

CONCEPT OF *PHYLLANTHUS NIRURI* (EUPHORBIACEAE) IN INDIAN FLORAS¹R. L. MITRA² AND S. K. JAIN³*Botanical Survey of India, Calcutta*

ABSTRACT

The study reveals that '*Phyllanthus niruri*' in *Flora of British India* is a mixture of three distinct species, viz., *P. amarus* Schum. & Thonn., *P. fraternus* Webster and *P. debilis* Klein ex Willd., the true *P. niruri* Linn. being endemic to West Indies. It is further observed that true *P. debilis* Klein ex Willd. (1804) is not correctly recognised in any Indian Flora and the plant that goes under the name is an altogether different species—*P. debilis* Herb. Ham. ex Hook.f. (1887), which however, being a later homonym is to be replaced by *P. airy-shawii* Brunel & Roux (1984). *P. mukerjeeanus* Mitra & Bennet has been found to represent juvenile form of *P. debilis* Klein ex Willd., hence reduced to the synonymy of that species. To facilitate proper identification a key to the different taxa of this complex in India is provided and their diagnostic characters are described and illustrated.

The Linnean species *Phyllanthus niruri* (Sp. Pl. 981. 1753) is an assemblage of at least two different species, observed G. L. Webster (J. Arnold Arb. 37 : 1-14. 1956) after scanning through various entries in the *Species Plantarum* (l.c.). These are (i) West Indian form of the widespread but strictly New World species, hitherto known as *Phyllanthus lathyroides* H.B.K. and (ii) the circumtropical weed—*Phyllanthus amarus* Schum. & Thonn., probably also of New World origin. Linnaeus's concept of *P. niruri* dates back to *Hortus Cliffortianus* (439. 1738) and *Hortus Upsaliensis* (282. 1748), whence he had actual familiarity with living/dried specimens. Both these (*Hortus Cliffortianus* and *Hortus Upsaliensis*) specimens represent the form of former species endemic to West Indies and found to be conspecific with the named (by Linnaeus himself), extant specimen (probably received from Philip Miller, Chelsea

Gardens in 1736) in Linnean Herbarium. On the other hand, Linnaeus's knowledge of Ceylonese and Indian elements cited in his various works including *Species Plantarum* (1753) was entirely based on meagre descriptions and poorly depicted plates of *Hortus Malabaricus* (10 : 29. t. 15. 1690), Hermann's *Musaeum Zeylanicum*⁴ (11. 1717), Burmann's *Thesaurus Zeylanicus* (230. t. 93. f. 2. 1737) and Plukenet's *Phytographia* (3 : t. 183. f. 5. 1692). Of these, the identity of only Plukenet's plate could be satisfactorily established for there exist two collections associated with that plate in Herb. Sloane (BM-SL), representing *P. amarus* Schum. & Thonn. (Webster l.c. 6. 1956). Webster, therefore, lectotypified *Phyllanthus niruri* with the specimen in *Hortus Cliffortianus* Herbarium (BM).

In *Hortus Cliffortianus* and *Hortus Upsaliensis*, Linnaeus gave the distribution of *P. niruri* as, "in Barbados, ... & in Malabar" and "in Zeylonia, Malabar, Barbados" respectively, but in the *Species Plantarum* (1753), indicated the range only

¹ Abstracted in Proc. 71st Ind. Sci. Congr. Pt. III. 98. 1984.

² Industrial Section, Indian Museum, Botanical Survey of India, Calcutta 700 016.

³ Emeritus Scientist (CSIR), National Botanical Research Institute, Lucknow 226 001.

Date of receipt : 1.5.86 Date of acceptance : 11.12.86.

⁴ Including Hermann's Icones in Herb. Hermann (BM).

"in Indies"⁵. This statement of distribution in *Species Plantarum* together with those specimens named as '*Phyllanthus niruri*' in Wallichian Catalogue from Indian region perhaps influenced Mueller-Argoviensis (Linnaea 32 : 43. 1863 & in DC. Prodr. 15(2) : 406. 1866) to form a concept of *P. niruri* (his *P. niruri* var. *genuinus*) based on the second species—*P. amarus* Schum. & Thonn. Mueller-Argoviensis (11. cc.) further recorded an apparently similar but till then undescribed Indian species as 'var. *scabrellus*' and reduced another distinct Indian species—*P. debilis* Klein ex Willd. as 'var. *debilis*'. Examination of microfische of specimens in Herb. G-DC shows that Mueller-Argoviensis's concept of *P. niruri* var. *genuinus*, *P. niruri* var. *scabrellus* and *P. niruri* var. *debilis* was based on fairly homogenous elements at least from Indian region. Yet, the liberal citation of a number of Indian materials under these taxa, particularly those included in the Wallichian Catalogue but not represented in Herb. DC, largely complicated the situation in Indian context in one way or the other. For example, Wall. Cat. 7893F (cited in Linnaea l.c. & DC. Prodr. l.c. as Wall. n. 7893 pr. p. 'sphalm. 7983' under 'var. *scabrellus*') in Herb. DC represents true 'var. *scabrellus*', while in K-W the same number represents *P. urinaria*; Wall. Cat. 7895A, B, C, E quoted under 'var. *genuinus*' in DC. Prodr. l.c. are not present in Herb. DC but are represented in K-W—'var. *scabrellus*' (7895A); *P. rotundifolius*, 'var. *genuinus*' and 'var. *debilis*' (7895B); 'var. *scabrellus*' and 'var. *genuinus*' (7895C); 'var. *genuinus*' (7895E).

Incidentally, J. D. Hooker in *Flora of British India* though extensively quoted Mueller-Argovinis, work in *Linnaea* (l.c.)

and DC. Prodr. (l.c.), possibly did not examine the specimens in the Herb. DC. He, however, annotated most of the specimens (including those Wallichian numbers quoted by Mueller-Argoviensis) of the above noted original and complete set of Wallichian Catalogue now in K-W. Evidently therefore, the inclusion of a number of diverse elements, especially those of 'var. *scabrellus*' and 'var. *debilis*' under 'var. *genuinus*' in DC Prodr. l.c. greatly obscured the delimitation of these taxa. Added to this, the specimens named as '*P. niruri*' in Herb. Roxb., Herb. Ham. and others included in the Wallichian Catalogue are likely to have misled J. D. Hooker further to conceive a very broad but confused concept of *P. niruri* in *Flora of British India*.⁶ Though the description of *P. niruri* in *Flora of British India* does not help much to unravel his concept of this species, his inclusion of Wall. Cat. 7895 (excl. part of B' 'Sphalm. A') under *P. niruri* and annotation of a number of specimens in K-W including those of Wall. Cat. 7895 (e.g. "*Phyllanthus niruri* Herb. Roxb." ; Wall. Cat. 7895A ; "*Phyllanthus lonphali* Herb. Ham." 'sphalm. Herb. Madr.' : Wall. Cat. 7895C p.p. ; "*Ph. polyphyllus* Herb. Wight" : Wall. Cat. 7895D ; "*Ph. urinaria* Herb. Russ." : Wall. Cat. 7895E ; "*Ph. simplex*" : Wall. Cat. 7898G) and citation of some of them in particular in the synonymy clearly indicate that *P. niruri* as circumscribed in the *Flora*

⁶ J. D. HOOKER (l.c. 298) considered 'var. *scabrellus* Muell.-Arg.' a *san untenable* taxon is apparent from his remark'. "As Mueller observes, Thomson's specimens (from Moradabad) have hirtellous tips of branchlets ; this is just as in *P. urinaria* and *scabrifolius*". A duplicate of the said specimen in BM represents typical 'var. *scabrellus*' (*P. fraternus* Webster).

⁷ In K-W only one specimen is mounted on the sheet 7895A ; this bears clear annotation—'*P. niruri*' by J. D. Hooker. On 7895B, five (one+two+one) specimens comprising of three species are mounted ; the left hand specimen has been correctly annotated as *P. rotundifolius* by J. D. Hooker. This excluded part of 7895B 'sphalm. A' has been cited under *P. rotundifolius* in *Fl. Brit. India* 5 : 299,

⁵ It is probable that Linnaeus meant both *India orientalis* and *occidentalis*, for in the next three species he clearly mentions "*Habitat in India*".

of British India include, *P. niruri* var. *scabrellus*, *P. niruri* var. *genuinus* and *P. niruri* var. *debilis* of Muell.-Arg. (*Linnaea* l.c. & DC Prodr. l.c.).

