

**PHYLLANTHUS PARVIFOLIUS, P. CLARKEI (EUPHORBIACEAE) AND
RELATED INDIAN TAXA**

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ABSTRACT

The study reveals that the concept of *Phyllanthus parvifolius* in Flora of British India is a mixture of altogether two different species save *P. parvifolius*. These are eastern Himalayan species *P. pseudoparvifolius* described here anew, and semiarid north-west Himalayan elements of *P. clarkei*. In addition to identifying these two species as representing *P. parvifolius*, a part of the semiarid elements of *P. clarkei* was also identified as *P. praetervisus* and hence *P. praetervisus* was reduced to the synonymy of alleged *P. parvifolius*. True *P. praetervisus* however, remained incognito in all the floras of the region as a constituent of *P. clarkei* described originally as a complex species from eastern Himalaya, while *P. parvifolius*, a species endemic to (? central) Nepal, also remained mixed up with the two aforesaid constituents of alleged *P. parvifolius* even in Nepal Flora.

I. *Phyllanthus parvifolius* complex:

Wallich in his Catalogue of Dried Plants enumerated under 7901 two different collections as follows:

7901 A “*Phyllanthus juniperinus*” Hort.Calc.

B Nepalia

Mueller-Argoviensis in Linnaea 32: 28. 1863 formally described the plants as ‘*Ph. juniperinus* Wall. Cat. n. 7901’ based on specimens received by De Candolle in Geneva Herbarium. In the protologue Mueller-Argoviensis cited the following specimens: ‘In Nepalia (Wall. n. 7901 !), in Himalaya boreali-occidentali (T. Thomson !)’ Here Mueller-Argoviensis also described a variety under *P. juniperinus*, var. ‘*β. obovatus*’ and cited a specimen - ‘In India orientalis montibus Khasia (Hook. et Thoms.!)’ In

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Linnaea 34: 73. 1865 Mueller-Argoviensis however, elevated this variety to a distinct species and named it *P. praetervisus*.

In DC., Prodr. 15.2: 385. 1866, Mueller-Argoviensis accepted *P. parvifolius* Ham. ex D.Don as the legitimate name for *P. juniperinus*. Here Mueller-Argoviensis indicated to have examined the type of *P. parvifolius* in BM ('Buchan.! in Mus. londin.') and also cited all the specimens quoted earlier in the protologue of *P. juniperinus*. Under *P. praetervisus* Mueller-Argoviensis (*l.c.* 1866) quoted besides its type an additional specimen 'Himalaya sept.- occid. alt. 4-5000 ped. s.m. (T. Thoms.!)

Examination of the microfiche of the above mentioned specimens in Herb. G-DC revealed the following :

(a) Wallichian sheet marked as 7901 contains two different collections comprising of three twigs mounted side by side. Attached to the twig on the left there is a label- "7901A Phyllanthus juniperinus 'hort. calc. Wall.'" Above that there is another label- "Ph. parvifolius Ham. De Candolle Prodr. 15.2. 385. 303" This twig represents Khasia hill plant raised in the Calcutta Botanic Garden. There is another label at the base of remaining two twigs - "Phyllanthus ... Nepalia 1820" These two twigs represent Nepal plant quoted specifically in the protologue of *P. juniperinus* in Linnaea (*l.c.* 1863) and under *P. parvifolius* in DC., Prodr. (*l.c.* 1866).

It is observed that though both Khasia hill plant raised in the Calcutta Botanic Garden bearing number 7901A and Nepal plant bearing number [7901]B were catalogued and distributed by Wallich under the name *P. juniperinus*, these two plants represent two distinct species. Apart from other distinguishing characters, in Khasia hill plants the filaments in male flowers are completely free while in Nepal plants these are conspicuously connate up to about middle from base and then free above. Incidentally in T. Thomson's plant from north-west Himalaya (discussed in 'c') quoted under both *P. juniperinus* and *P. parvifolius* in Linnaea (*l.c.* 1863) and DC., Prodr. (*l.c.* 1866) respectively the filaments are also free to the base. Critical appraisal of the descriptions of *P. juniperinus* Muell.-Arg. in Linnaea (*l.c.* 1863) and *P. parvifolius* Ham. ex D.Don in DC., Prodr. (*l.c.* 1866) reveal that both the descriptions are basically same and contain the same distinctive floral characteristics - 'filamentis primum parte dimidia inferiore connatis dein

subliberis', *i.e.* filaments lower half connate then more or less free. Therefore it can be safely concluded that description of *P. juniperinus* Muell.-Arg. (Linnaea *l.c.* 1863) has been drawn from the Nepal plant.

(b) Next sheet in G-DC is the type of *P. praetervisus* Muell.-Arg. (*P. juniperinus* var. *obovatus* Muell.-Arg.) and comprises of two twigs mounted side by side. There is a label on the left twig - the original 'Herb. Ind. Or. Hook. f. & Thomson' label of 'Mont. Khasia' plant having comparatively larger leaves and longer pedicelled female flowers. On the right twig there are two more labels of Mueller-Argoviensis - the lower reads: 'Ph. praetervisus Muell.-Arg.... Ph. juniperinus β ? obovatus Muell.-Arg.'; the label above reads: 'Ph. praetervisus Muell.-Arg. De Candolle prodr. 15.2. 385. 304'

(c) Next sheet in G-DC also contains two twigs arranged one above the other. At the base of the upper specimen there is an original label 'Herb. Ind. Or. Hook. fil. & Thomson *Phyllanthus juniperinus* Wall. Hab. Himal. Borealis Regio. Temp. alt. 4-5000 ped. Coll. T.T.' This twig is leafless but the minute cluster of bracts are prominent on the twig. This is the T. Thomson's specimen from north-west Himalaya cited in the protologue of *P. juniperinus* in Linnaea (*l.c.* 1863) and also under *P. parvifolius* in DC., Prodr. (*l.c.* 1866). At the base of the lower twig, which is leafy, there is an original label of T. Thomson which could not be read properly. On the right corner of that label there is another label 'Ph. praetervisus Muell.-Arg. De Candolle prodr. 15.2. 385. 304'. This is the T. Thomson's plant from north-west Himalaya added to the concept of *P. praetervisus* in DC., Prodr. (*l.c.* 1866). Both the specimens on the sheet however, represent a single species and they belong to the semiarid north-west Himalayan population of *P. clarkei*.

We could examine the type of *P. parvifolius* Ham. ex D.Don in BM (S[u]embu 5 June 1802, Buchanan s.n.!). It was found to be conspecific with the two twigs mounted on the right side of the Wallichian sheet 7901 in G-DC having the original label 'Phyllanthus ... Nepalia 1820....' and from which the description of *P. juniperinus* Muell.-Arg. had been drawn. *P. juniperinus* Muell.-Arg. is therefore lectotypified here with the above mentioned two specimens from Nepal on the Wallichian sheet 7901 in G-DC with the exclusion of the other specimen on the sheet (*i.e.* Khasia hill plant raised in Calcutta Botanic Garden), and also T. Thomson's specimen from north-west Himalaya (discussed under 'c' above). The fact that the label - 'Ph. parvifolius Ham. De Candolle

prodr. 15.2. 385. 303' was affixed to the other specimen (*i.e.* Khasia hill plant raised in Calcutta Botanic Garden) on the left on Wallichian sheet 7901 in G-DC may be ignored as curatorial lapse. *P. parvifolius* thus circumscribed is found to be confined to Nepal alone.

