

THE GENUS *SCLERIA* BERG. IN INDIA

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ABSTRACT

The paper presents a revision of the genus *Scleria* Berg. in India. It includes an account of 23 species and 3 varieties, with key to identification, correct names, synonyms, selected references, detailed descriptions, illustrations and other notes.

The present revision of the genus *Scleria* Berg. is part of a programme to revise the family Cyperaceae for Flora of India. The genus belongs to the tribe Sclerieae of the family and is readily recognised by rather large, about 2 - 4 mm long nuts, with usually white glistening crustaceous pericarp, frequently a well evolved hypogonium and complete absence of perianth. There are 3 - 6 glumes subtending and partly enveloping each nut. The genus *Diplacrum* R. Br., mainly distinguished by having only two glumes enveloping the nut and which fall off with it, is differently treated by various cyperologists as distinct from *Scleria* or synonymous with it. In India it is represented by the widely distributed *D. caricinum* R. Br., and probably *D. africanum* Clarke in Maharashtra. These species have not been included here.

For the present studies, specimens deposited in the Central National Herbarium, Botanical Survey of India, Howrah, all the Regional Herbaria of the Botanical Survey of India at Allahabad, Coimbatore, Dehra Dun, Ganktok, Itanagar, Port Blair, Pune and

Shillong, the Herbaria of the Forest Research Institute, Dehra Dun, State Forest Research Institute, Jabalpur, National Botanical Research Institute, Lucknow and Maharashtra Association for Cultivation of Science, Pune, were examined. Some Type specimens, original descriptions and other historical/authentic materials were also examined as per availability to solve some taxonomic confusions.

The results have been presented in the form of generic description, key to the species, detailed illustrated account of 23 spp., their distribution and miscellaneous notes. The nomenclatural paragraph contains correct name, basionym if any, and only those other synonyms which have been used as correct names in earlier major Indian Floras.

Some of the commonly used characters in classification of *Scleria* and identification of its species are the annual or perennial habit which is often difficult to judge in the herbarium specimens lacking underground parts; the development of wings on the leaf-sheaths which varies in degrees even on the same stem or stems from the same rootstock. Hence, these characters should be utilised with some degree of restraint. More dependable characters are the sexuality of the

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spikelets, and the various combinations it offers like all bisexual, or bisexual and male, or female and male, the development and shape of the hypogynous disk or its lobes, and sculpturing of the nut surface. However, even here, sometimes the variations recorded are so confusing that it becomes almost obligatory to study live populations. It is also observed in some species that the sculpturing of the nut disappears, becomes faint or more pronounced with maturity. However, the kind of sculpturing, when present, normally does not vary within the same species. For example, the cancellate nuts of *S. biflora* or *S. terrestris* may become more or less smooth but never rugulose or lacunose. Thus, in identification of *Scleria* species, a combination of a few characters is more useful and generally employed.

There is almost no record of economic utility of any significance for any of the Indian species of *Scleria*. However, Kern (l.c.) reports that in Malesian region, the leaves of *S. poaeformis* are sometimes used for making mats, the very young fragrant plants of *S. biflora* and lemon-scented leaves of *S. pergracilis* are sometimes eaten, and the leaves of *S. pergracilis* are used as a remedy against fever and some foot and mouth diseases.

An analysis of the distribution of the Indian species show that these generally range in distribution from Tropical Africa to China, Japan, South East Asia and Australia. While *S. pergracilis*, *S. lithosperma*, *S. corymbosa*, *S. levis*, *S. benthamii*, *S. oblata*, *S. foliosa*, *S. terrestris*, *S. psilorrhiza*, *S. sumatrensis*, *S. poaeformis*, *S. tessellata*, *S. biflora*, *S. parvula* and *S. rugosa* have a very wide distribution, *S. alta*, *S. scrobiculata*, *S. purpurascens* and *S. neesii* are much restricted. *S. borii*, *S. assamica*, *S. terrestris* var. *hookeriana* and *S. terrestris* var. *thomsoniana* are endemic to North East India and *S. stocksiana* is endemic to Central and South West India, *S.*

benthamii, *S. sumatrensis*, *S. alta*, *S. purpurascens* and *S. assamica* are known in India from a very few century old collections. These could be extinct in India or may be that recent collections have not been made in their area of occurrence. The genus is almost absent or little represented in dry North West India.

When compared with the earlier account of the Indian species of the genus *Scleria* by C. B. Clarke in J. D. Hooker's Flora of British India (Vol. 6 : 685—694. 1894), it is seen that *S. borii* has been added as a new species, and *S. foliosa*, *S. neesii*, *S. scrobiculata*, *S. purpurascens* and *S. psilorrhiza* as new records for the present day Indian political boundaries. *S. ridleyi*, *S. radula*, *S. elata*, including var. *latior* and var. *decolorans*, *S. melanostoma*, *S. hebecarpa* var. *pubescens*, *S. chinensis* var. *biauriculata* and *S. multifoliata* var. *filosula* recognised by Clarke as distinct taxa have been relegated to synonymy. The circumscription/understanding of *S. levis*, *S. tessellata*, *S. zeylanica* and *S. terrestris* have been clarified. *S. hookeriana* Boeck. and *S. thomsoniana* Boeck. have been reduced as varieties of *S. terrestris*. Further, in accordance with the International Code and while solving some taxonomic confusions, name changes have occurred for *S. oryzoides*, *S. multifoliata*, *S. hebecarpa*, *S. khasiana*, *S. flaccida* and *S. lithosperma* var. *roxburghii*. *S. bracteata* var. *assamica* has been elevated to species level. *S. caricina* is considered as belonging to a distinct genus *Diplacrum* R. Br.

SCLERIA Berg.

Sv. Vet-akad. Handl. 26 : 142. 1765 ; Benth. in B. & H., Gen. Pl. 3 : 1070. 1883 ; C. B. Clarke in Hook. f. Fl. Brit. India 6 : 685-694. 1894 ; Prain, Bengal Pl. 1903 (repr. ed. 2 : 852-853. 1963) ; Cooke, Fl. Pres. Bombay 2 : 902-905. 1908 ; Haines, Bot. Bihar & Orissa 3 : 930-933. 1924 ; Parker & Turill in

Duthie, Fl. Upper Gangetic Plain 3 : 367-369. 1929; Fischer in Gamble, Fl. Pres. Madras 3 : 1675-1678. 1931; Nelmès in Kew Bull. 10 : 415-453. 1955 *et ibid.* 11 : 73-111. 1956; Kern in Steenis, Fl. Males. ser. 1. 7 : 722-751. 1974; Robinson in Kew Bull. 18 : 487-551. 1966; Rao & Verma, Cyper. N. E. India 55-62. 1982; Tucker in J. Arn. Arb. 68 : 420-422. 1987—NUT-RUSH.

Type : *Scleria flagellum-nigrorum* Berg.

Erect or scrambling annual or perennial herbs, usually monoecious. Leaves linear, 3-ranked; sheaths sometimes winged, its mouth opposite the leaf blade, truncate or produced into a contraligule (ligule, antiligule, pseudoligule). Inflorescence spicate, capitate, or an interrupted panicle consisting of a terminal and usually also of one to several partial panicles. Spikelets bisexual or unisexual; bisexual spikelets : lower 3-4 glumes empty, next containing the pistil, next upper enclosing an empty glume and a branch bearing several glumes containing stamens; unisexual spikelets : lower 3-4 glumes empty, pistil absent in the males, staminate part absent or represented by 1-2

empty glumes in the females. Flowers unisexual. Perianth absent. Stamens 2-3. Style continuous with the ovary, caducous, the base sometimes persistent; stigmas 3. Nuts (achenes) globose, ellipsoid or ovoid, terete or trigonous, with a crustaceous generally glistening white pericarp, smooth or variously sculptured, sometimes bluish or discoloured, borne on a gynophore (cupula) which is dilated above into a hypogynous disk adhering to the ripe nut.

About 220 species mainly pantropical; 23 species in India, with larger concentration in the north-east, east and south India, from sea-level to about 1800 m, in open or partly shaded secondary forests. The Indian species range in distribution from Tropical Africa to China, Japan, South-East Asia and Australia.

The name *Scleria* has been derived from the Greek word 'skleros', harsh, the culm of the Type species being bound together into whips for beating slaves in Surinam; often incorrectly said to be derived from Greek 'skleria', tough, in reference to the nut walls (Tucker, *l.c.* 420).

KEY TO THE SPECIES

- | | | |
|---|-----|--------------------------|
| 1a. Glumes with long spreading hairs | ... | 2 |
| b. Glumes glabrous or minutely appressed hairy | ... | 3 |
| 2a. Spikelets in a solitary terminal globose cluster; nut stellately hairy; disk absent | ... | 17. <i>S. neesii</i> |
| b. Spikelets in more than one terminal and axillary clusters; nut glabrous; disk well developed, 3-lobed | ... | 22. <i>S. rugosa</i> |
| 3a. Inflorescence devoid of foliaceous bracts | ... | 4 |
| b. Inflorescence, at least in lower parts, with foliaceous bracts | ... | 5 |
| 4a. Inflorescence unbranched, spike-like (rarely with 1-2 branches at the base); spikelets in clusters | ... | 1. <i>S. pergracilis</i> |
| b. Inflorescence a profusely branched panicle; spikelets solitary | ... | 16. <i>S. poaeformis</i> |
| 5a. Partial panicles very loose, its primary axis bearing only a few branches with widely spaced clusters of spikelets; nut trigonous with three basal ferrugineous depressions | ... | 2. <i>S. lithosperma</i> |
| b. Partial panicles, disks and nuts not as above | ... | 6 |
| 6a. Partial panicles corymbosely branched; disks obsolete | ... | 3. <i>S. corymbosa</i> |
| b. Partial panicles racemosely branched; disk well developed or reduced to a narrow band | ... | 7 |

7a. Middle leaves and lower bracts in clusters of 2—5	...	8
b. Leaves and bracts all scattered	...	11
8a. Disk cyathiform or cupular, slightly undulate or 3—lobed with division of the lobes reaching less than half-way down, its margins throughout crenulate-lobulate	...	9
b. Disk neither cyathiform nor cupular, distinctly 3—lobed with division of the lobes reaching more than half-way down, its margins entire or toothed only at the tip	...	10
9a. Nuts about 3 mm long, its surface prominently lacunose with deep rounded pits	...	12. <i>S. assamica</i>
b. Nuts about 2 mm long, its surface superficially cancellate with faint rectangular pits	...	13. <i>S. sumatrensis</i>
10a. Leaves usually glabrous; nuts exserted from the glumes, deeply scrobiculate (rarely smooth), always white	...	14. <i>S. scrobiculata</i>
b. Leaves often with long white hairs beneath; nuts included within the glumes, superficially cancellate, at first whitish, soon discolouring to purplish black	...	15. <i>S. purpurascens</i>
11a. Annuals; terminal partial panicle pseudolateral due to erect posture of the uppermost bract, laterals on stout, often recurved, peduncles	...	23. <i>S. rugosa</i>
b. Perennials or annuals; inflorescence not as above	...	12
12a. Disk well developed, fleshy, plicate, irregularly lobulate, with whitish reticulations on a blackish-brown background	...	8. <i>S. alta</i>
b. Disk not as above	...	13
13a. Nuts rugose; disk lobes subquadrate, apiculate	...	9. <i>S. foliosa</i>
b. Nuts smooth or reticulate, or with rectangular or oval pits, never rugose; disk lobes various	...	14
14a. Nuts smooth or faintly reticulate — areolate	...	15
b. Nuts with prominent pits more or less in vertical rows	...	20
15a. Disk reduced to a narrow band; nut slightly laterally compressed, obtuse	...	23. <i>S. annularis</i>
b. Disk well developed, distinctly 3—lobed; nuts terete or trigonous, usually apiculate	...	16
16a. Leaves sometimes premorse in the apical part; contraligule with a yellowish cartilaginous margin; nuts 3—3.7 mm long	...	11. <i>S. psilorrhiza</i>
b. Leaves never premorse; contraligule with a brown scarious margin; nuts often smaller	...	17
17a. Nuts oblate, broader than long	...	18
b. Nuts ovoid-globose, as long as broad or longer	...	19
18a. Disk lobes oblong, rounded at the top	...	6. <i>S. oblata</i>
b. Disk lobes lanceolate with a acute tip	...	7. <i>S. borii</i>
19a. Disk lobes lanceolate, reaching about half way up of the nut, acute or bidentate at the tip	...	4. <i>S. levis</i>
b. Disk lobes hemispherical or broadly oblong — ovate, scarcely reaching about one-third way up of the nut, rounded or obtuse at the tip	...	10. <i>S. terrestris</i>
20a. Disk lobes hemispherical or subquadrate, rounded or truncate at the top	...	21
b. Disk lobes lance-ovate or oblong with subobtuse, acute or acuminate tip	...	22
21a. Annuals; disk lobes subquadrate; nuts obtuse	...	18. <i>S. tessellata</i>
b. Perennials; disk lobes hemispherical; nuts apiculate	...	10. <i>S. terrestris</i>
22a. Nuts obtuse	...	5. <i>S. benthamii</i>
b. Nuts beaked or apiculate	...	23

