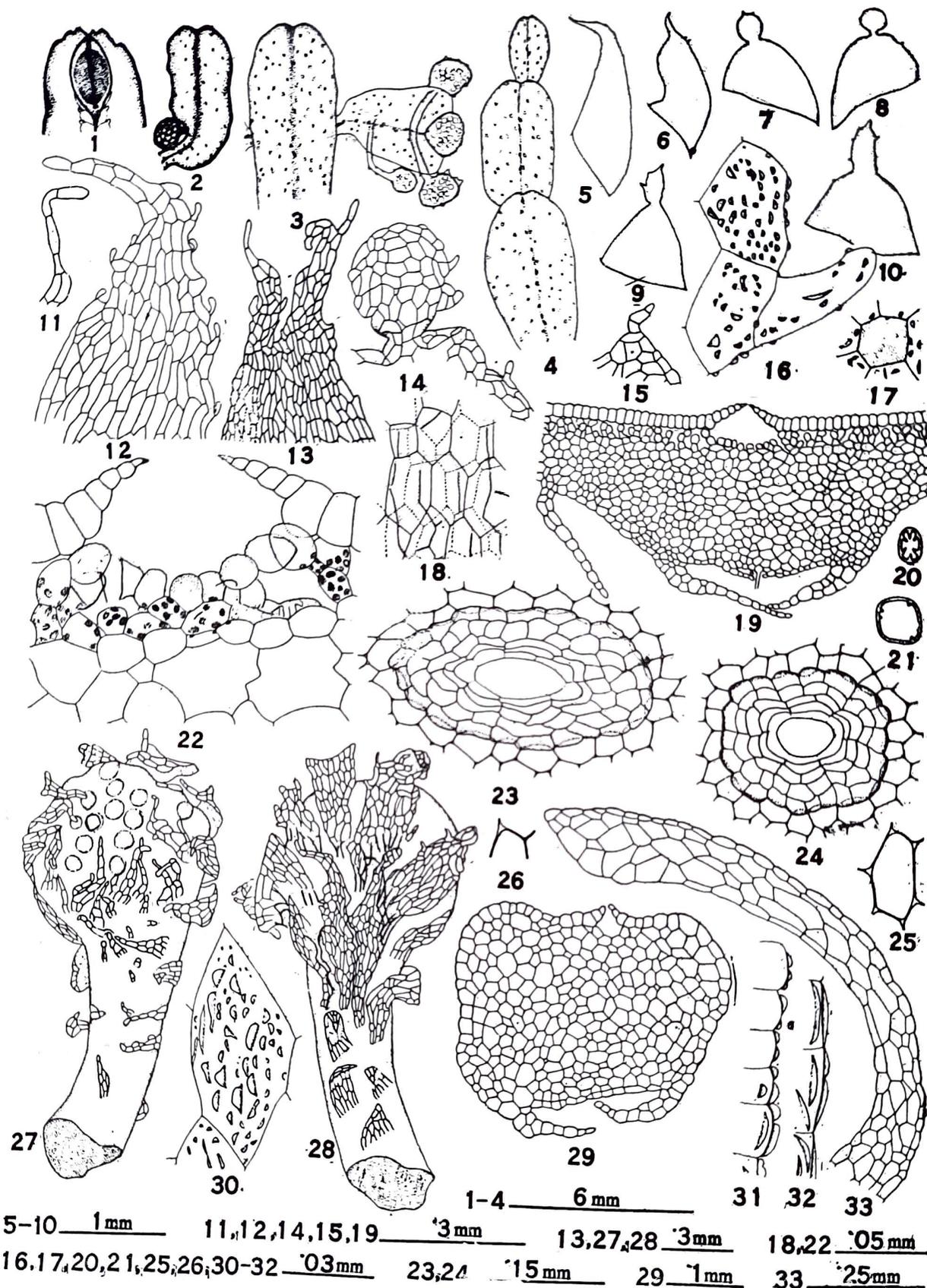
### ***Targionia indica* sp. nov.**

Figs. 1-69

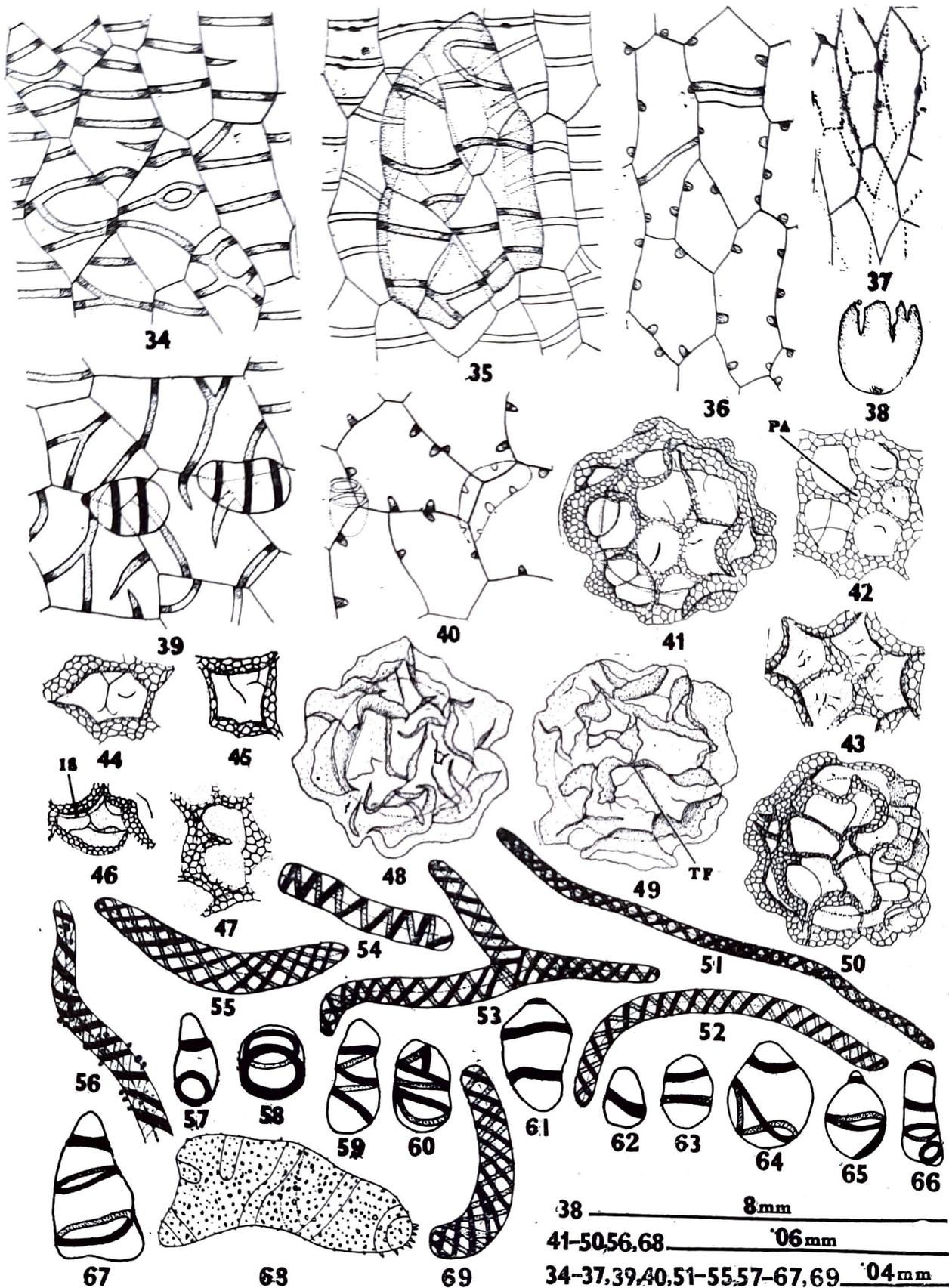
*A Targionia hypophylla* L. differt in sporae cum minuti reticulationibus localizatis ad paries e magnus reticulationibus.

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Text-figs. 1-33.—1. Portion of female thallus showing involucre. 2,3. Male shoots. 4. Thallus showing apical innovations. 5, 6. Scales showing attenuate apex. 7-10. Scales having appendage. 11. Apical portion of scale showing filamentous nature of attenuate apex. 12-15. Parts of scales showing outgrowths. 16, 17. Magnified cell(s) of scale showing ornamentation at surface. 18. Part of basal portion of scale becoming two-layered. 19, 22. T. S. of thallus. 20, 21. Details of trigone. 23, 24. Air pore. 25, 26. Epidermal cell in surface view showing shoot. 27. Dorsal surface of male lateral shoot. 28. Ventral surface of male lateral shoot. 29. T. S. of antheridiophore. 30. Enlarged cell of outer surface of involucre valve. 31, 32. Magnified margin of involucre valve showing projections. 33. T. S. of involucre valve.



Text-figs. 34-69.—34, 35. Cells of inner surface of capsule wall. 36, 37. Cells of outer surface of capsule wall. 38. Dehiscent capsule. 39. Cells of inner surface of lid with surface-fixed elaters. 40. Cells of outer surface of lid. 41. Distal surface of spore. 42-46. Portion of distal surface of spore showing various types of secondary lamellae at lumina. 47. Incomplete reticulations of distal surface of spore. 48, 49. Proximal surface of spore. 50. Equatorial view of spore. 51-56. Free elaters. 57-68. Surface-fixed elaters. 69. One-end-fixed elater (PA, pentangular area; TF, triradial fold).