In Flora of British India 5: 294. 1887, J.D.Hooker also accepted *P. parvifolius* Ham. ex D.Don as the legitimate name for *P. juniperinus* following Muell.-Arg. (*l.c.* 1866) but reduced *P. praetervisus* Muell.-Arg. a distinct species, to its synonymy. Examination of microfiche of Wallichian sheets in K-W showed that 7901A contains two twigs of the same Khasia hill plant raised in Calcutta Botanic Garden and 7901B also two twigs of the other plant from Nepal (collected on Dec.17, 1820 according to original label). Both the sheets however, have been annotated as '*P. parvifolius* Ham. by J.D.Hooker. We could examine photo (diapositive) of "Griffith - 'Khasiya' (K)" sheet (representing Wall.Cat. 7901A plant in K-W) quoted under *P. parvifolius* in Fl.Brit. India (*l.c.*). This sheet is not only annotated as '*P. parvifolius* Ham.' by J.D.Hooker but also contains a pencil drawing of male flower in his own hand showing 3 free stamens with the remark: '3 stamens 6 pedicelled glands' Besides these, we could also examine in CAL a duplicate of Griffith's other specimen - 'Bhotan - Griffith (Kew Distrib. 4800)', quoted under *P. parvifolius* in Fl. Brit. India (*l.c.*) representing the preceding Khasia hill plant.

A critical analysis of the treatment of *P. parvifolius* in Fl.Brit.India (*l.c.*) clearly shows that though the description was primarily drawn from Khasia hill plant named *P. juniperinus* in Wall. Cat. 7901A (K-W), the over all concept of *P. parvifolius* therein included at least elements of north-west Himalayan population of *P. clarkei* (evident from distribution - 'Jamu and Kumaon' and the description of female flower - 'longer pedicelled', and also discussion in 'c') and *P. praetervisus* in part (the name and the erroneously included north-west Himalayan element in the species concept subsequently in 1866; *c.f.* discussion in 'c'). J.D.Hooker appears to have been skeptical to include in his concept of *P. parvifolius* Wall. Cat. 7901B from Nepal is evident from his concluding remark under *P. parvifolius* (*l.c. p.* 294): "Wallich's 7901 A is from the Calcutta Garden, and accords with those from the habitats cited above, but his B from Nepal has longer acicular stipules on the branchlets."

We thus find Khasia hill plant represented by Wallichian sheet 7901A (a distinct species but without a legitimate name) formally described here anew as *P.*

pseudoparvifolius, and north-west Himalayan population of *P. clarkei* have primarily been treated as *P. parvifolius* in almost all the flora and herbaria of the region, while true *P. parvifolius*, which is endemic to Nepal remained mixed up with the constituents of this complex even in Nepal flora.

II. *Phyllanthus clarkei* complex:

J.D. Hooker in Fl.Brit.India 5: 297. 1887 described *Phyllanthus clarkei* and cited three collections in the protologue 'SIKKIM HIMALAYA, J.D.H; at Catsuperri, alt. 6000 ft., Clarke. UPPER ASSAM, Griffith (Kew Distrib. 4801).' After providing detailed description to his new species he made a concluding observation (*l.c.* p. 297): " - Very distinct from all others. I found a similar species in Sikkim, but with sessile exactly elliptic leaves, but out of flower and fruit; Griffith has also, in bad state, what I take to be my Sikkim plant from Upper Assam and the Khasia Mts."

We could examine photo (diapositive) of four specimens of these three collections housed in Kew Herbarium. The specimens, which in fact constitute syntypes of *P. clarkei*, however, represent two distinct species (d) Catsuperri, alt. 6000 ft., Clarke (2 sheets) -true *Phyllanthus clarkei* Hook.f., and (e) Sikkim Himalaya, J.D.H. and Khasia, Griffith (Kew Distrib. 4801) -*Phyllanthus praetervisus* Muell.-Arg.

(d) The original label of the above noted two sheets in the hand of C.B. Clarke reads as follows: '25420A Catsuperri 6000 Sikkim 18 Oct 1875' and '25420C Catsuperri 6000 Sikkim 18 Oct 1875' respectively. In the second sheet (25420C) the name of the collector - 'C.B. Clarke' was written in pencil by J.D. Hooker. Both the sheets contain some pencil drawings of floral parts and also pencil annotation - '*P. clarkei*' by J.D. Hooker, and agree well with the description of the species given in Fl.Brit.India (*l.c.* 1887). Of these two isosyntypes, we are designating here Clarke 25420A (K) as the lectotype of *P. clarkei* Hook.f. and formally excluding the other two collections mentioned in 'e' from its circumscription.

(e) The two sheets in K- 'Herb. Ind. Or. Hook.f. & Thomson, Hab. Sikkim alt. Regio. temp. Coll. J.D.H.' and 'Herbarium of the late East India Company. No. 4801 Khasia Herb. Griffith Distributed at the Royal Botanic Gardens, Kew. 1863-4', which actually belong to *P. praetervisus* Muell.-Arg., contain pencil annotation - 'near *clarkei*' by J.D. Hooker and appear belong to those gatherings

from Sikkim and Khasia Mts., about which he made preceding comments under *P. clarkei* in Fl. Brit. India. J.D.Hooker's concept of *P. praetervisus* appears to have been represented by T. Thomson's specimen from north-west Himalaya discussed in 'c' Further, in all the three of the four species of these two complexes, viz., *P. pseudoparvifolius*, *P. praetervisus* and *P. clarkei*, the floral structure being apparently very similar it is difficult to delimit each of these taxa properly unless there is scope to examine a series of specimens.

The study is primarily based on materials in CAL and specimens including type received on loan from BM, E, MANCH; A and GH. This has been supplemented by examination of photo (diapositive) and microfiche of types and original materials in K, K-W and G-DC.

KEY TO THE SPECIES OF THE COMPLEX

- 1a. Leafy, floriferous shoots unbranched,
deciduous; fruiting pedicels 1 - 2 mm long ... 2
- 1b. Leafy, floriferous shoots branches freely,
persistent; fruiting pedicels 3 - 12 (- 18) mm long ... 3
- 2a. Leaves 2 - 4 × 1 - 2 mm, subcoriaceous,
broadly elliptic to elliptic-oblong; filaments
connate to about middle, free above;
seeds irregularly striolate ... 1. *P. parvifolius*
- 2b. Leaves 5 - 12 × 3 - 7 mm, membranous,
obovate-elliptic or subcuneately obovate;
filaments free; seeds striolate in concentric rows ... 2. *P. pseudoparvifolius*
- 3a. Tender shoots 4-gonous, rough with
papillae along angles; leaves coriaceous
or subcoriaceous, rarely membranous,
oblanceolate to obovate-cuneate, distinctly
mucronulate at apex; stipules ovate-lanceolate,
incised or fimbriate along hyaline margin at base;
calyx not reflexed after dehiscence of fruit ... 3. *P. clarkei*

- 3b. Tender shoots moderately flattened, glabrous; leaves membranous, elliptic to obovate-elliptic, not mucronulate at apex; stipules deltoid-acuminate, denticulate along hyaline margin; calyx usually conspicuously reflexed after dehiscence of fruit

... 4. *P. praetervisus*

1. *Phyllanthus parvifolius* D.Don, Prodr. Fl. Nepal. 63. 1825 'parvifolia'; Muell.-Arg. in DC., Prodr. 15. 2: 385. 1866, *pro parte majore excl. spec. cit.* 'Himalaya septentr.- occident. (T.Thomson !)'; Hook.f., Fl. Brit. India 5: 294. 1887, *pro parte minore quoad nomen et spec.* Wall. Cat. 7901B; Burkill in Rec. Bot. Surv. India 4: 130. 1910, *pro parte quoad spec. cit.* 'Markhu, Burkill 29651'; Short & Vickery in Hara & al., Enum. Fl. Pl. Nepal 3: 198. 1982, *pro parte quoad spec. cit.* 'SSW 6742' Type: Nepal, S[u]lembu, 5 June 1802, *Buchanan s.n.* (BM !). *P. juniperinus* Wall. [Cat. no. 7901] ex Muell.-Arg. in Linnaea 32: 28. 1863, *pro parte majore excl. spec. cit.* 'Himalaya boreale -occidentali (T.Thomson !)' Type : Nepal, 1820 *Wallich s.n.* - [Wall. Cat. 7901, *p.p.*- two twigs mounted on the right of sheet bearing a label 'Phyllanthus ... Nepalia 1820 ...', (G-DC, lecto. - designated here, microf. !)].