- 23a. Nuts globose, cancellate with almost square pits in vertical rows, ferrugineous hairy on the walls between the pits; beak capillary, mostly purplish black, rarely white ... 20. *S. biflora*
 b. Nuts and beak not as above ... 24
- 24a. Disk lobes lanceolate, acuminate, with reddish brown striations ... 19. *S. stocksiana*
 b. Disk lobes ovate-oblong, acute or subobtusate, without red-brown striation ... 21. *S. parvula*

1. *Scleria pergracilis* (Nees) Kunth, Enum. Pl. 2 : 354. 1837; Clarke, l.c. 685; Prain, l.c. 853; Haines, l.c. 931; Kern, l.c. 743; Rao & Verma, l.c. 56. *Hypoporum pergracile* Nees in Edinb. New Phil. Journ. 17 : 267. 1834. (Figs. 1a-c).

Slender tufted annuals, 25-60 cm tall. Leaves shorter than the stem, 0.5-2 mm broad; sheaths glabrous or hairy, its mouth truncate or with a small membranaceous contraligule. Inflorescence spiciform, unbranched (rarely with 1-2 short branches), 4-15 cm long, consisting of 5-22 glomerules of spikelets on a smooth or hispidulous rhachis; bracts glumaceous. Spikelets 2-5 in each glomerule, bisexual, 2.5-3.5 mm long. Glumes oblong-obovate, acute, brown, red streaked with a green midrib, longest 2.5-3 mm. Stamens 2; anthers ca 0.8 mm long. Hypogonium stipe-like, triquetrous, ca 0.5 mm long. Nuts subterete, broadly obovoid, apiculate, 1.2-1.8 mm long, greyish white, lacunose, and tuberculate, especially towards the top.

Widely distributed : 200-2000 m.

Fl. & Fr. : Aug.-Oct.

INDIA : Uttar Pradesh—Duthie 5008 (DD), Strachey & Winterbottom (CAL acc. no. 511909); Bihar; W. Bengal—Kurz (CAL acc. no. 511907); Assam; Nagaland—Bor 22286 (ASSAM); Orissa—Mooney 2790, 3683 (DD); Madhya Pradesh—V. J. Nair 8247 (BSA), Mooney 1927, Lawrie (DD); Maharashtra; Karnataka; Kerala. TROPICAL AFRICA, SRI LANKA, CHINA, S. E. ASIA.

The unbranched slender spike bearing several glomerules of spikelets subtended by only glumaceous bracts would easily

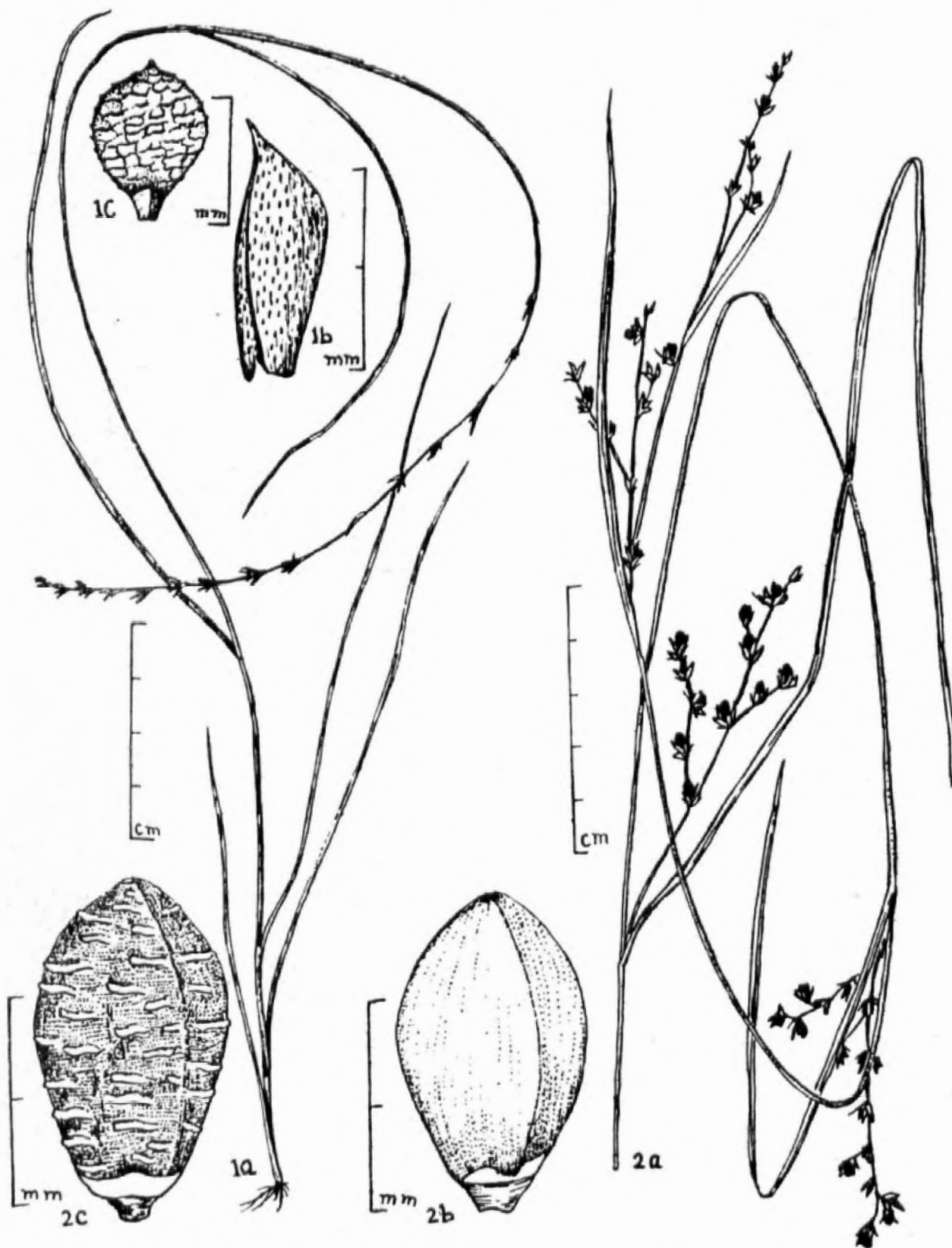
identify this species. Kern (l.c.) reports that in Java a decoction of this species is medicinally used for cough and fever, and the lemon-scented leaves are used to drive away mosquitoes.

2. *Scleria lithosperma* (L.) Sw., Prodr. 18. 1788; Clarke, l.c. 685; Prain, l.c. 852; Cooke, l.c. 903; Haines, l.c. 931; Fischer, l.c. 1677; Kern, l.c. 740; Rao & Verma, l.c. 56. *Scirpus lithospermus* L., Sp. Pl. 51. 1753. *Scleria lithosperma* var. *multispiculata* Govindarajulu in Proc. Ind. Acad. Sci. Sect. B. 71 : 221. f. 1a-b. 1970. (Figs. 2a-c).

Slender perennials, 30-90 cm tall. Rhizome shortly creeping. Leaves all scattered or a few middle ones sometimes aggregated, 1-5 mm broad, glabrous or pubescent; sheaths wingless, frequently hairy; contraligule ovate, 1-2 mm long; frequently hairy. Inflorescence paniculate, very loose, lateral partial panicles 2-3, solitary in each axil, its branches almost spiciform with a few distant clusters of spikelets. Spikelets solitary or usually in clusters of 2-7 (-16), bisexual (sometimes a few male), 2-7 mm long, with one female and few to several male flowers. Glumes mucronulate, brown. Stamens 1-2; anthers 1-1.5 mm long. Disk reduced to a narrow brown minutely glandular band. Nuts ovoid-oblong, trigonous, umbonulate, 2-3 × 1.5-2 mm, smooth, white or sometimes discoloured, with three prominent pits at the base which are rugulose by minutely glandular ferrugineous ridges.

Common throughout except the north-west region, 50-1500 m.

Fl. & Fr. : Throughout the year.



Figs. 1-2: 1a-c. *Scleria pergracilis* (Nees) Kunth. 1a. habit. 1b. glume. 1c. nut. (Bor 22286). 2a-c. *S. lithosperma* (L.) Sw. 2a. habit. 2b. nut (Chakraborty 5518). 2c. *S. lithosperma* var. *linearis* Benth.—nut (Lawrie 5518).

INDIA : Bihar—*Watt* 9242 (CAL, DD) ; W. Bengal ; Sikkim ; Meghalaya ; Orissa ; Madhya Pradesh—*Lawrie* 988 (CAL) ; Maharashtra—*Dhruva* 42, *Sedgwick* 6531 (CAL) ; Goa ; Andhra Pradesh ; Karnataka—*Hook. f. & Thom.* (CAL acc. nos. 511935, 511938) ; Tamil Nadu ; Kerala—*Rama Rao* 1691, 2095 (CAL) ; Andaman & Nicobar Isles—*Bhargava* 5046, *Chakraborty* 5581, 6013, N. G. *Nair* 1649, 4473 (PBL), *King* 231 (CAL). PANTROPICAL.

var. *linearis* Benth., Fl. Austr. 7 : 430. 1878 ; Kern, l.c. *Scleria lithosperma* var. *roxburghii* Clarke, l.c. 686 ; Haines, l.c. ; Fischer, l.c.

Nut surface rugulose by transversely undulate ferrugineous ridges.

INDIA : Bihar—*Kurz* (CAL acc. no. 511958) ; Madhya Pradesh ; Maharashtra—*Lawrie* 9881 (DD) ; Andhra Pradesh ; Tamil Nadu—*Bourne* (CAL acc. no. 511958). SRI LANKA, S. E. ASIA.

var. *muricata* Govindar. in Proc. Ind. Acad. Sci. Sect. B. 71 : 222. f. 1c. 1970.

Nuts muricate.

INDIA : Kerala—Pallathadka, *Krishnamurthy* 9512, n.v. ENDEMIC.

