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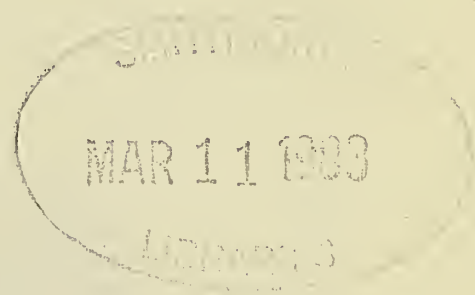
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VOLUME VI.—No. I

PIPERACEÆ NOVÆ E PENINSULA MALAYANA

AUCTORE

C. de CANDOLLE



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PIPERACEAE NOVAE
E PENINSULA MALAYANA.

AUCTORE C. DECANDOLLE.

PEPEROMIA RUIZ ET PAVON.

Folia opposita.

1. Peperomia Wrayi C. DC. n. sp.

Caulis decumbens puberulus, e nodis radicans ; rami erecti, dense pubescentes, ramulosi, in sicco angulosi, usque ad 10·5 cm. longi et 1 mm. crassi. Folia opposita, petiolata ; limbus supra in margine puberulus, caeterum glaber, e basi acuta vel subacuta obovatus, usque ad 20 mm. longus et 15·7 mm. latus vel in foliis supremis rotundato-obovatus et circiter 6 mm. diametro ; petiolus dense puberulus, 4-6 mm. longus. Pedunculi terminales, glabri, usque ad 12·5 mm. longi. Spicæ circiter 24 mm. longæ et 1 mm. crassæ, glabræ ; bractæ pelta rotunda, centro breviter pedicellata ; antheræ ellipticæ, filamenta brevissima ; ovarium ovatum, summo apice stigmatiferum, stigma glabrum ; bacca globosa ; asperulata, basi rhachi immersa, fere 1 mm. diametro.

BATANG PADANG ;—upper part of the valley, at 2,000 ft. altitude, on dead tree ; *Wray* 1,455 !

Folia alterna.

2. Peperomia maxwellana C. DC. n. sp.

Caulis decumbens e nodis radicans, ramuli spiciferi erecti, glabri, in sicco fere 1 mm. crassi. Folia alterna, modice petiolata ; limbus in sicco subcoriaceus, fuscescens, ellipticus, basi cuneatus apice obtusus, 3-nervius, supra subtusque glaber, margine in apice ciliatus, usque ad 40 mm. longus et 20 mm. latus ; petiolus glaber, 5 mm. longus. Pedunculi terminales et axillares, glabri, 8-10·5 mm. longi. Spicæ glabræ usque ad 5 cm. longæ et fere 1 mm. crassæ, densifloræ ; bractæ pelta orbicularis, 0·5 mm. diametro, centro subsessilis, ovarium emersum,

obovatum, paullo sub apice oblique stigmatiferum; stigma glabrum; bractea et ovarium in sicco rubropunctulata.

PERAK; Maxwell's Hill, *Ridley* No. 5481!

3. Peperomia malaccensis Ridley in *Kew Bull.* 1895, 185.

Caules prostrati succulentes, glabri, subangulosi; e nodis radican-tes, in sicco circiter 1 mm. crassi. Folia alterna, modice petiolata, glabra; limbus in vivo saturate virescens vel cupreofuscus, in sicco fuscescens et membranaceus, rotundato-ovatus, basi haud profunde cordatus, apice obtusus, 5-nerviis, 29 mm. longus et usque ad 30 mm. latus; petiolus 12-5 mm. longus. Pedunculi terminales, petiolis fere aequilongi, glabri. Spicae florentes 38 mm. longae, glabrae; bractea pelta oblonga, rotundata, centro pedicellata, pedicellus cum flore in rhachi immersus; ovarium globosum, summo apice stigmatiferum; stigma minutum, glabrum; bacca globosa, asperulata, basi in rhachi immersa, fere 1 mm. diametro.

MALACCA, rocks in forest, *Derry* No. 80!

4. Peperomia kotana C. DC. n. sp.

Caulis e basi repente erectus, dense hirtellus, in sicco fere 1 mm, crassus. Folia alterna, petiolata; limbus utrinque dense hirtellus rotundato-obovatus, 23 mm. diametro in foliis inferis, ellipticus, basi subacutus, apice rotundatus, 23 mm. longus, 14.5 mm. latus in superioribus; petiolus dense hirtellus, 10 mm. longus in inferis, 4 mm. longus in superis. Pedunculi terminales. Spicae 27 mm. longae, 1 mm. crassae glabrae, densiflorae; bractea pelta obovata, centro subsessilis, in sicco fusce punctulata; antherae rotundatae; ovarium emersum, obovatum, paullo sub apice oblique stigmatiferum; stigma minutum, glabrum.

Species *P. convexa* Miq. proxima ab ea bractea pelta obovata discrepans.

PAHANG; Kota Slanggi, *Ridley*!

PIPER L.

SECTIO. EUPIPER C. DC. in *Prodr.* XVI, 1,339, emend.

Spicae oppositifoliae. Bractea haud connatae, hypopeltatae, centro vel fere centro pedicellatae aut subsessiles vel rhachi adnatae et tum tantum marginibus et extremitatibus liberae. Flores unisexuales; raro bisexuales. Stamina 2, lateralia vel 3-4, quorum 2 lateralia. Ovarium liberum vel inferne rhachi immersum et cum ea connatum.

A. BACCA EXSTIPITATA.

1. BRACTEÆ HAUD RHACHI ADNATÆ.

*Stigma unicum.*1. *Piper globulistigmum* C. DC. n. sp.

Ramuli glabri in sicco pallide fuscescentes, spiciferi usque ad 1 mm. crassi; collenchyma continuum, haud libriforme; canalis lysigenus nullus; cellulæ fuscae in cortice et in medulla crebrae. Folia breviter petiolata, glabra; limbus in sicco rigidus et opacus, 9.5—11.5 cm. longus, 18 mm. latus, oblongo-elliptico-lanceolatus, basi inaequilatera latere longiore rotundatus, brevior attenuatus, penninervius, nervo centrali nervos adscendentes alternos utrinque 3 mittente quorum supremus a 24—36 mm. supra basin solutus; petiolus usque ad limbi latus longius, 3.5 mm. inter limbi latera 2 mm. longus, basi ima vaginans. Pedunculi glabri, 26 mm. longi. Spicae ♀ cylindricae, 52 mm. longae et 1 mm. crassae; rhachis dense velutino-puberula; bracteae glabrae pelta orbicularis, rigida, 1 mm. diametro, centro breviter pedicellata; bacca inferne rhachi immersa, superne libera, rotundata et dense velutino-puberula; stigma unicum, globulosum, minutum.

PERAK; *Scortechini*.

2. *Piper ramipilum* C. DC. n. sp.

Dioicum, scandens, usque ad 9 m. longum. Ramuli juniores pubescentes, cito glabri, spiciferi 2 mm. crassi, in sicco fuscescentes; pili in femina ramulosi, in mare haud ramulosi; collenchyma continuum, haud libriforme; canalis lysigenus, unicus, centralis. Folia breviter petiolata; limbus in sicco rigido-membranaceus, pellucido-punctulatus, usque ad 12 cm. longus et 5 cm. latus, ovato-ellipticus, basi leviter inaequilatera cordulatus, apice acute acuminatus, supra glaber, subtus ad nervos pubescens, pilis ramulosis, 7-plinervius, nervo centrali nervos adscendentes 2 mittente, quorum supremus a fere 32 mm. supra basin solutus, nervis lateralibus utrinque 2 a basi solutis quorum externus aliis multo brevior; petiolus dense pubescens, usque ad limbi latus longius 6 mm. inter limbi latera 2 mm. longus, usque ad medium vaginans, stipulis glabris superne in apicem obtusum connatis. Pedunculi parce pubescentes, 20—24 mm. longi, tenues. Spicae ♂ circiter 7.8 cm. longae et 2 mm. crassae, apice attenuatae; rhachis glabra; bracteae glabrae pelta rotundata, 1 mm. diametro; stamina 2, antherae ellipticae, bivalvatae. Spicae ♀ maturae 10.5 cm. longae et paullo ultra 2 mm. crassae, apice

obtusæ ; rhachis et bractea ut in mare ; ovarium basi rhachi immersum, superne liberum et glabrum ; stigma unicum, minutum, orbiculare, bacca tantum ima immersa, globosa, circiter 1 mm. diametro, in vivo aurantiaca vel saturate flava, in sicco nigra.

PENANG ;—at Gunung Bulang, on trees *Kunstler* 270 ! ; at Balik Pulau, at 800-1,000 ft., alt. *Curtis* 792 ! ; *Kunstler* 1481 ! ; *Deschamps* ! :

PERAK ;—at Gunung Keledang, *Ridley* 9582 ! ; at Larut *King's collector* 3574 ! : JOHORE ;—at Bukit Saya, *Ridley* 11022 ! .

Stigmata 3—4—6.

3. *Piper rufispicum* C. DC. n. sp.

Dioicum. Ramuli glabri in sicco pallido-fuscescentes, spiciferi 1 mm. crassi ; collenchyma in fasciculos discretos a latere productos dispositum et zona interna libriforme ; canalis lysigenus centralis canal- esque peripherici plures. Folia glabra ; limbus in sicco rigidus et caecus, 8.5—9.5 cm. longus, 3.2—3.5 cm. latus, elliptico-lanceolatus, basi leviter inaequilatera altero latere subacutus altero acutus, 6-nervius ; petiolus usque ad limbi latus longius 5 mm. inter limbi latera 1 mm. longus. Pedunculi glabri, 13 mm. longi. Spicæ ♀ cylindricæ, apice rotundatæ, 5.7 cm. longæ, 2.6 cm. crassæ ; rhachis rufo-tomentosa ; bracteæ pelta suborbicularis, apice emarginulata, utrinque minute glandulosa, centro sessilis, 1 mm. diametro ; bacca rhachi profunde immersa, superne stilo conico tenui circiter 1.5 mm. longo munita ; stigmata 4, brevia, ovato-acuta.

PERAK, *Scortechini*, Ijuk 1177 !

4. *Piper conibaccum* C. DC. n. sp.

Dioicum. Ramuli glabri, spiciferi 4 mm. crassi, 6—7-costulati, costulis membranaceis ; collenchyma in fasciculos discretos a latere productos dispositum, haud libriforme ; fasciculi intramedullares uni- seriati ; canalis lysigenus unicus, centralis ; cellulæ flavæ in cortice et in medulla crebræ. Folia breviter petiolata, glabra ; limbus in sicco firmus, 12—13.5 cm. longus, 5—7.5 cm. latus, elliptico-lanceolatus, basi aequila- tera acutus, apice subacute acuminatus, 7-plinervius, nervo centrali nervos adscendentes 2 mittente, quorum supremus 20—30 mm. supra basin solutus, nervis lateralibus utrinque 2, adscendentibus, a basi solutis ; petiolus 10 mm. longus, basi ima vaginans. Pedunculi petiolis acqui- lengi. Spicæ ♀ fere 40.3 cm. longæ ; rhachis glabra ; bracteæ glabræ pelta obovata, inferne attenuata, 2 mm. longa ; ovarium liberum,

superne in stilum conicum attenuatum ; stigmata 3—5, rarius 5 et interdum 2, linearia ; bacca glaucescens, stilus 7 mm. longus.

SELANGOR ;—at Semangko, *Ridley* 17056 !

5. Piper magnibaccum C. DC. n. sp.

Dioicum, scandens. Ramuli glabri, in sicco fuscescentes, spiciferi usque ad 6 mm. crassi et costulati ; collenchyma in fasciculos discretos a latere productos dispositum, haud libriforme ; fasciculi intramedullares uniseriati ; canalis lysigenus unicus, centralis. Folia modice petiolata, glabra ; limbus in sicco subcoriaceus, 15—22 cm. longus, 6—10.5 cm. latus, elliptico-lanceolatus, basi aequilatera acutus, apice acute attenuato-acutus, 7-plex—9-nervius, nervo centrali nervos adscendentes oppositos 2 a 20—26 mm. supra basin mittente, nervis lateralibus adscendentibus utrinque 2—3 a basi solutis quorum externi aliis multo breviores ; petiolus circiter 20 mm. longus, ima basi vaginans. Pedunculi glabri, petiolis fere æquilongi, 2 mm. crassi. Spicæ ♀ circiter 21 cm. longæ ; rhachis glabra ; bracteæ glabræ pelta obovata, inferne plus minusve producta et lacerulata, usque ad 3 mm. longa, centro late subsessilis ; ovarium glabrum, ovatum apice attenuatum ; stigmata 3—4, linearia, acuta, recurva ; bacca globosa, apice acuminata, in sicco nigra.

Species verisimiliter, quum mas notus erit, in sectione *Sarcostemon* C. DC. in *Philip. Journ.* v, 413 ut *P. Korthalsii* Miq. forma collocanda.

PERAK ;—Maxwell's Hill, at 4,000 ft., alt., September, *Curtis* 2046 ! ; at Thaiping, March, *Ridley* 2963, 5480 ! ; at Larut, rare, growing closely to the stem of a tree in dense jungle, *King's collector* 6369 ! ; at Maxwell's Hill at 3,800 ft. alt., *Wray* 4239 ! : SELANGOR ;—Samangko Pass, April, *Ridley* 15569 !

6. Piper flavibaccum C. DC. n. sp.

Dioicum. Ramuli glabri, in sicco pallide fuscescentes, spiciferi 1 mm. crassi ; collenchyma continuum, sparsim libriforme, fasciculi intramedullares uniseriati ; canalis lysigenus unicus, centralis. Folia modice petiolata, glabra ; limbus in sicco rigido-membranaceus, crebre pellucido-punctulatus, usque ad 11 cm. longus et 3.5 cm. latus, oblongo-ovatus, basi inæquilatera latere longiore rotundatus, brevior attenuatus, 4-nervius, nervis lateralibus in latiore latere 2 in angustiore 1 ; petiolus 10 mm. longus, basi ima vaginans. Pedunculi glabri tenues, fere 20 mm. longi. Spicæ ♂ florentes circiter 22 mm. longæ ; rhachis hirsuta ; bracteæ glabræ pelta rotunda, 0.5 mm. diametro, centro

pedicellata; stamina 2, antheræ rotundatae, 4-valvatae, filamentis oblongis, multo breviores. Spicæ ♀ maturæ 20 mm. longæ; bacca libera, globosæ in vivo læte flavæ, in sicco fuscescentes, 2 mm. diametro.

PERAK;—*Scortechini*! summit of Gunong Batu, Pateh, at 6,700 ft. alt., *Wray* 331!

7. *Piper semangkoanum* C. DC. n. sp.

Dioicum, omnino glabrum. Ramuli spiciferi 1.5 mm. crassi; collenchyma in fasciculos discretos dispositum, sparsim libriforme, fasciculi intramedullares uniseriati; canalis lysigenus unicus centralis; nigrescentes cellulæ in medulla crebræ. Folia breviter petiolata; limbus in sicco membranaceus, usque ad 11.5 cm. longus et 5 cm. latus, ovatus, basi æquilatera rotundatus, apice acuminatus, 7-plinervius, nervo centrali nervos adscendentes 2 a 4 cm. supra basin mittente, nervis lateralibus utrinque 2 a basi solutis; petiolus 5 mm. longus basi ima vaginans. Pedunculi 5 mm. longi. Spicæ ♀ cylindricæ, 8 mm. longæ, circiter 2 mm. crassæ, in sicco nigræ; bracteæ pelta orbicularis, centro subsessilis; ovarium liberum; stigmata 4, linearia.

SELANGOR;—Semangko pass, August; PERAK; cottage, *Ridley*!

8. *Piper gymnocladum* C. DC. n. sp.

Dioicum, omnino glabrum. Ramuli in sicco fuscescentes, spiciferi usque ad 1.5 mm. crassi; collenchyma libriforme, in fasciculos discretos dispositum, fasciculi intramedullares uniseriati; canalis lysigenus unicus, centralis. Folia breviter petiolata; limbus in sicco membranaceus, pellucido-punctulatus, usque ad 14.5 cm. longus et 6.5 cm. latus, ovatus, basi æquilatera rotundatus, apice attenuato acutus, 7-plinervius, nervo centrali nervos 2 adscendentes utrinque mittente quorum supremus a 12.5 mm. supra basin solutus, nervo laterali subadscendente brevi et tenui utrinque a basi soluto; petiolus usque ad limbi latus longius 8 mm. inter limbi latera 2 mm. longus. Pedunculi usque ad 27 mm. longi. Spicæ ♀ florentes 16.8 mm. longæ, 2.1 mm. crassæ; bracteæ pelta rotundata, 0.52 mm. diametro, centro breviter pedicellata; ovarium liberum; stigmata 3—4, ovato-oblonga, apice acuta; bacca sessilis, globosa, 3 mm. diametro.

PERAK;—Maxwell's Hill. *Ridley* 5479!

9. *Piper gymnophyllum* C. DC. n. sp.

Dioicum. Ramuli glabri, in sicco fusei et nigropunctati, spiciferi usque ad 2 mm. crassi; collenchyma partim vel omnino libriforme, in fasciculos discretos dispositum; fasciculi intramedullares uniseriati.

Folia modice petiolata, glabra ; limbus in sicco membranaceus, subtus nigropunctatus, usque ad 16 cm. longus et 5.5 cm. latus, elliptico-lanceolatus, basi leviter inæquilatera acutus, apice attenuato-acuminatus, 6-plinervius, nervo centrali nervos adscendentes 3 mittente quorum 2 in altero latere, supremus a fere 26 mm. supra basin solutus, nervo laterali adscendente utrinque a basi soluto ; petiolus usque ad 10.5 mm. longus, basi ima vaginans. Pedunculi glabri, 12.5 mm. longi. Spicæ ♀ limbi dimidium fere æquantur ; rhachis fulvescente hirsuta ; bracteæ pelta glabra, rotunda, 1.5 mm. diametro, centro subsessilis ; ovarium liberum, ovatum, glabrum ; stigmata 3—4, linearia ; bacca ovata, fere 4.2 mm. longa, in sicco nigra.

Forsan *P. eucalyptolimbi* femina.

PERAK ;—Bujang Malacca, *Ridley*, 9527 !

10. *Piper puberulirameum* C. DC. n. sp.

Dioicum. Ramuli parce puberuli, in sicco fusciscentes, spiciferi 1 mm. crassi ; collenchyma libriforme, in fasciculos discretos dispositum ; canalis lysigenus unicus, centralis, fasciculi intramedullares uniseriati. Folia breviter petiolata ; limbus in sicco rigidus, creberrime pellucidopunctulatus, 7.4—8.5 cm. longus, 2.5 cm. latus, ovato-lanceolatus, basi ima leviter inæquilatera acutus, apice acute attenuatus, 5-plinervius, nervo centrali nervos adscendentes oppositos 2 a 8.5—10.5 mm. supra basin mittente, nervo laterali adscendente utrinque a basi soluto, petiolus puberulus usque ad limbi latus longius 7.4 mm. inter limbi latera 1 mm. longus, basi ima vaginans. Pedunculi glabri, tenues, fere 19 mm. longi. Spicæ ♀ maturæ circiter 3.5 cm. longæ ; rhachis dense hirsuta ; bracteæ glabræ pelta rotunda, 1.5 mm. diametro, centro sessilis, ovarium liberum, glabrum, stigmata 4, rotundata, brevissima ; bacca sessilis, globoso-ovata, fere 4.2 mm. longa, in sicco nigra.

PENANG ;—Government Hill, at 2,000 ft. alt. April, *Curtis* 2291 ! Balik Pulau, March, 8026 ! ; Sunjei Ujong 2083 !

11. *Piper velutinervium* C. DC. n. sp.

Dioicum. Caulis 0.9—2.4 m. altus, inferne e nodis radicans. Ramuli spiciferi 4.2 mm. crassi, juniores fulvescente hirsuti præsertim in mare ; collenchyma in mare libriforme, in femina haud libriforme, in fasciculis discretos a latere productos dispositum ; fasciculi intramedullares uniseriati ; canalis lysigenus unicus, centralis. Folia longe-petiolata, limbus in sicco membranaceus, creberrime pellucidopunctulatus, supra glaber, subtus ad nervos venasque velutine-

hirtellus, usque ad 22 cm. longus et 21 cm. latus, rotundato-ovatus basi profunde cordatus, apice acute acuminatus, 11-plinervius, nervo centrali nervos adscendentes oppositos 2 a circiter 6.3 mm. supra basin mittente, nervis lateralibus utrinque 5 a basi divaricantibus; petiolus fere 11.5 cm. longus, usque ad 17 mm. supra basin vaginans, fulvescente hirsutus praesertim in mare, stipulis glabris. Pedunculi usque ad 16.8 mm. longi, in mare fulvescente hirsuti, in femina glabri. Spicae ♂ 3.8 cm. longae, 4.2 mm. crassae; rhachis hirsuta; bractea glabra pelta rotundata, 1 mm. diametro, centro pedicellata; stamina 2, antherae subglobosae, 4-valvatae, filamentis oblongis exsertis multo breviores. Spicae ♀ usque ad 5.7 cm. longae et fere 5.2 mm. crassae; rhachis hirsuta; bractea glabra pelta rotundata, 1.5 mm. diametro, centro pedicellata; ovarium liberum, glabrum, ovatum; stigmata 3 rarius 4, ovato-oblonga; bacca sessilis, ovato-globosa, in vivo flavo-rubra, in sicco nigra, 4.2 mm. longa.

PERAK;—Larut at 800—2,000 ft. altitudes, in open jungle between rocks, August, *Kunstler* 2193!, *King's collector* 2196!

Distribution: Sumatra.

12. *Piper Scortechinii* C. DC. n. sp.

Dioicum, scandens, caule tenui 4.5—6 m. longo. Ramuli glabri, in sicco fusci, spiciferi 1—1.5 mm. crassi; collenchyma in fasciculos discretos a latere productos dispositum, haud vel partim libriforme, fasciculi intramedullares uniseriati; canalis lysigenus nullus; cellulae rubescentes in cortice crebrae. Folia breviter petiolata, glabra; limbus in sicco membranaceus, creberrime et minute pellucido-punctulatus, 12—15 cm. longus, 36—48 mm. latus, oblongo-elliptico-lanceolatus, basi in mare leviter inaequilatera in femina aequilatera acutus, apice acute acuminatus, penninervius, nervo centrali nervos adscendentes 7 mittente quorum supremus a 6—7 cm. supra basin solutus altero latere 3 altero 4; petiolus usque ad limbi latus longius 8.4—12.5 mm. inter limbi latera 1.1—4.2 mm. longus, paullo ultra basin vaginans. Pedunculi glabri, tenues, 14.7—25.2 cm. longi. Spicae ♂ florentes 6.5 cm. longae, fere 1 mm. crassae; rhachis hirsuta; bractea glabra, rotundato-subovata, centro pedicellata pedicellus crassus, cellulis gelifactis fartus; stamina 2, filamenta brevissima, antherae ellipticae, bivalvatae. Spicae ♀ maturae circiter 7 7—15.6 cm. longae; rhachis et bractea ut in mare; ovarium liberum, glabrum ovatum; stigmata 3, linearia; bacca sessilis, subobovato-globosa, breviter mucronata, 4.2 mm. longa, in sicco nigra.

PERAK ;—Maxwell's Hill at 3,000 ft. altitude, March, *Scortechini* 285 ! Larut at 2,800—3,000 ft. August, *King's collector* 3230 ! Goping. Limestone hills at 300-500 ft. 5906 !

13. *Piper subfragile* C. DC. n. sp.

Dioicum, scandens. Ramuli glabri, in sicco pallide fuscescentes spiciferi 0.5 mm. crassi ; collenchyma libriforme in fasciculos discretos dispositum ; canalis lysigenus centralis canalesque peripherici plures. Folia breviter petiolata, glabra ; limbus in sicco subcoriaceus, creberrime pellucido-punctulatus, 5.2 cm. longus, 3.6 cm. latus, ovatus, basi leviter inæquilatera rotundatus, apice attenuatus, 7-plinervius, nervo centrali nervos 2 adscendentes oppositos a 8.4 mm. supra basin mittente, nervis lateralibus utrinque 2 a basi solutis quorum internus adscendens, externus subadscendens ; petiolus usque ad limbi latus longius 4.2 mm. inter limbi latera 2.2 mm. longus. Pedunculi, glabri adhuc juveniles 3.3 mm. longi. Spicæ ♀ 10.5 mm. longæ, 2 mm. crassæ ; rhachis hirsuta ; bracteæ pelta rotundata, glabra, centro pedicellata ; pedicellus hirsutus ; ovarium glabrum, inferne rhachi immersum.

KURAU, in the plains, May, *Wray* 4262 !

Species *P. fragile* Benth. valde referens structura discrepans.

14. *Piper minutistigmum* C. DC. n. sp.

Dioicum. Caulis 9—12 m. longus. Ramuli glabri in sicco pallide fuscescentes, spiciferi usque ad 3 mm crassi ; collenchyma continuum zona interna parce libriforme ; canalis lysigenus periphericus nullus cellulæ fuscae in cortice et in medulla creberrimæ. Folia modice petiolata glabra ; limbus in sicco rigidus, minute et parce pellucido-punctulatus, 13.5 cm. longus, 7 cm. latus, ovatus, basi inæquilatera rotundatus lateribus æquilatis altero longiore, apice acute acuminatus, 9-ninervius nervo centrali nervos adscendentes alternos 2 mittente quorum supremus a 16.5—19.8 mm. supra basin solutus, nervis lateralibus 3 utrinque a basi solutis, nervis omnibus subtus prominentibus ; petiolus usque ad limbi latus longius 12.6 mm. inter limbi latera 6.3 mm. longus. Pedunculi glabri, 5.8—7.7 cm. longi. Spicæ ♀ cylindricæ, fere 9 cm. longæ, maturæ 4.2 mm. crassæ ; rhachis velutino-puberula ; bracteæ glabræ pelta ovata-rotunda, 1.5 mm. longa, infra centrum pedicellata pedicellus brevis et crassus ; ovarium in rhachi profunde immersum ; superne convexum et velutino-puberulum : stigmata 3, minuta ; bacca apice subtetragona.

PERAK ;—Larut, September, *Kunstler* 2388 ! *Scortechini* !

15. Piper febrifugum C. DC. n. sp.

Dioicum, scandens. Ramuli dense fulvescente villosi, spiciferi 4 mm. crassi; collenchyma continuum libriforme; fasciculi intramedullares uniseriati; canalis lysigenus periphericus nullus, zona cellularum sclerosarum inter collenchyma et fasciculos fibrovasculares periphericos. Folia breviter petiolata; limbus in sicco firmo-membranaceus, supra glaber, subtus breviter et sat dense hirsutus, 22.5 cm. longus, 13 cm. latus, ample ovatus, basi leviter inæquilatera cordatus, lobis rotundatis ad petiolum æquilongis ab eo inæquilongis et inæquilatis, apice acuta acuminatus, 11-plinervius, nervo centrali utrinque nervos 3 adscendentes oppositos mittente quorum supremus a circiter 9 cm. supra basin solutus, nervis lateralibus utrinque 3 a basi divaricantibus; petiolus dense villosus, 10 mm. longus. Pedunculi minute puberuli, 45 mm. longi. Spicæ ♀ florentes 16.5 cm. longæ, 3.5 mm. crassæ; rhachis hirsuta; bractee glabrae pelta rotunda, centro breviter pedicellata, pedicellus crassus; ovarium paullo ultra medium in rhachi immersum, superne umbanum et glabrum; stigmata 3, ovato-acuta; bacca in sicco nigra.

SUNJEI UJONG;—Atrar Sang Trap, *Ridley* 1867!

The roots when boiled are given in cases of fever.

2. BRACTEA RHACHI ADNATA.

16. Piper flavispicum C. DC. n. sp.

Dioicum, erectum, 60 cm. altum. Ramuli glabri, spiciferi circiter 1.5 mm. crassi; collenchyma libriforme in fasciculos discretos sat crassos dispositum; fasciculi intra medullares uniseriati; canalis lysigenus unicus centralis. Folia brevissime petiolata, glabra: limbus in sicco membranaceus, minute pellucido-punctulatus, 13—15 cm. longus, 4.5—5.5 cm. latus, elliptico-lanceolatus, basi æquilatera acutus, apice acute et sat longe acuminatus, 7-plinervius, nervo centrali nervos 2 alternos adscendentes mittente quorum supremus a circiter 4 cm. supra basin solutus, nervis lateralibus adscendentibus utrinque 2 a basi solutis quorum externi aliis multo breviores et tenuiores; petiolus 4 mm. longus, basi ima vaginans. Pedunculi glabri, 6.3 mm. longi. Spicæ ♀ 5.6 cm. longa, 1 mm. crassa; rhachis glabra; bractea glabra, oblongo-obovatæ, 2.5 mm. longa, usque ad 1.5 mm. lata; stamina 3, antheræ ovatæ, 4-valvatæ, filamenta oblonga fere æquantia. Spicæ ♀ in vivo flava, 5.6 mm. longa; bractea ut in mare; bacca libera, ovata, 4 mm. longa, in sicco nigra

PERAK ;—Sunga Rya, near small limestone hill in dense jungle
Kunstler 1004 !

17. *Piper longicaule* C. DC. n. sp.

Dioicum, ad arbores et frutices longe et arcte scandens. Ramuli glabri, in sicco fuscescentes, spiciferi 1 mm. crassi; collenchyma libriforme in fasciculos discretos et tenues dispositum; fasciculi intramedullares uniseriati; canalis lysigenus unicus centralis. Folia modice petiolata, glabra; limbus in sicco rigidus-membranaceus, minutissime et inconspicue pellucido-punctatus, 7.5—10 cm. longus, 3.5—4 cm. latus, elliptico-lanceolatus, basi lævissime inæquilatera subacutus, lateribus æquilatis paullo inæquilongis apice acute acuminatus, 7-plinervius, nervo centrali nervos 2 adscendentes alternos mittente quorum supremus circiter 12—14 mm. supra basin solutus, nervis lateralibus adscendentibus utrinque 2 a basi solutis quorum externi aliis multo breviores et tenuiores; petiolus circiter 7 mm. longus, basi ima vaginans. Pedunculi glabri, 12—14 mm. longi, 0.5 mm. crassi. Spica ♂ fere 8 cm. longa et 0.5 mm. crassa; flores fere verticillati; rhachis hirsuta; bractea dorso minutissime puberula et margine minute ciliata, obovato-oblonga, inferne obtusa, apice rotundata vel brevissime attenuata, 1.5 mm. longa; stamina 3, antheræ obovatæ, 4-valvatæ, filamentis oblongis paulle longiores. Spica ♀ usque ad 19.5 cm. longa, in vivo alba; rhachis hirsuta, 1.5 mm. crassa; bractea dorso minutissime puberula et margine minute ciliata, subobovato-oblonga, 2.5 mm. longa; ovarium liberum, glabrum; stigmata 4—5, linearia, acuta et recurvata; bacca ovata, apice subacuta, fere 2.5 mm. longa, in vivo rubra vel flava, in sicco fuscescens.

INDIA :—*Wight* 2556 ! PENANG :—*Curtis* 1318 ! PERAK ;—*Ulu Slim* at 500—800 ft. dense jungle, rocky soil, *King's collector* 10673 !; *Scortechini* ! Larut at 100-3,000 ft. altitude: *Kunstler* 2545 ! *King's collector* 4048 !. Goping: *King's collector* 5876 Kota Larut, in plains *Wray* 2857, Tapa 1347 !. MALAYA : *Maingay* 1335 !

18. *Piper kotanum* C. DC. n.sp.

Dioicum. Ramuli glabri in sicco nigrescentes, spiciferi 1 mm. crassi; collenchyma libriforme, continuum; canalis lysigenus unicus centralis. Folia breviter petiolata; limbus in sicco rigido-membranaceus, minute pellucido-punctulatus, usque ad 12 cm. longus, et 5 cm. latus, ellipticus, basi leviter inæquilatera altero latere acutus, altero subrotundatus, apice acute acuminatus, penniuervius, nervo centrali utrinque nervos 3 adscendentes mittente quorum supremus a 31.5—37.5 mm. supra basin, infimus paullo supra basin soluti; petiolus glaber, usque,

ad 8.5 mm. longus. Pedunculi glabri, circiter 14.5 mm. longi, tenues. Spica ♀ 6.4 cm. longa, 1 mm. crassa; rhachis glabra: bractea glabra elliptica, rhachi adnata et tantum paullo ultra 1 mm. longa et 0.25 mm. lata; ovarium liberum; stigmata 3, triangularia, acuta; bacca globosa, fere 3 mm. diametro, in sicco nigra.

PERAK;—Kota, in the plains *Wray* 1947!

B. BACCA STIPITATA.

19. *Piper dindingsianum* C. DC. n.sp.

Dioicum. Ramuli glabri, spiciferi 2 mm. crassi; collenchyma fere continuum, partim libriforme; fasciculi intramedullares uniseriati; canalis lysigenus centralis et canales peripherici plures. Folia modice petiolata, glabra; limbus in sicco membranaceus, 10—13 cm. longus et 6.5 cm. latus, ovatus, basi æquilatera rotundatus vel repande cordulatus, apice acute acuminatus, 7-plinervius, nervo centrali nervos 2 adscendentes oppositos a circiter 10 mm. supra basin mittente, nervis laterali-bus subadscendentibus utrinque 2 a basi solutis quorum externi aliis multo tenuiores: petiolus 10 mm. longus, basi ima vagirans. Pedunculi glabri, 14.7 mm. longi. Spica ♀ 16.8 mm. longa; rhachis hirtella; bracteæ glabræ pelta rotunda, 1 mm. diametro, centro pedicellata; pedicellus modicus, cellulis gelifactis farctus; ovarium glabrum, liberum, ovatum; stigmata 3, linearia; bacca obovato-globosa, 3 mm. longa, in sicco nigra.

DINDINGS, July, *Ridley* 8370!

20. *Piper malaccense* C. DC. n. sp.

Ramuli juniores hirsuti dein glabri, spiciferi circiter 1.5 mm. crassi; collenchyma continuum, haud libriforme; fasciculi intramedullares uniseriati; canalis lysigenus centralis canalesque peripherici plures. Folia breviter petiolata; limbus in sicco membranaceus, minute pellucido-punctulatus, usque ad 17.5 cm. longus et fere 6 cm. latus, elliptico-lanceolatus, basi leviter inæquilatera acutus vel altero latere rotundatus altero acutus, apice acute et sat longe acuminatus, utrinque in nervis pilosus, penninervius, nervo centrali nervos adscendentes utrinque 3 mittente quorum supremus a 5.5 cm. supra basin solutus; petiolus dense hirsutus, basi ima vaginans, usque ad limbi latus longius 5 mm. inter limbi latera 2 mm. longus. Pedunculi hirsuti, 6 mm. longi. Spicæ bacciferæ circiter 3 cm. longæ; rhachis hirsuta; bracteæ glabræ pelta

rotunda, centro sessilis; 1.5 mm. diametro; flores unisexuales vel interdum bisexuales; stamina 1—2, antheræ rotundatæ; ovarium liberum, ovatum glabrum; stigmata 4, linearia, acuta; bacca globosa, in sicco nigra 3 mm. longa, ejus stipes glaber multo brevior.

MALACCA; *Ridley* 2338 !, *Mertiman* 1617 !.

Vern. *Poka Pimpir*.

21. Piper selangoreuse C. DC. n. sp.

Dioicum; scandens. Ramuli glabri, graciles, spiciferi 1 mm. crassi, in sicco virescentes; collenchyma partim libriforme, in fasciculos discretos a latere productos dispositum; fasciculi intramedullares uniseriati; canalis lysigenus unicus centralis; cellulae fulvescentes in cortice et in medulla crebra. Folia breviter petiolata, glabra; limbus in sicco rigido-membranaceus et virescens; crebre et minute rubrescente pellucido-punctatus, 9 cm. longus, 4.5 cm. latus, oblongo-ovatus, basi inæquilatera rotundatus, lateribus æquilongis altero latiore, apice obtusiuscule acuminatus, 5-nervius, nervo centrali nervos validos patulos multos mittente, nervis externis quam aliis multo tenuioribus et brevioribus; petiolus circiter 6 mm. longus. Pedunculi glabri, 12 mm. longi. Spica ♀ fere 26 mm. longa; rhachis hirtella; bractea glabra pelta obovata, 3 mm. longa, centro pedicellata; pedicellus carnosus, cellulis gelifactis fartus ovarium liberum, ovatum; stigmata 3, oblonga, brevia, obtusa; bacca stipitata, ovata, circiter 4 mm. longa, in sicco nigra, ejus stipes 3 mm. longus.

SELANGOR;—Semangkok pass, Sampang tracts, *Ridley* 15565 !

22. Piper subalbicans C. DC. n. sp.

Dioicum. Ramuli glabri in sicco fuscescentes, spiciferi 1.5 mm. crassi; collenchyma partim libriforme in fasciculos discretos dispositum; fasciculi intramedullares uniseriati; canalis lysigenus unicus centralis; cellulae aurantiaceae in cortice et in medulla crebra. Folia modice petiolata, glabra; limbus in vivo subtus albicans, in sicco pallide virescens, membranaceus, usque ad 12.5 cm. longus et 5.8 mm. latus, oblongo-ovatus, basi leviter inæquilatera altero latere rotundatus, altero acutus, apice acute acuminatus, 7—9-plinervius, nervo centrali nervos ascendentes tenues utrinque 2—3 mittente quorum supremus a 26—39 mm. supra basin solutus, nervo laterali adscendente tenui basi soluto; petiolus paullo ultra basin vaginans, usque ad limbi latus longius 12.8 mm. inter limbi latera 2 mm. longus. Pedunculi tenuis, circiter 10—12 mm. longi. Spica ♀ circiter 32 mm. longæ; rhachis hirsuta;

bracteæ glabræ pelta obovata, inferne subattenuata, 3·5 mm. longa usque ad 1 mm. lata, supra centrum sessilis; ovarium liberum, ovatum, glabrum; stigmata 3, ovata, brevia; bacca juvenilis elliptica, stipite suo paullo longior.

PERAK;—Gunong Batu Pateh, lower camp, at 3,400 ft. *Wray* 448!

23. Piper Curtisii C. DC. n. sp.

Dioicum, scandens. Caulis tenuis 3—4·5 m. longus. Ramuli glabri, spiciferi usque ad 1 mm. crassi; collenchyma continuum partim libriforme; fasciculi intramedullares uniseriati; canalis lysigenus unicus centralis; cellulæ flavæ in cortice et in medulla crebræ. Folia modice petiolata, glabra; limbus in sicco membranaceus, subtus creberrime nigro-punctulatus, 9—11·5 cm. longus, 3·7—4·5 cm. latus, subovato-elliptico-lanceolatus, basi æquilatera acutus, apice subacute attenuato-acuminatus, 5-plinervius, nervo centrali nervos adscendentes 2 a circiter 2 mm supra basin sursumque nervulos plures patulos mittente, nervo laterali adscendente utrinque a basi soluto; petiolus tenuissimus, 10 mm. longus basi ima vaginans. Pedunculi tenuissimi, petiolis æquilongi, glabri. Spica ♀ fere 4 cm. longa, tenuis; rhachis pilosa; bracteæ glabræ pelta elliptica, 2 mm. longa, centro pedicellata; pedicellus brevis et crassus, cellulis gelifactis farctus; ovarium liberum, glabrum; stigmata 3—4, ovato-acuminata; bacca globosa, in vivo flavo-rubra, in sicco nigra, fere 4 mm. longa, ejus stipes paullo brevior.

PERAK;—Waterloo, May, *Curtis* 2699! Larut at 2,500—3,000 ft. slender creeper 3·3—5 m. long, *King's collector* 6263! *Scortechini*!: SELANGOR, Kwala; MALACCA ubi vern. "Akar Siri Haton," *Ridley* 2337!

24. Piper paucistigmum C. DC. n. sp.

Dioicum, scandens. Ramuli glabri, spiciferi fere 1 mm. crassi; collenchyma partim libriforme, in fasciculos discretos a latere valde productos dispositum; fasciculi intramedullares uniseriati; canalis lysigenus unicus centralis; cellulæ flavæ in cortice et in medulla crebræ. Folia modice petiolata, glabra; limbus in sicco membranaceus et subtus crebre nigro-punctulatus, usque ad 10·5 cm. longus et 32 mm. latus, oblongo-ellipticus, basi æquilatera acutus, apice acute acuminatus, 5-plinervius, nervo centrali nervos adscendentes alternos 2 mittente, quorum supremus a circiter 26 mm. supra basin solutus, nervo laterali adscendente utrinque a basi soluto; petiolus tenuissimus, fere 8·4 mm. longus, basi ima vaginans. Pedunculi tenuissimi, petiolis æquilongi, glabri. Spica ♀ fere

4 cm. longa; rhachis puberula; bractea glabra pelta obovata, 1 mm. longa et usque ad 1 mm. lata, centro pedicellata; pedicellus brevis; ovarium liberum, glabrum; stigmata 2—3, ovato-acuminata; bacca in vivo rubra, in sicco nigra, globosa, fere 3 mm. longa, ejus stipes brevior.

PERAK;—near Ulu Kerling, April, on trees in dense bamboo forest, slender creeper half parasite, at 500-700 ft. *King's collector* 8820! *Scortechini*!

25. Piper maxwellianum C. DC. n. sp.

Dioicum, scandens. Ramuli glabri, in sicco subfuscescentes, spiciferi 2 mm. longi; collenchyma continuum libriforme; fasciculi intramedullares uniseriati; canalis lysigenus unicus centralis; cellulae aurantiacae in cortice et in medulla crebrae. Folia modice petiolata, glabra; limbus in sicco membranaceus et subtus punctulis rubescentibus conspersus, 7.5 cm. longus, 36 mm. latus, elliptico-lanceolatus, basi aequilatera acutus, apice acute acuminatus, 7-plinervius, nervo centrali nervos adscendentes utrinque 2 mittente quorum supremus a 26 mm. supra basin solutus, nervo laterali adscendente utrinque a basi soluto; petiolus tenuis, 1 mm. longus, ultra basin vaginans. Pedunculi glabri, tenues, 8—14 mm. longi. Spica ♀ circiter 36 mm. longa; rhachis hirtella; bractea glabra pelta obovata, 1.5 mm. longa et usque ad 1.5 mm. lata, supra centrum pedicellata; pedicellus cellulis gelifactis farctus; ovarium liberum, glabrum, ovatum; stigmata 3, ovato-acuta; bacca globosa, in vivo pellucida et rubra, in sicco nigra, circiter 4 mm. diametro, ejus stipes paullo brevior.

PERAK;—Maxwell's Hill, at 2,500 ft. *Wray* 1734!

26. Piper mucronatum C. DC. n. sp.

Dioicum, scandens vel repens? Ramuli glabri, spiciferi 1 mm. crassi, fasciculi intramedullares uniseriati. Folia breviter petiolata, glabra; limbus in sicco coriaceus, usque ad 10.5 cm. longus et 42 mm. latus, oblongo-ellipticus, basi aequilatera obtusus, apice acute et sat longe acuminatus, 5-plinervius, nervo centrali nervos adscendentes oppositos 2 a 10 mm. supra basin mittente, nervo laterali adscendente utrinque a basi soluto; petiolus 6 mm. longus, fere usque ad medium vaginans. Pedunculi glabri, 6 mm. longi. Spicae ♀ fere 21 cm. longae; rhachis puberula; bractea glabra rhachi adnata, lineari-oblonga, utrinque obtusa, circiter 2 mm. longa; bacca glabra, elliptica, apice in stilum distincte contracta, 5 mm. longa, stipite suo multo longior.

PENANG;—Sungei Ugong, *Ridley* 2126!

27. Piper longibracteum C. DC. n. sp.

Dioicum. Ramuli glabri in sicco fusciscentes, spiciferi 1·9 mm. crassi; collenchyma libriforme in fasciculos discretos tenues dispositum; fasciculi intramedullares uniseriati; canalis lysigenus unicus centralis. Folia sat longe petiolata, glabra; limbus 11·5 cm. longus, 5—6 cm. latus, elliptico-lanceolatus, basi æquilatera acutus, apice acute acuminatus, 7-plinervius, nervo centrali nervos adscendentes alternos 2 mittente quorum supremus a 16 mm. supra basin solutus, nervis lateralibus adscendentibus utrinque 2 a basi solutis; petiolus tenuis, 12-16 mm. longus, basi ima vaginans. Pedunculi glabri, 16 mm. longi, tenues. Spica ♀ 10·5 cm. longa; rhachis glabra, 1 mm. crassa; bractea glabra pelta oblongo-obovata, inferne attenuata, fere 2·2 mm. longa, supra centrum sessilis; ovarium liberum, glabrum; stigmata 4, ovato-acuminata; bacca elliptica, in sicco nigra, 4 mm. longa, ejus stipes paullo brevior.

PERAK;—Maxwell Hill, *Wray* 101!

28. Piper xanthocarpum C. DC. n. sp.

Dioicum, scandens. Ramuli glabri in sicco fusciscentes, spiciferi 1 mm. crassi; collenchyma continuum libriforme; fasciculi intramedullares uniseriati; canalis lysigenus unicus centralis; cellulæ aurantiacæ in cortice et in medulla crebræ. Folia breviter petiolata; limbus supra glaber, subtus puberulus, usque ad 14·5 cm. longus et 6 cm. latus elliptico-lanceolatus, basi æquilatera acutus, apice acute acuminatus, 7—9-plinervius, nervo centrali nervos adscendentes utrinque 1—2 mittente quorum supremus a 26—39 mm. supra basin solutus, nervis lateralibus adscendentibus utrinque 2 a basi solutis; petiolus glaber, basi ima vaginans circiter 6 mm. longus. Pedunculi glabri, usque ad 26 mm. longi, tenues. Spicæ ♀ usque ad 12 cm. longæ; rhachis hirsuta, usque ad 2 mm. crassa; bractea glabra, oblonga, inferne subattenuata, apice rotundata rhachi adnata et tantum marginibus libera, 3 mm. longa et usque ad 1 mm. lata; ovarium liberum, glabrum, ovatum; stigmata 3—4, ovato-acuminata; bacca globosa, circiter 3 mm. diametro, in vivo aurantiaca, in sicco nigra, stipite suo longior.

PERAK; at 1,000 feet altitude, *Wray* 3795!

29. Piper larutanum C. DC. n. sp.

Dioicum, ad arbores proceras scandens, 3—5·5 m. longum. Ramuli glabri, spiciferi 2 mm. crassi; collenchyma fere continuum, libriforme; fasciculi intramedullares uniseriati; canalis lysigenus centralis canalesque peripherici plures; cellulæ fuscae in cortice et in medulla crebræ. Folia

brevissime petiolata, glabra; limbus in sicco rigido-membranaceus et crebre pellucido-punctatus, 13—16 cm. longus, 4.8—7.0 mm. latus, oblongo-ellipticus, basi inæquilatera, altero latere rotundatus, altero attenuatus, apice acute acuminatus, penninervius, nervo centrali fere e tota longitudine sua nervos multos patulos subadscendentes mittente; petiolus usque ad limbi latus longius 2 mm. inter limbi latera 2 mm. longus, basi ima vaginans. Pedunculi glabri, 16 mm. longi. Spicæ ♀ 5.6 cm. longæ, in vivo albæ, in sicco nigræ; rhachis hirsuta; bractea oblonga, utrinque rotundata, 1.5 mm. longa, paullo sub 1 mm. lata, rhachi adnata et tantum marginibus minute ciliatis libera; ovarium liberum, glabrum; stigmata 3—4, ovato-acuminata; baccæ inter flores sparsæ, globosæ, 4 mm. diametro, in vivo rubræ, in sicco nigræ.

PERAK;—Larut, September, *Kunstler* 3327!

30. *Piper collinum* C. DC. n. sp.

Dioicum, scandens, caule tenui 3.5—4.5 m. longo. Ramuli glabri spiciferi 2 mm. crassi; collenchyma continuum, haud libriforme; fasciculi intramedullares uniseriati; canalis lysigenus periphericus nullus cellulæ flavo-rubescens in cortice et in medulla sparsæ. Folia breviter petiolata; limbus in sicco membranaceus, subtus nigro-punctulatus, 13—16 cm. longus, 4.8—7 cm. latus, elliptico-lanceolatus, basi æquilatera acutus, apice acute acuminatus, penninervius, nervo centrali nervos tenues patulo-subadscendentes utrinque 4 mittente, quorum supremus fere a 6 cm. supra basin solutus; petiolus 6 mm. fere usque ad medium suum vaginans. Pedunculi 30 mm. longi. Spicæ ♀ 8 cm. longæ; rhachis hirsuta; bracteæ glabræ pelta obovata, centro subsessilis, 1.5 mm. longa; ovarium liberum, glabrum, ovatum, apice acutum; stigmata 3, linearia; bacca ovata, apice acuta, in sicco nigra, 5 mm. longa, ejus stipes 1.5 mm. longus. Baccæ inter flores perpaucae.

PERAK;—Larut, Goping, on limestone hills at 300—500 ft. April, *King's collector* 5906! *Scortechini*!

31. *Piper muricatum* Bl. forma *peninsulare* C. DC. n. f.

Dioicum, 1—3.5 m. altum. Ramuli dense hirsuti, spiciferi 3 mm. crassi, pili fere 1.7 mm. longi; collenchyma fere omnino libriforme, in fasciculos discretos a latere productos dispositum vel continuum et partim libriforme; fasciculi intramedullares uniseriati; canalis lysigenus centralis canalesque peripherici plures. Folia modice petiolata; limbus in sicco membranaceus, utrinque pilosus, usque ad 17 cm. longus et 7 cm. latus, oblongo-ellipticus, basi inæquilatera haud profunde cordatus,

apice breviter acuminatus, nervo centrali nervos adscendentes utrinque 3—4 mittente quorum supremus a 5.5—7.5 cm. supra basin solutus; petiolus dense hirsutus, basi ima vaginans, usque ad limbi latus longius 8 mm. inter limbi latera 2 mm. longus. Pedunculi petiolis æquilongi, dense pilosi. Spicæ ♀ foliis pluries breviores, fere 4 cm. longæ; rhachis hirsuta; bractæe glabræ pelta obovata, 2 mm. longa, 1 mm. lata, centro pedicellata, pedicellus latus cellulis gelifactis fartus; ovarium liberum, ovatum, glabrum; stigmata 3—5, linearia; bacca ovato-globosa, apice subacuta, 4 mm. longa, in vivo aurantiaca vel rubra, in sicco nigra; ejus stipes glaber, 2 mm. longus.

SELA IGOR;—15th mile, Pahang tract, *Ridley* 8531!: PERAK;—*Scortechini* 314a! Larut, Waterfall Hill at 500 ft. *Wray* 4237!. *Ridley* 11025! *Kunstler* 2880, 1958!

Forma PILISTIPES C. DC. n. f.

Herba circiter 60 cm. alta; limbus subobovato-ellipticus, basi leviter inæquilatera rotundatus, apice acute acuminatus; baccæ stipes hirtellus.

SELANGOR;—Kwala Lumpur, *Ridley* 4685!: PERAK;—Waterfall Hill *Wray* 2076!

32. *Piper protractum* C. DC. n. sp.

Dioicum vel monoicum cum spicis androgynis. Ramuli dense hirsuti cum pilis 1 mm. longis spiciferi fere 6 mm. crassi; collenchyma continuum, partim libriforme; canalis lysigenus centralis canalesque peripherici plures. Folia breviter petiolata; limbus 20.8—33.8 cm. longus, 4.2—5.6 cm. latus, utrinque pilosus præsertim in nervis, oblongus, basi leviter inæquilatera cordulatus, apice subacuta acuminatus, penninervius, nervo centrali nervos utrinque 4 mittente quorum superi adscendentes et oppositi, inferi subadscendentes aliis multo tenuiores; petiolus subtus hirsutus, usque ad limbi latus longius 4 mm. inter limbi latera 6 mm. longus, ultra basin vaginans. Pedunculi hirsuti, circiter 12 mm. longi. Spicæ fere 8.7 cm. longæ, sæpe superne cum floribus masculinis; rhachis hirsuta; bractæe glabræ pelta obovata, inferne plus minusve attenuata; pedicellus brevissimus et crassus; ovarium liberum, ovatum, glabrum; stigmata 3—4, linearia; bacca globosa, apice acuta, 4 mm. longa, stipitem suum æquans.

JOHORE;—Cheng Kang, Gunong Pulai, *Castwood*!: SINGAPORE; Sunji Gurong, *Ridley* 588, 6723!

33. *Piper bipedale* C. DC. n. sp.

Dioicum, 60 cm. altum. Ramuli hirsuti, spiciferi 2 mm. crassi; collenchyma haud libriforme, in fasciculos discretos a latere productos dispositum; fasciculi intramedullares uniseriati; canalis lysigenus centralis canalesque peripherici plures. Folia modice petiolata; limbus in sicco membranaceus, supra ad nervos, subtus ubique et densius hirsutus, 20 cm. longus et usque ad 7 cm. latus, obovato-oblongus, basi leviter inæquilatera, altero latere rotundatus altero attenuatus, apice acute acuminatus, penninervius, nervo centrali nervos utrinque 4—5 mittente quorum supremi adscendentes alii minus adscendentes multo tenuiores; petiolus dense hirsutus, usque ad limbi latus longius 10 mm. inter limbi latera 4 mm. longus, basi ima vaginans. Pedunculi hirsuti, 12 mm. longi. Spicæ ♀ circiter 32 mm. longæ, in vivo virides; rhachis hirsuta; bracteæ glabræ pelta obovata, 1.5 mm. longa, centro breviter pedicellata, pedicellus cellulis gelifactis farctus; ovarium glabrum, ovato-acuminatum; stigmata 3, linearia, acuta; bacca ovato-globosa, apice acuta, 4 mm. longa, stipite suo multo longior.

PERAK; at 300 ft. *Wray* 3710 l.

34. *Piper Ridleyi* C. DC. n. sp.

Dioicum, erectum, 60—90 cm. altum. Ramuli dense hirsuti; spiciferi 4 mm. crassi, pili circiter 1 mm. longi; collenchyma parce libriforme in fasciculos discretos dispositum; fasciculi intramedullares uniseriati; fasciculi cellularum sclerosarum inter collenchyma et fasciculos fibro-vasculares periphericos; canalis lysigenus centralis canalesque peripherici plures. Folia breviter petiolata; limbus in sicco membranaceus, utrinque hirsutus, circiter 25 cm. longus, 12 cm. latus, lanceolato-ellipticus, basi subæquilatera acutus, apice acute acuminatus, penninervius, nervo centrali nervos adscendentes utrinque 5 mittente quorum supremus a 6.5 cm. supra basin solutus; petiolus hirsutus, usque ad 10 mm. longus. Pedunculi hirsuti, in mare 14 mm. in femina 22 mm. longi. Spicæ ♂ fere 10.5 cm. longæ et 2 mm. crassæ; rhachis hirsuta; bracteæ glabræ pelta obovata, inferne subacuta, 1.5 mm. longa; pedicellus crassus, cellulis gelifactis farctus; stamina 2, antheræ rotundatæ. Spica ♀ 12 cm. longa; rhachis hirsuta; bracteæ pelta obovata usque ad 2 mm. longa et 1.5 mm. lata; pedicellus ut in mare; ovarium liberum, glabrum; stigmata 4, linearia, acuta; bacca globosa, fere 3 mm. diametro, ejus stipes minute puberulus, 4 mm. longus.

SELANGOR;—Suiting Peras, May, *Ridley* 7609 ! 15 miles from Palang Track 8519 ! PERAK; Maxwell Hill, *Curtis* 2047 ! Waterloo 2697 !; rich soil, rocky locality, high hills, alt. 330—500 m. August, *Kunstler* 10784 ! Gunong Batu Patek, lower camp, alt. 1100 m. *Wray*, 428 !

FORMA β ; collenchyma continuum et fere omnino libriforme ; limbus basi obtusus. Spicæ androgynæ. Flores superi masculi ; inferi bisexuales.

PERAK ;—Ulu Kerling, dense bamboo forest, at 500—700 ft., flower light yellow, fruit sealing-wax red, *Kunstler* 8810 !

C. BACCA IGNOTA.

1. BRACTEA RHACHI HAUD ADNATA.

35. *Piper nigrantherum* C. DC. n. sp.

Dioicum. Ramuli glabri, spiciferi 2 mm. crassi ; collenchyma haud libriforme, in fasciculos crassos a latere valde productos dispositum vel subcontinuum ; fasciculi intramedullares uniseriati ; canalis lysigenus periphericus nullus ; cellulæ rubræ in cortice et in medulla creberrimæ. Folia modice petiolata, glabra ; limbus in sicco firmo-membranaceus, minute pellucido-punctulatus, usque ad 16·5 cm. longus et 9 cm. iatus, ample ovatus, basi inæquilatera cordatus, lateribus ad petiolum æquilongis altero a petiolo longiore et latiore, apice acute acuminatus, 8-plinervius, nervo centrali utrinque nervos 2 adscendentes mittente quorum supremus a 16 mm. supra basin solutus, nervis lateralibus altero latere 3 altero 2 a basi solutis quorum externus aliis multo brevior ; petiolus fere 15 mm. longus, usque ad medium suum vaginans. Pedunculi petiolos æquant, glabri. Spicæ ♂ florentes, circiter 9 cm. longæ, fere 3·5 mm. crassæ ; rhachis hirsuta ; bracteæ glabræ pelta obovata, inferne attenuata, centro pedicellata ; pedicellus clavatus ; stamina 2, antheræ ovatae, filamentis breviores, in sicco saturate nigræ.

SINGAPORE ; in horto botanico et verisimiliter spontanea quaque, *Ridley* !

36. *Piper filipes* C. DC. n. sp.

Dioicum, repens. Caulis et ramuli tenuissimi, glabri ; ramuli spiciferi usque ad 1 mm. crassi ; collenchyma libriforme in fasciculos discretos dispositum ; fasciculi intramedullares uniseriati ; canalis lysigenus unicus centralis ; zona cellularum sclerosarum interfascicularis. Folia breviter petiolata, glabra ; limbus in sicco membranaceus, minute

et rubescente pellucido-punctatus, circiter 9 cm. longus et 4 cm. latus, basi fere rotundatus, lateribus æquilongis altero paullo latiore, apice acute attenuatus, 5-plinervius, nervo centrali nervos 2 ascendentes oppositos suboppositosve mittente quorum supremus a 6 mm. supra basin solutus, nervo laterali adscendente utrinque e basi soluto; petiolus tenuissimus, 7 mm. longus, paullo ultra basin vaginans. Pedunculi filiformes, glabri, fere 28 mm. longi. Spicæ ♂ 16 mm. longæ et fere 1 mm. crassæ, in vivo albæ; rhachis hirsuta; bracteæ glabræ pelta rotunda, 0.5 mm. diametro, centro breviter pedicellata; stamina 3, brevissima, antherae rotundatæ, 4-valvatæ.

PERAK;—Larut at 3,200—3,500 ft., in open jungle, in rocky rich soil, *Kunstler* 2122!

37. *Piper rufibracteum* C. DC. n. sp.

Dioicum. Ramuli glabri, in sicco fuscescentes, spiciferi 1 mm. crassi; collenchyma subcontinuum et fere libriforme; fasciculi intramedullares uniseriati; canalis lysigenus nullus. Folia brevissime petiolata, glabra; limbus in sicco subcoriaceus, creberrime pellucido-punctulatus, usque ad 9.5 cm longus et 3.5 cm. latus, oblongo-ellipticus, basi inæquilatera utrinque rotundatus, apice breviter et obtuse attenuatus, 9-plinervius, nervo centrali nervos adscendentes 2 mittente quorum supremus a circiter 29 mm. supra basin solutus, nervis lateralibus utrinque 3 a basi solutis, quorum externus aliis magis arcuatus tenuior et brevior; petiolus usque ad limbi latus longius 2.5 mm. inter limbi latera 3 mm. longus, paullo ultra basin vaginans. Pedunculi glabri 4.2 mm. longi. Spicæ ♂ subflorentes circiter 25.5 mm. longæ et 1 mm. crassæ; rhachis glabra; bracteæ pelta obovata, inferne subattenuata, extus dense rufo-pubescentis; pedicellus glaber, brevis et carnosus, cellulis gelifactis fartus; stamina 2 vel 3? antheræ ovatæ, 4-valvatæ, filamentis oblongis breviores.

MALACCA; *Maingay* 1329!

38. *Piper Kunstleri* C. DC. n. sp.