Fig. 1 (a-k)

Scarcely branched woody undershrubs, 60 - 100 cm high; branches slender, strict, usually tinged red; deciduous leafy shoots 1 - 6 (- 8) cm long, usually scabridulous along ribs, subfiliform, solitary or in fascicles of 2 - 8 (- 9) arising from raised cushion of bracts at nodes. Leaves 2 - 4 × 1 - 2 mm, distichous, subsessile, subcoriaceous, broadly elliptic to elliptic-oblong, revolute along margin, rounded or minutely mucronulate at apex, rounded at base; lateral nerves 3 - 4 pairs, faint; stipules c. 1 mm long, distinctly spreading in leafless older nodes, subulate-acuminate, inaequilaterally subsagittate at base, inciso-dentate along margin at base, denticulate to subentire above. Flowers in axillary, unisexual and bisexual cymules on deciduous branchlets; male flowers numerous, (1 -) 2 in each axil; female flowers few in bisexual cymules of one male and one female flower. Male flowers: Pedicels at anthesis c. 1 mm long. Calyx lobes 6, biseriate, subequal, membranous, hyaline with unbranched midrib, each 1 - 1.5 × 0.9 - 1.2 mm, obovate, obtuse or rounded at apex. Disc segments 6, patelliform, eccentrically stiped, arranged in pairs towards base of inner whorl of calyx lobes. Stamens 3; filaments c. 0.8 mm long, connate to about middle, free above and deflexed; anthers dehiscing laterally. Female flowers: Pedicels 1 - 1.5 mm long in fruits, stout, obtusely 4-gonous

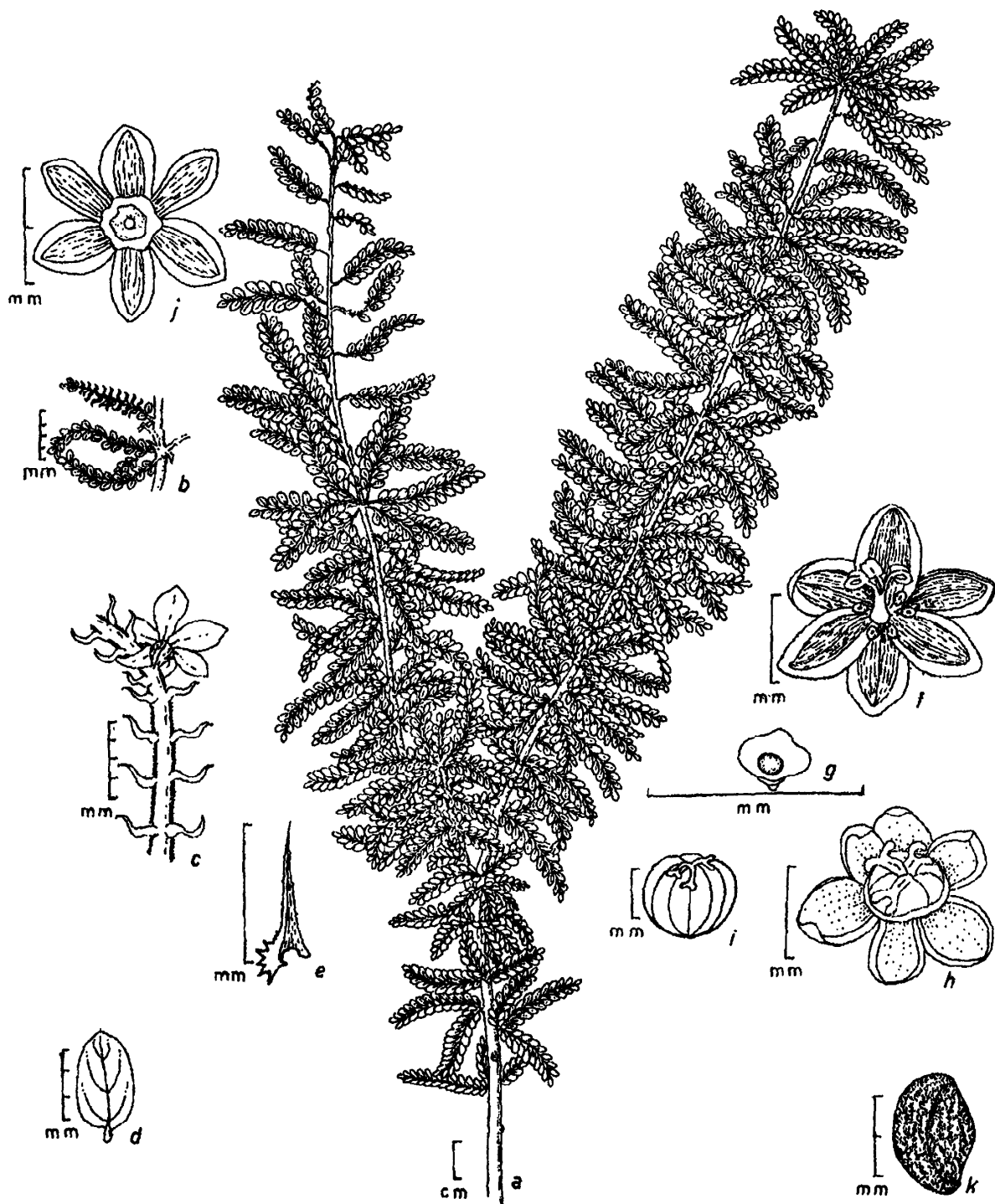


Fig.1 (a-k) : *Phyllanthus parvifolius* D. Don

a. twig; b. node showing deciduous shoots; c. deciduous shoot showing fruiting pedicel and stipules; d. leaf; e. stipule; f. male flower; g. male floral disc segment; h. female flower; i. young fruit; j. female flower showing floral disc; k. seed (a & b. Banerji, M. L. 1315; c-e. Sanjappa, M. s.n.; f - g. Stainton, Sykes & Williams 6742; h. Dawson, G. 450; i - k. Kanai, Hara & Ohba 724045).

and dilated above. Calyx lobes 6, biseriate, unequal, each $1 - 1.5 \times 0.5 - 1$ mm, inner ones elliptic, outer ones obovate-oblong, rounded at apex; midsepaline band about a third broad, margin hyaline. Disc saucer-shaped, obtusely 6-gonous along margin. Styles 3, free, appressed to ovary, each toothed or shallowly bifid at apex, becoming lobed to about a third with age. Capsules c. 2 mm across, depressed-globose. Seeds c. 1.5×1 mm, trigonous, semicircular on back, irregularly striolate.

Fl. & Fr. : July - November.

Distrib.: Endemic to (?central) NEPAL. Common amidst grasses in fallow fields along roadsides and rocky ridges, 1200 - 2000 m.

Notes : As pointed out earlier *P. parvifolius* in Nepal Flora is usually a mixture of true *P. parvifolius*, *P. pseudoparvifolius* and semiarid population of *P. clarkei*, while in the flora of other regions it is mostly a mixture of the last two.

In G-DC, the herbarium sheet marked as *Phyllanthus juniperinus* Wall. Cat. 7901 contains two different collections of Wallich – (I) a specimen of a (Khasia hill) plant cultivated in Calcutta Botanic Garden – Wall. Cat. 7901 A, and (II) two specimens of another plant collected from Nepal in 1820 – [Wall. Cat. 7901] B. Mueller-Argovius (l.c. 1863) formally described *P. juniperinus* Wall. Cat. 7901 drawing description from Wallich's above noted Nepal collections. In the protologue of *P. juniperinus*, in addition to Wall. Cat. 7901 he also cited a specimen of T. Thomson from north-west Himalaya which actually belong to the semiarid population of *P. clarkei*. D. Don (l.c. 1824) described *P. parvifolius* on Buchanan's collection from Nepal. Mueller-Argovius (l.c. 1866) on examination of the type of *P. parvifolius* relegated *P. juniperinus* to its synonymy.