3. *Scleria corymbosa* Roxb., Fl. Ind. 3 : 574. 1832 ; Clarke, l.c. 686 ; Fischer, l.c. 1677 ; Kern, l.c. 740 ; Rao & Verma, l.c. 57. *S. corymbifera* Boeck. in Linnaea 38 : 537. 1874. *S. ridleyi* Clarke, l.c. 686. (Figs. 3a-c).

Usually stout perennials, up to 2.5 m tall. Rhizome creeping. Leaves 7-25 mm broad ; sheaths smooth or scaberulous ; contraligule ovate, with a prominent brown scarious margin. Inflorescence paniculate, usually copious, up to 75 cm long, lateral partial panicles solitary or 2-3 together, densely corymbosely branched ; peduncles stout, up to 10 cm long.

Spikelets bisexual and male, 4-5 mm long. Glumes ovate-lanceolate, acute or mucronulate, stramineous, brown striolate. Stamens 3 ; anthers ca 2 mm long. Disk a narrow reddish brown triangular band. Nuts ovoid, obtusely trigonous, with 3 shallow depressions at the base, 3-4 × 2-2.5 mm, glistening white or sometimes discoloured.

Widely distributed ; 100-1500 m.

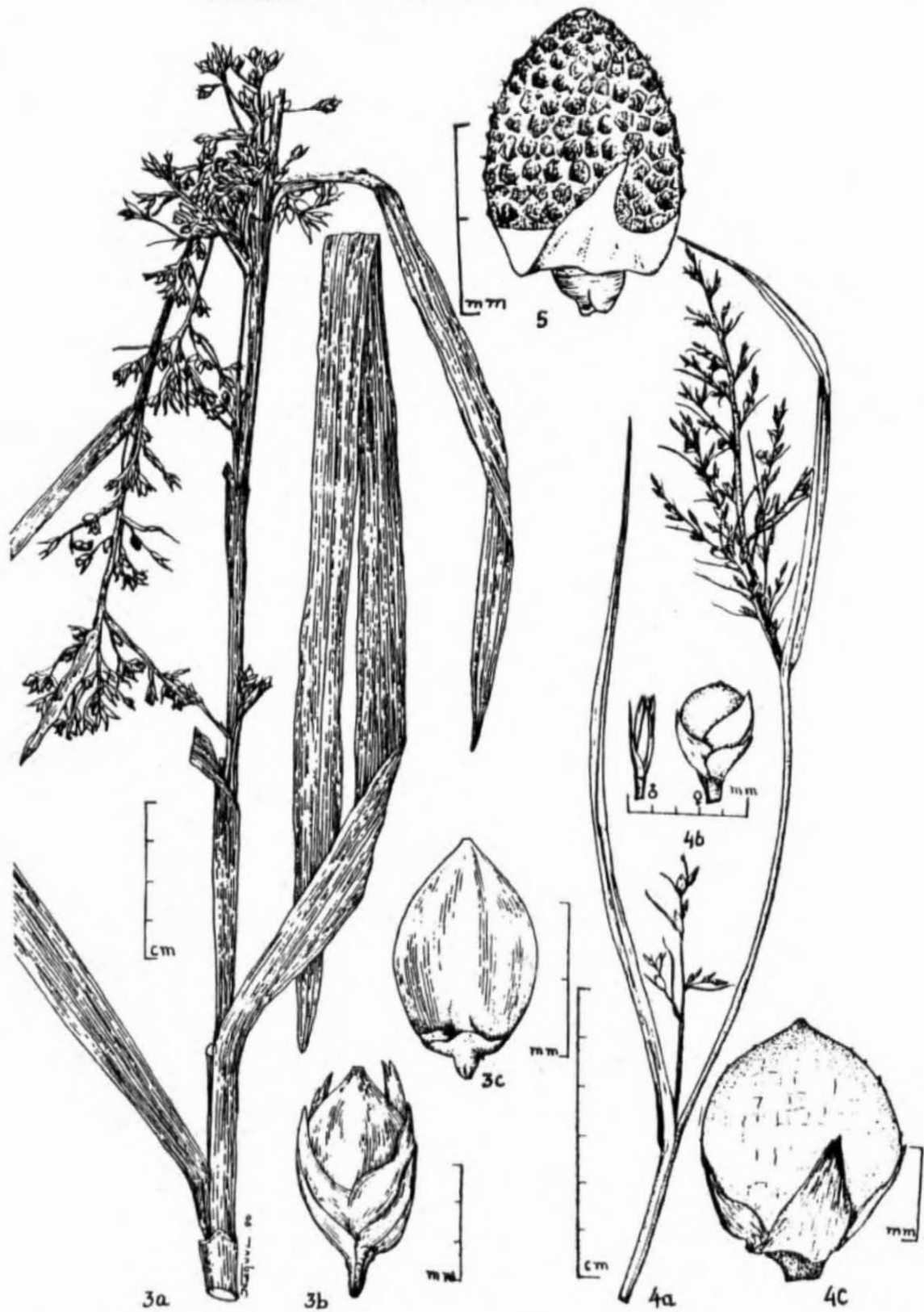
Fl. & Fr. : July-Feb.

INDIA : Uttar Pradesh—*Sri Ram* 46397 (DD) ; Meghalaya—*Hook. f. & Thom.* (CAL) ; Madhya Pradesh ; Maharashtra ; Karnataka ; Andhra Pradesh ; Tamil Nadu—*Narayanswamy* 629 (CAL) ; Kerala—*Narayanswamy* 1355 (CAL). CHINA, S. E. ASIA, SRI LANKA.

It is the only Indian species with corymbosely branched partial panicles.

4. *Scleria levis* Retz., Obs. 4 : 13. 1786 ; Kern, l.c. 732 ; Rao & Verma, l.c. 58 ; non Clarke. *S. hebecarpa* Nees in Wt. Contr. Bot. Ind. 117. 1834 ; Clarke, l.c. 689 ; Prain, l.c. 853 ; Cooke, l.c. 904 ; Haines, l.c. 932 ; Parker & Turill, l.c. 368 ; Fischer, l.c. 1677. *S. pubescens* Steud., Syn. Pl. 2 : 168. 1855. *S. hebecarpa* var. *pubescens* (Steud.) Clarke, l.c. (Figs. 4a-c).

Perennials, 0.3-1 m tall. Leaves 4-8 mm broad, glabrous or hairy ; sheaths triquetrous or broadly winged, scabrous on angles ; contraligule short, rounded, with a scarious triangular appendage. Inflorescence paniculate ; rhachis hispidulous ; lateral partial panicles 1-2 only, sometimes almost spike-like. Spikelets unisexual, 3-6 mm long. Glumes stramineous-brown, acute or mucronulate. Stamens 3 ; anthers 1-2 mm long, tip setose. Disk deeply 3-lobed, lobes thin, lanceolate, 1-1.5 mm long, brown, acute or notched. Nuts ovoid-globose, subterete, apiculate, 2-2.5 mm long, glossy white, smooth



Figs. 3-5: 3a-c. *Seleria corymbosa* Roxb. 3a. habit. 3b. spikelet. 3c. nut (Narayanswamy 629). 4a-c. *S. levis* Retz. 4a. habit. 4b. spikelets. 4c. nut (Verma 87865). 5. *S. benthamii* Clarke—nut (Clarke 44618A).

or faintly transversely rugulose, hairy or glabrescent.

INDIA : Uttar Pradesh—*T. A. Rao* 5599, 11628 (BSD); Bihar-Chandra 34171, *Srivastava* 20803 (LWG), *Kurz* (CAL acc. no. 512089); W. Bengal : Sikkim—*Clarke* 11893 (CAL); Assam—*Deka* (ASSAM acc. nos. 31681, 31682), *A. S. Rao* 38781, 47656, 39138, *Balakrishnan* 39397, *Anon.* 14084 (ASSAM), *Bor* 15906, 16103, 16331 (DD); Meghalaya—*Deka* 12408, 12630, 15078, 21592, *Verma* 37865 (ASSAM); Arunachal Pradesh—*Bor* 80 (DD), *Bor* 15079 (ASSAM); Nagaland—*Clarke* 41553 (CAL), *Bor* 18188 (DD); Manipur; Orissa; Madhya Pradesh—*Jain* 3030, *Murti* 19249, *V. J. Nair* 25680, *Panigrahi* 4465, *Sen Gupta* 14357, 15987, *Verma* 25045 (BSA); Maharashtra—*Ryan* 716 (BSI); Goa—*R. S. Rao* 84676, *Singh* 124749 (BSI); Andhra Pradesh—*Ramaswamy* 1534 (CAL); Karnataka—*Talbot* 1694 (DD); Tamil Nadu—*Arora* (DD); Kerala—*Meebold* 403 (CAL); Andaman & Nicobar Isles—*Helfer* 6117 (CAL). CHINA, EAST & SOUTH EAST ASIA, AUSTRALIA.

One of the most common and widespread among the Indian *Scleris* and readily distinguished by almost smooth ovoid globose nuts with lanceolate disk lobes. Blake (in *J. Arn. Arb.* 35 : 226. 1954) has shown that *S. levis* Retz. and *S. hebecarpa* Nees are conspecific. Hence, he gave a new name, *S. oblata* Blake, for the plants commonly known in the Indian Floras as *S. levis* Retz. (*laevis*, *sphalm*).

Rhizomes are reportedly used for digestive disorders.

5. *Scleria benthamii* Clarke in *Kew Bull. Addl. Ser.* 8 : 58. 1908; Kern, *l.c.* 732; Rao & Verma, *l.c.* 61. *S. khasiana* Clarke in *Hook. f., Fl. Brit. Ind.* 6 : 692. 1894; non Boeck. 1890. (Fig. 5).

Perennials, 30-80 cm tall with stout creeping rhizomes. Leaves 2-5 mm broad; sheaths

wingless or broadly winged, glabrous or hairy; contraligule short, rounded. Inflorescence paniculate; terminal partial panicle 2-5 cm long, laterals solitary or binate, sessile or shortly peduncled; lower bracts foliaceous, subequalling the panicle. Spikelets unisexual, 3-5 mm long. Glumes ovate-lanceolate, acute-mucronulate, brown. Stamens 3; anthers ca 2 mm long, apiculate. Disk deeply 3-lobed, lobes thick, ovate-lanceolate, acute, ca 1 mm long. Nuts ovoid-oblong, faintly trigonous, 3-3.5 × 1.5-2 mm, rounded at the top, obtuse or sometimes umbonulate, white, sparsely hairy or glabrescent, cancellate with shallow rectangular depressions.

