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SOME INDIAN OPHIOGLOSSUMS—TAXONOMY AND DISTRIBUTION

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ABSTRACT

A wider range of distribution for five taxa of *Ophioglossum, viz., O. reticulatum, O. polyphyllum, O. costatum, O. gramineum* and *O. nudicaule* var. *typicum* collected from the areas coming under the jurisdiction of Southern Circle, Botanical Survey of India, are presented. A map showing the new and already known distributions for these taxa is included. Descriptions, illustrations and a key to these five species are also given.

INTRODUCTION

The present paper relates to new distributions and descriptions of five species of *Ophioglossum, viz., O. reticulatum, O. polyphyllum, O. costatum, O. gramineum* and *O. nudicaule* var. *typicum* collected during recent botanical explorations. All these taxa show new distributions in the areas coming under the jurisdiction of the Southern Circle of the Botanical Survey of India (map). The data on new distributions are based on a comparison with the herbarium specimens present in the Central National Herbarium, Sibpur, the Madras Herbarium, Coimbatore and the information presented by d' Almeida (1922), Beddome (1873, 1883, 1892), Blatter and d' Almeida (1922), Chakravarty (1951), Clarke (1879), Clausen (1938), Fischer (1921), Hooker and Baker (1868) and Ninan (1958).

OBSERVATIONS

The detailed observations made during the present study have yielded additional taxonomic characters. Measurements given were made from populations of living plants and specimens preserved in 4% formalin water. On an average 25 to 50 specimens were examined for each taxon. Measurements of mature spores were made by mounting them in glycerine and using an occular micrometer.