In Flora of British India J.D. Hooker (l.c. 1887) while treating *P. parvifolius* drew its description primarily from Wall. Cat. 7901 A (K), i.e., the herbarium specimens of the (Khasia hill) plant cultivated in Calcutta Botanic Garden (described here anew as *P. pseudoparvifolius*). Here J.D. Hooker also included in the concept of *P. parvifolius* population of *P. clarkei* from north-west Himalaya following Mueller-Argovius (l.c. 1863 & 1866).

Mueller-Argovius (l.c. 1866) erroneously added to the original concept of *P. praetervisus* a collection of T. Thomson from north-west Himalaya, also representing

the aforesaid semiarid element of *P. clarkei*. This concept of *P. praetervisus* led J.D.Hooker (*l.c.* 1887) to relegate *P. praetervisus* to the synonymy of *P. parvifolius*. Thus in Flora of British India though *P. praetervisus* is treated as synonymous to *P. parvifolius* nomenclaturally, it remained incognito taxonomically as a constituent of a heterogenous assemblage described therein as *P. clarkei*.

Specimens examined : NEPAL. Godavari Botanic Garden, South of Kathmandu, Nov. 1987, *Sanjappa, M. s.n.* (CAL); Markhu Valley, 2, Dec. 1907, *Burkill, I.H.* 29651 (CAL); Nepal, *sine def. loc.* 1877, *Scully, J.* 3 (CAL); Chandrakote, west of Lumle Agriculture Centre, 3 Oct. 1975, *Dawson, G.* 450 (BM); Latsu - Pati Bhanjyang - Borlang, 30 Aug. 1972, *Kanai, Hara & Ohba* 724045 (BM); Dolalghat to Bhumla Danda, 10 Sept. 1964, *Banerji, M.L.* 1315 (A); Pokhara, 11 Aug. 1954, *Stainton, Sykes & Williams* 6742 (E); Wall. Cat. 7901 B (E, *p.p.* - left side specimen).

Microfiche of specimens examined: HERB. K-W: Wall. Cat. 7901 B (annotated as *P. parvifolius* by J.D.Hooker).

2. *Phyllanthus pseudoparvifolius* R. L. Mitra & M. Sanjappa *sp. nov.*

P. parvifolius D.Don *affinis, sed filis staminis omnino ad basin liberis et seminibus in seriem concentricam striolatis differt.*

Typus : India. Meghalaya: Khasi & Jaintia Hills, 31 mile Cherra Road (5500 ft), 12 Oct. 1914, *Kanjilal, U.* 4548 (holotypus, CAL). [*P. parvifolius auct. non* Ham. ex D.Don (1825): Hook.f., Fl. Brit. India 5: 294. 1887, *pro parte majore quoad descriptio et spec.* Wall. Cat. 7901 A, *excl. syn. P. praetervisus et. distrib.* 'Jam[m]u and Kumaon'; Kanjilal & al., Fl. Assam 4: 152. 1940; Short & Vickery in Hara & al., Enum. Fl. Pl. Nepal 3: 198. 1982, *p.p., quoad spec. cit. Stainton* 1615; Long in Grierson & Long, Fl. Bhutan 1 (3) : 775. 1987, *pro parte maxima*].

Fig. 2 (a-i)

Allied to *P. parvifolius* but differs primarily in having staminal filaments free to the base and seeds striolate in concentric rows.

Scarcely branched twiggy undershrubs or shrubs 1 - 3 (- 4) m high; branches slender, upright, usually tinged red; deciduous leafy shoots 2 - 12 cm long, minutely scabridulous along ribs, subfiliform, solitary or in fascicles of 2 - 6 (- 9), arising from raised cushion of bracts at nodes. Leaves 5 - 12 × 3 - 7 mm, distichous, subsessile, membranous,

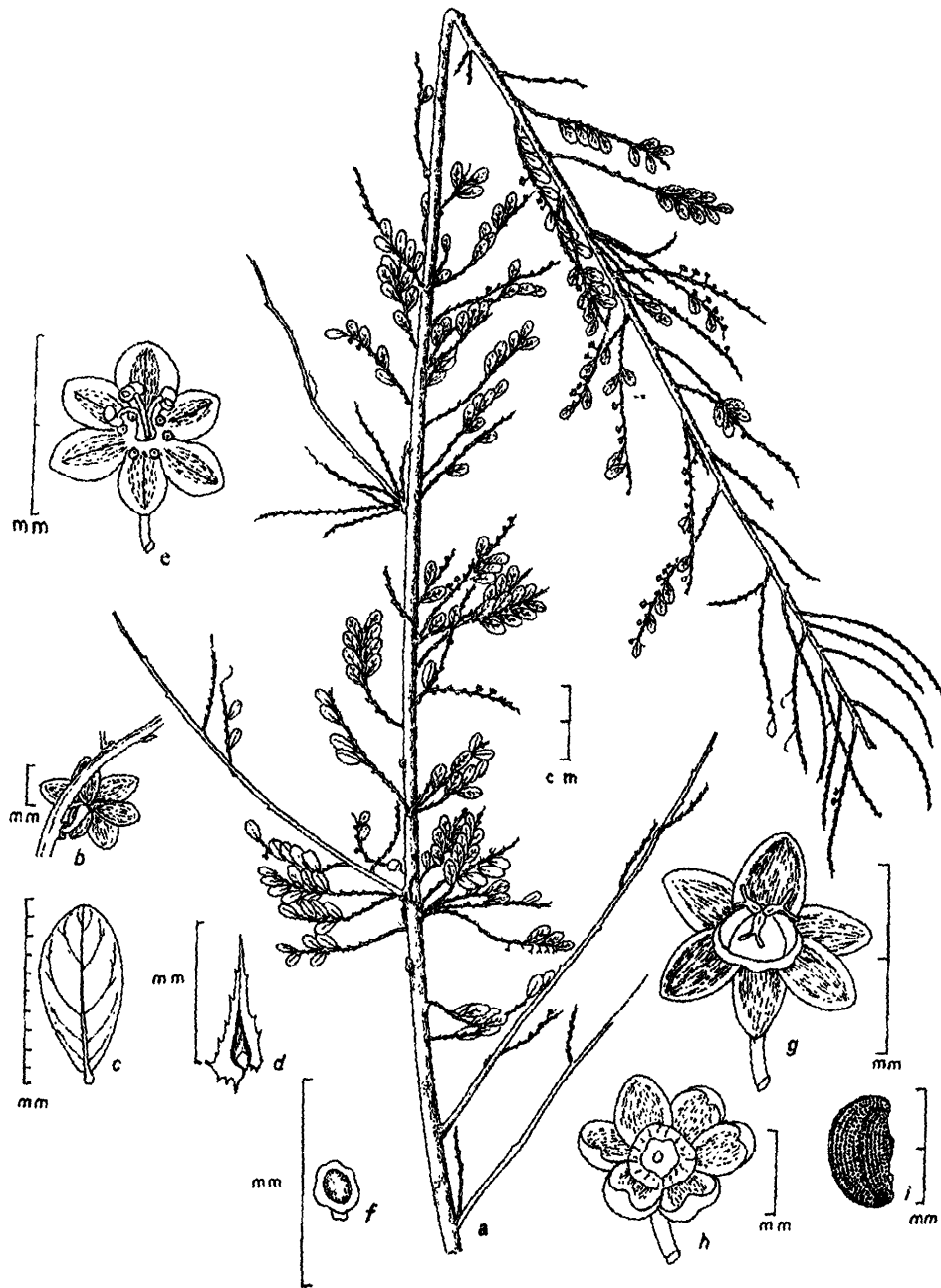


Fig.2 (a-i) : *Phyllanthus pseudoparvifolius* sp. nov.