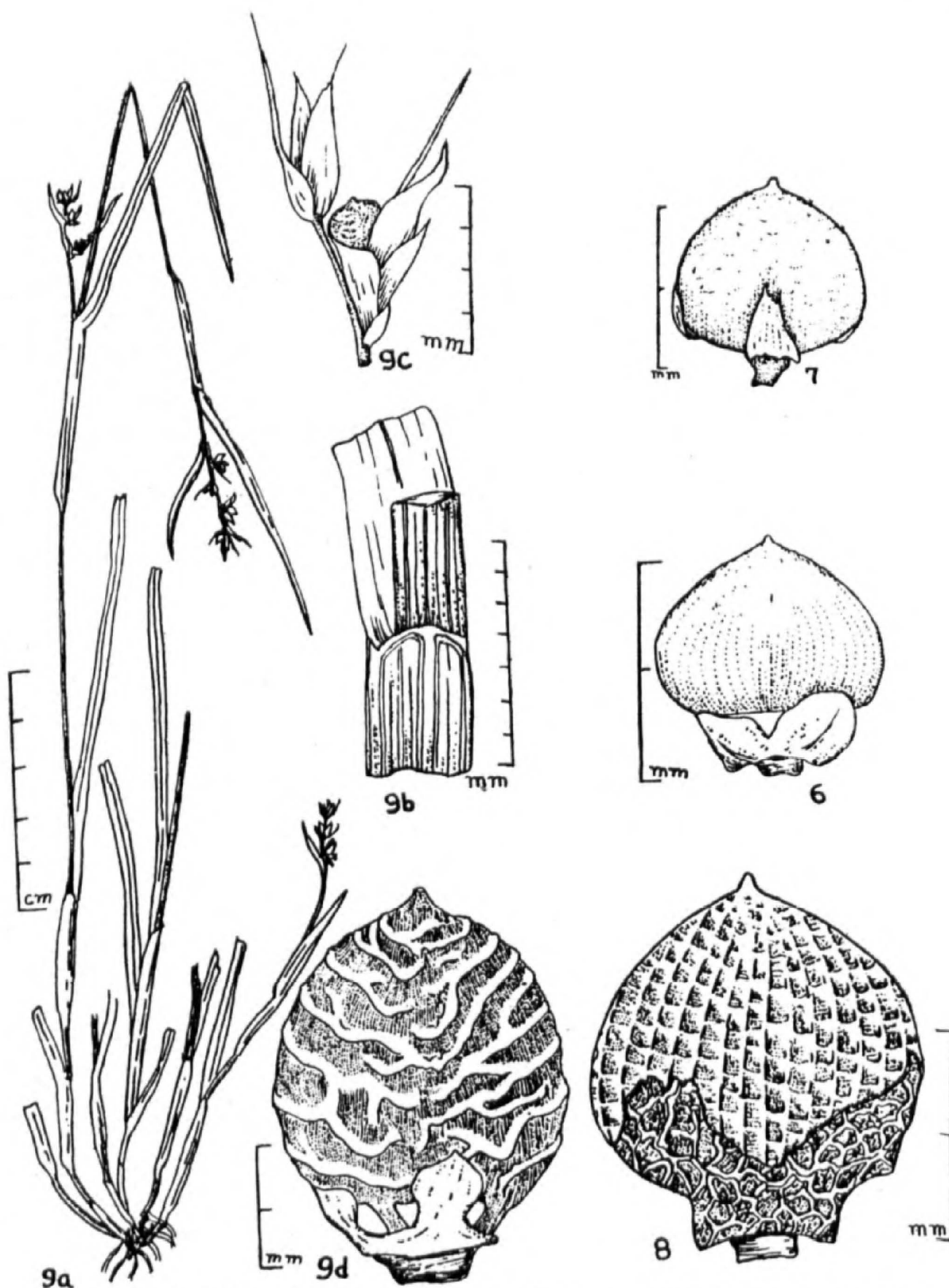
Fl. & Fr. : Sept.

INDIA : Meghalaya-Shillong, *Clarke* 44613A (K). S. E. ASIA, AUSTRALIA.

Clarke (in *J. Linn. Soc. Bot.* 34 : 102. 1898) states that it is frequent in the Khasi hills (Meghalaya) at 4500-6000 feet, and cites four of his own collections, viz. *Clarke* 40052, 44613, 44683, 44798. However, there does not appear to be any subsequent collection.

6. *Scleria oblata* S. T. Blake in *Blumea* 11 : 219. 1961; Kern, *l.c.* 733; Rao & Verma, *l.c.* 62. *S. levis* (non Retz.) Willd., *Sp. Pl.* 4 : 314. 1805 (*laevis*); *Clarke*, *l.c.* 694; *Fischer*, *l.c.* 1678. (Fig. 6).

Perennials, usually erect, 0.5-1 m tall, sometimes scrambling over bushes and up to 4 m tall. Leaves 4-10 mm broad, middle approximate; sheaths wingless, glabrous or puberulous; contraligule ca 1 mm long, ciliate. Inflorescence paniculate; lateral partial panicle solitary or binate. Spikelets unisexual, brown, 3.5-4.5 mm long; male shortly peduncled. Glumes acute-mucronulate, ciliate. Disk 3-lobed; lobes broadly ovate-rounded, obtuse, 1-1.2 mm long, stramineous, entire or slightly toothed. Nuts depressed globose, broader than long, 2-2.5 × 2.5-2.8 mm, apiculate, smooth or sometimes wrinkled with age, young with a blackish tinge, mature glossy white,



Figs. 6-9: 6. *Scleria oblata* S. T. Blake—nut (Balakrishnan 486). 7. *S. boru* Verma—nut (Bor 17808). 8. *S. alta* Boeck.—nut (Hook.f. & T.—CAL acc. no. 512132). 9a-d. *S. foliosa* Hochst, ex A. Rich. 9a. habit. 9b. leaf-sheath. 9c. spikelets. 9d. nut (Meerbold 9491).

In plains and low hills ; 50-200 m.

Fl. & Fr. : Sept.-Feb.

INDIA : Assam - *Masters* (ASSAM) ; Andaman & Nicobar Isles - *Balakrishnan* 486 (PBL), *Kurz* (CAL acc. no. 512347). CHINA, S. E. ASIA.

The oblate nuts with rounded disk lobes are distinctive features of this species.

7. *Scleria borii* Verma in Bull. Bot. Surv. Ind. 29 : 14. 1989. (Fig. 7).

Perennials, *ca* 1.2 m tall. Stem triquetrous, retrorsely scabrous on the angles. Leaves 5-10 mm broad, margins and ribs scaberulous above ; sheaths winged ; contraligule rotundate, with a brown scarious margin. Inflorescence paniculate, *ca* 30 cm long ; bracts lower 3 foliaceous, equalling the panicle, upper setaceous ; lateral partial panicles solitary, on slender pubescent peduncles. Spikelets unisexual, male long pedicelled. Glumes stramineous, densely red brown striolate, male elliptic oblong, 2.5-3 mm long, acute or mucronate, female ovate, 2.5-4 mm long, acute or aristate, pubescent or glabrescent. Disk 3-lobed almost to the base, lobes lanceolate, appressed, thin stramineous, red brown striolate, denticulate-crenulate at the apex. Nuts oblate, *ca* 2 × 2.3 mm, white, apiculate, with faint reticulate markings, glabrous or sparsely hairy, subtruncate at the base.

Fl. & Fr. : Sept.

INDIA : Manipur, Kangpokpi, *Bor* 17808 (DD). ENDEMIC.

The shape of the nut is very similar to that of *S. oblata* but the disk lobes are entirely different being akin to those of *S. levis*.

8. *Scleria alta* Boeck. in Linnaea 38 : 485. 1874 ; Clarke, *l.c.* 690. (Fig. 8).

Perennials, *ca* 1.2 m tall. Stems scabrid on the angles. Leaves 3-6 mm broad, acuminate ; sheaths broadly winged, the wings often denticulate ; contraligule ovate, glabrous.

Inflorescence paniculate ; lateral partial panicles solitary ; peduncles almost absent or up to 3 cm long. Spikelets unisexual, 4-5 mm long. Glumes ovate-lanceolate, acute or mucronulate, stramineous, brown striolate. *Stamens* 3 ; anthers *ca* 1.2 mm long, with dark brown setose tip. Disk 3-lobed, pale or dark brown, lobes subtruncate or broadly rounded with uneven margins, reticulately plicate. Nuts subglobose, umbonulate, *ca* 2 mm long and broad, greyish pubescent or glabrous, lacunose, almost smooth at the top.

In lower hills of north-east India.

Fl. & Fr. : Sept.-Oct.

INDIA : W. Bengal ; Assam - *Griffith* (DD) ; Meghalaya - *Hook. f. & Thom.* (CAL acc. no. 512132). BANGLADESH.

A rare species represented by only a few, more than a century old collections. It has the general appearance of a very common species *S. terrestris*, but the disk lobes are very distinctive.

9. *Scleria foliosa* Hochst. ex A. Rich., Tent. Fl. Abyss., 2 : 509. 1851 ; Robinson in Kew Bull. 18 : 525. 1966 ; Hooper in Saldanha & Nicolson, Fl. Hassan, 700. 1976. (Figs. 9a-d.).

Annuals, or perennials with a short rootstock, 15-80 cm tall. Stem smooth or retrorsely scabrous on the angles. Leaves shorter than to equalling the stem, 2-7 mm broad, margins and midrib antrorsely scabrous towards the tip ; sheaths narrowly winged ; mouth truncate or narrowly ovate, membranous-margined, hairy or glabrous. Inflorescence paniculate ; partial panicles solitary or binate, sessile or peduncled. Spikelets unisexual ; males 3.5-4 mm long on *ca* 1 mm long pedicel ; females ovoid, 4-5 mm long. Glumes acute or mucronate, stramineous, brown striolate. *Stamens* 3 ; anthers *ca* 0.8 mm long, apiculate. Disk 3-lobed, almost to the base, lobes oblong, thick, appressed, acute or apiculate, white or pale brown. Nuts ovoid

or sometimes oblong, $2.5-4 \times 2.2-2.5$ mm, umbonulate, white or sometimes discoloured and brownish, glabrous or the young sometimes sparsely hairy, base pitted, surface rugose with several transverse lines and sometimes also with a few small vertical lines in between forming a few scattered pits.

South West India, in open moist places ; 300-900 m.

Fl. & Fr. : Sept.-Nov.

INDIA : Rajasthan - Mt. Abu, *Duthie* 6716 (DD, K) ; Maharashtra-Pune, *Vartak* 1857, 17134, 17136, 17137, 22382, 22418, 22419, 24091, 24102, 24135 (AMN) ; Karnataka-Chickmanglur, *Meebold* 9491 (CAL). TROPICAL AFRICA.