KEY TO THE SPECIES

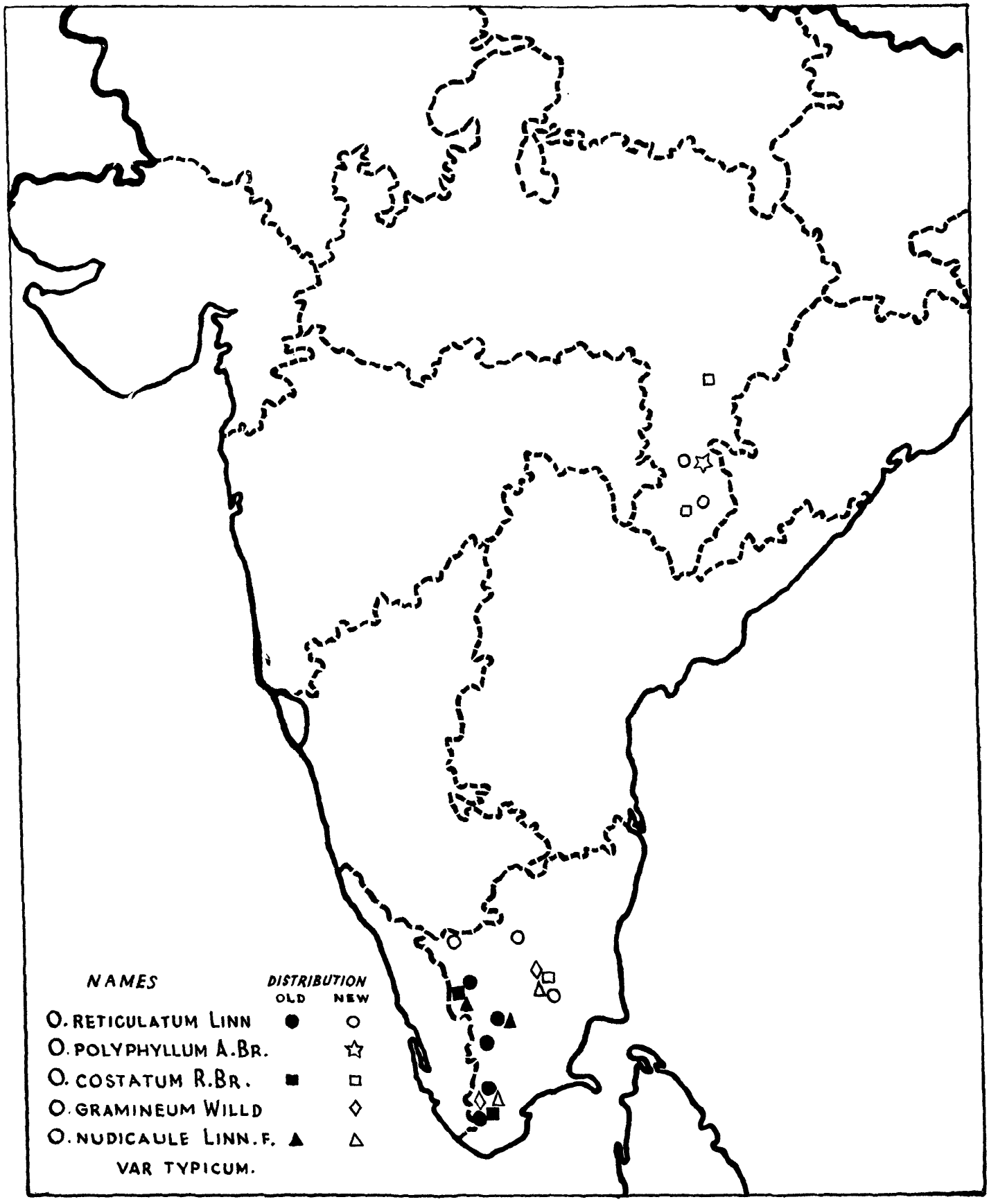
1. Rhizome globose, corm-like, massive, tuberous with numerous fibrous roots; principal veins form large primary areoles enclosing smaller secondary areoles; blade with a prominent pale median band.
   3. *O. costatum*
1. Rhizome not globose but elongate, cylindric, tuberous; principal veins form areoles not enclosing smaller areoles; blade without a median band.
   2. Sterile segment cuneate or attenuate at base.
      3. Blade ovate, elliptic or sub-orbicular, apiculate at apex.
         4. Rhizome with persistent caudate-acuminate brownish-black scale-like sheaths, stoloniferous.
            2. *O. polyphyllum*
         4. Rhizome without persistent sheaths, not stoloniferous.
            5. *O. nudicaule* var. *typicum*
      3. Blade linear-lanceolate, narrow, 1-3 mm. wide, acute at apex.
         4. *O. gramineum*
   2. Sterile segment cordate or broad-truncate at base.
      1. *O. reticulatum*

1. **Ophioglossum reticulatum** L., Sp. pl. **2**: 1063, 1763.
Syn. *O. peruvianum* Presl, Suppl. Tent. Pterid. p. 52, 1845.

Perennial herb, 6—32 cm. high; rootstock cylindric, elongate, with many horizontal roots, bearing during a season one or rarely several leaves; common stipe 0.8-10.5 cm. long; sterile segment placed generally below the middle, submembranous, broadly ovate, ovate-orbicular, either cordate or broad-truncate at base, acute to rounded at apex, 1-6 cm. long, 0.5-4.4 cm. wide; venation lax, distinctly reticulate; fertile segment 4.8-21.5 cm. long; sporangiferous portion 0.5-4.0 cm. long, 1.0-3.5 mm. wide; spores 33—45 μ in diameter (Figs. 1-2).

MADHYA PRADESH
Bastar Dt.—*Parewanala Stream, Keskal, 767 m. *K. Subramanyam* 10377;
*Dharba, 700 m. *K. Subramanyam* 10379.

MADRAS STATE
Coimbatore Dt.—Doddasampagai; Anamalais, Mount Stuart.
Madurai Dt.—High Wavy Mountains; Pulney Hills.
Nilgiri Dt.—*Moyar Valley, 1700 m. *N. P. Balakrishnan* 204.
Salem Dt.—*Balmadies Estate, Yercaud, 1666 m. *K. Subramanyam* 6564.
Tiruchirapalli Dt.—*Kondaiampatti, 250 m. *K. Subramanyam* 7780.
Tirunelveli Dt.—Courtallam; Kannikatti.