Dioicum, erectum, 60—90 cm. altum. Ramuli glabri, in sicco fuscescentes, spiciferi 0.5 mm. crassi; collenchyma continuum, parce libriforme; fasciculi intramedullares uniseriati; canalis lysigenus unicus centralis. Folia brevissime petiolata, glabra; limbus in sicco membranaceus, minute pellucido-punctulatus, 12.5 cm. longus, 4.5 cm. latus, elliptico-oblongus, basi leviter inæquilatera altero latere attenuatus altero paullo latiore rotundatus, penninervius, nervo centrali utrinque nervos 3 adscendentes mittente quorum supremus 25—30 mm. supra

basin solutus; petiolus circa 2 mm. longus, basi ima vaginans. Pedunculi glabri, tenuissimi, 6 mm. longi. Spicae ♂ florentes fere 21 mm. longae et 2 mm. crassae; rhachis hirsuta; bractea pelta orbicularis, glabra, paullo ultra 0.5 mm. diametro, centro pedicellata; pedicellus hirsutus; stamina 3, antherae ovatae, 4-valvatae, filamentis oblongis sat longis breviores.

PENANG:—In dense jungle, rocky soil, February, *Kunstler* 1315!

39. *Piper curtipetiolum* C. DC. n. sp.

Dioicum. Ramuli glabri, in sicco rubro-fuscescentes, spiciferi fere 1 mm. crassi; collenchyma haud libriforme, in fasciculos a latere productos dispositum; fasciculi intramedullares uniseriati; canalis lysigenus periphericus nullus. Folia breviter petiolata, glabra; limbus in sicco membranaceus, minute pellucido-punctulatus, 8.5 cm. longus, 2.6 cm. latus, elliptico-lanceolatus, basi æquilatera acutus apice acute acuminatus, 5-plinervius, nervo centrali nervos 2 adscendentes alternos mittente, quorum supremus a circa 17 mm. solutus, nervo laterali adscendente utrinque a basi soluto; petiolus 5 mm. longus, basi ima vaginans. Pedunculi glabri, tenuissimi, fere 5 mm. longi. Spicae ♂ circa 17 mm. longae et 1.5 mm. crassae; rhachis hirsuta; bractea glabra pelta rotunda, fere 1 mm. diametro, centro subsessilis; stamina 3, inæquilonga, antherae ovatae, filamentis oblongis adultis multo breviores.

PERAK; *Scortechini*!; Gunong Enas, *Wray* 4145!

40. *Piper erecticaule* C. DC. n. sp.

Dioicum, erectum. Ramuli glabri, spiciferi 1 mm. crassi; collenchyma continuum, libriforme, sat crassum; fasciculi intramedullares uniseriati; canalis lysigenus unicus centralis. Folia breviter petiolata, glabra; limbus in sicco membranaceus et subtus nigro-punctulatus, usque ad 15 cm. longus et 4 cm. latus, elliptico-oblongus, basi acutus, lateribus æquilongis paullulo inæquilatis, apice acute acuminatus, 8-plinervius, nervo centrali nervos adscendentes altero latere 2 altero 3 mittente quorum supremus a 3 cm. supra basin solutus, nervo laterali adscendente aliis multo brevior utrinque a basi soluto; petiolus usque ad 5 mm. longius, basi ima vaginans. Pedunculi 7 mm. longi, glabri. Spicae ♂ florentes 13 mm. longae; rhachis hirsuta; bractea glabra pelta rotunda, 1 mm. diametro, fere centro breviter pedicellata; stamina 3, antherae ovatae.

KEDAH;—Woods, Kedah Park; erect pepper, June, *Ridley*!

41. *Piper eucalyptolimbium* C. DC. n. sp.

Dioicum, scandens, caule 4·5—6 m. longo. Ramuli in sicco saturate fuscescentes, spiciferi 0·5 m. crassi; collenchyma partim libriforme, in fasciculos discretos dispositum; fasciculi intramedullares uniseriati; canalis lysigenus unicus centralis. Folia breviter petiolata, glabra; limbus in sicco membranaceus, minute et rubescente pellucido-punctulatus, usque ad 14·5 cm. longus et 4 cm. latus, elliptico-lanceolatus, basi leviter inæquilatera acutus, apice acute acuminatus, 7-plinervius, nervo centrali utrinque nervos 2 adscendentes et tenues mittente, quorum supremus a 5·7 cm. solutus, nervo laterali adscendente a basi soluto; petiolus 6·3 mm. longus, basi ima vaginans. Pedunculi 8·5 mm. longi, tenuissimi. Spicæ ♂ subflorentes 6·5 cm. longæ et 2 mm. crassæ; rhachis hirsuta; bractæ glabrae pelta subobovato-elliptica, 1·5 mm. longa; pedicellus brevi et crassus, cellulis gelifactis faretus; stamina 2, antheræ ellipticæ, 2-valvatæ.

PERAK;—Larut, at 2,800—3,000 ft. *King's collector* 3228 !.

42. *Piper subrubrispicum* C. DC. n. sp.

Dioicum, circiter 90 cm. altum. Ramuli sat longe hirsuti, spiciferi 3 mm. crassi; collenchyma continuum, haud libriforme; canalis lysigenus unicus centralis. Folia longe petiolata; limbus in sicco membranaceus, crebre pellucido-punctatus, supra glaber, subtus hirsutus, usque ad 15 cm. longus et 14 cm. latus, rotundato-ovatus, basi æquilatera profunde cordatus, apice obtuse acuminatus, 9-ninervius, nervo centrali nervos 2 adscendentes oppositos a 4·2 mm. supra basin mittente, nervis lateralibus utrinque 3 a basi solutis; petiolus fere 6 cm. longus, dorso hirsutus, fere usque ad 14·5 mm. supra basin vaginans, stipulis extus dense pubescentibus. Pedunculi 6·3 mm. longi, hirsuti. Spicæ ♀ florentes fere 6 cm. longæ et 4·2 mm. crassæ, apice obtusæ, in vivo albæ et subrubro-maculatæ, in sicco nigrescenti-rubræ; rhachis glabra; bractæ glabrae pelta oblongo-obovata, inferne attenuata, centro breviter pedicellata; stamina 3, antheræ reniformes, 4-valvatæ, filamentis oblongis breviores.

PERAK;—Upper land, *Wray* 3579 !.

43. *Piper longamentum* C. DC. n. sp.

Dioicum, scandens? Rami hirsuti, in sicco fuscescentes, spiciferi fere 1 mm. crassi, hirtelli; collenchyma in fasciculos discretos a latere productos dispositum et zona interna libriforme; fasciculi intramedul-

lares uniseriati; canalis lysigenus unicus centralis. Folia breviter petiolata; limbus in sicco membranaceus, minute pellucido-punctulatus, usque ad 10·5 cm. longus et 3·5 cm. latus, oblongo-ovato-lanceolatus, basi æquilatera acutus, apice acute et sat longe acuminatus, supra parce et subtus sat dense pubescens, 5-plinervius, nervo centrali nervos 2 adscendentes oppositos a fere 14·7 mm. supra basin mittente, nervo laterali adscendente utrinque a basi soluto; petiolus fere 6·3 mm. longus, dense hirtellus. Pedunculi fere glabri, 8·4 mm. longi, tenues. Spicæ ♂ circiter 14 cm. longæ, 1·5 mm. crassæ; rhachis hirsuta; bracteæ glabræ pelta rotunda, fere 1 mm. diametro; stamina 2, antheræ ovatae, 4-valvatae, filamentis oblongis fere æquilongæ.

PERAK;—Larut, at 2,800—3,000 ft. August, *Kunstler* 3207 !.

44. *Piper subsessililimum*, C. DC. n. sp.

Dioicum, scandens, cirrhis ramulosis. Ramuli glabri in sicco fuscescentes, spiciferi fere 1 mm. crassi; collenchyma libriforme in fasciculos discretos a latere valde productos dispositum; canalis lysigenus centralis canalesque peripherici numerosi; fasciculi intramedullares uniseriati; cellulæ fuscae in cortice et in medulla crebrae. Folia subsessilia, glabra; limbus in sicco membranaceus, minute pellucido-punctulatus, usque ad 19 cm. longus et 5 cm. latus, subobovato-elliptico-lanceolatus, basi acutus, lateribus inæquilongis æquilatis, penninervius, nervo centrali nervos subpatulos circiter 20 fere a tota longitudine sua utrinque mittente; petiolus usque ad limbi latus longius 2 mm. inter limbi latera 1 mm. longus, basi ima vaginans. Pedunculi glabri, 8·4 mm. longi. Spicæ ♂ juveniles fere 6 cm. longæ, usque ad 2 mm. crassæ, in vivo flavæ; rhachis hirtella; bracteæ glabrae pelta longitudinaliter elliptica, centro breviter pedicellata.

PERAK;—Near Goping in dense jungle, August, *Kunstler* 578 !.

2. BRACTEA RHACHI ADNATA.

45. *Piper obovantherum* C. DC. n. sp.

Dioicum. Ramuli glabri in sicco fusci, spiciferi 1 mm. crassi, in 2 mm. crassis collenchyma libriforme in fasciculos discretos, dispositum; fasciculi intramedullares uniseriati; canalis lysigenus unicus centralis. Folia petiolata, glabra; limbus in sicco membranaceus, usque ad 14 cm. longus et 9 cm. latus, ellipticus, basi leviter inæquilatera subrotundatus, lateribus æquilatis paullo inæquilongis, apice acute

acuminatus, 7-plinervius, nervo centrali nervos adscendentes utrinque 2 mittente quorum supremus fere a 12 mm. supra basin solutus, nervis lateralibus adscendentibus utrinque 2 a basi solutis; petiolus usque ad limbi latus longius 10 mm. inter limbi latera 2 mm. longus, basi ima vaginans. Pedunculi glabri, 18 mm. longi, tenuissimi. Spica ♂ florens circiter 52 mm. longa, fere 1 mm. crassa; rhachis hirtella; bractea obovato-oblonga, inferne subattenuata, apice obtusa, minute ciliolata, cæterum glabra, usque ad 2.5 mm. longa et 1 mm. lata; stamina 3, antheræ obovatæ, 4-valvatæ, filamentis oblongis paullo longiores.

PERAK:—Government Hill, March, *Ridley* 2732!

Forsan *P. Zuccarini* C. DC. in Prodr. xvi, 1. p. 265 mas.

46. *Piper argyrites* Ridl. mss.

Dioicum. Ramuli glabri in sicco fuscescentes, spiciferi 1.5 mm. crassi; collenchyma continuum, sparsim libriforme; fasciculi intramedullares uniseriati; canalis lysigenus unicus centralis. Folia modice petiolata, glabra; limbus in sicco firmus, minute pellucido-punctulatus, usque ad 18 cm. longus et 6 cm. latus, oblongo-ovatus, basi leviter inæquilatera rotundatus, apice acute acuminatus, 7-plinervius, nervo centrali nervos adscendentes 2 mittente quorum supremus a 15 mm. supra basin solutus, nervis lateralibus utrinque 2 a basi solutis, quorum externus subadscendens aliis multo tenuior et brevior; petiolus usque ad limbi latus longius 10 mm. inter limbi latera 2 mm. longus, usque ad medium suum vaginans. Pedunculi glabri, 25 mm. longi. Spicæ ♂ subflorentes 8 cm. longæ et 3 mm. crassæ; rhachis hirsuta; bractea glabra, rhachi adnata et margine libera, usque ad 1.5 mm. longa; stamina 2, antheræ reniformes, 4-valvatæ, filamenta antheris æquilata.

SELANGOR;—Gua Batu, December *Ridley* 8176!, Ginding Bidai, May 7611!.

SECTIO. MULDERA HOOK, F. Flor. Brit. Ind. v, 79.

Sectio *Schizonephros* C. DC. in Prodr. xvi, I, 241 emend.

Spicæ oppositifoliæ. Bracteæ rhachi adnatæ extremitatibus inferis et superis inter se in receptaculum floriferum connatæ. Flores unisexuales. Stamina 2—10 in receptaculo transverse uniseriata vel biseriata. Ovarium liberum, in receptaculo unicum vel ovaria 2—4 in receptaculo transverse uniseriata.

47. *Piper pentandrum* C. DC. n. sp.

Dioicum, scandens. Ramuli glabri, in sicco fuscescentes, spiciferi 2 mm. crassi; collenchyma libriforme, in fasciculos discretos a latere

productos dispositum ; fasciculi intramedullares uniseriati ; canalis lysigenus unicus centralis aut nullus ; zona cellularum sclerosarum fasciculos fibrovasculares periphericos arcte cingens. Folia modice petiolata, glabra ; limbus in sicco coriaceus, in foliis superis 9—12·5 cm. longus, 3·5—5 cm. latus, in inferis usque 12·5 cm. longus et 7·5 cm. latus, elliptico-lanceolatus, basi æquilatera acutus, apice acute acuminatus, 7-plinervius, nervo centrali nervos 2 adscendentes alternos vel oppositos mittente quorum supremus a 10·5—12·5 mm. supra basin solutus, nervis lateralibus adscendentibus utrinque 2 a basi solutis ; petiolus in foliis superis circiter 10·5 mm. longus, basi ima vaginans. Pedunculi glabri petiolis æquilongi. Spicæ ♂ circiter 27 mm. longæ et 3 mm. crassæ, dense floriferæ ; rhachis juvenilis glandulis asperulata, dein glabra ; receptacula sessilia, condensata, elliptica, bilabiata, extus glabra, intus pilosa, lignescentid ; stamina 5, raro 6, antheræ ovatæ, 4-valvatæ, filamentis oblongis breviores. Spicæ ♀ circiter 27 mm. longæ et 4 mm. crassæ ; ovarium liberum, ovatum, glabrum ; stigmata 3, elliptico-acuta ; bacca globosa, 5 mm. diametro.

PERAK ;—Upper land, at 300 ft. June, *Wray* 3655 !, *Scortechini* 114a !

β magnifolium Ramuli crassiores ; collenchyma continuum vel subcontinuum ; canales lysigeni peripherici plures ; zona cellularum sclerosarum nulla. Limbus ellipticus, fere 12 cm. longus et 7·5-10 cm. latus. Pedunculi et spicæ ♀ fere 26 mm. longi.

PERAK ; *Scortechini* 779 !

48. *Piper flavimarginatum* C. DC. n. sp.

Dioicum. Ramuli glabri, in sicco fuscescentes, spiciferi 2 mm. crassi ; collenchyma libriforme continuum ; fasciculi intramedullares uniseriati ; canalis lysigenus centralis canalesque peripherici ; in ramulis 4 mm. crassis zona adest cellularum sclerosarum continua fasciculos fibrovasculares periphericos arcte cingens. Folia modice petiolata, glabra ; limbus ellipticus, basi inæquilatera acutus, apice acute acuminatus, fere 12 cm. longus et 8 cm. latus, 7-plinervius, nervo centrali nervos adscendentes utrinque 2 mittente, quorum supremus a circiter 23 mm. supra basin solutus, nervo laterali adscendente utrinque a basi soluto ; petiolus usque ad limbi latus longius 8·5 inter limbi latera 6·3 mm. longus, basi ima vaginans. Pedunculi glabri, fere 26 mm. longi. Spicæ ♂ 6·3 cm. longæ ; rhachis glabra ; receptacula subsessilia, distantia, elliptica, bilabiata, extus glabra, intus hirsuta : stamina 8, 1-seriata ; antheræ ovatæ, 4-valvatæ, filamentis oblongis breviores.

Chan-chu-kan, *Ridley* 3772 ! ?

49. *Piper rarispicum* C. DC. n. sp.

Dioicum. Ramuli glabri, in sicco nigrescentes, spiciferi 1 mm. crassi; collenchyma continuum libriforme; canalis lysigenus centralis canalesque lysigeni plures; fasciculi intramedullares uniseriati. Folia modice petiolata, glabra; limbus 10.5—13 cm. longus, 5.8—7 cm. latus, ovatus, basi leviter inæquilatera rotundatus, apice acute et sat breviter acuminatus, 7-plinervius, nervo centrali nervos 2 adscendentes mittente quorum supremus a 14.5—16.5 mm. supra basin solutus, nervis lateralibus 2 a basi solutis quorum externus aliis minus adscendens multo tenuior et brevior; petiolus 14.5—19 mm. longus. Pedunculi glabri, tenues, 29 mm. longi. Spicæ ♂ raræ, fere 5.9 cm. longæ; rhachis puberula; receptacula stipitata, elliptica, utrinque velutino-puberula, diandra; antheræ obovatæ, 4-valvatæ, fere 0.5 mm. longæ, filamentis oblongis æquilongæ.

PENANG;—road to Sungei Penang, at 1,500 ft. March, *Curtis* 1771 !

50. *Piper polygynum* C. DC. n. sp.

Dioicum, scandens, caule usque ad 13 cm. crasso. Ramuli glabri in sicco fuscescentes, spiciferi 1 mm. crassi; collenchyma in 3 mm. crassis libriforme in fasciculos discretos dispositum; fasciculi intramedullares uniseriati; canalis lysigenus nullus; zona cellularum sclerosarum continua, fasciculos fibrovasculares arcte cingens. Folia modice petiolata, glabra; limbus in sicco coriaceus, circiter 13 cm. longus, 6.5 cm. latus, ellipticus, basi leviter inæquilatera attenuatus, apice acute et breviter acuminatus, penninervius, nervo centrali nervos 3 adscendentes alternos utrinque mittente quorum supremus a 29 mm. supra basin solutus; petiolus usque ad limbi latus longius 12.5 mm. inter limbi latera 2 mm. longus, basi ima vaginans. Pedunculi glabri, 29 mm. longi, tenues. Spicæ ♀ limbis fere æquilongæ; rhachis minute puberula; receptacula sat distantia, sessilia, transverse elliptica, extus minute, velutina, intus dense hirsuta; ovaria in eodem receptaculo 3—4, transverse inserta, libera, sessilia, ovata, apice velutina, quorum unum tantum maturescens; stigmata 3, linearia; bacca globosa, glabra, circiter 5 mm. crassa.

PENANG;—Sungei Ugong, *Stephenson* !. SELANGOR;—Gunong Pass, May, at 3,500 ft., *Wray* 4068 !

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RECORDS
OF THE
BOTANICAL SURVEY OF INDIA

VOLUME VI.—No. 2

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BY

W. W. SMITH, S. O. BANERJI & M. S. RAMASWAMI

(2) NEW INDIAN DIDYMOCARPI

BY

W. W. SMITH

(3) A NOTE ON THE HIMALAYAN SPECIES OF DAPHNE

BY

W. W. SMITH & G. H. OAVE



CALCUTTA
SUPERINTENDENT GOVERNMENT PRINTING, INDIA
1913

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TWO DECADES OF NEW INDO-BURMESE SPECIES.

By

W. W. Smith, S. C. Banerji & M. S. Ramaswami.

Gynura travancorica W. W. Smith, sp. nov.

Species affinis *Gynuræ hispidæ* Thwaites (*G. pseudo-China* DC. var. *hispidæ* in Fl. Br. Ind.) sed robustior, ramosa, et inter alia acheniis hispidis distincta.

Planta erecta, 80—120 cm. alta. *Caulis* robustus usque ad 8 mm. diametro, ramosus, striatus, fulvido-furfuraceo-hispidus, internodis ad 20 cm. longis. *Folia* (inferiora non visa) alterna, sessilia, semiamplexicaulia, ad 10 cm. longa, ad 4 cm. lata, oblonga, apice subacuta, ad basin insertione lata paululum cuneata, remote et grosse serrata, supra plus minusve dense furfuraceo-hispida, infra densius, nervis obscuris; in regione inflorescentiæ folia multo minora, lineari-oblonga, bractæformia. *Corymbi* 3—4, capitula pauca circiter 5—6 gerentes, longæ circiter 20 cm. pedunculati, ramulis 2—4 cm. longis, furfuraceo-hispidis. *Capitula* circiter 2 cm. diametro, basi lata; involucri bractæ circiter 16, lineari-oblongæ, 12—15 mm. longæ, in medio 2.5 mm. latae, subacutæ, margine lato scarioso instructæ; paucae exteriores minores lineares additæ. *Receptaculum* planum, foveolatum. *Corolla* tubulosa, gracillima, 12 mm. longa, flava. *Styli* rami longi, subulati, hirtelli. *Achaenium* oblongum, 4 mm. longum, 1 mm. latum, striatum, hispidum. *Pappi* setæ copiosæ, albæ.

SOUTH INDIA:—At Devicolam, Travancore, at an altitude of 5—6,000 ft. *Meebold* No. 13,516 in Herb. Calc.!

Embelia Rodgeri W. W. Smith, sp. nov.

Species affinis *Embeliæ ferrugineæ* Wall. Cat. sed inflorescentiis, multo longioribus inter alia distincta.

Frutex?; altitudo non nota. *Caulis* subteres, sat robustus, lenticellis minutis albidis notatus, minute puberulus. *Folia* alterna, petiolo circiter 2 cm. longo puberulo prædita, late obovata, circiter 13 cm. longa, circiter 8 cm. lata, apice truncato-rotundata, basi plus minusve late cuneata, subcoriacea, margine integra vel paululum undulata, supra subglabra,

subnigra, infra multo pallidiora, minute dense fulvo puberula, nervis utrinque 5—6, supra obscuris immersis, infra eminentibus, nervulis distincte reticulatis. *Inflorescentiæ* masculinæ spicaeformes usque ad 12 cm. longæ, in axillis foliorum, in medio ramulo 1—3-natæ, simplices, raro ramosæ, graciles, flexuoso-ascendentes, puberulæ. *Flores* numerosi, basi inflorescentiæ rariores, in nodulos 1—3-flores interrupte dispositi, bracteis minutis subulatis suffulti, pedicellis vix 1 mm. longis, puberulis. *Calyx* vix 1 mm. longus, fere ad imum in lobos ovatos obtusos puberulos fissus. *Corolla* puberula, 2—3 mm. longa, fere ad imum in lobos ovatos obtusos partita. *Stamina* 5, corollæ dimidium superantia. *Flores femininæ fructusque* desunt.

BURMA:—Ruby Mines Division, Mogok in the Irrawaddy Valley, *Rodger* No. 26 in Herb. Calc. ! Burmese name Eikmwé.

***Argyrea coonoorensis* Smith et Ramas., sp. nov.**

Species affinis *A. hirsuta* Arn. et *A. pilosa* Arn.; foliis bracteisque inter alia differt.

Caulis volubilis, alte scandens, angulatus, plus minusve dense fulvo-strigilloso-pilosus. *Folia* ampla, 10—20 cm. longa, 7—15 cm. lata, plus minusve late ovata, apice acuta vel acuminata, basi saepius rotundata, nonnunquam cordatula, margine subintegra, undulata, supra sparse adpresse pilosa, densius in venis, infra dense fulvo-strigosa, densissime in venis, nervis circiter 10, paribus, utrinque conspicuis; petiolus ad 8 cm. longus, adpresse pilosus. *Inflorescentiæ* breviter cymosæ, 5—10-floræ, in axillis ad 5 cm. pedunculatæ. *Pedunculi* flexuosi, strigosi; pedicelli usque ad 5 mm. longi; bracteæ lineari-oblongæ, 1—2 cm. longæ, fulvo-strigosæ. *Flores* speciosi, fere 6 cm. longi. *Sepala* oblonga, vel rarius suborbicularia, 6—7 mm. longa, apice rotundata, subglabra. *Corolla* infundibularis, 5.5 cm. longa vel ultra, a basi angustata, 3 mm. lata, sensim ad 3.5 cm. ampliata, extus parce strigillosa; limbus plicatus, breviter lobatus. *Stamina* inclusa, filamentis basi dilatatis ibique glanduloso-hirsutulis; antheræ oblongæ. *Ovarium* 4-loculare, 4-ovulatum; stylus filiformis, stigmate globoso-didymo muricatulo præditus. *Fructus* deest.

S. INDIA:—Coonoor, Nilgiris, at an elevation of 6,000 ft. flowering in November-December; *Meebold* No. 12397 in Herb. Calc. !

***Christisonia Rodgeti* Smith et Banerji, sp. nov.**

Species affinis *C. calcaratae* Wight.

Planta herbacea parasitica, in sicco fuscescens. *Caulis* 3—4.5 cm. longus, circiter 6 mm. latus, erectus, rigidus, foliis viridibus destitutus.

squamis 8—10 mm. longis alternis ovatis obtusis integris coriaceis præditus. *Flores* pauci, 3—4 ut videtur, racemose dispositi, usque ad 3 cm. pedicellati, bracteis 1.5—1.8 cm. longis squamiformibus coriaceis ovatis acutis basi vaginantibus suffulti. *Calyx* tubuloso-spathaceus, 2—2.5 cm. longus, circiter 1 cm. latus, irregularis, paulo obliquus, coriaceus, glaber, minute verruculosus, antice ad mediam partem postice ad tertiam partem in lobos quatuor inaequales acutos fissus; (vel rarius in lobos tres, duos minores acutos et unum multo majorem obtusum). *Corolla* usque ad 6 cm. longa, circiter 1.5 cm. infra lobos lata, e basi angustata, ventricose ampliata, bilabiata, labio superiore rotundato-bilobo, labio inferiore multo minore, obscure trilobo. *Stamina* 4, inclusa, didynama, filamentis crassis antheris brevioribus; antheræ lato-oblongæ, circiter 3 mm. longæ, basi subsaccatæ; in staminibus longioribus ut videtur antheræ loculi ambo perfecti, in brevioribus unus perfectus, alter cassus, angustus, basi mucronatus. *Ovarium* superius, globosum, uniloculare stylo apice inflexo superne minute glanduloso stigmate magno globoso transverse bifido minute glanduloso præditum; placentæ duæ, magnæ, sub-2-partitæ, undique ovuliferæ. *Fructus* deest.

BURMA:—Ruby Mines Division, Mogok, at an altitude of 2,000 ft.; flowers in July; *Rodger* No. 159 in Herb. Calc.!

The dissections were made from the dried material and observations in the field are necessary for more complete description. A species which in its somewhat spathiform calyx and in the character of its stamens apparently comes as near to the genus *Aeginetia* as to *Christisonia*.

***Vitex carbuncolorum* Smith et Ramas., sp. nov.**

Species affinis *V. canescenti* Kurz sed inflorescentia, calycis dentibus, fructu recedit.

Arbor vel *frutex*; altitudo non nota. *Ramuli* graciles, teretes, striatuli, cinerei, glabrescentes, juniores minute dense fulvo-crispo-tomentelli; internodia 1—7 cm. longa; nodi incrassati. *Folia* opposita, trifoliata, petiolata; petiolus 2—4 cm. longus, fulvo-tomentellus, tandem glabrescens; petioluli laterales circiter 3 mm. longi, medianus 3—15 mm. longus; foliola ovata vel elliptica, 2—9 cm. longa, 1.5—4 cm. lata, mediana plerumque maxima, apice acuta vel obtusa vel breviter acuminata, basi cuneata vel rotundata, margine integra vel undulata vel remote et grosse serrata, (in eodem specimine), supra primo puberula, infra dense fulvo-tomentella, deinde utrinque glabrescentia, nervis 5—7, paribus, supra obscuris, infra distinctis eminentibus. *Inflorescentiæ* numerosæ, cymoso-paniculatæ, ramulos terminantes, 6—8 cm. longæ, longe pedunculatæ, dense tomentellæ; ped-

unculi in parte superiore ramosi, bracteis 2—3 mm. longis subulatis tomentellis instructi; pedicelli circiter 5 mm. longi. *Calyx* cupularis, 1.5 mm. longus, 1.25 mm. latus, in lobos quinque triangulares obtusos ad tertiam partem fissus, tomentellus. *Corolla* 8 mm. longa, basi 2 mm., ore 4 mm. lata, extus tomentella, intus glabra, ad tertiam partem fissa; tubus a basi ampliatus, 1.5—3.5 mm. latus; lobi rotundati. *Stamina* inclusa, didynamā, filamentis planis, dimidio inferiore hirsutulis. *Ovarium* ovoideum, 5 mm. longum, glabrum. *Fructus* ovicideus, circiter 1 cm. longus, 7—8 mm. latus, niger.

BURMA:—Ruby Mines Division in the Irrawaddy Valley; flowers April; *Rodger* Nos. 15, 145!; Upper Burma in the Shan Hills, *Abdul Huk* No. 153, in Herb. Calc.!

Polygonum Meeboldii W. W. Smith, sp. nov.

Species *Polygono arifolio* Linn. et *P. pedunculari* Wall. affinis sed foliis palmatifidis floribus majoribus distincta.

Planta erecta, 75—100 cm. alta, ut videtur; radix deest. *Caulis* sat robustus, in medio 5 mm. latus, in regione inflorescentiæ ramosus, flexuosus, striatus, setis rufis basi incrassatis reflexis vel patentibus plus minusve parce scabride indutus; internodi foliis duplo longiores. *Folia* petiolata, usque ad 15 cm. longa, ad 18 cm. lata, palmatifida ad medium vel ultra in lobos 5—7 sinibus rotundatis late divaricatos, plus minusve late lanceolatos vel ovatos, acutos vel acuminatos, margine undulatos, undique parce setosos crebrius in venis, usque ad 10 cm. longos, 2—6 cm. latos, venis multis parallelis pererratos; petiolus usque ad 6 cm. longus, robustus, setis crebris instructus; stipulæ ad 2 cm. longæ, ovatæ, acuminatæ, setosæ, foliis texturâ fere similes. *Flores* inter majores in capitula globosa 8—10-flora subracemoso-paniculata longe pedunculata compositi; pedunculi usque ad 10 cm. longi, 1—3-nati, in axillis foliorum normalium vel foliorum lanceolatorum bractæformium, flexuosi, setosi; bractæ lineares, 5—10 mm. longæ, setosissimæ, superiores involucrum formantes; pedicellus fere 1 mm. longus, sub perianthio articulatus. *Perianthium* campanulatum, ore paululum contractum, in lobos quinque triangulares apice obtusos vel rotundatos fissum, glabrum, circiter 4 mm. longum, circiter 2 mm. latum. *Stamina* 8, inclusa; in basi staminum interiorum papillæ binæ glandulosæ. *Ovarium* trigonum, stylis tribus ornatum. *Fructus* apiculatus, minutissime punctulatus, subnitens, 3 mm. longus, 2 mm. latus.

MANIPUR:—Near Barak, altitude 4—5,000 ft. *Meebold* No. 5730 in Herb. Calc. and Herb. Kew. and Herb. Breslau.!

forma minor.

Planta annua, 45—60 cm. alta, glabrior; inflorescentiæ ad 2—4 capitula longe pedunculata reductæ. A typo tamen haud remota.

MANIPUR:—Jhirighat, alt.? *Meebold* No. 4890 in the Herbaria already quoted!

The material of these two plants is far from ample. No. 4890 possibly represents young states of No. 5730.

Polygonum stellato-tomentosum Smith et Ramas., sp. nov.

Species *Polygono perfoliato* Linn. et *P. arifolio* Linn. affinis; foliis mediocriter petiolatis stellato-tomentosis stipulis foliaceis suborbicularibus margine longe setosis pedunculis glandulosis et setosis et stellato-tomentosis capitulis parvis conspicua.

Planta vagans, scandens, 60—100 cm. longa vel ultra; radix et caulis inferior desunt. *Caulis* superior flexuosus, gracilis, 2 mm. latus, striatus, ramosissimus, stellato-tomentosus, aculeis multis reflexis circiter 1 mm. longis ornatus; internodia 4—5 cm. longa. *Folia* alterna, petiolata, hastata, 2—4 cm. longa, basi 1.5—3 cm. lata, medio circiter 1 cm. lata, plus minusve acuta, utrinque stellato-tomentosa, supra sparse setosa, infra parcius; nervi secundarii obscuri; petiolus 1—3 cm. longus, setosus, stellato-tomentosus; stipulæ circiter suborbiculares, circiter 1 cm. diametro, amplexicaules, obtuse lobatulæ, utrinque stellato-tomentosæ, præsertim in margine et prope basin setosæ. *Flores* inter minores in capitula parva 2—6-flora corymbose paniculata longe pedunculata compositi; paniculæ 2—5 cm. longæ, ramuli flexuosi, stellato-tomentosi, setosi, glandulis multis nigro-capitatis instructi; pedunculi ultimi circiter 2 cm. longi; bracteæ inferiores 4—15 mm. longæ, lineares; bracteæ superiores involucrum formantes, obovatæ vel oblanceolatæ, setosæ; pedicellus sub perianthio articulatus, vix 1 mm. longus. *Perianthium* in sicco albidum, 5-partitum, glabrum. *Stamina* 5, eglandulosa. *Ovarium* trigonum, stylis tribus ornatum. *Fructus* inclusus, subacutus, circiter 3 mm. longus.

MANIPUR:—At Imphal, altitude 3,000 ft., *Meebold* No. 6439 in Herb. Calc. and Herb. Kew. and Herb. Breslau.!

Habenaria shweliensis Smith et Banerji, sp. nov.

Species proxima *Habenariæ tipuliferæ* Parish et Reichb.

Planta terrestris, erecta, 40—60 cm. alta. *Radix* deest. *Folia* 5—7, a basi 3—4 cm. paululum conferta, ascendencia, subæqualia, circiter 10 cm. longa, circiter 3 cm. lata, lanceolata vel elliptico-lanceolata, apice acuta, basi in petiolum latum brevissimum vaginâ longâ cylindricâ membranaceâ amplexicaulem cuneatim angustata, integra, utrinque glabra. *Scapus*

30 cm. longus vel ultra, glaber; pars inferior circiter 20 cm. longa, bracteis 9—10 ovato-lanceolatis longe subulato-acuminatis 1—3 cm. longis instructa; pars florifera circiter 10 cm. longa, bracteis ovato-lanceolatis subulato-acuminatis circiter 5 mm. longis albidis costa nigrescente pererratis ornata. *Inflorescentia* laxissime spicata, 15—25-flora. *Flores* usque ad 15 mm. longi. *Sepala* late ovata, obtusa, circiter 3 mm. longa. *Petala* lateralia ovata, obtusa, sepalis fere æqualia. *Labellum* trifidum, circiter 4 mm. longum, lobis lateralibus loriformibus, lobo medio parte basali quadrato, apice loriformi. *Calcar* circiter 3 cm. longum falcatum. *Ovarium* circiter 12 mm. longum, fere lineare.

BURMA:—Ruby Mines Division, Mogok, in the Shweli Valley, *Rodger* No. 387 in Herb. Calc. and Herb. Kew.! Flowers in September.

Habenaria Rodgeri Smith et Banerji, sp. nov.

Species affinis *Habenariæ carneæ* N. E. Br.

Planta terrestris, fere acaulis, scapo 20—25 cm. alto instructa. *Radix* deest. *Folia* 4—5 ad basin rosulatum conferta, subæqualia, circiter 8—10 cm. longa, 3—5 cm. lata, plus minusve lato-oblonga vel lato-elliptica, apice acuta vel obtusa vel subrotundata, basi lato-cuneata, vix petiolata, integra, supra albido-maculata, utrinque glabra. *Scapus* dimidio inferiore bracteis 6—8 lanceolatis vel ovato-lanceolatis acutis 1.5—2.5 cm. longis instructus. *Inflorescentia* circiter 8 cm. longa, laxè spicata, 8—12-flora, subglabra, bracteis circiter 1 cm. longis lato-ovatis acuminatis apiculatis ornata. *Flores* fere sessiles, usque ad 4.5 cm. longi, erecto-patentes. *Sepala* obovata, obtusa, circiter 7 mm. longa, glabra. *Petala* lateralia lineari-spathulata, glabra, sepalis fere æqualia. *Labellum* trifidum, 16 mm. longum, glabrum, lobis lateralibus oblongis, subobtusis, circiter 1 cm. longis, lobo medio circiter 13 mm. longo, obovato, ad medium lobatulo. *Stigmata* 2, in processus elongatos producta. *Calcar* prælongum, usque ad 4 cm. longum, tenuissimum, lineare. *Ovarium* circiter 2.5 cm. longum, fusiforme.

BURMA:—Ruby Mines Division, Mogok, at an altitude of 1,000 ft. *Rodger* No. 201 in Herb. Calc. and Herb. Kew.! Flowers in September.

Globba mogokensis Smith et Banerji, sp. nov.

Species valde affinis *G. albo-bracteata* N. E. Br.; habitu foliis bracteis albidis appropinquat; inflorescentia villosiore pedunculis longioribus strictis bracteis longioribus recedit.

Planta terrestris, herbacea, circiter 45 cm. alta, radicibus circiter 12, fasciculatis e rhizomate brevi ortis. *Caulis* erectus, teres, circiter 2 mm. diametro, sat foliatus, infra parcius supra dense albido-hirsutulus, stramineus. *Folia* inferiora squamiformia, longe amplexicauli-vaginantia, lamina nulla vel minima; folia superiora 4—7; lamina ad 15 cm. longa, ad 4 cm. lata, lanceolata, apice prælonge acuminata, basi in petiolum cuneata, membranacea, supra parce pilosula, infra glabrescentia; petiolus 9 cm. longus vel ultra, 3—4 mm. latus, planus, amplexanti-vaginans, albo-hirsutulus, stramineus. *Inflorescentia* terminalis; flores 1—3-nati, in apice pedunculorum 5—7, racemose dispositorum, ad 4 cm. longorum, et bracteis primariis conspicuis usque ad 2.5 cm. longis superne decrescentibus, 5—6 mm. latis oblanceolatis albidis 8—9 nervatis suffultorum, usque ad 4 cm. longorum, strictorum dense albo-hirsutulorum; flores ipsi (immaturi) fere sessiles, bracteis secundariis ovatis acutis circiter 5 mm. longis membranaceis albidis suffulti. *Calyx* tubulosus, obtuse trilobus. *Corollæ* tubus angustus, calycem excedens; lobus posterior subcymbi formis, sub apice mucronulatus, laterales minores ovati. *Staminodia* lateralia petaloidea, petalis multo breviora; labellum bifidum; staminis perfecti filamentum robustum, incurvum, anthera unilateraliter bialata. *Stigma* turbinatum; stylodia duo filiformia. *Fructus* deest.

BURMA:—Ruby Mines Division, Mogok, at an elevation of 2,000 ft.; *Rodger* No. 130 in Herb. Calc. and Herb. Kew.! Flowers July.

The description of the flowers requires verification with more fully developed material, fresh if possible. The species is a very distinct one, widely differing from any known Indo-Burmese species but approaching near the Sumatran *Globba albo-bracteata*.

Sisymbrium monachorum W. W. Smith, sp. nov.

Species affinis *S. lasiocarpo* Hook. f. et Thoms. sed foliis angustis integris fructu minore inter alia distincta.

Herba humilis, decumbens vel suberecta. *Caulis* 2—6 e coronâ radicis sat crassæ lignosæ orti, flexiles, 4—5 cm. longi, dense cano-stellato-tomentosi. *Folia* radicalia et caulina similia, 5—12 mm. longa, linearia vel lineari-oblonga, ita involuta ut caulibus haud dissimilia, integra, dense cano-stellato-tomentosa. *Flores* sub-dense racemosi, ebracteati, circiter 12—20, inter minores. *Sepala* 1—1.5 mm. longa, late ovata vel suborbicularia, dense stellato-tomentosa. *Petala* circiter 3 mm. longa, in sicco albida. *Siliqua* lineari-elongata, circiter 1 cm. longa, teres, polysperma, densissime stellato-tomentosa, stylo circiter 1 mm. longo, stigmatibus perbre-viter bilobo, seminibus 2-seriatis.

TIBET:—On Gompa Hill, Gyantse, Capt. *H. M. Stewart*, I.M.S., without number in Herb. Calc.! Collected 25th June 1907.

Allied to *Sisymbrium lasiocarpum* but differing in being perennial, in the narrow entire leaves, and shorter pods. The stellate pubescence is the same in each.

Pueraria quadrastipellata C. B. Clarke, nomen tantum in Herb. Calc. et Herb Kew.

Species *P. Thomsoni* Benth. affinis sed foliolis sinuato-trilobatis calyce glabro distinguenda.

Frutex scandens; altitudo non nota. *Caulis* teres, glabrescens. *Folia* 3-foliolata, petiolo circiter 6—7 cm. longo striato dense fulvo-setoso prædita; stipulæ sub insertione productæ, 1—1.25 cm. longæ, coriaceæ, lanceolatæ, distincte 6—8-striatæ; foliola ovata, 9—15 cm. longa, ad 9 cm. lata, stipellis ovatis coriaceis striatis prædita, fere ad medium sinuato-tri-vel bi-lobata; foliolum medium 2—3 cm. petiolulatum, caudato-acuminatum, lobulis lateralibus apice rotundatis, foliola lateralia sæpius bilobata, uno lobo alterum multo excedente, ambobus acuminatis; lamina supra atroviridis, plus minusve dense fulvo-setulosa, infra pallidior fulvo-setulosa præsertim in venis, margine fulvo-ciliata; nervi supra obscuri, infra eminentes, straminei, bene reticulati. *Flores* circiter 2 mm. pedicellati, pedunculis elongatis axillaribus racemosi; pedunculus 20—30 cm. longus, fere per longitudinem floriger, in nodis subtumidus, glabrescens; bracteæ minutæ, subulatæ; bracteolæ 3—5 mm. longæ, ovatæ, coriaceæ, 7—8-striatæ, virides, persistentes, sub-calyce insertæ. *Calyx* 6—8 mm. longus, (petaloideus purpureus teste collectore) glaber vel subglaber, in lobos acutos vel subacutos ad medium fissus. *Corolla* 10—13 mm. longæ, atropurpurea. *Stamen* vexillare fere omnino solutum. *Ovarium* sessile, stylo filiformi imberbi præditum. *Legumen* (vix maturum) ad 7 cm. longum, fere 1 cm. latum, compressum, membranaceum, setis longis fulvis dense obsitum, 9—12-seminiferum.

SIKKIM HIMALAYA:—At Yoksun, at an elevation of 5,000 ft., C. B. Clarke No. 25157 in the herbaria of Kew and Calcutta!

Homalium bhamoense Cubitt et Smith, sp. nov.

Species affinis *Homalio zeylanico* Benth.; foliis oblongo-ovatis vel oblongis apice basique rotundatis infra plus minus rufo-pilosulis conspicua.

Arbor magna. *Ramuli* superiores striati, rufo-pilosuli, lenticellis elongatis albidis notati. *Folia* alterna, petiolo 8—10 mm. longo pilosulo

prædita, coriacea, 10 cm. longa vel ultra, usque ad 7 cm. lata, ovato-oblonga vel oblonga, apice rotundata vel obtusissima, basi rotundata, nec cuneata margine crenata, supra glabra, infra plus minusve dense pilis rufis patentibus obsita; nervi utrinque 7—8, supra distincti, paululum eminentes, infra pilosuli distinctiores. *Inflorescentiæ* spiciformes, graciles, ex axillis foliorum ortæ, ad apicem ramuli 4—6 paniculato-aggregatæ, dense multifloræ; axis inflorescentiæ usque ad 30 cm. longus, dense rufo-patenti-pilosulus, basi circiter ad 2 cm. florulis nudus, cæterum interrupte vel continuo florulis fasciculatis vestitus; flores 2 mm. longi, in nodulos 12—20-floros aggregati, pedicellis 2—3 mm. longis dense pilosulis præditi. *Calycis* tubus turbinatus, 1 mm. longus, pilosulus; lobi 6—7, vix 1 mm. longi, oblongo-ovati, albo-ciliati. *Petala* 6—7, 1 mm. longa, oblonga, sepalis angustiora, pilosula, albo-ciliata. *Stamina* petalis isomera et opposita, filamentis filiformibus glabris, antheris minimis. *Ovarium* semisuperum, stylis plerumque 4 filiformibus coronatum. *Fructus* deest.

BURMA:—Bhamo Division; “from a tree outside the Forest Office, Bhamo, Upper Burma”; altitude 4,000 ft. No. 524, *Cubitt* in Herb. Calc.! Flowers in March and April.

***Heracleum biternatum* W. W. Smith, sp. nov.**

Species ex affinitate *Heraclei burmanici* Kurz; foliolis et fructu distincta.

Biennis? *Caulis* 60—90 cm. altus, simplex, teres, striatulus, glaber vel glabrescens. *Folia* tenuiter coriacea, ternatim dissecta; petiolus 5—30 cm. longus; foliola trilobata vel sæpius iterum ternatim divisa, lobulis secundariis subintegris vel lobulatis; lobuli variabiles, ovati vel lineari-oblongi vel lineari-lanceolati, modo circiter 7 cm. × 5 cm., modo circiter 12 cm. × 3 cm., crebre irregulariterque serratuli, supra atrovirides, minute subscabride pilosuli, infra pallidiores, præsertim in venulis setosuli; petioluli primarii 1—10 cm. longi, secundarii 1—3 cm. vel absentes; nervi supra in sicco distincti, infra distinctiores, pulchre reticulati. *Umbellæ* radii ± 12, circiter 5 cm. longi, in fructu ad 8 cm. elongati, subrigidi; bracteæ 0—2, lineares, mox caducæ; radii secundarii ± 30, in fructu 2—3 cm. longi, minute pilosuli; bracteolæ 3—5, lineares, 1—2 cm. longæ, subpersistentes. *Petala* alba. *Fructus* 1 cm. longus, 7—8 mm. latus, obovatus, vittis plerumque sex apice ad medium vel ultra pertinentibus notatus; commissura 6-vittata.

BURMA:—At Maymyo Hill, Upper Burma, *Badal Khan* No. 333 in Herb. Calc.!; in the Southern Shan States, *MacGregor* without number in Herb. Calc.!

A species quite unlike any of the Himalayan species; the fruit has a strong odour resembling that of ‘Gregory Powder.’

Lettsomia Maymyo W. W. Smith, sp. nov.

Species affinis *L. setosæ* Roxb., sed inflorescentia laxiore, floribus majoribus, calyce diverso recedit: flores eos *Lettsomiae Championii* Benth. et Hook. f. suggerunt.

Frutex alte scandens, caule volubili primo adpresse fulvo-piloso, deinde glabrescenti. *Folia* alterna, petiolo circiter 6 cm. longo adpresse piloso prædita, perlate ovata, usque ad 12 cm. longa, circiter 12 cm. lata, ambitu apiculo minimo addito rotundata, basi paulo cordata, integra, coriacea, supra sparse adpresse fulvo-pilosa, infra præsertim in nervis densius; nervi utrinque circiter 10, ascendentes, intra marginem obsolescentes, supra paulo eminentes, infra distinctiores. *Inflorescentiæ* subumbellate cymosæ, longe pedunculatæ in foliorum axillis, 7—15-floræ. *Pedunculus* 10—20 cm. longus, dense adpresse fulvo-pilosus; pedicelli 1—2 cm. longi, bracteis linearibus circiter 5 mm. longis, 3—10 mm. sub calyce positus cito deciduis præditi. *Sepala* imbricata, perlate ovata, 4 mm. longa, 3 mm. lata, apice basique rotundata, dense adpresse argenteo-pilosa. *Corolla* campanulatâ, circiter 4.5 cm. longa, ore 5 cm. lata vel ultra, a basi 5 mm. lata sensim ampliata, breviter obtuse lobulata, extus dense adpresse longiuscule argenteo-pilosa, intus glabra; color non notus. *Stamina* 2—2.5 cm. longa, filamentis glabris vel sparse pilosis, antheris elongatis 4 mm. longis. *Ovarium* ovoideum, glabrum, 2-loculare. *Fructus* immaturus.

BURMA:—Maymyo Plateau, 3,500 ft. altitude, No. 4257, *Lace* in Herb. Calc.! A specimen from the Shan States, 4,000 ft. altitude collected by N. Manders, without number in Herb. Calc. is in my opinion the same.

Primula pudibunda W. W. Smith, sp. nov.

Primula affinis *P. reticulatæ* Wall. et *P. sikkimensi* Hook. sed corolla minima vix calyce exserta inter alia differt.

Planta circiter 20 cm. alta, multo minus robusta quam affines citatæ, glabra, inflorescentia excepta efarinosa. *Folia* longe petiolata, 6—9 cm. longa, 1.5—2 cm. lata, anguste obovata-spathulata, apice rotundata vel obtusa, basi in petiolum 6—8 cm. longum cuneatim attenuata, indurato-serratula, venis supra indistinctis, infra conspicuis. *Scapus* elongatus, circiter 20 cm. longus, umbellam paucifloram (sæpius 3—4-floram) gerens; bracteæ angustæ e basi lata subulato-acuminatæ, 5—7 mm. longæ; pedicelli graciles, 5—7 mm. longi; flores subcernui. *Calyx* 5-costatus, 3—7 mm. longus, tubuloso-campanulatus, vix ad medium fissus; lobi triangulares, acuti, erecti vel subrecurvi. *Corolla* flava, vix calyce exserta

infundibuliformis, (in sicco) circiter 5—6 mm. diametens; lobi rotundati, emarginati. *Capsula* non visa.

SIKKIM HIMALAYA :—At the Yumtso (Eumtso) La, at an elevation of 13,700 ft., No. 1614 *Smith* and *Cave.*! Confused with *P. sikkimensis* and recorded under that species in *Rec. Bot. Surv. Ind.* 1V, 218.

Pogostemon MacGregorii W. W. Smith, sp. nov.

Species valde affinis *P. strigoso* Benth. sed foliis petiolatis inter alia distincta.

Planta habitu *P. strigosi* Benth., 60—90 cm. alta. *Caulis* erectus, plus minusve dense adpresse strigosulus. *Folia* (inferiora non visa) petiolata ad 2 cm., opposita, circiter 10 cm. longa, 4—5 cm. lata, ovato-lanceolata, subacuta nec acuminata, basi cuneata vel subrotundata, serrata, supra atroviridia strigosula, infra præsertim in venis densius; nervi utrinque eminentes. *Inflorescentia* terminalis, plerumque singularis, spiciformis, strigulosa, circiter 10 cm. longa; verticillastri multiflori, sublaxe glomerato-spicati. *Calyx* tubulosus, dentibus subulatis ciliatis tubum æquantibus. *Corollæ* circiter 3 mm. longæ, tubus vix exsertus, lobi subæquales, glabri. *Stamina* exserta, subæqualia, filamentis medio barbatis.

BURMA :—At Keng Tung in the Southern Shan States, at an altitude of 4,000 ft., *MacGregor* No. 844 in *Herb. Calc.*! Closely allied to the Khasian *P. strigosus*.

Plectranthus Meeboldii W. W. Smith, sp. nov.

Species habitu *Plectranthi Parishii* Hook. f. sed floribus minimis inter alia facile distinguenda.

Planta nana, annua ut videtur, erecta vel suberecta, nonnunquam fere acaulis. *Caulis* 2—10 cm. longus, flexuosus, striatus, simplex, plus minusve dense fulvo-tomentosus. *Folia* petiolo 3—8 cm. longo fulvo-tomentoso prædita, 6—12 cm. longa, 4—6 cm. lata, ovato-oblonga, apice rotundata, basi subrotundata vel breviter cordatula, margine regulariter crenata, atroviridia, supra subscabride pilosula, infra pallidiora in venulis molliter setulosa; nervi utrinque 3—5, supra obscuri, infra distinctiores. *Inflorescentia* terminalis, cum pedunculo pilosulo ad 10 cm. longa; cymæ 3—4-floræ in racemum laxum dispositæ; pedicelli 1—3 mm. longi, pilosuli. *Flores* minuti, vix aperti, albi (teste collectore). *Calyx* 5 mm. longus, campanulatus, breviter 5-dentatus, dense pilosulus. *Corollæ* tubus exsertus, basi gibbus, apice pilosulus. *Stamina* 4, exserta, filamentis liberis. *Fructus* deest.

BURMA:—At Sittaung, Upper Chindwin Valley, Upper Burma, *Meebold* No. 7758 in the herbaria of Kew, Breslau and Calcutta!

Achyrospermum Wallichianum Benth.

Var. *gokteikense* W. W. Smith, var. nov.

Varietas nana, repens vel suberecta, 8—15 cm. alta. *Caulis* tortuosus, infra subnudus, supra bene foliatus. *Folia* 4—8 cm. longa, 1.5—2.5 cm. lata, elliptico-ovata, non acuminata, basi cuneata, 1—3 cm. petiolata, utrinque minute pilosula. *Spica* 2—7 cm. longa, densiflora; flores albi.

BURMA:—At Gokteik Gorge, in the Shan Hills, Upper Burma, growing sparingly in the fissures of dry rocks; *Meebold* No. 8077 in the herbaria of Kew, Breslau, and Calcutta!

A dwarf plant and at first sight very different from the typical *A. Wallichianum*.

Pouzolzia Meeboldii Smith et Ramas., sp. nov.

Species distinctissima; ob spicas bracteatas axillares nec terminales sectione nova generis digna; in structura floris *P. Wightii* Benn. et *P. caudata* Benn. haud dissimilis.

Planta erecta, circiter 60 cm. alta ut videtur; radix et caulis inferior desunt. *Caulis* triqueter, glaber, internodiis 5—6 cm. longis. *Folia* 3-verticillata, 10—16 cm. longa, 2—3 cm. lata, sessilia, lanceolata, longe et acute acuminata, basi rotundata vel cordatula, margine subintegra, supra minutissime scabridula, infra glabra, nervis primariis tribus supra immersis infra eminentibus pererrata; stipulæ 3-natæ, interfoliæ, membranaceæ, fere 1 cm. longæ, ovatæ, longe acuminatæ, deciduæ, brunneæ. *Inflorescentiæ* 3-natæ, axillares, (terminalis tardissima vel deficiens), 10 cm. longæ vel ultra, spiciformes, flexuosæ, scabridule puberulæ. *Flores* 1—3-nati, numerosi, laxius dispositi, bracteis circiter 4 mm. longis ovato-acuminatis cordatulis scabridulis suffulti. Floris masculini *perianthium* 4-fidum; alabastrum truncatum; segmenta medio abrupte inflexa, ibique transverse plicata, apice acuta, basi cuneata; floris femininæ *perianthium* cupuliforme, ore minute dentatum. *Stylus* 2 cm. longus, deciduus, rufo-villosus; ovarium 1.5 mm. longum, alatum, striatum. *Fructus* cum alâ nervulis rubidis striatâ 3 mm. longus, 4 mm. latus.

SOUTH INDIA:—Kavalay (elevation?), *Meebold* No. 12137 in Herb. Calc.!

NEW INDIAN DIDYMOCARPI.

By

W. W. Smith.

Didymocarpus Gageana W. W. Smith, sp. nov.

Species yunnanensi *Didymocarpi Margaritæ* W. W. Smith affinis sed foliis irregulariter oblongis marginibus sinuatis inflorescentiis diffusioribus flore diverso facile distinguenda.

Herba gracillima, caule nullo vel vix 2 cm. longo. *Folia* interdum 3—4, omnia radicalia longepetiolata, interdum 2—3 radicalia, 2 caulina opposita longepetiolata, quibus addita in extrema apice nonnunquam duo minima fere sessilia; basalia et primaria caulina prælonge petiolata (2—8 cm.), 6—10 cm. longa, 3—4 cm. lata, formâ irregularia, plerumque oblonga, nonnunquam obovata vel elliptica vel ovata, apice subacuta vel rotundata, basi cuneata vel rotundata, margine ad apicem serratulata, paululum sinuata, ad basin fere integra, supra plus minusve dense adpresse pilosula, infra parcius nisi in venis pilosioribus, glandulis minutis rotundis nigris sparse punctata; nervi primarii utrinque 5—7, supra immersi, infra distinctiores. *Inflorescentiæ* 1—2, in axillis superioribus cymosæ, gracillimæ, multifloræ (circiter 20), folia æquantes vel superantes; pedicelli circiter 10 cm. erecti, rigidi, ad apicem iterum atque iterum divisi, pedicellis 1—2 cm. longis parce glandulosis, bracteis 3 mm. longis ellipticis. *Calyx* 2 mm. longus, in lobos quinque lineares recurvos ad imum fissus, ei *D. Margaritæ* persimilis. *Corolla* circiter 1.5 cm. longa, glabra; tubus cylindricus, 12 mm. longus, basi 1.5 mm. latus, superne ad 4 mm. sensim ampliat, carneo-ruber; lobi inæquales, rotundati, albido-flavi. *Stamina* duo, perfecta, inclusa, antheris cohærentibus filamentis glabris. *Ovarium* lineare, vix stipitatum, glabrescens, disco cylindrico 1 mm. longo ornatum. *Fructus* 1.5 cm. longus, linearis, valvis utrinque solutis.

UPPER BURMA:—"Kalay Hills, on rocks near the streams; the upper part of the flower is yellow, the lower flesh red when not dried." Coll. J. C. Præzer.!

Didymocarpus Lacel W. W. Smith, sp. nov.

Species distinctissima aspectu *Chiritæ pumilæ* Don, sed stigmate *Didymocarpi*; a speciebus indicis et birmanicis sectionis *Eudidymocarpi* remota; fructu deficiente affinitas pro tempore dubia.

Herba gracilis, debilis, circiter 8—10 cm. alta, caule flexuoso sparse albobilosulo. *Folia* radicalia nulla; caulina 2—3, paria, in apice approximata vel nonnunquam 1—2 inferiori parti caulis addita, superiora fere sessilia, inferiora 3—20 mm. petiolata, 3—8 cm. longa, 2—3.5 cm. lata, ovata vel obovata vel elliptica, apice acuminata vel obtusa vel rotundata vel etiam emarginata, basi rotundata vel cuneata, margine serratulata vel subintegra, ciliata, supra capillis albo-nitentibus plus minusve dense adpresse pilosula, infra parcius; nervi utrinque 6—7, supra immersi, infra distinctiores. *Flores* 2—3, in axillis superioribus, pedicellis circiter 1 cm. longis. *Calyx* 8—10 mm. longus, 3 mm. latus, tubulosus, dense adpresse albonitenti-pilosulus, intus glaber, in lobos lineares acutos pilosulos ad tertiam partem fissus. *Corolla* 4—5 cm. longa, in medio 1 cm. lata, a basi 2 mm. late ampliata, lobis quinque subæqualibus; in sicco tubus atro-purpureus, fauces et lobi albo-lutei. *Stamina* duo, inclusa, antheris cohærentibus, filamentis pilosulis; staminodia duo. *Ovarium* lineare, breviter stipitatum, pilosulum, stigmatе circulari indiviso.

BURMA:—Gokteik Gorge, altitude No. 1,500 ft. *Lace*, 4,152! Types in the herbaria of Calcutta and Kew.

Didymocarpus Rodgeri Smith et Banerji, sp. nov.

Species ex affinitate *D. cyaneæ* Ridley ex Malaysia sed foliis basi plus minusve rotundatis adpresse pilosis flore minore tubo angustiore, colore diverso distincta: habitu inflorescentia calyce 5-partita pubescente accedit.

Herba fere acaulis. *Folia* radicalia vel subradicalia, sæpius 2—4, opposita, inæqualia, elliptica vel ovato-elliptica, apice obtusa, basi inæqualiter cordatula vel rotundata, 10—15 cm. longa, 5—8 cm. lata, crenato-serrata, supra adpresse cano-pilosa, subtus pallidiora, glabrescentia venis pilosis exceptis, glandulis minutis sparsis instructa, venis utrinque 7—8 vix prominentibus; petioli 4—6 cm. longi. *Inflorescentiæ* cymosæ paucifloræ, sæpius 3—5-floriferæ, longepedunculatæ, 1—3 in axillis foliorum subradicalium ortæ, foliis breviores; pedunculi suberecti, flexuosi, circiter 10—15 cm. longi, glandulose albo-pubescentes; pedicelli circiter 1—2 cm. longi; bracteæ lineares vel lineari-lanceolatæ, circiter 5 mm. longæ, glandulose albo-pubescentes. *Calyx* usque ad imum in 5—6 lobos suberectos lineares vel lineari-lanceolatos circiter 1.2 cm. longos capillis albis glandulosis sparse indutos partitus. *Corolla* circiter 3 cm. longa, glabra, in sicco rubra, purpureo-lineata; tubus cylindricus, 2.5 cm. longus, basi 2 mm. latus, superne gradatim ad 5 mm. ampliatus; lobi inæquales, rotundati, patentés. *Stamina* duo antica perfecta, filamentis glabris infra medium tubi insertis, antheris connatis; staminodia tria. *Ovarium* lineare,

falcatum, 3—4 cm. longum, sparse glanduloso-pubescens, disco annulari integro 1 mm. longo ornatum. *Fructus* maturus deest.

BURMA:—Mogok, Ruby Mines Division, at an elevation of 4,000 ft., *A. Rodger* No. 161. Flowers in July Types in the Calcutta and Kew Herbaria.

var. *siamensis* W. W. Smith.

Minor, compactior, glandulosior, ceterum cum typo congruens; folia subtus densius glandulosa; flores albi, violaceo-lineati.

SIAM:—Doi Sootep, 5,200 ft., *Kerr* No. 1,996. "Flowers white, lip with violet markings. On trees in dense evergreen jungles. Aug. 27th, 1911."

The *Didymocarpi* in Indo-Malaya are so restricted in their specific distribution that it is interesting to note a species of comparatively wide distribution. Type in Kew Herbarium.

Didymocarpus Meeboldii Smith et Ramas., sp. nov.