Webster, who critically analysed the constituents of *P. niruri* sensu Muell.-Arg., described *P. niruri* var. *scabrellus* Muell.-Arg. as a distinct species namely, *P. fraternus* in Contrib. Gray Herb. 176 : 53. 1955. It appears, "*T. Thomson s.n. Punjab* (Herb. Ind. Or. Hook. fil. & Thomson)"* in Herb. C-DC marked as *P. niruri* var. *scabrellus* is a duplicate of the specimen designated as type of *P. fraternus* in K. In 1956, Webster reduced *P. fraternus* to a synonym of *P. asperulatus* Hutch. (J. Arnold Arb. 37 : 14. 1956) ; but a year later (J. Arnold Arb. 38 : 309. 1957) he rescinded his earlier decision with the remark (l.c. 311), "... I acted too hastily in reducing *P. fraternus* to the status of a synonym of *P. asperulatus* Hutch. ... but later more detailed study ... indicates *P. fraternus* and *P. asperulatus* are by no means identical...". Only here did Webster clearly quote under *P. fraternus*—"*Phyllanthus niruri* sensu Hook. f. Fl. Br. Ind. 5 : 298. 1887 (ex p.)"

In J. Arnold Arb. 37 : 13. 1956 & 38 : 313. 1958 Webster correctly identified *P. niruri* var. *genuinus* as representing *P. amarus* Schum. & Thonn. In the synonym of *P. amarus*, he added *P. nanus* Hook. f., a Burmese species described in *Flora of British India*. In course of discussion he also made a generalised observation (l.c. 8. 1956), "It is to this ... species that many, perhaps most, of the Old World record of '*Phyllanthus niruri*' must be referred", but made no specific reference to *P. niruri* of Indian Flora.

Webster (J. Arnold Arb. 38 : 307. 1957) recognised *P. debilis* Klein ex Willd. as a

distinct species. The fact that he perfectly knew this plant is evident from the cited specimens, a few of which in US and A we could examine and also from his disposition of *P. niruri* var. *javanicus* and *P. niruri* var. *debilis* under *P. debilis* Klein ex Willd. As already discussed, J. D. Hooker considered *P. niruri* var. *debilis* (*P. debilis* Klein ex Willd.) to represent *P. niruri* (c.f. '*P. polyphyllus* Herb. Wight' : Wall. Cat. 7895D in the synonymy). He further described another plant named as '*Phyllanthus debilis* Herb. Ham.' (Wall. Cat. 7892A). The mode of citation and the explicit exclusion of Mueller-Argoviensis reference in this species, give a strong indication that Hooker was fully aware of the distinctness of Hamilton's plant from *P. niruri* var. *debilis* (*P. debilis* Klein ex Willd.), which he considered to represent only '*P. niruri* Linn.'. Unfortunately, Webster could not recognise *P. debilis* Herb. Ham. ex Hook. f. as distinct from *P. debilis* Klein ex Willd. ; he appears to have been swayed away by the name '*P. debilis*' itself and mistook it to be a simple case of citational error by Hooker. Hence he quoted—'*Phyllanthus debilis* "Herb. Ham." ex Hook. f. Fl. Br. Ind. 5 : 298. 1887' in the synonymy of true *P. debilis* Klein ex Willd., with the remark (l.c. 309), "Hooker who had a clearer understanding of these plants, recognised *P. debilis* as distinct..."

It is true, resolving the identity of '*P. niruri*' of Indian Flora was not quite within the purview of Webster's work, yet the effect of his publications on Indian Botany, has been curiously manyfold : e.g., *Phyllanthus fraternus* Webster though represents one of the less common species of the complex, the binomial remained to be indiscriminately adopted for all the three species of *P. niruri* complex in Indian Floras. Though a few publications did record *P. amarus* Schum. & Thonn. as a distinct species, they gave no indication that the

* Similar 'Type Collections' are available also in CAL and GH.

plant actually represented the commonest species of the *P. niruri* complex of Indian Flora. *P. debilis* Klein ex Willd. (1804) was never disentangled from *P. niruri* complex, and the name—'*P. debilis* Klein ex Willd.' continued to misrepresent an altogether distinct species—*P. debilis* Herb. Ham. ex Hook. f. (1887), which however, being a later homonym is to be replaced by *P. airy-shawii* Brunel & Roux (Nord. J. Bot. 4 : 470. 1984) described from Thailand (Mittra *ined.*).

The study is primarily based on materials in CAL, BSIS, BSA, BSI, BLAT, LWG, DUH, and specimens including type received on loan from BM, A, AAU, GH and US. This has been supplemented by study of fresh materials in Indian Botanic Garden, Howrah, and examination of photo and microfiche of types and original materials in K, K-W, G-DC, B and C.

A key to the species of this complex occurring in India is given below and their diagnostic characters are illustrated. It is followed by detailed account of these species. It is felt that the exsiccatae cited will help to correctly annotate materials of this considerably misunderstood complex in other Indian herbaria and thereby provide a comprehensive picture of their relative abundance in different parts of the country.

Key to the species of the complex

- 1a. Most cymules bisexual; cymules of proximal 2-3 nodes with 1-3 male flowers; all succeeding nodes with bisexual cymules of one male and one female, or two males and one female, or one male and two female flowers, or other combinations thereof .. *P. amarus* 1.
- 1b. Almost all cymules unisexual; cymules of proximal 2-5 nodes with 2-4 male flowers; all succeeding nodes with solitary female flowers; transitional node occasionally with a bisexual cymule or a few transitional nodes even barren :
 - 2a. Main stem, when very young, with conspicuous normal leaves in about ten lower nodes. Branchlets smooth. Cataphyll stipules

triangular-acuminate. Leaves usually narrowed to a point at apex. Female disc saucer-shaped, obtusely and shallowly 6-lobed along margin. Styles appressed and spreading ..

P. debilis 2.

- 2b. Main stem, even when young, usually naked, rarely with leaves in lower 2-3 nodes. Branchlets usually scabridulous. Cataphyll stipules lanceolate. Leaves rounded at apex. Female disc of 6-9 lacerated and toothed segments. Styles erect and spreading ..

P. fraternus 3.

1. *Phyllanthus amarus* Schum. & Thonn.

Kongl. Danske Vidensk. Selsk. Skr. 4 : 195. 1829; Webster in J. Arnold Arb. 37 : 13. 1956 et 38 : 313. t. 19. f. I-K. 1957. *P. nanus* Hook. f. Fl. Brit. India 5 : 298. 1887. *P. niruri* auct. non Linn. (1753) : Muell.-Arg. in DC. Prodr. 15(2) : 406. 1886 '*P. niruri* [var.] *β genuinus*'; Hook. f. Fl. Brit. India 5 : 298. 1887; *p.p. maj.* quoad syn. *P. urinaria* Herb. Russ. ex Wall. Cat. 7895E. 1847, nomen et *P. lonphali*⁹ Herb. Ham. ex Wall. Cat. 7895C. 1847, nomen, *p.p.*; Roxb. Fl. Ind. Ic. t. 261 (incd.); Wt. Ic. t. 1894. 1852. (Fig. 1)

Erect annual herbs, 10-60 m tall; main stem simple or branched, terete, smooth, or scabridulous in younger parts. Cataphylls : Stipules 1.5-1.9 mm long, deltoid-acuminate; blade 1-1.5 mm long, subulate-acuminate. Deciduous branchlets 1.5-14 cm long, subterete, smooth, or a few lower nodes sometimes scabridulous, with 13-30 distichous leaves. Leaves 3-11 × 1.5-6 mm, elliptic-oblong, obovate-oblong, or even obovate, obtuse, or minutely apiculate at apex, obtuse or slightly inequilateral at base; petioles 0.3-0.5 mm long; stipules 0.8-1.1 mm long, triangular-acuminate. Flowers in axillary unisexual and bisexual cymules on deciduous branchlets; proximal

⁹ Francis Hamilton (Buchanan) spelt the specific epithet as '*sonphali*' in *schedula* and '*sonphalia*', in his "Cat. Dried Plants ... (MSS. 1822)" under serial no. 2093 after the local name.

2-3 axils with unisexual cymules of (1-) 2(-3) male flowers ; all succeeding axils with bisexual cymules, each consisting of 1 male and 1 female, or 2(-3) males and 1 female, or 1 male and 2(-3) female flowers, or combinations thereof. Male flowers : Pedicels at anthesis *ca* 1 mm long. Calyx lobes 5 (rarely 6), subequal, each *ca* 0.7 × 0.3 mm, elliptic or oblong-elliptic and abruptly acute at apex, hyaline, with unbranched midrib. Disc segments 5, roundish. Stamens 3 (rarely 2) ; filaments connate into a column 0.2-0.3 mm high ; anthers sessile atop the column, dehiscing longitudinally. Female flowers : Pedicels 0.8-1 mm long, obtusely 4-gonous, dilated above, *ca* 1.5 mm in fruits. Calyx lobes 5 (rarely 6), subequal, *ca* 0.6 × 0.25 mm, *ca* 1.0 × 0.3 mm in fruits, ovate-oblong, or oblong, acute at apex ; mid-sepaline band green, about a third broad, margin hyaline. Disc flat, deeply 5-lobed, lobes sometimes toothed at apex. Styles 3, free, more or less spreading, shallowly bifid at apex ; arms divergent. Capsules *ca* 1.8 mm across, oblate, rounded. Seeds *ca* 0.9 mm long, triangular, with 6-7 longitudinal ribs and numerous minute transverse striae on back.