NAMES
DISTRIBUTION
OLD
NEW
O. RETICULATUM LINN
O. POLYPHYLLUM A.BR.
O. COSTATUM R.BR.
O. GRAMINEUM WILLD
O. NUDICAULE LINN.F. VAR TYPICUM.

2. **Ophioglossum polyphyllum** A. Br. *Webbia* **9**: 628-660, 1954.
Syn. *O. capense* Sw., Schrader's *J. Bot.*, p. 308, 1803.
Syn. *O. nudicaule* Thunb, Prod. Fl. Cap. p. 171, 1801 ; non Linn. f. Suppl. p. 443, 1781.
Syn. *O. vulgatum* L. var. *Aitchinsoni* Clarke, *Trans. Linn. Soc. London* II. **1**: 586, 1880.
Syn. *O. Aitchinsoni* (Clarke) d' Almeida, *J. Indian Bot.* **3**: 63. f. 12, 1922.

Perennial slender herb, 3-13.5 cm. high ; rhizome elongate, cylindric, stoloniferous, with many roots, bearing caudate-acuminate brownish-black persistent scale-like sheaths ; leaves one or two ; common stipe 0.8-3.6 cm. long ; sterile segment placed below the middle, ovate-elliptic, slightly attenuate at base, acute or mucronate, membranous, 0.9-5.7 cm. long, 0.4-1.1 cm. wide, venation reticulate forming oblong areoles ; fertile segment 1.3-10.5 cm. long ; sporangiferous portion 0.4-2.4 cm. long, 0.75-2.00 mm. wide ; spores 32.5-47.5 μ in diameter (Figs. 3-5).

MADHYA PRADESH
Bastar Dt.—*Parewanala Stream, Keskal, 567 m. *K. Subramanyam* 8959.

This species has not been reported so far from the area under consideration.

3. **Ophioglossum costatum** R. Br., Prod. Fl. Nov. Holl.. p. 163, 1810. (Ninan, 1958).
Syn. *O. pedunculosum* Desv., *Magazin Gessellschaft Naturforsch. Freunde Berlin* **5**: 306, 1811.
Syn. *O. fibrosum* Schum., *K. Danske Videnskabernes Naturvidenskabelige og Mathematiske Afhandingar* **4**: 226, 1827.
Syn. *O. brevipes* Bedd., Ferns of Southern India, p. 23. t. 72, 1873.
Syn. *O. bulbosum* Bedd., Ferns of British India, Suppl. p. 28, 1876.
Syn. *O. wightii* Greville and Hook., *Bot. Misc.* **3**: 218, 1833.

Perennial herb, 5-12.5 cm. high ; rootstock round, massive, tuberous, with numerous fibrous roots bearing one to three leaves ; common stipe 1-3.2 cm. long ; sterile segment placed below the middle, ovate-elliptic, slightly cuneate at base, obtuse or acute at apex, slightly fleshy with a prominent pale median band of veins, 2-3.5 cm. long, 1.3-2.1 cm. wide ; venation double, with primary veins forming large oblong hexagonal areoles in which are included networks of secondary veinlets forming smaller secondary areoles ; fertile segment 3-10.2 cm. long ; sporangiferous portion 0.9-2.1 cm. long, 1-3 mm. wide ; spores 35-45 μ in diameter (Figs. 6-7).

The specimens collected from Dharba, Bastar District and Pacheda Farm, Raipur District in Madhya Pradesh, are larger in size of the rhizome and sterile and fertile segments. Apart from these no other qualitative character distinguishes it from the specimens collected from Narthamalai, Tiruchirapalli Dt., Madras State. The distinguishing characters are merely quantitative exhibiting continuous variation. However, separate descriptions, measurements and illustrations are given for this form also.