Species affinis *Didymocarpo Humboldtianæ* Gardn.; inter species zeylanicas et Deccanenses floribus fructibusque magnis conspicua.

Herba diffusa, fere acaulis. *Folia* 6—10, omnia radicalia; alia longe petiolata, petiolis 5—12 cm. longis, irregulariter lacerato-alatis ad 2—5 mm., 8—10 cm. longa, 6—7 cm. lata, elliptica vel late ovata, saepissime lacerata et perforata, apice rotundata, basi in petiolum alatum angustata, grosse crenato-serrata, supra plus minusve parce furfuraceo-pilosula, densius in serraturis, infra parcius nisi in venulis pilosioribus; nervi utrinque 5—6, supra immersi, infra paululum eminentes; alia (juniora) sessilia vel petiolis 1—2 cm. longis rufopilosis instructa, 3—6 aggregata, 3—5 cm. longa, 2—3 cm. lata, ovata vel elliptica, apice basique rotundata, irregulariter serratulata, supra dense pilosula, infra reticulatim corrugata, rufo-pilosula præsertim in venis. *Inflorescentiæ* 1—4, in axillis foliorum radicalium floribus binatis racemosæ, 4—12 florae; 10—25 cm. longae, in fructu ad 30 cm. elongatae, pedunculis ad 15 cm. longis, primo albo-pilosulis, tandem glabrescentibus stramineis, pedicellis 1—2 cm. longis, bracteis minutis linearibus. *Calyx* 3—4 mm. longus, in lobos quinque lineari-oblongos fere ad imum fissus, glandulose albo-pilosulus. *Corolla* 1.5—2 cm. longa, ventricosa, glabra; tubus brevis, in sicco luteus; lobi subæquales rotundati. *Stamina* duo inclusa, antheris cohærentibus filamentis glabris; staminodia duo. *Ovarium* 3 mm. longum, sessile, pilosulum, disco minimo annulari ornatum. *Fructus* 3—4.5 cm. longus, in medio 2 mm. latus, basi obliquus, valvis folliculatim solutis.

SOUTHERN INDIA.—At Peermade Ghat, No. 12851 *Meebold!*

A NOTE ON THE HIMALAYAN SPECIES OF DAPHNE.

By

W. W. Smith & G. H. Cave.

There has always been some doubt whether the *Daphne cannabina* Wall, of the Flora of British India (Vol. V, p. 193) contains one or more species. Hooker's material was inadequate to settle the point and with a critical genus such as *Daphne* detailed observations in the field are necessary. The attention of the writers was directed to the question partly by Hooker's note wherein he expresses his doubt and partly by the difficulty we found in recognising as conspecific two apparently very distinct species occurring freely in the Darjeeling area. The distribution areas of the two plants overlap in the neighbourhood of Darjeeling and opportunity was thus given for a careful comparison at various seasons. Visits to Sandakphu, to the Chola Range and to Northern Sikkim gave us acquaintance with other species and varieties of the genus and somewhat enlarged the scope of our enquiry. The observations were continued for two years and the following notes give our conclusions. In addition to the ample East Himalayan material of the genus in the Calcutta Herbarium, the herbaria of the Royal Gardens Kew and of the British Museum were consulted, as well as the Wallichian sheets in the charge of the Linnæan Society.

The earliest collections from the Himalaya in which we have any record of the genus are those of Buchanan-Hamilton who travelled in Nepal and Kumaon in 1802—3. His material was taken to England and upon it and the accompanying notes, with some additions collected by Wallich was based Don's description of two species in the *Prodromus Floræ nepalensis*. Wallich however described his plant first. His material under No. 1045 is thus referred to in his Catalogue:—

“1045 *Daphne cannabina* Lour.? Herb. 1824

1. Napalia 1820

2. Kamoan R. B.

β *latifolia* Wall. an *distincta* spec.?

Pundua. F. De Silva.”

But prior to his own visit in 1820-1, Wallich was in touch with Nepal. “Among the extensive and constant supplies of plants and seeds

from Nepal which the Botanic Garden owes to the liberality of the Honourable Edward Gardner, Resident at Katmandu, are also specimens and plants of the Paper-shrub, which I am informed by that gentleman grows very commonly in that country and when in flower is exquisitely fragrant. It appears there are two varieties one with perfectly white, the other with reddish flowers; both are used for ornament and for the manufactory of Paper." (Wallich in *Asiat. Research*, Vol. XIII, p. 386.) Wallich's description of the *Daphne* was read to the Asiatic Society in 1818 and the volume containing the description published in 1820 along with a very good figure.

It is evident then that in the beginning two 'forms' were recognised. Our observations in the Eastern Himalaya have persuaded us that as far as that region is concerned there are two distinct species (apart from *D. involucrata* and *D. retusa*) and for the present we may distinguish them as the high-level and the low-level plants. The high-level plant is the same as Wallich's 1045 from Nepal, but there is no evidence to show that the low-level Darjeeling plant occurs in Kumaon and Western Nepal.

There is little doubt as to the plant on which Wallich based his description and figure. The figure undoubtedly represents the high-level plant with a short broad purplish perianth, with ovate subretuse lobes and is 1045 A in Wallich's collection in the Calcutta Herbarium. (We should note here that one marked character of the low-level Darjeeling plant and of *D. odora* Don, the first species of Buchanan-Hamilton is the narrow acute lobes of a whitish perianth and that these two species are in our opinion distinct from one another.) In the description Wallich refers to the perianth-lobes thus:—"laciniis ovatis subretusis vel lanceolatis acutis"—which may be intended to include both the western species. When later he obtained Sylhet material, he labelled it "1045 B latifolia, Wall. an distincta spec.?" showing that his first plant did not match in his opinion the later arrivals. It should moreover be noted that Wallich did not recognise that his plant was new as he identified it, though with doubt, as *D. cannabina* Lour. (which is *Wikstræmia indica* C. A. Mey.). He points out that Loureiro's description gives opposite leaves (hence his doubt), and also that the Nepal plant comes extremely near to *Daphne odora* Thunb.

Wallich's description and figure were available for Don when he published his *Prodromus* in 1825. Relying on Buchanan-Hamilton's specimens and notes, Don made two species. Buchanan-Hamilton was a careful and accurate observer and in his notes he had attached the manuscript names of *D. papyrifera* and *D. Bholua* to the two plants. Don considered that the first was equivalent to the *D. odora* Thunb. The dis-

inctions given by Don may be summarised thus:—[*D. odora*..... perianthiis leviter sericeis; laciniis ovatis acutis, stylo distincto, floret Octobri et Decembri. *Set Burooa* vernacule nuncupatur.....Flores virescente-albi, odoratissimi.

D. Bholua.....perianthiis pedicellatis extus sericeo-villosis; laciniis subrotundo-ovalibus retusis, stylo nullo. Floret Januario. *Bholu Swa* NAWARICE. Frutex ramosissimus, magnitudine et facie omnino *D. odora*, cui arcte affinis est, quæ tamen discriminatur floribus sessilibus, tubo perianthii versus basin solummodo sericeo, laciniis ovatis acutis, stylo distincto.—Prodromus Fl. Nepal, p. 68.]

Don's use of the style as a distinguishing character has not commended itself to us in the field. After fertilisation, the developing ovary plumps itself up at the 'shoulders' and the length of the style is a varying quantity, depending in great measure on the development of the ovary. The high-level plant in Sikkim (*D. cannabina* Wall.) varies as regards length of style and we note the same in the case of Khasian specimens (*in sicco*) related to *Daphne Sureil* which is the name we have proposed for the low-level Darjeeling shrub. These conclusions regarding *D. cannabina* are based on the examination of flowers from 28 plants near Darjeeling, 38 on Senchal and 43 on Ghoom range. In all there is a short style, which becomes less and less distinct when the fruit begins to develop. In *D. Sureil* the large size of the stigma tends to diminish to the eye the style which is scarcely shorter than in *D. cannabina*. Further we disagree with Don when he refers Wallich's description and figure definitely to his first species (*D. odora*); the figure is in our view quite that of the second (Don's *D. Bholua*) and the description we have seen may include both.

Subsequent authors do not add much to the elucidation of these two species of Buchanan-Hamilton. Steudel's Nomenclator Botanicus (1821) gives the name *D. papyracea* Wall. but on what authority is unknown. In Griffith's Notulæ IV, 370, (publ. 1854) we find attached to a description of a Khasian plant collected at Churra Ponjee in 1835 "floribus capitatis albis subodoratis" the name "*Daphne cannabina* Lour. vix *D. indica*, ex Donio." Meissner's account in DC. Prodromus XIV, p. 537, (1856), is based practically on Wallich's and Don's data and to judge from the re-misquotation of the page (385 in Vol. XIII as in Don) in the Asiatic Researches, Wallich's figure and text were not available. *D. Bholua* is referred to as "species obscura, forsan a *D. papyracea* haud distincta. Wallich's β . *latifolia* No. 1045 is accepted as a variety and a small leaved form is added γ *parvifolia* from the Khasias. The figure of Decaisne in Jacq. Voy. Bot. t. 148 is evidently

taken from dried material and appears to us to be *D. odora* Don; this is partly confirmed by "Flores nivei inodori. Calyx pilis subadpressis vestitus," though evidently there is a disagreement regarding the perfume. Brandis in the Forest Flora of North-West and Central India, p. 386 makes but the one species, "Flowers scented, white yellowish or purple, sessile.....perianth tube $\frac{1}{2}$ in. long pubescent outside, segments ovate acute. Fl. March-April also in autumn. Attains 7—8 ft.....Set baruwa." This is close to Don's *D. odora*. Hooker in the Flora of British India, Vol. V, p. 193 includes all under *Daphne cannabina* Wall. but suggests that "possibly two species are included here". Also: "perianth $\frac{1}{2}$ in., tube rather slender; lobes broad or narrow, ovate, acute." Gamble Manual of Indian Timbers, ed. 1902, p. 578—adds: "The flowers of the Sikkim plant are pink, very sweet scented; those of the West Himalayan plant white and often hardly scented at all." Finally in "Indian Trees" p. 545, Brandis recurs to Don's view and considers that *D. cannabina* is possibly a local variety of *D. odora* Thunb. It may be of interest to add that the late Sir George King to judge from a note on the species cover in the Calcutta Herbarium lent to the re-establishment of *D. Bholua* Ham.

Unfortunately the suite of specimens in the Calcutta Herbarium from the North-West Himalaya do not furnish much information regarding the habit, colour of flower and fruit of the species of that area and we felt at one period of our survey that it was useless attempting to clear up the question of the relationship of the East Himalayan species with the Western without better acquaintance with the latter. However later we were fortunate in having the opinion of Mr. J. S. Gamble, F.R.S., on our notes and the loan of his suite of Himalayan sheets which include both Western and Eastern types. Subsequently we had the valued criticism of Dr. Otto Stapf, F.R.S., who has pointed out to us that the question of the North-West Himalayan species appears to have been already settled by Decaisne in 1844, when he described and also figured it as *D. papyracea* in Jacquemont, Voy. dans l'Inde, Vol. IV. (Bot.) p. 143, t. 148. Afterwards it was confused and amalgamated with *D. cannabina* Wall. in spite of Wallich's figure of the latter.

D. papyracea Decne. and *D. Sureil* are at once distinguished from *D. cannabina* Wall. by the pointed lobes of the corolla and fruits reddish at maturity. *D. Sureil* differs from *D. papyracea* in the leaves being less coriaceous and more pointed, in the bracts being very early deciduous forming no collar round the inflorescence, and in the longer and narrower flowers. The range of these three species is approximately as follows:—*Daphne papyracea* Decne., N. W. Himalaya and Western Nepal, 7—8,000 ft.; *Daphne cannabina* Wall., Nepal, Sikkim,

Darjeeling, and Bhutan above 6,000 ft. and up to 11,000 ft. · *Daphne Sureil*, Darjeeling 4,500—5,500 ft.

Contrast between *D. cannabina* and *D. Sureil*.

The following notes give a detailed contrast between *D. cannabina* Wall. and *D. Sureil* as they occur in the Darjeeling district.

HABITAT :—*D. cannabina* frequents the forest area between 6,000 and 8,000 ft. and an alpine variety goes much higher. *D. Sureil* is a not uncommon plant of the upper belt of cultivation 4,500—5,500 ft.

NAMES :—Both are called *Deyshing* by the Bhutiyas, *Dhenok* by the Lepchas, and both have in Nepalese the two names of *Argaley*—the name of the plant itself—and *Kagati*—in allusion to paper being made from its bark.

PRODUCTS :—Both equally yield paper and string from the tough fibrous bark.

HABIT :—*D. cannabina* is a shrub of 6-12 ft.; bushy, branching somewhat irregularly; the branches horizontal or almost drooping, very dense, concealing objects on the other side from an observer; internodes short, leaves on the older shoots fairly persistent. *D. Sureil* is an upright shrub of 4 to 8 ft., with branches almost in whorls; branches straight and erect, not dense, and not concealing objects on the other side from observer; internodes fairly long, leaves on the older shoots retained in fewer numbers.

FLOWERING :—*D. cannabina* is in flower from the end of December to end of February; flowers numerous from every terminal shoot. *D. Sureil* is in flower from October to the end of January; flowers not plentiful and usually well away from the foliage. The time of flowering does not alter in the case of plants of each growing side by side in the Lloyd Botanic Garden, Darjeeling, where they have been for some years. It is not merely an altitudinal variation.

PERFUME :—Both have flowers agreeably scented, strongly in the first, faintly in the second.

LEAVES :—The leaves of *D. cannabina* are dark shining green in colour; average length 3 in. average width $\frac{3}{4}$ in.; petiole $\frac{1}{8}$ in.; veins more deeply impressed on upper surface; texture rather hard and leaf always rather corrugated. In *D. Sureil* the leaves are a lighter shining green; average length $3\frac{1}{2}$ inch; average width 1 inch; petiole $\frac{1}{4}$ in.; veins less deeply impressed on upper surface; texture rather softer and leaf much less corrugated.

BARK:—The bark is covered in *D. cannabina* with a short rough scaly tomentum; the young shoots have a fairly shaggy tomentum. In *D. Sureil* the bark is smooth with many distinct longitudinal lenticels. Tomentum on the young shoots is much less shaggy.

INFLORESCENCE:—The flowers of *D. cannabina* are in sessile bracteate heads terminating the branches, very fugacious, the slightest shake of the tree sending down a shower of even fresh flowers; the foliaceous bracts surround the flowers like a collar. In *D. Sureil* the flowers are both terminal and borne on the older branchlets, much less numerous, and more persistent, usually well away from the foliage.

FLOWER:—In *D. cannabina* the pedicels are usually $\frac{1}{8}$ inch long; tube $\frac{3}{10}$ inch long, stout, purple, densely covered with silky hairs easily visible to the naked eye; segments of limb ovate obtuse, reflexed, somewhat crinkled or corrugated, bluish-purple to a rosy white; bracts broad, lax and silky, $\frac{5}{8}$ inch long. In *D. Sureil* the pedicels average $\frac{1}{10}$ inch long, the tube $\frac{1}{2}$ inch, more slender; the whole perianth a dull ivory white, almost glabrous, a fine pubescence appearing under the lens; segments of limb narrow, lanceolate, subacuminate and only slightly reflexed; bracts like scales or awns, narrow acuminate, fairly stiff, $\frac{1}{2}$ in. long. The flowers of *D. cannabina* are distinctly oblique to the pedicel and slightly zygomorphic.

OVARY:—In *D. cannabina* the ovary is somewhat acute at the apex and with a relatively small stigma; in *D. Sureil* the ovary is less acute at the apex and the stigma is much larger, almost filling the tube.

FRUIT:—The fruits of both are figured in the accompanying plate. In the second week of February the fruit of *D. Sureil* is quite ripe, of a reddish-orange reminding one of rose-hips before they take on their more brilliant winter colouring. At this time the fruit of *D. cannabina* is quite green and immature. When later we collected it in June in the Kulhait Valley (7—8,000 ft.) we found it quite black when ripe. It does not show any red or orange tint during the ripening stage, the change of colour is that of ripe grapes, the purple gradually overcoming the green and then darkening in tint.

From the above there are evidently ample differences between the two species. Sir George King on a sheet in the Calcutta-Herbarium collected at Sureil has indicated his opinion by a distinct 'var.' attached to the name *Daphne papyracea* Wall.; Gamble on No. 7093 collected at Sureil has a note showing that he dissociated it from the high-level plant, and later still H. H. Haines on a sheet collected by him in British Bhutan, altitude 6,000 ft., notes:—“*Daphne cannabina* Wall. var. This white flowered scentless variety with no involucre is probably a distinct species.”

The following is a more complete diagnosis :—

Daphne Sureil Smith & Cave.

Species *Daphne cannabina* Wall. affinis sed perianthii eburneo-nivei lobis lanceolatis subacuminatis erectis nec patentibus tubo gracillimo fructu rubro-aurantiaco distinguenda; a *D. papyracea* Decne. ex Himalaya occidentali foliis acutioribus minus coriaceis bracteis sub anthesin ocius deciduis floribus longioribus sed angustioribus recedit.

Frutex, circiter 1—3 m. altus, erectus, sempervirens, ramis fere verticillatis suberectis glabris. *Folia* satis numerosa, alterna, plerumque 8—9 cm. longa, rarius ad 16 cm., 2.5 cm. lata, lanceolata vel rarius lineari-lanceolata, plus minusve acute acuminata, margine subintegra paululum undulata, tenuiter coriacea, utrinque glabra. nervis 9—12 paribus, supra vix impressis indistinctis, infra paululum distinctioribus, haud eminentibus. *Inflorescentiæ* laxè capitatæ, ramulos superiores hornotinos terminantes vel sparsius e ramis (senioribus) ortæ, sine involucri foliaceo distincto, floribus circiter 12, circiter 2—3 mm. pedicellatis; bracteæ 1—1.5 cm. longæ, squamiformes, angustæ; acuminatæ, paululum rigidæ, mox deciduæ. *Perianthii* 2 cm. longi, eburneo-nivei, tubus circiter 1.25 cm. longus, 2 mm. latus, cylindricus, gracillimus, extus minute pubescens, lobis lanceolatis subacuminatis suberectis, vix patentibus. *Stamina* 8, biseriata, subsessilia. *Ovarium* ovoideum, in apice obtusum, stigmatè magno fere latitudinem tubi æquante instructum. *Fructus* ovoideus, 1.5 cm. longus, 1.1 cm. latus, rubro-aurantiacus, vestigiis minimis perianthii basi cohærentibus. Florèt mensibus Octobri-Decembri; fructus in mense Februario maturat.

E. HIMALAYA :—At an elevation of 4,500—5,500 ft. in the Darjeeling district; frequent in the neighbourhood of Sureil, Government Cinchona Plantation; *King* without number! *Gamble* No. 7093, and others near Sureil in Calcutta Herbarium.; at Pashok, 5,000 ft. *Gamble* No. 2136A in Herb. Gamble!; at Rungli Rungliot, 4,000 ft. *Gamble* No. 2612 A, B, in Herb. Gamble!; British Bhutan,* *Haines* without number!

The extreme alpine form of *Daphne cannabina*.

Although we have given earlier the range of the high level plant as 6,000—8,000 ft., the optimum for the typical *D. cannabina* is 7,000—8,000 ft. in the Darjeeling district. We believe most of the plants below 7,000 ft. occurring near Darjeeling, Senchal and Ghoom to be planted. As the alpine variety appears to be connected with the typical plant by intermediate forms, a more correct range would be 7—11,000 ft. Thus

* "British Bhutan" means the part of the Darjeeling district east of the Teesta river. [*Editor.*]

there may be a distinct break of approximately 1,500 ft. not covered by either species. When *Daphne Sureil* is planted in Darjeeling it does not set fruit so far as our observations go.

Hooker notes the occurrence of small alpine states 6—8 in. high in Sikkim. These we have observed both in the Western area and in Northern Sikkim. In the moist west they seem to be linked by a striking series of intermediates with *D. cannabina*, in the dry north with Tibetan conditions they are apparently dwarfs of *D. retusa* Hems. Of the former series we have endeavoured to secure the successive stages determined by altitude and exposure. In the neighbourhood of Darjeeling plants which flower when leafless occur occasionally but this may be due to age or to bad health, as the shrivelled appearance of the bark and the smaller size of the flower compared with normal specimens in the same area would lead one to infer. The normal plants at this altitude (7—8,000 ft.) have well developed leaves at the time of flowering. In the belt about 8—10,000 ft. (well shown at Tonglo and neighbourhood) there is a gradual change until at 10,000 ft. on Tonglo, flowers and young leaves appear simultaneously at the apices of the shoots and the rest of the shrub is bare. So far the shrub has not shown much reduction in size. But between 10,000 and 11,000 ft. (and possibly higher) this *Daphne* is exposed to much severer conditions and becomes gnarled and usually very dwarf. In the most exposed situations it is the 6—8 in. shrub described by Hooker, with stems frequently prostrate, lichen-covered and half buried in the soil. The flowers may appear contemporaneously with the young leaves or may precede them. These higher altitudes make a marked difference in the time of flowering; January and February at Darjeeling, 7,000 ft.; April and first week of May at Tonglo, 10—11,000 ft.; at Lachung, 8,500 ft., a much drier area, first week in May.

The name *glacialis* is proposed for this high alpine variety.

***Daphne cannabina* Wall., var. *glacialis* Smith & Cave.**

Frutex 15—30 cm. altus, nodosus, nonnunquam reptans, foliis deciduis, flores cum foliis nascentes vel sæpe priores.

The following is a piece of Lepcha folk-lore regarding the above variety. "Such plants, flowering when leafless are to be found only occasionally, and when found and at the time of flowering, the flowers from the branches which are nearest the snow or nearest a snowy range, together with portions of the root on the same side of the plant are gathered and dried. From these a decoction is made and after clarifying is used as a medicine, taken internally for 'pains in the stomach.'

No virtue whatever is attributed to the medicine made from leaf-bearing plants nor to the parts of leafless plants which are not the parts nearest the snow."

Daphne retusa Hemsl.

An alpine *Daphne* occurs in North Sikkim near the Tibetan frontier, *Younghusband* without number in Herb. Calc. and Herb. Kew. !; *Ribu* No. 2828, Tangu, 13,000 ft. in Herb. Calc. ! The specimens are imperfect and have been referred to *D. retusa* Hemsl. probably correctly though the leaves are much narrower (almost linear so great is the amount of 'revolution') than those of *Pratt* No. 737 which is the type of *D. retusa*. They approach *D. tangutica* Maxim. both in leaves and in the character of the shoots. All these species are imperfectly known.

Assam Daphnes.

The specimens from Assam come nearest to *Daphne Sureil* but are too inadequate to warrant more than a few observations. No. 677 *Gallatly* from Cherrapongee, 5,000 ft., has waxy white flowers with long narrow perianth tube and acute lobes. The leaves are relatively broad; (Wallich ticketed his Sylhet specimens "*β* latifolia, an distincta spec. ?") There are two interesting sheets from Shillong, collected by General Collett, one at 5,000 ft., recalling *Gallatly*'s plant but with even narrower leaves relatively than the Himalayan *D. cannabina*. The second sheet is from "The Peak, Shillong", altitude 6,000 ft. with frequently ovate leaves, 2.5 cm. long 1.5 cm. broad, dense terminal inflorescences, and narrow perianth tube with acute lobes. The specimen shows remarkable pseudodichotomous branching.

In a note on this sheet General Collett remarks:—

"*Daphne cannabina* Wall. I suppose? Var? It cannot be '*involutrata*' and yet it differs much in leaves etc. from the commoner forms. I have seen this form only at the Peak."

The altitude is noteworthy for 6,000 ft. in the Khasias corresponds botanically with a higher altitude in the East Himalaya. The plant is neither *D. cannabina* Wall. nor *D. Sureil*. The *Daphnes* of the area would repay investigation in the field.

Enumeration of Himalayan species.

A list of the Himalayan *Daphnes* is given below with a note of the synonymy of the *papyracea-cannabina* series. The writers have not at

present means of ready access to all the works on Indian Botany, more especially the local forest floras, and have consequently not found it possible to treat the synonymy adequately.

D. oleoides Schreb. ex Hooker in Fl. Brit. Ind. V., p. 193.

Scarcely equivalent to the South European plants.

D. cannabina Wall. in Asiat. Research, XIII, 315, t. 7, 8, and Cat. 1045A. *D. cannabina* Wall. ex Fl. Brit. Ind. V., p. 193 pro parte. *D. Bhotua* Don. Prod. Fl. Nepal, p. 68. *D. cannabina* Wall. in Gamble's List of Trees in Darjeeling District, p. 67.

var. **glacialis** Smith et Cave.

D. papyracea Decne. in Jacq. Voy. Bot. 143, t. 148. *D. cannabina* Wall. ex Fl. Brit. Ind. V., p. 193 pro parte. *D. papyrifera* Ham. MSS. *D. odora* Don (nec Thumb.) Prod. Fl. Nepal, p. 68. *D. papyracea* Wall. ex Steud. Nomencl. p. 483. *D. papyracea* Wall. ex DC. Prodr. XIV, p. 537. *D. papyracea* Wall. ex Brandis For. Fl. p. 386. *D. cannabina* Wall. ex Brandis Ind. Trees, p. 544, pro maxima parte. And generally the *D. cannabina* of forest and local floras of the North-West Himalaya.

D. Sureil Smith et Cave.

D. retusa Hemsl. vel aff.

D. involucrata Wall.

DESCRIPTION OF PLATE.

Fig. I.—*DAPHNE CANNABINA* Wall.

A—Bud.

B—Flower from one side.

C— „ „ above.

D— „ split and rolled out flat × 3.

E—Fruit in second week of February.

F— „ ripe, middle of June.

Fig. II.—*DAPHNE SUREIL* Smith et Cave.

A—Bud.

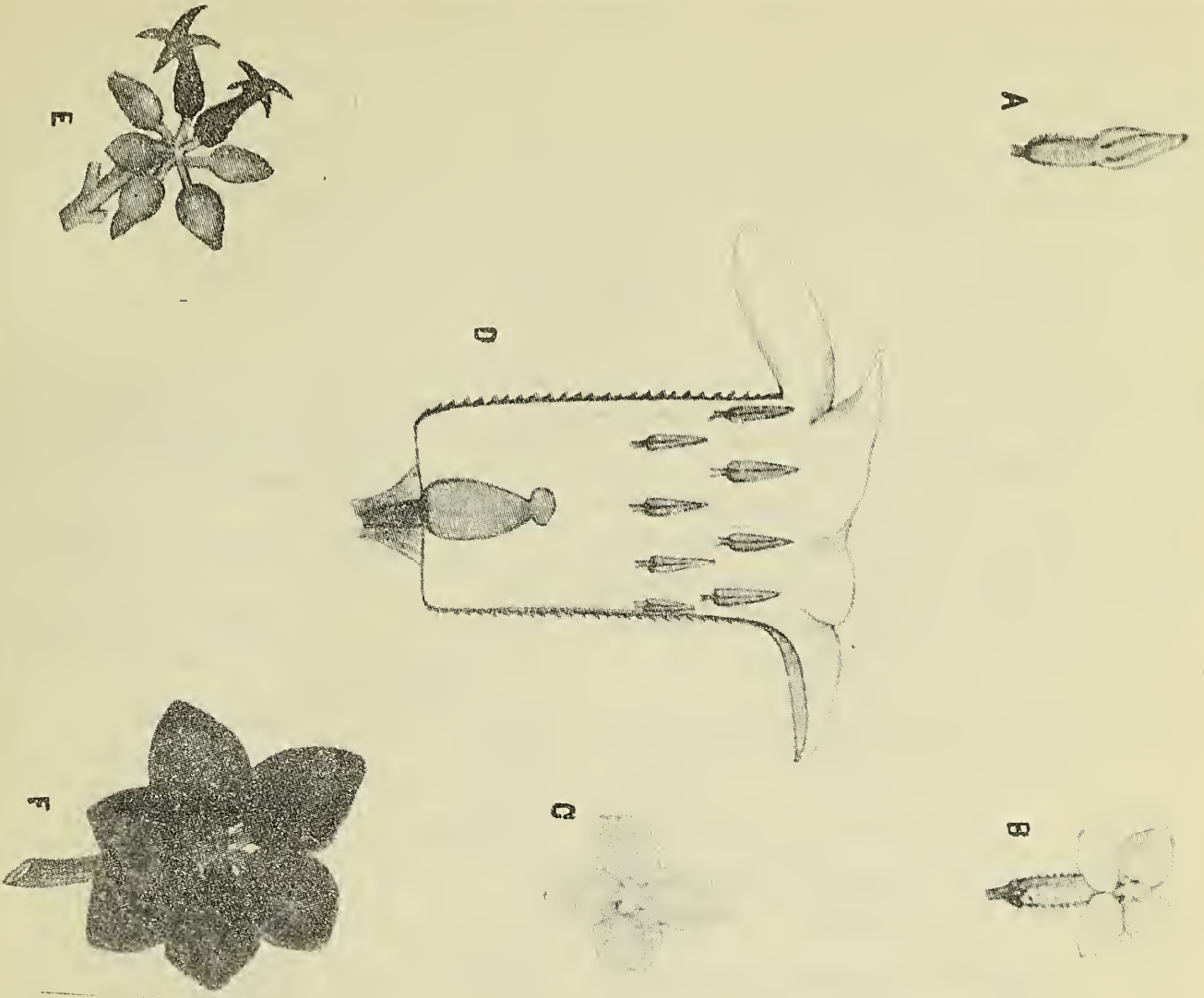
B—Flower from the side.

C— „ „ above.

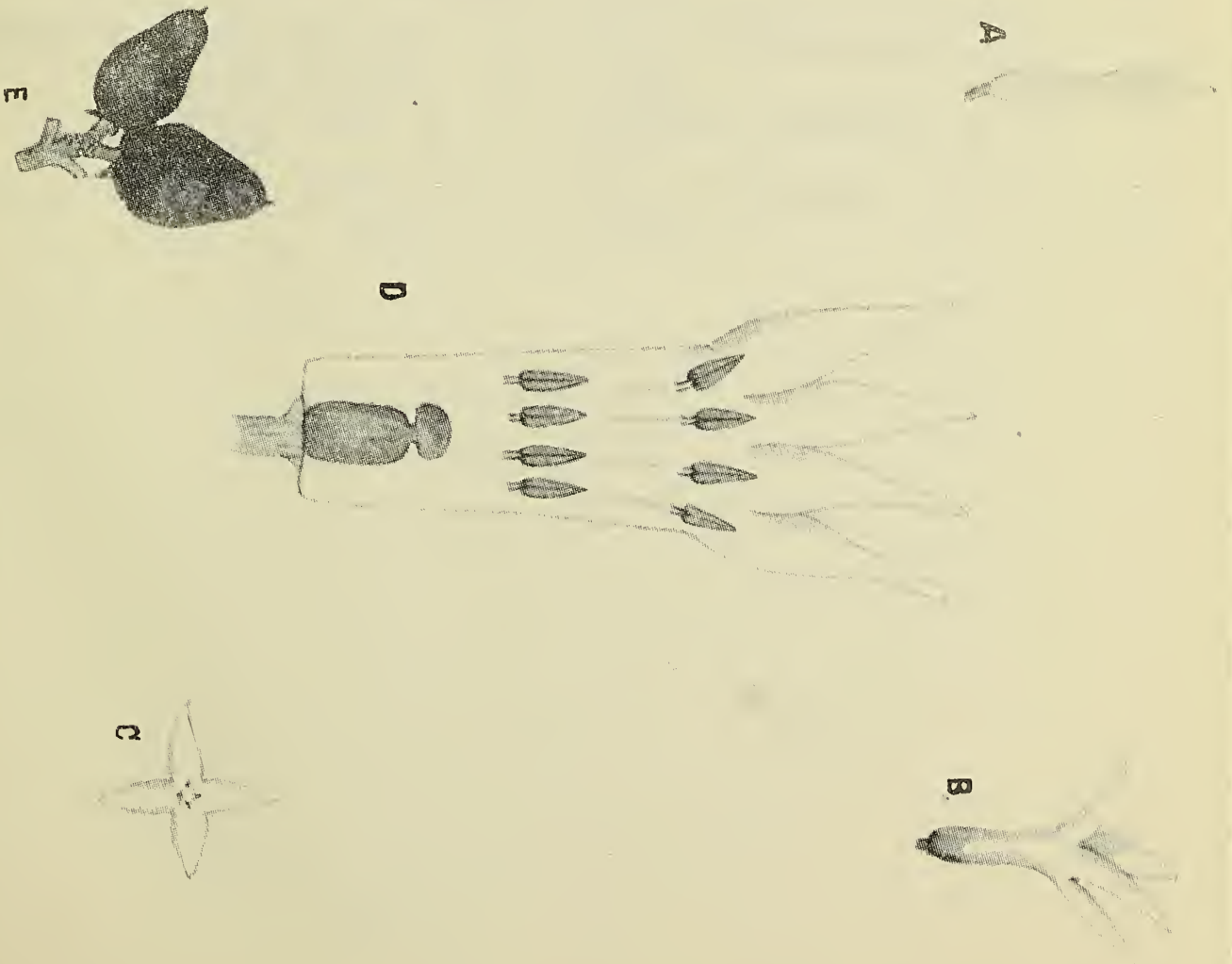
D— „ split and rolled out flat × 3.

E—Fruit ripe in second week of February.

I. *Daphne cannabina* Wall.



II. *Daphne surell* Smith & Gave.



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RECORDS
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VOLUME VI.—No. 3

(1) REPORT ON THE MOSSES OF THE ABOR EXPEDITION 1911-12

BY

H. N. DIXON, M.A., F.L.S.

(2) REPORT ON THE MOSSES COLLECTED

BY

MR. C. E. C. FISCHER

AND OTHERS FROM SOUTH INDIA AND CEYLON

BY

H. N. DIXON, M.A., F.L.S.



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REPORT ON THE MOSSES OF THE ABOR EXPEDITION, 1911-12

By

H. N. DIXON, M.A., F.L.S.

[Editorial Note :—The Abor Hills constitute “a section of the Himalayan range lying on the northern frontier of Assam, between the Siom river on the west and the Dibang on the east, occupied by tribes of Tibeto-Burman origin.” (Imperial Gazetteer of India 1908, V, 9.)

A punitive expedition was despatched against the Abors towards the end of 1911. Several officers of the Scientific departments of the Government of India were permitted to accompany the expedition and amongst them was Mr. I. H. Burkill, M.A., F.L.S., lately Economic Botanist to the Botanical Survey of India, and now Director of the Botanical Gardens in the Straits Settlements. The mosses collected by Mr. Burkill were sent to Mr. H. N. Dixon, M.A., F.L.S., for determination, and the following report has been kindly contributed by the latter.]

The mosses collected by Mr. Burkill were not numerous, amounting to a little over 60 numbers; but for the size of the collection they presented a considerable degree of interest, including some half-a-dozen undescribed species besides a few which indicated an interesting extension of geographical range. The most notable perhaps of these is *Claopodium crispulum* Broth. (*Pseudoleskea crispula* Bry. jav.), which has hitherto been recorded only from Java and Formosa. Cardot in the *Mousses de l'île Formose* (Beihefte zum Bot. Centralbl., Bd. XIX, Abt. II, 1905), in giving some account of the general distribution of the mosses of that island, has drawn up a list of 15 species which are common to Formosa, the Himalayan range, and the Malayan Archipelago, with six others found in the two former regions but not known at present from Malaysia. This relationship supports, so far as it goes, the evidence afforded by Phanerogams and Vascular Cryptogams as to the geographical affinities of the flora of the Assam region. Drude (Handb. der Pflanzengeographie, p. 479), divides the Indo-Malayan tract into ten floral regions; the 5th and 6th being—

5. Birma (Pegu, Cachar, etc., nordwärts sich mit der Tropenregion des südöstl. Himalaya mischend).

6. Siam—Annam mit Formosa und dem nordöstlichen Ausläufern des indischen Reiches.

These two regions merge together in Assam, from the south and east, while from the west the flora of the great Himalayan range intrudes; and these three floral zones are represented among the bryophytes equally with the higher plants; indeed even the comparatively small

collection dealt with here includes representatives of all three. Thus, Drude's regions 5 and 6 respectively, and the Himalayan region, are represented by the species, among others, in the following three groups:—

- (1) *Vesicularia Montagnei*, *Mnium succulentum*.
- (2) *Barbella enervis*, *Leucobryum javense*, *Floribundaria floribunda*, *Campylium glaucocarpum*, *Physcomitrium repandum*.
- (3) *Neckeropsis acutata*, *Vesicularia succosa*, *Hypopterygium flavo-limbatum*, *Trematodon conformis*.

All the species in (1) and (2) were collected, as would be expected, in the plains around Kobo or at quite low altitudes in the hills. As soon as we ascend to the higher levels, the Lower Hill and Upper Hill Forests described by Mr. Burkill (The Botany of the Abor Expedition—Report of the British Association, Section K, Dundee, 1912), these floral relations cease and the affinity of the mosses with those of the Himalayan range becomes at once evident as in (3).

It is obvious that the geographical and climatal conditions that permit a given area to be the meeting place of several phyto-geographical regions, may also, provided the conditions persist over a sufficient period, permit also of that area being a centre of distribution back into the several regions concerned; indeed identical facts of distribution might in certain cases be explicable on either ground. This should perhaps be taken into account in considering the plant distribution in this district. I have not attempted to ascertain what body of evidence there is for looking upon the Assam or Khasian region as a centre of dispersal, either from the bryophytes or other groups of plants, but the distribution of one genus of mosses, at least, is certainly highly suggestive in this direction. I refer to the genus *Symphiodon*. This is a clearly characterized and striking genus, of which at present, so far as I am aware, eighteen species are known. Of these the Philippines, New Caledonia and S. China furnish one endemic species each, the remaining 15 being entirely confined to the Indian and Malayan peninsulas, except that one species, *S. Perrottetii* with a wide distribution in India extends also to Java and the Moluccas. Fourteen species, therefore, out of eighteen find their limits within the East Indian peninsular region, and of these eleven are confined to the area centring round Khasia, from Nepal and Bhotan on the west (including four undescribed species of *Brotherus* in Sikkim), and an unpublished species of Mitten's from Burma on the south-east; five or six of them, including the two species described in this paper, occurring in, and four being confined to this part of Assam. It seems impossible in such a case to look upon the Khasian district in any

other way than as the centre of dispersal of this genus, and without attempting to base any generalizations upon a single case, I suggest that it may be worth investigation how far it is supported by further evidence from this and other groups of plants.

I desire to express my obligation to M. Cardot for assistance in the preparation of both this and the following report.

I may also mention that the types of the new species here described are in my herbarium, which I hope will ultimately find a home in the British Museum collection; co-type specimens of each, moreover, are in the Herbarium of the Royal Botanic Garden, Calcutta.

1. *Trematodon* Rich.

1. *Trematodon conformis* Mitt. *Musc. Ind. or.* p. 12.

On a stone, Pasighat (n. 36587). Kobo, February, 1912 (n. 38107).

Mr. Burkill remarks on this that "it was very common about the clearing of the camp, growing on the bare earth. It was not present in December, or at least not noticed." As the capsules are in many cases ripe and deoperculate, it is scarcely possible that the entire development could have taken place, from the spore, between the two visits. It is probable that the gametophyte was present, but being small would be inconspicuous, or indeed partly hidden; the clearing would give an opportunity for the better development of the plants, no doubt, than would normally be the case. Both specimens were in good fruit, the capsules exhibiting, as is usual in this genus, a great diversity of maturity in the same gathering.

2. *Dicranoloma* Ren.

2. *Dicranoloma subreflexifolium* Par.

Syn. *Dicranum reflexifolium* Mitt. *Musc. Ind. or.* p. 15 (haud C. Müll.)

Dicranum subreflexifolium C. M. in *Bot. Zeit.*, 1864, p. 349. Summit between Serpo and Lalik, alt. 5,100 ft., xerophytic moss from rocks (n. 36344) c. fr.

I have compared this with the Khasian specimens in Hooker's herbarium, referred (erroneously) by Mitten to the Malaysian *D. reflexifolium* C. M., but distinguished by C. Müller and forming the type of his *D. subreflexifolium*. It agrees in nearly every detail, the toothing of the leaves varies in Hooker and Thomson's plant, being often weaker

than, but at times equal to, that of the Abor specimen; and the leaves are a shade closer, and not markedly fragile, as they are to some extent in the latter; the seta also is a shade shorter; but the differences are minute in comparison with the general agreement, and I do not think it is possible to separate them.

3. *Leucobryum* Hpe.

3. *Leucobryum javense* (Brid.) Mitt. *Musc. Ind. or.* p. 25. Rocks at top of summit between Serpo and Lalik, alt. 5,100 ft., c. fr. n. 36345).

Fleischer (*Musci... von Buitenzorg I*, 149) cites Hampe's description of the fruit of this species, which is in some respects rather misleading, notably in the terms "Kapsel klein trocken wenig gestreift." I have examined the fruiting specimens in Hampe's herbarium (Borneo, leg. Beccari), which shows the capsules exactly as in the Abor plant, by no means small for the genus, and quite markedly striate when dry.

4. *Octoblepharum* Hedw.

4. *Octoblepharum albidum* (Linn.) Hedw.

South side of a tree trunk in dense shade, Kobo, c. fr. (n. 37027).

5. *Fissidens* Hedw.

5. *Fissidens diversifolius* Mitt. *Musc. Ind. or.* p. 140.

Fruiting abundantly on pieces of wood embedded in the river bed; it had been submerged all the rains. Kobo, c. fr. (n. 37086). On lower rocks on the river bank, Janakmukh, c. fr. (n. 37160).

From the description of the locality for the type plant, and from specimens which I have received from southern India, it is evident that the normal habitat for this species is within the reach of, and frequently overflowed by, water. It varies very greatly, not only in the form of leaf but also in the degree of limbation, for though usually quite immarginate the vaginant lamina may sometimes show a quite distinct though narrow border.

Mr. Burkill informs me that the Abor plant bears ripe fruit early in December only a month, or even less, from the date when it becomes exposed—a very interesting instance of adaptation to the special circumstances of its development.

6. Fissidens pulchellus Mitt. *Musc. Ind. or.* p. 140.

Trees, summit of Bapu, alt. 6,240 ft. c. fr. (n. 36563).

I only know this plant from descriptions, but I think there can be little doubt of the correctness of the determination. The single specimen of this name in the Brit. Mus. in herb. Hampe does not look to me at all likely to be correctly determined.

7. Fissidens nobilis Griff.

Near Upper Rengging camp at 2,600 ft.; on a rock in considerable shade, on north exposure, growing downwards and outwards; ♀ (n. 36258).

6. Barbula Hedw.**8. Barbula comosa** Dz. and Mb.

On small stones on the undercliff below Janakmukh where water trickles down c. fr. (n. 37214).

7. Macromitrium Brid.**9. Macromitrium nepalense** (Hook. and Grev.) Schwaegr.

On upper side of branches of *Flacourtia cataphracta* Roxb., Janakmukh, c. fr. (n. 37185).

On trunks of *Terminalia myriocarpa*, Janakmukh, c. fr. (n. 37255).
On rocks, Yambung stream, alt. 900 ft. c. fr. (n. 37723).

A slender, lax, elongate form with more pellucid, thinner-walled cells (n. 36485 without locality) seems to be a shade form of the same plant. *M. nepalense* is a wide-spread and apparently a variable species, and judging from Wilson's specimen of *M. assamicum* in the British Museum collection (W. 28 without locality), I should think that Mitten is quite correct in tentatively referring that species to *M. nepalense*.

8. Physcomitrium Brid.**10. Physcomitrium pulchellum** Mitt. *Musc. Ind. or.* p. 54.

Syn. *Gymnostomum pulchellum* Griff.

On bare soil, near Rotung, c. fr. (n. 37625).

11. Physcomitrium repandum Mitt. *op. et. loc. cit.*

Syn. *Gymnostomum repandum* Griff.

On vertical face of earth, alt. 900 ft., junction of Yambung and Dehong, c. fr. (n. 37722).

9. *Rhizogonium* Brid.

12. *Rhizogonium spiniforme* (Linn.) Bruch.

Spur above upper Rengging camp, on fallen rotten branch, alt. 4,200 ft., c. fr. (n. 36285). Tree trunk, Lalik Valley, alt. 2,700 ft., c. fr. (n. 37335a.)

10. *Mnium* Dill.

13. *Mnium rostratum* Schrad.

Evidently a common moss here as throughout the Himalaya range (nos. 36115, 36174, 36541).

14. *Mnium succulentum* Mitt. Musc. Ind. or. p. 143.

Janakmukh; with Hepatic on rocks, st. (n. 37177). (Plates I, II, fig. 5.)

Fleischer (Musci.....von Buitenzorg, II, 581) describes *M. succulentum*, referring to it *M. integrum* Bry. jav.; and has issued Javanese specimens as *M. succulentum* and *M. succulentum*. n. var. *densum* Fleisch. in the M. Frond. Arch. Ind., nos. 367 and 467. He has however unfortunately been misled, no doubt by an examination of the specimens purporting to be Mitten's types. The type specimen should be No. 680, Hb. Ind. or. of Hooker, Nepal orient. reg. temp. Unhappily both at Kew and at the British Museum the specimen under this number contains only *M. rostratum*, with which no doubt the true plant was associated. Mitten however describes his plant as "*M. rostrato habitu omnino simile, sed foliis paululum majoribus, cellulis sexies majoribus succulentis*," and Assam specimens, leg. Griffith, at Kew, determined by Mitten, agree precisely in these respects with his description, having a quite different texture, a narrow, not cartilaginous border to the leaves, and the cells between two and three times the diameter of those of *M. rostratum* (Mitten's "sexies" would apply quite well to the superficial measurement).

It will be seen from a comparison of Fleischer's description that it applies to a moss in no way markedly distinct from *M. rostratum* except in the dioicous inflorescence (the cell measurements would apply very well to that, but by no means to the true *M. succulentum*). I have not seen No. 367 M. Fr. Arch. Ind.; but No. 467—which has the leaves by no means entire—I should refer unhesitatingly to *M. rostratum*, judging from the vegetative characters; I have not been able to examine the inflorescence.

The margin in *M. succulentum* varies greatly even as between the leaves of a single stem. Mitten describes the cells as "marginalibus con-

formis intensius coloratis," which however scarcely applies to the prevailing type so far as I have studied his specimens. In most cases I find a narrow border of a single or at times double row of elongate cells, which are by no means cartilaginous or incrassate, often scarcely narrower than the interior cells, sometimes chlorophyllose, at others nearly empty and pellucid. The number of rows of marginal cells varies from one to three or four, and the border may be subentire or sharply and closely toothed, with all intervening forms. In no case could it, I think, be taken for *M. rostratum*, and in certain forms where it is entire or practically so, it more nearly resembles that of *M. subglobosum*. The cells in the upper part of the leaf, about half-way between the nerve and the margin, measure about 45—60 μ in the shortest diameter (as compared with 18—25 μ in *M. rostratum*), and are not at all incrassate or collenchymatous.

As it seems desirable to establish the species more firmly, and it has not yet been figured, I have given figures of the Abor plant (Plate I, fig. 5a) showing the cells as compared with those of *M. rostratum* (fig. 4a), and also of the Assam plant at Kew, referred to above, showing the marginal cells on different leaves.

11. *Philonotis* Brid.

15. *Philonotis speciosa* (Griff.) Mitt.

Janakmukh, c. fr. (n. 36474, 37171); on loose stones and mud on the undercliff below Janakmukh, c. fr. (n. 37213).

12. *Pogonatum* P. Beauv.

16. *Pogonatum* sp. On dry stony surface of undercliff below Janakmukh (n. 37215).

Possibly *P. leucopogon* Ren. and Card. but in the absence of mature fruit doubtful. The capsute is only slightly papillose, the seta slightly longer, and the leaf base only slightly and not abruptly widened. The marginal cell of lamella in section is not enlarged and scarcely flattened.

13. *Floribundaria* C. Müll.

17. *Floribundaria floribunda* (Dz. & Mb.) Fleisch.

On the upper side of a hanging tree trunk in deep shade, Kobo, st. (n. 37070). A rather robust, bright green form, but consisting entirely of quite young stems. The cells are nearly all unipapillate; the margin here and there narrowly recurved.

14. *Barbella* Fleisch.

18. *Barbella enervis* (Thw. & Mitt.) Fleisch. (Plate II, fig. 8).

Syn. *Meteorium enerve* Thw. & Mitt.

Meteorium trichophoroides (Hampe) Mitt.

Puak, alt. 800 ft. st. (n. 36039); det. Cardot.

M. Cardot points out that this differs from *B. enervis* only in the alar cells being slightly larger and more distinct; the habit, very marked in the distinction between the widely spreading large leaves of the secondary stems and the closely appressed filiform pointed leaves of the flagellate branches is identical in both, and the leaf characters apart from the difference referred to above, are also the same. The distribution of this plant as at present known is remarkable, being recorded hitherto only from Ceylon, the Australian Continent and Lord Howe Island. The Abor specimen, which I have figured on Plate II, is a small, probably only partially grown plant.

15. *Aerobryopsis* Fleisch.

19. *Aerobryopsis membranacea* Broth.

Syn. *Meteorium membranaceum* Mitt. Musc. Ind. or. p. 88.

Tree trunk, Rotung, 1,300 ft. alt., st. (n. 37515).

This agrees exactly with Griffith's Assam plant at Kew, on which Mitten's species was founded. I do not know that it has since been recorded.

16. *Meteoriopsis* Fleisch.

20. *Meteoriopsis squarrosa* (Hook.) Fleisch.

Trunk of *Stereospermum*, Rotung, 1,300 ft., st. (n. 36068).

17. *Trachypodopsis* Fleisch.

21. *Trachypodopsis crispatula* (Hook.) Fleisch.

Trees, summit of Bapu, alt. 6,240 ft., c. fr. (n. 36564). A green form.

18. *Neckeropsis* Rchdt.

22. *Neckeropsis acutata* Fleisch.

Syn. *Neckera acutata* Mitt. Musc. Ind. or. p. 121.

On tree trunks, above the head of the Eggar, alt. 4,500 ft., st. (n. 36196).

23. *Neckeropsis crinita* (Griff.) Fleisch.

Syn. *Neckera crinita* Griff., Mitt. Musc. Ind. or. p. 120.

Boulders in stream-bed, between Yambung and Sissin. alt. 1,000 ft., st. (n. 36015).

19. *Homalia* (Brid.) Schpr.24. *Homalia exigua* Bry. jav.

Boulders in stream-bed, with the previous species, st. (n. 36015b).

20. *Homaliodendron* Fleisch.25. *Homaliodendron flabellatum* (Dicks.) Fleisch.

Tree trunks, alt. 4,500 ft. above the head of the Egar, st. (n. 36196a).
Tree trunk, Lalik Valley, alt. 2,700 ft., st. (n. 37335b).

21. *Symphyodon* Mont.26. *Symphyodon complanatus* Dixon sp. nov. (Plate I, fig. 2.)

Procerus, *late-virens*, nitidus. Caulis fron diformis, *percomplanatus*, bis-, terpinatus, repens, ad 10 cm. longus., ramis ramulisque brevibus, *obtusis, rigidiusculis*. Folia laxiuscule disposita, *percomplanata*, lateralialia a caule *valde distantia, patula, immo subrecurva*, dorsalia ventraliaque erecta, appressa. Folia caulina e basi ovali oblonga subcultriformia, 2mm. longa, ad 75mm. lata, breviter bicostata, uno margine incurvo, superne *rotundata, obtusa*, apicem versus vel e medio folio *grossiuscule irregulariter, dentibus inæqualibus, sæpe recurvatis, dentata*. Cellulæ angustissime lineares, 50-80 μ longæ, 3-5 μ latæ, prope apicem paullo breviores, *omnino læves*, ad infimam basin tantum latiores, irregulariter hexagono-rectangulares, alares perpaucae, parvæ, rectangulares pellucidæ, parietibus subincrassatis, Folia ramea ramulinaque minora, cetera similia. Dioicus Fl. ♂ haud visi. Flores feminei medium versus caulem insiti, bracteæ perichæstiales patulæ externæ longiuscule, internæ breviter late acuminatæ, acutæ, omnes *grosse dense dentatæ*. Seta elongata, gracilis, 3.5—4.5 cm. longa, parte inferiore *omnino lævis, prope apicem tantum scabriusculum*; theca elliptica, 3mm. longa, in parte dimidia inferiore *parce irregulariter humiliter grosse verrucosa*. Peristomium generis, processibus 3-4 dentium longitudinem vel supra æquantibus. Spori circa 15 μ . Calyptra æque ac operculum ignota.

Hab. On a fallen branch of tree, watershed of Egar and Serpo, alt. 5,500 ft., Abor District, 23rd January 1912, leg. Burkill (n. 36208).

A fine species, which with the next is very different in habit from nearly all the species known to me, in the absolutely complanate branching, together with the form of the leaves and their dentation. *S. erraticus* (Mitt.) and *Stereodon pennatulus* Mitt. appear to be its only near allies hitherto described. The former differs in the reddish brown colour, more slender branching, the leaves less complanate, acute, with papillose upper cells, and finer marginal dentation. Brotherus places *S. erraticus* in a section with "Kapsel mit hohen Stacheln dicht besetzt;" but the

specimens in Hooker's herbarium show numerous capsules, lowly tuberculate only, as in the present plant

Stereodon (Symphyodon) *pennatulus* Mitt. (ined.?), "Moulmein Parish," in Herb. Kew., is similar in the complanate habit, but a very small plant, with very regularly subdistichous foliation, and leaves distinctly spathulate, finely crenulate only or erose at summit.

27. *Symphyodon scabrisetus* Dixon sp. nov. (Plate I, fig. 3.)

Speciei præcedenti habitu similis, sed multo minor, gracilius, minus exacte complanatus, ramis longioribus, ramulis paullo attenuatis; foliis oblongis, minus curvatis, supra vix angustatis, obtusis vel subacutis, tenerius denticulatis nervis binis brevissimis. Flores ♂ numerosi in axillis foliorum præcipue superiorum. Folia perichætialia anguste acuminata, parum denticulata. Seta vix 3 cm. alta, pars infima quarta tantum lævis, supra magis magisque scabra, parte dimidia superiore papillis præcællis cylindricis densissime echinata. Theca elliptica, minor, ore angustiore, per totam fere superficiem verucis valde inæqualibus plerumque humilibus densiuscule irregulariter obtecta. Peristomium ei præcedentis simile, tenerius, dentibus intus altius trabeculatis. Dioicus. Cetera ignota.

Hab. On tree trunk, Lalik Valley, alt. 2,700 ft., Abor District, 22nd December 1911; leg. Burkill (n. 37335).

Closely allied to the last species, and in the vegetative characters only distinguished by slight differences which in a sterile state might have been judged to be varietal merely; they are however in all probability constant, especially the finer denticulation of the leaves in the present species, which is shown to be of no trivial importance by the absolute difference shown by the perichætial bracts in the two species. The fruiting characters also are widely different.

The seta in this genus is usually scabrous in the upper part, especially near the capsule, but rarely if ever approaching the degree of asperity of the present plant.

I find when too late for alteration that a *S. scabrisetus* exists as a MS. name in Hampe's herbarium. It is however certainly identical with *S. erraticus* (Mitt.), so that no confusion is likely to occur.

22. *Distichophyllum* Dz. & mb.

(28). *Distichophyllum Griffithii* Par.

Syn. *Mniadelphus Griffithii* Mitt. Musc. Ind. or. p. 145.

Epiphyllous, growing obliquely forward and downwards on leaves overhanging a stream—a tributary of the Egar—alt. 3,000 ft., o. fr. (n. 36106).

Griffith's specimens at Kew are a little more robust, but essentially agree. In one specimen (II. 3872) the cells are a little smaller, both upper and basal, while in another specimen of the same number they are appreciably larger, and almost exactly identical with those of the Abor plant.

23. *Cyathophorum* P. B.

29. *Cyathophorum Burkillii* Dixon sp. nov. (Plate I, fig. 1, II, fig. 9.)

Dioicum; habitu *C. Hookeriani* Mitt. Caulis primarius repens, tomentosus, secundarii sat conferti, ad 5 cm. alti, madefacti ad 8 mm. lati, subrigidi, simplices vel sæpius *hic illic ramos laterales paucos* gerentes; plerumque in apicem caudiformem, siccitate decurvatum, filis articulatis dense sitis obrutum sensim attenuati; cæspites saturate virides, siccitate haud nitentes. Folia sat conferta, valde asymmetrica, late ovata, apice breviter acutissime acuminata, illis *C. parvifoliae* figura similia, *distincte sat late limbata, parte superiore dimidia argute minute denticulata; costa debilis, partem tertiam vel quartam folii tantum attingens, sæpe brevior furcata.* Areolatio regulariter rhomboideo hexagona, e cellulis apud basin laxis, apicem versus et latera pariter decrescentibus in medio folio circa 30 μ . latis, valde chlorophyllosis, parietibus tenuissimis instructa; marginalibus 2-4 seriebus, angustissimis, linearibus vel peranguste rhomboideo-linearibus, incrassatis, limbum bene notatum, latiusculum formantibus. Amphigastria exacte orbicularia, ad 1.5 mm. lata, apice breviuscule rigide cuspidata, ecostata vel costam pertenuem dimidiam partem folii vel infra attingentem exhibentia, margine serie unica cellularum angustissime obscure limbata, *in parte superiore dimidia argute denticulata.*

Flores ♂ in plantæ propriae caulibus copiosi, sæpe in cujusque folii axillis frondis superioris siti. Planta fœminea flores pauciores, medium versus frondem plerumque insertos gerens. Seta valde arcuata vel geniculata, pallida, 4—5 cm. longa lævis, vel cellulis mammosè prominentibus subrugulosa. Theca angustissime elliptica vel elliptico-cylindrica, pallida, 2 mm. longa, collo distincto prædita. Calyptra conico-mitriformis, glabra, basi subintegro. Operculum conicum, *longe rostratum.* Annulus latus, facile friabilis. Peristomium *bene evolutum* fusco-rubrum; dentes externi e basi paullo latiore lineares, fragiles, siccitate arcuato-incurvi, 6 mm. longi, extus densissime minute papilloso, linea media perincrassata recta vel sinuosula exarati, intus conferte altiuscule lamellati; endostomium membrana humilis, processibus linearibus subfiliformibus *dentibus subæquilongis* nodosis papilloso, siccitate erectis, linea media recta tenui pellucida notatis, haud perforatis; cilia nulla. Spori *parvi*, 15—18 μ . lati, virides, *omnino læves.*

Hab. Growing horizontally on a tree trunk near the ground, hill south of the Rebang, alt. 2,800ft., Abor District, 8th January 1912; leg. urkill (n. 37737).

A well marked species of this interesting and very beautiful genus, having for its nearest ally *C. parvifolium* Bry. jav., but distinct from that and all the Indo-Malayan species in the amphigastria, which are perfectly orbicular, with a shorter, cuspidate point. The comparatively broadly margined leaves, and the fine and almost even denticulation over the whole of the upper half both of leaves and amphigastria are also good characters. The fruit is known in but few of these species, so far as I am aware in only *C. Adiantum* and *C. Hookerianum*, and these have the peristome much less developed, indeed comparatively rudimentary. I have figured part of a peristome on Plate II, fig. 9.

24. *Hypopterygium* Brid.

30. *Hypopterygium flavo-limbatum* C. M.

On stump, above the Serpo river, alt. 1,800 ft., c. fr. (n. 37319). Hills south of Rotung, alt. 4,400 ft., c. fr. (n. 36236a).

25. *Leskea* Hedw.

31. *Leskea perstricta* Dixon sp. nov. (Plate II, fig. 6.)

Atroviridis; caules intertexti, repentes, parce radiculosi, paraphylliis nullis, dense pinnatim vel fasciculatim ramosi; rami suberecti *perbreves*, vix 5 mm. longi, simplices vel hic illic ramulosi, *tenelli*. Rami ramulique *stricti*, nec curvati, sicci *cylindrici*, *teretes*. Folia *dense imbricata*, madefacta erecto patentia, sicca *arcte imbricata*, *adpressa*; caulina 75 mm. longa, e basi late ovato-cordata *tenui-acuminata*, acuta; ramea minora, angustiora, breviter *latiuscule acuminata*, *minus acuta seu subobtusata*, omnes marginibus planis vel superne leniter anguste reflexis, integerrimis. Costa validiuscula, dorso prominens, lœvis, supra vix angustata, *prope apicem soluta vel subpercurrens*. Cellulæ superiores rhomboideo-hexagonæ, 5—8 μ latæ (circa 2 x 1), juxta costam elongatæ, marginem versus contra breviores; basilares medianæ subsimiles, paullo laxiores, marginem versus seriebus pluribus breviores, subquadratæ, numerosæ; omnes *parietibus tenuiusculis, lœves*.