a. twig; b. deciduous shoots showing fruiting pedicel; c. leaf; d. stipule; e. male flower; f. male floral disc segment; g. female flower; h. female flower showing floral disc; i. seed (a, c & d. Kurz, S. CAL Acc. no. 402173; b. Haines, H. H. 1007; e - h. Stainton, J. D. A. 1293; i. Sengupta, G. 320).

obovate- elliptic or subcuneately obovate, glaucous, revolute at margin, obtuse at apex, rounded at base; lateral nerves (3 - 4 - 5 pairs; stipules c. 1 mm long; subulate-acuminate, inaequilaterally subsagittate at base, irregularly inciso-dentate especially along hyaline margin at base. Flowers in axillary, unisexual and bisexual cymules; male flowers numerous, (1 - 2 (- 3) in each axil; female flowers few in bisexual cymules of 1 (- 2) male and 1 female flowers. Male flowers : Pedicels at anthesis c. 2 mm long, filiform. Calyx lobes 6, biseriate, subequal (inner 3 smaller), membranous, hyaline with unbranched midrib, each $1 - 1.25 \times 0.8 - 1$ mm, obovate. Disc segments 6, patelliform, eccentrically stiped, arranged in pairs towards base of inner whorl of calyx lobes. Stamens 3; filaments c. 0.8 mm long, free; anthers dehiscing laterally. Female flowers: Pedicels 1 - 2 mm long in fruits, stout, obtusely 4 -gonous, dilated above. Calyx lobes 6, biseriate, subequal (inner 3 bigger), each c. $1 \times 0.4 - 0.6$ mm, narrowly to broadly elliptic, rounded at apex, midsepaline band about a third broad, margin hyaline. Disc saucer-shaped, suborbicular (obtusely 6-gonous) along margin, appear annular and undulate-crenate when dry. Styles 3, free, appressed to ovary, each lobed to about two-third. Capsules c. 2 mm across, depressed globose. Seeds c. 2×1.5 mm, trigonous, semicircular on back, striolate in concentric rows.

Fl. & Fr.: July - November.

Distrib.: INDIA : Subtropical forest and forest edges amongst trees and shrubs, 800 - 1850 m. West Bengal (Darjeeling), Sikkim and Meghalaya (Khasia hills).

EAST NEPAL, BHUTAN AND MYANMAR.

Specimens examined : INDIA : WEST BENGAL : Darjeeling. Dalapchand Slip Area Reserve Forest (1500 - 1850 m), 7 Nov. 1961, *Sengupta, G.* 320 (CAL). Sikkim: Suruk (3500 ft.), Nov. 1904, *Haines, H.H.* 1007 (E). MEGHALAYA : Mont. Khasia (4 - 5000 ped), *Hooker, J.D. & Thoms., T.* s.n. (CAL Acc. no. 402174 & 402333; E p.p., right side specimen & MANCH); Khasi Hills, *Kurz, S.* s.n. (CAL Acc. no. 402173); Khasia, 22 Oct. 1871, *Clarke, C.B.* 15591A (CAL); Cherra (4300), Khasia, 12 Sept. 1885, *Clarke, C. B.* 40479B (CAL); Mausmai (3500), Khasia, 14 Oct. 1886, *Clarke, C.B.* 45913 A (CAL); Pynursla, E.Khasi Hills, 4 Nov. 1938, *Biswas, K.P.* 4030 (CAL); 31st mile Cherra Road (5500 ft), Khasi & Jaintia Hills, 12 Oct. 1934, *Kanjilal, U.* 4548 (holotype, CAL); Cherrapunji Gate, Khasi Hills, 18 Dec. 1956, *Panigrahi, G.* 4803 (CAL); Shella - Mausmai Road crossing, south of Cherrapunji, *van der Maesen, L.J.G.*

3113 (CAL); *sine loc. & no.*, Mann, G. (CAL Acc. no. 402178 & 402181); 'Khasiya', Griffith, *s.n.* (K - diapositive).

NEPAL : E. Nepal : Tamur Valley, Mewakhola, 8 Aug. 1956, Stainton, J.D.A. 1293 (E); Arum Valley, Sedua, west of Num, 10 Sept. 1956, Stainton, J.D.A. 1615 (E).

BHUTAN : 'Bhotan', *sine def. loc. & no.* Griffith (Kew Distrib. no. 4800 & CAL Acc. no. 412090); Chumurchi Valley (800 - 900 ft), Jan. 1905, Searight, G.L. 193 (CAL); Dumons (6000 ft), Dec. 1879, Gamble, J.S. 7528 (CAL); Diwangiri ('Dewangary') Hills, Jan. 1853, *sine coll. & no.* (CAL Acc. No. 402191).

MYANMAR. *sine def. loc. coll. & no.* (CAL Acc. No. 402200).

3. ***Phyllanthus clarkei*** Hook. f., Fl. Brit. India 5: 297. 1887, *pro parte majore, excl. spec. cit.* 'Sikkim Himalaya, J.D.H.' et 'Griffith (Kew distrib. 4801)'; Kanjilal & al., Fl. Assam 4: 154. 1940, *pro parte majore*; Short & Vickery in Hara & al., Enum. Fl. Pl. Nepal 3: 198. 1982; Long in Grierson & Long, Fl. Bhutan 1 (3): 774. 1987, *p.p.* Type : Sikkim, Catsuperri, 18 Oct. 1875, Clarke, C.B. 25420 A (K, lecto.- designated here, diapositive !). [*P. juniperinus* auct. non Wall. ex Muell.-Arg. in Linnaea 32: 28. 1863, *pro parte minore, quoad spec. cit.* 'Himalaya boreale - occidentali (T.Thomson !)']. [*P. parvifolius* auct. non Ham. ex D.Don (1825): Muell.-Arg. in DC., Prodr. 15.2: 385. 1866, *pro parte minore, quoad spec. cit.* 'Himalaya septentr.-occident. (T.Thomson !); Hook. f., Fl. Brit. India 5: 294. 1887, *pro parte minore, quoad plantum* 'Jam[m]u and Kumaon'; Burkill in Rec. Bot. Surv. India 4: 130. 1910, *pro parte, quoad spec. cit.* 'Kakni 29885'; Kitamura in F. & Fl. Nepal Himal. 172. 1995, *quoad spec. cit.*]. [*P. praetervisus* auct. non Muell.-Arg. (1865): Muell.-Arg. in DC., Prodr. 15.2: 385. 1866, *pro parte minore, quoad spec. cit.* 'Himalaya sept.-occid. alt. 4 - 5000 ped. s.m. (T.Thoms. !)'].