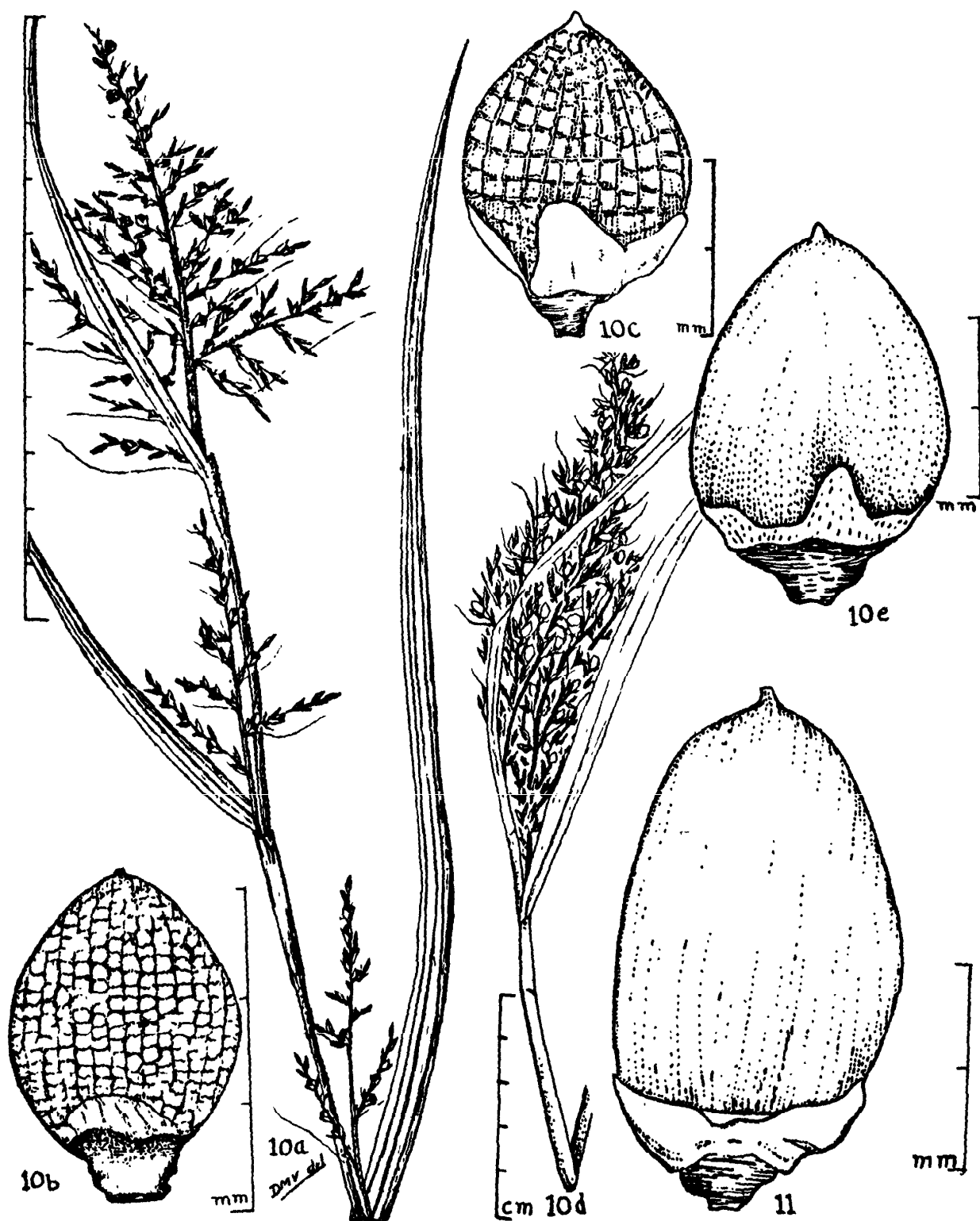
This species has not been described either in Flora of British India or any of the subsequently published Regional Floras of the country. Hooper (*l.c.*) appears to be the first botanist to report it from India. However, the species is not a new introduction to Indian flora. At least the collection of *Duthie* 6716 from Mt. Abu made in Oct., 1889 was available to Clarke while he was revising Cyperaceae for Flora of British India, and he identified it as *S. tessellata* Willd. (*cf.* J. Linn. Soc. Bot. 34 : 97. 1898).

10. *Scleria terrestris* (L.) Fass. in *Rhodora* 26 : 159. 1924. *incl. var. latior* (Clarke) Fass. & *var. decolorans* (Clarke) Fass ; Kern, *l.c.* 733 ; Rao & Verma, *l.c.* 60. *Zizania terrestris* L., *Sp. Pl.* 991. 1753. *Diaphora cochinchinensis* Lour., *Fl. Cochinch.* 578. 1790. *S. radula* Hance in *Ann. Sci. Nat. Bot.* 18 : 232. 1862 ; Clarke, *l.c.* 691. *S. elata* Thw., *Enum. Pl. Zeyl.* 353. 1864 ; Clarke, *l.c.* 690, *incl. var. latior* Clarke and *var. decolorans* Clarke ; Prain, *l.c.* 853 ; Haines, *l.c.* 933 ; Parker & Turill, *l.c.* 368. *S. melanostoma* Nees ex Boeck. in *Linnaea* 38 : 514. 1874 ; Clarke, *l.c.* 692. *S. rinkiana* Boeck., *Cyper. Nov.* 2 : 30. 1890 ; Clarke, *l.c.* 694. *S. chinensis* var.

biauriculata Clarke, *l.c.* 690. *S. cochinchinensis* (Lour.) Druce in *Rep. Bot. Exch. Club Brit. Isles* 4 : 646. 1917. (Figs. 10a-b).

Perennials, erect or scrambling over bushes, 1-4 m tall. Rhizome shortly creeping. Leaves 4-40 mm broad, acuminate, tip scabrid ; sheaths wingless or broadly winged, glabrous to villous ; contraligule short, rounded, glabrous or ciliate, with a narrow brown scarious margin. Inflorescence paniculate, of a terminal and one to many lateral partial panicles which may be solitary or binate ; branches hairy, usually almost rectangularly divaricate to slightly ascending. Spikelets unisexual, 3-5 mm long. Glumes acute-mucronulate, pale or dark brown, usually hairy. Stamens 2-3 ; anthers 1-2.3 mm long with a purplish subulate setose tip. Disk 3-lobed, lobes thick, hemispherical, rounded at the top, stramineous, purplish striolate. Nuts ovoid or subglobose, terete or trigonous, apiculate, $2.2-3 \times 2-2.8$ mm, deciduously hairy, cancellate (or sometimes smooth), usually glossy white, sometimes purplish black.

INDIA : Uttar Pradesh - U. N. *Kanjilal* 1076 (DD), *T. A. Rao* (CAL acc. no. 551793) ; Bihar - *Kurz* (CAL acc. no. 312089) ; W. Bengal - *Lawrie, s.n.*, *Parker* 3209 (DD) ; Sikkim - *Clarke* 37042, 36218C, 35110F (CAL), *Anderson* 1346 (DD) ; Arunachal Pradesh - *Bor* 69127, *Sahni* 5204 (DD), *Murthy* 12961, 13031, *Panigrahi* 5940, 14457, *G. V. S. Rao* 19991, *Sastry* 40820, 54431 (ASSAM) ; Assam - *Balakrishnan* 39307, *Biswas* 11, *Deb* 35015, *G. K. Deka* 15087, *U. N. Kanjilal* 4393, *Mann* 790, *Pal* 10454, *Panigrahi* 5466, 9288, 9433, 9565, 11273, 19828, 22161, 27695, *Purkayastha* 15081, *A. S. Rao* 38807, 42443, *Verma* 46230 (ASSAM), *Jenkins* (DD), *Mann* 286 (CAL), *Simons* (CAL acc. no. 512200) ; Nagaland - *Bor* 16058, 17170 (DD), *Clarke* 40778 (CAL) ; Manipur ; Tripura - *R. S. Rao* 8917, 8918 (ASSAM) ; Meghalaya - *Balakrishnan* 42728, 42895, *G. K. Deka* 5077,



Figs. 10-11: 10a-b. *Scleria terrestris* (L.) Fass. 10a. habit. 10b. nut (Verma 46230). 10c. var. *thomsoniana* (Boeck.) Verma—nut (Hook.f. & T. 12). 10d-e. var. *hookeriana* (Boeck.) Verma. 10d. inflorescence. 10e. nut (Bor 15932). 11. *S. psilorrhiza* Clarke — nut (Mooney 4012).

P. C. Kanjilal 10411, *U. N. Kanjilal* 5377, *Mann* 113, *Panigrahi* 19283, *A. S. Rao* 38438, *G. V. S. Rao* 28528, *Verma* 37833, 37861, 35645 (ASSAM), *Clarke* 15861, 18226, 41822, 43274, *Gallatly* 463 (CAL), *Bor* 16095, *Gallatly* 92 (DD) Orissa; Madhya Pradesh - *Murti* 19452 (BSA); Maharashtra - *Stocks, Law & Co.* (CAL acc. no. 512191); Goa; Andhra Pradesh; Karnataka - *Talbot* 2669 (DD); Tamil Nadu - *Gamble* 17393, *Sebastine* 3156 (CAL), *Schmid* 1981 (DD), Kerala; Andaman & Nicobar Isles - *King* 230 (CAL), *Heinig* (CAL acc. no. 512143), *Kurz* (CAL acc. no. 512179). SRI LANKA, CHINA, S. E. ASIA, AUSTRALIA.

A highly polymorphic species of wide distribution. Several facies of this species were distinguished by Boeckeler and Clarke as distinct species or varieties, mainly on the extent of development of wings on the leaf-sheaths, and the colour and surface of the nuts. These characters are found to be highly variable, sometimes even in the same plant. Kern (in *Blumea* 11 : 170-174. 1961) has given a fairly detailed account on the variability and distinctivity of these species/varieties, with reference to protologue. We agree with his observations. From the long list of synonyms he has given we have included only those names which have earlier been used in Indian floristic publications. In addition, two more north-east Indian species, *S. thomsoniana* Boeck. (T. : Khasi hills, *Hook. f. & Thom.* 12) and *S. hookeriana* Boeck. (T. : Khasi hills, *Hook. f. & Thom.* 13) are also found to be very near to *S. terrestris*. The Types of these in the Berlin Herbarium appear to have been destroyed (cf. Kern, *l.c.* 174). However, we have been able to examine duplicates of the same in the Central National Herbarium, Howrah (CAL). These certainly do not deserve specific rank and have been reduced to varietal levels. However, careful field observations on its widely spread populations and biosystematic studies are required for

proper taxonomic evaluation of *S. terrestris* complex.

Scleria terrestris* (L.) Fass. var. *thomsoniana (Boeck.) D. M. Verma, *stat. nov.* *S. thomsoniana* Boeck. in *Linnaea* 38 : 479. 1874. (Fig. 10c.).

Panicle branches glabrous or puberulous. Disk lobes oblong, longer than broad. Nuts cancellate.

From 500-1200 m.

Fl. & Fr. : May.

INDIA : Meghalaya - *Clarke* 15861, *Gallatly* 463, *Hook. f. & Thom.* 12 (CAL). ENDEMIC.

Scleria terrestris* (L.) Fass. var. *hookeriana (Boeck.) D. M. Verma, *stat. nov.* *S. hookeriana* Boeck. in *Linnaea* 38 : 498. 1874. (Figs. 10d-e).

Immature partial panicles always dense, ellipsoid-oblong, chestnut coloured, mature becoming lax with ascending branches. Disk lobes oblong, longer than broad. Nuts cancellate or smooth.

From 700-3000 m.

Fl. & Fr. : May-Sept.

INDIA : Assam - *Simons* (CAL acc. no. 512261); Meghalaya - *Clarke* 38451, 44603, *Hook. f. & Thom.* 13, *Mann* 286 (CAL); Manipur - *Watt* 7139, 7153 (CAL); Nagaland - *Bor* 15932 (DD). ENDEMIC.

11. *Scleria psilorrhiza* Clarke in *Hook. f. Fl. Brit. Ind.* 6 : 691; Kern, *l.c.* 735. (Fig. 11).

Perennials, 1-1.5 m tall, bearing long creeping stolons. Leaves chartaceous, 6-25 mm broad, scabrous, acuminate, or frequently suddenly narrowed and premorse; sheaths broadly winged, retrorsely scabrous; contraligule short, triangular, with a yellow cartilaginous margin. Inflorescence paniculate; lateral partial panicles solitary. Spikelets unisexual, 4-5 mm long. Glumes mucronate,

pale brown. Stamens 3; anthers *ca* 1.5 mm long. Disk reflexed, shallowly 3-lobed, lobes broadly rounded, obtuse. Nuts oblong-ovoid, obtuse, faintly trigonous, 3-3.7 mm long, *ca* 3 mm broad, smooth, glistening white.

Widely scattered but not common; 200-500 m.

Fl. & Fr. : Aug.-Oct.

S. E. ASIA, AUSTRALIA.

The cartilaginous margin of the contraligule distinguishes it from the commonly found *S. terrestris*. Apart from it some of the leaves show 'premorse' character, being broad and 3-5-costate in the lower part but upwards nearer the tip the marginal costae suddenly disappear leaving a notched margin (usually at different levels in the two margins) while the remaining 1 or 3 costae continue in the distal part.

12. *Scleria assamica* (Clarke) D. M. Verma, *stat. nov.* *S. bracteata* Cav. var. *assamica* Clarke in Hook. f., *Fl. Brit. Ind.* 6 : 694. 1894 *et in* J. Linn. Soc. Bot. 34 : 103. 1898; Rao & Verma, *l.c.* 62. Lectotype : Assam, *Masters* (K !). (Figs. 12a-b).