Autoica. Flores ♂ numerosi, parvi, prope flores fœmineos. Perichætia *longa* (ad 4.5 mm.), *stricta*, foliis internis omnino erectis subappressis, subvaginantibus, *plurics plicatis*, integris, longe subulato-acuminatis, tenuiter areolatis, e cellulis pellucidis anguste linearibus instructis, costa *valida, longe excurrente*.

Seta 1.5—2 cm. longa, tenuis; calyptra angusta, pallide straminea, nitida; theca (immatura) cylindrica, leniter curvata vel suberecta, operculo conico obtuso pallido. Cetera ignota.

Hab. On tree trunk, Rotung, alt. 1,000 ft., Abor District, 26th December 1911; leg. Burkill (n. 37514).

A distinct species, and in some respects of somewhat anomalous position. In the branching and foliation it more closely resembles some species of *Pseudoleskea*; the capsule, however, though immature, claims it undoubtedly I think for *Leskea*; the calyptra and lid, etc., being almost exactly those of *L. polycarpa*; the curved, and occasionally even arcuate form of the capsule is no doubt due to its unripe condition, and almost identical forms may be seen in unripe *L. polycarpa*. The straight, terete, rigid branches give it an unusual appearance, and will separate it from other species of the genus, and also from *Lindbergia*. In habit it is much like certain forms of *Leskeella nervosa*, but the inflorescence at once separates it from that. *Leskea pusilla* Mitt., from Japan, must be quite different from our plant, judging from the somewhat brief description.

26. *Claopodium* Ren. & Card.

32. *Claopodium crispulum* Broth. forma.

Syn. *Pseudoleskea crispula* Bry. jav.

On tree trunks, Kobo, c. fr. immatur. (n. 35939, 37070).

A very interesting extension of the range of this plant, hitherto only known from Java and Formosa. It differs from the figures given in the Bry. jav. in having the branch-leaves gradually shorter-pointed as they pass upwards on the branch, the uppermost ones being quite obtuse. I find however that Javanese specimens (leg. Teysmann, in Hb. Hampe, in Hb. Mus. Brit.) show the upper branch-leaves decidedly subobtuse, thus forming an intermediate link with the Abor plant, which must be considered a form only.

27. *Thuidium* Schpr.

33. *Thuidium trachypodum* Bry. jav.

Syn. *Leskea trachypoda* Mitt. Musc. Ind. or p. 133.

On living trunk of tree, Kobo, c. fr. (n. 35954). On rock, alt. 800 ft., mouth of the stream north of Puak, c. fr. (n. 36038). Above the mouth of the Serpo river, alt. 1,800 ft., c. fr. (with n. 37319).

34. *Thuidium cymbifolium* Dz. & Mb.

On fallen log, hills south of Rotung, alt. 4,400 ft., st. (n. 36236).

28. *Macrothamnium* Fleisch.

35. *Macrothamnium macrocarpum* (Reinw. & Hornsch.) Fleisch.

On fallen trunk, south face of Bapu, alt. 3,800 ft., c. fr. (n. 36533).
On decaying trunks on the ground, near the top of Bapu., alt. 5,400 ft.,
c. fr. (n. 36544).

Both these are slender forms, probably referable to *M. pseudo-striatum* (C. M.) Fleisch. ; but I am quite unable to detect any characters sufficient to warrant its separation from *M. macrocarpum*, and M. Cardot shares this opinion with me. Fleischer retains it as separate, but has not indicated any distinguishing characters (Hedw. XLIV, 307). It is represented in Mitten's herbarium, but in letters which I have received from him he appears to have thought of it as only a more slender form of *M. macrocarpum*, as his note on the species (Musc. Ind. or. p. 114) also indicates. The distribution of *M. pseudo-striatum*, it may be noted, is identical practically with that of *M. macrocarpum*.

29. *Campylium* Bryhn.

36. *Campylium glaucocarpon* (Reinw.) Broth.

Syn. *Stereodon glaucocarpus* Mitt. Musc. Ind. or. p. 115.

On tree trunks, particularly on loose flakes of bark standing out from the trunk, Janak stream, c. fr. (n. 37303).

The specimen is in young and good fruit, and shows well the remarkable coesious waxy excretion on the capsule and summit of the seta.

30. *Ectropothecium* Mitt.

37. *Ectropothecium cyperoides* (Hook.) Jaeg.

Syn. *Stereodon cyperoides* Mitt. Musc. Ind. or. p. 99.

On upper rocks of river bank, Janakmukh, c. fr. (n. 37161). On tree trunks, Janak stream, c. fr. (n. 37302).

E. cyperoides is a highly variable plant, as Mitten has pointed out (l. c.); but I am quite in agreement with M. Cardot, who has expressed the opinion to me in letters, that it will not include the Javan moss figured in Bry. jav. II, t. 294. I have examined carefully the original plants of Harvey's and others in Hooker's herbarium, and while finding there all the variation in leaf-form mentioned by Mitten, I find no forms with the leaves so shortly and widely pointed as figured in the Bry. jav., while the areolation there depicted is of quite a different character from that of *E. cyperoides*, in all forms of which it is extremely narrow, linear-vermicular, with a single marginal row usually very

slightly wider; and the cells remain almost unaltered to the base. The leaves vary from shortly acuminate and almost plane to a form with finely, almost filiform-acuminate leaves, strongly decurved and falcate, almost exactly as in *Stereodon cupressiformis*. The species appears to have a wide geographical range, and I can find no correlation between the form of leaf and the distribution. The length of seta and size of capsule also show considerable variability. I think there is no doubt that the Javan moss issued by Fleischer as *E. pseudo-cyperoides* Fleisch. n. sp. (M. Fr. Arch. Ind., No. 343) belongs to the true *E. cyperoides* (Hook). It is identical with "*E. cyperoides*, Ceylon, Gardner, No. 971," cited by Mitten, which in its turn is quite the same as several North Indian plants. The Javan plant described under this name in the Bry. jav. must, I feel assured, receive another designation; I have seen no specimens agreeing with the figures.

Var. *papillosum* Card. and Dixon var. nov.

Cellulæ superiores sæpe, præcipue foliorum rameorum, *dense, argute, altiuscule papillosæ*.

On logs, above upper Rotung, alt. 2,500 ft., 23, Jan. 1912. c. fr. leg. Burkill (n. 36173) also n. 37301A without further localization.

E. cyperoides is described as having the cells occasionally papillose with the projecting ends of the upper cell walls, but in this case it is so much more highly developed as to seem worthy of varietal distinction. The cells are somewhat shorter than in the type in some leaves, but I do not find this a sufficiently constant character to be included in the diagnosis. The papillæ are somewhat less pronounced in 37301A.

31. *Vesicularia* C. Müll.

38. *Vesicularia succosa* (Mitt.) Broth.

Syn. *Stereodon succosus* Mitt. Musc. Ind. or. p. 101.

On a stone, under Rotung in the Dehong gorge, alt. 900 ft., c. fr. (n. 36154). On a fallen log, Kobo, c. fr. (n. 37091).

(The former specimen appears to be actually growing on wood as would be expected.) I have compared this with Mitten's co-type (no. 1038, Hooker) in the British Museum.

39. *Vesicularia Montagnei* (Bél.) Broth.

Running along the upper surface of a fallen and rapidly decaying log, Kobo, c. fr., det. Cardot (n. 37079). On rotten wood, Kobo, c. fr. (n. 37104).

32. *Isopterygium* Mitt.

40. *Isopterygium taxirameum* (Mitt.) Jaeg.

Syn. *Stereodon taxirameus* Mitt. Musc. Ind. or. p. 105

On sand, Janakmukh, c. fr. (n. 37263).

A large form, with rather long setæ and large capsules. M. Cardot writes of it "ne me paraît être qu'une des nombreuses formes de l'*I. taxirameum* (Mitt.), à peu près identique à celle que Müller a appelé *I. taxirameoides*."

33. *Rhynchostegiella* Limps.

41. *Rhynchostegiella assamica* Card. and Dixon sp. nov. (Plate II, fig. 7.)

Caulis reptans, ad terram arcte adhærens, vage ramosus; folia juniora læteviridia, senilia nigricantia. Folia caulina sat conferta, erecto-patentia nec compressa, siccitate vix mutata, circa 1.5 mm. longa, e basi angustata, parum decurrente, *ovato-lanceolata acuta nec acuminata*, paullo concava, marginibus planis, *ubique conferte regulariter denticulatis*; costa sat valida, $\frac{3}{4}$ folii longitudinem attingens, dorso in spiculum apicalem sæpe excedens. Cellulæ rhomboideo-lineares, subvermiculares, 30-40 μ longæ, 5-6 μ latæ, parietibus firmis; apicem versus breviores, elongate ellipticæ, inferiores sensim laxiores, infimæ anguste rectangulares, alares numerosæ, *sat magnæ late breviter rectangulares, pellucidæ bene notatæ*. Folia ramea minora, *minus acuta vel obtusiuscula, siccitate marginibus involutis sub-tubulosis* (interdum ramuli tenerrimi angustifolii subflagelliformes inveniuntur).

Autoica. Perichætium parvum, bracteis erecto-patentibus vel recurvis, argute acuminatis, fortiter denticulatis vaginula elongatæ. Seta tenuis, rubra, *lævis* (interdum prope apicem obscure humiliter sub-scaberula seu rugulosa), 1—1.25 cm. longa. Theca parva pallida, breviter turgide ovata, curvata, cernua, operculum *acute decurvato-rostratum*.

Hab. Kekar Monnying, Abor District, alt. 800 ft., on silted earth on tree trunks, 15th Jan. 1912, leg. Burkill (n. 36044). On stem of *Ficus pyriiformis* var. and stones near the stem, alt. 1,200 ft., gorge of the Yambung, 9th Jan. 1912 (n. 37766).

This rather uninteresting little plant is placed by M. Cardot in the Section Lepto-rhynchostegium of Brotherus, but does not seem quite at home there, any more than in Eu-rhynchostegiella. The cells are somewhat long for the former section, and the leaves scarcely concave. The limits between *Rhynchostegiella* (especially the Section Lepto-rhynchostegium) and Eurhynchium seem very ill-defined, and it is doubtful whether the separation can be maintained.

The other Indian species of the genus have the leaves widely spreading or squarrose with long acute points and a scabrous seta. The

blackish colour of the older leaves, and the pale green of the younger branch leaves which are strongly enrolled and subtubular when dry, give the plant a distinct appearance.

34. *Rhynchostegium* Schpr.

42. *Rhynchostegium herbaceum* (Mitt.) Jaeg.

Syn. *Hypnum herbaceum* Mitt. Musc. Ind. or. p. 81.

On fallen tree trunks and branches, Kobo, c. fr. (n. 35989, 37070 bis, 37099). On decayed stump, above the Egar stream, alt. 3,400 ft., c. fr. (n. 36103). On rotten branch on the ground, alt. 1,000 ft., Yambung to Sissin, st. (n. 36018).

Explanation of Plates.

Plate I.—Fig. 1. *Cyathophorum Burkillii*. *a*, stem of ♂ plant, nat. size. *b*, portion of stem, under side $\times 3$. *c, c*, leaves $\times 4$. *d, d*, amphigastria $\times 4$. *e*, upper median cells $\times 250$. *f*, calyptra $\times 5$. *g*, lid $\times 8$. *h*, marginal cells $\times 200$.

Fig. 2. *Symphiodon complanatus*. *a*, stem nat. size. *b*, stem leaf $\times 20$. *c*, branch leaf $\times 20$. *d*, upper cells $\times 200$. *e*, capsule $\times 10$. *f*, apex of perichæatial bract $\times 10$.

Fig. 3. *Symphiodon sabrisetus*. *a*, stem leaf $\times 20$. *b*, branch leaf $\times 20$. *c*, apex of perichæatial bract $\times 40$. *d*, capsule $\times 10$. *e*, portion of upper part of seta $\times 40$.

Fig. 4. *Mnium rostratum*. *a*, upper marginal cells $\times 200$.

Fig. 5. *Mnium succulentum* (Burkill, no. 37177). *a*, upper marginal cells $\times 200$.

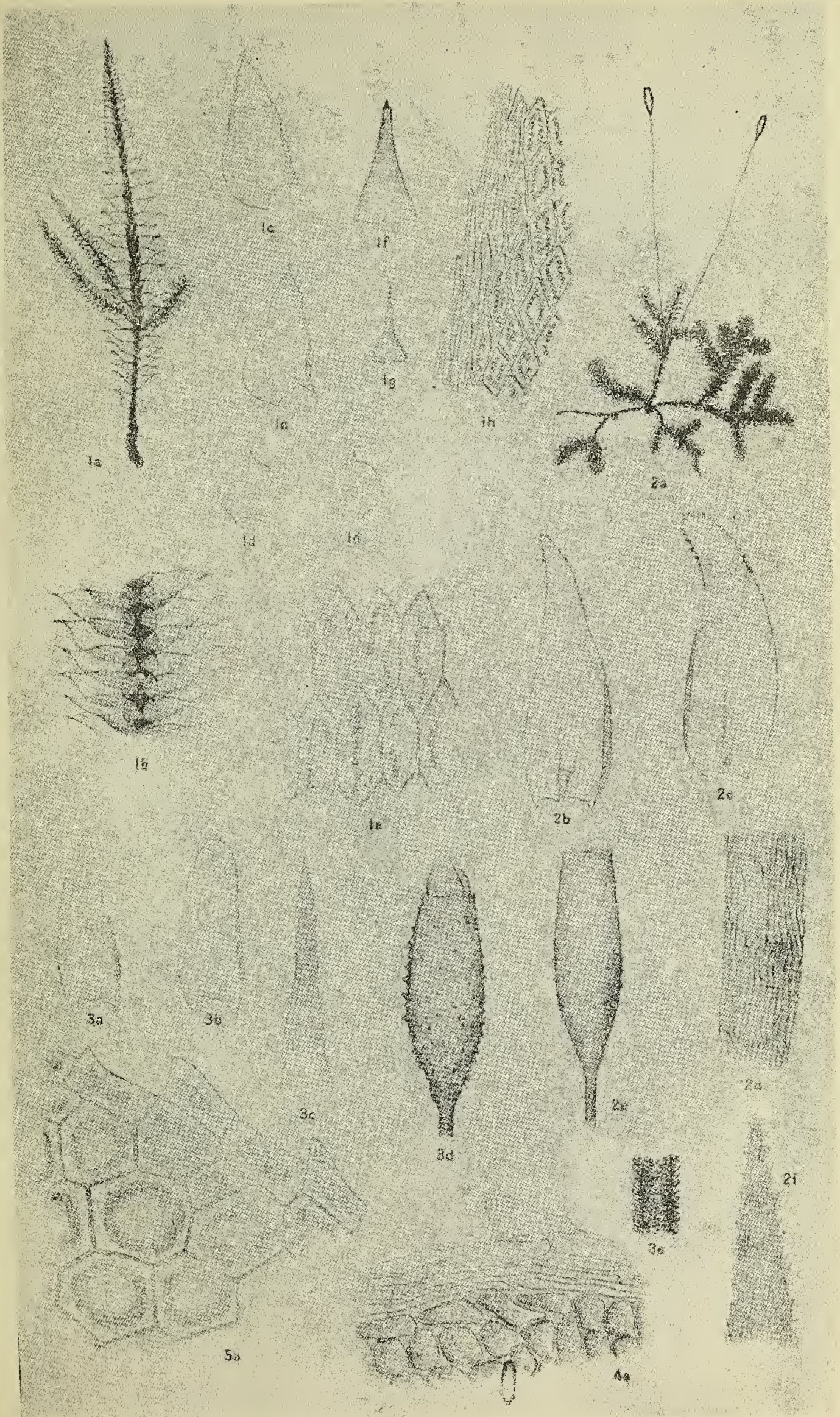
Plate II.—Fig. 5. *Mnium succulentum* (Assam, leg. Griffith). *b, c, d*, marginal cells near apex $\times 50$. *e*, do. at mid leaf.

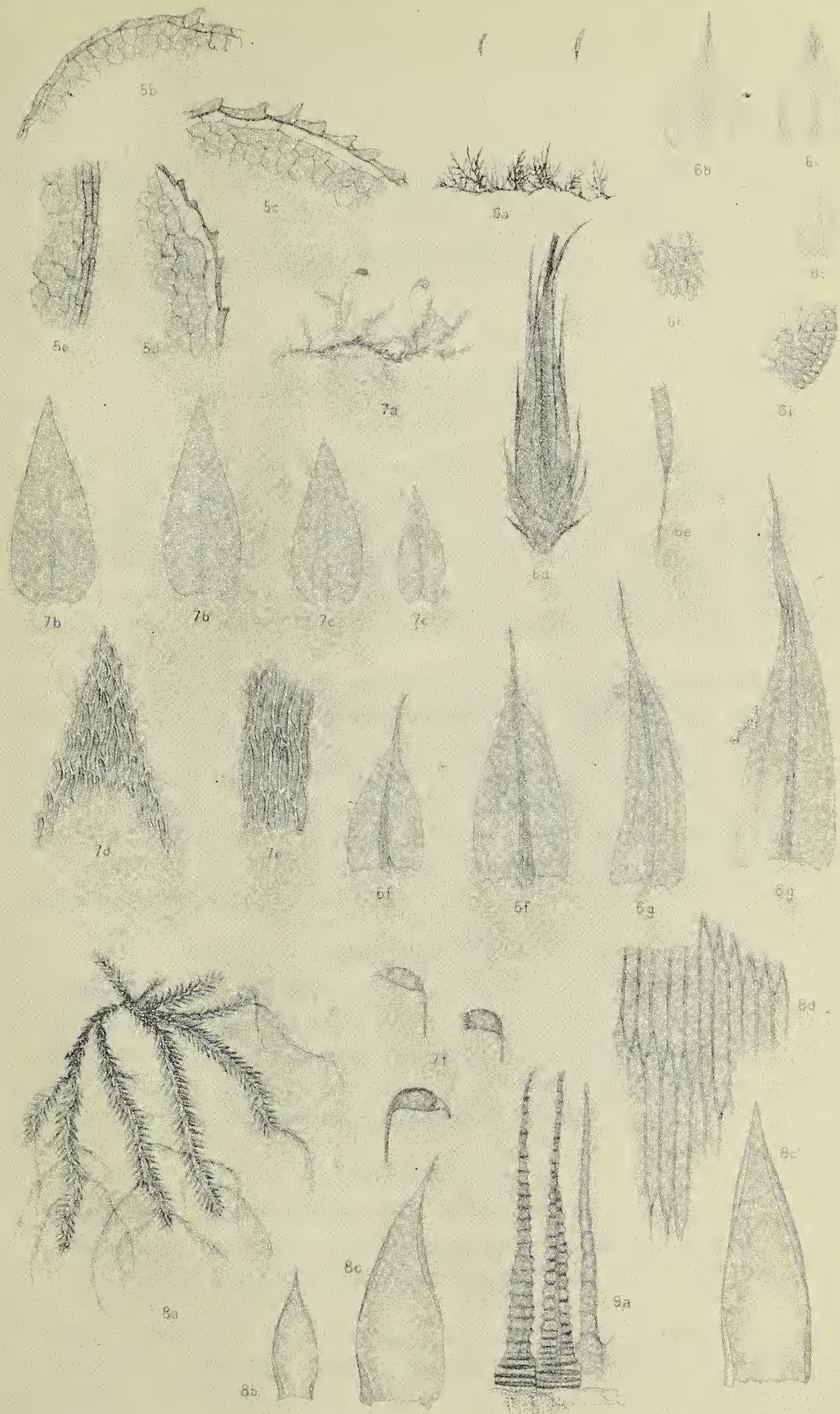
Fig. 6. *Leskea perstricta*. *a*, plant, nat. size. *b*, stem leaf $\times 20$. *c, c*, branch leaves $\times 20$. *d*, perichæatium $\times 10$. *e*, capsule $\times 5$. *f*, outer, *g*, inner perichæatial bracts, $\times 10$. *h*, upper leaf cells $\times 200$. *i*, alar do. $\times 200$.

Fig. 7. *Rhynchostegiella assamica*. *a*, stem, nat. size. *b, b*, stem leaves $\times 20$. *c, c*, branch leaves $\times 20$. *d*, apex of stem leaf $\times 150$. *e*, upper cells $\times 200$. *f*, capsules $\times 4$.

Fig. 8. *Barbella nervis* (Burkill, no. 36039). *a*, stem, nat. size. *b*, leaf of secondary stem $\times 10$. *c, c*, do. (somewhat flattened out) $\times 20$. *c*, upper cells $\times 200$.

Fig. 9. *Cyathophorum Burkillii*, peristome $\times 80$ (*left*, outer tooth, ventral surface; *middle*, do., dorsal surface; *right*, process of endostome).





del. H. N. Dixon.

ABOR MOSSES.

West. Newman proc.

REPORT ON THE MOSSES COLLECTED BY MR. C. E. C.
FISCHER AND OTHERS FROM SOUTH
INDIA AND CEYLON

BY

H. N. DIXON, M.A., F.L.S.

The subject of this report is partly a collection of mosses made by Mr. C. E. C. Fischer, Deputy Conservator of Forests in Coimbatore, placed in my hands for determination by the authorities of the Royal Botanic Garden, Calcutta, together with a further collection of Mr. Fischer's which reached me through the Rev. E. Blatter, S. J. These were gathered, some in the Palni Hills, others in various parts of the hilly district of Coimbatore.

I have further included a number sent from the Western Ghats, by Mr. L. J. Sedgwick, on whose collections I have already reported in several articles in the Journal of Botany; a small collection made by Father Queste, partly in Ceylon, partly at Shembaganur, in the Madura district, in 1911; with finally a few collected in 1898 by Mr. J. H. Darrell in Ceylon. All the gatherings from continental India were (with the exception of Mr. Sedgwick's) made, therefore, probably between the 10th and 12th parallels of latitude.

1. *Dicranum* Hedw.

1. *Dicranum fragile* Hook.

Shembaganur leg. Queste, c. fr. (no. 6).

This species has hitherto been recorded from North India (Nepal and Khasia); but M. Cardot, by whom it was determined, has received it from more than one locality in this part of India.

2. *Leucoloma* Brid.

2 *Leucoloma amœne-virens* Mitt. Musc. Ind. or., p. 13.

Unnagiriya, Central Provinces, Ceylon, leg. Queste, st. (n. 31).

3. *Leucoloma Walkeri* Broth. var. *stenocarpum* Card. and Dixon, var. nov. (Plate I, Fig. 2.)

Seta *longior*, 8-10 mm. alta; theca *cylindrica*, 1.75--2.5 mm. *longa*.

Kyanktalon, Mergui, Burma; on wood, Mar. 1911, c. fr., leg. A. Meebold (n. 16616).

I have included this plant in the present report, on account of its geographical relationships. *L. Walkeri* was described by Brotherus in this publication (Volume I, 1899; Contrib. to the Bryol. Flora of S. India, p. 313), from South Coorg, leg. Dr. Walker. The seta is described as "6 mm. alta," the capsule as 'c. 1.5 mm., anguste subcylindrica.' Meebold's plant agrees precisely with *L. Walkeri* as to the gametophyte, the longer seta and capsule being the only differentiating characters observable. It seems undesirable therefore to consider the two plants specifically distinct. Herzog (in Hedwig. L., 121) has published an allied species, *L. Herzogii* Broth., allied to *L. Walkeri*, only differing in certain vegetative characters (leaves subsecund, entire, border stronger and reaching higher in the leaf); but the fruit has not been found.

Walkeri also occurs in Mitten's herbarium from Moulmein, Burma, leg. Parish (n. 32), under the herbarium name *L. erosum*.

3. *Campylopus* Brid.

4. *Campylopus* (*Pseudo-campylopus*) *pseudo-gracilis* Card. and Dixon sp. nov. (Plate I, Fig. 1.)

Camp. gracili (Mitt.) affinis, *robustior*, 3-4 cm. altus, superne læte-viridis, infra *nigrescens*; caulis erectus, *substrictus*, inferne *ruforadiculosus*. Folia *stricta*, suberecta, *minus attenuata*, *sicca haud flexuosa*, 5-7 mm. longa, integerrima vel in summo apice bis terve minute denticulata. Costa basin versus $\frac{2}{3}$ - $\frac{3}{4}$ latitudinis folii, cellulæ alares tenuissimæ, hyalinæ, rarius coloratæ, supra-alares angustissimæ, lineares, pellucidæ limbum *pallidum obliquum* efformantes per totam longitudinem partis basilaris folii protractum *ab internis (juxta-costalibus) brevioribus chlorophyllosis sæpe rhomboideis bene delimitatum*. Cetera desunt.

Hab. Unnasingiriya, Central Provinces, Ceylon, 1911, leg. Queste (n. 32).

This species belongs to the small Section or Subgenus *Pseudo-campylopus* distinguished by the absence of stereid cells from the nerve, which shows in section usually two ventral series of large, empty cells, and one or two (in this case usually two) series of smaller cells, less thin-walled but not incrassate nor sub-stereid, and moderately large. Its only near Indian allies are *C. gracilis* (Mitt.) and *C. subfragilis* Ren. and Card. It is without doubt nearly allied to the former, but seems to be well marked in the much more robust habit, dark colour, more rigid stems and leaves; and the clearly defined band of narrow pellucid marginal cells, extending outwards and upwards for a considerable height in the leaf, appears a good character; the marginal cells in *C. gracilis* are similar, but they pass gradually into the juxta-costal cells both at the base and higher up in the

leaf, and hence form neither a distinctly marked nor an obliquely ascending band; the cells too seem to be all of one character, rectangular throughout, while in the present case the upper cells of the expanded part are obliquely rhomboid, chlorophyllose and obscure, thus rendering still more pronounced the delimitation of the border cells. *C. subfragilis* is still smaller and more delicate than *C. gracilis*.

5. *Campylopus lætus* (Mitt.) Jaeg.

Syn. *Dicranum lætum* Mitt. Musc. Ind. or., p. 19.

Shembaganur, Madura, leg. Queste, st. (n. 20). This plant shows some difference in its areolation from that presented by most specimens of *C. lætus*, the upper cells being subquadrate, the alar cells smaller, more numerous and more highly coloured; the upper areolation in *C. lætus* being, frequently at least, obliquely oval or oval-rhomboid. The type of *C. lætus* is Hooker's Khasian plant (No. 84), which I have examined at the British Museum. The upper areolation there, while mostly of the oblique, rhomboidal form, varies a good deal and the cells are frequently quite irregular in outline: in the Madura plant they are equally variable, and in some leaves are quite identical with some of the leaves of the type. The habit in the type specimen is somewhat more rigid, but other specimens, including some at Kew probably determined by Mitten, are identical in this respect. Altogether I have no hesitation in referring the Madura plant to *C. lætus*.

I have also received it from Mahableshwar, Western Ghats, leg. Sedgwick, 1909, st. (n. 39), a shorter, more rigid form, more exactly recalling the habit of the Nepal plant.

4. *Leucobryum* Hps.

6. *Leucobryum Bowringii* Mitt. Musc. Ind. or., p. 26.

Shembaganur, leg. Queste, st. (n. 16); Unnasgiriya, Central Provinces, Ceylon, alt. 4,950 ft., leg. Queste, st. (n. 24).

5. *Fissidens* Hedw.

7. *Fissidens diversifolius* Mitt. Musc. Ind. or., p. 140.

In an article published in the Journal of Botany (1909, p. 158), I recorded *Fissidens* (*Semi-limbidium*) *Walkerii* Broth. as collected by Sedgwick at Walwa, Kistna River, 1908, mentioning that it showed a slight difference from Brotherus' description. A further specimen of what was evidently the same moss was sent later from Waishakhan, Western Ghats, leg. Sedgwick, 1909 (n. 29), differing, however, in

some slight characters, as pointed out in a subsequent article (Journal of Botany, 1910, p. 305). What I did not observe in this second specimen was that the leaves were in most cases entirely borderless, and M. Cardot to whom I sent a part of the latter plant recognised in it a species of *Aloma*, and not, therefore, identical with *F. Walkeri*, of which he possessed a part of the type gathering, and which has smaller and much more obscure areolation than Mr. Sedgwick's moss. The latter was referred to *F. diversifolius* Mitt., to which it undoubtedly belongs, and M. Cardot agrees with me that the Kistna River specimen, in spite of the distinct border prevailing on the vaginant lamina, must be referred there also. The areolation is of a type prevalent in *Aloma* rather than in *Semilimbidium*; and moreover the presence of a border must be looked upon as quite exceptional or indeed abnormal in this species. I have referred to the variability it exhibits in other respects, and the peculiarity of its habitat, on a previous page, in my Report on the mosses of the Abor expedition.

8. Fissidens bryoides Hedw.

Side of a cave, Fort Purandhar, Western Ghats, October 1910, leg. Sedgwick, c. fr. (n. 115).

I am unable to separate this from our European plant; some of the capsules—not all—are slightly curved or cernuous, but in all other respects, including the axillary male inflorescence, it presents no differences.

6. Pottia Ehrh.

9. Pottia vernicosa Hampe.

On chunan walls, Bombay, December 1910, leg. Lieutenant-Colonel Kirtikar, c. fr.

7. Hyophila Hpe.

10. Hyophila subflaccida Broth. and Dixon.

On tiles of a roof, Satara, Deccan, leg. Sedgwick, c. fr. (n. 142).

8. Schlotheimia Brid.

11. Schlotheimia Grevilleana Mitt. Musc. Ind. or., p. 53.

Shembaganur, Madura, leg. Queste, c. fr. (n. 20d).

9. Macromitrium Brid.

12. Macromitrium sulcatum Brid.

Iyarpadi, Anaimalai Hills, on tree trunk, alt. 4,000 ft., January 1912, leg. Fischer, c. fr. (n. 3,267), on Shola trees on the Kundahs, Nilgiri Hills, February 1911, leg. Fischer, c. fr. (n. 18, 23); Unnagiriya, Central Provinces, Ceylon, 1911, leg. Queste c. fr. (n. 23).

10. Funaria Schreb.**13. Funaria physcomitrioides Mont.**

Syn. *Entosthodon physcomitrioides* C. M., Mitt. Musc. Ind. or., p 55.
Upper Palnis, alt. 8,100 ft., September. 1911, leg. Fischer, c. fr. (n. 3017).

14. Funaria hygrometrica Sibth.

Altakatti, Anaimalai Hills, December 1911, leg. Fischer, c. fr. (n. 3211).

Var. *calvescens* B. and S.

Shembaganur, leg. Queste, c. fr. (n. 17).

11. Pohlia Brid.**15. Pohlia elongata Hedw.**

Sholas, Kundahs, Nilgiri Hills, February 1911, leg. Fischer, c. fr. (n. 19).

P. elongata is known from the Himalayas, but I do not know that it has been recorded from south of that range in India.

12. Brachymenium Hook.**16. Brachymenium leptostomoides (C. M.) Schimp.**

Syn. *Bryum leptostomoides* C. M., Mitt. Musc. Ind. or., p. 74.

Kukal, Upper Palnis, about 6,300 ft. alt., on tree trunk, leg. Fischer, c. fr. (n. 2986); and Upper Palnis, on trunk of tree in the open, alt. 6,200 ft.. c. fr. (n. 3062), this latter a fine and very beautiful form, with large, elongate capsules, quite recalling *Leptostomum gracile* or *L. inclinans* of New Zealand; near Kandy, Ceylon, 1911, leg. Queste, c. fr. (n. 11, 12, 15).

17. Brachymenium exile (Dz. and Mb.) Bry. jav.

Kavungi, Upper Palnis, on stone steps of rest-house, leg. Fischer, c. fr. (n. 3060); Kodikanal, Upper Palnis, on rocks, 6,800 ft. alt., leg. Fischer, c. fr. (n. 3065a), earthy bank, Fort Purandhar, Western Ghats, 1911, leg. Sedgwick, c. fr. (n. 126). It is perhaps worth noting that the capsules before they are fully ripe have the narrower outline of those of *B. coarctatum*.

13. Bryum Dill.**18. Bryum sahyadrense Card. and Dixon.**

In crevices of a stone wall, Purandhar, Western Ghats, leg. Sedgwick c. fr. (n. 134).

19. *Bryum retusifolium* Card (ined.) VAR. *heterophyllum* Card.
Shembaganur, Madura, leg. Queste, 1911, st. (n. 20a); det. Cardot.
20. *Bryum argenteum* L. VAR. *lanatum* B. and S.
Rocks, Upper Palnis, 6,800 ft, alt.; and Attakatti, Anaimalai Hills, alt. 3,000 ft., leg. Queste. (n. 3065; 3210).
Var. *australe* Rehm. (cf. Journ. of Bot, 1911, p. 148).
Shemburuve, Anaimalai Hills, alt. 4,500 ft., on rocks in evergreen forest, leg. Fischer, c. fr. (n. 3412).
21. *Bryum ramosum* (Hook.) Mitt. Musc. Ind. or., p. 75.
Rock, Gundara river bank, Upper Palnis, alt. 6,300 ft., and Kodikanal, alt. 6,900 ft., on banks in evergreen forest, leg. Fischer, c. fr. (n. 3052, 3075); Shembaganur, leg. Queste (n. 3a, 10, 13).
22. *Bryum Wightii* Mitt. Musc. Ind. or., p. 74.
Syn. *B. strigosum* Wils. nomen.
Satara, Western Ghats, 1911, leg. Sedgwick st. (n. 139).
14. *Rhizogonium* Brid.
23. *Rhizogonium spiniforme* (L.) Bruch.
Upper Palnis, alt. 7,000 ft., c. fr. (n. 2988, 3074); Shemburuve, Anaimalai Hills, alt. 4,600 ft., c. fr. (n. 3411), all leg. Fischer.
15. *Pogonatum* P. Beauv.
24. *Pogonatum microstomum* (R. Br.) Brid.
Upper Palnis, alt. 7,000 ft., leg. Fischer, c. fr. (n. 2987, 3050, 3080).
25. *Pogonatum aloides* (Hedw.) Beauv.
Karungi, Upper Palnis, alt. 6,300 ft., leg. Fischer, c. fr. (n. 2997)
26. *Pogonatum hexagonum* Mitt. Musc. Ind. or., p. 151.
Upper Palnis, on banks of stream, alt. 6,800 ft., leg. Fischer, c. f. (n. 3059). I was at first in some doubt as to the identity of this with Mitten's plant, as he describes the capsule as "plicis subindistinctis sex exarata," while the mature capsules here were deeply plicate. On comparing Hooker's specimens of *P. hexagonum* and others cited by Mitten, however, I found that these too showed a strong plication of the capsules when fully mature and empty. The capsule in this and no doubt in other similar species goes in fact through several stages; when dry and empty it is, as indicated, somewhat deeply ribbed and furrowed; when fully mature but not over-ripe, it is as Mitten describes it, indistinctly plicate; at an earlier stage still, viz., when about mature and still

operculate, it will generally be found to show six slightly elevated, narrow ribs, with no furrows between; before this it goes through a stage when there are no visible ribs on the surface, and it is quite terete, while in a still younger state and when semi-translucent, the ribs may be made out faintly by the aid of a strong transmitted light.

27. Pogonatum Teysmannianum (Dz. and Mb.) Bry. jav.

Iyarpadi, Anaimalai Hills, alt. 4,000 ft., on a bank. leg. Fischer, c. fr. (n. 3266). *P. Teysmannianum* is placed by Brotherus in a Section with those species having the lamellæ with 3-4 rows of cells; while Mr. Fischer's moss has 6-7. I find however Javan specimens in the Brit. Museum collection that have 5-6 and perhaps 7 rows of cells, and with these no. 3266 agrees exactly.

28. Pogonatum Junghuhnianum (Dz. & Mb.) Bry. jav

Shembaganur, leg. Queste, c. fr. (n. 8).

16. Erpodium Brid.

29. Erpodium mangiferæ C. M.

Close growing on the bark of smooth trees, Satara, Western Ghats, leg. Sedgwick, c. fr. (n. 141).

17. Braunia Brch. & Schpr.

30. Braunia indica (Mont.) Par.

Syn. *Hedwigia indica* Mitt. Musc. Ind. or., p. 123.

Gundara river bank, Palnis, alt. 6,300 ft., leg. Fischer, c. fr. (n. 3051). Growing in magnificent sheets, richly fruiting.

18. Pterobryopsis Fleisch.

31. Pterobryopsis aurantia (C. M.) Fleisch.

Syn. *Pterobryum ceylanicum* Thw. and Mitt in Journ. Linn. Soc.. Botany, XIII, 315.

Unnasgiriya, Central Prov., Ceylon, alt. 4,950 ft., leg. Queste, st. (n. 23)—a fine, robust form. Fleischer has reduced *P. ceylanicum* Thw. and Mitt. to this species. It may be noted that Mitten in his description of that plant in describing the cells writes "basalibus nullis diversiformibus!" I find the alar cells well differentiated and of a deep orange colour in the plant here recorded, as also in a specimen collected in Ceylon by Miss Bamforth, and determined (as *Pterobryum ceylanicum* Thw. and Mitt.) by Brotherus; and this agrees precisely with a specimen of *Endotrichum aurantium* in the British Museum collection, I believe from C. Müller's herbarium.

19. *Aerobryidium* Fleisch.32. *Aerobryidium attenuatum* (Thw. and Mitt.) Fleisch.

Syn. *Meteorium attenuatum* (Thw. and Mitt.) in Journ. Linn. Soc., Botany, XIII, 316.

Nuwara-Eliya, Ceylon, March 1898, leg. J. H. Darrell, st. (n. 146). This appears to be a rare species, confined to Ceylon. I have a further Ceylonese specimen sent me by Rev. C. H. Binstead, collected in 1897 by Mrs. E. J. Dew, and determined by Mitten.

20. *Papillaria* C. Müll.33. *Papillaria* sp.

Unnasgiriya, Central Provinces, Ceylon, alt. 4,950 ft., leg. Queste, st. (n. 26).

This agrees exactly with *P. Bamforthiæ* Broth., ined., to which I have referred in Journ. of Bot. 1912, p. 148. As however the character there mentioned (the position of the papillæ on the cell face) is certainly variable, it is doubtful whether the species can be maintained as distinct from *P. fuscescens*, in which case it is perhaps best referred to var. *crassiramea* Ren. and Card.

21. *Barbella* Fleisch.34. *Barbella Questei* Card. and Dixon sp. nov. (Plate I, Fig. 3.)

Foliorum forma structuraque *B. Determesii* Ren. and Card. omnino fere similis, habitu autem longe aliena. Caulis secundarius pro more brevis 5-8cm. longus, *parce irregulariter ramosus, sat robustus, rigidiusculus*, una cum foliis 4-5 mm. latus, ramis, 2-3 cm. longis, haud attenuatis; colore stramineo, ætate rufo-fusco, subnitido. Folia *et caulis secundarii et ramorum sub-complanata*, stricta, lateralia valde patentia, interdum leniter homomalla, superiora et inferiora erecta, appressa; omnia 3-4 mm. longa, *concaua*, e basi deltoideâ, amplexicauli, subauriculata oblongo-lanceolata, sensim (nonnunquam abruptius) in acumen longum subfiliforme angustata, per totum fere marginem, præcipue apud basin, minute indistincte remote denticulata, costis *divis brevissimis vel obsoletis*, cellulis anguste rhomboideo-linearibus basin versus laxioribus, alaribus numerosis, distinctis majusculis, omnibus dorso *omnino lævibus*. Cetera ignota.

Hab. Shembaganni. Madura, 1911, leg. Queste (n. 14).

This plant, as M. Cardot points out, is in the form and structure of the leaves almost identical with *B. Determesii* Ren. and Card., which also has been found in Madura; that species however has the leaf cells

generally lightly papillose, and the habit entirely different, having long, flexuose stems with the leaves more or less appressed, and numerous spreading branches, as in *B. japonica*. The habit and colour of the present plant is more like that of *B. spiculata* (Mitt.), which, however, apart from the single nerve and other structural differences, has more distant leaves and a softer, less rigid texture. *B. Kurzii* has quite different leaf base and alar cells. *B. subulifera* Fleisch., from the description has, with a very similar leaf-structure, a much more slender and delicate habit, more or less appressed stem leaves, etc.

22. *Bryosedgwickia* Card. and Dixon.

35. *Bryosedgwickia Kirtikarii*. Card. and Dixon.

Castle Rock near Goa, S. W. India, leg. Gammie, comm. Sedgwick, c. fr. (n. 138).

23. *Erythrodonium* Hampe.

36. *Erythrodonium julaceum* (Hook.) Par.

Syn. *Stereodon juliformis* Mitt. Musc. Ind. or., p. 92.

Lower Punachi, Anaimalai Hills, alt. 2,800 ft., c. fr. (n. 3231), and Attakatti; Anaimalai Hills, alt. 3,500 ft. c. fr. (n. 3239), leg. Fischer; Shembaganur, leg. Queste. c. fr. (n. 20b) Attapadi Hills, alt. 1,900 ft. leg. Fischer, c. fr. (n. 11).

24. *Entodon* C. Müll.

37. *Entodon plicatus* C. M.

Syn. *Stereodon plicatus* Mitt. Musc. Ind. or., p. 106. Shembaganur, leg. Queste, c. fr. (n. 5).

25. *Levierella* C. Müll.

38. *Levierella fabroniacea* nov. var. *dilatatinerve* Card. and Dixon. *Robustior*, folia *majora*, costa *valida*, ad 50 μ lata juxta basin, dimidiam partem versus raptim attenuata, nonnunquam furcata.

On wall in loose mats growing downwards, Purandhar, W. Ghats, May 1911, leg. Sedgwick, c. fr. (n. 132).

In addition to the characters given above M. Cardot points out that the peristome teeth have on the dorsal surface a thickening along the commissural line, with lateral branches on each side, usually opposite one another, forming a kind of false lamellæ. I find this character,

though perhaps usually present, at times very inconspicuous or wanting, so have not included it as a varietal character. M. Cardot also has detected traces of an inner peristome (as described by Carl Müller). He also points out that Brotherus' diagnosis "Alarzellen nicht differenziert" is incorrect, as indeed his figure indicates where the numerous subquadrate alar cells are well shown.

26. *Stereophyllum* Mitt.

39. *Stereophyllum Blatteri* Card. ined.

On Bhendi bark (*Thespesia populnea*) Matheran, Thana District, Bombay, October 1906, leg. Lieut.-Col. K. R. Kirtikar, c. fr. (n. 73a).

This very well marked new species of *Stereophyllum* was sent to Brotherus, and it was intended naming it after the finder; the description indeed was drawn up. It subsequently transpired however that the same species had been sent to M. Cardot independently by Rev. E. Blatter, collected at Khandala in October 1909, and had been named as above, and it will receive publication under that name shortly.

40. *Stereophyllum ligulatum* (C. M.) Jaeg. (Plate II, Fig. 7).

Syn. *Hypnum ligulatum* C. M., Mitt. Musc. Ind. or., p. 82.

Stem and roots of a tree, Mahableshwar, W. Ghats, January 1909, c. fr. (n. 24), and trees, Fort Purandhar, Poona District, May 1910, c. fr. (n. 91, 96), both leg. Sedgwick. On fallen tree trunk, 2,500 ft. alt., Bolampatti Hills, Coimbatore, May 1911, leg. Queste, c. fr. (n. 24).

Sedgwick's plant (n. 24) was kindly compared with C. Müller's type (*Euglossophyllum ligulatum*) at Berlin by Herr L. Loeske, and found to be identical.

A noteworthy feature in this and probably in other species of the genus is that in the lateral, asymmetrical leaves the enlarged alar cells are very unequally and irregularly distributed; frequently all the cells on one side of the nerve base will be of this character, while on the other side all the cells will be linear except one to two marginal rows.

VAR. NOV. *Sedgwickii* Broth. and Dixon (Plate II, Fig. 8).

Perrobustum; caulis ad 5-8 cm. longus, vage ramosus, folia magna, ad 2.25 mm. longa, 1 mm. lata, concava, elliptica, obtusa vel subobtusa, integra vel interdum ad summum apicem crenulata.

On a tree, Panchgani, W. Ghats, 4,000-4,500 ft. alt., 1909, leg. Sedgwick, st. (n. 48).

The size and habit, and the very concave leaves with rather more obscure, chlorophyllose areolation gave this a very distinct appearance,

and it was supposed at first to be a new species. It seems however to be scarcely separable specifically from *S. ligulatum*, but is at any rate a very pronounced variety.

27. Rhacopilum P. Beauv.

- 41. Rhacopilum Schmidii (C. M.) Jaeg. var. breviaristatum Card. ined.**
On trunk of coffee-bush, Palni Hills, alt. 5,000 ft., leg. Fischer, c. fr. (n. 2990).

28. Herpetineuron Cardot.

- 42. Herpetineuron Toccoe (Sull. and Lesq.) Card. NOV. var. excurrentinerve Card. and Dixon.**

Costa in cuspidem brevem excurrens.

Shembaganur, leg. Queste, st. (n. 20 c). The typical form has the nerve ceasing just below the leaf apex.

29. Thuidium Schpr.

- 43. Thuidium glaucinum (Mitt.) Jaeg.**
Syn. *Leskea glaucina* Mitt. Musc. Ind. or., p. 133.
Shembaganur, leg. Queste, st. (n. 19); Nuwara-Eliya, Ceylon, 1898, leg. J. H. Darrell, st. (n. 149). Upper Palnis, leg. Fischer (with n. 2989)—a fragment mixed with *Ctenidium lychnites*.

30. Macrothamnium Fleisch.

- 44. Macrothamnium submacrocarpum (Hampe) Fleisch.**
Shembaganur, leg. Queste, c. fr. (n. 4).

31. Ctenidium Schpr.

- 45. Ctenidium lychnites (Mitt.) Broth.**
Syn. *Stereodon lychnites* Mitt. Musc. Ind. or., p. 114.
Upper Palnis, alt. 6,400 ft., st. (n. 2989); and Kodikanal, Upper Palnis, on banks in evergreen shola, alt. 7,000 ft., c. fr. (n. 3077); leg. Fischer. These plants represent a rather robust, rigid form. Near Galle, Ceylon, 1898, leg. Darrell, st. (n. 153.)

32. Ectropothecium Mitt.

- 46. Ectropothecium cyperoides (Hook.) Jaeg.**
Syn. *Stereodon cyperoides* (Hook.) Mitt. Musc. Ind. or., p. 99.
Shembaganur, leg. Queste, c. fr. (n. 1).

This was at first referred to *E. pseudo-cyperoides* Fleisch., with which it certainly agrees. Subsequent correspondence with M. Cardot however led to the conclusion that this could not be separated from Hooker's plant, as I have remarked on a previous page, in my report on the mosses of the Abor Expedition; where I have attempted to show that the Javan plant described and figured as *H. cyperoides* in the Bry. javanica is a different thing from the Indian and Ceylonese plant of Hooker. Fleischer no doubt was led to describe the Ceylonese *E. pseudo-cyperoides* as new, by recognizing its difference from the Javan species; it is, however, identical with certain forms of *E. cyperoides* (Hook.), and must, I think, without doubt be transferred there. It is the Javan plant which requires re-naming.

33. *Trichosteleum* Mitt.

47. *Trichosteleum cylindricum* (Reinw. and Hornsch.) Broth.

Unnasgiriya, Central Provinces Ceylon, 1911, leg. Queste, c. fr. (n. 25).*

48. *Trichosteleum monostictum* (Thw. and Mitt.) Broth.

Syn. *Sematophyllum monostictum* Thw. and Mitt., Journ. Linn. Soc., Botany, XIII, 318.

VAR. NOV. *lævius* Dixon.

Papillæ foliorum multo minores, indistinctæ.

The leaves of *T. monostictum* are highly papillate, though varying in degree; in the present plant they are also somewhat variable, the leaves being at times almost smooth; in other respects it seems to agree exactly.

Hab. In dense mats on the roots of trees, Mahableswar, W. Ghats, January 1909, leg. Sedgwick, c. fr. (n. 21).

34. *Taxithelium* Mitt.

49. *Taxithelium (Anastigma) vivicolor* Broth. and Dixon sp. nov.
(Plate I, Fig. 4.)

Late intricate cœspitosum, humile, subnitens, *saturate viride*, ætate fuscens; caulis vage laxè ramosus, 3-4 cm. longus, tenellus. Folia octofaria, *parva, raro 1 mm. longa, dimorpha*; alia *undique imbricata, concava, late ovata vel oblongo-ovata*, valde obtusa vel rarissime subacuta, superne sat argute minute denticulata; alia, præcipue ramulorum, *valde complanata, plana, rotundato ovata vel breviter spathulata, interdum suborbicularia*, minute crenulata, viridissima; omnia enervia vel nervis binis tenuissimis brevibus inconspicuis prædita. Cellulæ, breviter lineares, vermiculares, parietibus firmis, 20-30 μ longæ, juxta apicem

* Since this was in type I find the plant is *Rhaph. leptorrhynchoides* (Mont.).

breviores, latiores, sinuoso-rhomboides, basin versus majores, medio lineares, ad angulos 3-4 seriebus rectangulares, parum distinctæ; cæ foliorum ramulorum ubique multo breviores, late rhomboides-ellipticæ, parietibus tenuioribus; omnes vel *omnino læves vel parietibus apice indistincte prominentibus obsolete scabriusculæ*. Cetera ignota.

Hab. On stones in the bed of a torrent, Mahableswar, Western Ghats; alt. circa 4,000 ft., January 1909, leg. Sedgwick. M. Cardot sends it to me also gathered by M. Foreau, at Shembaganur, Madura, in 1911.

A very distinct species, growing on stones overflowed by running water, and conspicuous by its bright green colour, and rounded, subdistichous leaves, giving the branches at first sight the appearance of a minute *Homalia*, or of *Lejeunea serpyllifolia*. Other plants—perhaps from a less submerged station—have these characters less marked, with brown, imbricated leaves of the form first described in the diagnosis. Apart from the above characters it differs from its nearest allies, *T. glossoides* (Bry. jav.) and *T. similans* (Bry. jav.) in the wider, rounder leaves with different basal areolation and finer apical denticulation. *T. lingulatum* Card. from Formosa has somewhat similarly shaped leaves, but is much more robust, and the habit, texture and tooting of the leaves are totally different.

35. *Rhaphidostegium* Schpr.

50. *Rhaphidostegium subhumile* (c. m.) Jaeg.

Syn. *Stereodon subhumilis* (c. m.) Mitt. Musc. Ind. or., p. 102.

Kodikanal, Upper Palnis; on trunk of rosebush, alt. 6,700 ft., and on banks, alt. 7,000 ft., leg. Fischer, c. fr. (n. 2985, 3076). I have no doubt the determination is correct, though I have not compared an authenticated plant of C. Müller's.

51. *Rhaphidostegium leptorrhynchoides* (Mont.) Jaeg.

Syn. *Stereodon leptorrhynchoides* (Mont.) Mitt. Musc. Ind. or., p. 103.

In Khundalas (ravines), Nilgiri Hills, leg. Fischer, c. fr. (n. 22). In accordance with Brothrus' arrangement I have placed this under *Rhaphidostegium*, although I think M. Cardot is probably correct in referring it, principally on account of the more or less distinctly papillose cells, to *Trichosteleum*.

36. *Sematophyllum* Mitt.

52. *Sematophyllum monoicum* (Lac.) Jaeg.

Unnagiriya, Central Provinces., Ceylon, leg. Queste, st. (n. 30)

55 *Sematophyllum cucullifolium* Card. and Dixon, sp. nov. (Plate II, Fig. 6.)

Dioicum videtur. Caespites *densi*, straminei, nitidi. Caulis repens, densissime foliosus, *conferte ramosus*, ramis *perbrevibus* erectis, circa 5 cm. altis, foliis apicalibus convolutis subcuspidatis. Folia ramea *valde concava*, e basi parum angustata oblongo-ovata, *apice concavo-cucullato*, in cuspidem *subfragilem angustum canaliculatum acutum, plus minusve elongatum, subrecurvatum, abrupte angustata, integerrima*, folia caulina minus abrupte, longius acuminata; Cellulæ omnino læves, basilares mediæ aurantiacæ, perangustæ, alares seriebus 4-5 hyalinæ, magnæ, oblongæ, subvesiculosæ.

Perichætia inconspicua, bracteis erecto-patentibus, late ovatis, *sensim anguste acuminatis, marginibus grosse dentatis*. Cetera ignota.

Hab. Shembaganur, Madura, 1911, leg., Queste (n. 20 e).

This appears to belong to the Section Chætomitriella, and to be near *S. bunodiocarpum* (C. M.) which however has the leaves much longer pointed, almost piliferous.

I have found a fertilized perichætium, but no male flowers.

Minute-leaved, dwarf plants frequently, indeed habitually occur epiphytically on the upper surface of the leaves, arising from a small tuft of protonemoid filaments, but I have no evidence at present that these are male plants.

54. *Sematophyllum pilotrichelloides* Card. and Dixon sp. nov. (Plate II, Fig. 5.)

S. extenso Card. (Beihefte zum Bot. Centralbl, Bd. XIX Abt. II, p. 134, 1905) Formosæ peraffine. Caulis secundarius *pendulus, semipedalis, gracilis, mollis, flexuosus, irregulariter remote subpinnatim ramosus*; rami breves, circa 1 cm. longi, nitidi, straminei.

Folia caulina erecta, sicca subappressa, concava, *oblongo-elliptica, in cuspidem breve acutum sæpe recurvum raptim attenuata*, enervia; marginibus infra plus minusve reflexis, supra denticulatis; areolatio superior perangusta, cellulis ad infimam basin mediam aurantiacis alaribus trinis, magnis, hyalinis, parietibus *incrassatis, porositis*. Folia ramea magis patentia, paulo latiora, magis concava, *brevius cuspidata seu apiculata*. Reliqua desunt.

Hab. Unnasgiriya, Central Province, Ceylon, 1911, leg. Queste (n. 28). Also n. 27, a more slender, greener, less branched form.

This interesting plant has for its only near ally *S. extensum* Card. from Formosa, and forms an addition to the small number of identical or closely related species found in Ceylon and Formosa, without, so far as is at present known, appearing in intermediate regions. The Ceylon plant differs from the Formosan in the form of its leaves, much more abruptly and shortly pointed, and in the more incrassate alar cells.

37. *Rhegmatodon* Erid.

55. *Rhegmatodon polycarpus* (Griff.) Mitt. *Musc. Ind. or.*, p. 127. Shembaganur, leg. Queste, c./fr. (n. 2). This species, known from several parts of the Himalayan range, has not, I believe, been recorded before from Southern India.

38. *Pleuropus* Griff.56. *Pleuropus fenestratus* Griff.

Shembaganur, leg. Queste, c. fr. (n. 20 f.).

39. *Brachythecium* Schpr.57. *Brachythecium procumbens* (Mitt.) Jaeg.

Syn. *Hypnum procumbens* Mitt. *Musc. Ind. or.*, p. 79.

Shembaganur, leg. Queste, st. (n. 3). Near Galle, Ceylon, 1898, leg. Darrell (n. 150, 151).

40. *Oxyrrhynchium* Warnst.58. *Oxyrrhynchium prælongum* (Hedw.) Broth.

Poona; leg. Woodrow, circa 1895, ex herb. Kirtikar (n. 79=n. 40 Kirtikar; n. 8, Woodrow).

EXPLANATION OF PLATES.

Plate I.—Fig. 1. *Campylopus pseudo-gracilis*. *a*, plant, nat. size. *b*, leaf $\times 10$. *c*, apex of do. $\times 50$. *d*, leaf-base $\times 25$. *e*, cells (at the point marked \times in *d*) $\times 200$.

Fig. 2. *Leucoloma Walkeri* (var. *stenocarpum*). *a*, leaf $\times 20$. *b*, leaf base $\times 50$. *c*, apex of leaf $\times 200$.

Fig. 3. *Barbella Questei*. *a*, stem, nat. size. *b*, leaf $\times 20$. *b*, do., flattened out, $\times 20$. *c*, alar cells $\times 80$.

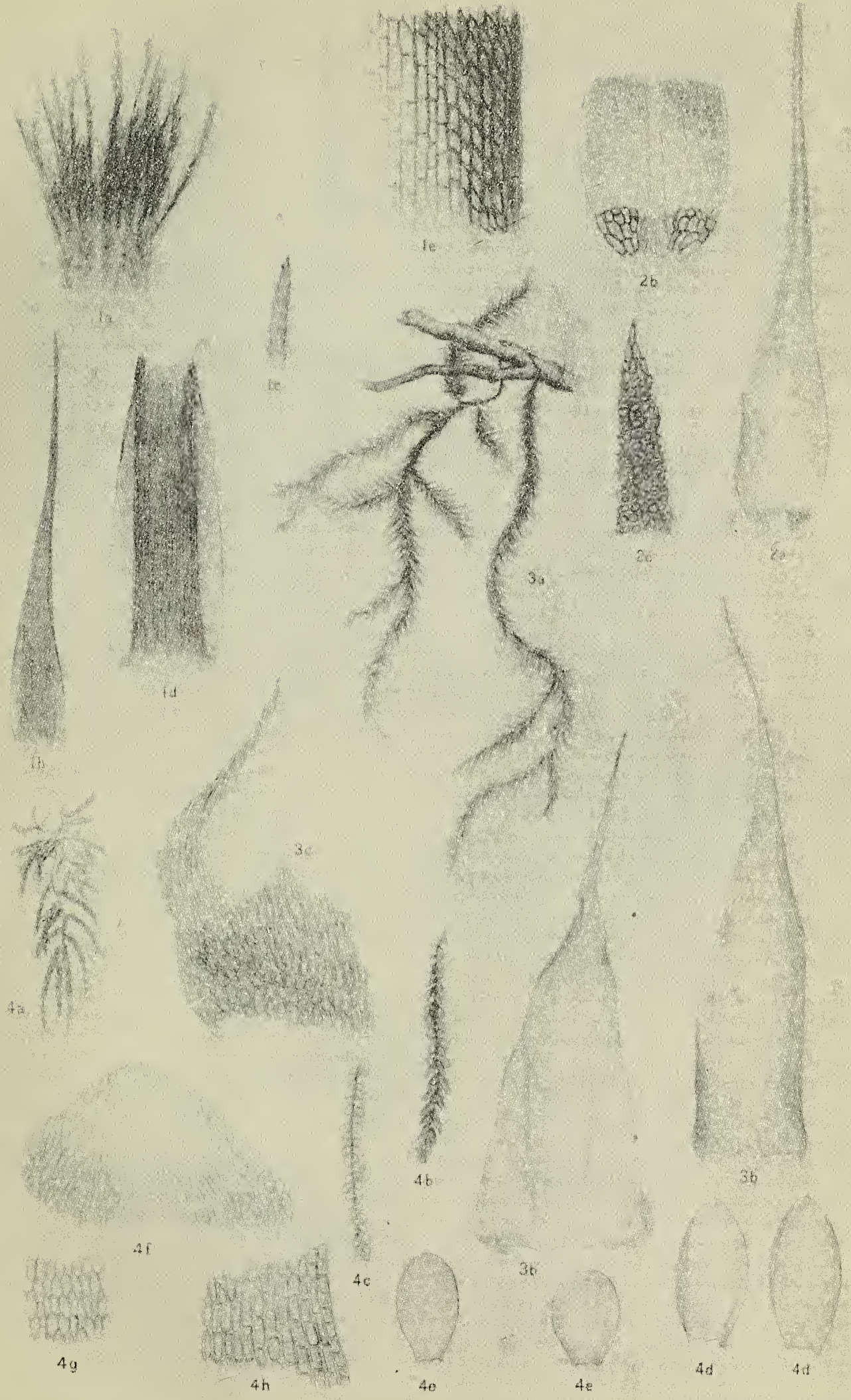
Fig. 4. *Taxithelium vivicolor*. *a*, stem, nat. size. *b, c*, branches (showing dimorphous leaves) $\times 4$. *d*, leaves of *b* $\times 20$. *e*, do. of *c* $\times 20$. *f*, apex and upper cells of *d* $\times 200$. *g*, upper cells of *e* $\times 200$. *h*, alar cells $\times 200$.