Plant 10-32 cm. high ; rhizome black, massive, 0.6-2.0 cm. in diameter, in older plants a circular ridge on the top of the rhizome surrounds a pit-like depression from which arises 1-4 leaves ; common stipe 2-6 cm. long ; sterile segment elliptic-lanceolate, cuneate or attenuate at base, acute or apiculate at apex, 3.3-8.5 cm. long, 1.2-2.5 cm. wide ; fertile segment 7-26 cm. long ; sporangiferous portion 1.5-6.5 cm. long, 2-4 mm. wide ; spores 35-45 μ in diameter (Figs. 8-10).

MADHYA PRADESH
Bastar Dt.—*Dharba, 700 m. *K. Subramanyam* 8655.
Raipur Dt.—*Pacheda Farm, 380 m. *K. Subramanyam* 8573.

MADRAS STATE
Coimbatore Dt.—Anamalai Teak Forest.
Tiruchirapalli Dt.—*Narthamalai, 333 m. *K. Subramanyam* 8956.
Tirunelveli Dt.—Mahendragiri Hills.

4. **Ophioglossum gramineum** Willd., Schrift. Ak. Erfurt. 18, t.1, f.1, 1802.
Syn. *O. gracillimum* Welw., Hooker and Baker, Synopsis Filicum, p. 445, 1868.
Syn. *O. lucitanicum* var. *gracillimum* A. Braun, Kuhn. Fil. Afr. 177, 1868.
Syn. *O. vulgatum* var. *lanceolatum* Luerssen, *J. Mus. Godeffr.* **8**: 247c. pl. 12, 1875.
Syn. *O. lusoafricanum* Welw., Prantl, *Ber. deutsch. bot. Ges.* **1**: 351, 1883.
Syn. *O. lanceolatum* (Luerss.) Prantl, *Ber. deutsch. bot. Ges.* **1**: 352, 1883.
Syn. *O. molluccanum* f. *inconspicuum* Raciborski, *Nat. Tijdschr. Ned. Ind.* **59**: 237. pl. 2, f.5, 1900.
Syn. *O. inconspicuum* (Rac.) van Alderwerelt van Rosenburgh, *Bull. Dept. Agric. Ind. Neerl.* **21**: 9, 1908.

Slender herb, 2.5-7.5 cm. high ; rootstock cylindric or tuberous, with few to many roots running obliquely downwards, bearing one to three leaves ; common stipe 0.8-2.8 cm. long ; sterile segment placed generally below or occasionally at the middle, linear or linear-lanceolate, acute at apex, sub-membranous to slightly fleshy 1-3 cm. long, 1.3-3.0 mm. wide ; veins parallel, anastomosing frequently, fertile segment 1-5.5 cm. long ; sporangiferous portion 0.4-2.0 cm. long, 1-2.5 mm. wide, spores 35-48 μ in diameter (Figs. 11-12).

MADRAS STATE
Tiruchirapalli Dt.—*Narthamalai, 333 m. *K. Subramanyam* 10378.
Tirunelveli Dt.—*Courtallam, 433 m. *K. Subramanyam* 3748.

Though Beddome (1892) mentions that this species has been reported from South India, the exact place of its occurrence has not been given.

5. **Ophioglossum nudicaule** L. f. var. **typicum** (in Clausen, 1938).

Syn. *O. nudicaule* L. f., Suppl. p. 443, 1781.

Syn. *O. parvifolium* Greville and Hook., *Bot. Misc.* **3**: 218, 1833.

Syn. *O. luersseni* Prantl, *Ber. deut. botsch. Ges.* **1**: 352, 1883.

Syn. *O. moluccanum* f. *pumilum* Raciborski, *Nat. Tijdschr. Ned. Ind.* **59**: 237, t.2, f.2-3, 1900.