Perennials. Leaves linear, acuminate, 7-15 mm broad, pubescent, scabrous on margins, upper approximate or more or less clustered; sheaths wingless; contraligule ovate, 4-6 mm long, hairy. Inflorescence paniculate; lateral partial panicles several, suberect; rhachilla scabrous. Spikelets unisexual, *ca* 3 mm long. Glumes ovate-lanceolate, stramineous-brown, pubescent, lower aristate, upper obtuse. Disk cyathiform, obscurely 3-lobed, enveloping about one-third of the nut, lobes broadly rounded with a cartilaginous margin bearing many membranous *ca* 0.3 mm long ovate-lanceolate teeth. Nuts ovoid-subglobose, *ca* 3 × 2.5 mm, apiculate, deciduous-hairy, stramineous, lacunose.

INDIA; Assam, *Masters* (K !). ENDEMIC.

Clarke in Hook. f. (*l.c.*) mentioned only two specimens while describing the above variety, viz. *Scleria*, n. 6, *Herb. Ind. Or., Hk. f. & T.* and Assam, *Masters* (in *Herb. Kew*). However, later, in J. Linn. Soc. Bot. (*l.c.*) where he listed the specimens on which his work on Cyperaceae of Flora of British India was based, he mentioned only the latter. Hence, the specimen of *Masters* from Assam at Kew Herbarium is chosen as its Lectotype. The cartilaginous rim of the hypogynous disk bearing numerous teeth is a character not found in any other Indian *Scleria*.

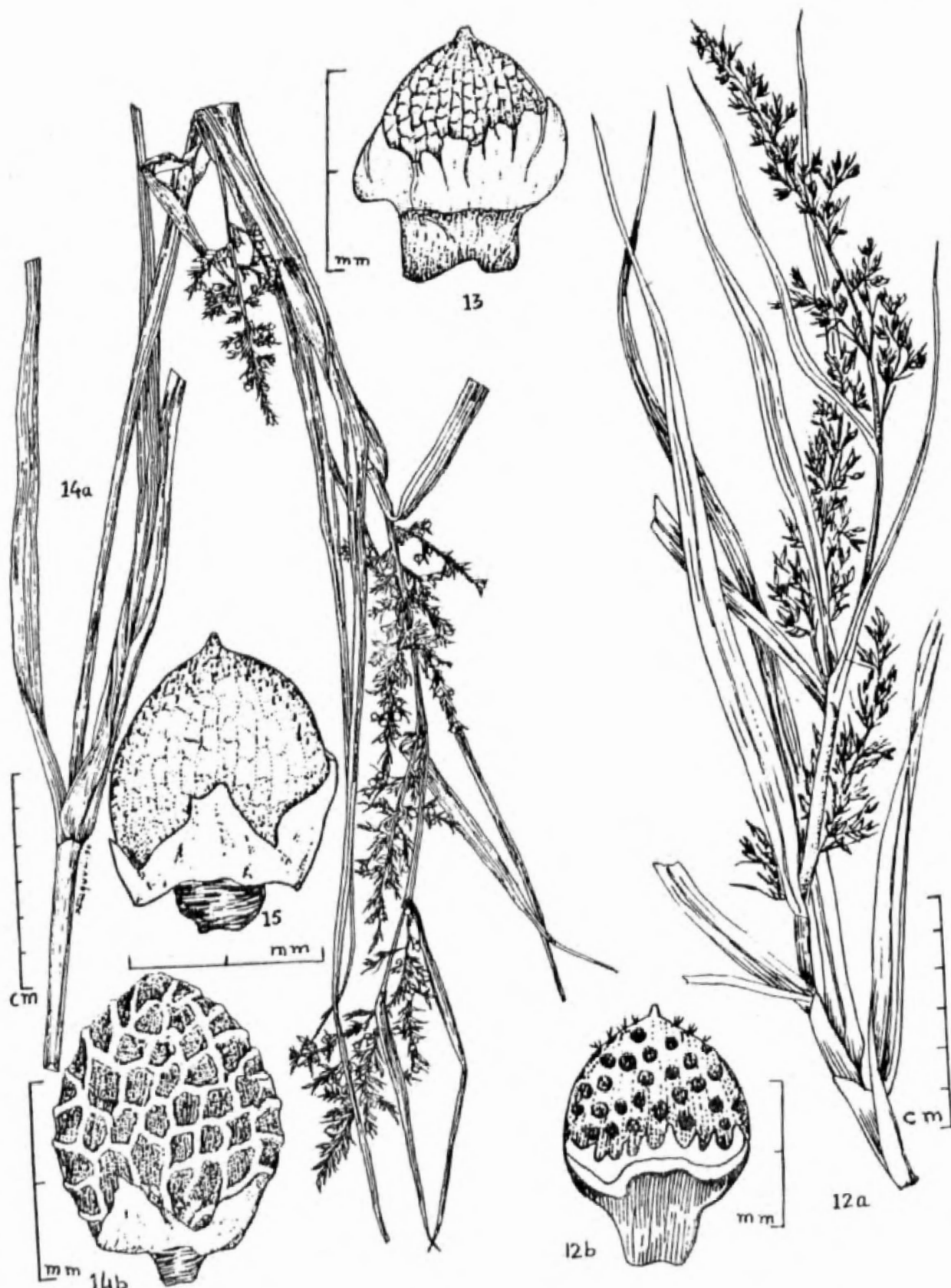
13. *Scleria sumatrensis* Retz., *Obs.* 5 : 19. t. 2. 1789; Clarke, *l.c.* 693; Prain, *l.c.* 853; Fischer, *l.c.* 1678; Kern, *l.c.* 736; Rao & Verma, 61. (Fig. 13).

Perennials, erect or scrambling over bushes, up to 4 m tall, with a thick woody rhizome. Leaves rigid, 7-13 mm broad, scabrous-margined, upper leaves and lower bracts in close groups or clusters of 3-5 giving a whorled appearance; sheaths winged or wingless; contraligule short, rounded, ciliate. Inflorescence rigid, paniculate; lateral partial panicles solitary or binate. Spikelets unisexual, 4-5 mm long. Glumes ovate-lanceolate, acute, stramineous or purplish. Stamens 3; anthers *ca* 2 mm long, setose at tip. Disk large, cyathiform, enveloping the lower half to about two-third of the nut, yellowish red, crenulate, faintly 3-lobed. Nuts globose, *ca* 2 mm long, cancellate, deciduously hairy, grey or blackish.

In north-east and south India; 100-1500 m.

Fl. & Fr. : Jan.-March.

INDIA : W. Bengal - *Clarke* 16922 (CAL); Mizoram; Andaman & Nicobar Isles - *Prain* Coll. 23 (CAL); *Kurz* (CAL acc. no. 512318); Tenasserim & Andamans, *Helper* 6133 (DD); Kerala. CHINA, S. E. ASIA, SRI LANKA, AUSTRALIA,



Figs. 12-15:

13. *S. sumatrensis* Retz. — nut (Helfer 6133). 14a-b. *S. scrobiculata* Nees & Mey. ex Nees, 14a. habit. 14b, nut (M. K. V. Rao 7405). 15. *S. purpurascens* Steud. — nut (Helfer 6132);

The whorled leaves/bracts coupled with cyathiform disk are quite distinctive.

- 14. *Scleria scrobiculata*** Nees & Mey. ex Nees in Wt. Contr. Bot. Ind. 117. 1834; Kern, *l.c.* 738. (Figs. 14a-b).

Perennials, 1-3 m tall, with a creeping rhizome. Leaves in upper part of the stem in clusters of 2-5 forming pseudo-whorls, 4-20 mm broad, scabrid on margins and costae; sheaths wingless or broadly winged; contraligule short, rounded, hairy. Inflorescence paniculate; lateral partial panicles several, solitary or binate, on stout or slender peduncles; rhachis scabrid; upper bracts ciliate at the base. Spikelets unisexual, 3-4 mm long, males peduncled. Glumes ovate-lanceolate, acute or mucronulate, brown or reddish. Stamens 3; anthers 3; anthers 1-1.5 mm long, bristly at tip. Disk thick, deeply 3-lobed, pale brown, lobes triangular, 1-1.2 mm long, toothed at the top. Nuts broadly ovoid or subglobose, umbonulate, 2.2-2.8 mm long, scrobiculate, white, sometimes hairy.

Common in Andaman and Nicobar Islands; 30-500 m.

Fl. & Fr. : Throughout the year.

INDIA : Andaman & Nicobar Isles - *Balakrishnan* 1031, 5478, 4786, 6472, *Chakraborty* 1130, 6017, *N. G. Nair* 940, *M. K. V. Rao* 7405 (PBL), *King's Coll.* (CAL acc. no. 512224), *Kurz* (CAL acc. no. 512179), *Prain's Coll.* (CAL acc. no. 512317). S. E. ASIA.

The species is not included in J. D. Hooker's Flora of British India. The clustered upper leaves together with white scrobiculate nuts and toothed hypogynous disk lobes are quite distinctive.

There is a specimen in DD labelled '*Carex baccata*', Flora of Sikkim Himalayas, 1882, *King's Coll.* which is *Scleria scrobiculata* only. It is however extremely doubtful that this species confined to low altitudes in S. E. Asia and Andamans would be suddenly

found in the Sikkim Himalayas. It is felt that the label might have been wrongly pasted.

- 15. *Scleria purpurascens*** Steud., Syn. Pl. 2 : 169. 1855; Kern, *l.c.* 739; *S. multifolcata* Boeck. in Linnaea 38 : 510. 1874; Clarke, *l.c.* 693, *incl. var. pilosula* Clarke. (Fig. 15).