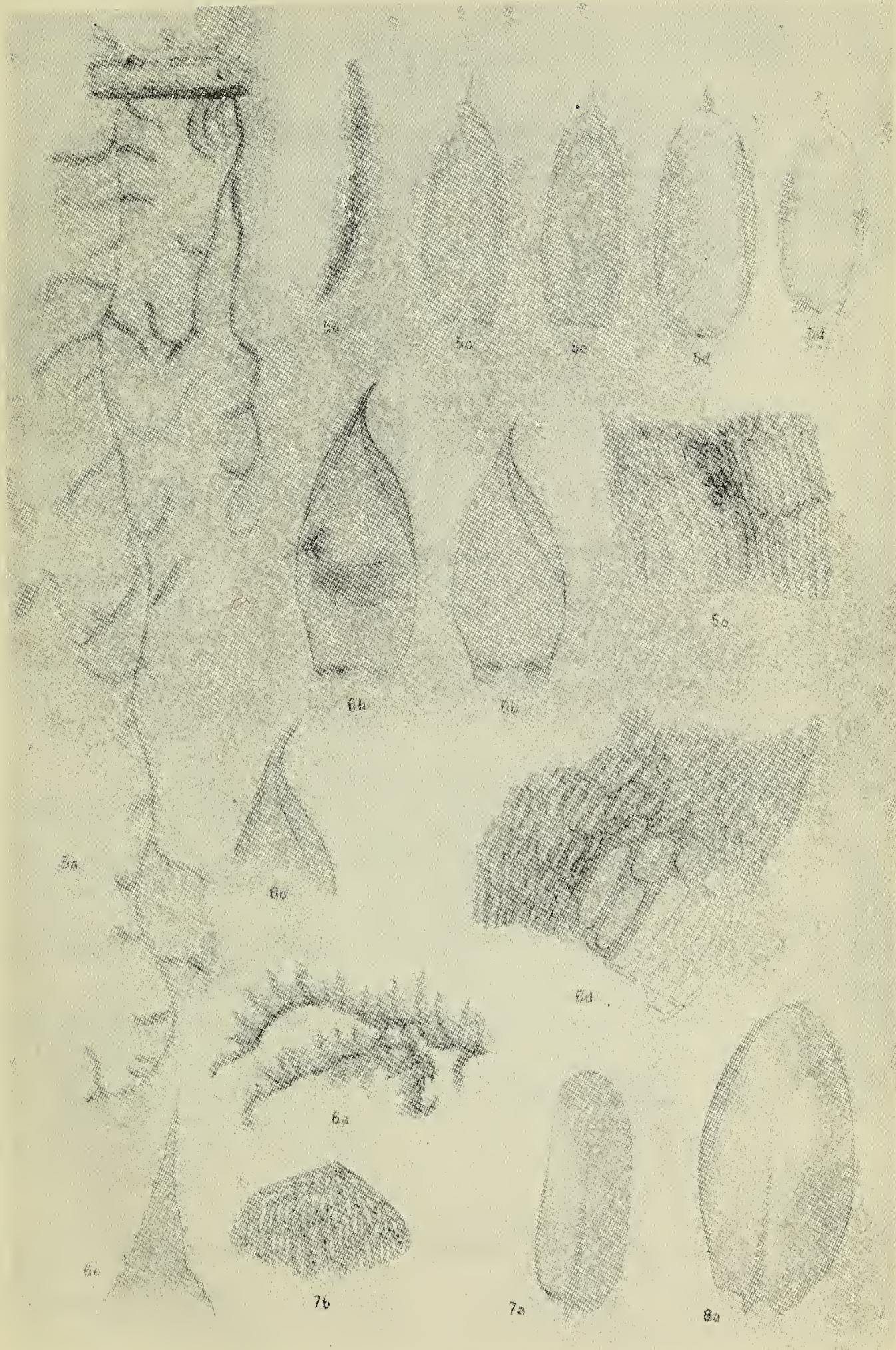
Plate II.—Fig. 5. *Sematophyllum pilotrichelloides*. *a*, stem, nat. size. *b*, branch (moistened) $\times 3$. *c*, leaves of secondary stem $\times 20$. *d*, branch leaves $\times 20$. *e*, alar cells $\times 200$.

Fig. 6. *S. cucullifolium*. *a*, stem, nat. size. *b*, branch leaves $\times 20$ (showing dwarf plant). *c*, apex of do. $\times 40$. *d*, alar cells $\times 200$. *e*, apex of perichæetial bract $\times 40$.

Fig. 7. *Stereophyllum ligulatum*. (orig. spec., Bombay, ex herb. C Müll.) *a*, leaf $\times 20$. *b*, apex of do. $\times 50$.

Fig. 8. *S. ligulatum* var. *Sedgwickii*. *a*, leaf $\times 20$





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RECORDS
OF THE
BOTANICAL SURVEY OF INDIA

VOLUME VI.—No. 4

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ALANGIUM.

BY

G. H. CAVE and W. W. SMITH.

2. SPECIES NOVÆ PLANTARUM IN HERBARIO
HORTI. REG. CALCUTT. COGNITARUM.

Auctore

W. W. SMITH.



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NOTE ON THE EAST HIMALAYAN SPECIES OF ALANGIUM.

BY

G. H. CAVE and W. W. SMITH.

IN the Flora of British India, Vol. II, p. 743, C. B. Clarke, in dealing with the species of *Marlea* of the Section Eu-*Marlea*, refers all the Indian material to *Marlea begoniæfolia*, Roxb. The alpine specimens collected in Sikkim by Hooker (*Marlea* sp. 2) at an altitude of 6,000—9,000 ft. are separated as var. *alpina*, and distinguished from the type by "the leaves not angular, hairy all over beneath and no tufts in the nerve-axils." In the Calcutta Herbarium Sir George King separated similar specimens in fruit as *Marlea sikkimensis*, King MSS. In Brandis, Indian Trees (1906), p. 355, the species is briefly described under the name of *Marlea alpina*, Gamble MSS.—"Sikkim 6-9,000 ft., leaves usually not angled or lobed, fruit $\frac{3}{4}$ in. long, putamen crustaceous, one-seeded, one cell abortive."

Wangerin in his Monograph on Alangiaceæ in "Das Pflanzenreich" IV (1910), 220b., where he includes *Marlea* in *Alangium*, makes no reference to Brandis's note on this new species and refers all the Sikkim Himalayan material seen by him to *Alangium begoniæfolium*, and ignores the varietal name *alpina* given by Clarke to the original Hookerian specimens.

As these early collections of the alpine plant are somewhat incomplete (this is true at least as far as the specimens we have seen) and as *Alangium begoniæfolium* is a variable, wide-spread species (Kamerouns, German East Africa, India, Burma, Java, Philippines, China), there was no doubt good reason for doubting the validity of a species very incompletely known, and for treating it as a "geographical race" merely.

Later in Rec. Bot. Surv. Ind., Vol. VI (1912), p. 378, W. W. Smith refers to the question, but beyond giving the measurements of the ripe fruit has no other data to quote as flowers of the high level species were not then available.

Knowing, however, the very different habit of the two trees in the Darjeeling district, one a low level plant and one a high level, the present writers were convinced that a careful comparison of the two at various times of the year would soon bring out the differences between them, and the following note is the result of such observations. Those who know the graceful appearance of the low level plant (*Alangium begoniæfolium*) with its leaves symmetrically arranged in a very beautiful

way cannot fail to remark how different in appearance its high level ally is.

For convenience of comparison the notes are arranged in parallel columns :—

	<i>A. begoniæfolium</i> in East Himalaya.	<i>A. alpinum</i> in East Himalaya.
Nomenclature.	Called Palit-kung by the Lepchas. (kung=tree). Called Anowruk by the Pahariyas, in allusion to its use for plough-handles. (Anow=plough-handle, rukh=tree). The style of its branching makes wood properly angled for this purpose.	Called Palit-nyok by the Lepchas. (nyok = sluggish or dilatory—an allusion to its later leafage and flowering.) No Pahariya name that we can learn.
Habitat.	Found from the lowest valleys up to 5,000 ft. [up to 6,000 ft. in West Himalaya].	Found from 6,000 ft. to 9,000 ft.
Habit.	Tall tree, up to 60 ft., usually erect. Branches horizontal and regularly angled from node to node. The leaves hang almost perpendicularly from the branches. A very rank growth of branches is made by young trees and by the growing parts of older ones. From this growth in the Spring short secondary flowering growths spring. Deciduous in the cold season .	Erect tree, up to 40 ft. Branches ascending and not so angled from node to node, leaves not hanging perpendicularly and the two kinds of growth not so differentiated. Deciduous till late Spring.
Leaves.	Leaves on primary growths very large (up to 10 in. × 8 in.) and often very angled, sometimes irregularly so. Tufts of hairs in axils of nerves and scattered hair along nerves at back of leaves. But the leaf character appears to be somewhat unreliable in both; the tufts seem to be absent or to disappear, and to be less noticeable on the leaves of the secondary growth. Leaves in secondary growth not so large and not so distinctly angled, but always more so than the leaves of the other species.	Leaves seldom much angled and fairly regular in size (5 in. × 4 in.) Sparse hair all over the veins at back of leaf.

	<i>A. begoniæfolium</i> in East Himalaya.	<i>A. alpinum</i> in East Himalaya.
Inflorescence.	Inflorescence stiff short (up to 2 in.) much and regularly branched, with many flowers.	Inflorescence lax and longer (3 in.—4 in.) with only about 3 flowers, their pedicels arising from a point almost common to all, and lying almost parallel.
Flower. Stamen shaggy towards the base which is hollowed like a spoon; bearded below anther.	Flowers larger. Bud much longer. Stamen nearly glabrous, not bearded below anther, a few hairs at the very base; base not hollowed.
Fruit.	Fruit rather ovate than ellipsoid in early stages. Longitudinal ridges absent or somewhat indistinct. Fruit smaller, 1—1.4 cm. long, 6 mm. broad. Ripens in July-August In section ovate In cross section hardly compressed . Style base often persistent and protruding beyond calyx tube. Testa thicker and harder, brittle Distinctly 2-celled, 1 cell larger than the other. Albumen granulated Embryo not distinct and not easily separable.	Fruit at first elongate turbinate, afterwards compressed ellipsoid. Longitudinal ridges distinct, especially at base. Fruit larger, 1.8—2 cm. long, 7—9 mm. broad. Ripens in October-November. In section oblong. In cross section much flattened. Apex of ripe fruit usually with star-shaped hollow. Testa thinner, more like parchment splits off in 2 layers. Only 1celled. Albumen somewhat convoluted. Embryo distinct and easily separable. The veining of the cotyledons, which can also be easily separated the one from the other, is very distinct.

The habits of these two plants are very distinct. *Alangium begoniæfolium* has a very striking appearance in consequence of its horizontal zig-zag branches and large, pendent, angled leaves. Its outline recalls to one's mind that of the old-fashioned sheeted turnip headed ghost. The upper level plant is not particularly distinct in habit from the

other forest trees and at a distance might be taken for a tree such as a *Styrax*, for instance. There is no mistaking *A. begoniaefolium*.

Two distinct types of growth with differentiated leaves occur in the lower but not in the upper species. The inflorescence is a very good character, being short and stout, much branched and many flowered in the lower, and long, lax, semi-pendent and very few flowered in the higher plant. The base of the stamen is a noticeable character, and one of importance in the genus. However in *A. Alpinum*, while in some cases the stamens are glabrous, in other specimens dissected there is a distinctly hairy base, but not comparable to what obtains in the stamens of the other species. The fruit is (after the habit of the tree) the most marked point of difference.

It must, however, be recognised that the foregoing description of *A. begoniaefolium* applies only to the East Himalayan form of that species where the angularity of the leaves and the peculiar 'set' of the leafy lower branches are always prominent. Pronounced angularity of leaf occurs more rarely in the 'general' species — *integerrima vel rarius apicem versus leviter lobata* (Wangerin, Alang, p. 20). Thus the shape of the leaf, its hairiness and the paucity of flowers in the inflorescence are not in themselves sufficient to discriminate *A. alpinum*; cf. description of *A. begoniaefolium*, Wangerin, l. c. p. 20—21 *passim*. But the shape and size of the fruit and the almost glabrous stamens are additional characters and the sum of these seems to us sufficient justification for the separation of the alpine plant as a distinct species. The differences are not such as can be attributed merely to the effect of altitude; no intermediates between the two species were observed nor do their habitats in the East Himalaya overlap. The zone of cultivation in this region may however be a factor influencing the distribution.

[A diagnosis of *A. alpinum* is given below. Our thanks are due to J. S. Gamble, Esq., C.I.E., F.R.S., for the loan of his herbarium material of Alangium and to Major A. T. Gage, I.M.S., Director of the Botanical Survey, who has seen the paper through the press.]

Alangium alpinum (Clarke pro var, sub *Marlea*) Smith et Cave. Comb. nov. et descript. ampl.

Species affinis *Alangio begoniaefolio* (Roxb.) Baill. sed arboris habitu, foliis minoribus, minus angulatis, inflorescentiis laxioribus longioribus paucifloris, staminum filamentis fere glabris, fructu majore, multum compresso, semine solitario, differt.

Arbor erecta, ad 12 m. alta, decidua, ramis ascendentibus, paulo inter nodos angulatis. Folia petiolata; lamina suborbicularis vel ovata vel oblongo-ovata, apice ± acuminata, basi rotundata vel subtruncata ve.

cordatula, coriacea, margine undulata, vix angulata, supra glabra, infra nunc \pm dense pilosa in nervis venisque, nunc fere glabra, nervise petiolo 5-7-palmatim currentibus supra vix, subtus valde prominentibus, nervis secundariis inter se subparallelis; petiolus circ. 2 cm. longus. Inflorescentiae axillares laxae, 4-10 cm. longae, saepius 3-florae; pedicelli 1 cm. longi vel ultra, in fructu ad 3 cm. elongati; bractee deciduae lineares 1 mm. longae vel ultra; calyx et corolla eis *A. begoniaefolii* simillimi sed paulo majores. Staminum filamenta fere glabra, nec infraantheras barbata, 5-6 mm. longa; antherae \pm 1 cm. longae. Fructus primo elongato-turbinatus, deinde compresso-ellipsoideus, ad 20 mm. longus, 8-9 mm. latus, longitudinaliter sulcis percursus, multo compressus, semine unico testa membranacea; albumen paulo convolutum.

Eastern Himalaya:—Lachen, Sikkim, 7-9,000 ft., Phadonchen, Sikkim, 5,000 ft., *Hooker* in Herb. Kew. et Herb. Calc.; *Prain's Coll.*, 331 in Herb. Calc.; Choongtam, Sikkim, *Hooker* in Herb., Kew.; Sikkim, *King* in Herb. Calc. without locality or number; Sikkim, *Thomson* in Herb. Calc. without number; Sikkim, in Herb. Calc. without number; Senechal, Darjeeling District, 7,000 ft.; *Gamble* 2440 A in Herb. Gamble. Rangbul, Darjeeling District, 7,000 ft., *Lace* Tashiding Forest 2,293 in Herb. Calc.; *Kurz*, Darjeeling, 7,000 ft. in Herb. Calc., *Gamble* 6,950 in Herb. Gamble. Towards Chuka, Bhutan, damp woods, 6,000 ft., *Griffith* 1,097 in Herb. Kew. (Kew Distr. 3,389).

Synonymy:—

Marlea begoniaefolia, Roxb. var. *alpina* ex C. B. Clarke in Fl. Brit. Ind. II, p. 743. *Marlea sikkimensis*, King MSS. in Herb. Calc. *Marlea alpina*, Gamble MSS. ex Brandis in Indian Trees, p. 355. *Alangium begoniaefolium* (Roxb.) Baill. pro minima parte — Speciminibus Sikkimensibus alpinis — in Wangerin, Alangiaceae, p. 21.

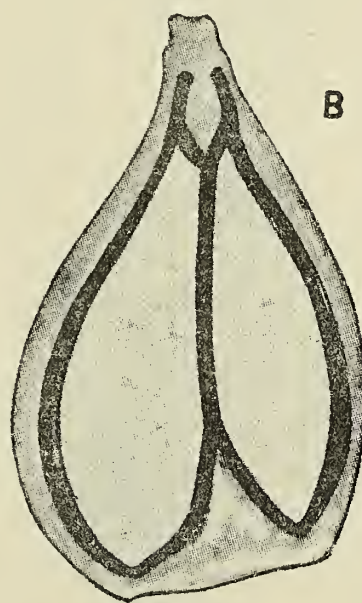
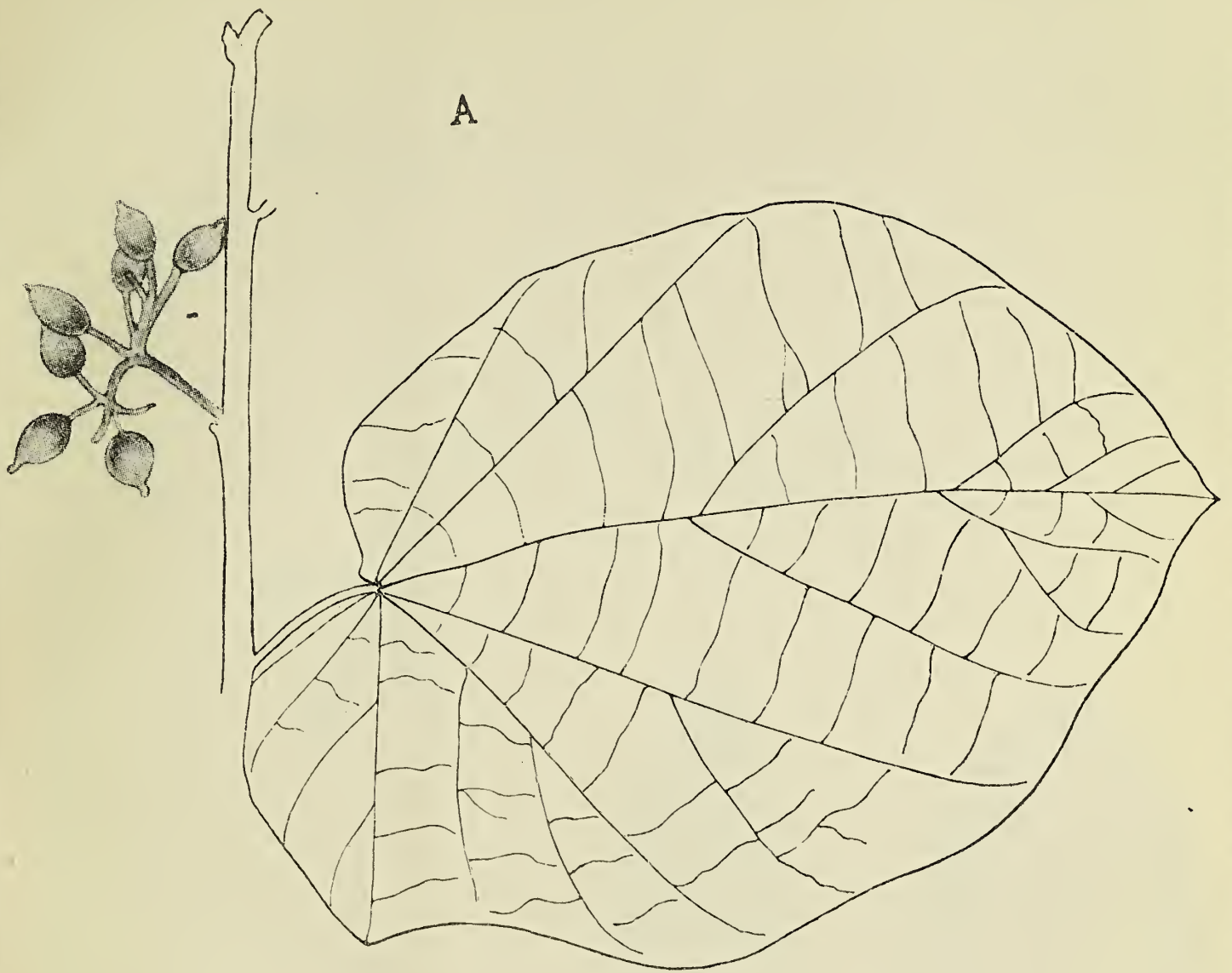
Description of Plates.

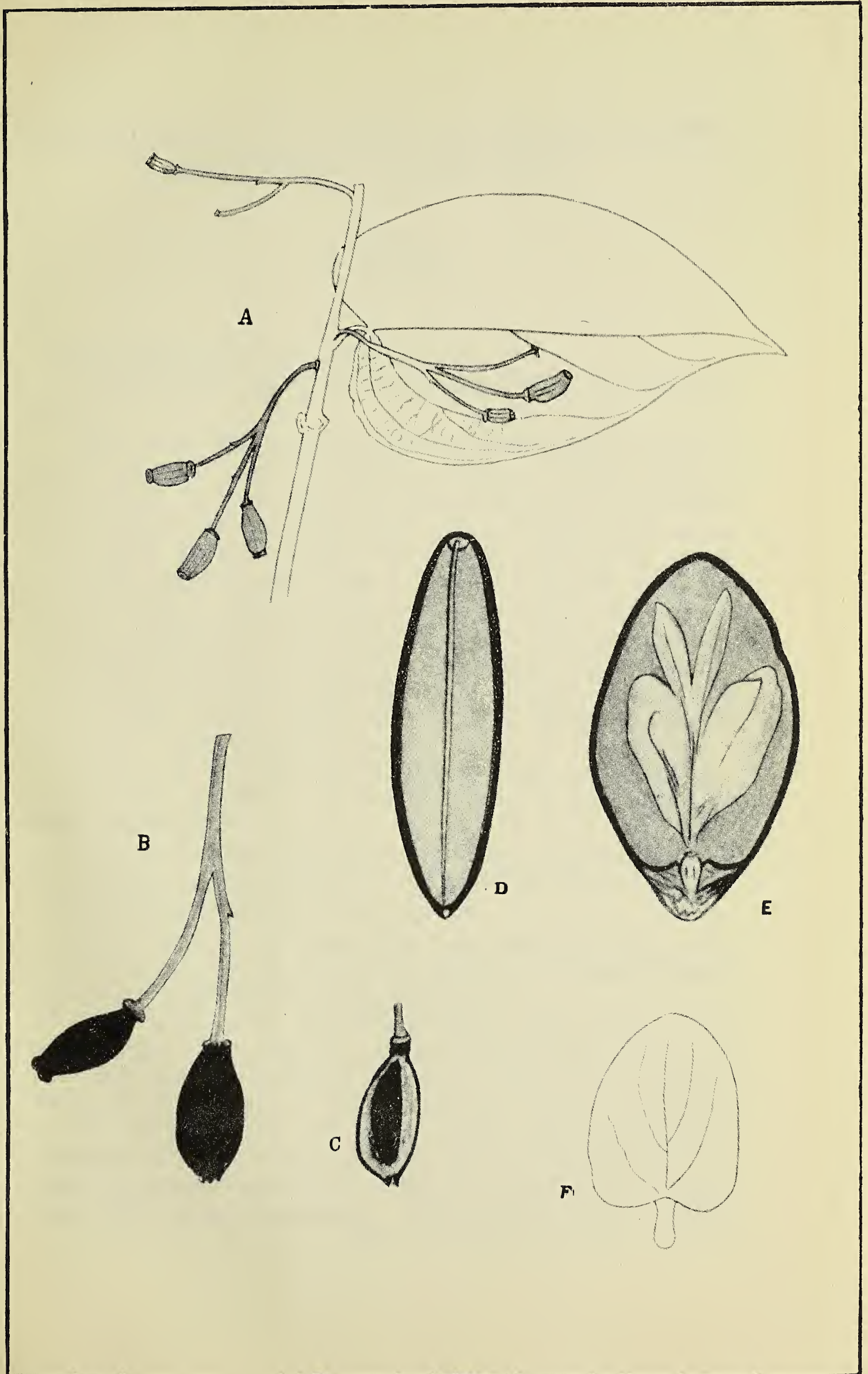
Plate I.—*Marlea begoniæfolia* Roxb

- A. Leaf, inflorescence with fruit natural size but not ripe. Collected at Reang 4th July $\times \frac{3}{4}$.
- B. Ripe fruit in section, 3rd August $\times 4$.

Plate II. *Marlea alpina*. *Smith et Cave*

- A. Leaf, inflorescence with fruit natural size but not ripe. Collected on Senchal, 11th July. $\times \frac{1}{2}$.
- B. Ripe fruit, 19th October $\times 1$.
- C. „ „ in section $\times 1$.
- D, E, Stone in section $\times 4$.
- F. Embryo. $\times 4$.





SPECIES NOVÆ PLANTARUM IN HERBARIO HORTI.
REG. CALCUTT. COGNITARUM.

Auctore
W. W. SMITH.

Rhus amherstensis, W. W. Sm. Sp. nov.

Species birmanica affinis *R. Wallichii* Hook. f. et *R. insignis*,
Hook. f.

Arbor. *Folia* imparipinnata, 40-50 cm. longa; petiolus 10-15 cm.
longus, striatulus, sparse fulvo-villosus; foliola 9, petiolulo 3-5 mm.
longo praedita, 10-15 cm. longa, 5-7 cm. lata, elliptica vel ovato-elliptica,
basi rotundata, apice abrupte acuminata, integra, coriacea, supra glabra
nervis 12-24 paribus distinctis, infra sparse fulvo-villosa nervis
eminentibus, reticulationibus utrâque facie plus minusve conspicuis.
Panicula axillaris, ampla, circ. 24 cm. longa, plus minusve dense
villosula; ramuli 4-5 cm. longi, densiflori; flores circ. 2 mm. diametro.
Sepala plerumque 5, vix 5 mm. longa, ovata, obtusa, albido-marginata.
Petala vix 1 mm. superantia, oblonga, obtusa, albida (?), lineâ medianâ
nigrâ pererrata. *Stamina* petalis paulo breviora, filamentis antheras
aequantibus. *Ovarium* maturum abest.

Burma:—On the Tá-ok plateau, Dawna Range, Amherst District,
at an elevation of 3,500 ft. *Lace* 4765 in Herb. Calc. Collected in
flower 22nd March 1909.

This species is closely allied to the two Himalayan species mentioned
above but I have failed to match it in the material at Kew and Calcutta.

Begonia Macgregorii, W. W. Sm. Sp. nov.

Species *Begoniae verticillatae*, Hook. valde affinis sed minor; foliis
triangulari-ovatis, bracteis eglandulosis, capsulis subaequalitar tri-alatis,
marginibus descendentibus inter alia distinguenda.

Planta annua parva gracillima suberecta radice debili. *Caulis*
3-5 cm. longus, 5 mm. diametens, flexuosus, glaber, basi unifolius vel
nudus, apice 2-4 foliis verticillatis instructus. *Folia* 3-5 mm. petiolata,
triangulari-ovata, obtusa, basi vix inaequalia truncata, plerumque
2-3 cm. longa, 2-3 cm. lata, grosse crenata, glabra, membranacea.
Pedunculi 1-3 terminales, gracillimi, capillacei folia duplo excedentes, in
ramulos paucos dichotome divisi. *Bracteae* minutae, vix 5 mm. longae,
ovatae, eglandulosae, subpersistentes. Flores parvi 2-3, albi. In flore

masculino *sepala* 2, suborbicularia, 2 mm. longa; *petala* 2, lineari-oblonga, 2mm. longa; *floris* feminei perianthii segmenta 4, subaequalia, lineari-oblonga, plus minusve 2 mm. longa. *Stamina* 9-10, monadelphia, 1 mm. longa, antheris oblongis 7-8 mm. longis. *Stigmata* 3, breviter bifida. *Capsula* triquetra, cum alis 5 mm. lata, 3 mm. longa, 2-locularis; alae marginibus descendentes, duae 2 mm. latae, tertia minor, 1 mm. tamen excedens. *Semina* immatura, breviter ellipsoidea.

Burma:—Keng Tung, S. Shan States, at an elevation of 3,000 ft. *Macgregor*, 553 in Herb. Calc. Flowers in July. It is very closely allied to *Begonia verticillata*, and resembles small forms of that plant.

***Pyrus kachinensis*, W. W. Sm. Sp. nov.**

Species affinis *Pyro cuspidatae*, Bertol. sed foliis oblongis nec ovatis, vix acuminatis, nitentibus, petiolis brevioribus, petalis glabris, stylis tribus inter alia differt.

Arbor; altitudo non nota; ramuli graciles teretes rubelli, hinc inde lenticellis elongatis notati, tomento albido deterrenti primo praediti, deinde glabrescentes. *Folia* petiolo circ. 1 cm. longo plus minusve tomentoso praedita; 10-13 cm. longa, 3-5 cm. lata, subcoriacea, ambitu oblonga, basi late cuneata aequalia vel inaequalia, apice acuta vel subacuta nec acuminata, crebre et regulariter serratulata, supra nitentia nervis immersis infra pallidiora nervis paulo eminentibus, 6-8 paribus, nervulis bene reticulatis distinctis. *Inflorescentiae* amplae, corymboso-paniculatae, 6-8 cm. latae, folio-oppositae, ramulos terminantes; pedunculi 4-7-nati, 2-3 cm. longi, pedicelli circ. 1 cm. longi, omnes plus minus albido-villosi. *Calyx* campanulatus circ. 2 mm. longus in lobos subobtusos ad tertiam partem divisus, sparse albido-villosus. *Petala* circ. 3 mm. longa, late obovata, vix unguiculata. *Stamina* 20-25 petalis breviora. *Ovarium* immaturum triloculare villosum stylis tribus coronatum.

Burma:—In the Kachin Hills, Upper Burma, *Shaik Mokim* in Herb. Calc. (1898 anno.).

***Pleurospermum dochenense*, W. W. Sm. Sp. nov.**

Species affinis *Pleurosermo Hookeri*, C. B. Clarke; bracteis praelongis bipinnatis, pedicellis complanatis margine fimbriatis inter alia conspicua.

Planta erecta 30-40 cm. alta, valde robusta. *Radix* crassa, foliorum delapsorum vaginarum reliquiis apice obsita. *Caulis* circ. 7 mm. diametro, striatus, glaber. *Folia* radicalia 1-2, caulina 2-3, subsimilia; petiolus ad 15 cm. longus vaginâ mediocri vel parvâ praeditus; lamina ambitu ad 12 cm. longa, ad 10 cm. lata, bipinnata, pinnulis alte lobatis vel pinnatifidis, segmentis ultimis oblongis 1-3-apiculato--lobulatis, coriacea, glabra, venulis infra eminentibus. *Inflorescentia* ampla; bractee 2-5, foliis subsimiles, 4-10 cm. longae, petiolo nonnunquam 6 cm. longo, laminâ bipinnatâ; radii primarii 12-15, robusti, ad 12 cm. longi,

3 mm. diametro; umbellulae globosae 2 cm. diametro, 80-100-florae; pedicelli 6-7 mm. longi, complanati, margine albo-crispato-fimbriati; bracteolae variables, aliae ad 3 cm. longae, apice pinnatifidae, lobulis, apiculatis, aliae minores loriformes margine albo-fimbriatae. *Petala* late obovata, apice lobulata, nonnunquam subacuminata, circ. 1.5 mm. longa. *Fructus* maturus abest.

Tibet:—Dochen Plain (near Gyantze?). Coll. Capt. H. M. Stewart, I. M. S. August 1907.

A species with remarkable bracts and peculiar pedicels.

Vernonia Bourneana, W. W. Sm. Sp. nov.

Species affinis *Vernoniae Wightianae*, Arn., speciei zeylanicae, sed foliis, tomento, bracteis, corollâ, acheniis differt.

Frutex. *Caulis* (pars superior) subteres, striatulus, tomento brevi deterrenti ± denso crispato fulvido praeditus, sat foliosus. *Folia* alterna, 5-7 cm. longa, 2-3 cm. lata, elliptica vel obovata, apice obtusa vel rotundata, basi cuneata, margine sub-integra, supra sparse scabride pilosula, infra dense fulvo-crispato-tomentosa, nervis 5-6 paribus, supra obscuris, infra distincte reticulatis eminentibus, albidis; petiolus 6-12 mm. longus, dense fulvo-tomentosus. *Inflorescentiae* ample, ramos terminantes, late corymboso-paniculatae, fulvo-tomentosae; bracteae 2-3 mm. longae, lineares vel subulatae, fulvo-tomentosae; pedunculi ultimi 5-20 mm. longi; capitula circ. 8 mm. longa, circ. 7 mm. lata; involucri phylla 2-3-seriata, 3-4 mm. longa, exteriora lanceolata acuta, extus tomentosa, interiora oblonga obtusiora fere glabra, intus nitentia glabra; flores circ. 5 mm. longi, glabri; ovarium 1 mm. longum; pappi setae circ. 5 mm. longae, sordide albiae, simplices, setulae paucae circ. 1 mm. longae exteriores additae. *Achaenium* circ. 2 mm. longum, subquadratum, minute nitenti-glandulosum.

Southern India:—In the Pulneys, 1st Shola, Poomburai Road, Bourne 1351 in Herb. Calc.

Allied to but quite distinct from the Ceylon *Vernonia Wightiana* Arn.

Pentasacme shanense, MacGregor et Sm. Sp. nov.

Species affinis *P. caudato*, Wall. sed pedicellis longis, floribus multo minoribus inter alia differt.

Planta perennis. *Caules* plures e radice sat crassâ lignosâ orti, 12-25 cm. alti, erecti simplices flexuosi, quadranguli, glabri, inferne mox defoliati. *Folia* opposita, petiolo 1-2 mm. longo, nonnunquam sparse hirsutulo praedita, 3-6 cm. longa, 3-5 mm. lata, subcoriacea, lineari-lanceolata, apice basique acuta, integra, undique glabra nisi nonnunquam prope petiolum hirsutula, infra glaucescentia, costâ conspicuâ notata. *Inflorescentia* terminalis racemiformis; flores subnutantes 2-5-nati in

ramulo 1-2 mm. longo in axillis foliorum superiorum oriente; pedicelli 1-2 cm. longi, flexiles, graciles. *Calyx* 5-partitus segmentis 2-4 mm. longis lineari-lanceolatis acutis. *Corolla* 6 mm. longa, lobis 4 mm. longis lanceolatis obtuse acuminatis contortis; Coronae squamæ 5 prope basin tubi affixae, oblongae circ. 2 mm. longae, apice lacerae. *Filamenta* in tubum circ. 2 mm. longum connata; antherae membranâ inflexâ terminatæ; pollinia pedicellata erecta ovoidea. *Folliculus* immaturus circ. 1 cm. longus, tenuis, teres.

Burma:—In the Southern Shan States *MacGregor* 535 in Herb. Calc.

The glands on the calyx segments, characteristic of *Pentasacme* as defined, were not seen in dissection nor did the pollinia appear to have pellucid tips. But the habit and inflorescence of the plant are quite that of *Pentasacme*.

***Cordia globifera*, W. W. Sm. Sp. nov.**

Species distinctissima, affinis *Cordiae fragrantissimæ*, Kurz; foliis oblongis undique dense fulvo-tomentosis, inflorescentiis dense tomentosis, inter alia differt.

Arbor magnitudinis mediae; ramuli ultimi crassi robusti 3-5 mm. diametro, striati, hinc inde fulvo-tomentosi, ad apicem densissime, cicatricibus foliorum delapsorum hippocrepiformibus 5-7 mm. latis notati; cortex rimosus griseus; innovationes densissime fulvo-tomentosae, ad apicem ramulorum globulos 1-2 cm. diametro formantes. *Folia* seniores, ut videtur, mox delabuntur; juniora, ad apicem ramulorum paulo conferta, alterna, petiolo 1-2 cm. longo densissime fulvo-tomentoso praedita, 4-7 cm. longa, 2-4 cm. lata, oblonga, basi plus minusve rotundata nec cordata, apice nunc rotundata, nunc obtusa, nunc obtuse acuminata, integra, nonnunquam paulum sinuata, supra primo dense fulvo-tomentosa, deinde glabrescentia cystolithis albidis dense lepidota, infra tomento densissimo fulvo persistente praedita, nervis circ. 5 utrinque obscuris. *Flores* (teste collectore) albi, inter minores, sessiles in cymas terminales dichotomas ebracteatas densas fere globosas dispositi, ramulis scorpioideis densissime fulvo-tomentosis ad 7 cm. longis. *Calyx* tubulosus 12-13 mm. longus vix costatus extus dense fulvo-tomentosus, intus glaber, venulis multis pererratus; lobi quinque 3-4 mm. longi subacuti triangulares tomentosi. *Corollae* albae tubus infundibuliformis 13-14 mm. longus, lobi 3-4 mm. longi, anguste obovati, margine crispatis (in sicco). *Stamina* 5, tubo aequaliter affixa, paululum exserta; antherae oblongae hastatae. *Stylus* bifidus, iterum partitus. *Fructus* abest.

Burma:—"In district Henzada, village Myanaung, medium size, white flower; March 1903". *Shaik Mokim* 1675 in Herb. Calc.

[A very peculiar species and one requiring further investigation in the

field. The specific name refers to the globular woolly masses at the ends of the branchlets.

Thunbergia papilionacea, W. W. Sm. Sp. nov.

Species in sectione *Meyenia*. ob calycem annularem brevissimum et flores axillares vel imperfecte racemosos forsitan ponenda; duae species indicae hujus sectionis ei haud propinquae.

Caulis volubilis striatus plus minusve dense hirsutulus, deinde glabrescens. *Folia* opposita fere sessilia 4-5 cm. longa, 3-4 cm. lata, late ovata, basi cordata, apice acuminata, remote indurato-dentata, formâ specieque papilionis alis haud dissimilia, supra adpresse hirsutula, infra plus minusve dense velutino-hirsuta, densius in venis; nervi supra obscuri, infra eminentes, bene reticulati. *Flores* axillares solitarii vel 2-3-nati, ramulos terminantes, vix racemum formantes, in sicco purpurei; pedicelli circ. 2 cm. longi, densissime hirsuti; bracteae foliis similes; bracteolae duae cohaerentes in tubum spathaceum, 1-5 cm. longum, ore obliquo, extus densissime hirsutum, intus glabrum, calycem et corollae tubum velantem. *Calyx* annularis, brevissimus. *Corolla* 3-4 cm. longa; tubus fere 2 cm. longus, bracteolis celatus, ventricosus, superne ampliatus, extus passim hirsutus; limbus in sicco circ. 2-5 cm. latus, obliquus, lobis subaequalibus rotundatis. *Stamina* didynama, infra medium tubi affixa, filamentis loriformibus 1 cm. longis, 2 mm. latis, glabris; antherae fere glabrae, hinc inde sparse barbatulae, circ. 6 mm. longae, connectivo apiculatae; loculi oblique ovoidei basi hamulis 6 mm. longis sparse barbatulis praediti; in staminibus longioribus hamuli subaequi, in staminibus brevioribus hamuli valde inaequales. *Discus* carnosus breviter annularis. *Ovarium* ovoidum densissime hirsutum, 3-4 mm. longum; stylus circ. 2 mm. longus, hirsutulus, apice dilatato-cuneatus. *Capsula* matura non visa.

Burma:—In the Thaton district in the Thaungyin Valley, *Lace* 4669 in Herb. Calc.

The specimen is somewhat imperfect and possibly longer inflorescences will be found. The species may yet have to be placed in the section *Hexacentris*. The specific name is taken from the shape of the pairs of leaves.

Juncus trichophyllus, W. W. Sm. Sp. nov.

Species inter *Juncos* alpinos, *Buchena*, ponenda; inter species himalaicas *Junco leucantho* vel *J. leucomelani* affinis, sed inflorescentiâ 1-2-florâ distincta; habitu specieque *Junco Maximowiczii* et *J. luzuliformi* haud dissimilis; bulbillis remotis sub inflorescentia ortis conspicua.

Caespites parvos formans; caules 8-10 cm. alti erecti gracillimi, fere capilliformes, basi cataphyllis parvis castaneis praediti. *Folia* basalia plura capilliformia, flexuosa, saepe crispata, plerumque caule multo breviora sed rarius subaequantia; caulina 1-3, plerumque 2, unum in medio caule,

alterum superius, 1-2 cm. longa, setacea, basi vaginantia, plerumque bulbifera. *Capitulum* unicum 1-2-florum, 4-5 mm. diametro. *Bracteae* flores aequantes vel minores, ovato-lanceolatae, acutae vel acuminatae, fuscae. *Tepala* lineari-oblonga, acuta vel subacuta, membranacea, pallide straminea, 3 mm. longa. *Stamina* exserta; filamenta filiformia, sepala paulo superantia, antheris linearibus circa 2-3 plo longiora. *Stylus* 2 mm. longus; ovarium circ. 3 mm. longum, trigono-obovatum. *Fructus* seminaque matura non visa. *Bulbilli* 2-3 mm. longi ovoidei, foliis 1-2 capillaceis brevissimis coronati.

Sikkim Himalay—near Changu, 13,000 ft., in the Chola Range, Eastern Sikkim, *Smith* 3502 in Herb. Calc. without locality or number *King's Coll.* (anno 1889) in Herb. Calc.

***Juncus uniflorus*, W. W. Sm. Sp. nov.**

Species habitu *Juncus trichophyllo* et *J. leucomelani* affinis; floris structurâ *J. sikkimensi*, var. *monocephalae* haud dissimilis; flore solitario conspicua.

Planta gracillis dense caespitosa, vix stolonifera, plerumque 2-3 cm. alta, rarius ad 10 cm. *Caulis* nunc gracillima flexilis, nunc robustior stricta, basi cataphyllis paucis obsita. *Folia*, pauca vel unum, basilaria, caulis dimidium aequantia, rarius caulem subaequantia, teretia filiformia acuta, paulo supra canaliculata. *Inflorescentia* uniflora, raro biflora; bracteae filiformes, una tepala aequans vel paulo minor, altera plerumque 2-3-plo longior, raro subaequans. *Tepala* 3 mm. longa, lineari-lanceolata, nigrescentia. *Stamina* inclusa; antherae filamentis 2-3-plo longiores. *Stylus* fere 3 mm. longus, ovario triquetro paulo longior. *Fructus* ovoideus, tepala aequans, acutus, nitens, 3 septatus: semina pauca .5 mm. longa elliptico-ovoidea, ecaudata.

Sikkim Himalaya:—Jongri, West Sikkim, at an elevation of 13,000 ft. *Gammie*; 202 in Herb. Calc. Se-moo-do-ne about 2,500 ft. below the Jelep La (*i.e.*, about 12,000 ft.), Eastern Sikkim, *King's Coll.*, in Herb. Calc. at Nathui La, Changu, Tosa, Chakung Chu, *Smith* 3202, 3465, 3854, 4046 in Herb. Calc.

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A BOTANICAL TOUR IN THE TINNEVELLY
HILLS

By M. S. RAMASWAMI, M.A.,

Officiating Curator of the Herbarium, Royal Botanic Garden, Calcutta.



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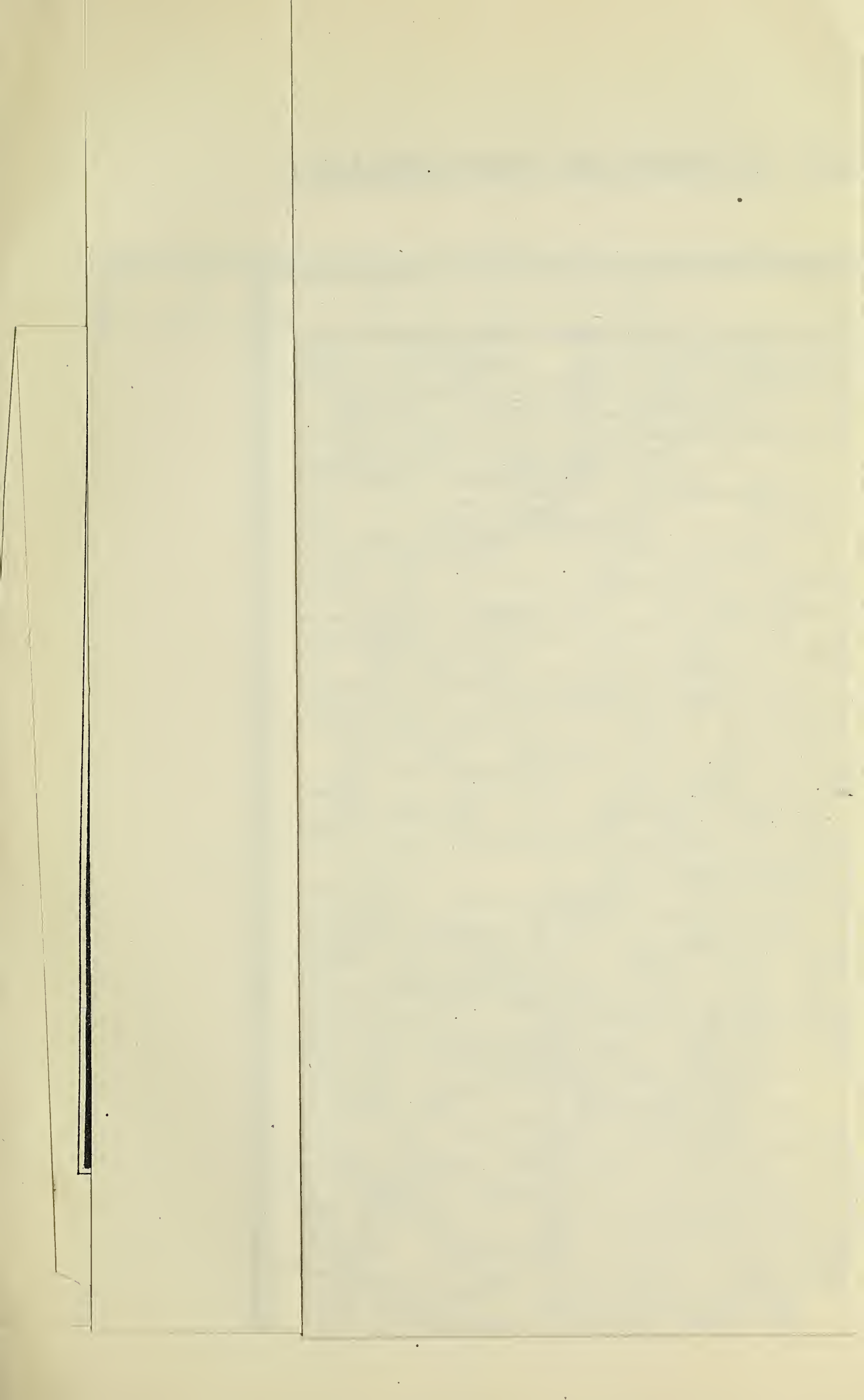
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PARTS OF DISTRICT TINNEVELLY AND TRAVANCORE STATE.



ROUTE MAP
TO ILLUSTRATE

A BOTANICAL TOUR IN THE TINNEVELLY HILLS

Mr. Ramaswami's route, shown thus.....

Scale 1 inch = 4 miles

A BOTANICAL TOUR IN THE TINNEVELLY HILLS

BY

M. S. RAMASWAMI, M.A.

Officiating Curator of the Herbarium, Royal Botanic Garden, Calcutta.

PART I.

THE following is a brief account of a botanical excursion undertaken by the writer and Mr. D. Hooper, late Economic Botanist to the Botanical Survey of India, in the month of February 1913, to a portion of the Tinnevelly hills, in accordance with instructions from Major A. T. Gage, I.M.S., Director of the Botanical Survey of India.

Topography and Nature of the Vegetation.

The District of Tinnevelly is roughly triangular in shape, occupying the eastern half of the extreme southern end of the Indian Peninsula. It is bounded on the west by the Western Ghats, on the east and south by the sea, on the north by the district of Madura and "lies between $8^{\circ} 9'$ and $9^{\circ} 43'$ N. and $77^{\circ} 12'$ and $78^{\circ} 23'$ E., having an area of 5,389 square miles with an extreme length of 120 miles from north to south and a maximum width of 75 miles near the Madura frontier."

The district can be divided naturally into three distinct portions:—

- (1) The coast, with back waters, *Avicennia* type of growth and salt-swamps.
- (2) The plains between the coast and the western hill slopes, with a few low stony hills covered with a poor scrubby growth and long stretches of shifting red sand known locally as the *Teri*. The Palmyra is the principal feature of this region.
- (3) The ghat slopes on the west with elevations ranging from 300 ft. to 6,000 ft. It is from these the district gradually slopes down eastward to the sea. The outer slopes are often very bare and sometimes covered with a few grasses and some scattered trees, more or less deciduous. The inner slopes, however, contain much evergreen forest, frequently even at low elevations, and above 2,500 ft. very large stretches of regular moist heavy evergreen shola. These shola forests lie mostly in 3 taluks, *viz.*, Tenkasi, Ambasamudram and Nanguneri. In Tenkasi the slopes face nearly north, in Ambasamudram and Nanguneri nearly west, with a distinct corner ground by an outlying spur between the two.

It is to a few of the sholas situated on the slopes of the last named two taluks our excursion was confined.

The District is drained by several rivers the chief of them being the Tambraparni. All of them have their sources in the Ghats and run eastwards into the sea.

Although there are no distinctly well-marked seasons during the year, the hot and the cold seasons are fairly distinct. The hottest months are from April to June "when the temperature is rarely above 95° in the shade and the coldest months are December and January when the temperature seldom falls below 77°."

The rainfall is greatest near the hills and least on the eastern side, but even in the hills themselves there are local variations in the rainfall. In the three western taluks above mentioned, "the maximum is nearly 60 inches while the minimum is about 20 inches. In other parts of the district the fall varies from between 40 and 50 inches as a maximum to between 10 and 15 inches as a minimum."

The ghat slopes of the Nanguneri Taluk were first explored. Several small coffee estates nestle in the more sheltered valleys of the higher elevations on this side. From Tirukarungudi a small bridle path leads into these estates. At the foot of the hills the vegetation is somewhat uniform, strongly reminding one of the plains at the foot of the Nilgiri hills. Composites and hill grasses were particularly abundant. Up to 2,000', *Stenosiphonium Russellianum* takes the first place and then several other shrubs and herbs belonging to the Natural orders *Rubiaceæ* and *Compositæ* respectively. Above 2,000', the herbaceous vegetation on the clearings of the coffee estates consisted chiefly of patches of *Kalanchoe*, *Vernonia* spp. a *Barleria*, an *Asystasia*, several shrubs belonging to the Natural orders *Rubiaceæ* and *Acanthaceæ* and various leguminous herbs. The silver oak *Grevillea* was found largely planted in this area. From 3,000' to 4,000', a very heavy evergreen forest occurs. These evergreen forests generally get the full force of the S. W. Monsoon as well as heavy showers during the N. E. monsoon so that they are exceedingly damp nearly throughout the year. The trees composing this forest are very tall and of many different species. Amongst the most common and conspicuous are *Hopea parviflora*, *Balanocarpus utilis*, *Artocarpus hirsuta*, *Gordonia obtusa*, *Bombax malabaricum*, *Elæocarpus oblongus*, *Elæocarpus tuberculatus*, *Pterocarpus Marsupium*, *Ormosia travancorica*, *Hardwickia binata*, *Pithecolobium subcoriaceum*, *Myristica attenuata*, *Myristica laurifolia*, *Tectona grandis*, *Litsea sebifera*, *Villebrunea intergrifolia* and others too numerous to mention—most of them being evergreen.

Climbing and twining plants are represented by such species as *Mucuna atropurpurea*, *Derris scandens*, *Piper nilghirianum*, *Hoya pauciflora*, several species of *Jasminium*, *Thunbergia fragrans*, *Dunbaria ferruginea*, *Rubia cordifolia* and several species of Yams such as *Dioscorea pentaphylla*, *Dioscorea spicata*, etc.

The shrubby undergrowth of this forest was constituted chiefly by several species of *Leguminosæ*, *Rubiaceæ* and *Acanthaceæ* such as *Crotalaria albida*, *Crotalaria verrucosa*, *Indigofera pulchella*, *Indigofera tinctoria*,

Tephrosia tinctoria, *Desmodium scalpe*, *Desmodium latifolium*, *Rhynchosia cana*, *Rhynchosia rufescens*, *Wendlandia Notoniana*, *Hedyotis purpurascens*, *Hedyotis viscida*, *Mussaenda frondosa*, *Pavetta indica*, *Pavetta breviflora*, *Psychotria congesta*, *Psychotria elongata*, *Strobilanthes pulneyensis*, *Barleria nitida*, *Crossandra undulaefolia*, *Diotacanthus albiflorus*, *Diotacanthus grandis*, as well as a few species belonging to other orders such as *Polygala arillata*, *Hypericum mysorense*, *Chloranthus brachystachyus* several species of *Cinnamomum*, *Lasiosiphon eriocephalus*, *Sauropus albicans*, *Agrostis-tachys indica*, *Debregeasia velutina*.

The herbaceous vegetation was extremely rich, and consisted chiefly of several species in each of *Compositæ*, *Leguminosæ*, *Rubiaceæ*, *Gramineæ*, *Scitamineæ* and *Campanulaceæ*. Ferns and Selaginellas were quite abundant in moist hollows. Parasitic *Loranthi* and *Viscums* were noticed on several trees. *Balanophora indica* with its beautiful spike of coral-red male flowers was invariably present on the ground near the base of several of the tall trees. Plants of economic importance, noticed in these sholas, were cardamoms and turmeric. Fringing the margins of the several small hill streams which we crossed are found *Impatiens grandis*, *Impatiens subcordata*, two or three small shrubs of *Osbeckia*, a very small leaved *Elatostema*, *Polygonum chinense*, *Arisœma Leschenaultii*, *Anaphyllum Beddomei* and several species of sedges and ferns—prominent among the former being *Scirpus mucronatus* and *Cyperus corymbosus*. Within and mixed up with the fringe of sedges *Viola distans*, *Laurembergia (Serpicula) hirsuta* and an *Utricularia* occur in great abundance.

The vegetation on the other side of these slopes towards Kalkad was to all intents the same, except that the forests here are frequently broken by dense impenetrable stretches of *Ochlandra travancorica*.

The down hill journey from Naterikal to Kalkad proved very interesting as it enabled us to observe the striking transition from a high elevation flora to a low elevation one. High elevations contained species of *Clematis*, *Begonias* on moist rocks, *Pouzolzas* hanging in clusters above the rocks with their long arching inflorescences, pretty looking *Lobelias*, *Argyreias* with white-villous leaves, several *Didymocarpi* and other gesnerads with crumpled velvety leaves, numerous species of *Rubus* and *Anaphalis* besides a few terrestrial and epiphytic orchids. On gradually going down these disappear more or less and *Strobilanthes* shrubs take their place becoming quite abundant, followed by several shrubs belonging to the Natural orders *Rubiaceæ* and *Acanthaceæ*. Finally, around Kalkad in the plains several *Euphorbias*, *Helicteres Isora*, *Grewia* spp., *Dioscorea* spp., *Aristolochia* spp. and a host of Leguminous and Compositaceous herbs are noticeable, the Palmyra of course occurring everywhere on the plains.

The second part of our expedition was across what is known as the Papanasam hills towards Kannikatti, situated in the Ambasamudram Taluk at an elevation of 2,500 feet in moist heavy shola. The vegetation along our route up to Mundandurai which stands at an elevation of only about 700 feet, presented no remarkable features except thickets of thorny deciduous shrubs

composed of such species as *Randia dumetorum*, *Hugonia Mystax*, *Scutia indica*, *Grewia* spp., *Capparis* spp. and a host of other shrubs.

After leaving Mundandurai our march lay across forests. These are not so dense and impenetrable as those near Naterikal. There were a lot of species peculiar to these forests as distinct from those of the other forests. Instead of attempting to give a detailed enumeration of all the species collected by us here, it will be convenient to consider the chief distinctive points in the flora of this area. One striking peculiarity of the vegetation of this region lies in the large preponderance of several typical Ceylon plants such as *Garcinia echinocarpa*, *Filicium decipiens*, *Pithecolobium subcoriaceum*, *Erythroxyllum lucidum*, *Dianella ensifolia* and several others. Another feature, though somewhat less striking, is the presence of a number of species common to this region and the Malay Peninsula. These are *Scolopia crenata*, *Calophyllum inophyllum*, *Urena lobata*, *Aglaia Roxburghiana*, *Erythralium populifolium*, besides several other herbs.

Remarks on the Distribution of Species.

Though the collection dealt with in this paper is no doubt a very partial one, a glance at the systematic list will show that it possesses some interest with regard to the distribution of the species. Of the 470 plants enumerated, the following species are known to be endemic to this area (i.e., occurring only in the Tinnevelly hills and the adjoining portion of Travancore hills):—

Ionidium travancoricum, *Balanocarpus utilis*, *Pterospermum obtusifolium*, *Leptonychia moacurroides*, *Homalium travancoricum*, *Hedyotis albo-nervia*, *Hedyotis purpurascens*, *Hedyotis viscida*, *Acranthera grandiflora*, *Psychotria nudiflora*, *Centratherum molle*, *Vernonia* sp. *Vernonia travancorica*, *Ardisia* sp., *Diospyros Barberi*, *Diospyros foliolosa*, *Didymocarpus Rottleriana*, var. *Wightii*, *Stenosiphonium Russellianum*, var. *subsericea*, *Andrographis elongata*, *Andrographis viscosula*, *Diotacanthus albiflorus*, *Diotacanthus grandis*, *Orthosiphon comosus*, *Coleus parviflorus*, *Anisochilus robustus*, *Anisochilus scaber*, *Cinnamomum gracile*, *Mallotus Beddomei*, *Elatostema* sp., *Ania latifolia*, *Elettaria Cardamomum*, *Anaphyllum Beddomei*, *Ochlandra travancorica*.

There is, therefore, a very appreciable endemic element in the Tinnevelly flora, as the present collection alone contains 33 endemic forms out of a total of 470, making about one-fourteenth or 7·02 per cent. of the whole. Of the remaining thirteen-fourteenths, 12 plants, making only 2·12 per cent. of the whole collection, are purely Ceylon species while 47 or 10 per cent. are purely South Peninsular Indian ones, the number of species common only to both these regions being 123 or 26·17 per cent. of the whole. There are still 255 species left out of which a little more than half are distributed throughout India while varying proportions of the remaining half are distributed to Assam, Upper Burma, Lower Burma and Malaya.

A synoptic view of the systematic character of the collection is given in the following table :—

Systematic synopsis of Tinnevelly plants collected during February 1913.

—	Natural orders.	Genera.	Species.
Phanerogamia . . .	94	310	449
Dicotyledones . . .	80	266	394
Polypetalae . . .	43	119	167
Thalamiflorae . . .	15	27	36
Disciflorae . . .	11	30	37
Calyciflorae . . .	17	62	94
Gamopetalae . . .	24	106	170
Monochlamydeae . . .	13	41	57
Gymnosperms . . .	1	1	1
Monocotyledones . . .	13	43	54
Cryptogamia . . .	6	20	2
TOTALS . . .	100	330	470

Of Phanerogams, the whole collection comprises 94 Natural orders, 310 genera and 449 species. The most extensively represented Natural order is, as might be expected, *Leguminosæ* with 55 species, followed by *Rubiaceæ* with 38 species; *Compositæ*, *Acanthaceæ* and *Labiataæ*, 24 each; *Euphorbiaceæ*, 21; *Gramineæ*, 14; *Convolvulaceæ* and *Urtiaceæ* 10 each; of those natural orders with less than 10 species, *Melastomaceæ* and *Solanaceæ* have 9 each; *Asclepiadaceæ*, *Orchidaceæ* and *Cyperaceæ* 7 each; *Malvaceæ*, *Cucurbitaceæ* and *Verbenaceæ* 6 each. There are seven Natural orders with five representatives, nine with four species, sixteen with three species, ten with two species, the rest with but one species each.

Itinerary.

Our Itinerary very briefly shown is as follows :—

7th February 1913	.	.	left Calcutta.
8th	„	.	in the train.
9th	„	.	At Madras.
10th	„	.	all day in the train ; all night travelling in bullock cart.
11th	„	.	at Tirukarungudi.
12th	„	.	Tirukarungudi to Naterikal.
13th	„	.	at Naterikal.
14th	„	.	Naterikal to Sengalteri.
15th	„	.	at Sengalteri.
16th	„	.	all day Sengalteri to Kalkad ; all night Kalkad to Sermadevi.
17th	„	.	Sermadevi to Ambasamudram.
18th	„	.	Ambasamudram to Mundandurai
19th	„	.	at Mundandurai.
20th	„	.	Mundandurai to Kannikatti.
21st	„	.	at Kannikatti.
22nd	„	.	Kannikatti to Mundandurai.
23rd	„	.	Mundandurai to Ambasamudram.
24th	„	.	Ambasamudram to Madras.
25th	„	.	at Madras.
26th	„	.	left Madras.
27th	„	.	in the train.
28th	„	.	arrived in Calcutta.

The whole excursion occupied just three weeks, of which a little more than a week was spent in travelling from Calcutta to Tinnevelly and returning from Tinnevelly to Calcutta.

The writer is glad to end this brief attempt to give an account of the tour, which was at best but a hurried rush across the district, by expressing his and Mr. Hooper's obligations to Messrs. T. P. Peake and F. L. Brigstocke, the former the principal Forest Officer of the District, the latter the Sub-Divisional Officer at Sermadevi and also to the Forest Range Officers, who accompanied us in their respective ranges and did all in their power to make the trip comfortable.

PART II.

SYSTEMATIC CENSUS.