Type : Africa, Guinea, *Thonning s.n.* (C, Holo., Microf. !).

Distrib. : Probably native to America, now a circumtropical weed.

Critical notes : Webster (l.c. 313. 1957) described the bisexual cymules in *P. amarus* as comprising of one male and one female flower. Study of several populations in Indian Botanic Garden, however, showed great variability in the composition of bisexual cymules in this species even on the succeeding axils of the same branchlets.

Specimens examined : UTTAR PRADESH : Mirzapur : Rihand Dam, 22 July 1965, *Misra* 9899 (CAL & BSA) ; Dudhi Khema river bank, 27 Oct. *Panigrahi* & *Prasad* 2087 (BSA). BIHAR : *Hope s.n.*

(Acc. no. 402349). Hazaribagh : Ramgarh, 27 Nov. 1874, *Clarke* 24971A ; Daltongung Circuit House, 10 Aug. 1956, *Chandra* 35351 (LWG). Monghyr : Begusarai, *Paul s.n.* Patna : Barh, 22 Dec. 1957, *Srivastava* 46684 (LWG). WEST BENGAL : Birbhum : Santiniketan, Sept. 1964, *Guha s.n.* Mur-

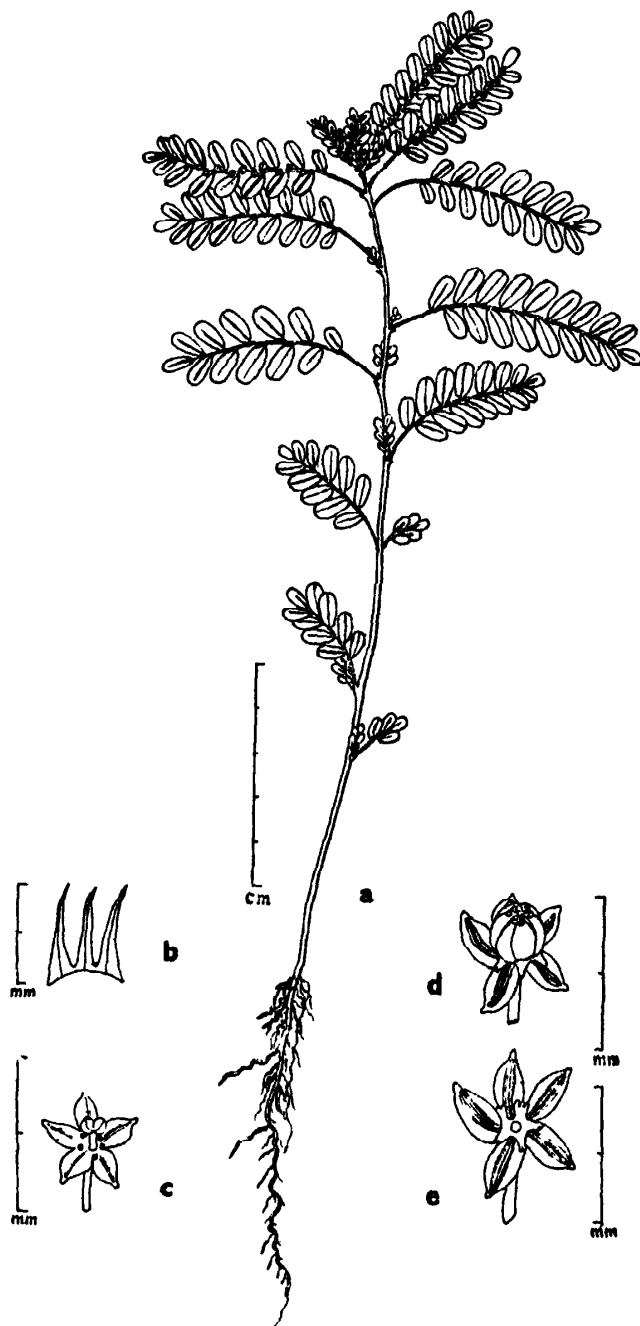


Fig. 1. *Phyllanthus amarus* Schum. & Thonn. : a. habit, b. cataphylls, c. male flower, d. female flower, e. female flower after ovary removed (a. *Sebastine*, K. M. 13643, b-e. pickled materials from Indian Botanic Garden, Howrah)

- shidabad : *Guha Bakshi* 886. Burdwan : Durgapore, 19 Jan. 1958, *Mukerjee* 4453 ; Bamunpara, Burdwan 18 May 1960, *Dutta* 175 ; Dishergarh, 21 Sept. 1972, *Banerjee* 15. Hooghly : Chandannagore, Aug. 1902, *Abu Hosein s.n.* (Acc. no. 402342) ; Chapdani, Baidyabati, 22 June 1963, *Ghosh* 2405 ; Hind Motor St., 26 Nov. 1967, *Sen* 22 ; Balagar, 11 Sept. 1968, *Sen* 768. Howrah : Howrah Rly. Stn., 3 July 1964, *Bennet* 813 ; Panchpara, 4 June 1964, *Bennet* 777 ; Belgatchia, 8 July 1964, *Bennet* 853 ; Shibpur, 1 Oct. 1966, *Naskar s.n.* (mixed with *P. urinaria*) ; Indian Botanic Garden, 28 Nov. 1879, s.l. & s.n. (Acc. no. 402360), 13 July 1958, *Chatterjee* 711, 7 Dec. 1965, *Sharma* 87, 31 May 1966, *Sharma* 376. Calcutta : 29 Mar. 1960, *Hara et al.* 3025. 24-Parganas : Jadavpur Univ. 17 Apr. 1965, *Mitra* 46 ; Tollygunge Club, 13 July 1965, *Mitra* 212 ; Jadavpur Rly. Stn. 22 Feb. 1969, *Mitra* 684. Dum Dum, 2 Sept. 1966, *Basu* 10. ASSAM : Herb. Griffith (Herb. East India Company No. 4802). Kamrup : Gauhati Forest I.B. 2 July 1969, *Rao* 46053. ORISSA : Puri : Near Puri, 1889, *Waloh, s.n.* (Acc. no. 402351) ; Puri, 13 Nov. 1956, *Saran* 37865 (LWG) ; Chilka, 8 Mar. 1959, *Saran* 57925 (LWG). Ganjam : Sobalkota, Mahendragiri, 14 Mar. 1959, *Saran* 58627 (LWG). Kalahandi : Kanghatta, 21st Sept. 1956, *Mukerjee* 4304 (mixed with *P. urinaria*) ; Annigarh, 21 Mar. 1943, *Biswas* 6188. Keonjhar : Olara, 17 Feb. 1961, *Panigrahi* 23907. MADHYA PRADESH : Jubbalpore : *Beddome s.n.* (Acc. no. 402361). Khandwa : Bhano Tank, Khandwa, 25 Aug. 1949, *Narayanswami* 3676. Hosangabad : Bhains dehi, 22 July 1964, *Panigrahi* 4371 (CAL & BSA) ; Kothal Kunda, 20 July 1964, *Panigrahi* 4309 (CAL & BSA). Narsinghpur : Jamgaon, 29 Jan. 1978, *Pant* 27002 (BSA). Damoh : Singhrampur, 16 Aug. 1978, *Sukla* 28701 (2 sheets, one mixed with *P. fraternus*, BSA) ; Singhrampur-Jodhpur Road, 24 April 1980, *Sukla* 30188 (BSA). Bilaspur : Khudia, 15 Feb. 1972, *Panigrahi* 15461 (BSA) ; Khudia to Kari-dongri, 24 July 1973, *Murti* 19315 (BSA). Mandla : Mangal Kanj, 21 Aug. 1962, *Joseph* 14489 (BSA). Raipur : Khallari, 3 June 1972, *Verma* 17497 (BSA). Sidhi : Mara, 3 Mar. 1971, *Sengupta* 14736 (BSA). Raigarh : Sarangarh, 11 Nov. 1971, *Sengupta* 16129 (BSA). Salaghat : Hamta, 3 June 1977, *Nair* 23071 (BSA). Shahdol : Deolon, 25 Jan. 1981, *Misra* 31584 (BSA). RAJASTHAN : Jodhpur : College campus, *Bhandari, s.n.* (Acc. no. 402366). Jaipur : Jaipur Gatta, 18 Mar. 1959, *Jain* 39583 (BSI) ; Jagatpura Rd. 22 Sept. 1963, *Sharma* 235. Jaisalmer : Amar Sagar Garden, 16 Nov. 1973, *Tiwari* 855. Ajmer : Pushkar ghat, 10 July 1958, *Puri* 35838 (BSI) ; Gana-hase, 10 July 1958, *Puri* 35894 ; Ajmir-Panchkund, 20 March 1959 ; *Jain* 49657 (BSI) ; Balsaman, 10 Aug. 1957, *Vasavada* 23974 (BSI). GUJARAT : Rajkote : R.C. Compound, 18 Aug. 1952, *Santapau* 14528 (BLAT) ; Jilla Garden, 20 Aug. 1952, *Bole* 611 (BLAT) ; Jilla Park 21 Oct. 1953, *Santapau* 16891 (BLAT) ; Rajkote, s.l. & s.n. (Acc. no. 402368). Sasan, along river bank, Saurashtra, 7 Oct. 1953, *Santapau* 16491 (BLAT). Mangrol, Anerut Bag, 12 May, 1952, *Santapau* 14268 (BLAT). Dangs : Nadiad Science College Compound, 24 July 1957, *Toor* 14211 (BSI) ; Nadiad, 8 Oct. 1958, *Toor* 39420 (BSI) ; Dangs Forest, Unai along Ambika river, 31 Oct. 1953, *Santapau* 17063 (BLAT). Breach, river bed, 26 Dec. 1956, *Shah* 8286 (BLAT). Ratanpur forest, 20 Oct. 1966, *Pataskar* 110275 ; Kavi, near Jain temple, Derara, *Jain* 17791 (BSI). Deshalpur, 16 Sept. 1968, *Raghavan* 114881 (BSI). Tabu, 21 Aug. 1950, *Dhruva* 43. MAHARASHTRA : Bombay : Borivli National Park, 6 Nov. 1955, *Herbert* 902 (BLAT), 4 May 1956, *Herbert* 1638 (BLAT), Borivli, 1954, s.l. 1287 (BLAT). Dhulia : Muktilake, 23 Aug. 1956, *Mahajan* 6518 (BSI). Poona : BSI Office Compound, Koregaon, Poona, 27