Fig. 3 (a-j)

Rigid, woody, often much branched, undershrubs or shrubs, 50 - 120 cm high; branches stiff, suberect to spreading, arise singly from younger nodes and usually in fascicles from older nodes; leafy shoots 4-gonous, usually with prominently raised cushion of axillary bracts, rough with papillae along angles in tender parts. Leaves (4-) 5 - 15 (- 18) × (2 -) 3 - 6 (- 9) mm, subsessile, oblanceolate to obovate-cuneate, rarely obovate-elliptic, subacute, subtruncate or retuse and apiculate at apex, usually coriaceous or

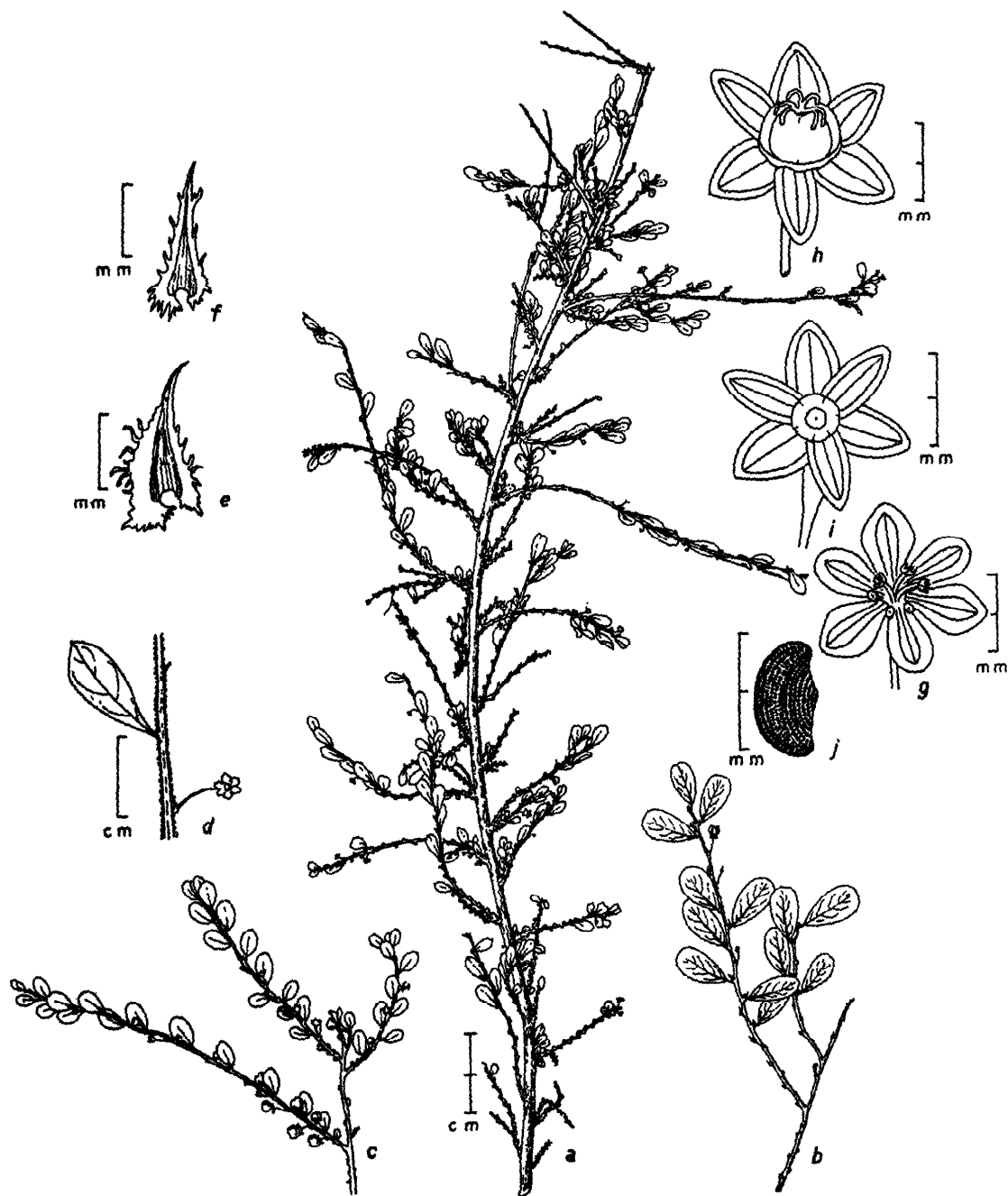


Fig.3 (a-j) : *Phyllanthus clarkei* Hook. f.

a. twig; b & c. floriferous shoot; d. tender shoot showing papillae along angles; e. & f. stipule; g. male flower; h. female flower; i. female flower showing floral disc; j. seed (a, *Kingdon-Ward, F. 13812*; b & e *Hara & al. 6306775*; c. *King, G. s.n. CAL Acc. no. 402193*; d & f. *Arora, C.M. 49983*; g & j. *Bengal Borders 61226*; h & i. *Anderson. A. s.n.*).

subcoriaceous, rarely even membranous, green above, paler beneath, revolute along margin; lateral nerves 3 - 4 (- 5) pairs; stipules 1.5 - 2 mm long, ovate-acuminate, inaequilaterally subsagittate at base, hyaline margin irregularly incised below, fimbriate or inciso-dentate above. Flowers solitary or in unisexual [2 - 3 (- 4) δ or 2 ϕ] or bisexual (1 - 2 δ + 1 ϕ) cymules arising from axillary cushion of bracts. Male flowers: Pedicels at anthesis 1.5 - 3 mm long. Calyx lobes 6, biseriate, subequal, outer broadly elliptic to rhomboidal and subacute at apex, inner smaller and obovate, rounded at apex, each 1 - 1.7 $\times$ 0.5 - 1 mm. Disc segments patelliform, eccentrically stiped, arranged in pairs towards base of inner whorl of calyx lobes. Stamens 3; filaments c. 0.75 mm long, free, spreading, recurved at apex. Female flowers: Fruiting pedicels (3 -) 5 - 10 (- 18) mm long, slender to filiform. Calyx lobes 6, biseriate, subequal (inner smaller), each 0.8 - 1.5 $\times$ 0.6 - 1 mm, broadly elliptic, obovate or obovate-oblong, obtuse or subacute at apex; midsepaline band about a half broad, margin hyaline. Styles 3, free, each divided to about two-third. Capsule 2 - 3 mm across, depressed-globose. Seeds c. 2 $\times$ 1.25 mm, trigonous, semicircular on back, striolate in concentric rows.

Fl. & Fr.: (April -) July - November.

Distrib.: INDIA : In thickets along streams, grassy hill slopes, crevices of rocks and dry hilly tracts, (1300 -) 1500 - 2500 (- 3000) m. Jammu and Kashmir (Jammu region adjoining Himachal Pradesh), Himachal Pradesh, Uttaranchal, Sikkim, West Bengal (Darjeeling), Arunachal Pradesh, Nagaland and Manipur.

NEPAL and BHUTAN.

Notes : Of the four species of these two complexes only *P. clarkei* appears to be pan-Himalayan in distribution, extending perhaps further east to Siam (Airy-Shaw in Kew Bull. 26: 317. 1972) through Nagaland, Manipur and (?) Myanmar.

In Flora of British India, J.D.Hooker originally conceived *P. clarkei* as an eastern Himalayan species comprising of a mixture of true *P. clarkei* and *P. praetervisus*, while he identified the north-west Himalayan population of *P. clarkei* as '*P. parvifolius*'. It is in this context one can easily appreciate the following observations of Short & Vickery (*l.c.* 1982), though they too did not have a clear concept of these two complexes: "many of the literature records listed under *P. parvifolius* probably refers to this species. *P. parvifolius* has the stipules narrow, pointed with well-defined margins, while *P. clarkei* has stipules broad, rounded and emarginated-fimbriate."

P. clarkei growing under predominantly monsoon climate in eastern Himalaya have in general a lax appearance with larger and thinner leaves (obovate-cuneate, obtuse, subtruncate or retuse at apex), and much longer and slender to filiform fruiting pedicels (which usually remain curved), while those growing under much drier climate in western Himalaya usually have a stunted appearance with smaller subcoriaceous leaves (oblanceolate, subacute at apex), and much smaller, slender and straight fruiting pedicels (usually 3 - 5 mm long; a few mature and immature fruits have 3 mm and 5 mm long pedicels respectively on the same specimen - *c.f.* *Arora* 49983 in CAL).

Because of high humid condition a few specimens from higher altitudes in eastern Himalaya (Bagmati Zone, Sindhu Palchok District, Nepal, 2400 m, *Nicolson* 2688-BM) were found laden with dense growth of lichen.

Airy-Shaw (*op.cit.*), while recording *P. clarkei* from Siam remarked: "these specimens from Doi Chiengdao region, with small, rigid, cuneate-obovate leaves, closely match the type gathering of *P. clarkei* from Sikkim. They appear to represent the form assumed by the species under condition of extreme altitude or exposure. Other gatherings including those of *P. simplex* var. *tonkinensis*, and specimens from Assam and Burma, show leaves that are somewhat larger and thinner and more elliptic, and appear at first sight specifically distinct, but seems to be connected with the type by intermediates."