The accompanying systematic list includes all the plants collected during the excursion whether they are indigenous or introduced, wild or cultivated, and identified by the writer at the Calcutta Herbarium. New species or species not known to occur previously in Southern India and those not mentioned in the Flora of British India are distinguished by an* prefixed to them—the basis for the former having been taken from the existing examples in the Calcutta Herbarium. Throughout the list references have been given to Hooker's Flora of British India. The Intra-Indian Distribution of every species is given and is nearly always taken from specimens in the Calcutta Herbarium. The sequence of Bentham and Hooker's Genera Plantarum is chiefly followed and the species are arranged in alphabetical order under the respective genera. The writer is vastly indebted to Major A. T. Gage, I.M.S., Director, Botanical Survey of India, for having kindly examined and identified the several critical species forwarded to him while he remained at Kew and also for his kind encouragement throughout.

PHANEROGAMIA.

DICOTYLEDONES.

POLYPETALÆ.

THALAMIFLORÆ.

I.—RANUNCULACEÆ.

1. Clematis Linn.

1. *Clematis Gouriana* Roxb.—F. B. I., i, p. 4.
Sengalteri to Kalkad, 3,000 ft., No. 39213.
Distr. Himalaya to Ceylon, E. Peninsula.

2. Naravelia DC.

2. *Naravelia zeylanica* DC.—F. B. I., i, p. 7.
Mundandurai, 1,500 ft., No. 39373.
Distr. Tropical Himalaya, Bengal, Assam, East and West Peninsula.
Ceylon.

II.—MENISPERMACEÆ.

3. *Cissampelos* Linn.

3. *Cissampelos Pareira* Linn.—F. B. I., i, p. 103.
Mundandurai to Kannikatti, 2,400 ft., No. 39360.
Distr. Throughout India.

III.—CAPPARIDEÆ.

4. *Cleome* Linn.

4. *Cleome monophylla* Linn.—F. B. I., i, p. 168.
Papanasani to Mundandurai, No. 39282.
Distr. Peninsular India and Ceylon.

5. *Cadaba* Forsk.

5. *Cadaba trifoliata* W. & A.—F. B. I., i, p. 172.
Mundandurai, Nos. 39302, 39279.
Distr. Southern Districts of the Madras Presidency and Ceylon.

6. *Capparis* Linn.

6. *Capparis horrida* Linn.—F. B. I., i, p. 173.
Naterikal road, 1,000 ft., No. 38448.
Distr. Throughout India.

IV.—VIOLACEÆ.

7. *Viola* Linn.

7. *Viola distans* Wall.—F. B. I., i, p. 183.
Naterikal hill, 4,000 ft., No. 38543.
Distr. Mountainous parts of India generally.

This plant was found almost floating in fresh water on the hill-top in company with a *Cyperus* and *Laurembergia hirsuta*.

8. *Ionidium* Vent.

8. *Ionidium suffruticosum* Ging.—F. B. I., i, p. 185.
Sengalteri to Kalkad, No. 39255; Naterikal, No. 38437
Distr. Throughout India and Ceylon.

9. * *Ionidium travancoricum* Bedd. I.c. Pl. or. i, 55.
Sengalteri to Kalkad, 3,000 ft., No. 39217.
Distr. Apparently endemi to the Tinnevelly hills.

V.—BIXINEÆ.

9. *Scolopia* Schreb.

10. *Scolopia crenata* Clos.—F. B. I., i, p. 191.
Nardkhani shola, 2,000 ft., No. 38338.
Distr. Malabar, Mysore and Ceylon.

VI.—POLYGALEÆ.

10. *Polygala* Linn.

11. *Polygala javana* DC.—F. B. I., i, p. 201.
Naterikal road, 2,000 ft., No. 38412; Naterikal hill, No. 38493; Mundandurai, 700 ft., No. 39310.
Distr. Western Peninsula and Ceylon.
12. *Polygala arillata* Ham.—F. B. I., i, p. 200.
Naterikal, top of hill, 4,000 ft., No. 38536.
Distr. Eastern India, Western Peninsula, Ceylon.

11. *Xanthophyllum* Roxb.

13. *Xanthophyllum flavescens* Roxb.—F. B. I., i, p. 209.
Kannikatti, 2,500 ft., No. 39405.
Distr. East Bengal, Western Peninsula.

VII.—CARYOPHYLLEÆ.

12. *Polycarpæa* Lamk.

14. *Polycarpæa corymbosa* Lamk.—F. B. I., i, p. 245.
Sengalteri, 3,000 ft., No. 38699.
Distr. Throughout India generally.

VIII.—PORTULACEÆ.

13. *Portulaca* Linn.

15. *Portulaca oleracea* Linn.—F. B. I., i, p. 246.
Ambasamudram, No. 39439.
Distr. Nearly throughout India.

IX.—HYPERICINEÆ.

14. *Hypericum* Linn.

16. *Hypericum mysorense* Heyne.—F. B. I., i, p. 253.
Naterikal, No. 38497; Sengalteri, 3,000 ft., No. 38697
Distr. S. Peninsular India, Ceylon; common.

X.—GUTTIFERÆ.

15. *Garcinia* Linn.

17. **Garcinia echinocarpa* Thw.—F. B. I., i, p. 264.

Kannikatti, 2,500 ft., No. 39428.

Distr. Ceylon.

This record is interesting in the fact that the species is not entirely restricted to Ceylon but its distribution also extends to the Tinnevelly District.

18. *Garcinia Morella* Desr.—F. B. I., i, pp. 264-265.

Kannikatti, 2,500 ft., No. 39433.

Distr. East Bengal, Khasia, Eastern and Western Peninsulas.

16. *Calophyllum* Linn.

19. *Calophyllum inophyllum* Linn.—F. B. I., i, p. 273.

Tirukarungudi, No. 38323.

Distr. Eastern and Western Peninsulas, Ceylon.

This plant was also noticed several times in a cultivated state, near roads and dwelling houses. The seeds, the people informed us, afford excellent oil for burning lamps.

XI.—TERNSTROMIACEÆ.

17. *Gordonia* Ellis.

20. *Gordonia obtusa* Wall.—F. B. I., i, p. 291.

Naterikal, 3,000 ft., No. 38361; Sengalteri, near bungalow, 3,000 ft., No. 38694.

Distr. Mountains of the Western Peninsula.

A very common tree in this shola.

XII.—DIPTEROCARPEÆ.

18. *Balanocarpus* Bedd.

21. **Balanocarpus utilis* Bedd.

Mundandurai to Kannikatti, 1,700 ft., No. 39380.

Distr. Near Tinnevelly (Beddome).

Beddome in Flora. Sylvat. Gen. XXVII says of this species under *H. parviflora* Bedd. "my specimens from southern Tinnevelly where the tree is called *Nirkong* have longer and narrower leaves (5-7 inches long by 1-1½ inches broad) than the south Canara specimens,....". Afterwards Sir William Thiselton Dyer when writing up the account of the order *Dipterocarpeæ* for the Flora of British India, made the above quoted Tinnevelly specimens of Beddome to be the type of a new species and called it *Hopea longifolia* Dyer. As far as is known at present this species seems restricted only to South Tinnevelly.

XIII.—MALVACEÆ.

19. *Urena* Linn.

22. *Urena lobata* Linn.—F. B. I., i, p. 329.
Naterikal, 3,000 ft., No. 38367.
Distr. Throughout India generally.

20. *Pavonia* Cav.

23. *Pavonia zeylanica* Cav.—F. B. I., i, p. 331.
Naterikal road, 2,000 ft., No. 38462.
Distr. North-Western Provinces, Western Peninsula and Ceylon.
24. *Pavonia odorata* Willd.—F. B. I., i, p. 331.
Sengalteri to Kalkad, No. 39246.
Distr. North-Western Provinces, Western Peninsula, Burma and Ceylon.

21. *Hibiscus* Medik.

25. *Hibiscus micranthus* Linn.—F. B. I., i, pp. 335—336
Tirukarungudi, No. 38311.
Distr. Throughout India generally.
26. *Hibiscus canescens* Heyne.—F. B. I., i, p. 337.
Papanasam to Mundandurai, No. 39290.
Distr. Mysore and Southern Districts, Madras Presidency.
27. *Hibiscus angulosus* Mast.
var. *purpureus* Thw.—F. B. I., i, pp. 341-342.
Naterikal hill, 4,000 ft., Nos. 38350, 38526.
Distr. Southern Peninsular India and Ceylon.

XIV.—STERCULIACEÆ.

22. *Helicteres* Linn.

28. *Helicteres Isora* Linn.—F. B. I., i, p. 365.
Naterikal hill, 4,000 ft., No. 38461; Sengalteri to Kalkad, 2,000 ft., No. 39253.
Distr. Central India, Peninsular India and Ceylon. Abundant.

23. *Pterospermum* Schreb.

29. *Pterospermum Heyneanum* Wall.—F. B. I., i, p. 369.
Mundandurai to Kannikatti, 2,000 ft., No. 39383.
Distr. Mountains of the Western Peninsula.
30. *Pterospermum obtusifolium* Wight.—F. B. I., i, pp. 369-370.
Nardkhani shola, 2,000 ft., No. 38336.
Distr. Tinnevelly.
So far, this *Pterospermum* appears to be endemic in the Tinnevelly hills.

24. Waltheria Linn.

- 31. Waltheria indica** Linn.—F. B. I., i, pp. 374-375.
Naterikal hill, 4,000 ft., No. 38434.
Distr. Throughout India generally.

XV.—TILIACEÆ.**25. Grewia** Linn.

- 32. Grewia columnaris** Sm.—F. B. I., i, p. 383-384.
Sengalteri to Kalkad, No. 39242; Papanasam to Mundandurai,
No. 39287.
Distr. Bengal, Peninsular India, Ceylon.
- 33. Grewia tiliæfolia**, Vahl.—F. B. I., i, p. 386.
Nardkharni shola, 2,000 ft., No. 38342.
Distr. Western India, Peninsular India, Burma, Ceylon.

This identification must be regarded as tentative until complete material is obtained. The leaves are very large—scarcely the size given in the description. Our material consisted of leaves only.

26. Triumfetta Linn.

- 34. Triumfetta pilosa** Roth.—F. B. I., i, pp. 394-395.
Naterikal to Sengalteri, 3,500 ft., No. 38589.
Distr. Throughout India generally.
- 35. Triumfetta rhomboidea** Jacq.—F. B. I., i, p. 395.
Naterikal to Sengalteri, 3,500 ft., No. 38652.
Distr. Throughout India generally.

27. Leptonychia Turcz.

- 36. Leptonychia moacurroides** Bedd.—F. B. I., i, p. 379.
Kannikatti, 2,500 ft., No. 39427.
Distr. Travancore and Tinnevelly.
Probably restricted to this region.

DISCIFLORÆ.

XVI.—LINEÆ.**28. Hugonia** Linn.

- 37. Hugonia Mystax** Linn.—F. B. I., i, p. 413.
Naterikal road, 2,000 ft., No. 38471.
Distr. Peninsular India and Ceylon.

29. Erythroxylon Linn.

- 38. *Erythroxylon lucidum**
- Moon.—F. B. I., i, p. 415.

Kannikatti, 2,300 ft., No. 39403.

Distr. Ceylon.

Not previously recorded from Southern India.

- 39. Erythroxylon monogynum**
- Roxb.—F. B. I., i, p. 414.

Mundandurai, 700 ft., No. 39308.

Distr. Southern Peninsular India and Ceylon.

XVII.—GERANIACEÆ.**30. Biophytum** De Cand.

- 40. Biophytum sensitivum**
- DC., var. 1,
- Candolleana*
- ,—F. B. I., pp. 436-437.

Sengalteri to Kalkad, 3,000 ft., No. 39220.

Distr. South-West Peninsula and Ceylon.

31. Impatiens Linn.

- 41. Impatiens Balsamina**
- Linn. var ?—F. B. I., i, p. 454.

Naterikal, 2-3,000 ft., No. 38393.

I am a little doubtful about the variety under which this is to be placed.

The material is insufficient for fixing definitely the variety.

- 42. Impatiens grandis**
- Heyne—F. B. I., i, p. 463.

Naterikal to Sengalteri, 3,500 ft., No. 38656.

Distr. Mountains of Malabar and Tinnevelly.

- 43. *Impatiens subcordata**
- Arn.—F. B. I., i, pp. 461-462.

Naterikal to Sengalteri, 3,500 ft., Nos. 38598, 38611.

Distr. Ceylon.

This is yet one more instance of a Peninsular distribution for a Ceylon Plant.

XVIII.—RUTACEÆ.**32. Toddalia** Juss.

- 44. Toddalia aculeata**
- Pers.—F. B. I., i, p. 497.

Naterikal, Nos. 38375, 38638. Mundandurai, No. 39334.

Distr. Throughout India generally.

33. Acronychia Forst.

- 45. Acronychia laurifolia**
- Bl.—F. B. I., i, p. 498.

Naterikal, 4,000 ft., No. 38544.

Distr. Throughout India generally.

- 34. *Glycosmis* Corr.

46. *Glycosmis pentaphylla* Corr.—F. B. I., i, pp. 499-500.
Mundandurai, 700 ft., No. 39322; Kannikatti, 2,500 ft., No. 39423.
Distr. Throughout India generally.

35. *Atalantia*, Corr.

47. *Atalantia monophylla* Corr.—F. B. I., i, pp. 511-512.
Naterikal, No. 38451.
Distr. Silhet, Peninsular India and Ceylon.

36. *Citrus* Linn.

48. *Citrus decumana* Linn.—F. B. I., i, pp. 516.
Naterikal, No. 38379.
Distr. Cultivated in India—a native of the Malayan and Polynesian Islands.

XIX.—BURSERACEÆ.

37. *Filicium* Thw.

49. *Filicium decipiens* Thw.—F. B. I., i, pp. 539-540.
Sengalteri, 3,000 ft., No. 39211.
Distr. South-West Peninsula and Ceylon.

XX.—MELIACEÆ.

38. *Aglaia* Lour.

50. *Aglaia Roxburghiana* Miq.—F. B. I., i, p. 555.
Mundandurai, 700 ft., No. 39322; Kannikatti, 2,000 ft., No. 39431.
Distr. Western Peninsula, Ceylon and Singapore.

51. *Aglaia* sp. aff. *apiocarpa* Hiern.

Naterikal to Sengalteri, 3,500 ft., No. 38670.

This differs from the Ceylon species *A. apiocarpa* in its narrower 7-9 leaflets with strongly involute margins, its less dense panicle (male rather lax, flowers being distinctly pedicellate, hermaphrodite very dense, flowers being almost sessile) and its miniature gourd-shaped non-apiculate rough, brown, lepidote fruit.

A moderate sized tree, extremities of young shoots covered very densely with dark-brown scales. *Leaves* unequally pinnate, leaflets 7-9 unequally elliptic, acute, base cuneate, densely lepidote beneath, margins strongly folded inwards. *Panicle* shorter than the leaves, sometimes supra-axillary, with short spreading branches, male lax, hermaphrodite very dense.

Flowers as long as the pedicels, bracteolate.

Calyx 5 lobed, lobes hairy and minutely ciliolate.

Petals 5 concave, short, imbricate, slightly glandular at the apex.

Staminal tube subglobose, shallowly 5 lobed.

Anthers 5, just above the sinuses between the lobes, half-exserted, erect, hairy.

Ovary globose, ferruginous hairy, 1 celled, style very short, almost obsolete.

Stigma capitate. *Berry* dry, 1 seeded, rough, dirty-brown, gourd-shaped.

Seed solitary. *Testa* smooth.

Some specimens exactly matching this were already existing in Herb. Calc. doubtfully under *A. minutiflora* *Bedd.* But on examination I think they are not *A. minutiflora* *Bedd.* but may be the present species.

39. *Walsura* Roxb.

52. *Walsura piscidia* Roxb.—F. B. I., i, p. 564.

Nardkani shola, 2,000 ft., No. 38328.

Distr. Peninsular India and Ceylon.

40. *Cedrela* Linn.

53. *Cedrela Toona* Roxb.—F. B. I., i, pp. 568-569.

Nardkhani shola ; 2,000 ft., No. 38344.

Distr. Throughout India generally,

41. *Chloroxylon* DC.

54. *Chloroxylon Swietenia* DC.—F. B. I., i, p. 569.

Nardkhani, 2,000 ft., No. 38339 ; Naterikal road, 4,000 ft., No. 38480.

Distr. Western Peninsula and Ceylon.

XXI.—OLACINEÆ.

42. *Erythralum* Blume.

55. *Erythralum populifolium* Mast.—F. B. I., i, p. 578.

Kannikatti, 2,500 ft., No. 39414.

Distr. South Malabar, Travancore, Anaimalai hills and Ceylon.

43. *Pyrenacantha* Hook.

56. **Pyrenacantha volubilis* Hook.

Sengalteri to Kalkad, No. 39271 ; Mundandurai, 700 ft., No. 39345.

Distr. Madura and Ceylon.

This Ceylon plant was sent by Dr. (now Sir) A. G. Bourne to the Calcutta Herbarium as having been found in Madura in 1898 and latterly by Mr. C. E. C. Fischer in 1911, collected in the same district.

The Natural order to which this genus belongs remained unsettled for a long time, but I have followed Dr. Trimen in putting it under *Olacineæ*.

This very singular genus is peculiar in having its endosperm perforated with holes to accommodate the internal spines of the endocarp.

XXII.—CELASTRINEÆ.

44. *Euonymus* Linn.

57. *Euonymus* sp. aff. *indicus* Heyne.
Naterikal, 4,000 ft., No. 38525.
Not quite matched at Calcutta.

XXIII.—RHAMNEÆ.

45. *Ventilago* Gaertn.

58. *Ventilago madraspatana* Gaertn.—F. B. I., i, p. 631.
Mundandurai, 700 ft., No. 39327.
Distr. Peninsular India, Lower Burma and Ceylon.

46. *Zizyphus* Juss.

59. *Zizyphus Oenoplia* Mill.—F. B. I., i, p. 634.
Naterikal road, below 1,000 ft., No. 38468; Naterikal, No. 38470.
Distr. Throughout India generally.
60. *Zizyphus rugosa* Lamk.—F. B. I., i, p. 636-637.
Naterikal 2,000 ft., No. 38,417; Naterikal road, 1,000 ft., No. 38482.
Distr. Tropical Himalaya, Eastern India, Peninsular India and Ceylon.

47. *Gouania* Linn.

61. *Gouania microcarpa* DC.—F. B. I., i, p. 643.
Naterikal to Sengalteri, 3,500 ft., No. 38630.
Distr. Southern Peninsular India, Pegu, Ceylon.

XXIV.—AMPELIDEÆ.

48. *Vitis* Linn.

62. *Vitis tenuifolia* W. & A.—F. B. I., i, p. 660.
Naterikal to Sengalteri, 3,500 ft., Nos. 38617, 38642.
Distr. Nearly throughout India.
63. *Vitis quadrangularis* Wall.—F. B. I., i, p. 645.
Naterikal road; below 1,000 ft., No. 38465.
Distr. Throughout India generally.
64. *Vitis setosa* Wall.—F. B. I., i, p. 654.
Tirukarungudi, No. 38303; Naterikal road, No. 38475.
Distr. Madras Presidency.

49. *Leea* Linn.

- 65. *Leea sambucina* Willd.**—F. B. I., i, pp. 666-667.
Mundandurai to Kannikatti, 2,000 ft., No. 39397.
Distr. Throughout India generally.

XXV.—SAPINDACEÆ.**50. *Cardiospermum* Linn.**

- 66. *Cardiospermum canescens* Wall.**—F. B. I., i, p. 670.
Naterikal, 2,000 ft., No. 38433.
Distr. Upper Burma, South Peninsular India.

51. *Allophylus* Linn.

- 67. *Allophylus* Cobbe Bl.**—F. B. I., i, p. 673.
Mundandurai, 700 ft., No. 39321.
Distr. Throughout generally the plains of India.

52. *Sapindus* Plum.

- 68. *Sapindus trifoliatus* Linn.**—F. B. I., i, pp. 682-683.
Mundandurai, 700 ft., No. 39341.
Distr. South Peninsular India.—(The Soap-nut).

53. *Nephelium* Linn.

- 69. *Nephelium Longana* Camb.**—F. B. I., i, pp. 688-689.
Nardkani shola, 2,000 ft., No. 38330.
Distr. Bengal, Pegu, Peninsular India and Ceylon.

54. *Dodonæa* Linn.

- 70. *Dodonæa viscosa* Linn.**—F. B. I., i, pp. 697.
Tirukarungudi, Below 1,000 ft., No. 38490.
Distr. Throughout India generally.

XXVI.—ANACARDIACEÆ.**55. *Mangifera* Linn.**

- 71. *Mangifera indica* Linn.**—F. B. I., ii, pp. 13-14.
Naterikal, 3,000 ft., No. 38489.
Distr. Throughout India generally.

56. *Buchanania* Roxb.

- 72. *Buchanania latifolia* Roxb.**—F. B. I., ii, p. 23.
Sengalteri to Kalkad, No. 39243.
Distr. Throughout India generally.

57. Spondias Linn.

- 73. Spondias mangifera** Willd.—F. B. I., ii, p. 42.
Nardkhani 2,000 ft., No. 38329.
Distr. Throughout India generally.

CALYCIFLORÆ.

XXVII.—CONNARACÆ.**58. Connarus Linn.**

- 74. Connarus Wightii**, Hook. f.—F. B. I., ii, p. 51.
Kannikatti, near bungalow, 2,200 ft., No. 39387.
Distr. North Kanara and probably Travancore.

XXVIII.—LEGUMINOSÆ.**59. Crotalaria Linn.**

- 75. Crotalaria albida** Heyne.—F. B. I., ii, p. 71.
Naterikal road, 3,000 ft., No. 38478; Sengalteri, near bungalow,
3,000 ft., No. 38700.
Distr. Throughout India generally.
- 76. Crotalaria calycina** Schrank.—F. B. I., ii, pp. 72-73.
Sengalteri to Kalkad, No. 39236; Naterikal, No. 38394.
Distr. Throughout India.
- 77. Crotalaria prostrata** Roxb.—F. B. I., ii, p. 67.
Naterikal, 2,000 ft., No. 38389.
Distr. Plains from Ganges to Ceylon.
- 78. Crotalaria verrucosa** Linn.—F. B. I., ii, p. 77.
Naterikal, Nos. 38436, 38443.
Distr. Throughout India generally.

60. Indigofera Linn.

- 79. Indigofera aspalathoides** Vahl.—F. B. I., ii, p. 94.
Tirukarungudi, No. 38319.
Distr. Plains of Southern Peninsular India and Ceylon.
- 80. Indigofera glandulosa** Willd.—F. B. I., ii, p. 94.
Sengalteri to Kalkad, 3,000 ft., No. 39230.
Distr. Plains of S. W. India.
- 81. Indigofera pentaphylla** Linn.—F. B. I., ii, p. 95.
Naterikal, No. 38390.
Distr. Throughout India generally.

- 82. *Indigofera pulchella* Roxb.**—F. B. I., ii, p. 101.
Sengalteri to Kalkad, No. 39222.
Distr. Throughout India.
- 83. *Indigofera tenuifolia* Rottl.**—F. B. I., ii, p. 95.
Naterikal, No. 38388.
Distr. South Peninsular India and Ceylon.
- 84. *Indigofera tinctoria* Linn.**—F. B. I., ii, p. 99.
Sengalteri to Kalkad, No. 39238.
Distr. Cultivated. Baker in the Flora of British India says that it is doubtful whether it is truly wild.

61. *Tephrosia* Pers.

- 85. *Tephrosia purpurea* Pers. var. *pumila*,** F. B. I., ii, p. 113.
Mundandurai, 700 ft., No. 39346.
Distr. Throughout India.
- 86. *Tephrosia tinctoria* Pers.**—F. B. I., ii, p. 111.
Naterikal, No. 38416.
Distr. Southern Peninsular India and Ceylon.
- 87. *Tephrosia villosa* Pers.**—F. B. I., ii, p. 113.
Naterikal road, 2,000 ft., No. 38426.
Distr. Plains of India.

62. *Zornia* Gmel.

- 88. *Zornia diphylla* Pers.**—F. B. I., ii, p. 147.
Mundandurai, 700 ft., No. 39309.
Distr. Plains of India.

63. *Pycnospora* R. Br.

- 89. *Pycnospora hedysaroides* R. Br.**—F. B. I., ii, p. 153.
Sengalteri to Kalkad, No. 39231.
Distr. Khasia, Lower Burma, Peninsular India and Ceylon.

64. *Pseudarthria* W. & A.

- 90. *Pseudarthria viscida* W. & A.**—F. B. I., p. 154.
Sengalteri to Kalkad, No. 39237.
Distr. Central India, West and South India, Burma, Malay Archipelago.

65. *Alysicarpus* Neck.

- 91. *Alysicarpus rugosus* DC.**—F. B. I., ii, p. 159.
Naterikal road, below 1,000 ft., No. 38467.
Distr. Himalayas to Ceylon and Burma.

66. Desmodium Desv.

- 92. Desmodium gangeticum** DC.—F. B. I., ii, p. 168.
Sengalteri to Kalkad, No. 39232.
Distr. Throughout India.
- 93. Desmodium latifolium** DC.—F. B. I., ii, pp. 168-169.
Naterikal, 4,000 ft., No. 38415 ; Naterikal road, 2,000 ft., No. 38477.
Distr. Throughout India.
- 94. Desmodium polycarpum** DC.—F. B. I., ii, p. 171.
Naterikal to Sengalteri, 3,500 ft., No. 38596.
Distr. Throughout India.
- 95. Desmodium Scalpe** DC.—F. B. I., ii, pp. 165-166.
Naterikal hill ; 4,000 ft., No. 38514.
Distr. Hills of S. Peninsular India and Ceylon.

67. Abrus Linn.

- 96. Abrus precatorius** Linn.—F. B. I., ii, p. 175.
Sengalteri to Kalkad, No. 39267.
Distr. Throughout India.

68. Glycine Linn.

- 97. Glycine Javanica** Linn.—F. B. I., ii, p. 183.
Sengalteri to Kalkad, No. 39233.
Distr. Peninsular India and Ceylon.

69. Teramnus Sw.

- 98. Teramnus labialis** spreng.—F. B. I., ii, p. 184.
Tirukarungudi, No. 38312.
Distr. Plains of India.

70. Mucuna Adans.

- 99. Mucuna atropurpurea** DC.—F. B. I. ii, p. 186.
Sengalteri to Kalkad, No. 39278.
Distr. S. Peninsular India and Ceylon.

71. Erythrina Linn.

- 100. Erythrina indica** Lamk.—F. B. I., ii, p. 188.
Mundandurai to Kannikatti, No. 39391.
Distr. Throughout India.

72. Galactia Br.

- 101. Galactia tenuiflora** W. & A.—F. B. I., ii, p. 192.
Sengalteri, 3,000 ft., No. 38689.
Distr. Throughout India generally.

73. Canavalia DC.

102. Canavalia ensiformis DC. Var. virosa.—F. B. I., ii, p. 196 — *C. virosa* W. & A.

Naterikal at the foot of the hills, 1,000 ft., No. 38446 ; Papanasam to Mundandurai, No. 39295.

Distr. E. Himalaya to Ceylon.

Not a good sp.—but probably the wild form of the cultivated plant.

74. Phaseolus Linn.

103. *Phaseolus sublobatus Roxb. var. grandiflora.—F. B. I., ii, p. 203.

Naterikal to Sengalteri, 3,500 ft., No. 38608.

This variety was previously recorded from L. Burma and Malay Archipelago only. It is however new to this area.

104. Phaseolus trilobus Ait.—F. B. I., p. 201-202.

Sengalteri to Kalkad, No. 39235.

Distr. Throughout India generally.

75. Clitoria Linn.

105. Clitoria Ternatea Linn.—F. B. I., ii, p. 208.

Tirukarungudi, No. 38316.

Distr. Throughout India and Ceylon.

76. Dolichos Linn.

106. Dolichos biflorus Linn.—F. B. I., ii, p. 210.

Naterikal, 2,000 ft., No. 38430 ; Naterikal hill, 4,000 ft., No. 38504.

Distr. Throughout India.

107. Dolichos falcatus Klein.—F. B. I., ii, p. 211.

Mundandurai, 700 ft., Nos. 39347, 39311.

Distr. From Kumaon to Khasia, Western Peninsula and Ceylon.

77. Atylosia W. & A.

108. Atylosia scarabæoides Benth.—F. B. I., ii, p. 215.

Naterikal road, 2,000 ft., No. 38406.

Distr. Plains of India.

78. Dunbaria W. & A.

109. Dunbaria ferruginea W. & A.—F. B. I., ii, p. 217.

Naterikal, 3-4,000 ft., No. 38441.

Distr. Peninsular India and Ceylon.

79. *Rhynchosia* Lour.

110. *Rhynchosia cana* DC.—F. B. I., ii, p. 222.
Sengalteri to Kalkad, No. 39252.
Distr. Peninsular India and Ceylon.
111. *Rhynchosia rufescens* DC.—F. B. I., ii, p. 220.
Naterikal hill, 4,000 ft. ; No. 38460 ;
Distr. Peninsular India and Ceylon, Khasia hills.
112. *Rhynchosia viscosa* DC.—F. B. I., ii, p. 225.
Papanasam to Mundandurai, No. 39286.
Distr. Peninsular India and Ceylon.

80. *Dalbergia* Linn. f.

113. * *Dalbergia coromandeliana* Prain—in Journ. Asiat. Soc. Beng. lxx., 2, 60 (1901).
Mundandurai, 700 ft., No. 39435.
This differs from Sir David Prain's description in the Annals of the Royal Botanic garden, Calcutta, x, p. 46, merely in its recurved cyme-branches being longer. Apart from this, I could see no other essential difference.
Distr. Shevagiri hills.
Not previously recorded from the Tinnevelly District.
114. *Dalbergia latifolia* Roxb.—F. B. I., ii, p. 231.
Nardkhani, 2,000 ft., No. 38347,
Distr. Sikkim, Behar and Peninsular India.

81. *Pterocarpus* Linn.

115. *Pterocarpus Marsupium* Roxb.—F. B. I., ii, p. 239.
Nardkhani, 2,000 ft., No. 38346 ; Naterikal, 4,000 ft., No. 38420.
Distr. Plains of the Western Peninsula and Ceylon.
116. *Pterocarpus* sp. or *Dialium* sp.
Nardkhani, 2,000 ft., No. 38343.
A rather peculiar tree with caudate-acuminate leaflets. Specimens are without flowers and fruits. Not matched in Herb. Calc.

82. *Derris* Lour.

117. *Derris scandens* Benth.—F. B. I., ii, p. 240.
Mundandurai, 700 ft., No. 39304.
Distr. Throughout India generally.

83. *Cassia* Linn.

118. *Cassia Absus* Linn.—F. B. I., ii, pp. 265-266.
Sengalteri to Kalkad, No. 39270.
Distr. Throughout India generally.

119. *Cassia auriculata* Linn.—F. B. I., ii, p. 263.

Naterikal road, below 1,000 ft., No. 38455; Mundandurai, 700 ft.
No. 39300.

Distr. The Central Provinces, Peninsular India and Ceylon.

84. *Bauhinia* Linn.**120. *Bauhinia malabarica* Roxb.—F. B. I., ii, p. 277.**

Mundandurai, 700 ft., No. 39326.

Distr. Throughout India generally.

121. *Bauhinia tomentosa* Linn.—F. B. I., ii, p. 275.

Sengalteri to Kalkad, No. 39272; Papanasam to Mundandurai, No. 39288; Naterikal, 4,000 ft., No. 38440.

Distr. Throughout India generally.

85. *Dichrostachys* DC.**122. *Dichrostachys cinerea* W. & A.—F. B. I., ii, p. 288.**

Naterikal road, above 1,000 ft., No. 38431.

Distr. North-West Provinces, Western Peninsula and Ceylon.

86. *Mimosa* Linn.**123. *Mimosa pudica* Linn.—F. B. I., ii, p. 291.**

Tirukarungudi, No. 38321.

Distr. Hotter parts of India. Abundant.

87. *Acacia* Willd.**124. *Acacia Intsia* Willd.—F. B. I., ii, p. 297.**

Mundandurai, 700 ft., No. 39301.

Distr. Throughout India generally.

125. *Acacia Latronum* Willd.—F. B. I., ii, p. 296.

Tirukarungudi to Naterikal, below 1,000 ft., No. 38484.

Distr. S. W. Peninsular India.

This is, in all probability, a myrmecophilous plant.

126. *Acacia pennata* Willd.—F. B. I., ii, p. 297.

Naterikal, No. 38396.

Distr. Throughout India generally.

88. *Albizzia* Durazz.**127. *Albizzia amara* Boiv.—F. B. I., ii, p. 301.**

Road near Tirukarungudi, 1,000 ft., No. 38466.

Distr. S. Peninsular India and Ceylon.

128. *Albizzia odoratissima* Benth.—F. B. I., ii, p. 299.

Nardkhani shola, 2,000 ft., No. 38327.

Distr. Throughout India generally.

89. Pithecolobium Mart.

129. *Pithecolobium subcoriaceum* Thw.—F. B. I., ii, p. 305.

Naterikal to Sengalteri, 3,500 ft., No. 38666.

Distr. S. Peninsular India : Anaimalai hills and Ceylon.

XXIX.—ROSACEÆ.**90. Rubus Linn.**

130. Rubus ellipticus Smith.—F. B. I., ii, p. 336.

Naterikal, 3-4,000 ft., No. 38358.

Distr. Throughout India generally.

131. Rubus lasiocarpus Smith.—F. B. I., ii, p. 339.

Naterikal 3,000 ft., No. 38357.

Distr. Throughout India generally.

132. Rubus moluccanus Linn.—F. B. I., ii, p. 330.

Naterikal, 4,000 ft., No. 38541.

Distr. Throughout India generally.

Very common.

XXX.—CRASSULACEÆ.**91. Kalanchoe Adans.**

133. Kalanchoe floribunda W. & A.—F. B. I., ii, pp. 414-415.

Naterikal, No. 38382.

Distr. Mountains of Peninsular India.

This was seen as a dense patch in only one place.

XXXI.—HALORAGÆÆ.**92. Laurembergia Berg.**

134. * Laurembergia hirsuta (W. & A.) Schindler in Das Pflanzenreich IV 225, p. 65.

Naterikal, along the banks of streams in water 4,000 ft., No. 38550.

Distr. S. Indian hills ; Nilgiri hills.

I have followed Schindler in adopting the name *Laurembergia* instead of *Serpicula*. In the Flora of British India, presumably two different species are included under *Serpicula indica* Thw.

XXXII.—COMBRETACEÆ.**93. Terminalia Linn.**

135. Terminalia Chebula Retz.—F. B. I., ii, p. 446.

Sengalteri, near Bungalow, 3,000 ft., No. 38691.

Distr. Throughout India.

94. Anogeissus Wall.

136. Anogeissus latifolia Wall.—F. B. I., ii, p. 450.

Nardkhani, 2,000 ft., No. 38348 ; Naterikal, near coffee estate, 3,000 ft., No. 38438.

I may add as a diagnostic character to this species that there are nearly always two or more glands on the under surface of the leaf at about the centre of the lamina

XXXIII.—MYRTACEÆ.**95. Psidium Linn.**

137. Psidium Guyava Linn.—F. B. I., ii, p. 468.

Kannikatti, near Bungalow, 2,500 ft., No. 39388.

Distr. Probably planted.

96. Myrtus Tournef.

138. Myrtus communis Linn.—F. B. I., ii, p. 462 (name only).

Naterikal to Sengalteri, 3,500 ft., No. 38634.

Distr. A medicinal plant, probably grown, or here found as an escape.

97. Eugenia Linn.

139. Eugenia Jambolana Lamk.—F. B. I., ii, p. 499.

Nardkhani shola, 2,000 ft., No. 38335.

Distr. Throughout India generally.

XXXIV.—MELASTOMACEÆ.**98. Osbeckia Linn.**

140. Osbeckia aspera Bl.—F. B. I., ii, p. 519.

Naterikal, 4,000 ft., No. 38539.

Distr. S. Peninsular India and Ceylon.

141. Osbeckia cupularis Don.—F. B. I., ii, p. 514.

Naterikal, 4,000 ft., No. 38520.

Distr. Mountains of Peninsular India and Ceylon.

142. Osbeckia octandra DC.—F. B. I., ii, p. 521.

Naterikal, 4,000 ft., No. 38517.

Distr. Travancore, Tinnevelly, Nilgiri hills and Ceylon.

143. Osbeckia Wightiana Benth.—F. B. I., ii, p. 519.

Sengalteri to Kalkad, No. 39257.

Distr. S. Peninsular Indian mountains.

144. Osbeckia zeylanica Willd.—F. B. I., ii, p. 516.

Mundandurai, 700 ft., No. 39340 ; Kannikatti, 1,700 ft., No. 39396.

Distr. Malabar and Ceylon.

99. Sonerila.

145. *Sonerila grandiflora* Wall.—F. B. I., ii, p. 535.

Naterikal, 4,000 ft., No. 38518; Naterikal to Sengalteri, 3,500 ft., No. 38616.

146. *Sonerila* sp. aff. *travancorica* Bedd.—F. B. I., ii, p. 534.

Naterikal, 3,500 ft., No. 38588; Naterikal to Sengalteri, 3,500 ft., No. 38612.

147. *Sonerila* sp. aff. *versicolor* Wt.—F. B. I., ii, p. 535.

Kannikatti, 2,500 ft., No. 39424.

The material in the Calcutta Herbarium is too inadequate for accurate identification of the species.

100. Memecylon Linn.

148. *Memecylon terminale* Dalz.—F. B. I., ii, pp. 558-559.

Naterikal to Sengalteri, 3,500 ft., No. 38662.

Distr. Southern mountains of the Peninsula.

XXXV.—LYTHRACEÆ.**101. Ammannia Linn.**

149. *Ammannia cordata* W. & A.—F. B. I., ii, p. 570.

Mundandurai, 700 ft., Nos. 39299 and 39351.

Distr. Peninsular India and Ceylon.

150. *Ammannia pentandra* Roxb.—F. B. I., ii, p. 568

Mundandurai, 700 ft., No. 39352,

Distr. Throughout Tropical India.

XXXVI.—ONAGRACEÆ.**102. Ludwigia Linn.**

151. *Ludwigia parviflora* Roxb.—F. B. I., ii, p. 586.

Mundandurai, 700 ft., No. 39354

Distr. Throughout India.

XXXVII.—SAMYPDACEÆ.**103. Casearia Jacq.**

152. *Casearia esculenta* Roxb.—F. B. I., ii, p. 592.

Sengalteri, near Bungalow, 3,000 ft., No. 38698.

Distr. S. Peninsular India, Ceylon and L. Burma.

104. Homalium Jacq.**153. Homalium travancoricum** Bedd.—F. B. I., ii, p. 598.

Naterikal, above waterfall, 2,000 ft., No. 38421.

Distr. Endemic in Travancore and Tinnevelly hills.

There were no examples of this in the Calcutta Herbarium and I am indebted to Major Gage for kindly confirming my identification at Kew.

XXXVIII.—PASSIFLOREÆ.**105. Passiflora. Linn.****154. Passiflora Leschenaultii** DC.—F. B. I., ii, p. 599.

Naterikal to Sengalteri, 3,500 ft., No. 38595.

Distr. Pulney hills, Nilgiri hills and Khasia.

106. Modecca Lamk.**155. Modecca palmata** Lamk.—F. B. I., ii, p. 603.

Mundandurai, 700 ft., No. 39305.

Distr. S. Peninsular India and Ceylon.

XXXIX.—CUCURBITACEÆ.**107. Trichosanthes Linn.****156. Trichosanthes lobata** Roxb.—F. B. I., ii, p. 610.

Naterikal to Sengalteri, 3,500 ft., No. 38593.

Distr. Peninsular India.

108. Momordica Linn.**157. Momordica dioica** Roxb.—F. B. I., ii, p. 617.

Mundandurai, 700 ft., Nos. 39306, 39313.

Distr. Throughout India.

109. Citrullus Schrad.**158. Citrullus Colocynthis** Schrad.—F. B. I., ii, p. 620.

Tirukarungudi, Nos. 38308, 38313.

Distr. Throughout India—often wild.

110. Cephalandra Schrad.**159. Cephalandra indica** Naud.—F. B. I., ii, p. 621.

Tirukarungudi, Nos. 38305, 38306.

Papanasam to Mundandurai, No. 39283.

Distr. Throughout India.

111. Bryonia Linn.

- 160. Bryonia laciniosa** Linn.—F. B. I., ii, pp. 622-623.
Naterikal, 4,000 ft., No. 38557.
Distr. Throughout India.

112. Zehneria Endl.

- 161. Zehneria Hookeriana** Arn.—F. B. I., ii, p. 624.
Naterikal, 4,000 ft., No. 38555.
Distr. North Bengal, Peninsular India and Ceylon.

XL.—BEGONIACEÆ.

As the Calcutta material of this order is anything but complete, I sent the six numbers I collected to Major Gage at Kew for favour of determination. A list of the identifications is not yet available. There might in all probability be three or four species of *Begonia*.

113. Begonia.**XLI.—FICOIDEÆ.****114. Mollugo Linn.**

- 162. Mollugo stricta** Linn.—F. B. I., ii, p. 663.
Naterikal, 3,000 ft., No. 38401 ; Mundandurai No. 39318.
Distr. Throughout India.

XLII.—UMBELLIFERÆ.**115. Hydrocotyle Linn.**

- 163. Hydrocotyle javanica** Thunb.—F. B. I., ii, p. 667.
Naterikal to Sengalteri, 3,500 ft., No. 38590.
Distr. Nearly throughout India.

116. Bupleurum Linn.

- 164. Bupleurum mucronatum** W. & A.—F. B. I., ii, p. 676.
Naterikal, 4,000 ft., No. 38496 ; Sengalteri, 3,000 ft., No. 39210.
Distr. S. Peninsular India and Ceylon mountains.

117. Pimpinella Linn.

- 165. Pimpinella Heyneana** Wall.—F. B. I., ii, p. 682.
Sengalteri to Kalkad, No. 39240.
Distr. Peninsular India and Ceylon.

118. *Heracleum* Linn.

- 166. *Heracleum Sprengelianum* W. & A.—F. B. I., ii, p. 716.**
Sengalteri, 3,500 ft., No. 38696.
Distr. S. Peninsular Indian hills.

XLIII.—CORNACEÆ.**119. *Alangium* Lamk.**

- 167. *Alangium Lamarckii* Thw.—F. B. I., ii, p. 741.**
Tirukarungudi, No. 38322,
Distr. Throughout India.
Very common round the village.

GAMOPETALÆ.**XLIV.—RUBIACEÆ.****120. *Hymenodictyon* Wall.**

- 168. *Hymenodictyon excelsum* Wall.—F. B. I., iii, p. 35.**
Papanasam to Mundandurai, No. 39280.
Distr. Dry hills throughout India generally.

121. *Wendlandia* Bartl.

- 169. *Wendlandia Notoniana* W. & A.—F. B. I., iii, p. 40.**
Naterikal, No. 38583,
Distr. S. Peninsular Indian hills and Ceylon.

122. *Neurocalyx* Hook.

- 170. *Neurocalyx Wightii* Arn.—F. B. I., iii, p. 47.**
Kannikatti, 2,500 ft., No. 39429.
Distr. S. Peninsular Indian hills and Ceylon.

123. *Hedyotis* Linn.

- 171. *Hedyotis albo-nervia* Bedd.—F. B. I., iii, p. 55.**
Naterikal, 4,000 ft., Nos. 38523, 38535.
Distr. Tinnevelly and Travancore hills.
- 172. *Hedyotis purpurascens* Bedd.—F. B. I., iii, p. 50.**
Sengalteri to Kalkad, No. 39258 ; Naterikal, 4,000 ft., No. 38521.
Distr. Tinnevelly and Travancore Mts.
- 173. *Hedyotis viscida* Bedd.—F. B. I., iii, p. 57.**
Naterikal, 4,000 ft., Nos. 38355, 38373 ; Sengalteri, in beds of streams,
3,500 ft., Nos. 38628, 38693.
Distr. Tinnevelly hills.
The leaves appear to be extremely variable, from linear lanceolate to broadly-ovate.

124. Oldenlandia Linn.

- 174. Oldenlandia Heynei** Br.—F. B. I., iii, p. 65.
Sengalteri, 3,000 ft., No. 39212 ; Papanasam to Mundandurai, No. 39284.
Distr. Throughout India except E. Himalaya.
- 175. Oldenlandia umbellata** Linn.—F. B. I., iii, p. 66.
Naterikal, No. 38453.
Distr. Peninsular India and Ceylon.

125. Anotis DC.

- 176. Anotis Leschenaultiana** W. & A.—F. B. I., iii, p. 72.
Naterikal, 4,000 ft., No. 38512.
Distr. Mountains of S. W. Peninsula.

126. Ophiorrhiza Linn.

- 177. Ophiorrhiza Mungos** Linn.—F. B. I., iii, p. 77.
Naterikal to Sengalteri, 3,500 ft., No. 38597.
Distr. Throughout India generally.
- 178. Ophiorrhiza Roxburghiana** Wight.—F. B. I., iii, p. 81.
Naterikal to Sengalteri, 3,500 ft., No. 38619. —
Distr. Pulney hills.
An interesting extension of Geographical distribution.

127. Mussaenda Linn.

- 179. Mussaenda frondosa** Linn.—var. F. B. I., iii, p. 89.
Naterikal, 4,000 ft., Nos. 38556, 38580 ; Mundandurai to Kannikatti,
2,000 ft., No. 39375.
Distr. Throughout India generally.

128. Acranthera Arn.

- 180. Acranthera grandiflora** Bedd.—F. B. I., iii, p. 93.
Naterikal to Sengalteri, 3,500 ft., No. 38591.
Distr. Tinnevelly.

129. Webera Schreb.

- 181. Webera corymbosa** Willd.—F. B. I., iii, p. 102.
Mundandurai, 700 ft., No. 39328.
Distr. Peninsular India and Ceylon.

130. Randia Linn.

- 182. Randia dumetorum** Lamk.—F. B. I., iii, p. 110.
Tirukarangudi to Naterikal, below 1,000 ft., No. 38459.
Distr. Throughout India generally.

131. Knoxia Linn.

- 183. Knoxia Wightiana** Wall.—F. B. I., iii, pp. 129-130.
Sengalteri, 3,000 ft., No. 39204.
Distr. Nilgiri hills.

132. Canthium Lamk.

- 184. Canthium umbellatum** Wight—F. B. I., iii, pp. 132-133.
Nardkhani shola, 2,000 ft., No. 38326.
Distr. Peninsular India and Lower Burma.

133. Ixora Linn.

- 185. Ixora brachiata** Roxb.—F. B. I., iii, p. 142.
Nardkhani shola, 2,000 ft., No. 38331.
Distr. Peninsular India, on the W. Ghats.
- 186. * Ixora undulata** Roxb.—F. B. I., iii, p. 147.
Sengalteri, near bungalow, 3,000 ft., No. 38692.
Distr. E. Himalaya, Bengal, Bihar and Assam.
There exists in Herb. Calc. one fragmentary sheet of this species collected by Dr. Cleghorn in July 1853. It is curious that this was not recorded from South India since that date.

134. Pavetta Linn.

- 187. Pavetta indica** Linn.—F. B. I., iii, p. 150.
Naterikal to Sengalteri, 3,500 ft., No. 38681.
Distr. Throughout India generally.
- 188. Pavettabreviflora** DC.—F. B. I., iii, p. 151.
Naterikal to Sengalteri, 3,500 ft., No. 38673.
Distr. South Indian hills: Nilgiri, Travancore and Tinnevelly mountains.

135. Psychotria Linn.

- 189. Psychotria congesta** W. & A.—F. B. I., iii, pp. 162.
Naterikal, 3,000-4,000 ft., Nos. 38381, 38632.
Distr. Nilgiri and Pulney hills.
- 190. Psychotria elongata** Wight.—F. B. I., iii, pp. 163-164.
Naterikal, 4,000 ft., No. 38558.
Distr. Nilgiri hills, Ceylon.
- 191. Psychotria nudiflora** W. & A.—F. B. I., iii, p. 175.
Kannikatti, 2,500 ft., No. 39402.
Distr. Tinnevelly hills.
Probably endemic here.

136. Chasalia Comms.

192. Chasalia curviflora Thw.—F. B. I., iii, pp. 176-177.

Naterikal, 4,000 ft. Nos. 38366, 38542; Kannikatti, 2,500 ft., No. 39420.

Distr. Throughout India generally.

137. Spermacece Linn.

193. Spermacece hispida Linn.—F. B. I., iii, pp. 200-201.

Tirukarungudi, Nos. 38301, 38495.

Mundandurai, 700 ft., No. 39336.

Distr. Throughout India generally.

194. Spermacece stricta Linn. f.—F. B. I., iii, pp. 200.

Naterikal road, 3,000 ft., No. 38485.

Distr. Throughout India generally.

138. Rubia Linn.

195. Rubia cordifolia Linn.—F. B. I., iii, pp. 202.

Naterikal, 4,000 ft., No. 38530.

Distr. Throughout the hilly districts of India.

XLV.—COMPOSITÆ.**139. Centratherum** Cass.

196. Centratherum molle Benth.—F. B. I., iii, p. 227.

Naterikal, No. 38584.

Distr. Southernmost part of the Peninsula.

140. Vernonia Schreb.

197. Vernonia cinerea Less.—F. B. I., iii, pp. 233-234.

Sengalteri, 3,000 ft., No. 39201.

Distr. Throughout India.

198. Vernonia divergens Benth.—F. B. I., iii, pp. 234-235.

Naterikal, 2,000 ft., No. 38391.

Distr. Behar, Central India, South India and Burma.

199. Vernonia setigera Arn.—F. B. I., iii, p. 235.

Naterikal, 4,000 ft., Nos. 38519, 38377, 38680.

Distr. Ceylon.

200. Vernonia sp.—aff. malabarica Hook. f.—F. B. I., iii, p. 230.

Naterikal, 4,000 ft., No. 38581.

A pretty-looking small composite. Occasional.

201. Vernonia travancorica Hook. f.—F. B. I., iii, p. 240.

Naterikal to Sengalteri, 3,500 ft., No. 38646.

Distr. Travancore and Tinnevelly.

141. Elephantopus Linn.

- 202. Elephantopus scaber** Linn.—F. B. I., iii, p. 242.
Mundandurai to Kannikatti, 2,000 ft., No. 39394.
Distr. Throughout India generally.

142. Adenostemma Forst.

- 203. Adenostemma viscosum** Forst.—F. B. I., iii, p. 242.
Naterikal, 4,000 ft., Nos. 38376, 38569, 38592.
Distr. Throughout India generally.

143. Dichrocephala DC.

- 204. Dichrocephala latifolia** DC.—F. B. I., iii, p. 245.
Naterikal, 3,500 ft., No. 38620.
Distr. Throughout India generally.

144. Blumea DC.

- 205. Blumea Wightiana** DC.—F. B. I., iii, p. 261.
Kannikatti, 2,500 ft., No. 39415.
Distr. Throughout India.

145. Blepharispermum Wight.

- 206. Blepharispermum petiolare** DC.—F. B. I., iii, p. 276.
Naterikal, 4,000 ft., No. 38469.
Distr. Tinnevelly District and Ceylon.

146. Anaphalis DC.

- 207. Anaphalis oblonga** DC.—F. B. I., iii, p. 283.
Naterikal, 4,000 ft., No. 38546.
Distr. Mountains of the extreme south of India and Ceylon.
- 208. Anaphalis Wightiana** DC.—F. B. I., iii, p. 286.
Naterikal, No. 38397.
Distr. Nilgiri hills.

147. Gnaphalium Linn.

- 209. Gnaphalium indicum** Linn.—F. B. I., iii, p. 289.
Naterikal, 4,000 ft., No. 38364.
Distr. Throughout India, on the plains generally.

148. Helichrysum Gaertn.

- 210. Helichrysum buddleioides** DC.—F. B. I., iii, p. 290.
Naterikal, 3-4000 ft., No. 38362.
Distr. Mountains of the Western Peninsula and Ceylon.

149. Vicoa Cass.

- 211. Vicoa auriculata** Cass.—F. B. I., iii, p. 297.
Naterikal road, 2,000 ft., No. 38472.
Distr. Throughout India.

150. Blainvillea Cass.

- 212. Blainvillea latifolia** DC.—F. B. I., iii, p. 305.
Papanasam to Mundandurai, No. 39296.
Distr. Western India, Peninsular India and Ceylon.

151. Spilanthes Linn.

- 213. Spilanthes Acmella** Linn.—F. B. I., iii, p. 307.
Naterikal, Nos. 38398, 38499.
Distr. Throughout India.

152. Bidens Linn.

- 214. Bidens pilosa** Linn.—F. B. I., iii, p. 309.
Naterikal, 2,000 ft., No. 38411.
Distr. Throughout India.

153. Emilia Cass.

- 215. Emilia sonchifolia** DC.—F. B. I., iii, p. 336.
Naterikal, 4,000 ft., No. 38515 ; Sengalteri, 2,500 ft., No. 39249.
Distr. Common throughout India.

154. Senecio Linn.

- 216. Senecio (Synctis) calcadensis** Ramaswami, sp. nov.
Species Senecioni Buimaliæ Ham, proxima ; capitula campanulata, diametro 2·5 cm., in corymbos 1-2-3 ; Phyllaria 2-seriata, 24 ; Achenium 5-6 striatum, puberulum.

Caulis fruticosus, ramosus, scandens, volubilis lanuginosus. *Folia* alterna, longepetiolata ; petiolus 3·8 cm. longus, albo-lanuginosus ; lamina cordato-ovata 5·08 cm. -7·62 cm. longa, 3·81 cm. to 6·35 cm. lata, apice acuminata, margine sinuato-dentata, membranacea, supra glabra, subtus lanuginosa. *Corymbæ* axillariæ et terminaliæ, bracteatae, longe pedunculatae. *Pedunculi* 6·35 cm. -10·16 cm. longi. *Bracteæ* ovatae, acutae. *Bracteolæ* 3-4, lineares, lanuginosae. *Capitula*, 18·9 mm. longa. 14·7 mm lata, pluriflora. *Phyllaria* 2-seriata, exteriora 10-12, 6·3 mm. longa, lineare-acuta, extus lanuginosa, interiora 10-12, erecta, 8·5 mm. longa, rigida, lineare-oblonga. *Ligulæ* 8·5 mm. longae, 2-3 dentatae ; floris tubularis, 10·5 mm. longis, dentes 5. *Antheræ* basi longius caudatae. *Achenium* 4·2 mm. longum, 0·8 latum, 5-6 striatum, anguste oblongum. *Pappum* album, 8·5 mm. longum, minute barbellatum.

A profuse climber, on tall trees in mid forest. *Branches and inflorescence* zigzag, grooved, cottony. *Leaves* alternate, long petiolate (but petiole shorter than the peduncle, $1\frac{1}{2}$ in. long) ovate, 2 in. to 3 in. long, $1\frac{1}{2}$ in. to $2\frac{1}{2}$ in. broad, shallowly cordate, acuminate, sinuate-toothed, 5-7 nerved from the base, membranous, glabrous above, cottony beneath. *Corymbs* axillary and terminal, long pedunculate, bracteate, peduncle $2\frac{1}{2}$ in. to 4 in. long. *Heads* bracteolate, many flowered, $\frac{9}{12}$ inch long, $\frac{7}{2}$ in. broad. *Involucral bracts* 2-seriate, outer 10-12, $\frac{1}{4}$ in. long, thin, herbaceous with recurved tips, linear acute, cottony beneath, inner 10-12, erect, $\frac{1}{3}$ in. long, rigid, linear oblong, very acute, with a thickened mesial band and thin glabrous borders. *Ligules* few, $\frac{1}{3}$ in. long, pink. Corolla tubular, widened towards the top, $\frac{5}{12}$ inch long, teeth acute, with recurved tips. *Anthers* distinctly tailed, tail barren. *Achenes* $\frac{1}{8}$ in. compressed, 5-6 ribbed, ribs sparsely hairy. *Pappus* $\frac{1}{3}$ in. long, white, minutely barbellate.

At an elevation of 2,500 feet in the shola forest on the Calcad hills, No. 39250, Hooper and Ramaswami. [PLATE I.]

A very graceful climber, found in the middle of shola forest in dense shade. This differs from *S. Buimalia Ham.* principally in the 2-3 flowered corymbs, the larger heads and in the number and size of the involucral bracts.

155. *Notonia* DC.

217. *Notonia grandiflora* DC.—F. B. I., iii, p. 337.

Tirukarungudi, No. 38310.

Distr. South-West Peninsula and Ceylon.

218. **Notonia grandiflora* DC. *major*, var. nov.

Differs from *Notonia grandiflora* DC. in its much larger size, in its leaves being 7-9 in. by 4-6 in. and in its profusely branched corymbs.

A shrub, 5-7 ft. high, branches long and very stout. Leaves 7-9 in. long 4-6 in. broad, corymbs profusely branched. Achenes $\frac{1}{3}$ in. long.

Sengalteri, 3,500 ft., No. 38695.

156. *Sonchus* Linn.

219. *Sonchus oleraceus* Linn.—F. B. I., iii, p. 413.

Naterikal, 4,000 ft., No. 38363 ; Kannikatti 2,500 ft., No. 39417.

Distr. Throughout India.

XLVI.—CAMPANULACEÆ.

157. *Lobelia* Linn.

220. *Lobelia nicotianæfolia* Heyne.—F. B. I., iii, p. 427.

Naterikal, 4,000 ft., Nos. 38528, 38618.

Distr. Western Peninsula and Ceylon.

- 221. *Lobelia trigona* Roxb.**—F. B. I., iii, p. 423.
Naterikal road, 2,000 ft., No. 38476.
Distr. Deccan, Ceylon, Assam, Bengal and Burma.

158. *Campanula* Linn.

- 222. **Campanula canescens* Wall.**—F. B. I., iii, p. 439.
Sengalteri to Kalkad, No. 39239.
Distr. Northern India, Upper Burma, Ceylon.
A new record for Southern India.

XLVII.—PLUMBAGINEÆ

159. *Plumbago* Linn.

- 223. *Plumbago zeylanica* Linn.**—F. B. I., iii, pp. 480-481.
Sengalteri to Kalkad, No. 39268.
Distr. Throughout India.

XLVIII.—MYRSINEÆ.

160. *Maesa* Forsk.

- 224. *Maesa indica* Wall.**—F. B. I., iii, p. 509.
Naterikal road, 2000-3000 ft., No. 38360.
Distr. Throughout India.

161. *Embelia* Burm.

- 225. *Embelia Ribes* Burm.**—F. B. I., iii, p. 513.
Mundandurai to Kannikatti, 2-2,500 ft., No. 39371.
Distr. Throughout India

162. *Ardisia* Swartz.

- 226. *Ardisia pauciflora* Heyne.**—F. B. I., iii, p. 529.
Naterikal, 4,000 ft., Nos. 38568, 38645.
Distr. Mountains of South India and Ceylon.

227. *Ardisia* sp.

Kannikatti, 2,500 ft., No. 39406.
Not matched at Calcutta.

XLIX.—SAPOTACEÆ.

163. *Dichopsis* Thw.

- 228. *Dichopsis elliptica* Benth.**—F. B. I., iii, p. 542.
Kannikatti, 2,500 ft., No. 39432.
Distr. Peninsular India. Western Ghats. (The Indian Gutta-Percha.)

L.—EBENACEÆ.

164. *Maba* T. R. & G. Forst

229. *Maba buxifolia* Pers.—F. B. I., iii, p. 551.
Nardkhani shola, 2,000 ft., No. 38345.
Distr. Southern Peninsular India, Ceylon, also Lower Burma and Malay Peninsula.

165. *Diospyros* Linn.

230. **Diospyros Barberi* Ramas. in Journ. Asiat. Soc. Beng. X, pp. 47-49.
Kannikatti, towards Agastiyamalai, 2650 ft., No. 39438.
Distr. Western Tinnevelly hills.
231. *Diospyros foliolosa* Wall.—F. B. I., iii, pp. 556-557.
Nardkhani shola, 2,000 ft., No. 38324.
Distr. Tinnevelly hills.
232. *Diospyros oocarpa* Thw.—F. B., I., iii, p. 560.
Kannikatti, 2500 ft., No. 39430.
Distr. North Canara, Travancore, and Ceylon.
233. *Diospyros tomentosa* Roxb.—F. B. I., iii, p. 564.
Mundandurai, 700 ft., No. 39324.
Distr. Bengal, Chota Nagpur, South-West Peninsular India.
Nearly all the leaves of this tree from which we collected our specimens, were attacked by a fungus causing dark brown patches on the leaves. This fungus has since been kindly determined for me by Dr. E. J. Butler, of the Agricultural Research Institute, Pusa, as *Æcidium rhytismoideum* Berk.

LI.—STYRACEÆ.

166. *Symplocos* Linn.