- July 1960, *Cherian* 63472 (CAL & BSI) ; Law College Hostel, Poone, 7 July 1951, *Razi* 5190 (BLAT). Khandala, April 1942, *Santapau* 6897 (BLAT), 7 July 1957, *Santapau* 12901 (BLAT), 19 Aug. 1957, *Santapau* 21922 (BLAT), Berham's Flat. 4 Sept. 1943, *Santapau* 2602 (BLAT), 17 Aug. 1945, *Santapau* 6943 (BLAT). Aurangabad : Behind Mukbara Tomb, Aurangabad, 5 Nov. 1961, *Rao* 76892 (BSI) ; Opposite 10th Cave, Ellora, 4 Nov. 1961, *Rao* 68556 (BSI). Ahmednagar : Toka, Pravarasangam, 5 Nov. 1960, *Rao* 68556 (BSI), Kolhapur : Brahampuri, July 1920, *Acland s.n.* (BLAT). Savantawadi : Octavane, 29 May 1977, *Almeida* 278 (BLAT). Nagpur, Agriculture field, 14 Nov. 1957, *Subramanyam* 4603. Chanda, *Duthie* 9752. Harapsar, 20 Aug. 1960, *Kanodia* 65771 (BSI). Tawba, Chandrapur, 12 Oct. 1972, *Wadhwa* 12954 (BSI).
- ANDHRA PRADESH : Hyderabad : Moosi river bank, 26 June 1958, *Sebastine* 5967 ; Secunderabad, 5 Jan. 1954, *Kaul* 6647 (LWG). Medak : Petancheru, 29 Sept. 1977, *van der Maesen* 2829. Warangal : Pakhal, 30 Nov. 1960, *Sebastine* 11692. Visakhapatnam : Araku Valley, 17 Sept. 1961, *Balakrishnan* 637 ; Araku Govt. Colony, 9 May 1956, *Wagh* 2409 (BLAT) ; University campus, Waltair, 21 Oct. 1956, *Wagh* 1941 (BLAT). Cuddapah : Tummalaui, 26 Jan. 1958, *Wagh* 8043 (BLAT) ; Belapalli, 29 July 1962, *Ellis* 14303. Krishna : Kondapalli Fort, 25 Aug. 1956, *Wagh* 3344 (BLAT) ; Machalipatnam Creek, *Rao* 7423 ; Vijayawada, Aug. 1883, *Gamble* 12647. E. Godavari : Kakinada, 4 Mar. 1956, *Wagh* 1941 (BLAT). W. Godavari : Vadapulle, 31 Dec. 1901, *Bourne* 3323. Chittor : Bakrapet, 12 Mar. 1957, *Wagh* 5686 (BLAT).
- TAMIL NADU : Madras, Aug. 1916, *Sedgewick* 1811 (BLAT) ; Tirunelveli : Kannikatti, 10 July 1959, *Sebastine* 8434 ; Kayamoli, 27 Nov. 1961, *Sebastine* 13643. Tiruchirapalli : Way to Pachamalai, 6 Aug. 1958, *Sebastine* 6163. Madurai : Kodaikanal Ghat, Pulneys, 7 July 1901, *Bourne* 2125 ; Pulney hills, *Beddome* 7051 (BM). Coimbatore : Bolampatti valley, Velapatti, 19 July 1901, *Fischer* 2036 ; Hassanur, 19 Dec. 1906, *Fischer* 1361 ; Siruvani, 13 Aug. 1960, *Henry* 174 (BLAT), 9 July 1961, *Henry* 1984 (BLAT). Nilgiris : Burliar, 23 Aug. 1957, *Sengupta* 2243. South Arcot : Palur, 14 June 1907, *Barbar* 8342 ; Bhuvangiri to Kuringipadi, 12 Feb. 1979, *Ramamurthy* 60115. Ramanathapuram : Muthukulathur, 18 June 1978, *Nair*, 57323 ; Sundaranadappu, Sivagamga, 25 June 1978, *Nair* 57446 ; Puduppatti, Forest Rest House, 15 Feb. 1979, *Nair* 60826. PANDICHERRY : Karikkal, 25 Apr. 1972, *Sastry* 9107.
- KARNATAKA : Dharwar, July 1917, *Sedgewick* 2668 (BLAT). North Kanara : Halial, July 2, 1889, *Talbot* 1889, *p.p.* (BSI). Mandha : Srirangapatna, 25 Nov. 1978, *Murthy & Prakash* 4543. KERALA : Cannanore : Cannanore shore, 18 Nov. 1972, *Rao* 9965. Ernakulam : Port Cochin, 1 Nov. 1972, *Rao* 9680 ; Vendurthy Islands, 5 Nov. 1972, *Rao* 9741. Quilon, 12 May 1958, *Vasavada* 36943 (BSI) ; Quilon-Shencottai Rly. line, 6 Feb. 1962, *Subramanian* 63343A (BSI). Tenmalai-Ariankavu Rly. road, 6 May, 1961, *Subramanian* 70929 (BSI). Trivandrum, Kallar, 20 Feb. 1959, *Ansari* 50318 (BSI). Ottakkal, 15 June, 1960, *Kanodia & Subramanian* 63040 (BSI). Mammoode, 9 Feb. 1961, *Subramanian* 70490 (BSI). DAMAN : Daman (Grande), 6 May 1963, *Rao* 89029 (CAL & BSI) ; 29 Sept. 1963, *s.l.* 93661 (CAL & BSI) ; Nagar-Haveli, Banks of Damanganga river, *Ansari* 126785 (BSI). Diu : Gagola, riverside near sea shore, 21 Sept. 1964, *Rao* 102732 (BSI).
- LAKSHADWEEP ISLANDS : Agathi Island : 14 Dec. 1960, *Wadhwa* 68866 & 68884, 22 Feb. 1959, *Srinivasan s.n.* Androth Island : 9 May 1889, *Alcock s.n.* (Acc. no. 402386), 30 Nov. 1962, *Wadhwa* 68434. Kadmat Island : 26 Feb. 1959, *Wadhwa* 49200 ; 19 Dec. 1960, *Wadhwa* 68802 & 68824. Kalpeni Island : 13 Nov. 1960, *Wadhwa* 64813.