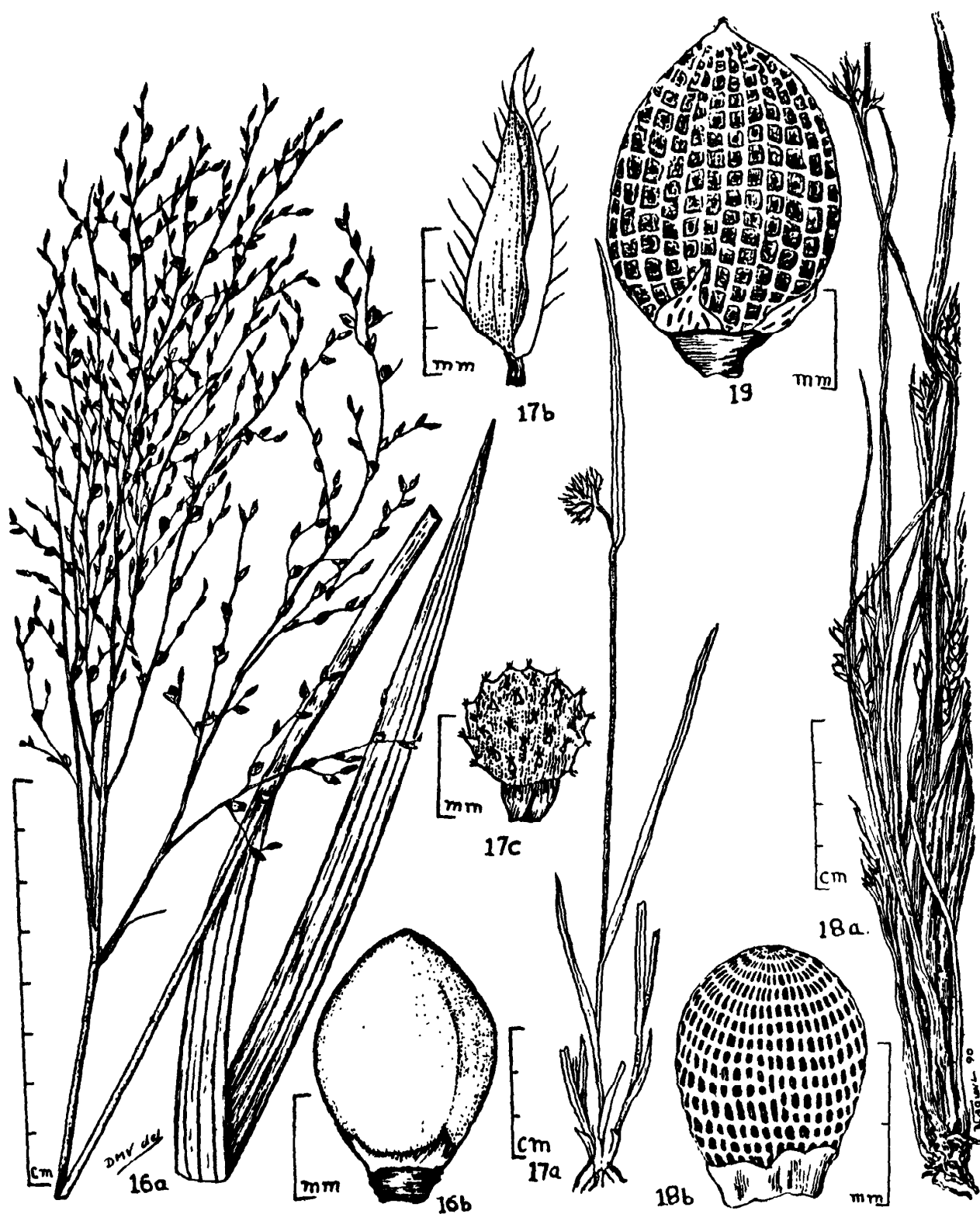
Perennials up to 2 m tall. Leaves 3-4 mm broad, scabrous on margins and costae, middle leaves and lower bracts in clusters of 3-5 forming pseudo-whorls; sheaths wingless; contraligule short, rounded, ciliate. Inflorescence paniculate; lateral partial panicles several, 1-4 together, rather spreading. Spikelets unisexual, 3-4 mm long, ultimately purplish. Stamens 3; anthers 1.5-2 mm long. Disk 3-lobed, thick, brownish, lobes triangular, obtuse, toothed at the top. Nuts ovoid or subglobose, shortly beaked, 2-2.5 x 2 mm, tessellate, deciduously hairy at the top, mature purplish or blackish.

INDIA : Tenasserim & Andamans - *Helfer* 6132 (CAL, DD). S. E. ASIA.

It could not be ascertained whether the specimen cited above was collected in Tenasserim (Burma) or in the Andaman group of islands (India). Among the Indian species with pseudo-whorled leaves, *S. purpurascens* stands distinct with its discoloured purplish black tessellated nuts and small hypogynous disk lobes.

- 16. *Scleria poaeformis*** Retz., Obs. 4 : 13. 1786; Fischer, *l.c.* 1678; Kern, *l.c.* 736; Rao & Verma, *l.c.* 61. *S. oryzoides* Presl, Rel. Haenk. 1 : 201. 1828; Clarke, *l.c.* 691. (Figs. 16a-b).

Perennials, 1-2 m tall, sometimes rooting at the lower nodes. Rhizomes creeping. Leaves several in a basal cluster and a few upwards on the stem, 8-25 (-50) mm broad, septate-nodulose, thick at the base; sheaths wingless or narrowly winged; mouth subtruncate,



Figs. 16-19: 16a-b. *Scleria poaeformis* Retz. 16a. inflorescence. 16b. nut (G. K. Deha 15087).
 17a-c. *S. neesii* Kunth. 17a. habit. 17b. glume. 17c. nut (N. G. Nair 4547).
 18a-b. *S. tessellata* Willd. 18a. habit. 18b. nut (Witt, s.n.). 19 *S. stoksiana* Boeck — nut (Joseph 11173).

Inflorescence a solitary terminal panicle, 10-20 × 5-12 cm, subtended by a glumaceous or a setaceous bract, ultimate branches flexuous. Spikelets solitary, unisexual, 4-5 mm long. Glumes ovate-lanceolate, acute, brown. Stamens 3; anthers *ca* 1.5 mm long with a subulate reddish setose crest. Disk shallowly 3-lobed, *ca* 0.5 mm high, lobes thick, ovate, acute. Nuts ovoid-subglobose, 2.5-3 × 2-3 mm, obtuse, smooth, glistening white, with three depressions at the base.

In north-east and south India; 100-1000 m.

Fl. & Fr. : July-Sept.

INDIA : Arunachal Pradesh - Bor 1878 (DD); Assam - G. K. Deka 15087 (ASSAM); Karnataka; Tamil Nadu. TROPICAL AFRICA, CHINA, S. E. ASIA, AUSTRALIA.

The large terminal panicles bearing numerous solitary spikelets with only subulate bracts (the lower sometimes setaceous) easily distinguishes this species. It is reported that in Java the leaves are sometimes used for making mats and for polishing wood, and fruiting panicles for poultices.

17. *Scleria neesii* Kunth, Enum. Pl. 2 : 358. 1837; Clarke, *l.c.* 688; Fischer, *l.c.* 1677; Kern, *l.c.* 741; Nair in Ind. J. For. 2 : 258. 1979. *Hypoporum capitatum* Nees in Edinb. New Phil. J. 17 : 267. 1834; *non Scleria capitata* Willd. 1805. (Figs. 17a-c).

Annuals, 10-20 cm tall, copiously hairy with 1-1.5 mm long greyish spreading hairs. Stems sometimes retrorsely scabrous. Leaves mostly basal, shorter than to equalling the stem, 2-3 mm broad, sheath mouth with a narrow brown band. Inflorescence a dense subglobose terminal cluster of spikelets, *ca* 1 cm across. Spikelets unisexual, lanceolate, 6-7 mm long. Glumes narrowly lanceolate, acuminate-mucronulate, hairy, greenish brown. Stamens 3; anthers *ca* 2 mm long. Hypogonium columnar, triquetrous, stipe-like, much narrower than the nut, *ca* 0.5 mm long. Nuts globose, *ca* 1.5 mm across, greyish white with

brown tubercles bearing deciduous stellate hairs.

INDIA : Kerala; Andaman & Nicobar Isles - Car Nicobars, N. G. Nair 4547 (PBL). SRI LANKA, S. E. ASIA.

Mainly a south-east Asian species only once reported by Fischer (*l.c.*) from the mainland, from Kerala. It can easily be identified by its hairy nature and globose clusture of spikelets.

18. *Scleria tessellata* Willd., Sp. Pl. 4 : 315. 1805; Clarke, *l.c.* 686, *p.p.*; Parker & Turill, *l.c.* 367, *p.p.*; Fischer, *l.c.* 1677, *p.p.* Figs. 18a-b).

Annual, tufted, 20-60 cm tall. Leaves shorter than to exceeding the stem, 2-6 mm broad; sheaths narrowly to prominently winged, pubescent; contraligule short, rounded, hairy. Inflorescence paniculate, usually copious with several solitary or binate partial panicles, peduncles sparsely hairy. Spikelets unisexual, 5-6 mm long. Glumes ovate-lanceolate, acute, stramineous, brown striolate with a green midrib. Stamens 3; anthers *ca* 2 mm long. Disk thick, white or cream coloured, deeply 3-lobed; lobes somewhat rectangular with a broad truncate top and slightly narrower base. Nuts ellipsoid, terete, umbonulate, 2.7-3 × 2-2.2 mm, lacunose-tessellate, pitted at the base, glabrous or puberulous, white or frequently discoloured brown.

In Central, Northern and Western India; 300-1000 m.

Fl. & Fr. : Sept.-March.

INDIA : Uttar Pradesh - Naithani 1879, Som Dev 5979 (DD); Madhya Pradesh - Anon. 29, Witt (DD); Maharashtra - Anon. 720, Watt 8112, Wingar (DD); Goa. TROPICAL AFRICA.

The shape of the disk lobes alongwith tessellated lacunose nuts are very distinctive characters for *S. tessellata* Willd. Specimens belonging to *S. parvula*, *S. foliosa*, *S. biflora* and *S. mikawana* (from Tropical Africa,

Sri Lanka, S. E. Asia and Japan) were previously mixed up with *S. tessellata* and published as such in the Flora of British India.

19. *Scleria stocksiana* Boeck. in Linnaea 37 : 474. 1874 ; Clarke, *l.c.* 687 ; Cooke, *l.c.* 905. Fig. 19).

Perennials or annuals, 20-70 cm tall. Root-stock, if present, short. Stems smooth or scabrid on the angles. Leaves 3-6 mm broad, glabrous or puberulous, scabrid on margins and midrib ; sheaths wingless or narrowly winged ; contraligule ovate-oblong, *ca* 2 mm long, hairy or glabrous, membranous-margined. Inflorescence paniculate ; lateral partial panicles binate, 1-3 cm long, one subsessile, the other shortly peduncled. Spikelets bisexual and male, in clusters of 2-3. Glumes ovate-lanceolate, acute-mucronate, stramineous, brown striolate. Disk deeply 3-lobed, lobes thin, appressed, lanceolate, acute, *ca* 0.8 mm long, with recurved margins, stramineous or white, red-brown striolate. Nuts ellipsoid-oblong or globose, terete or faintly trigonous, 3.3-3.7 × 1.8-2.5 mm, umbonulate, cancellate, greyish white, glabrous.

Central and South West India ; 100-1000 m.

Fl. & Fr. : Oct.

INDIA : Madhya Pradesh - *Joseph* 11173 (BSA) ; Maharashtra - *Stocks, Law & Co.* (K 1), *Vartak* 24091 (AMH) ; Karnataka - *Talbot* 2066 (DD). ENDEMIC.

20. *Scleria biflora* Roxb., *Fl. Ind.* ed. 2, 3 : 573. 1832 ; Clarke, *l.c.* 687 ; Prain, *l.c.* 853 ; Cooke, *l.c.* 904 ; Mooney, *Suppl. to Haines, Bot. Bihar & Orissa*, 153. 1952 ; Kern, *l.c.* 743 ; Rao & Verma, *l.c.* 57. (Figs. 20a-b).

Slender tufted annuals, 15-50 cm tall. Roots aromatic. Leaves 2-6 mm broad ; sheaths narrowly winged, smooth or scaberulous ; contraligule rounded, ciliate. Inflorescence paniculate ; lateral partial panicles solitary or binate. Spikelets unisexual or male

and bisexual, 3-4.5 mm long, males subsessile or peduncled. Glumes ovate-lanceolate, mucronate, brown. Stamens 2-3, *ca* 1 mm long with a reddish setose tip. Disk deeply 3-lobed ; lobes lanceolate, ferrugineous, reaching to about middle of the nut, acute-acuminate. Nuts globose, terete, beaked, 2-2.5 mm across, cancellate, white or sometimes discoloured, usually ferrugineous pubescent on the ridges, base with 6 pits, beak (the persistent style base) somewhat acicular, purplish black, rarely white.

Widely distributed ; sea level to 2000 m.