It appears from the above critical observations that the specimens from Doi Chiengdao belong to true *P. clarkei*, while all other specimens belong to the *P. praetervisus* part of *P. clarkei* complex of the Flora of British India.

In Flora of Bhutan (*l.c.*) the male flowers have been erroneously described as 'stamens 3 connate into short column', perhaps from a faulty concept of *P. clarkei*.

Specimens examined : INDIA. HIMACHAL PRADESH : Simla (8000 ft), Oct. 1907, *Meebold*, A. 5006 (CAL); Simla to Almorah (5000 - 7000 ft), *sine dies*, *Madden*, E. 607 (E); Pasada to Rampur, Bashahr State, (4000 ft), 6 Oct. 1891, *Lace*, J.H. 1089 (E-2 sheets). UTTARANCHAL : near Mussoorie, 1869, *King*, G. s.n. (CAL Acc. nos. 402193, 402194 & 402196); Landour, Mussoorie, Sept. 1900, *Hooper*, B. s.n. (CAL); Mussoorie, 15 Sept. 1897, *Mackinnon*, P.W. s.n. (CAL Acc. nos. 402197 & 402198); Mussoorie, 24 April 1898, *Mackinnon*, P.W. s.n. (CAL Acc. no. 402199); near Bhatta Village (5000 ft), Mussoorie, Sept. 1915, *Anderson*, A. s.n. (E); Mussoorie, Sept. 1916. *Anderson*, A. s.n. (E); Rajpur Road (5000 ft), Mussoorie, July 21, 1930,

Stewart, R.R. 11000 (A); Mussoorie, Kempti Road, 12 Dec. 1956, *Puri, G.S.* 10265 (BSI); *sine def. loc.* N.W. Himalaya, 1877, *Duthie, J.F.* 73 (CAL); Almorah (5000 ft), Kumaon, *sine dies*, *Strachey, R. & Winterbottom, J.E.* 5 (GH); East Almorah Div., Kumaon, 21 May 1933, *Bis Ram* 2251 (E); Bhimtal, Oct. 1905, *Meebold, A.* 10875 (CAL); Dodital (10,000 ft), Tehri, *sine dies*, *Gupta, R.K. s.n.* (CAL); Shanchatti, Tehri-Garhwal, 12 June 1961, *Rau M.A.* 15651 (CAL); Chanpeta, Kumaon, 17 Aug. 1973, *Arora, C.M.* 49983 (CAL); Dafia Dharas, Kumaon, 29 Aug. 1973, *Arora, C.M.* 50096 (CAL). SIKKIM: between Mangan and Chungthang, *Sanjappa, M.* 18351 (CAL-2 sheets). WEST BENGAL: Bengal & Borders, *sine def. loc., dies & coll.* 6226 (CAL). ARUNACHAL PRADESH : Dirang Dzong (5000 - 6000 ft), Lohit, 30 June 1938, *Kingdon-Ward, F.* 13812 (BM); Rupu (1800 m), Kameng, 10 Oct. 1964, *Joseph, J.* 40425 (CAL). NAGALAND : Zakhoma (5000'), Naga Hills, 21 Oct. 1949, *Kingdon-Ward, F.* 18905 (BM). MANIPUR : Sirhoi (7500 - 8000 ft), 23 July, 1948, *Kingdon-Ward, F.* 178149 (BM & A).

NEPAL. W. NEPAL : Dhimia (7000 ft), 20 Aug. 1952, *Polunin, O. & al.* 521 (E) & 15 Oct. 1952, *Polunin, O. & al.* 5670 (E); Katai & Pokhari (Fl.W.Nepal), 29 March 1929, *Bis Ram* 155 (A). C. NEPAL : Kukni, Naikot and Valley of Likhu, 8 Dec. 1907, *Burkill, I.H.* 29885 (CAL-2 sheets); Buri Gandak River between Katlai and Ngyak, 2 - 4 Dec. 1952, *Nakao, S. s.n.* (CAL); Bagmati zone, below Helumbu (2400 m), Sindhu Palchok Dist., 28 Sept. 1966, *Nicolson, D. H.* 2668 (BM). E. NEPAL. Yamphodin-Ghatte, 18 Nov. 1963, *Hara, H. & al.* 6306775 (CAL & BM). *Sine def. loc.* Nepal, 1877, *Scully, J.* 48 (CAL); *sine def. loc. & coll.* Nepal, 1967 No. 8315 (CAL).

BHUTAN. Bagh La (6000 ft), Kurmed, 26 Aug. 1915, *Cooper, R.E.* 4588 (BM & E); Mangde Chu bridge near Tongsa (2000 m), 18 May 1979, *Grierson, A.J.C. & D.G.Long* 1126 (E).

4. *Phyllanthus praetervisus* Muell.-Arg. in *Linnaea* 34: 73. 1865 & in DC., Prodr. 15.2: 385. 1866, *pro parte majore et var. β, excl. spec. cit.* 'Himalaya sept.-occid. alt. 4-5000 ped. s.m.(T.Thoms.!)' *P. juniperinus β. obovatus* Muell.-Arg. in *Linnaea* 32: 28. 1863. Type : India Orientalis, Montibus Khasia, *J.D.Hooker & T.Thomson, s.n.* (G-DC, microf. !). [*P. clarkei* auct. non Hook.f. (1887): Hook.f., Fl. Brit. India 5: 297. 1887, *pro parte, quoad spec. cit.* 'Sikkim Himalaya, *J.D.H.* et 'Griffith (*Kew Distrib.* 4801)'; *Kanjilal & al.*, Fl. Assam 4: 154. 1940, p.p.; Mukherjee & Mallick in Rec. Bot. Surv. India 20 (2): 193. 1974, *quoad spec. cit.*]. [*P. parvifolius* auct. non Ham. ex D.Don (1825): Hook.f., Fl. Brit.

India 5: 294. 1887, *pro parte minore quoad syn. P. praetervisus (nomen)*].

Fig. 4 (a-g)

Woody herbs or undershrubs 30 - 90 cm high; main stem obscurely ribbed, often sparsely branched; branches slender, upright, 4-angled, usually tinged red; leafy shoots 3 - 18 cm long, subfiliform, usually solitary or in fascicles of two or more from each node, glabrous and moderately flattened in tender parts. Leaves 6 - 18 × 3 - 9 mm, membranous, elliptic to obovate-elliptic, subacute or subobtuse at base, green above, glaucous beneath, revolute along margin; lateral nerves 5 - 9 pairs; petioles 0.7 - 1 mm long. Stipules membranous, ovate-acuminate, subcordate or subsagittate at base, denticulate along prominently hyaline margin. Flowers solitary, axillary, rarely 2 in one or two axils; male flowers usually in lower axils, female flowers in upper axils. Male flowers: Pedicels at anthesis c. 2 mm long, filiform. Calyx lobes 6, biseriate, subequal (outer broadly elliptic, inner obovate-oblong or oblanceolate), membranous, hyaline with unbranched midrib, each 1 - 1.25 × 0.8 - 1 mm. Disc segments 6, patelliform, eccentrically stiped, arranged in pairs towards base of inner whorl of calyx lobes. Stamens 3; filament c. 0.75 mm long, free. Female flowers: Pedicels 7 - 10 mm long in fruits, filiform. Calyx lobes 6, biseriate, subequal (outer ovate-elliptic, inner ovate-lanceolate), each c. 1 × 0.6 mm; midsepaline band about two-third broad, margin hyaline. Disc saucer-shaped, obscurely crenate along margin. Styles 3, free, appressed to ovary, each lobed to about two-third. Capsule c. 2 mm across, depressed-globose. Seeds c. 2 × 1 mm, trigonous, semicircular on back, striolate in concentric rows.