Kiltan Island : 14 Nov. 1891 (H. M. I. M. Investigator), *s.l.* & *n.* (Acc. no. 402397). Kavarthi Island : 4 Dec. 1960, *Wadhwa* 68717. Cardamum Island. 15 Nov. 1891 (H. M. I. M. Investigator), *s.l.* & *n.* (Acc. no. 402388). Ancutta Island, 19 Nov. 1891, (H. M. I. M. Investigator), *s.l.* & *n.* (Acc. no. 402388). Minicoy Island : 6 Dec. 1891, (H. M. I. M. Investigator), *s.l.* & *n.* (Acc. no. 402389). ANDAMAN & NICOBAR ISLANDS : Middle Andaman : Mayabandar, 30 Jun. 1959, *Thothathri* 9147, 1 Aug. 1974, *Bhargava* 1979. Long Island, 27 Mar. 1961, *Saran* 88360 (LWG). South Andamans : Port Blair, 19 Mar. 1961, *Saran* 88728, 23 Mar. 1961, *Saran* 88798. Havelock Island, 20 May 1974, *Ansari* 1461, Neil Island, 15 Nov. 1978, *Basu* 7017. Nicobar Islands : *Kurz.* *s.n.* (Acc. no. 402338). Katchall Island : Feb. 1875, *Kurz.* *s.n.* (Acc. no. 402339) ; West Bay, Katchall Island, 15th Feb. 1977, *Chakraborty* 5223. Great Nicobar : Campbell Bay, 18 Aug. 1975, *Balakrishnan* 2734, 28 July 1976, *Balakrishnan* 4062, 19 June 1977, *Balakrishnan* 5850. BURMA : Tenna-serim ; Choungzon, 1 Apr. 1887, *Gallatly* 593. Pegu : Tonkyeghat, Seven Pagodas, *Kurz* 1585. Kyauksi, 19 June 1890, *Huk* *s.n.* (Acc. no. 402395). Southern Shan States : Keng Taung, 1896, *Khalil* *s.n.* (Acc. no. 402356). SINGAPORE : About Singapore, 1880, *Kunstler* 28. Changi, 1891, *Ridley* 3419. MALAYASIA : Pahang : Kwala Pahang, May 1890, *Ridley* 1402a. Malacca : Malacca hill, 1892, *Ridley* *s.n.* (Acc. no. 402746). SIAM : Chiongmai, Oct. 1910, *Kerr* 1444. PHILIPPINES : Manila, 12 May 1902, *Merrill* 72. Luzon, Apr. 1909, *Ramos* 7870 ; Luzon, Aug. 1914, *Merrill* : *Species Blancoanae* No. 101 ; Ban'as Islands, May-June 1907, *Fenix* 3722. N.-E. NEW GUINEA (Former Kaiser-Wilhelmsland) : Finschhafen, 1889-91, *Weinland* 221 ; Stephansort, Aug. 1899, *Lewandowsky* 57 ; Gulf of Huon, *s.l.* 811. HERB. CAL-W : '*Phyllanthus niruri*' (Nepalia,

Wallich) : Wall. Cat. 7895F (left hand two specimens).

Specimens examined : (Microfiche) : HERB. G-DC : Maisor & Carnatic (Herb. Ind. Or. Hook. fil. & Thoms.), *Thomson* *s.n.* ; '*Phyllanthus niruri*' (Nepalia, *Wallich*) : Wall. Cat. 7895F (All bear label —*P. niruri* β *genuinus* DC. Prodr. 15.2. 406. 358). HERB. K-W : '*Phyllanthus niruri*' Herb. Madr. : Wall. Cat. 7895B *p.p.* (2 specimens in the Centre—annotated as *P. niruri* by J. D. Hooker) ; '*P. niruri*' Herb. Ham. (Mungyer, 17 June 1811) : Wall. Cat. 7895C *p.p.* (right hand specimen) ; *P. lonphali* Herb. Ham. (Mungyer, 26 May 1811) : Wall. Cat. 7895C *p.p.* (2 specimens—the centre bottom—annotated as *P. niruri* by J. D. Hooker) ; '*P. urinaria*' Herb. Russ. ; Wall. Cat. 7895E ; '*P. niruri*' (Nepalia, *Wallich*) : Wall. Cat. 7895F.

2. *Phyllanthus debilis* Klein ex Willd. Sp. Pl. 4 : 582. 1804 ; Webster in J. Arnold Arb. 38 : 307. t. 19. f. C & D. 1957, excl. syn. *P. debilis* Herb. Ham. ex Hook. f. Fl. Brit. India 5 : 299. 1887. *P. niruri* [var.] α *javanicus* Muell.-Arg. in Linnaea 32 : 43. 1863 et in DC. Prodr. 15(2) : 407. 1866. *P. niruri* [var.] δ *debilis* (Willd.) Muell.-Arg. *ibid.* *P. mukerjeeanus* Mitra & Bennet in Bull. Bot. Soc. Bengal 19 : 145. f. 1. t. 1. 1966, syn. nov. Type : West Bengal, Howrah : Burgachia, *Bennet* 621A (CAL, Holo. !) ; 621 B & C (CAL, Iso. !). *P. niruri* auct. non Linn. (1753) : Hook. f. Fl. Brit. India 5 : 298. 1887, *p.p.* Quoad syn. *P. polyphyllus* Herb. Wight ex Wall. Cat. 7895D, 1847, nomen. — *Fig. 2.*

Erect, annual herbs 10-70 cm tall ; main stem usually sparingly branched with conspicuous normal leaves in lower about ten nodes (also in a few lower branches) when young, becoming leafless, woody and sometimes much branched (even from base) with age, terete or sub-terete below, 4-gonous with more acutely angled leaf-bases on

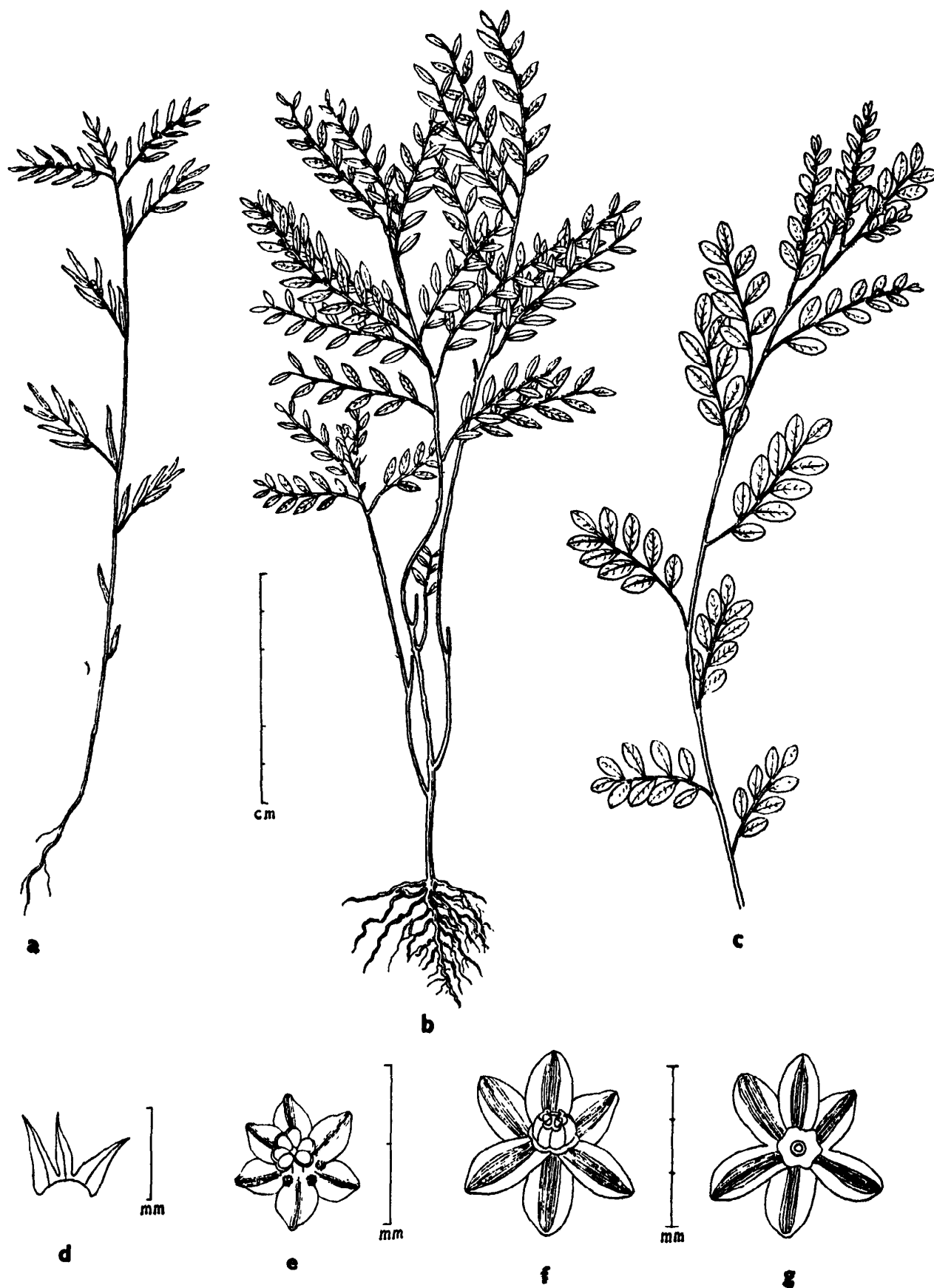


Fig. 2. *Phyllanthus debilis* Klein ex Willd : a, b & c. habit, d. cataphylls, e. male flower, f. female flower, g. female flower after ovary removed (all except c. Mitra, R. L. 1503, a. Sonjappa, M. 746).