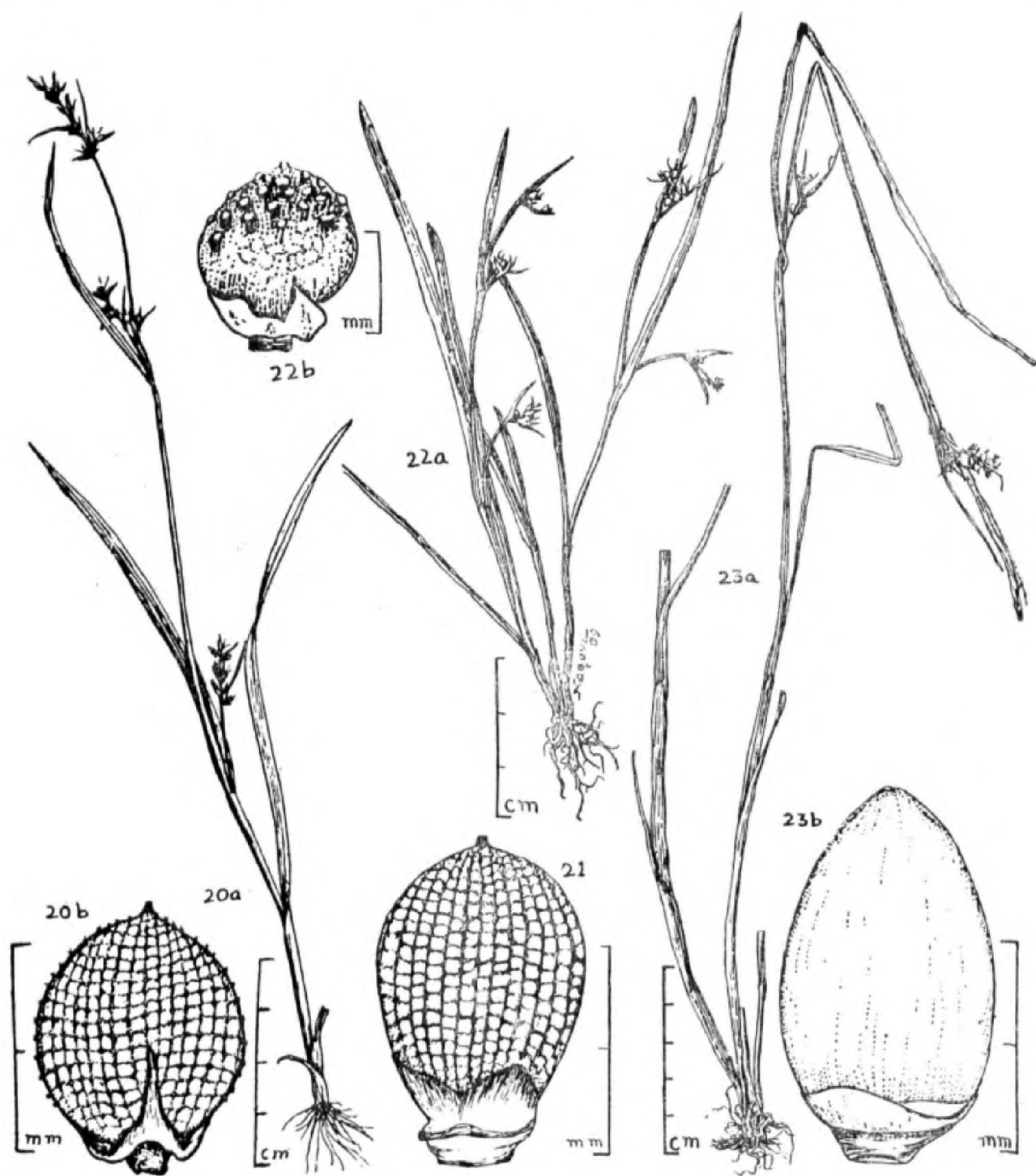
Fl. & Fr. : July-Oct.

INDIA : Uttar Pradesh - *Babu* 34929, *Som Dev* 5969, *T. A. Rao* 7263 (BSD), *Naithani* 1887, 1889 (DD) ; W. Bengal - *Kurz* (CAL acc. no. 512035), *Wallich* 3405 (CAL) ; Sikkim - *Kurz* (CAL acc. no. 512013) ; Arunachal Pradesh - *Bor* 80, *Panigrahi* 14964 (ASSAM) ; Assam - *Panigrahi* 18942 (ASSAM), *Craib* 105 (CAL), *Jenkins* (CAL acc. no. 512023), *Anon.* (CAL acc. no. 512000), *Bor* 17272, 17943 (DD) ; Meghalaya - *Verma* 37875 (ASSAM) ; Orissa - *Mooney* 3105, 3598, 4015 (DD) ; Madhya Pradesh - *Pant* 25445 (BSA) ; Karnataka - *Talbot* 150 (DD) ; Andaman & Nicobar Isles - *N. G. Nair* 508, 4587 (PBL). CHINA, S. E. ASIA.

Very widespread and common in India. This is the only species bearing globose cancellate nuts characteristically tipped by a short slender purplish black beak. However, sometimes, even in the same plant, the beak may be brownish or white. Roots strongly smell of camphor and according to Kern (in *Blumea* 11 : 198. 1961) the very young plants in Java are eaten with rice.

21. *Scleria parvula* Steud., *Syn. Pl.* 2 : 174. 1855 ; Kern, *l.c.* 746 ; Rao & Verma, *l.c.* 57. *S. tessellata* (non Willd.) ; Clarke, *l.c.* 686, *p.p.* (Fig. 21).

Slender tufted annuals, 20-120 cm tall.



Figs. 20-23: 20a-b. *Scleria biflora* Roxb. 20a. habit. 20b. nut (Verma 37875). 21. *S. parvula* Steud. — nut (G.K.Deka - ASSAM acc. no. 986). 22a-b. *S. rugosa* R. Br. 22a. habit. 22b. nut. (V.J.Nair 18248). 23a-b. *S. annularis* Nees ex Steud. 23a. habit. 23b. nut (Witt 38).

Leaves 2-5 mm broad, sparsely hairy; sheaths glabrous or hairy, wingless or narrowly winged; contraligule short, ciliate. Inflorescens paniculate; lateral partial panicles

2-4 together; peduncles slender or stout, often curved, up to 8 cm long. Spikelets unisexual, 4-5.5 mm long; males with peduncles very short to almost as long as the spikelets.

Glumes ovate-lanceolate, acute or mucronulate, brown. Stamens 2-3; anthers 1-1.5 mm long with a subulate ciliate reddish tip. Disk rather thick, deeply 3-lobed; lobes ovate, acuminate, or sometimes bidentate. Nuts obovoid, subterete, shortly beaked, $2.2-2.5 \times 1.5-2$ mm, tessellate lacunose, glossy white or discoloured and brownish, glabrous or brown pubescent on the transverse ridges.

Widely distributed; 200-2000 m.

Fl. & Fr. : May-Oct.

INDIA : Uttar Pradesh - *Pant* 43146 (BSD); W. Bengal; Sikkim; Assam - *Panigrahi* 9555 (ASSAM); Nagaland - *Bor* 16678 (DD); Manipur - *Clarke* 42071 (CAL); Meghalaya - *G. K. Deka* 19201, 23382, *P. C. Kanjilal* 8515, *Panigrahi* 3421 (ASSAM), *Clarke* 5628, 12986, 19385, 38876 (CAL); Madhya Pradesh - *Arora* 5891 (BSA), *Anon.* (CAL acc. no. 512026); Gujarat - *Toor* 25745 (BSI), *Anon.* (DD acc. no. 126962); Maharashtra - *Cherion* 11363, *Jain* 7589 (BSI); Kerala. TROPICAL AFRICA, SRI LANKA, EAST & SOUTH EAST ASIA.

Though Clarke, and probably several earlier workers, confused it with *S. tessellata*, the disk lobes of the two species are very different. Moreover, *S. tessellata* is somewhat confined to the drier central, northern and western India.

22. *Scleria rugosa* R. Br., Prodr. 240. 1810; Kern, *l.c.* 749; Rao & Verma, *l.c.* 58. *S. flaccida* Clarke in Hook. f., Fl. Brit. Ind. 6 : 688. 1894, non Steud. 1855. *S. zeylanica* (non Poir); Clarke, *l.c.* 687, excl. syn. *S. thwaitesiana* Boeck. (Figs. 22a-b).

Annuals, 5-40 cm tall, copiously hairy or almost glabrous. Leaves linear, obtuse, 1.5-3.5 mm broad; sheaths wingless or winged; contraligule ciliate. Inflorescence paniculate; terminal partial panicle pseudolateral due to erect posture of the subtending bract; lateral partial panicles solitary or binate; peduncles winged, up to 3 cm long, often curved. Spikelets unisexual, 3-4 mm long. Glumes

acute-mucronulate, greenish stramineous, usually long ciliate. Stamen 1; anthers ca 0.5 mm long. Disk thick, shallowly 3-lobed; lobes hemispherical, broadly rounded at the top. Nuts broadly ovoid or globose, terete, 1.3-1.8 mm across, apiculate, glossy greyish white, smooth, rugulose or lacunose.

Widespread; 50-1000 m.

Fl. & Fr. : Sept.-Nov.

INDIA : Assam - *Clarke* 40744 (CAL); Orissa - *Mooney* 2322, 3103 (DD); Madhya Pradesh - *V. J. Nair* 18248 (BSA); Maharashtra; Andaman & Nicobar Isles - *Kurz* (CAL acc. nos. 512044, 512045). CHINA, BURMA (*Kurz* 2702 - CAL), EAST & SOUTH EAST ASIA, SRI LANKA (*Thwaites*, C.P. 3796 - CAL), AUSTRALIA.

The general hairiness, texture of the nut surface and wings of the leaf-sheaths have been found to be highly variable and we entirely agree with Kern (*l.c.*) that *S. flaccida* and *S. zeylanica* considered distinct by Clarke fall within the variability range of *S. rugosa*. The annual habit, paniculate inflorescence and hemispherical disk lobes are together distinctive features of *S. rugosa*. In this connection two authentic specimens, *Thwaites* 3796 (for *S. zeylanica*) and *Kurz* 2702 (for *S. flaccida*) were also examined.

23. *Scleria annularis* Nees ex Steud., Syn. Pl. 2 : 176. 1855, ex descr.; Clarke, *l.c.* 687; Cooke, *l.c.* 903; Haines, *l.c.* 932; Parker & Turill, *l.c.* 368; Kern, *l.c.* 744. (Figs. 23a-b).

Annuals, usually tufted, 30-90 cm tall. Stems triquetrous, sparsely retrorsely scabrous. Leaves 3-6 cm broad, scabrid-margined; sheaths narrowly winged, glabrous or ciliate; contraligule ovate, glabrous or ciliate. Inflorescence paniculate; lateral partial panicles solitary or binate; peduncles 1-3 cm long, hairy, 2-winged towards the dilated top. Spikelets bisexual and male, 3-4 mm long. Glumes ovate-lanceolate, acute or mucronate,

stramineous, brown striolate. Stamens 2-3; anthers *ca* 1 mm long. Hypogonium short, triangular. Nuts oblong, trigonous, slightly laterally compressed, apiculate, $2.3-2.5 \times 2$ mm, smooth, glistening white, glabrous or pubescent.

Widely distributed; 200-1500 m.

Fl. & Fr. : April-Jan.

INDIA : W. Bengal; Manipur - *Bor* 17738 (DD); Orissa - *Mooney* 3690 (DD); Madhya Pradesh - *Mooney* 1818, *Witt* 38, *Anon.* 38 (DD); Maharashtra - *Anon.* 8A (DD); Goa; Karnataka, CHINA, S. E. ASIA.

The annual habit, dilated peduncles and

slightly compressed trigonous nuts with short hypogynous disks are distinctive features of this species.

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