Syn. *O. pumilum* (Rac.) van Alderwerelt van Rosenburgh, Malay Ferns Suppl. **1**: 453, 1916.

Perennial slender herb, 1-7 cm. high; rootstock slightly tuberous with few roots, bearing one to three leaves; common stipe 0.1-1.4 cm. long; sterile segment placed far below the middle or near the base, ovate, elliptic, sub-orbicular, cuneate at base, apiculate, submembranous, 0.3-2.4 cm. long, 0.2-0.7 cm. wide; venation rather lax with the veins forming large and small areoles; fertile segment 0.5-6.0 cm. long; sporangiferous portion 0.2-1.5 cm. long, 1-2 mm. wide; spores 27.5-42.5 μ in diameter (Figs. 13-14).

MADRAS STATE

Coimbatore Dt.—Anamalais.

Madurai Dt.—Pulney Hills.

Tiruchirapalli Dt.—*Narthamalai, 333 m. *K. Subramanyam* 8958.

Tirunelveli Dt.—*Courtallam, 400 m. *K. Subramanyam* 8957.

Distribution

Seven species of *Ophioglossum* have been recorded so far from India (Chakravarty, 1951) which besides the five species dealt in this paper, include *Ophioglossum vulgatum* and *O. pendulum*. *O. pendulum* has so far been reported from Assam only, while *O. vulgatum* has a wider distribution namely South India, Assam, Sikkim Himalayas and North Western Himalayas. Recently this species is reported from the Kusmi forest, Gorakhpur, Uttar Pradesh (Ganguli and Roy, 1960) which is a new record. Further, they have also recorded *O. polyphyllum* from Varanasi, Uttar Pradesh, for the first time.

A perusal of the distribution data shows that *O. reticulatum* is the most widely distributed species. Further, it may also be pointed out here that out of the five species described three species occur in Madhya Pradesh and four species in the present Madras State. It is further interesting to note that while *O. polyphyllum* has been recorded only from Bastar Dt., Madhya Pradesh, and Varanasi Dt., Uttar Pradesh, *O. nudicaule* var. *typicum* and *O. gramineum* have been collected from Courtallam, Tirunelveli Dt., and Narthamalai, Tiruchirapalli Dt., of Madras State.

Another peculiar feature observed is the association of more than one species at the same spot. Thus *O. reticulatum* and *O. polyphyllum* were found to grow together in association with *Anthoceros* and mosses under bamboo shade in Keskal, Bastar Dt., Madhya Pradesh. In Courtallam, Tirunelveli Dt., Madras State, *O. gramineum* and *O. nudicaule* var. *typicum* occur among grasses from which they can hardly be distinguished. From Narthamalai, Tiruchirapalli Dt., Madras State, *O. gramineum*, *O. nudicaule* var. *typicum* and *O. costatum* were collected from the same locality. Some of these species were noticed in moist sandy humus soil, especially on the sides of small streams and under the shade of other plants.

Note:—* Asterisk marks before the localities indicate new distributions to the area under consideration and the rest are old distributions based on herbarium specimens present in Central National Herbarium and Madras Herbarium.