either sides decurrent between the nodes, smooth, with 7-35 leaves. Leaves variable, dark green above, paler beneath with prominent midrib and 4-5 faintly raised lateral nerves; those on main stem and primary branches $10-35 \times 1-5$ mm, linear, linear-elliptic-lanceolate, or oblanceolate, acute, subacute or obtuse at apex, obtuse or attenuate at base; those on branchlets $4-20 \times 1.5-6$ mm, linear, linear-lanceolate, oblanceolate, elliptic or even obovate-elliptic, acute, subacute or obtuse at apex, attenuate or obtuse at base; petioles 0.5-1 mm long; cataphylls: stipules $1.2-1.8 \times 0.6-0.8$ mm, triangular-acuminate, one side somewhat dilated at base; blade about same in length, narrowly lanceolate, acuminate. Stipules similar to cataphyll stipules, but narrower and not dilated at base. Flowers in axillary unisexual cymules on deciduous branchlets; proximal (2-) 3-5 axils with 3-4 male flowers, succeeding axils with solitary female flowers; transitional axil occasionally with a bisexual cymule, or a few transitional axils sometimes even barren. Male flower: Pedicels at anthesis 0.5-0.8 mm long. Calyx lobes 6, biseriate, subequal, membranous, hyaline, each $0.5-0.6 \times 0.5$ mm, obovate and somewhat cuculate at apex, with unbranched midrib. Disc segments 6, roundish. Stamens 3; filaments connate into a column about 0.3 mm high; anthers sessile atop the column, dehiscing horizontally. Female flower: Pedicels ca 1.2 mm long, obtusely 4-gonous, dilated above, becoming ca 2 mm in fruit. Calyx lobes 6, biseriate, subequal, each $1.5 \times 0.8-0.9$ mm, becoming ca 2.0×1.1 mm in fruit, oblong-obovate, or oblong-elliptic, subacute or obtuse at apex; mid-sepaline band green, unbranched, about a third broad, margin hyaline. Disc saucer shaped, obtusely and shallowly 6-lobed along margin. Styles 3, free, appressed to ovary, each bifid at apex; style arms recurved. Capsules ca 2.5 mm, across, oblate, rounded. Seeds 1.0-1.1 mm long, trigonous, with 7-8

longitudinal ribs and many fine transverse striae on back.

Type: India, Tamil Nadu, Tanjor: Tranqueber, in rice fields, February 1799, Klein s.n. (3 sheets-Herb. Willd. 17898-B, Syntypes, Photo! Microf.!).

Distribution: India, Sri Lanka, Burma, Indonesia, Pacific Islands and the West Indies.

Ecology: *P. debilis* commonly grows as a weed in rice fields, moist lands and muddy flats amidst grasses. It is restricted to the coastal regions and so far not reported from far inland places. Webster (l.c. 312. 1957) mentioned it as occurring 'also in Sikkim and Bhutan', through his misapprehension of *P. debilis* Herb. Ham. ex Hook. f. *P. fraternus* and particularly *P. amarus* on the other hand are ubiquitous species and found almost throughout India.

Critical notes: In Berlin Herbarium (B), there are three sheets of Klein's original collection (Syntypes) bearing Herb. Willd. No. 17898. As also pointed out by Webster (l.c. 308. 1957), there is considerable variation in the leaf size and shape among the type sheets. Sheet No. 1 has a much branched small specimen with elliptic leaves-this usually represents plants which have been injured in some way resulting in the development of several accessory buds into permanent branchlets (cf. Fig. 2b). Sheet No. 2 has three small specimens, which are sparingly branched, and besides leaves on deciduous branchlets, conspicuously bear linear-elliptic-lanceolate normal leaves on lower few nodes of main stem and permanent branchlets-these represent juvenile forms in which the flowering and fruiting have just started (cf. Fig. 2a). Sheet No. 3 has a much bigger specimen with bigger leaves which are usually oblanceolate or obovate-elliptic, and a few much longer permanent branchlets-this normally represents older plants which

usually grow amidst tall grasses (cf. Fig. 2c).

Thus it appears that the specimens were judiciously selected by the Collector (Mr. Klein) to represent various life-forms in this species.

Mitra & Bennet (*l.c.*) described *P. mukerjeeanus* from Howrah district in West Bengal. They considered their new species to be closely allied to '*P. debilis* Klein ex Willd.' and characterised it in having normal leaves on main stem and primary branches. *P. mukerjeeanus* is however, found to represent only a juvenile form of true *P. debilis* Klein ex Willd., mentioned above and compares well with the type specimens mounted on the second sheet. As discussed earlier, true *P. debilis* Klein ex Willd., is not correctly recognised so far in Indian Floras and the plants with which Mitra & Bennet (*l.c.*) compared their new species in fact represent *P. debilis* Hrb. Ham. ex Hook. f.

Specimens examined :¹⁰ WEST BENGAL : Howrah : Burgachia, 3 Sept. 1964, Bennet 621A, B & C ; Indian Botanic Garden, recently reclaimed plot near Medicinal Plant Garden, 29 May 1981, Mitra 1503. ORISSA : Puri : Balugaon, 18 Mar. 1959, Saran 56794 (LWG) ; Puri, 24 Apr. 1965, Abraham 327. MAHARASHTRA : Bombay : Malad, Marve-Madh Road, 2 Dec. 1957, Shah s.n. (BLAT). Ratnagiri : Mangaon Forest near Akeri, 29 June 1965, Cherian 105503 (BSI) ; Varad, 10 Km. from Kundal, 19 Nov. 1965, Kulkarni 107637 (BSI) ; Songadpar, Ghotge, 7 June 1970, Kulkarni 121105 (BSI) ; Kerude, Dukanwad, 16 Apr. 1971, Kulkarni 128737 (BSI). Savantvadi : Otavani, 29 May 1977, Almeida 287 (BLAT) ; Insuli, 5 Sept. 1977, Almeida 792 (BLAT) ; Charatha, 31 Dec. 1977, Almeida 1872 (BLAT) ; Danoli, 12 May 1978, Almeida 1612 (BLAT) ; Namas-Talkhamba,

22 May 1978, Almeida 1784 (BLAT) ; Namas, 14 May 1979, Almeida 2192 (BLAT). ANDHRA PRADESH : East Godavari : Pithapuram, 17 Apr. 1975, Rao, P. N. s.n. Visakhapatnam : Araku, Near Patel river, 26 Aug. 1960, Balakrishnan 10868, Kurnool : Nandyal, 27 Feb. 1957, Wagh 5242 (BLAT). TAMIL NADU : Madurai : Near Kumili, 22 June 1959, Subramanyam 8138. Tirunelveli : (Travancore) Courtalam, 27 Nov. 1913, Rama Rao's Coll. 1926 ; Courtalam main falls, 23 July 1957, Subramanyam 3744 (mixed with *P. amarus*) ; On way to Pandanus swamps from Sengalteri Forest Rest House, 22 Dec. 1980, Sanjappa 746. KARNATAKA : North Kanara : Kala Nuddi, Dec. 1852, Ritshie 12522 ; Kotgal, 2 May 1956, Puri 1944 (BSI) ; Mattikar, 26 Apr. 1956, Mahajan 1277 (BSI) ; Halial, 2 July 1889, Talbot 1889A (BSI-Lower specimen) ; Karwar ('Carwar'), 15 Aug. 1889, Talbot 1943 (BSI) ; Karwar, Hall & McCann 34277 (BLAT). Maisor & Carnatic, Thomson, s.n. (CAL Acc. no. 402375 & GH). South Kanara : Mangalore, 1849, Hohenacker 674 (BM). KERALA : Trivandrum : Poojapura, Surv. Med. Pl. CCRIMH No. 140 (BSIS Acc. No. 43465). Quilon : Quilon-Shencottai Rly. line, 6 Feb. 1961, Subramanian 63343 (BSI) ; Vellumalai, Kulathapugha, 17 Feb. 1961, Subramanian 70794 (BSI) ; Nilemel, 24 May, 1978, Mohanan 55771. GOA : Muddy flat on the other side of Kolvelly ferry crossing, 18 Nov. 1962, Rao 84891 (CAL & BSI) ; Goodeer, 1 mile beyond Margao on way to Quepum, 9 Sept. 1962, Rao 84502 (CAL & BSI) ; Porvorim-Betim roadside, 10 Nov. 1963, Rao 92939 (CAL & BSI) ; Bali, 18 Sept. 1965, Cherian 106239 (CAL & BSI) ; Nadquem, 26 Apr. 1963, Kanodia 88259 & 88260 (CAL & BSI) ; Margao, Field near Rest House, 22 Aug. 1963, Kanodia 89435 (CAL & BSI) ; Near Curti village on Panda-Darbandora, 29 Aug. 1963, Kanodia 89636 (CAL & BSI) ; Nandorem along river bank, 25 Mar. 1967, Kanodia 96494 (BSI) ; Nand-