Dioecious, rarely monoecious, thalli 6-17 mm long, 2-5 mm broad; ventral innovations both lateral and apical frequent, usually 1-3 per thallus, either vegetative or bearing involucre, often much larger than main thallus. Scales stiff, brown, in one row on either side of midrib, covering 1/4—1/2 portion of ventral surface, appendaged with round to sometimes ovate-subovate appendages, rarely with straight to curved attenuate apex, margin irregular with mucilage papillae and extended scale cells, unistratose in terminal part, bistratose basally, cell surface with elliptical-sub spherical-spherical cuticle. Air pores elevated, elliptical, rarely roundish, enclosed by 4-6 superimposed rings of cells, uppermost two rings with 6-8 and rest with 18-26 cells, epidermal cells trigonous. Antheridia aggregated on dorsal surface of ventral shoot which in turn may contain several lateral shoots having cylindrical stalk and subspherical disc, antheridial groups cover 1/4—ca 1/2 surface forming distinct mid-dorsal cushion, lateral shoot with numerous small scales, stalk with assimilatory zone extremely reduced, often represented by tiny air chamber at margin, devoid of assimilatory filaments. Involucre bi-valved, margin and outer surface with distinct projections throughout, projections papillate-baculate-lamellate. Capsule wall predominantly with nodular thickenings on outer surface, inner surface with radial wall thickenings extending partially or completely on inner tangential walls, rarely forming loop in middle, both nodules and bands becoming fainter towards base but never disappearing completely, capsule wall two cells thick at base. Lid small, spherical, cells with thickenings. Spores yellow-brown, cryptopolar,  $\pm$  spherical, 35-68  $\mu\text{m}$  in diameter, double sculptured; distal surface with reticulate apparent sculpturing, reticulations 3-5 across,  $8 \times 6 \mu\text{m}$  to  $19 \times 12 \mu\text{m}$  across, lumina subspherical-somewhat angular, partition walls conspicuously raised with minutely reticulate minor sculpturing, lumina surface minutely granulate, often secondary lamellae running across meeting the partition walls or ending abruptly; proximal surface with irregularly folded apparent sculpturing, surface minutely granulate-lamellate-very rarely with scattered minute reticulations, folds variable in size, rarely folds aligned to give triradiate shape; unwinged. Elaters always with thickening bands, free and fixed; free elaters 106-273  $\mu\text{m}$  long, 2-19  $\mu\text{m}$  broad, bispiral, very rarely unispiral, trispiral or tetraspiral, with an additional line of thickening in middle, unbranched, rarely branched; fixed elaters surface-fixed and/or one-end-fixed, surface-fixed 22-55  $\mu\text{m}$  long, 13-41  $\mu\text{m}$  broad, stumpy, unbranched, with complete band towards inner and nodular thickening towards outer surface, also with annular or spiral or both annular and spiral or rarely semiannular and annular thickenings; one-end-fixed elaters elongated, attached at base of capsule, bispiral, surface with additional irregular grains.

*Holotype*—LWU No. 418/78. Tiffin Top, Nital, western Himalayas. Leg. Asha Gupta, Date : 15.10.1978.

*Range of distribution in India*—Western and Eastern Himalayas, Pachmarhi (Madhya Pradesh) and Lonavala, Khandala, Panchgani, Mahabaleshwar (Maharashtra).

## DISCUSSION

A general survey of the populations of *Targionia* in various parts of the country have revealed that *T. indica* grows together with *T. hypophylla* in the Himalayas and at Pachmarhi in Madhya Pradesh but tends to form pure populations at several places in Maharashtra. The main differentiating features of the two species have already been delineated by us (UDAR & GUPTA, 1981). While several features tend to be of somewhat overlapping nature in the two taxa, it seems certain that *T. indica* consistently

differs from *T. hypophylla* in darker thalli, predominance of ovate pores with larger number of rings of cells surrounding it as well as the larger number of cells in each ring and the spores with the minor reticulations confined to the partition walls of larger reticulations on the distal face instead of being uniformly distributed all over. Among these features, the spores show the most reliable and stable characteristics. It is well-known that Targioniaceae show a range of sporoderm morphology (see UDAR, 1964, 1976, 1980) which characterise various species of *Cyathodium*. A somewhat similar evolutionary trend seems to have occurred in *Targionia*. It was at first thought to treat *T. indica* at a varietal rank of *T. hypophylla* but the stability of spore character, associated with others, lends it the status of a new species. All the three species of *Targionia* occurring in the country could be clearly separated on this basis as follows :

#### KEY TO THE SPECIES

1. Spores with minor reticulations present all over distal and proximal surfaces.....  
.....*T. hypophylla*
1. Spores with minor reticulations confined to certain portions.....2.
  2. Partition walls of larger reticulations and peripheral portion of lumina with minor reticulations, proximal surface always granulate.....*T. lorbeeriana*
  2. Only partition walls of larger reticulations beset with minor reticulations, proximal surface variable, granulate and very rarely with some or without minor reticulations.....*T. indica*

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