234. *Symplocos acuminata* Bedd.—F. B. I., iii, p. 583.
Naterikal to Sengalteri, 3,500 ft., No. 38613.
Distr. South West Peninsular India, chiefly Malabar.
235. *Symplocos* sp. aff. *cuneata* Thw.—F. B. I., iii, pp. 584-585.
Naterikal, Nos. 38374, 38380.
Distr. Ceylon.
Not matched exactly at Calcutta ; specimens are imperfect.
236. *Symplocos spicata* Roxb. var. *laurina*.—F. B. I., iii, p. 573
Sengalteri, 3,000 ft., Nos. 38690, 39259.
Distr. West Deccan Peninsula and Ceylon.
237. *Symplocos* sp.
Naterikal, 4,000 ft., No. 38579.
Our material is incomplete. Not matched at Calcutta.

LII.—OLEACEÆ.

167. *Jasminum* Linn.

238. *Jasminum auriculatum* Vahl.—F. B. I., iii, p. 600.
Naterikal, No. 38445.
Distr. Peninsular India and Ceylon.
239. *Jasminum calophyllum* Wall.—F. B. I., iii, p. 602.
Naterikal, 4,000 ft., No. 38383.
Distr. Southernmost part of the Peninsula.
240. *Jasminum flexile* Vahl.—F. B. I., iii, p. 601.
Mundandurai to Kannikatti, 1,000-2,000 ft., No. 39364.
Distr. Deccan Peninsula and Ceylon.
241. *Jasminum Rottlerianum* Wall.—F. B. I., iii, p. 593.
Naterikal, No. 38400.
Distr. South Deccan Peninsula.

168. *Linociera* Swartz.

242. *Linociera purpurea* Vahl. var. *dichotoma* Wall. Cat. (Sp.).—F. B. I., iii, p. 608.
Mundandurai, 700 ft., No. 39331; Naterikal, 4,000 ft., No. 38413;
Nardkhani, 2,000 ft., No. 38325.
Distr. Ceylon.

I am inclined to take these as the var. *dichotoma* although the leaves are not subacute at both ends but either very obtuse or rounded at their tips. The nearly glabrous, lax, panicle is alone sufficient to put this down to be the same as Wallich's species *Linociera dichotoma*.

LIII.—APOCYNACEÆ.

169. *Hunteria* Roxb.

243. *Hunteria corymbosa* Roxb.—F. B. I., iii, p. 637.
Nardkhani, 2,000 ft., No. 38332.
Distr. South Peninsular India, especially Tinnevelly hills, Lower Burma, Ceylon.

170. *Alstonia* Br.

244. *Alstonia venenatus* Brown.—F. B. I., iii, pp. 642.
Mundandurai to Kannikatti, 2,000 ft., No. 39372.
Distr. Hills of the extreme south of the Peninsula.

171. *Tabernæmontana* Linn.

245. *Tabernæmontana coronaria* Br.—F. B. I., iii, pp. 646-647.
Kannikatti, 2,500 ft., No. 39408.
Distr. Throughout India.

LIV.—ASCLEPIADEÆ.

172. *Cryptolepis* Br.

246. *Cryptolepis grandiflora* Wight.—F. B. I., iv, pp. 5-6.
Papanasam to Mundandurai, No. 39291.
Distr. Mountains of the Madras Presidency.

173. *Dæmia* Br.

247. *Dæmia extensa* Br.—F. B. I., iv, p. 20.
Sengalteri to Kalkad, No. 39274.
Distr. Throughout India.

174. *Gymnema* Br.

248. *Gymnema sylvestre* Br.—F. B. I., iv, p. 29.
Tirukarungudi, No. 38349.
Distr. West Peninsular India.

175. *Tylophora* Br.

249. *Tylophora asthmatica* W. & A.—F. B. I., iv, pp. 44-45.
Naterikal road, 1,000 ft., No. 38483.
Distr. Throughout India generally, but not in the Himalayas.
250. *Tylophora pauciflora* W. & A.—F. B. I., iv, p. 41.
Tirukarungudi, No. 38304.
Distr. South Peninsular India and Ceylon.

176. *Dregea* E. Meyer.

251. *Dregea volubilis* Benth.—F. B. I., iv, p. 46.
Sengalteri to Kalkad, No. 39266.
Distr. Bengal, Assam, Peninsular India, Ceylon.

177. *Hoya* Br.

252. *Hoya pauciflora* Wight.—F. B. I., iv, p. 56.
Naterikal to Sengalteri, 3,500 ft., No. 38677.
Distr. Travancore, Cochin, Tinnevelly and Ceylon.

LV.—LOGANIACEÆ.

178. *Fagraea* Thunb.

253. *Fagraea obovata* Wall.—F. B. I., iv, p. 83.
Mundandurai to Kannikatti, 2,300 ft., No. 39356.
Distr. Peninsular India, Ceylon, Khasia, Burma and Malay Peninsula

LVI.—GENTIANACEÆ.

179. *Canscora* Lamk.

254. *Canscora sessiliflora* R. & S.—F. B. I., iv, p. 104.

Mundandurai, 700 ft., No. 39312.

Distr. South Peninsular India, Ceylon.

The height of this plant surely exceeds that given by C. B. Clarke. This plant is a foot or more high and appears more robust.

LVII.—BORAGINEÆ.

180. *Ehretia* Linn.

255. *Ehretia buxifolia* Roxb.—F. B. I., iv, pp. 144.

Mundandurai, 700 ft., No. 39319.

Distr. Peninsular India.

256. *Ehretia lævis* Roxb.?—F. B. I., iv, pp. 141-142.

Papanasam to Mundandurai, No. 39289.

Distr. Throughout India.

181. *Cynoglossum* Linn.

257. *Cynoglossum furcatum* Wall.—F. B. I., iv, pp. 155-156.

Naterikal, 3,000 ft., No. 38368.

Distr. Throughout India and Ceylon.

LVIII.—CONVOLVULACEÆ.

182. *Rivea* Choisy.

258. **Rivea hypocrateriformis* Choisy.—F. B. I., iv, pp. 184.

Naterikal, 4,000 ft., No. 38449.

Distr. Peninsular India—but previously supposed to extend only up to Mysore.

183. *Argyreia* Lour.

259. *Argyreia bracteata* Choisy.—F. B. I., iv, p. 188.

Sengalteri to Kalkad, No. 39218.

Distr. Peninsular India.

260. **Argyreia superbiens* Cam.

Mundandurai, 700 ft., No. 39316.

184. *Ipomœa* Linn.

261. *Ipomœa barlerioides* Benth.—F. B. I., iv, p. 201.

Sengalteri to Kalkad, No. 39241.

Distr. North-Western India, Oudh, Chota-Nagpur and Peninsular India.

- 262. *Ipomœa hederacea* Jacq.**—F. B. I., iv, p. 199.
Papanasam to Mundandurai, No. 39293.
Distr. Throughout India.
- 263. *Ipomœa obscura* Ker.**—F. B. I., iv, p. 207.
Sengalteri to Kalkad, No. 39262.
Distr. Throughout India and Ceylon.
- 264. **Ipomœa pilosa* Sw.**—F. B. I., iv, p. 213.
Papanasam to Mundandurai, No. 39285.
Distr. Western Himalaya, and Upper Gangetic plain.
New to this area.
- 265. *Ipomœa staphyllina* R. & S.**—F. B. I., iv, p. 210.
Tirukarungudi, No. 38302.
Distr. South Peninsular India, Assam and Penang.
- 266. *Ipomœa tridentata* Roth.**—F. B. I., iv, p. 205.
Naterikal, No. 38502.
Distr. Peninsular India and Ceylon.

185. *Evolvulus* Linn.

- 267. *Evolvulus alsinoides* Linn.**—F. B. I., iv, pp. 220-221.
Mundandurai, 700 ft., No. 39338.
Distr. Throughout India and Ceylon.

LIX.—SOLANACEÆ.**186. *Solanum* Linn.**

- 268. *Solanum bigeminatum* Nees.**—F. B. I., iv, p. 231.
Naterikal, 4,000 ft., No. 38578.
Distr. Travancore, Malabar Ghats.
- 269. *Solanum giganteum* Jacq.**—F. B. I., iv, p. 233.
Naterikal, No. 38378.
Distr. Southernmost mountains of the Peninsula and Ceylon.
- 270. *Solanum indicum* Linn.**—F. B. I., iv, pp. 234-235.
Naterikal to Sengalteri, 3,500 ft., No. 38664.
Distr. Throughout Tropical India.
- 271. *Solanum læve* Dunal.**—F. B. I., iv, p. 231.
Naterikal to Sengalteri, 3,500 ft., No. 38624.
Distr. Nilgiri hills and North Travancore hills.
- 272. *Solanum nigrum* Linn.**—F. B. I., iv, p. 229.
Kannikatti, 2,500 ft., No. 39413.
Distr. Throughout India and Ceylon.
- 273. *Solanum pubescens* Willd.**—F. B. I., iv, p. 230.
Naterikal, No. 38447.
Distr. Deccan Peninsula and Ceylon.

- 274. *Solanum torvum* Swartz.**—F. B. I., iv, p. 234.
Kannikatti, 2,500 ft., No. 39404.
Distr. Throughout India.
- 275. *Solanum vagum* Heyne.**—F. B. I., iv, p. 230
Sengalteri to Kalkad, No. 39248.
Distr. South Peninsular India.
- 276. *Solanum xanthocarpum* Schrad.**—F. B. I., iv, p. 236.
Tirukarungudi, No. 38309.
Distr. Throughout India.

LX.—SCROPHULARINEÆ.

187. *Limnophila* Br.

- 277. *Limnophila gratioloides* R. Br.**—F. B. I., iv, p. 271.
Mundandurai, 700 ft., No. 69353.
Distr. Throughout India.

188. *Torenia* Linn.

- 278. *Torenia asiatica* Linn.**—F. B. I., iv, 277.
Naterikal to Sengalteri, 3,500 ft. No. 38607.
Distr. Nilgiri hills, Ceylon, also Lower Burma.

189. *Sopubia* Hamilt.

- 279. *Sopubia delphinifolia* G. Don.**—F. B. I., iv, p. 302.
Sengalteri, 2,500 ft., No. 39205 ; Mundandurai No. 39329.
Distr. Behar, Peninsular India and Ceylon.

LXI.—LENTIBULARIEÆ.

190. *Utricularia* Linn.

- 280. *Utricularia* sp.**
Naterikal, 4,000 ft., No. 38510.
This *Utricularia* was found floating in running water and I am unable to identify the species in the absence of flowers.

LXII.—GESNERACEÆ.

191. *Didymocarpus* Wall.

- 281. *Didymocarpus Rottleriana* Wall. Var. *Wightii*.**—F. B. I., iv, p. 353.
Sengalteri to Kalkad, No. 39219.
Distr. Tinnevelly hills.

LXIII.—BIGNONIACEÆ.**192. Stereospermum Cham.**

- 282. Stereospermum chelonoides** DC.—F. B. I., iv, p. 382.
Nardkhani, 2,000 ft., No. 38344 ; Mundandurai, No. 39297.
Distr. Throughout India.

LXIV.—PEDALINEÆ.**193. Sesamum Linn.**

- 283. Sesamum indicum** DC.—F. B. I., iv, p. 387
Tirukarungudi, No. 39437.
Distr. Cultivated generally throughout India for its oil.

LXV.—ACANTHACEÆ.**194. Thunbergia Linn. f.**

- 284. Thunbergia fragrans** Roxb.—F. B. I., iv, 390.
Naterikal, 4,000 ft., Nos. 38356 and 38522.
Distr. Throughout India.

195. Hygrophila Br.

- 285. Hygrophila spinosa** T. And.—F. B. I., iv, p. 408.
Tirukarungudi, No. 38318.
Distr. Throughout India.
Common in all the marshes.

196. Stenosiphonium Nees.

- 286. Stenosiphonium Russellianum** Nees.—F. B. I., iv, p. 427.
Naterikal, 2000-4,000 ft., No. 38423 ; Sengalteri to Kalkad, 2,000 ft.,
No. 39256.
Distr. South Peninsular India, on hills and Ceylon.
- 287. Stenosiphonium Russellianum** Nees. var. **subsericea** T. Anders.—
F. B. I., iv, p. 427-428.
Papanasam to Mundandurai, No. 39292.
Distr. Tinnevelly hills.

197. Strobilanthes Bl.

- 288. Strobilanthes pulneyensis** Clarke.—F. B. I., iv, p. 438.
Naterikal, 4,000 ft., No. 38532.
Distr. Pulney and Anaimalai hills.

198. Blepharis Juss.

- 289. Blepharis boerhaavifolia** Pers.—F. B. I., iv, p. 478.
Naterikal road, No. 38486.
Distr. Peninsular India, also Burma.

199. Barleria Linn.

- 290. *Barleria cristata** Linn.—F. B. I., iv, p. 488.
Sengalteri to Kalkad, No. 39216.
Distr. Sub-Tropical India, but known previously not to occur south of Nilgiris.
- 291. Barleria cuspidata** Heyne.—F. B. I., iv, p. 483.
Tirukarungudi, No. 38320.
Distr. Mysore, Coimbatore, South West Peninsula.
This is the small leaved form.
- 292. Barleria nitida** Nees.—F. B. I., iv, p. 490.
Naterikal, No. 38464.
Distr. Tinnevelly hills.
- 293. Barleria Prionitis** Linn.—F. B. I., iv, p. 482.
Mundandurai, 700 ft., No. 39325.
Distr. Throughout India, sparingly distributed.

200. Crossandra Sausb.

- 294. Crossandra undulæfolia** Salisb.—F. B. I., iv, p. 492.
Naterikal, 4,000 ft., No. 38439.
Distr. South West Peninsula and Ceylon.
(Glabrous form).
- 295. *Crossandra undulæfolia** Salisb.—forma nova.
Naterikal, 4,000 ft., No. 38427.
(Pubescent form.)

I recognise this to be a distinct form of this species. The frequent form is the long-petioled, lanceolate-leaved, completely glabrous one with very long bracteoles. This is short-petioled, ovate-leaved, pubescent with shorter bracts. Consequently, I have indicated the species twice. In view of the numerous specific names already attached to various forms of this species, I think it better to indicate this plant as a new form only.

201. Asystasia Bl.

- 296. Asystasia chelonoides** Nees.—F. B. I., iv, p. 493.
Mundandurai to Kannikatti, 2,000 ft., Nos. 39358, 39412.
Distr. Travancore, Tinnevelly hills and Ceylon.
- 297. Asystasia coromandeliana** Nees.—F. B. I., iv, p. 493.
Sengalteri to Kalkad, No. 39260.
Distr. Peninsular India and Ceylon.

202. Andrographis Wall.

- 298. *Andrographis elongata* T. And.—F. B. I., iv, p. 502.**
Mundandurai, 700 ft., No. 39315.
Distr. Tinnevelly hills.
- 299. *Andrographis viscosula* Nees.—F. B. I., iv, p. 504.**
Naterikal, 4,000 ft., Nos. 38513, 38631.
Distr. Tinnevelly hills.

203. Gymnostachyum Nees.

- 300. *Gymnostachyum canescens* T. And.—F. B. I., iv, p. 509.**
Mundandurai to Kannikatti, 2,500 ft., No. 39359.
Distr. South West Peninsular India, Tinnevelly hills.

204. Diotacanthus Benth.

- 301. *Diotacanthus albiflorus* Benth.—F. B. I., iv, p. 515.**
Naterikal to Sengalteri, 3,500 ft., No. 38599.
Distr. South Tinnevelly hills.
- 302. *Diotacanthus grandis* Benth.—F. B. I., iv, p. 515.**
Naterikal, 4,000 ft., No. 38587.
Distr. South Tinnevelly and South Travancore hills.

205. Justicia Linn.

- 303. *Justicia glauca* Rottl.—F. B. I., iv, p. 529.**
Naterikal road, 2,500 ft., No. 38491.
Distr. South Peninsular India.
- 304. *Justicia procumbens* Linn.—F. B. I., iv, p. 539.**
Sengalteri, 3000 ft., No. 39209.
Distr. South Peninsular India and Ceylon.
- 305. *Justicia simplex* Don. F. B. I., iv, p. 539.**
Naterikal road, 2,000 ft., No. 38500.
Distr. Central and South India, also North-West India.

206. Rungia Nees.

- 306. *Rungia Wightiana* Nees.—F. B. I., iv, p. 546.**
Naterikal, 4,000 ft., No. 38372.
Distr. Tinnevelly hills.

207. Dicliptera Juss.

- 307. *Dicliptera cuneata* Nees.—F. B. I., iv, p. 552.**
Naterikal road, 1,000—2,000 ft., No. 38481.
Distr. Extreme south of the Madras Presidency, Tinnevelly hills.

LXVI.—VERBENACEÆ.**208. Stachytarpheta Vahl.**

- 308. Stachytarpheta indica Vahl.**—F. B. I., iv, p. 564.
Naterikal to Sengalteri, 3,500 ft., No. 38622.
Distr. Throughout India generally.

209. Callicarpa Linn.

- 309. Callicarpa lanata Linn.**—F. B. I., iv, p. 567.
Naterikal, 4,000 ft., No. 38409.
Distr. Peninsular India and Ceylon.

210. Tectona Linn. f.

- 310. Tectona grandis Linn. f.**—F. B. I., iv, pp. 570-571.
Nardkhani, 2,000 ft., No. 38338; Naterikal, No. 38444.
Distr. Peninsular India, Central India and Burma.

211. Gmelina Linn.

- 311. Gmelina asiatica Linn.**—F. B. I., iv, p. 582.
Naterikal, 3,000 ft., No. 38429; Mundandurai, 700 ft., No. 39303.
Distr. South Peninsular India and Ceylon.

212. Vitex Linn.

- 312. Vitex altissima Linn. f.**—F. B. I., iv, p. 584.
Nardkhani, 2,000 ft., No. 38334.
Distr. South-West Peninsular India.

213. Clerodendron Linn.

- 313. Clerodendron infortunatum Gærtn.**—F. B. I., iv, pp. 594-595.
Sengalteri to Kalkad, No. 39251.
Distr. Throughout India.

LXVII.—LABIATÆ.**214. Ocimum Linn.**

- 314. Ocimum adscendens Willd.**—F. B. I., iv, p. 609.
Sengalteri to Kalkad; No. 39263.
Distr. Central and Peninsular India.
- 315. Ocimum gratissimum Linn.**—F. B. I., iv, p. 608.
Naterikal road, 1,500 ft., No. 38422.
Distr. Bengal, Burma, Peninsular India,

316. *Ocimum sanctum* Linn.—F. B. I., iv, p. 609.

Naterikal road, 3,000 ft., No. 38487.

Distr. Throughout India generally.

215. *Geniosporum* Wall.**317. *Geniosporum prostratum* Benth.—F. B. I., iv, p. 610.**

Mundandurai, 700 ft., No. 39307.

Distr. South Peninsular India and Ceylon.

216. *Orthosiphon* Benth.**318. *Orthosiphon comosus* Wight mss.—F. B. I., iv, p. 615.**

Naterikal 3,000 ft., No. 38387.

I add a complete description of this plant as this is an imperfectly known species and Wight's description was based on imperfect material.

An erect shrub, 3-5 feet high, tomentose. *Stem* terete, with multicellular shining glandular hairs. *Branches* usually opposite. *Leaves* crowded towards the inflorescences, subsessile, obovate, cuneate, crenato-serrate, with shining hairs on both surfaces. *Racemes* terminal, very long, rachis stout, somewhat 4-angled, verticillasters laxly arranged, 6-flowered. *Bracts* rose-coloured, upper ones larger, foliaceous, obovate, 3-nerved, nearly entire, glandular, concealing the flower buds and deciduous.

Calyx $\frac{1}{2}$ in. erect but deflexed when fruiting, upper lip broad, entire, concave at first and convex when fruiting, lower lip with 4 subulate teeth.—*Corolla* $1\frac{1}{2}$ in.-2 in. long, pubescent without, tube long, slender, inflexed towards the tip. Upper lip slightly larger than the lower, 3 lobed, mid-lobe very slightly emarginate, lower lip entire, concave.

Stamens 4 free, declinate.

Disc gibbous. *Style* filiform, *Stigma* clavate, *Nutlets* ovoid, smooth.

Distr. Probably found only in the Tinnevelly hills.

319. *Orthosiphon glabratus* Benth.—F. B. I., iv, 614.

Sengalteri to Kalkad, No. 39247.

Distr. South Peninsular India and Ceylon.

320. *Orthosiphon tomentosus* Benth.—F. B. I., iv, p. 613.

Sengalteri to Kalkad, No. 39245; Mundandurai, 700 ft., No. 39342.

Distr. South Peninsular India and Ceylon.

217. *Plectranthus* L'Herit.**321. *Plectranthus menthoides* Benth.—F. B. I., iv, p. 620.**

Naterikal to Sengalteri, 3,500 ft., No. 38615.

Distr. South Peninsular India and Ceylon.

322. **Plectranthus nigrescens* Benth.—F. B. I., iv, p. 617.

Naterikal to Sengalteri, 3,500 ft., No. 38626.

Distr. Ceylon. A new record for South India.

323. *Plectranthus Stocksii* Hook. f.—F. B. I., iv, p. 618.

Naterikal to Sengalteri, 3,500 ft., No. 38669.

Distr. South Peninsular India.

324. *Plectranthus Walkeri* Arn.—F. B. I. iv, p. 617.

Naterikal to Sengalteri, 3,500 ft., Nos. 38627, 38679.

Distr. Tinnevelly hills, Ceylon.

I have some difficulty in taking this to be absolutely correct as the cymes are not hoary and the leaves are not puberulous on the nerves.

218. *Coleus* Lour.**325. *Coleus barbatus* Benth.—F. B. I., iv, p. 625.**

Naterikal, 4,000 ft., No. 38567

Distr. Peninsular India and Ceylon.

326. *Coleus parviflorus* Benth.—F. B. I., iv, p. 625.

Kannikatti, 2,500 ft., No. 39416.

Distr. Travancore and Tinnevelly.

This is probably synonymous with the *Coleus tuberosus* of Bentham and *Plectranthus tuberosus* of Blume. The small potato-like tubers of this plant form one of the food-stuffs of a hill-tribe called 'Kanais' who live near Kannikatti in the Tinnevelly hills.

219. *Anisochilus* Wall.**327. *Anisochilus robustus* Hook. f. ?—F. B. I., iv, p. 629.**

Naterikal, 4,000 ft., No. 38479.

There are no specimens of this species in the Calcutta Herbarium. As my specimen is too imperfect, having neither flowers nor fruits, the identification has to remain as doubtful. The leaves are altogether different from any other *Anisochilus* in the Calcutta Herbarium.

The species appears to have been once only collected by Wight at Courtallum, Tinnevelly District.

328. *Anisochilus scaber* Benth.—F. B. I., iv, p. 627.

Naterikal to Sengalteri, 3,500 ft., No. 38623.

Distr. Tinnevelly.

Probably restricted to the Tinnevelly hills.

220. *Pogostemon* Desf.**329. *Pogostemon mollis* Benth.—F. B. I., iv, pp. 635-636.**

Sengalteri, 3,000 ft., No. 39203.

Distr. Nilgiri hills.

330. *Pogostemon paniculatus* Benth.—F. B. I., iv, p. 631.

Naterikal, 4,000 ft., Nos. 38553, 38573.

Distr. Lower Burma and South Peninsular India.

221. *Scutellaria* Linn.

331. *Scutellaria violacea* Heyne.—F. B. I., iv, p. 668.
Naterikal to Sengalteri, 3,500 ft., Nos. 38614, 38365, 38516.
Distr. South Peninsular Indian Mountains and Ceylon.

222. *Anisomeles* Br.

332. *Anisomeles malabarica* R. Br.—F. B. I., iv, p. 673.
Naterikal road, 2,000 ft., No. 38425 ; Sengalteri to Kalkad, No. 39244
Distr. South Peninsular India and Ceylon.

223. *Leucas* Br.

333. *Leucas biflora* Br.—F. B. I., iv, p. 683.
Sengalteri, 3,000 ft., No. 39208.
Distr. South Peninsular India and Ceylon.
334. *Leucas hirta* spreng.—F. B. I., p. 687.
Sengalteri, 3,000 ft., No. 39206
Distr. South Peninsular India.
335. *Leucas lamifolia* Desf.—F. B. I., iv, 686.
Naterikal, 4,000 ft., No. 38540.
Distr. Mountains of Southern Peninsular India.

224. *Leonotis* Br.

336. *Leonotis nepetaefolia* Br.—F. B. I., iv, p. 691.
Mundandura, 700 ft., No. 39298.
Distr. Throughout India and Ceylon generally.

225. *Teucrium* Linn.

337. *Teucrium* sp. nov. ?—species affinis *Teucrio tomentosum* Heyne. *Caulis* ad 60-70 cm. altus, 4-angulatus, pubescens ; *Folia* opposita, petiolata ; petiolus 3·8 cm. 5 cm. longus ; lamina 6·3 cm. 10·1 cm. longa, 4·4 cm. 7·6 cm. lata, ovata, basi truncata vel cuneata, serrata, acuta, minutissime puberula, membranacea, nervis 6-paribus. *Paniculae* racemose-ramosae. *Bractea* 5·2 mm. longae, ellipticae, acuminatae. *Pedicellae* 2·1 mm. longae. *Calyx* 7·4 mm. longus, 10-nervis, extus glanduloso-pubescens, intus villosus ; dente supremo late orbiculari cuspidatae, lateralibus brevioribus late triangulare, infimis lanceolati acuminati ; *corollae* albae, 19 mm. longae. *Stamina* 4 exserta. *Antherae* reniformae. *Nuculae* minutissime reticulatae.

Naterikal to Sengalteri, 3,500 feet, No. 38609. [PLATE II.]

This differs from *Teucrium tomentosum* Heyne in the following points :—

- (1) The uppermost calyx-teeth is broadly orbicular and cuspidate.
- (2) The two lateral teeth are very short, broadly triangular and acute.

- (3) The corolla is larger.
 (4) The petiole is longer and the leaf is nearly glabrous.

MONOCHLAMYDEÆ.

LXVIII.—NYCTAGINEÆ.

226. *Boerhaavia* Linn.

338. *Boerhaavia repens* Linn.—F. B. I., iv, p. 709.
 Naterikal, 4,000 ft., No. 38501.
 Distr. Throughout India generally.

227. *Pisonia* Linn.

339. *Pisonia aculeata* Linn.—F. B. I., iv, p. 711.
 Tirukarungudi, No. 38317; Naterikal, 4,000 ft., No. 38442; Sengalteri
 to Kalkad, No. 39273.
 Distr. Southern Peninsular India, Ceylon and Burma.

LXIX.—AMARANTACEÆ.

228. *Celosia* Linn.

340. *Celosia pulchella* Moq.—F. B. I., iv, p. 715.
 Sengalteri to Kalkad, 3,000 ft., No. 39234.
 Distr. Nilgiri hills, Ceylon.

229. *Achyranthes* Linn.

341. *Achyranthes bidentata* Blume.—F. B. I., iv, p. 730.
 Naterikal to Sengalteri, 3,500 ft., No. 38621.
 Distr. Throughout India and Ceylon generally.

230. *Aerua* Forsk.

342. *Aerua lanata* Juss.—F. B. I., iv, p. 728.
 Naterikal, No. 38402.
 Distr. Plains of India generally and Ceylon.

LXX.—POLYGONACEÆ.

231. *Polygonum* Linn.

343. *Polygonum chinense* Linn. var. *ovalifolia*—F. B. I., v, pp. 44-45.
 Naterikal, 4,000 ft., Nos. 38533, 38371.
 Distr. Generally throughout Indian hills.

LXXI.—ARISTOLOCHIACEÆ.

232. *Aristolochia* Linn.

344. *Aristolochia indica* Chois.—F. B. I., v, p. 75.

Sengalteri to Kalkad, No. 39265.

Distr. Throughout India.

345. *Aristolochia Roxburghiana* Klotzsch.—F. B. I., v, pp. 75-76.

Naterikal, No. 38395.

Distr. Eastern and Western Peninsula and Ceylon.

LXXII.—PIPERACEÆ.

233. *Piper* Linn.

346. *Piper nigrum* Linn.—F. B. I., v, pp. 90-91.

Sengalteri to Kalkad, No. 39261.

Distr. Peninsular India and Ceylon, also found in damp parts in India generally.

347. **Piper nilghirianum* CDC.

Naterikal to Sengalteri, 3,500 ft., No. 38685.

Distr. Nilgiri hills and Coorg.

234. *Peperomia* Ruiz. and Pav.

348. *Peperomia reflexa* A. Dietr.—F. B. I., v, p. 99.

Naterikal, 4,000 ft., No. 38549.

Distr. Sub-tropical Himalaya, Upper Assam, Khasia, Tinnevelly and Ceylon.

LXXIII.—CHLORANTHACEÆ.

235. *Chloranthus* Swartz.

349. *Chloranthus brachystachyus* Bl.—F. B. I., v, p. 100.

Naterikal, 4,000 ft., Nos. 38563, 38657.

Distr. Assam, Upper Burma, Travancore, Malabar and Ceylon.

LXXIV.—LAURINEÆ.

236. *Cinnamomum* Blume.

350. *Cinnamomum gracile* Hook. f.—F. B. I., v, p. 133.

Kannikatti, 2,500 ft., No. 39410.

Distr. Tinnevelly hills.

Cinnamomum spp.

Two or three other species of *Cinnamomum* were collected but unfortunately none were either in flower or fruit.

237. Actinodaphne Nees.

- 351. Actinodaphne (angustifolia) Nees.**—F. B. I., v, p. 152.
Naterikal, 4,000 ft., No. 38560.
Distr. Throughout India generally.

238. Litsea Lamk.

- 352. Litsea sebifera Pers.**—F. B. I., v, p. 157.
Naterikal, 4,000 ft., No. 38559.
Distr. Throughout India generally.
- 353. Litsea Wightiana Hook. f.**—F. B. I., v, p. 177.
Kannikatti, 2,500 ft., No. 39407.
Distr. Nilgiri hills and Tinnevelly.
- 354. Litsea zeylanica Nees.**—F. B. I., v, p. 178.
Mundandurai to Kannikatti, 1,500 ft.—2,500 ft., Nos. 39361, 39398.
Distr. Throughout India generally, one or other of its various forms.
- 355. Litsea sp.**—Too incomplete.
Naterikal, 4,000 ft., No. 38575.

LXXV.—THYMELEACEÆ.**239. Lasiosiphon Fresen.**

- 356. Lasiosiphon eriocephalus Dcne.**—F. B. I., v, p. 197.
Naterikal, 4,000 ft., Nos. 38399, 38586.
Distr. Southern Peninsular India and Ceylon.

LXXVI.—LORANTHACEÆ.**240. Loranthus Linn.**

- 357. Loranthus longiflorus Desr. var. falcatus.**—F. B. I., v, p. 215.
Naterikal, No. 38435.
Distr. Southern Peninsular India and Ceylon.
- 358. Loranthus tomentosus Heyne.**—F. B. I., v, p. 212.
Naterikal, No. 38359.
Distr. North Kanara and Ceylon.

241. Viscum Linn.

- 359. Viscum articulatum Burm.**—F. B. I., v, p. 226.
Mundandurai to Kannikatti, 2,000 ft., No. 39392.
Distr. Throughout the hills of India below 6,000 ft.

LXXVII.—SANTALACEÆ.**242. Santalum Linn.**

- 360. Santalum album** Linn.—F. B. I., v, p. 231.
Naterikal, 4,000 ft., No. 38582.
Distr. Peninsular India—also cultivated.

243. Osyris Linn.

- 361. Osyris arborea** Wall.—F. B. I., v. p. 232.
Naterikal, 3,000 ft., No. 38384.
Distr. Lower Himalaya, Peninsular India and Ceylon.

LXXVIII.—BALANOPHOREÆ.**244. Balanophora Forst.**

- 362. Balanophora indica** Wall.—F. B. I., v, pp. 237-238.
Naterikal to Sengalteri. 3,500 ft., No. 38686.
Distr. Southern Peninsular India, Nilgiri hills and Ceylon.

LXXIX.—EUPHORBIACEÆ.**245. Euphorbia Linn.** (Det. by Major A. T. Gage, I.M.S.)

- 363. Euphorbia cristata** Heyne.—F. B. I., v, p. 247.
Naterikal, 3,500 ft., No. 38385; Sengalteri to Kalkad, No. 39221.
Distr. Peninsular India, Central India and Ceylon. Probably Burma.
- 364. Euphorbia Rothiana** Spreng.—F. B. I., v, p. 263.
Naterikal, 4,000 ft., No. 38545.
Distr. Peninsular India and Ceylon.

246. Bridelia Willd. (Det. by Major A. T. Gage, I.M.S.)

- 365. Bridelia retusa** Spreng.—F. B. I., v, p. 268.
Nardkhani shola, 2,000 ft., No. 38341; Naterikal, 4,000 ft., No. 38414.
Distr. Throughout India generally.
- 366. Bridelia scandens** Willd.—F. B. I., v, p. 270.
Mundandurai to Kannikatti, 2,000 ft., No. 39363.
Distr. Throughout India generally.

247. Actephila Bl.

- 367. Actephila excelsa** Muell. Arg.—F. B. I., v, p. 282.
Mundandurai to Kannikatti, 1,700 ft., No. 39378.
Distr. Assam, Khasia, Peninsular India and Ceylon.

248. *Phyllanthus* Linn. (Det. by Major A. T. Gage, I.M.S.)

- 368. *Phyllanthus Emblica* Linn.**—F. B. I., v, p. 289.
Naterikal, 4,000 ft., No. 38505.
Distr. Throughout India generally.
- 369. *Phyllanthus maderaspatensis* Linn.**—F. B. I., v, p. 292.
Mundandurai, 700 ft., No. 39337; Sengalteri to Kalkad, 2,000 ft.
No. 39269.
Distr. Peninsular India and Ceylon.
- 370. *Phyllanthus polyphyllus* Willd.**—F. B. I., v, p. 290.
Naterikal, 4,000 ft., No. 38374.
Distr. Peninsular India and Ceylon.
- 371. *Phyllanthus reticulatus* Poir.**—F. B. I., v, p. 288.
Tirukarungudi, No. 38307; Naterikal, 4,000 ft., No. 38505.
Distr. Throughout India generally.

249. *Glochidion* Forst. (Det. by Major A. T. Gage, I.M.S.)

- 372. *Glochidion ellipticum* Wight.**—F. B. I., v, p. 321.
Naterikal, 3,500 ft., No. 38463.
Distr. Malabar.

250. *Breynia* Forst.

- 373. *Breynia rhamnoides* Muell. Arg.**—F. B. I., v, p. 330.
Naterikal road, 2,500 ft., Nos. 38419, 38498 and 38594.
Distr. Throughout India generally.

251. *Sauropus* Bl.

- 374. *Sauropus albicans* Bl.**—F. B. I., v, p. 332.
Naterikal, 3,500-4,000 ft., Nos. 38404, 38604.
Distr. Sikkim, Burma, Southern Peninsular India and Ceylon.

252. *Givotia* Griff.

- 375. *Givotia rottleriformis* Griff.**—F. B. I., v, p. 395.
Naterikal, No. 38386.
Distr. Southern Peninsular India and Ceylon.

253. *Agrostistachys* Dalz.

- 376. *Agrostistachys indica* Dalz.**—F. B. I., v, p. 406.
Naterikal, 4,000 ft., No. 38572; Naterikal to Sengalteri, 3,500 ft., No.
38641.
Distr. Southernmost part of the Peninsula and Ceylon.

254. Acalypha Linn.

- 377. Acalypha ciliata** Forsk.—F. B. I., v, p. 417.
Sengalteri to Kalkad, No. 39276.
Distr. Western Himalaya, Peninsular India and Ceylon.
- 378. Acalypha paniculata** Miq.—F. B. I., v, p. 415.
Sengalteri to Kalkad, No. 39275.
Distr. Peninsular India and Ceylon.

255. Mallotus Lour.

- 379. Mallotus Beddomei** Hook. f.—F. B. I., v, p. 438.
Naterikal to Sengalteri, 3,500 ft., No. 38683.
Distr. Tinnevelly.
- 380. Mallotus philippinensis** Muell. Arg.—F. B. I., v, pp. 442-443.
Mundandurai to Kannikatti, 1,700 ft., No. 39379.
Distr. Throughout India generally.
- 381. Mallotus stenanthus** Muell. Arg.—F. B. I., v, p. 437.
Mundandurai to Kannikatti, 2,000 ft., Nos. 39362, 39401.
Distr. Canara and Tinnevelly.
Probably restricted to this area.

256. Macaranga Thouars.

- 382. Macaranga Roxburghii** Wight.—F. B. I., v, p. 448.
Mundandurai to Kannikatti, 2,300 ft., No. 39369.
Distr. Southern Peninsular India and Ceylon.

257. Gelonium Roxb.

- 383. Gelonium lanceolatum** Willd.—F. B. I., v, p. 459.
Mundandurai, 700 ft., No. 39323.
Distr. Southern Peninsular India and Ceylon.

258. Excoecaria Linn.

- 384. Excoecaria crenulata** Wight.—F. B. I., v, p. 473.
Sengalteri to Kalkad, 3,000 ft., No. 39226.
Distr. Southern Peninsular India and Ceylon.

LXXX.—URTICACEÆ.**259. Celtis** Linn.

- 385. Celtis Wightii** Planch.—F. B. I., v, p. 483.
Nardkhani, 2,000 ft., Nos. 38339, 38340; Papanasam to Mundandurai,
No. 39281.
Distr. Southern Peninsular India, Ceylon.

260. *Dorstenia* Linn.

- 386. *Dorstenia indica* Wall.**—F. B. I., v, p. 494.
Naterikal to Sengalteri, 3,500 ft., Nos. 38600, 38601.
Distr. Southern Peninsular Indian hills, Ceylon

261. *Ficus* Linn.

- 387. *Ficus hispida* Linn. f.**—F. B. I., v, pp. 522-523.
Mundandurai to Kannikatti, 700 ft., No. 39390.
Distr. Throughout India.

262. *Pilea* Lindl.

- 388. *Pilea Wightii* Wedd.**—F. B. I., v, pp. 554-555.
Naterikal 4,000 ft., No. 38548.
Distr. Temperate Himalaya, Sikkim, Nilgiri, Ceylon, all in high hills.

263. *Elatostema* Forst.

- 389. *Elatostema lineolatum* Wedd.**—F. B. I., v, p. 565.
Naterikal to Sengalteri, 3,500 ft., No. 38629.
Distr. Throughout India generally.
- 390. *Elatostema* sp.**
Naterikal to Sengalteri, 3,500 ft., No. 38643; Sengalteri, 3,000 ft., No. 38699.
A small narrow leaved *Elatostema* growing on rocks in running water. No flowers were available.

264. *Pouzolzia* Gaud.

- 391. *Pouzolzia Bennettiana* Wight.**—F. B. I., v, p. 585.
Sengalteri to Kalkad, 3,000 ft., No. 39215.
Distr. Southern Peninsular India and Ceylon.
- 392. *Pouzolzia pentandra* Benn. var. *Stocksii*.**—F. B. I., v, p. 583.
Distr. Peninsular India.

265. *Villebrunea* Gaud.

- 393. *Villebrunea integrifolia* Gaud. var. *sylvatica*.**—F. B. I., v, p. 589.
Naterikal, 3,500 ft., No. 38651.
Distr. Sikkim, Assam, Burma, Andamans, Western Ghats and Ceylon.

266. *Debregeasia* Gaud

- 394. *Debregeasia velutina* Gaud.**—F. B. I., v, p. 590.
Naterikal, 4,000 ft., No. 38354.
Distr. North-East India, Lower Burma, Peninsular India and Ceylon.

MONOCOTYLEDONES.

LXXXI.—ORCHIDACEÆ.

267. *Oberonia* Lindl.

395. **Oberonia zeylanica* Hook. f.—F. B. I., v, p. 680.
Naterikal to Sengalteri, 3,500 ft., No. 38682.
Distr. Ceylon.

268. *Eria* Lindl.

396. *Eria* (*pauciflora* Wight).—F. B. I., v, p. 799.
Naterikal, 4,000 ft., Nos. 38585, 38678.
Distr. Southern Peninsular India.

I hesitate to give this identification as my plant was collected without flower or fruit.

269. *Tainia* Bl.

397. **Ania latifolia* Wight. Ic. t. 914 not *Tainia bicornis Benth* as given in F. B. I., Naterikal to Sengalteri, 3,500 ft., No. 38637.
Distr. Probably confined to Travancore and Tinnevelly.

270. *Calanthe* Br.

398. *Calanthe Masuca* Lindl.—F. B. I., v, pp. 850-851.
Naterikal to Sengalteri, 3,500 ft., No. 38671.
Distr. Eastern Himalaya, Southern Peninsular India.

271. *Cymbidium* Swartz.

399. *Cymbidium* sp.
Naterikal to Sengalteri, 3,500 ft., Nos. 38639, 38672.

272. *Aerides* Lour.

400. *Aerides cylindricum* Lindl —F. B. I., vi, p. 44.
Naterikal, by streams, 4,000 ft., No. 38509.
Distr. Mysore, Nilgiri hills, and Ceylon.

273. *Vanda* Br.

401. *Vanda Roxburghii* Br.—F. B. I., vi, p. 52.
Kannikatti, 2,500 ft., No. 39245.
Distr. Bengal, Peninsular India, Ceylon and Lower Burma.

LXXXII.—SCITAMINEÆ.

274. *Curcuma* Linn.

402. *Curcuma aromatica* Salisb ?—F. B. I., vi, p. 210.

Naterikal, 4,000 ft., No. 38561.

Distr. Throughout India generally.

The material is without flowers or fruits so that it is impossible for me to be certain of the species.

275. *Amomum* Linn.

403. **Amomum floribundum* Benth.—F. B. I., vi, p. 233.

Naterikal, 4,000 ft., No. 38687 A.

Distr. Ceylon.

276. *Elettaria* Maton.

404. *Elettaria Cardamomum* Maton.—F. B. I., vi, p. 251.

Naterikal to Sengalteri, 3,500 ft., No. 38687.

Distr. Southernmost part of the Western Ghats. Cultivated in other places. (The cardamomum.)

277. *Alpinia* Linn.

405. *Alpinia Allughas* Rosc.—F. B. I., vi, pp. 253-254.

Naterikal, 4,000 ft., No. 38352.

Distr. Throughout India generally.

LXXXIII.—HÆMODORACEÆ.

278. *Ophiopogon* Ker.

406. *Ophiopogon intermedius* Don.—F. B. I., vi, p. 269.

Naterikal to Sengalteri, 3,500 ft., No. 38653.

Distr. Himalaya, Khasia, North-East India, Southern Peninsular India and Ceylon.

LXXXIV.—AMARYLLIDEÆ.

279. *Curculigo* Gaertn.

407. *Curculigo Finlaysoniana* Wall.—F. B. I., vi, p. 279.

Mundandurai to Kannikatti, 2,200 ft., No. 39366.

Distr. Southernmost part of the Peninsula and Ceylon.

LXXXV.—DIOSCOREACEÆ.**280. Dioscorea Linn.**

- 408. *Dioscorea oppositifolia* Linn.**—F. B. I., vi, p. 292.
Mundandurai, 700 ft., No. 39317.
Distr. Nearly throughout India.
- 409. *Dioscorea pentaphylla* Linn. var. *Rheedei*, Prain & Burkill.**
Sengalteri to Kalkad, 2,000 ft., No. 39225 ; Mundandurai, 700 ft., No. 39320.
Distr. South India.
- 410. *Dioscorea spicata* Roth.**—F. B. I., vi, p. 291.
Naterikal to Sengalteri, 3,500 ft., No. 38644.

LXXXVI.—LILIACEÆ.**281. Smilax Linn.**

- 411. *Smilax zeylanica* Linn.**—F. B. I., vi, pp. 309-310.
Naterikal, 4,000 ft., No. 38538 ; Mundandurai to Kannikatti, 2,000 ft.,
Nos. 39376, 39377.
Distr. Throughout India generally.

282. Asparagus Linn.

- 412. *Asparagus racemosus* Willd.**—F. B. I., vi, p. 316.
Naterikal, 4,000 ft., Nos. 38432, 38552.
Distr. Throughout India generally.

283. Dracæna Linn.

- 413. *Dracæna terniflora* Roxb.**—F. B. I., vi, pp. 328-329.
Kannikatti, 2,500 ft., No. 39419.
Distr. North-East India, Peninsular India.

284. Dianella Lamk.

- 414. **Dianella ensifolia* Redouté.**—F. B. I., vi, p. 337.
Naterikal to Sengalteri, 3,500-4,000 ft ; Nos. 38571, 38668.
Distr. North-East India, Burma, Malay Peninsula.
New to this area.

285. Gloriosa Linn.

- 415. *Gloriosa superba* Linn.**—F. B. I., iv, p. 358.
Tirukarungudi, No. 38304.
Distr. Throughout Tropical India and Ceylon.

LXXXVII.—COMMELINCEÆ.**286. Cyanotis Don.**

- 416. Cyanotis cristata** Schultes. f.—F. B. I., vi, p. 385.
Mundandurai, 700 ft., No. 39350.
Disti. Throughout India.

- 417. Cyanotis villosa** Schultes. f.—F. B. I., iv, p. 387.
Naterikal, No. 38370.
Distr. Southern Peninsular India and Ceylon.

287. Floscopa Lour.

- 418. Floscopa scandens** Lour.—F. B. I., iv, p. 390.
Mundandurai to Kannikatti, 2,000 ft., No. 39382.
Distr. Throughout India in swampy places.

LXXXVIII.—PALMEÆ.**288. Phoenix Linn.**

- 419. Phoenix humilis** Royle.—F. B. I., vi, p. 426.
Naterikal, 3-4,000 ft., No. 38454.
Distr. Throughout India.

289. Calamus Linn.

- 420. Calamus pseudo-tenuis** Becc. mss.—F. B. I., vi, p. 445.
Naterikal, 4,000 ft., No. 38574.
Distr. Southern Peninsular India and Ceylon.

LXXXIX.—AROIDEÆ.**290. Lagenandra Dalz.**

- 421. Lagenandra toxicaria** Dalz.—F. B. I., vi, p. 495.
Kannikatti, 2,500 ft., No. 39426.
Distr. Southern Peninsular India and Ceylon, in marshes.

291. Arisaema Mart.

- 422. Arisaema Leschenaultii** Blume.—F. B. I., vi, p. 504.
Naterikal, 4,000 ft., No. 38527.
Distr. South-Western Peninsular India.

292. Anaphyllum Schott.

- 423. *Anaphyllum Beddomei** Engl. in Das Pflanzenreich, iv, 23c. 1911, pp. 26-27
Naterikal, 4,000 ft., No. 38554.

Distr. Travancore and Tinnevelly hills. Previous to this, the only known Indian species of *Anaphyllum* was *A. Wightii* Schott. The present species, however, is distinguished from it chiefly by its oblong-ovate non-spiral spathe and by the form of the leaf.

293. Pothos Linn.

- 424. Pothos scandens** Linn.—F. B. I., vi, pp. 551-552.
Mundandurai to Kannikatti, 2,200 ft., No. 39365.
Distr. Throughout India.

XC.—NAIADACEÆ.

294. Aponogeton Thunb.

- 425. Aponogeton monostachyon** Linn. f.—F. B. I., vi, p. 564.
Mundandurai to Kannikatti, 1,700 ft., No. 39393.
Distr. Throughout India and Ceylon.

XCI.—ERIOCAULEÆ.

295. Eriocaulon Linn.

- 426. Eriocaulon (sexangulare)** Linn.—F. B. I., vi, p. 580.
Mundandurai to Kannikatti, 1,000 ft., No. 39436.
Distr. Southern Peninsular India, Lower Burma and Ceylon.
The material of *Eriocaulon* in the Calcutta Herbarium is too inadequate for accurate identification of the species.

XCII.—CYPERACEÆ.

296. Cyperus Linn.

- 427. Cyperus corymbosus** Rottb. Var. *Pangorei* C. B. Clarke. F. B. I., vi, p. 612.
Sengalteri to Kalkad, No. 39228.
Distr. Southern Peninsular India.
This species is of economic importance as the famous Tinnevelly mats are manufactured out of this plant.
- 428. Cyperus Haspan** Linn.—F. B. I., vi, p. 600.
Mundandurai, 700 ft., No. 39349.
Distr. Throughout India.

297. Fimbristylis Vahl.

- 429. Fimbristylis complanata** Link.—F. B. I., vi, p. 646.
Mundandurai, 700 ft., No. 39355.
Distr. Throughout India.

298. Scirpus Linn.

- 430. Scirpus mucronatus** Linn.—F. B. I., vi, p. 657.
Naterikal, 4,000 ft., No. 38551.
Distr. Throughout India.

299. Carex Linn.

- 431. Carex baccans** Nees.—F. B. I., vi, p. 722.
Naterikal to Sengalteri, 3,500 ft., No. 38654.
Distr. North-East India and Western Ghats from Malabar to Ceylon.
- 432. Carex leucantha** Arn. F. B. I., vi, p. 721.
Naterikal to Sengalteri, 3,500 ft., No. 38655.
Distr. Tinnevelly.
- 433. Carex Myosurus** Nees. F. B. I., vi, p. 723.
Naterikal, 4,000 ft., No. 38566.
Distr. Southernmost part of the Western Ghats, also Tinnevelly.

XIII.—GRAMINEÆ.**300. Isachne Br.**

- 434. Isachne Walkeri** W. & A.—F. B. I. VII. p. 26.
Naterikal to Sengalteri, 3,500 ft. 38605.
Distr. Nilgiri hills. Ceylon

301. Panicum Linn.

- 435. Panicum plicatum** Lamk.—F. B. I., vii, p. 55.
Naterikal, 3,-4,000 ft., No. 38403.
Distr. Throughout the hilly parts of India.
- 436. Panicum ramosum** Linn.—F. B. I., vii, p. 36.
Tirukarungudi, No. 38488.
Distr. Plains of India.

302. Oplismenus Beauv.

- 437. Oplismenus compositus** Beauv.—F. B. I., vii, pp. 66-67.
Naterikal to Sengalteri, 3,500 ft., No. 38606.
Distr. Throughout India.

303. Arundinella Raddi.

- 438. Arundinella nervosa** Nees ?—F. B. I., vii, p. 70.
Naterikal, 4,000 ft., No. 38506.
Distr. Southern Peninsular India.

304. Saccharum Linn.

- 439. Saccharum spontaneum** Linn.—F. B. I., vii, p. 118.
Tirukarungudi, No. 38494.
Distr. Throughout India.

305. Andropogon. Linn.

- 440. Andropogon contortus** Linn.—F. B. I., vii, p. 199.
Naterikal road to Tirukarungudi, 1,000 ft., No. 38456.
Distr. Throughout India and Ceylon.
- 441. Andropogon monticola** Sehult.—F. B. I., vii, p. 192.
Naterikal road, 2,000 ft., No. 38457.
Distr. Hilly districts of India generally.
- 442. Andropogon Nardus** Linn. var. *luridus*.—F. B. I., vii, pp. 205-207.
Sengalteri to Kalkad, 1,000 ft., No. 39277.
Distr. Nilgiri hills and Ceylon.
- 443. Andropogon Nardus** Linn. var. *flexuosus* Hack.—F. B. I., vii, p. 207.
Naterikal road, 1,500 ft., No. 38424.
Distr. Southern Peninsular India.

306. Pseudanthistiria Hook. f.

- 444. Pseudanthistiria umbellata** Hook. f.—F. B. I., vii, p. 220.
Naterikal, 4,000 ft., No. 38577.
Distr. Southern Peninsular India and Ceylon.

307. Aristida Linn.

- 445. Aristida Hystrix** Linn. f.—F. B. I., vii, pp. 225-226.
Naterikal road, No. 38507.
Distr. Peninsular India and Ceylon.

308. Eragrostis Beauv.

- 446. Eragrostis bifaria** Wight.—F. B. I., vii, p. 325.
Tirukarungudi, 1,000 ft., No. 38458.
Distr. Peninsular India.
- 447. Eragrostis tenella** R. & S. var. *plumosa* Stapf.—F. B. I., vii, p. 315.
Mundandurai, 700 ft., No. 39348.
Distr. Throughout India and Ceylon.

309. Ochlandra Thw.

- 448. Ochlandra travancorica** Benth.—F. B. I., vii, p. 419.
Sengalteri, 3,500 ft., No. 39440.
Distr. Travancore and Tinnevelly.
This is the "Bheesha" grass occupying miles of country.

GYMNOSPERMÆ.

XCIV.—CYCADACEÆ.

310. *Cycas* Linn.

449. *Cycas circinalis* Linn.—F. B. I., v, p. 656.

Mundandurai, 700 ft., No. 39335.

Distr. Southern Peninsular India and Ceylon.

This differs from the type in its smaller leaves with narrower leaflets.

CRYPTOGAMIA.

PTERIDOPHYTA.

XCV.—POLYPODIACEÆ.

311. *Davallia* Sm.

450. *Davallia Speluncoe* Baker.—Hook and Bak. Syn. Fil., p. 100.

Naterikal, 4,000 ft.

Distr. Throughout India generally.

312. *Adiantum* Linn.

451. *Adiantum hispidulum* Sw.—Bedd. F. B. I., p. 86.

Naterikal road, 2,000 ft., No. 38508.

Distr. South-Western Peninsular Indian hills and Ceylon.

313. *Cheilanthes* Schwartz.

452. *Cheilanthes mysorensis* Wall.—Bedd. F. B. I., p. 89.

Naterikal road, 2,000 ft., No. 38452.

Distr. Southern Peninsular India and Ceylon.

314. *Pteris* Linn.

453. *Pteris quadriaurita* Retz. var. *argentea* Bedd. F. B. I., p. 111.

Naterikal to Sengalteri, 3,500 ft., No. 38635.

Distr. Nilgiri and South-Western Ghats.

Well-known in cultivation.

315. *Blechnum* Linn.

454. *Blechnum orientale* Linn.—Bedd. F. B. I., p. 132.

Mundandurai to Kannikatti, 2,000 ft., No. 39400,

Distr. Throughout India and Ceylon.

316. Asplenium Linn.

- 455. Asplenium falcatum** Lamk.—Bedd. F. B. I., p. 150.
Mundandurai to Kannikatti, No. 39399.
Distr. South-Western Peninsular India, Ceylon, Malay Peninsula.
- 456. Asplenium lunulatum** Sw.—Bedd. F. B. I., p. 147.
Naterikal to Sengalteri, 3,500 ft., No. 58603.
Distr. South-Western Ghats and Ceylon.

317. Actiniopteris Link.

- 457. Actiniopteris dichotoma** (*Forsk*, under *Acxostichum*).—Bedd. F. B. I.
p. 197.
Papanasam to Mundandurai, No. 39294.
Distr. Throughout India, especially Southern Peninsular India and
Ceylon.

318. Aspidium Swartz.

- 458. Aspidium aristatum** Sw.—Bedd. F. B. I., p. 229.
Naterikal, 4,000 ft., Nos. 38570, 38674.
Distr. Southern Peninsular India, Ceylon and Burma

319. Nephrolepis Schott.

- 459. Nephrolepis tuberosa** Presl. —Bedd. F. B. I., p. 282.
Naterikal, at 3,500 ft., No. 38650.
Distr. Throughout India.

320. Polypodium Linn.

- 460. Polypodium lineare** Thunb.—Bedd. F. B. I., p. 346.
Naterikal, 3,500 ft., No. 38658.
Distr. Himalaya, Khasia, South-Western Peninsular India, Ceylon,
Malay Peninsula.

321. Niphobolus Kaulf.

- 461. Niphobolus fissus** Bl.—Bedd. F. B. I., p. 330.
Naterikal, at 3,500 ft., No. 38647.
Distr. South-Western Peninsular India, Ceylon, Himalaya, Khasia,
Malay Peninsula.

322. Vittaria Sm.

462. Vittaria elongata Sw.—Bedd. F. B. I., p. 404.

Naterikal, at 3,500 ft., No. 38659.

Distr. South-Western India on the mountains, Ceylon, Malay Peninsula, Burma.

323. Drymoglossum Presl.

463. Drymoglossum piloselloides Presl.—Bedd. F. B. I., p. 411-412.

Mundandurai, 2,000 ft. No. 39381.

Distr. Bengal plains, Burma, Ceylon, South Indian mountains.

324. Hemionitis Linn.

464. Hemionitis arifolia (Burm. under *Asplenium*.)

Mundandurai, 700 ft., No. 39330.

Distr. Southern Peninsular India, Eastern Bengal, Ceylon and Lower Burma.

325. Acrostichum Linn.

465. Acrostichum crispatum Wall.

Kannikatti, 2,500 ft., No. 39418.

Distr. Sikkim, Burma, Southern Peninsular India, Ceylon.

XCVI.—SCHIZÆACEÆ.**326. Lygodium Sw.**

466. Lygodium microphyllum R. Br.—Bedd. F. B. I., p. 455.

Sengalteri to Kalkad, No. 39223.

Distr. Southern Peninsular India, West Coast, Ceylon, Malay Peninsula.

XCVII.—MARATTIACEÆ.**327. Angiopteris Hoffm.**

467. Angiopteris evecta Hoffm.—Bedd. F. B. I., p. 460.

Naterikal, 4,000 ft., No. 38562.

Distr. Throughout India generally.

XCVIII.—OPHIOGLOSSACEÆ.**328. Botrychium Sw.**

468. Botrychium daucifolium Wall.—Bedd. F. B. I., p. 469-470.

Naterikal, No. 39441.

Distr. Throughout India.

XCIX.—LYCOPODIACEÆ.

329. Lycopodium Linn.

- 469. Lycopodium cernuum Linn.**—Bak. Fern. All., p. 23.
Naterikal, 4,000 ft., No. 38511.
Distr. Throughout India.

C. SELAGINELLACEÆ.

330. Selaginella Spreng.

- 470. Selaginella plumosa Baker.**—Bak. Fern. All., p. 50.
Naterikal to Sengalteri, 3,500 ft., No. 38649.
Distr. East Himalaya, Southern Peninsular Indian Mountains, Ceylon
and Burma.

Explanation of Plates.

Plate I.—*SENECIO CALCADENSIS* *Ramas*, SP. NOV.

- I. Part of plant (Natural size).
- II. Ray Flower.
- III. A very young disk-flower.
- IV. Corolla of a disk-flower laid open.
- V. Anther, with a part of the filament.
- VI. Achene with style.
- VII. Achene with Pappus.
- VIII. Achene and seed.

Plate II.—*TEUCRIUM* SP. AFF. *T. TOMENTOSUM* *Heyne*.

- I. Part of plant (Natural size.)
- II. Calyx, laid open, showing nutlets.
- III. Corolla, with stamens laid open.
- IV. Stamens.
- V. Ovary and style.





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RECORDS
OF THE
BOTANICAL SURVEY OF INDIA

VOLUME VI.—No. 6

SOME PLANTS OF THE ZOR HILLS,
KOWEIT, ARABIA,

BY

HUMPHREY G. CARTER, M.B., Ch.B.

Economic Botanist to the Botanical Survey of India.

WITH NOTES BY

SIR P. Z. COX, K.C.S.I., K.C.I.E.,

AND

LIEUTENANT-COLONEL S. G. KNOX, C.I.E.



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INTRODUCTION.

THE plants that form the subject of this paper were collected some ten years ago mainly by Sir Percy Z. Cox, K.C.S.I., K.C.I.E., under the slopes of the Zor Hills on the coast line of the north-east corner of the principality of Koweit on the Persian Gulf. The specimens were sent shortly after they were collected to the Royal Botanic Garden, Calcutta, where they were identified by Captain (now Major) A. T. Gage, I.M.S., and afterwards returned to Sir Percy Cox. In 1915 the collection was returned to the Director of the Botanical Survey by the Foreign and Political Department of the Government of India for preservation in the Herbarium of the Royal Botanic Garden, Calcutta. At the same time the manuscript notes recorded by Sir Percy Cox and by Lieutenant-Colonel S. G. Knox, C.I.E., on the appearance of the plants in the field, their uses, vernacular names and such like were also sent. These notes have been reproduced with as little editing as possible, so that their practical value should not be impaired. The value of Sir Percy Cox's collection is greatly enhanced by his accurate record of Arabic and Persian plant names, which he has written in fully pointed naskh. This forms a welcome-contrast to the carelessness with which many collectors record vernacular names. He has also given romanised transcriptions of these names. It may be as well to point out for the benefit of those who have learnt languages in India, that Arabic scholars in transcribing often use different letters from those used in transcriptions from Indian languages such as Urdu. For example ق is often transcribed by 'g,' ض by 'th' etc.

The collection is necessarily not completely representative of the vegetation of the Zor Hills but is nevertheless of much interest. As might be expected from the climatic conditions the specimens show decidedly xerophilous characters. Some of the monocotyledons (*Gagea*) resemble bundles of wire. The species of *Haloxylon* are almost leafless. The Boraginaceae have rosettes of densely hairy leaves. The species of *Filago*, etc., are diminutive and wool-clad. The Cruciferae, which unfortunately comprise many undetermined specimens, show perhaps less xerophily than the others. This may be connected with the faculty possessed by annual cruciferous plants of completing their life history from seed to seed in very short periods. The rain falls, and the seeds germinate. During the few moist days the plants grow up and flower, and before drought again prevails, seed is already set.