¹⁰ Specimens not otherwise specified belong to CAL.

rona near Maden, 18 Sept. 1970, *Singh*, 124292 (BSI); Satrem, 25 May 1970, *Singh*, 124550 (BSI); Sanguem, 10 Oct. 1970, *Khisti* 125239 (BSI). ANDAMAN & NICOBAR ISLANDS: Andamans: *Prain's Coll. s.n.* 1899 (Acc. No. 402340). North Andamans: Mayabandar, 30 Jan. 1959, *Thothathri* 9147 (mixed with *P. amarus*). South Andamans: Jirkatang range, weed in the nursery, *Saran & Party* 53179 (LWG). Little Andaman: Hut Bay, 29 Apr. 1975, *Bhargava* 2335. North Nicobars: Car Nicobar, Arong, 25 Apr. 1976, *Nair* 3728. South Nicobars: Great Nicobar, Magar Nallah, 4 km. on North-South Road in paddy field, 10 Oct. 1980, *Dwivedi* 8042. BURMA: Tennaserium. Mergui, Mar. 1911, *Meebold* 14224. SRI LANKA: Peradeniya, 19 Apr. 1859, *T T. s.n.* (Acc. No. 402379 p.p.), 26th Mar. 1950, *Chatterjee* 569. HERB. CALW: Wall. Cat. 7893C p.p. (right hand top specimen).

Specimens examined (Microfische): HERB. G-DC: Wall. Cat. 7895 p.p.; Bengalia, *Wallich s.n.* (all bear label-*Ph. niruri* δ *debilis* Muell.-Arg. DC. Prodr. 15. 2. 407. 358). HERB. K-W: '*Ph. niruri*' Herb. Madr.: Wall. Cat. 7895B p.p. (extreme right hand side specimen); '*Ph. polyphylla*' Herb. Wight: Wall. Cat. 7895D (annotated as *P. niruri* by J. D. Hooker); '*Ph. simplex*' Herb. Madr. (ex Iter Travancore): Wall. Cat. 7898D p.p. (Left hand two specimens); '*Ph. simplex*': Wall. Cat. 7898G¹¹ (four specimens on 1st sheet, bears an inscription in pencil 'Bengal 7898'-annotated as *P. niruri* by J. D. Hooker).

3. *Phyllanthus fraternus* Webster in Contrib. Gray Herb. 176: 53. 1955 et in J. Arnold Arb. 38: 309. t. 19. f. G & H. 1957. *P. niruri* [var.] β *scabrellus* Muell.-Arg. in Linnaea 32: 43. 1863 et in DC. Prodr.

15(2): 406. 1866 '*scabrellus*'. *P. niruri* auct non Linn. (1753): Hook. f. Fl. Brit. India 5: 298. 1887, p.p.—Fig. 3.

Erect annual herbs 7-50 cm tall; main stem terete and mostly naked below, rarely when young with inconspicuous normal leaves in lower 2-3 nodes, 4-gonous above, often with a few slender, lateral branchlets with age. Cataphylls: Stipules 0.8-1.2 mm long, lanceolate, not dilated at base; blade narrower. Deciduous branchlets (2-) 4-11 cm long with 10-30 leaves, 4-gonous with decurrent leaf-bases on either side conspicuously winged, usually scabridulous along winged-edge. Leaves 3-16 $\times$ 2-8 mm, elliptic-oblong, rounded at apex, obtuse or cuneate at base, dark green above, paler beneath with prominent midrib and 4-5 faintly raised lateral nerves; petioles 0.3-0.6 cm long; stipules similar to cataphyll stipules. Flowers in axillary unisexual cymules on deciduous branchlets; proximal (2-) 3-4 (-5) axils with 2-3 male flowers, succeeding axils with solitary female flowers; transitional axil occasionally with a bisexual cymule. Male flowers: Pedicels at anthesis 0.5-0.8 mm long. Calyx lobes 6, subequal, membranous, hyaline, each 0.6-0.7 $\times$ 0.4-0.5 mm, elliptic to obovate-elliptic, acute or subacute at apex, with unbranched midrib. Disc segments 6, irregularly angular or lobed. Stamens 3; filaments connate into a column about 0.3 mm high; anthers sessile atop the column, dehiscing longitudinally. Female flowers: Pedicels ca 1.2 mm long, obtusely 4-gonous, dilated above, becoming 1.5-2 mm in fruits. Calyx lobes 6, unequal, each 1-1.2 $\times$ 0.4-0.5 mm, up to 1.5 $\times$ 0.7 mm in fruits, elliptic, obovate, or even spatulate, rounded to subacute at apex; green mid-sepaline band unbranched, about a third broad; margin hyaline. Disc of three broad, irregularly laciniately toothed segments, each deeply 2-3 lobed with age (i.e. of 6-9 lacerated and toothed segments). Styles 3, free, erect and spreading, each

¹¹ In K-WALL 2 sheets are numbered 7898G.



Fig. 3. *Phyllanthus fraternus* Webster : a. habit, b. cataphylls, c. male flower, d. female flower, e. female flower after ovary removed (a. Roy. G. P. 3939. b-e. pickled materials from Indian Botanic Garden, Howrah)

briefly bifid at apex; style arms knob-like, diverging. Capsules ca 2 mm across, oblate, rounded. Seeds ca 0.9 mm long, with 6-7 longitudinal ribs and many fine transverse striae on the back.

Type: Pakistan, ('West') Punjab, Tum-moghat, Ravee-Chenab ('Rechna') Doab, Oct. 1846 (Herb. Ind. Or. Hook. fil. & Thomson), *Thomson, T* s.n. (K, Holo., Photo!).

Distribution: Pakistan and India; introduced into Africa and the West Indies.

Specimens examined: HARYANA: Jind, 29 July 1961, *Nair* 15892. DELHI: I.A.R.I. Botany Division, 20 Feb. 1953, *Singh* 10; Rohilla Sarai Gardens, 20 June 1954, *Maheshwari* 125 (DUH); Delhi University Campus, 24 Aug. 1957, *Maheshwari* s.n. (DUH Acc. no. 7755), 25 Sept. 1960, *Rama Murthy* s.n. (DUH Acc. no. 7756). BIHAR: Champaran: Areraj, 14 Aug. 1964, *Banerjee* 157; Bettiah, 9 Sept. 1965, *Banerjee* 357; Bagha 10 Aug. 1964, *Banerjee* 69 & 20 Sept. 1965, *Banerjee* 688; Gobardhana Forest, 15 Nov. 1963, *Shetty* 333; Gamharia Village, 7 Aug. 1964, *Banerjee* 7, Matihari, 18 Aug. 1964, *Banerjee* 199; Patahi 17 June 1957, *Singh* 42111 (LWG). Darbhanga: Samastipur, 23 Aug. 1964, *Banerjee* 310. UTTAR PRADESH: Almora: Bagesar, Kumaon, *Strachy Winterbottom* 2 (BM). Moradabad, Aug. 1843, *Thomson* 804 (BM). Allahabad, Chatham Lines, 26 Aug. 1963, *Prasad* 334 (CAL & BSA), Garden of Central Circle, 8 Aug. 1962, *Arora* 3824 (BSA), Daraganj, 17 July, 1964, *Rajgopal* 4186 (BSA). Lucknow, CDRI Grounds, 11 July 1956, *Patil*¹² s.n. (BSA). Jhansi: Jhansi killa, 16 Sept. 1980, *Verma* 30774 (BSA). Lakholi, s.l. & n. (DUH). WEST BENGAL: Purulia: Manbhum, *Campbell* (Herb. G. Watt. Field No. 9417); Panehкот Foot hills, 27 Aug. 1966, *Mallick* 454. Hooghly: Makhla, 12 Dec.