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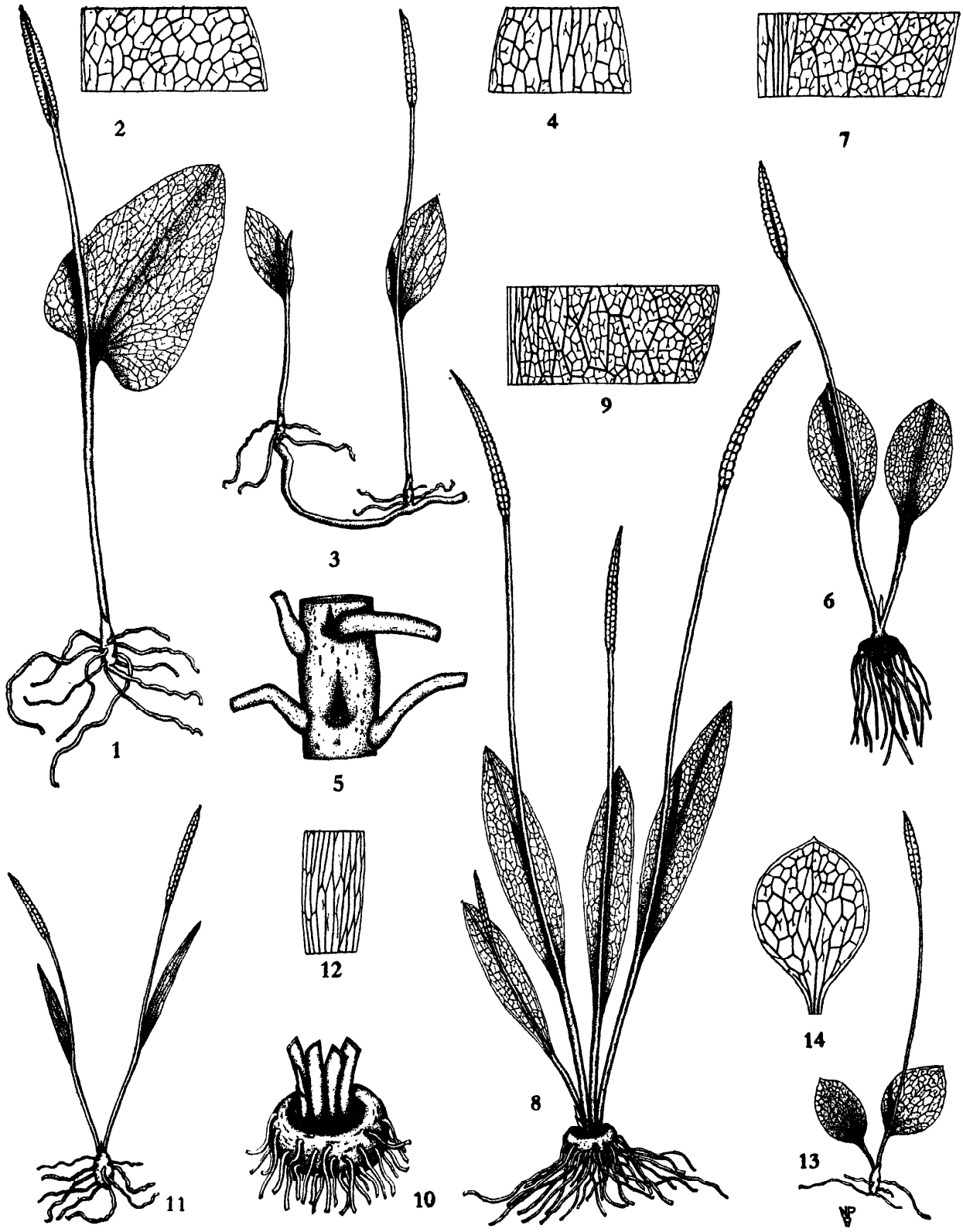

Figs. 1-2. *O. reticulatum*: Fig. 1. habit ×½; Fig. 2. venation ×3. Figs. 3-5. *O. polyphyllum*: Fig. 3. habit ×1; Fig. 4. venation ×2; Fig. 5. portion of rhizome showing scale-like sheaths and roots ×10. Figs. 6-7. *O. costatum* from Narthamalai: Fig. 6. habit ×1; Fig. 7. venation ×3. Figs. 8-10. *O. costatum* from Bastar: Fig. 8. habit ×½; Fig. 9. venation ×4; Fig. 10. rhizome showing ridge and pit-like depression ×1. Figs. 11-12. *O. gramineum*: Fig. 11. habit ×1; Fig. 12. venation ×3. Figs. 13-14. *O. nudicaule* var. *typicum*: Fig. 13. habit ×1; Fig. 14. venation ×2.