Fl. & Fr.: July - November.

Distrib.: INDIA : Foothills and lower reaches of subtropical forests and forest edges, often under shade of trees, 200 - 1100 (- 1300) m. West Bengal (Darjeeling & Jalpaiguri), Sikkim, Meghalaya, Arunachal Pradesh, Nagaland and Manipur.

BHUTAN, MYANMAR and CHINA (Yunnan).

Notes : Because of the confounded concept of *P. clarkei*, *P. praetervisus* has not been recognised in any flora of the region since its publication. Of the remaining species of these two complexes *P. praetervisus* shares in part habitat of *P. pseudoparvifolius* only in subtropical forests, while in its lowermost range of distribution it is often found together with *P. airy-shawii* in the foothill regions.

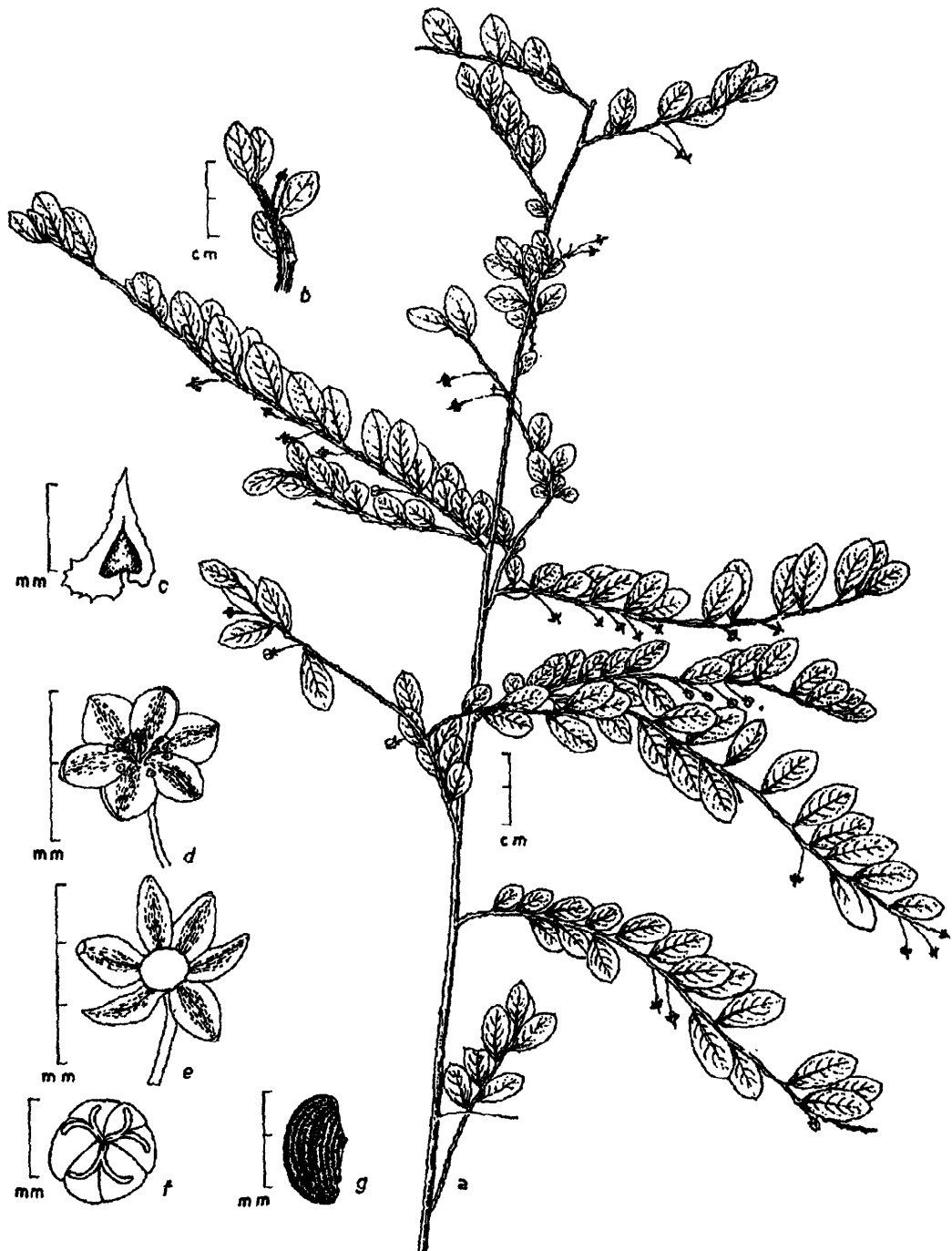


Fig.4 (a-g) : *Phyllanthus praetervisus* Muell.-Arg.

a. twig; b. tender shoot; c. stipule; d. male flower; e. female flower showing floral disc; f. young fruit; g. seed (a. Toppin, R. A. 4058; b - g. Panigrahi, G. 19392).

Specimens examined INDIA. WEST BENGAL : Darjeeling. Mongpoo (2000 ft), 21 Dec. 1885, *Gammie, G.A. s.n.* (CAL, Acc. no. 402167 & BSA); Badamtaw Incet (2000 ft), Dec. 1879, *Gamble, J.S.* 7488 (CAL); Balukabasthi, north-west of Kalimpong (4000 ft), 11 Nov. 1960, *Thothathri, K.* 9516 (CAL); Llyod Botanic Garden, *Basu, S.K.*, H 9. no. 6233 (CAL). Jalpaiguri, Buxa to Santrabari, 23 May 1949, *Narayanaswamy, V.* 2928 (CAL); Jaldaka Valley (1500 - 3000 ft), Dec. 1904, *Searight, G.L.* 123 (CAL - 2 sheets). SIKKIM Rangpoo (350 - 700 m), 5 Nov. 1961, *Sengupta, G.* 293 (CAL); *sine loc. & dies*, *Rao, R.S.* 36 (CAL); Dikchu Left Flank, E. Sikkim, 9 Dec. 1997, *Shukla, B.K.* 19678 (BSHC); near Ranipool, E. Sikkim, 29 Nov. 1988, *Raju, D.C.S. & N.R. Mondal* 7199 (BSHC); 'Sikkim, *J.D.H.*' *s.n.* (K- diapositive). MEGHALAYA 'Khasia, Herb. Griffith', Kew Distrib. 4801 (K-diapositive). ARUNACHAL PRADESH Drinking Valley, Duphla Hills (2500 ft), 3 Feb. 1875, *Lister, J. L.* 260 (CAL); East bank of Dihong opposite Yambing (Abor Expedition), 13 Jan. 1912, *Burkill, I.H.* 36012 (CAL); Kobo (Abor Expedition), 1 Dec. 1911, *Burkill, I.H.* 35935 (CAL); Kimin, Subansiri F.D. (230 - 290 m), 25 Sept. 1959, *Panigrahi, G.* 19392 (CAL- 2 sheets). MANIPUR Soorangad, Muneypoor (3500 ft), 26 Nov. 1885, *Clarke, C.B.* 42151 (CAL). NAGALAND below Narum, Naga Hills (3000 ft), Dec. 1907, *Meebold, A.* 7434 (CAL).

BHUTAN Gaylegphug, Sarbhang Div. (300 m), 14 Dec. 1963, *Sengupta, G.* 850 (CAL); Dorokha (2000 ft), 24 Dec. 1963, *Thothathri, K.* 10514 (CAL).

MYANMAR : Byinbou (1000 ft), Upper Chindwin, Dec. 1907, *Meebold, A.* 7795 (CAL & E); Wasi (700 ft), Upper Burma (Kampti Long Mission Collection, 1911 - 12), 10 Dec. 1911, *Toppin, R.A.* 4058 (CAL).

CHINA. Yunnan Expedition, *Anderson, D.J. s.n.* (CAL).

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