1965, *Mandal* 8; Bhadreswar, 24 Sept. 1968, *Sen* 825; Pargopalnagar, 11 Aug. 1962, *Mallick* 4. Howrah: Chengail, 15 Apr. 1963, *Bennet* 274; Indian Botanic Garden, s.l. & n. (Acc. No. 402361-mixed with *P. urinaria*), 5 Sept. 1915, *Debbarmann* s.n., 11 July 1966, *Sharma* 446; Shibpur, July 1894, *Gammie* 36, *Kurz* s.n. (Acc. No. 402344). Calcutta: *Sen* (Herb. G. Watt. Field No. 14002-BSIS); Indian Museum Premises, 29 Apr. 1959, *Subba Rao* 2342 (BSIS). 24-Parganas: Sunderbans, 1893, s.l. & n. (Acc. no. 402352); Chandpie, Sunderbans, 30 July 1902, *Prain* s.n. (Acc. no. 402348); Lower Bengal, 1867, *Kurz* s.n. (Acc. No. 402345). Murshidabad: Omrahagunge, 16 July 1965, *Guha Bakshi* 91; Baranagar, 19 Oct. 1965, *Guha Bakshi* 268, *Guha Bakshi* 499. TRIPURA: Agartala, 26 Apr. 1914, *Debbarmann* 63. ORISSA: Puri: Berkuda Island, 10 Aug. 1919, *Annandale* 1235; Chilka, Bhalari Pahar, 9 Mar. 1959, *Saran* 58363 (LWG). MADHYA PRADESH: Ratlam: Raoti, 1 Sept. 1964, *Arora* 5675 (CAL & BSA). Guna: 'Goona', Aug. 1867, *King* 156. Sagar: Saugar, *Vicary*, s.n. (Acc. no. 402396-mixed with *P. amarus*). Damoh: Singhrampur, 16 Aug. 1978, *Sukla* 28701 p.p. (Left hand specimen-BSA). Panna: Brahaspat Kund, 29th December 1958, *Singh* 54278 (LWG). Shivpuri: National Park, Shivpuri, 14 July 1972, *Panigrahi* 16974 (BSA). Satna: Pili Kothi, Satna, 23 Sept. 1974, *Mamgan* 20782 (BSA); Harnampur, 6 Aug. 1975, *Mamgan* 21830 (BSA). Sidhi: Gandhigram, 22 Oct. 1962, *Panigrahi* 5557 (BSA). Rewa: Rewa-Sidhi Road (25 km), 23 July 1968, *Sengupta* 12719 (BSA). RAJASTHAN: Jaipur: Jaigarh, 25 Aug. 1963, *Sharma* 120. Jhalawar: Raipur Balghar Block, 18 Sept. 1964, *Wadhwa* 5469. Banswara: Anand Sagar forest, on the hill slopes, 25 Sept. 1961, *Kanodia* 75275 (BSI); Paloda, 18 Aug. 1976, *Singh* 2828. Ganganagar: Layalpuria Bagh, Ganganagar, 16 Nov. 1976, *Roy* 3939; Raising, 6 Oct. 1977, *Roy* 4917. Sirohi: Mt.

- Abu-Abu Road (9th mile), 30 Sept. 1960, *Rao* 66705 (BSI); Erinpura, near Jawai Dam, 2 Oct. 1960, *Rao* 66832 (BSI). Durgapur Range forest Office compound, 22 Sept. 1962, *Kanodia* 67293 (BSI). GUJARAT : Bhavnagar : Gopinath shore, 7 Oct. 1964, *Rao* 2116; Jafarabad, sub-coastal plains near light house, 10 Oct. 1964, *Rao* 2213; Saurashtra coast, Dwarka, 15 Oct. 1961, *Rao* 412 (BLAT). Rajkot : Gondal Road, 20 Aug. 1952, *Bole* 566 (BLAT). Broach : Gora, opposite, Narbada, 1 Sept. 1967, *Pataskar* 110393 (BSI); Piplod-Dumkhol, 10 Sept. 1967, *Pataskar* 112065 (BSI). North-east Ranipur towards, Kotbadhan, 12 Aug. 1965, *Pataskar* 101474 (BSI). Saroli, a weed in cotton field, 23 Sept. 1958, *Puri* 44072 (BSI). Ahwa, Dangs, 26 Aug. 1958, *Jain* 43026 (BSI). MAHARASHTRA : Bombay : Borivli National Park, *Bhargavi* 189 (BLAT), 8 Nov. 1954, *Herbert* 308 (BLAT), 20 Oct. 1955, *Herbert* 848 (BLAT), 7 July 1956, *Herbert* 1660 (BLAT). Goregaon, Aarey Milk Colony, 17 July 1958, *Tovakari* 1345 & 1346 (BLAT). Worli Hill, 14 July 1951, *Santapau* 12962 (BLAT), 20 July 1957, *Merchant* 17 (BLAT). Malad, Marare-Madh Road, 2 Oct. 1956, *Shah* 7702 (BLAT). Madh Island, 18 July 1957, *Shah* 8813 (BLAT). Sion, Nov. 1916, *Blatter* s.n. (BLAT). Andheri, 27 July, 1941, *Santapau* 6848 (BLAT). Versova, 31 July, 1941, *Santapau* 6845 (BLAT). Mora-Uran, 5 Aug. 1960, *Divakar* 1111, 1112 & 1113 (BLAT), 17 Sept. 1961, *Divakar* 2590 (BLAT). Mathe-
ran, Neral-Thakurwadi, 2 July, 1959, *Irani* 4180 (BLAT), 22 July, 1959, *Irani* 4247 (BLAT). Thane : Vagreswari, R. F. Bhiwandi Range, 24 July 1968, *Billore* 11635; Near Ganja village. Dahisar range, 15 Sept. 1968, *Billore* 116716 (CAL & BSI); Arnala Island, Fort, Mandvi, 1 range, 17 Jan. 1968, *Billore* 113618 (CAL & BSI); Tansa river bridge, near Amboli, Bhiwandi range 19 July 1968, *Billore* 116205 (CAL & BSI); Shahapur Forest Res. Garden, 23 June, 1967, *Billore* 111096 (BSI); Near Jawhar, 1 Sept. 1967, *Billore* 111666 (BSI). Tungar, Shivan-sai, 28 July, 1960, *Das* 1521, 1522 (BLAT), Mandvi, 9 July 1961, *Das* 3350 (BLAT), Chandip, 20 July, 1961, *Das* 3403 (BLAT). Poona : Khandala, Monkey Hill Plat. 6 Aug. 1944, *Santapau* 4660 (BLAT), 13 July, 1946, *Santapau* 9247 (BLAT). Battery Hill Plat. 21 July 1945, *Santapau* 6791 (BLAT). Nasik : Peine, 11 July 1967, *Cherian* 111126 (BSI); Sawarna valley down Gujarat border, 16 July 1967, *Cherian* 111207 (BSI). Sholapur hill range side along Rly. line, 16 Sept. 1962, *Rao* 81499 (BSI). Sholapur near Hipparga, 20 July, 1957, *Jain* 19988 (BSI). TAMIL NADU : Nilgiris : Nilgiri, *Schimid* s.n. (Acc. no. 402378-mixed with *P. amarus*). Tiruchirapalli, Uppliyapuram, 30 Oct. 1959, *Sebastine* 7068. Madras : Museum Compound, July 1910, *Hooper* s.n. (BSIS Acc. No. 27073). KARNATAKA : North Kanara : Carwar, July 10, 1883, *Talbot* 537. DIU. Nagoa, creek along sea shore, 17 Sept. 1964, *Rao* 102425 (CAL & BSI), rocky creek opposite Airport, 20 Sept. 1964, *Rao* 102693 (CAL & BSI). Castle area, sandstone ditch near sea shore, 18 Sept. 1964, *Rao* 102592 (CAL & BSI). DAMAN : Nagar-Haveli, Morlehal, 9 Nov. 1970, *Ansari* 126758 (BSI). LAKSHADWEEP ISLANDS : Minicoy, 5 Dec. 1891, (H.M.I.M. Investigator) s.l. & n. (Acc. no. 402380). PAKISTAN : Punjab (Herb. Ind. Or Hook. fil. & Thomson), *Thomson*, *T* s.n.—Type Collection. N.W. Frontier Prov. Malakand, Oct. 1910, *Sydney Toppin* 2044. HERB. CAL-W : '*Ph. urinaria*' (Bengalia inferior, *Wallich*) : Wall. Cat. 7893F (left hand specimen). *Specimens examined* (Microfische) : HERB. G-DC : Panjab (Herb. Ind. Or Hook. fil. & Thomson), *Thomson* s.n.—Type Collection; '*Ph. urinaria*' p.p. (Bengalia inferior, *Wallich*) : Wall. Cat. 7893F; Calcutta, *Wallich*, s.n. (All bear label-*Ph. niruri* & *scabrellus* Muell.-Arg. DC. Prodr.

15. 2. 406 358). HERB. K-W : '*Ph. niruri*'
Herb. Roxb. : Wall. Cat. 7895A (annotated
as *P. niruri* by J. D. Hooker) ; '*Ph. nirori*'
Herb. Ham. (Gangachora, 20 July 1809) :
Wall. Cat. 7895C *p.p.* (Lefthand top—
2 specimens).

ACKNOWLEDGEMENTS

We are thankful to the authorities of
Blatter Herbarium, Bombay, National
Botanical Research Institute, Lucknow,

Department of Botany, University of Delhi,
Delhi, for facilities to consult their herbaria,
and to British Museum (Natural History),
London, Smithsonian Institution, Washing-
ton, DC, Arnold Arboretum and Gray
Herbarium of Harvard University, Cam-
bridge, Mass., and Herbarium Jutlandicum,
University of Aarhus, Denmark, for loan of
herbarium specimens. Shri D. P. Saha has
helped in the preparation of illustrations.