A large number of the species included extend into the desert region of India. Some of the species have a wide range, seven of them belonging to the British Flora. These are:—

Cynodon dactylon Pers.

Silene conica L.

Papaver hybridum L.

Erodium cicutarium L.

Anagallis arvensis L.

Plantago coronopus L.

Filago germanica L.

All these plants except *Silene conica* and *Plantago coronopus* also extend into India.

A departure from the practice in previous numbers of the Records of the Botanical Survey has been made in arranging the plants according to Engler's System (Syll. ed vii.)

H. G. C.

ABBREVIATIONS.

- D. C. Prod.—*Prodomus Systematis Naturalis Regni Vegetabilis*.
D. E. P.—*Dictionary of the Economic Products of India* by George Watt.
E. P.—*Die Pflanzenfamilien*, by Engler and Prantl.
F. B. I.—*Flora of British India*, by Sir Joseph Hooker.
Fl. Or. —*Flora Orientalis*, by Edmond Boissier.
Forskål —*Flora Aegypto-Arabica*, by P. Forskål.
Muschler—*Manual Flora of Egypt*, by Dr. Reno Muschler.

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EUMYCETES.

FUNGI.

EDIBLE fungi are generally confined to *Basidiomycetes*. Koweit and the surrounding country are said to be full of fungi, many of which are edible and some of which form a regular article of trade in the local bazars. Of these the most important is "faga'ah" (فَقْعَه) which is sold in the Koweit bazar in large quantities. There are, however, two kinds of "faga'ah," one soft and crumply which is somewhat suggestive from the description of a *Phellorina* and the other harder and more compact. Another valuable kind is known as "fukaiah" (فُقَيْه) which is largely eaten in Koweit and by the English at Basra as truffles. These are generally to be found in the soils where "ragrōg" (رُقْرُوق) or *Helianthemum Lippii* Pers. grows and they are usually sought for in the mud plots between sandhills wherever this plant is met with. A smaller kind is known as the "birds' faga'ah". There are moreover plenty of the *Agaricaceae*, only one kind of which, picked up near Bunder Shwaik, seems to have come within the knowledge of Sir Percy Cox as good.

EMBRYOPHYTA SIPHONOGAMA.

ANGIOSPERMAE.

MONOCOTYLEDONEAE.

I—GRAMINACEAE.

1. *Zea* Linn.

1. *Zea Mays* L. Sp. Pl. 971. Not mentioned by Boissier or Muschler; F. B. I. VII, 102.

Local name.—Arab. “dhura” (ذُرَّة); Pers. “zurat shirbalal” (ذُرَّتْ شِيرْبَلَال): Eng. Maize, Indian Corn. Watt in the Dictionary of Economic Products gives Arabic names as “durah kizan”, and “durah shami.” Sir Percy Cox observes that the term “dhura” is applied with explanatory suffixes both to *Zea Mays* and to *Sorghum*.

Distrib.—Almost cosmopolitan in the state of cultivation. It may be of recent introduction to the Persian Gulf.

2. *Sorghum* Pers.

2. *Sorghum vulgare* Pers. Syn. I, 101.

S. annuum Pers. Fl. Or. V, 459.

Andropogon Sorghum Brot. Fl. Lus. I, 88; Fl. Br. Ind. VII, 183.

Also see Rendle's Catalogue of Welwitsch's African Plants.

Without locality or number.

Local name.—Arab. “idhra” (اذْرَة); Pers. “zurat” (ذُرَّتْ). According to Sir Percy Cox “dhura” is the general Arabic name for Jowari and also for Maize (see above).* Muschler and Watt both give “dhura” as one of the names for it.

Distrib.—Throughout the warmer parts of Europe, Asia, and Africa, also cultivated in North America.

It is a cultivated cereal, and, according to Boissier, is largely grown in Egypt, Persia and the entire Western Asiatic region. In Egypt Muschler found under cultivation only eight varieties, but in India there are innumerable varieties and forms of this grain in cultivation.

* Arabic ذُرَّة—an atom, particle, hence applied to grains.

3. *Panicum* Linn.

3. *Panicum miliaceum* L. Sp. Pl. 58. Fl. Or. V, 441; F. B. I. VII, 45.

Oman. Without number.

Local name.—Arab. and Pers. “dukhn” (دُخْن) or “sahwi”. The Arabic name “dukhn” appears to be generally known. It is quoted by A. DeCandolle in his Origin of Cultivated Plants, by Muschler, and by Watt in his Dictionary of Economic Products.

Distrib.—Syria, Egypt and N. Africa. It is cultivated in many parts of Europe and North Asia and almost throughout India.

4. *Pennisetum* Pers.

4. *Pennisetum typhoideum*. Rich. in Pers. Syn. I, 72; Fl. Or. V, 447; F. B. I. VII, 82.

Without locality or number.

Local name.—Arab. and Pers. “ilm” or “ulm” (إِلْم or اَلْم). In India it is called “bajri” or “bajra”. Muschler calls it “quasak” or “hema”.

Distrib.—S. Europe and N. Africa. In India found mostly in cultivation.

5. *Aristida* Linn.

5. ? *Aristida* sp.

Zor Hills. No. 56.

Local name.—“Nasi” (نَسِي). Muschler gives this name to two species of *Aristida*, viz., *A. plumosa* Linn. and *A. caloptila* Jaub. et Sp.

It is a common tufted grass of the Hazūm lands, growing as a rule on high ground and is collected in large quantities, dried and sold as hay.

6. *Bromus* Linn.

6. *Bromus tectorum* L. Sp. Pl. 77; Boiss. Fl. Or. V, 647; F. B. I. VII, 359. Zor Hills No. 53.

Local name.—Arab. “zirī'aah” (زِرِيْعَة).

Distrib.—Western and Northern Asia, Europe and N. Africa. In India it is found in the Western Himalayas. Though common by road-sides, etc., in N. Europe, it does not extend to Britain.

A grass growing like wild oats to about 10 inches or a foot high.

7. Cynodon Pers.

7. Cynodon dactylon Pers. Syn. I, 85; Boiss. Fl. Or. V, 553; F. B. I. VII, 288.

Without locality or number.

Local name.—“Najam”. Muschler gives the name as “negil” while Forskål has it as “nishil”.

Distrib.—Throughout all warm countries. Common in India where it is called Düb or Dürbā (**दूर्वा**).

Extends North to Holland and S. W. Britain.

8. Tetrapogon Desf.

8. Tetrapogon villosus Desf. Fl. Atlant. II, 388; Boiss. Fl. Or. V, 555.

Chloris villosa Pers. Syn. I, 87; F. B. I. VII, 291.

Without locality or number.

Local name.—“Sakhbar”.

Distribution.—In the desert regions of Persia westward to Arabia, Egypt and the Canary Islands. In India found in the Punjab and Rajputana.

9. Triticum Linn.

9. Triticum vulgare Vill. Hist. Pl. Dauph. II, 153; Boiss. Fl. Or. V, 672; F. B. I. VII, 367.

Without locality or number.

Local name.—Arab. “hantah” (**حنطة**) and Pers. “gandum” (**گندم**); Eng. Wheat. Watt quotes both names in his Dictionary of Economic Products. The Persian name is very near to the Sanskrit “godhūm” (**गोधूम**).

Distrib.—Cosmopolitan. In India grown in the more temperate parts.

10. Hordeum Linn.

10. Hordeum vulgare L. Sp. Pl. 84; Boiss. Fl. Or. V, 686 (excluding sp. vulgare); F. B. I. VII, 371.

Without locality or number.

Local name.—Arab. “shayer” (**شعير**) and Pers. “jau” (**جو**); Eng. Barley. Watt in his Dictionary of Economic Products gives both these names. Here also the Persian and Sanskrit names are very close “yava” (**यव**). Cultivated. In India it is grown chiefly in Upper India.

Distrib.—Cosmopolitan.

II—LILIACEÆ.

11. *Asphodelus* L.

11. *Asphodelus tenuifolius* Cav. in Anal. Cienc. Nat. III, (1801), 46 ; Fl. Or. V, 314 ; F. B. I. VI, 332.

Asphodelus clavatus Roxb. ex. Hook. f. in F. B. I. 1. c.
Zor Hills No. 20.

Local name.—“ Barwak ” (بَرَّوَق) Muschler confirms this as the generally accepted name. Forskål gives “buraq”.

Distrib.—Persia westward to Asia Minor and Western Arabia, Egypt and the Canary Islands. In India found in the plains from the Punjab to Bengal.

This plant grows to about 10 inches in height. The flowers have white stripes on a brownish pink ground. The leaves bunch up round the stalk and do not trail on the ground. Animals will not graze it. Men use it like No. 95 (see under *Matricaria*) to produce “igt”. Sometimes “Barwak” is used alone and sometimes *Matricaria* and sometimes both mixed together. In the Punjab the seeds of “Barwak” are sometimes used as food, especially during periods of scarcity.

12. *Gagea* Salisb.

12. *Gagea reticulata* (Pall.) Schult. Syst. Veg. VII (1829), 552 ; Fl. Or. V, 208 ; F. B. I. VI, 356.

Zor Hills No. 18.

Local name.—“ 'Anaisalân ” (عَيْصَلَان). Muschler calls it “za'eytemâm”.

Distrib.—From Persia westward to Greece, Turkistan and North Africa. In India it is found in the Punjab plains ascending to the Western Himalayas and the Salt Range.

Common in the plains. It is a low plant about 3 inches high with a rather large, yellow, usually solitary flower. It is somewhat star-shaped and is one of the first to appear in the spring. With the exception of the shape of flower, in general growth and appearance the plant resembles the English field *Crocus*. Men have no use for it and animals do not graze on it so that, in spite of its being so common, few Bedouins can name it.

III—IRIDACEÆ.

13. *Iris* Linn.

13. *Iris Sisyrinchium* L. Sp. Pl. I (1753), 59 ; Fl. Or. V, 120 ; F. B. I. VI, 272.

Zor Hills No. 74.

Local name.—“Isnainīra” (اِسْنَيْنِيرَة). Muschler gives it the names of “onsegl”, “kheyta”, “busseyl” and “zambaq”.

Distrib.—From Persia westward to Asia Minor and the Mediterranean region. Also in Afghanistan and Beluchistan. In India it is found only in the Punjab

A small plant with orange flowers. Is not known to be of any use. According to Muschler the bulbs are edible.

DICOTYLEDONEÆ.

IV—SALICACEÆ.

14. *Populus* Linn.

*14. *Populus* sp. probably *P. euphratica* Oliv. Voy. Atlas, III, 449 ; Fl. Or. IV, 1194 ; F. B. I. V., 638.

Without locality or number.

Local name.—Arab. “quāq” (قَواق); Pers. “dārsafeda” (دارسفید). In D. E. P. the term “safeda” is given as the general name for *Populus*, the prefix “dār” meaning a tree. Boissier, however, gives only the name “patta” by which the poplar is known in North-western India, Afghanistan, and Beluchistan.

Distrib.—Westward to Syria and Egypt, also in Central Asia. In India it is found along the Indus Valley and in the Punjab.

15. *Salix* Linn.

*15. *Salix* sp.

Without locality or number.

Local name.—Arab. “gharah” (غَرَب); Pers. “bed” (بید).

V—POLYGONACEÆ.

16. *Rumex* Linn.

16. *Rumex lacerus* Balb. in Mem. Acad. Turin. 335 ; Fl. Or. IV, 1017.

R. pictus Forsk. Flor. aeg.-arab LXV, No. 215, 77.

Zor Hills No. 47.

Local name.—“Hambasis” (حَبَبِصِيس). Muschler records it as “hommeyd”.

Distrib.—Asia Minor to Egypt.

This is a wild sorrel with a tiny pink flower, and resembles the English plant. Both animals and men eat it freely. Common.

17. *Rumex vesicarius* Linn. Sp. Pl. 336 ; Fl. Or. IV, 1017 ; F. B. I. V, 61.

Zor Hills No. 26.

Local name.—“Hammaith” (حَمَيْض). Muschler gives several similar names.

Distrib.—Arabia, Egypt and the Levant. In India it is indigenous in the Western Punjab and the Salt Range ; elsewhere cultivated.

The plant grows to about a foot high, and the flowers are reddish green. The leaves, stalks, etc., are succulent with an acid sorrel taste. It is fairly common, growing everywhere except in swamps. Animals graze on it and the Arabs, both Bedouins and townsmen, are very fond of it, eating it both fresh and cooked with meat.

In India it is used as a salad for its acid taste.

17. *Calligonum* Linn.

18. *Calligonum comosum* L'Hérit. in Trans. Linn. Soc. I, 180 ; Fl. Or. IV, 1,000.

Zor Hills and elsewhere. Without number.

Local name.—“Arta” also called “ghardak” (غَرْدَق). Both these names are given by Muschler, the former being the common Arabic name for this species.

Distrib.—Southern Persia, Arabia to Asia Minor and N. Africa.

It is common in the swamps and is grazed by camels.

18. *Polygonum* Linn.

19. *Polygonum afghanicum* Meissn. in DC. Prod. XIV, 90 ; Fl. Or. IV, 1041.

Zor Hills No. 43.

Local name.—“Makar” (مَكْر).

Distrib.—Formerly recorded of Afghanistan only.

A spreading plant with white flowers. Animals graze on it. The Bedouin women dry this plant and use it as a remedy for wounds and snake bite. They have the following saying about it :—

”لولا المكر ضاع الفكر” or “loola ul makar, zaya ul fikar” meaning “if we had not the 'makar,' we should be at our wits' end.”

VI—CHENOPODIACEAE.

19. Kochia Roth.

20. Kochia sp.

Zor Hills No. 75.

Local name.—“Shilwah” (شِلْوَه). Muschler does not give this name.

A thorny little plant lying almost flat on the soil and of no use to men or animals.

20. Arthrocnemum Moq.

* 21. *Arthrocnemum glaucum* Ung. Sternb. in Atti. Bot. Congr. Firenz. 1874, 283. (ex. sp. Delile); Fl. Or. IV, 932; F. B. I. V, 12.

Zor Hills. Without number.

Local name.—“Shinān” (شِنَان). Muschler corroborates this vernacular name. It is one of the Chenopodiaceous plants commonly included under the generic terms of “rimth” or “hamth” (رَمِث or حَمَض).

Distrib.—Western Asia, Arabia and the Mediterranean region. In India it is found in the Deccan Peninsula.

It belongs to the tribe *Salicorneæ* and is, as stated by Boissier, often confused with *Salicornia fruticosa* L.

The plant rises to the height of about 4 feet and its flowers are green. It is found round the “gasar” land in Central Arabia.

21. Schanginia C.A. Mey.

* 22. *Schanginia baccata* (Forsk.) Moq. in DC. Prod. XIII, 119; Fl. Or. IV, 944. Engler treats this genus under *Suaeda*.

Zor Hills. Without number.

Local name.—“Tahmah” or “suwwād” (طَحْمَه or سُوَاد).

Muschler quotes the former name.

Distrib.—Tropical Arabia to Egypt.

It is found chiefly in the swamps and the plant grows to the height of about 2 feet. Its flowers are dark in colour. Grazed by camels.

22. *Salsola* Linn.

* 23. *Salsola tetragona* Del. Fl. Egypt. 203 t. 21, f. 4; Fl. Or. IV, 957.

Boissier has included Forskål's *Salsola tetrandra* as a variety under *S. tetragona* Del. but Engler and Muschler have treated it as synonymous.

Zor Hills. Without number.

Local name.—“'Arād” (عَرَاد). Muschler gives this name.

Distrib.—Asia Minor, Arabia and Egypt.

It is a plant of compact growth reaching to the height of 2 feet. Flowers yellowish. Generally found in Saman and north of Batin.

* 24. *Salsola foetida* Del. Fl. Egypt. Illustr. No. 310; Fl. Or. IV, 961; F. B. I. V, 18.

Zor Hills. Without number.

Local name.—“Kharit” (خَرِيْط). Muschler and Boissier both give this name.

Distrib.—From Beluchistan to Arabia, Persia and N. Africa. In India it is found in the Punjab and the Upper Gangetic Plain.

This plant is confined to “hazum” lands (حَزْم) but is widespread in its locality. It rises to the height of about 2 feet and its flowers are green.

23. *Haloxylon* Bunge.

25. *Haloxylon salicornicum* Bunge in Boiss. Fl. Or. IV, 949; F. B. I. V, 16.

Oman. Without number.

Local name.—“Ramth” (رَمْت).

Distrib.—Afghanistan, Beluchistan and Persia.

26. *Haloxylon* sp.

Zor Hills. No. 27.

Local name.—“Rimth” (رِمْت).

This is the commonest of the many species of the “rimth” or “hamth” plants. It is whitish grey in colour and does not grow to more than 2 feet in height. It is eaten by camels.

27. *Haloxylon recurvum* Boiss. Fl. Or. IV, 949; F. B. I. V, 15.

Zor Hills. Without Number.

Local name.—“Haram” (هَرَم).

Distrib.—Afghanistan and Beluchistan. In India it is found in the Western Punjab Plains, the Salt Range, Sind and in parts of the Deccan.

This is the commonest shrub of the swamps. On this the camels feed, especially when they have got nothing better.

VII—CARYOPHYLLACEÆ.

24. *Silene* Linn.

28. *Silene conica* Linn. Sp. Pl. 418; Fl. Or. I, 578.

Zor Hills. No. 81

Local name.—“Tarbah” (تَرْبَه).

Distrib.—Asia Minor, Trans-Caucasia, Southern and Central Europe, Britain and North Africa.

A plant spreading along the ground and not rising above 3 inches. It loves the sand hills and is especially common round Thum Niga, the conspicuous sand hills, east of the Geishang Wells. It has white flowers. No use is known for it.

British specimens are usually about a foot high.

29. *Silene tenuis* Willd. Enum. Hort. Berol. 474; F. B. I. I, 219.

S. repens Boiss. Fl. Or. I, 614.

Zor Hills. No. 40.

Local name.—“Jaraisah” (جَرَّيسَه).

Distrib.—Armenia to Trans-Caucasia, Northern and Arctic Asia. In India it is found in the North-West Himalayas from Kumaun to Kashmir.

A common little plant about 8 inches high with white flowers. It grows everywhere except in swamps and is of no use or harm to men or animals.

VIII—PAPAVERACEÆ.

25. *Papaver* Linn.

30. *Papaver hybridum* Linn. Sp. Pl. 506; Fl. Or. I, 117; F. B. I. I, 117.

Zor Hills. No. 65.

Local name.—“Daidhān” (دَيْدَحَان). Forskāl calls it “abun-nom” which Muechler also quotes.

Distrib.—From the Punjab to South and Central Europe, Britain and North Africa.

A small poppy growing to a height of 6 inches, and fairly common in the “haz-um” lands (هَزُوم) and in open sandy plains. It has flowers purple-black in colour. It is much admired by the Bedouins for its beauty. Grazed on by animals.

IX—CRUCIFERÆ.

26. *Erucaria* Gaertn.

31. ? *Erucaria uncata* Boiss. Diagn. Ser. I, VIII, 47.

Hussonia uncata Boiss. Fl. Or. I, 367.

Zor Hills. No. 16.

Local name.—“Silih” (سليح). Muschler quotes it as “slih” but

he gives the same name to *Launea angustifolia* Muschler.

Distrib.—The deserts of North-Eastern Africa.

It grows to a height of 2 feet, bears handsome, mauve flowers and has a purplish stem, and not much leaf. It is common in plains and hills but not in swamps. It resembles “yahak” (يَهَق) (see *Chorispora* No. 39). The flowers have a fairly strong and sweet scent like but fainter than the scent of heliotrope. Camels are very fond of it. A fine study in contrasts is presented by the sight of a camel's head with a bunch of these handsome flowers protruding from its mouth.

27. *Carrichtera* Adans.

32. *Carrichtera vellæ* DC. Syst. Veg. II, 642; Fl. Or. I, 397.

C. annua L. Aschers. Ind. Sem. Hort. Berol, 13; Muschler Fl. Egypt, I, 417.

Zor Hills. No. 30.

Local name.—“Khishshain” (خيشين). Muschler calls it “qinebra” or “geleyqela”.

Distrib.—Persia to Asia Minor and parts of the Mediterranean region.

A small plant about 6 inches in height with small white flowers. Camels and other animals graze freely on it but men have no use for it. It grows everywhere except in swamps.

28. *Savignya* DC.

33. *Savignya aegyptiaca* DC. Syst. II, 283; Fl. Or. I, 397.

S. parviflora (Del.) Webb Fragm. aeg. (1854), 47; Muschler Fl. Egy. I, 417.

Zor Hills. No. 13.

Local name.—“Gulgulan” or “gulaijalān” (كُلْجَلَان or كَلْبَجَلَان). Muschler gives its name as “reshad gebely”.

Distrib.—Central and Eastern Persia, Arabia to the Suez and Lower Egypt.

It grows to the height of about 15 inches. This plant loves the pebbly plots of land known to the Bedouins as “hazam” (حَزْم) or “hazum” (حَزْم) but it also grows in sand. The flowers are small and pink. The distinctive characteristics of the plant are the flat oval green seeds growing side by side and far more numerous than the flowers. The light feathery nature of the stalk and branches is another distinctive feature. Men do not eat this plant, but camels are very fond of it and it is very good for them. An ancient Sulabi leech of some note, living at the time of Bani Hallal, one Rūshid-ul-Khalāwi (راشد الخلاوي) made up the following doggerel lines about this plant which every Bedouin knows:—

إلى طار حُب الكَلَيْجَلانِ وَ دُرُجِنِ
فُرُوقِ القَطِّ أَلْتَمَّ شَمْلُ القَبَائِلِ

Ali tar hubb ul gulaijalan o dur jun
Fooruq ul kat ul tam shamal ul kabbayal

Roughly translated it means “when the seeds of ‘gulaijalan’ fly and the young of the sand-grouse run along the ground (i.e. when the hot weather has set in), there is gathering together of the tribes (because they can no longer wander about independently in the desert, but must gather near the wells)”.

29. *Diplotaxis* DC.

34. *Diplotaxis* sp.

Zor Hills. No. 29.

Local name.—“Khafsh” (خَفْش).

A plant about 2 feet high. It resembles the mustard and bears yellow flowers. The leaves and seeds are hot to the taste. Camels are very fond of it and it is said to increase their milk. Other animals also graze on it freely, but men have no use for it. It grows everywhere except in swamps and is very common.

30. *Notoceras* Br.

35. *Notoceras canariense* R. Br. in Ait. Hort. Kew ed. II, iv, 117; Fl. Or. I, 314; F. B. I. I, 140.

N. bicornis (R. Br.) Caruel Flor. Toscan. (1860), 536; Muschler, Fl. Egy. I, 403.

Zor Hills. No. 78.

No local name.

Distrib.—From the Punjab to N. Africa, Southern Spain and the Canary Islands.

A plant resembling “hasār” (حَسَار), another cruciferous plant, with which it grows on sandy plains in close company (s. e No. 41).

31. *Malcolmia* Br.

36. *Malcolmia torulosa* Boiss. Fl. Or. I, 225 ; F. B. I. I, 146.

Zor Hills, No. 60.

Local name.—“ Haraf ” (حَرْف).

Distrib.—From West Persia to Syria and North Africa. In India found in the Punjab.

A small plant not unlike “ khafsh ” (see No. 34) in general appearance and manner of growth. It has small white flowers, height about 6 inches, and is fairly common.

32. *Leptaleum* DC.

37. *Leptaleum filifolius* DC.—Syst. II, 511 ; Fl. Or. I, 243.

L. pygmaeum DC. Syst. II, 511.

Zor Hills. No. 69.

No local name.—Muschler calls it “ qeseysa ”.

Distrib.—Southern and Eastern Persia to Syria and Trans-Caucasia, Turkestan and the Eastern Mediterranean region. De Candolle also records it of Siberia.

This plant is not common in Koweit and the Bedouins do not know of any use for it.

33. *Matthiola* Br.

38. *Matthiola oxyceras* DC. Syst. II, 173 ; Fl. Or. I, 155.

Zor Hills. No. 2.

Local name.—“ Shigāra ” (شِقَارَة). Muschler gives the name “ shegāra ” to *Matthiola humilis* DC. while *M. oxyceras* he calls “ manthûr.” It has, however, to be noted that the same name of “ manthûr ” is applied by him to *M. incana* R. Br. as also to *Cheiranthus Chieri* L. and *Nasturtium palustre* DC.

Distrib.—From Southern Persia to Asiatic Turkey and Trans-Caucasia, Arabia, Egypt and Cyprus.

The plant grows to about 12 inches in height. The corolla has 4 inch long wrinkled petals, is very variable in colour from dark mauve to pink and even white, but the dark coloured blossoms have generally a white centre with the colour darkening to the tips. From one to six stems may spring from a single root. The species is very common except in swamps and would be a handsome addition to garden cultivation. Camels, the milk of which it flavours, are fond of it. No other use is known for it. This species is reported as an escape on cultivated lands in Syria and Damascus.

34. *Chorispora*. DC.

39. *Chorispora syriaca*. Boiss. Ann. Sc. Nat. 1842, 384 ; Fl. Or. I, 143.

Zor Hills. No. 59.

Local name.—“Yahak” (يَهَق).

Distrib.—Asia Minor.

A plant with mauve flowers strongly sweet-scented. It grows in sand and camels graze on it. Bedouins do not generally recognise the plant. It is more common near Basra and was first noticed at Satra.

40. *Cruciferae*. Sp ?

Zor Hills. No. 21.

Local name.—“Haraisha” (حَرَيْشَه).

It is a plant resembling “rai” (*Brassica juncea* H. F. and T.). In this locality it seldom grows to over 2 feet but in favourable localities, such as the Batin, it reaches to about 3 feet. The flowers are yellow. The leaves are broad and hairy, lying flat on the ground and radiating from a central root. Men do not use it but camels are very fond of it and it is said to be good for them. It is very common and is indeed the staple food of the camels during the “Ayyām-ur-Rabia” after “hamz” (gram) and

“arfaj” (*Centaurea* sp.) (عَرَفَج and حَمَف).

41. *Cruciferae*. Not identifiable.

Zor Hills. No. 45.

Local name.—“Hasār” (حَسَار).

A bushy plant with tiny white flowers which somewhat resemble those of *Notoceras* but its leaves and habit are quite different.

X—RESEDACEÆ.

35. *Reseda* Linn.

42. *Reseda Aucheri* Boiss. Diagn. Ser. I, 1, 5 ; Fl. Or. I, 434 ; F.B.I. I, 181.

Zor Hills. No. 5.

Local name.—“Thinibān” (ذِنْبَان).

Distrib.—East Persia to Asia Minor. In India it occurs only in Sind where Stocks found it.

This plant reaches its full height at about 8 inches and the flowers seem to have a faint resemblance to the English mignonette. Its habit is also very similar and though no scent has been detected there is a report that the flowers when fresh are sweet scented. It is found in stony soil, sand hills, sandy plains and rocks but never in swamps. Animals graze on it freely but men have no use for it.

XI—ROSACEÆ.

36. *Neurada* Linn.

*43. *Neurada procumbens* Linn. Sp. Pl. 441 ; Fl. Or. II, 735 ; F. B. I. II, 368.

Zor Hills. No. 44.

Local name.—“ S’adān ” (سَعْدَان). Muschler also gives this name.

Distrib.—From Sind and the Punjab to North Africa and Afghanistan.

A curious little plant, whitish grey in colour and spreading along the ground. It bears a thorny fruit round, flat, and hard which is eaten by men when young and fresh. Animals graze on it freely. The spreading arms of the plant sometimes run to 18 inches along the ground. The seed germinates on the fruit which remains as a collar around the top of the root of the mature plant.

XII—LEGUMINOSÆ.

SUB FAMILY I. MIMOSOIDEÆ.

37. *Acacia* Linn.

*44. *Acacia Seyal* Del. Fl. Aeg. 286, t. 52 f. 2 ; Fl. Or. II, 636.

Without locality or number.

Local name.—“ Talh ” (طَلْح). Muschler states that the name “ talh ” is generally given to *Acacia Seyal* and occasionally to the closely allied species of *A. tortilis* Hayne which is often confused with it.

Distrib.—Arabia, Upper Egypt and N. Africa.

This tree is prized for the good quality of gum arabic that it yields which is a valuable article of export.

45. *Acacia Farnesiana* Willd. Sp. Pl. IV, 1083 ; Fl. Or. II, 637 ; F. B. I. II, 292.

Without locality or number.

Local name.—“ Karat ” (كَرَات). Sir Percy Cox gives this name to another species of *Acacia* (see No. 47.)

Distrib.—Cosmopolitan throughout the tropics.

Boissier records it of Syria, Babylon and Egypt where probably it had originally been cultivated but has become naturalised to such an extent as to appear native.

46. *Acacia Jacquemontii* Bth. in Hook Lond. Journ. Bot. I, 499 ; F. B. I. II, 293.

Without locality or number.

Local name.—“ Babul ” (بَبُول).

Distrib.—Arabia and Afghanistan. In India it is found only in Upper India.

Boissier does not record *A. Jacquemontii* but quotes *A. eburnea* which has generally the same habit, differing chiefly in the pod.

47. *Acacia* sp.

Oman. Without number.

Local name.—Arab. “ ghaf ” (غَاف); Pers. “ karat ” (كَرَات).

Muschler gives “ qarad ” (pods) as the name for *Acacia arabica* Willd var. *nilotica* Forsh.

Sir Percy Cox suggests that it may be *Acacia arabica* Willd. but Boissier does not mention the occurrence of this species in West Asia. It has, however, been found in Egypt, Abyssinia and Nubia.

48. *Acacia* sp.

Oman. Without number.

Local name.—Arab. “ samr ” (صَمْر) Pers. “ babul ” (بَبُول). Sir Percy Cox calls it *Acacia vera* Willd. which is a synonym for *Acacia arabica* Willd. Muschler, however, identifies “ samr ” or “ sammur ” with *A. spirocarpa* Hochst which is indigenous to Arabia Petraea.

SUB FAMILY II. CÆSALPINIOIDÆ.

38. *Cassia* Linn.

49. *Cassia obovata* Collad. Hist. Cass. 92, t. 15 ; Fl. Or. II, 631 ; F. B. I. II, 264.

Oman. Without number. No local name.

Distrib.—Persia to North Africa and Beluchistan. In India it is found in the Punjab, Sindh and South India.

In India it is sometimes called country Senna and is occasionally to be seen in the bazars.

SUB FAMILY III. PAPILIONATÆ.

39. *Trigonella* Linn.

50. *Trigonella polycerata* L. Sp. Pl. 777 ; F. B. I. II, 87.

T. brahūica Boiss. Fl. Or. II, 73.

Zor Hills. No. 66.

Local name.—"Nifal" (نفل). Muschler gives this name ("nifl") to *T. maritima* Del.

Distrib.—Western Asia, Southern Europe and Siberia. In India it is found in the Punjab and the Upper Gangetic Plain.

A handsome little vetch-like plant about 8 inches in height with yellow flowers. It somewhat resembles "umm ukhwaitim" (see No. 53), but is easily recognised by the Bedouins.

51. ? *Trigonella media* Del. Fl. Aeg. Illstr. 71; Fl. Or. Supp. p. 162.
Zor Hills. No. 58.

Local name.—"Handakük" (حَدُّ قُرُق) and "umm a'ayainah" (أم آعِينَه). Muschler corroborates the former name but records it as known only from Egypt. Sir Percy Cox observes that he has no confidence in either name.

Distrib.—Egypt.

A handsome little yellow vetch. It grows upright on a slender stalk to a height of 6 inches. Though not rare, most Bedouins deny any knowledge of this plant.

40. *Medicago* Linn.

52. *Medicago laciniata* All. Ped. I, 316; Fl. Or. II, 104; F. B. I. II, 90.

Without locality or number.

Local name.—"Nafal" and "kataifi." Muschler quotes the vernacular name of "nefl" for several species of *Medicago*.

Distrib.—From the Punjab to the Mediterranean region and North Africa.

53. *Medicago* sp.

Zor Hills. No. 34.

Local name.—"Umm ukhwaitim" (أم أَخْوَيْتِم). Mother of Rings.

A white flowering vetch, the fruits of which are said to resemble rings, whence the name. It is eaten by many animals but men have no use for it. It grows on the plains, hills and sand hills and is fairly common.

41. *Alhagi* Desv.

*54. *Alhagi maurorum* Desv. Journ. I, 120, t. 4; Fl. Or. II, 558
F. B. I. II, 145.

Without locality or number.

Local name.—Arab. “agul” (عاقول) ; Pers. “khār-i-shutur” (خارشتر).

To the English it is generally known as the “Camel Thorn”. Boissier gives “aqual” and “hadz” as the Arabic names for this plant while Muschler gives only “aqual.” These names are also found in Watt’s D. E. P.

Distrib.—Southern Persia to Egypt. In India found in the north-western and Upper Gangetic plains, also in the Concan.

A valuable fodder for camels. Its manna is a well known article of export.

42. Cicer Linn.

*55. *Cicer arietinum* Linn. Sp. Pl. 738 ; Fl. Or. II, 560 ; F. B. I. II, 176.

Without locality or number.

Local name.—Arab. “hamas” (هَمَص) or “nakhi” (نَخِي) ; Pers. “nakhūd” (نَخُود) ; English “gram”. According to Muschler the name “hommus” is applied to the seeds only while the plant is known as “melaneh”.

Distrib.—Western Asia, the Mediterranean region, North Africa, Afghanistan but commonly met with in a state of cultivation.

43. Vicia Linn.

*56. *Vicia* sp.

Without locality or number.

Local name.—“Bāqla” (باقله). Sir Percy Cox calls it the “Broad Bean” which is *Vicia Faba* L. In India the name “bakla” is generally given to *Vicia Faba* L. though Forskål applies to *Vicia lutea* the name of “bakhra”.

Distrib.—Cultivated everywhere.

44. Phaseolus Linn.

This genus is not included by Boissier or Muschler. The following species are probably recent introductions.

*57. *Phaseolus mungo* L. Mant. I. 101 ; F. B. I. II, 203 ; Prain’s Bengal plants, I, 387.

Without locality or number.

Local name.—Arab. “Māsh” (ماش); Pers. “mashaq” (ماشک)

The above two names have probably been transposed; “māsh” is the common Persian name for this plant. Sir Percy Cox calls it the “Black Vetch.” In India the name “māsh” is uniformly applied to *Phaseolus mungo* L. (the black seeded kind).

Distrib.—Throughout the Eastern Tropics.

*58. *Phaseolus vulgaris* Linn. Sp. Pl. 723; F. B. I. II, 200.

Without locality or number.

Local name.—Arab. “lubi”; Pers. “lubia” (P. لوبيا; A. لوبي).

Sir Percy Cox calls it the “Kidney Bean”; but according to Muschler the name “lubia” is generally given to *Dolichos Lablab* L.

Distrib.—Cosmopolitan. Known only in cultivation.

*59 *Phaseolus multiflorus* Willd. Sp. Pl. III, 1030; F. B. I. II, 200.

Without locality or number

Local name.—Arab. “lubi ahmur” (لوبيا احمر); Pers. “lubia kirmiz” (لوبيا قرمز) the red “lubia”. Sir Percy Cox calls it the Scarlet Runner.

45. *Dolichos* Linn.

*60. *Dolichos Lablab* L. Sp. Pl. 725; F. B. I. II, 209.

Boissier does not mention this genus in the text of his *Flora Orientalis* but in the Appendix quotes “liblab” as the Arabic name for the plant. Muschler quotes both “lubia” and “liblab”

Without locality or number.

Local name.—“Lubia” (see remarks above). In India it is very common and is cultivated in a large number of forms.

Distrib.—Throughout the tropics in the old world.

XIII—GERANIACEÆ.

46. *Erodium* L' Herit.

61. *Erodium cicutarium* L' Hér. Géranicol. 5, No. 12; Fl. Or. I, 890; F. B. I. I, 434.

Zor Hills. Nos. 17, 19 and 42.

Local name.—“Ragam” “garsh” and “bisbās” (بِسْبَاس - قَرَش - رَقْم).

Distrib.—From Persia to N. Africa and throughout the temperate parts of N. Asia and of Europe. Very common on the coasts of Great Britain. In India it is found in the North-Western India from Sind to the Punjab. Elsewhere introduced.

A low spreading herb growing from 6 to 8 inches with deep cut leaves somewhat like parsley and a thin pink root running deep into the soil. It is very common on "huz-nm" lands and low hills. Both men and animals eat the plant, particularly the Arabs who eat it raw. The long pointed fruits are characteristic.

VIV—ZYGOPHYLLACEÆ.

47. Fagonia Tourn.

62. *Fagonia Bruguieri* DC. Prod. I, 704; Fl. Or. I, 905; F. B. I. I, 425.

Zor Hills. No. 23.

Local name.—"Jambah" (جَبْهَة) or "shacha'ah" (شَجَا'اه).

Distrib.—Southern Persia to Asia Minor and Westward to Algeria. N. W. India.

A thorny plant spreading along the ground and covering it like a carpet, sometimes enclosing a space of 18 inches in diameter. It has tiny pink flowers. Camels will feed on it when hungry but not readily. It is of no use to men.

48. Tribulus Linn.

*63. *Tribulus terrestris* L. Sp. Pl. 387; Fl. Or. I, 902; F. B. I. I, 423.

Thaffir and Agnian country. Without number.

Local name.—"Gathā" (قُضَا). Muschler gives this name both to *T. terrestris* L. and *T. alatus* Del.

Distrib.—Throughout the warm regions of the globe.

This plant was not found in Koweit, but in the localities mentioned above. It reaches about 10 ft. in length, trailing along the ground and is one of the commonest plants in the swamps. Camels graze on it occasionally. In India the fruits and seeds are deemed to be of medicinal value.

XV—EUPHORBIACEÆ.

49. Euphorbia Linn.

64. *Euphorbia Emodi* Hook. f. F. B. I. V, 250.

Zor Hills. No. 28.

Local name.—"Ghazālah" (غَزَالَه) also called "khannaiz" (خَنْيَز)

Distrib.—Afghanistan. N. W. India.

It is a tiny shrub growing not higher than 2 to 4 inches. It bears small white flowers and fruits that are said to act as a violent purgative. It is fairly common in the locality.

65. *Euphorbia dracunculoides* Lam. Encyc. II, 428; Fl. Or. IV, 1110; F. B. I. V, 262.

Zor Hills. No. 71.

Local name.—“Khamṣān” (خمسان); it is also occasionally called “ghazāla” (see above No. 64).

Distrib.—Arabia and Tropical North-Africa. In India it is found in the plains and low hills from the Punjab to Behar and southwards to Concan and the Coromandel.

A small plant growing to about 12 inches in height and bearing small angular fruits of the size of peas. These act as a violent purgative.

XVI—RHAMNACEÆ.

50. *Zizyphus* Linn.

66. *Zizyphus Spina-Christi* Willd. Sp. Pl. I, 1105; Fl. Or. II, 13; F. B. I. I, 637.

Zor Hills and elsewhere; without number.

Local name.—Arab “sidr” or “sadr” (سدر). The fruits are called “nebek” or “nabq” (نبق); Persian “kunar” (کنار). Boissier and Muschler quote both the Arabic names.

Distrib.—Persia to Asia Minor and Egypt. Also Afghanistan, Bēluchistan and North-West India where it is cultivated.

Aga Kazim Shirazi of the Board of Examiners, Calcutta, has given the following note about the “sadr” :—

“Sidrat-ul-Muntaha” (سدرۃالمنتهی), lit. the “Lote tree of the extremity”. A tree in the seventh heaven, having its roots in the sixth. It is situated on the right-hand side of عرش “arsh” (Throne of God) and is the seat of angel Gabriel. This tree is mentioned twice in the Qur’an, Sūrah LIII, 8-18. Its fruits were like water-pots, and its leaves like elephant’s ears (Mishkāt).

The “sidr” tree is called “ber” in India. A decoction of its leaves is used by Muslims to wash the dead, on account of the sacredness of the tree.

XVII—MALVACEÆ.

51. *Malva* Linn.

67. *Malva verticellata* L. Sp. Pl. 689; F. B. I. I, 320.

Without locality or number.

Distrib.—Throughout Western Asia and Europe. It occurs in Upper India and is much cultivated as a vegetable in Assam.

68. ? *Malva* sp.

Zor Hills. No. 46.

Local name.—“Khubbaiz” (*خُبَيْز*) applied to the raw plant, and “tūlah” (*تُولَه*) applied to the cooked plant. Muschler gives “khubbaiz” as the name of *Malva parviflora* L.

This common weed, resembling a mallow with pink flowers, grows up to a height of 12 inches. The specimen was from Basra, but on every dung heap round Koweit, after a little rain, the plant at once sprouts thickly growing where no other weed or grass will grow.

Animals graze on it freely and the Persians are very fond of the cooked leaves.

69. *Malvaceæ* ?—Indeterminable.

Zor Hills. No. 39.

Local name.—“Garnah” (*قَرْنَه*). The name “garniya” is given by Muschler to *Pelargonium zonale* Willd. which is abundant in the Levantine region.

This plant grows chiefly on “hazum” land to about 6 inches in height and the leaves grow out in a rosette from a fusiform root that runs deep into the soil. The root is red and is largely used for tanning hides and skins. The process generally adopted is as follows:—The roots are boiled in water and the skins are placed in the water before it cools, and are left for 2 or 3 days. The process takes away the evil smell of the hide, softens and strengthens it and gives it a red colour. The plant is eaten by grazing animals.

XVIII—TAMARICACEÆ.

52. *Tamarix* Linn.

70. *Tamarix articulata* Vahl. Symb. Bot. II, 48 t. 32; Fl. Or. I, 777; F. B. I. I, 249.

Bushire. Without number.

Local name.—Arab. “tarfā” (*طرفا*); Pers. “gaz” (*گز*). Muschler calls this species by the name of “athl” which according to our specimen belongs to the following species.

Distrib.—From Beluchistan to Egypt and S. Africa. In India it is abundant in the Punjab and in Sind.

71. *Tamarix macrocarpa* Bunge. Tent. Gen. Tamaric. (1852) 79; Fl. Or. I, 779.

Koweit. Without number.

Local name.—Arab. “ithl” (*اثل*). Pers. “gaz” (*گز*) See above

No. 70.

Distrib.—From Persia to Arabia and Egypt.

Said to be a common species of *Tamarix* in this locality. Sir Percy Cox calls it the dwarf tamarisk, and says that it grows by the seaside. He associates it with *T. indica* Willd.

*72. *Tamarix* sp. ?

Zor Hills ; without number.

Local name.—Arab. “tarfā” (طرفا) Pers. “gaz” (جاز). Muschler assigns the name “tarfā” to *T. tetragyna* Ehrenb. which according to Boissier occurs in Arabia, Mesopotamia and Egypt.

The commonest species in the Zor Hills.

XIX—CISTACEÆ.

53. *Helianthemum* Pers.

73. *Helianthemum salicifolium* L. Mill. Gard. Dict. ed. VIII, 21 ; Fl. Or. I, 441.

Zor Hills. No. 64.

Local name.—“Jarraid” (جرید) .

Distrib.—Persia to Asia Minor, the Mediterranean region and Central Europe.

This is not a common plant but is apparently somewhat prized by the Bedouins. Its uses, however, are not generally known.

74. *Helianthemum Lippii* Pers. Syn. II, 78 ; Fl. Or. I, 443.

Zor Hills. No. 35.

Local name.—“Ragrög”, (رقرق) . Muschler gives it the name of “ralah” or “ra'al”.

Distrib.—Persia to Asia Minor and Egypt. A variety of this species was discovered by Stocks in Beluchistan.

It is a small plant with a woody stock, small yellow flowers, and fruits of the size of a pepper corn which at first are reddish yellow but dry into a neutral whitish tinge. It grows in mud plots between sand hills. All kinds of grazing animals feed on it. It is believed that the land where it grows is sure to produce large quantities of the edible fungi called “fukaiah,” (فُقَعَاهُ) which the English at Basrah eat as truffles.

XX—PRIMULACEÆ

54. *Anagallis* Linn.

75. *Anagallis arvensis* L. Sp. Pl. 148 ; Fl. Or. IV, 6 ; F. B. I. III, 506.

Zor Hills. No. 68.

Distrib.—Cosmopolitan. Two forms occur—one with scarlet flowers (*A. phoenicea* Scop, the Scarlet Pimpernel) and the other with sky blue flowers mentioned above (*A. cærulea* Lam.)

Local name.—Not known.

It is a tiny plant with handsome blue flowers exceedingly common in the sea coast. It has also been observed in Basra. It is a rather conspicuous plant and is poisonous to stock.

XXI—PLUMBAGINACEÆ.

55. *Statice* Linn.

76. *Statice suffruticosa* Linn. Sp. Pl. 276 ; Fl. Or. IV, 867.

Without locality or number.

Local name.—"Kataf".

Distrib.—Afghanistan, Caucasia, N. Turkestan, Southern Russia and Siberia.

XXII—APOCYNACEÆ.

56. *Nerium* Linn.

*77. *Nerium Oleander* Linn. Sp. Pl. 209 ; Fl. Or. IV, 47 ; F. B. I. III, 655.

Koweit ; without number.

Local name.—Arab. "daflah" or "dafā" (دَفْلَه or دَفْلِي) ; Pers. "khar zahara" (خَرْزَهْرَه), the latter word meaning the "Asses' bane" which agrees with the name the Italians give to Oleander, viz. "Amnaya d'assino." Muschler corroborates the Arabic name while both are quoted in Watt's D. E. P.

Distrib.—Asia Minor to the Mediterranean region. In India found occasionally as a garden plant.

XXIII—ASCLEPIADACEÆ.

57. *Orthanthera* Wight.

78. *Orthanthera viminea* Wight and Arn. Contrib. 48 ; F. B. I., IV, 64. Not mentioned by Boissier.

Without locality, number or local names.

Distrib.—N.W. India and Beluchistan.

In Beluchistan, as in India, this plant is known as "khip." It is believed to be a good fodder for camels staving off thirst for a long time. Ropes of the fibre of this plant withstand moisture and are good for Persian wheels.

XXIV—BORAGINACEÆ.

58. *Paracaryum* Boiss.

79. *Paracaryum microcarpum* Boiss. Diagn. Ser. II, 3, 139; Fl. Or. IV, 255; F. B. I. IV, 162.

Zor Hills. No. 77.

Local name.—“Fakīkah” (فَكِيكَة).

Distrib.—Afghanistan. In India found in Kashmir and the sub-alpine Western Himalayas.

A plant resembling “hamāt” (see under *Anchusa* No. 82) in general appearance and growth. It has tiny blue flowers and grows on sandy plains.

59. *Echinospermum* Swartz.

80. *Echinospermum minimum* Lehm. Asperif. 126; F. B. I., IV, 162; near *E. Szovitsianum* Fisch. and Mey., Fl. Or. IV, 248. Engler and Prantl place it under *Lappula*.

Zor Hills. No. 61.

Local name.—Not known.

Distrib.—Kashmir, Afghanistan and Beluchistan to the Ural and Altai Mountains.

This plant bears small white flowers. It is not quite uncommon and several plants of it were found growing in the locality where it was observed, but the Arabs, even those desert born, could not identify it nor specify its uses.

60. *Anchusa* Linn.

81. *Anchusa hispida* Forsk. Fl. Aegypt. Arab. 40; Fl. Or. IV, 158.

Zor Hills. No. 31.

Local name.—“Chahīl” (چَهِيل) (*cf.* No. 83.) Muschler gives it the name “qir’i.”

Distrib.—From Persia to Asia Minor, Western Arabia, Egypt and North Africa; also found in Afghanistan and Beluchistan.

It is a plant spreading along the ground, with tiny flowers which are seldom more than 2 to 3 inches from the ground. The colour of the flower varies from pink and blue to white on the same plant. The leaves are very hairy but camels and sheep graze on it freely. It does not appear to be of any use to men.

82. *Anchusa* sp.

Zor Hills. No. 73.

Local name.—“Hamāt” (حمات)

A hairy spreading plant with leaves lying very fiat on the sand and radiating from one central root that runs deep into the soil. The flowers are pink. It is fairly common and is invariably found on sand hills. Animals graze on it but men have no use for it.

61. *Nonnea Medic.* (*Nonea Moench.*)

83. *Nonnea picta* Sweet. Hort. Brit. ed. I, 292 ; Fl. Or IV, 166.
Zor Hills. No. 9.

Local name.—“Chahal” (چاهال). This vernacular name differs little from that applied to *Anchusa hispida* Forsk. (cf. No. 81).

Distrib.—From Persia westward to Armenia, Trans-Caucasia, Eastern and Southern Russia. Also in Afghanistan and Beluchistan.

The plant, at its full height, reaches to about one foot. It grows in clumps and has small yellow flowers. It is found everywhere except in swamps. Camels graze on it readily but men have no use for it.

XXV—LABIATE.

62. *Teucrium Tournef.*

84. *Teucrium sinaicum* Boiss. Diagn. Ser. I, 12, 91 ; Fl. Or. IV, 822.
Zor Hills. No. 41.

Local name.—“J’adah” (جعدة). Boissier gives this name (“jaada”) but Muschler gives the same name (“jaade”) to *Ajuga Iva* Schrb., an allied Egyptian plant.

Distrib.—Known chiefly in Arabia Petraea.

A bush about the size of the “arafij” (see under *Centaurea* No. 98), growing to 2 feet high. It bears a white flower. The leaves are greyish white and give forth, when crushed, a characteristic scent. The growth is peculiar. Long roots work out from a central root and each branch root carries innumerable stalks of the plant. It is generally found in the sandy torrent beds as they work down to the sea and is especially common round Sabr’a. All grazing animals except horses and donkeys feed on it. Both Bedouins and townsmen use the leaves boiled up with limes as a cooling draught in fever. Bedouins also dry the leaves and smoke them as tobacco.

XXVI—SCROPHULARIACEÆ.

63. *Scrophularia Linn.*

85. *Scrophularia lucida* Linn. Syst. ed. X, 1114 ; Fl. Or. IV, 403 ;
F. B. I. IV, 256
Zor Hills, without number or local name.

Distrib.—Asia Minor to Italy. W. Himalayas.

This small shrub has a long spreading root that goes deep into the soil.

XXVII—PLANTAGINACEÆ.

64. *Plantago* Linn.

86. *Plantago Loefflingii* Linn. Sp. Pl., 115; Fl. Or. IV, 883.

Zor Hills. No. 50.

Local name.—“Asab’i ul’urūs” (أصابع العروس) which means “bridegroom’s fingers”.

Distrib.—From Persia westward to Asia Minor and Greece, North Africa and the interior of Spain.

It is easily distinguished from the following species of *Plantago* (see below) in having the club-shaped seeds longer than in those two. The leaves are curiously toothed or spiked. The seeds are eaten by the Arabs like those of *P. ovata* Forsk. The plant is not common.

87. *Plantago ovata* Forsk. Fl. Aegypt. Arab. 31; Fl. Or. IV, 885; F.B.I. IV, 707.

Zor Hills. No. 79.

Local name.—“Braiḥō” (بريهو). In India it is generally known under the name of “Ispaghul” (اسپغول), a word said to be derived from Pers. “asp” (اسپ) a “horse” and Arab. “ghol” (غول) an “ear” in allusion to shape of the leaves.

Distrib.—From Persia to Spain and the Canaries. In India in the Punjab and in the low hills westwards from the Sutlej.

This plant closely resembles the above species but its flower-heads are shorter and rounder while its leaves are very thin like hairs and entire. The seeds are used by the Arabs as a laxative. They are demulcent and are official in the British Pharmacopœia (1914) under the name of “Ispaghula”. They are often called “Spogel” seeds.

88. *Plantago Coronopus* Linn. Sp. Pl. 115; Fl. Or. IV, 888.

Zor Hills. No. 10.

Local name.—“Riblah” (ربلاه).

Distrib.—From Persia westward to Asia Minor, the Mediterranean region and Egypt, also Afghanistan. Common in England especially by the sea and known as “Stag’s Horn Plantain”.

A grasslike plant that never grows to over 4 inches in height. It is found everywhere except in swamps and is eaten by the Arabs. All grazing animals feed on it.

XXVIII—RUBIACEÆ.

65. *Randia* Linn.89. *Randia* sp.

Koweit. Without number or notes.

XXIX—DIPSACEÆ.

66. *Scabiosa* Linn.90. *Scabiosa rotata* Bieb. Fl. Taur. Cauc: III, 102; Fl. Or. III, 145.
Zor Hills. No. 11.

Local name.—“ Tarbah ” (تَرْبَاهُ). This vernacular name is stated to be very doubtful as the plant recognised as true “tarbah” has been identified as *Silene conica* L. (see No. 28).

Distrib.—Southern Persia and Caucasia.

It is a sand-hill plant growing about 8 inches in height and bears large white flower-heads, somewhat sweet scented. Several specimens of it were found near the Zor Hills but the plant does not appear to be common. It is of no known use.

XXX—COMPOSITÆ

67. *Ifloga* Cass.91. *Ifloga spicata* Sch. Bip. Webb. and Berth. Phyt. Canar. 11, 310;
Fl. Or. III, 248.

I. Fontanesii Cass. Dict. Sc. Nat. XXIII, 14; F. B. I. III, 277.

I. cauliflora Clarke Comp. Ind. 99.

Zor Hills. No. 63.

Local name.—“ Hasach ” (حَسَاح).

Distrib.—From Persia westward to the Canary Islands, Afghanistan, Beluchistan and N. W. India.

A plant growing to barely 4 inches with a simple stem and narrow leaves growing horizontally. Grazing animals feed on it.

68. *Filago* Linn.92. *Filago germanica* L. Sp. Pl. II, 1311; Fl. Or. III, 246; F. B. I. III, 277.

Zor Hills. No. 70.

Local name.—“ Kattain ” (قَطِين). *Muschler calls it “kurbat.”

* Arabic قطن cotton. The plant is covered with cottony hairs. Compare the latin name “Filago” from “filum” a thread.

Distrib.—From Persia westward to the Canaries. Found in India in the plains and hills of the N. W. India. Common in England and known as “Cudweed.”

This species grows in sandy soils and is common round Gishāniya but has not been observed further south. It is easily confounded with another plant called “saadān,” “s’adān” *Neurada procumbens* L. (No. 43).

69. Pulicaria Gaertn.

93. *Pulicaria gnaphalodes* Boiss. *Diagn. Ser. I, VI, 76; Fl. Or. III, 203; F. B. I. III, 299.*

Without locality or number.

Local name.—“Nafeej”.

Distrib.—Persia, Turkistan and Afghanistan.

70. Anthemis Linn.

94. *Anthemis odontostephana* Boiss. *Diagn. Ser. I, VI, 85; Fl. Or. III, 319; F. B. I. III, 312.*

Zor Hills, No. 37.

Local name.—“Chahwiyān.” (چَهْوَيَان).

Distrib.—Persia, Afghanistan and Beluchistan. In India found in Sind and the Punjab.

It resembles the ox-eyed daisy very closely. It is common especially in the sand hills but grows everywhere out of the swamps. Grazing animals feed on it but not very freely. Men make no use of it.

71. Matricaria Linn.

95. *Matricaria* sp.

Zor Hills. No. 7.

Local name.—“Gargās” or “Garais” (قَرَقَاصُ or قَرْدِيمُ).

This plant never grows above 6 inches in height and occurs both singly and in clumps. It is very common everywhere and men use it for seasoning and eat it by itself for its hot taste. The principal use of “gargas”, however, is in the manufacture of “igt” (اِط) the curious brick cheese of the Bedouins which is an article of sale in the Koweit bazar. This product is a provision for the hot weather and the Bedouins use it both dry and moistened with water and pounded with dates. To make “igt” the flowers of “gargās” are dried and boiled into a cheesy consistency with “liban” which, according to the Bedouin dialect around Koweit, means butter milk.

72. Senecio Linn.

96. *Senecio coronopifolius* Desf. *Fl. Atlant. II, 273; Fl. Or. III, 390; F. B. I. III, 341.*

Zor Hills. No. 25.

Local name.—"Zimloog" (زملوق).

Distrib.—From Persia westward to Asia Minor and the Mediterranean region. In India it is found in the Western Himalayas.

A small plant with yellow flowers like a daisy and in some respects resembling *Anthemis*, No. 94. It grows to about 10 inches and is especially common on the sand hills near Ras Ijlafa.

73. *Calendula* Linn.

97. *Calendula arvensis* Linn. Sp. Pl. ed. II, 1303; Fl. Or. III, 418; F. B. I. III, 358.

Zor Hills. No. 6.

Local name.—"Hanwa" (حَنْوَة).

Distrib.—From Persia westward, also in Caucasia, Central and Southern Europe and North Africa.

This plant is not more than 8 inches in height and the flowers resemble a small marigold, some having a black and others an orange centre. In habit the species may be either prostrate or erect. It grows everywhere except in the swamps and camels feed on it, but the Bedouins believe that it is fatal to camels to eat much of this plant.

74. *Centaurea* Linn.

98. *Centaurea* Sp.

Without locality or number.

Local name.—"Arafij" (أَرْفَج) or "arfaj".

75. *Koelpinia* Linn.

99. *Koelpinia linearis* Pall. Itin. III, App. 755; Fl. Or. III, 721; F. B. I. III, 392.

Zor Hills. No. 12.

Local name.—"Th'ilüg" or "Lahyat ultais" (ذَعْلُوقُ or لَحْيَةُ الْتَيْسِ)

which means "nanny goat's beard".

Distrib.—Western and Central Asia, South Russia and North Africa. In India found in the Punjab and in Kashmir.

A spreading plant not more than 6 inches high with a handsome yellow flower like a minute dandelion and with curiously characteristic fruits like birds' claws. The leaves are thin and almost hair-like and the flowers and fruits grow side by side. It grows chiefly on sandy plains. The Bedouins are fond of the plant, eating all but the root. All grazing animals feed on it.

76. Launea Cass.**100. Launea nudicaulis** Hook. f. F. B. I. III, 416.*Zollikoferia nudicaulis* Boiss. Fl. Or. III, 824.

Zor Hills. No. 48.

Local name.—"Hūa" (هوا)*Distrib.*—From Arabia and Egypt to the Atlantic Coast; also in India and Afghanistan.

It is the plant known as "Eve's Dandelion." It has a flowering stem growing to about 12 inches in height and is very common. It is eaten by Bedouins and also by townsmen. All grazing animals devour it freely.

101. Compositae Sp. ?

Without locality or number.

Local name.—"Hamra".

ADDENDUM.

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'Ansil	"	" 8
'As'ansal	"	" 72
Athid	"	" 1
Gafa'ah	"	" 32
Ghākah	"	" 80
Hambaizan	"	" 3
Hauthān	"	" 15
Harāsa	"	" 4
Imrār	"	" 52
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RECORDS OF THE BOTANICAL SURVEY OF INDIA

VOLUME VI.—No. 7

PLANTS OF NORTHERN GUJARAT

BY
W. T. SAXTON, M.A., F.L.S., I.E.S., I.A.R.O.,

BY
L. J. SEDGWICK, B.A., F.L.S., I.C.S.



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INTRODUCTION.

THE present paper is the outcome of about two and a half years' work on the vegetation of the area defined below. At first the work was confined to a systematic investigation of the flora, but since we have become fairly familiar with the common species we have attempted a preliminary study of the oecology of the district. We are fully aware that the latter is, at present, in many ways, very far from complete, but we hope that on some future occasion it may be possible to fill in some of the gaps. For instance, no study has yet been made of the water content of the soil in the different associations, nor has the question of anatomy in relation to function (physiological anatomy) been touched.

We are glad to take this opportunity of expressing our thanks to the Director, Royal Gardens, Kew, and to the Director of the Botanical Survey of India, for kindly sending us determinations of a number of species which we had submitted to them for this purpose, nearly all of which are so noted below as "Determined at Kew", and "Determined at Calcutta", respectively. We have referred our specimens to one or other of these authorities whenever we had reason to consider that any doubt existed as to the correctness of our own determinations.

We have also referred a good many specimens to Mr. R. K. BHIDE of the Poona Herbarium, whose opinions have always been of value, and to whom also we desire to express our thanks.

W. T. SAXTON.
L. J. SEDGWICK.

Ahmedabad, April 1916.

PLANTS OF NORTHERN GUJARAT

BY

W. T. SAXTON, M.A., F.L.S., I.E.S., I.A.R.O.,

AND

L. J. SEDGWICK, B.A., F.L.S., I.C.S.

PART I.

DESCRIPTIVE AND ANALYTICAL.

1. Cooke's Flora of the Bombay Presidency and the Present Work.

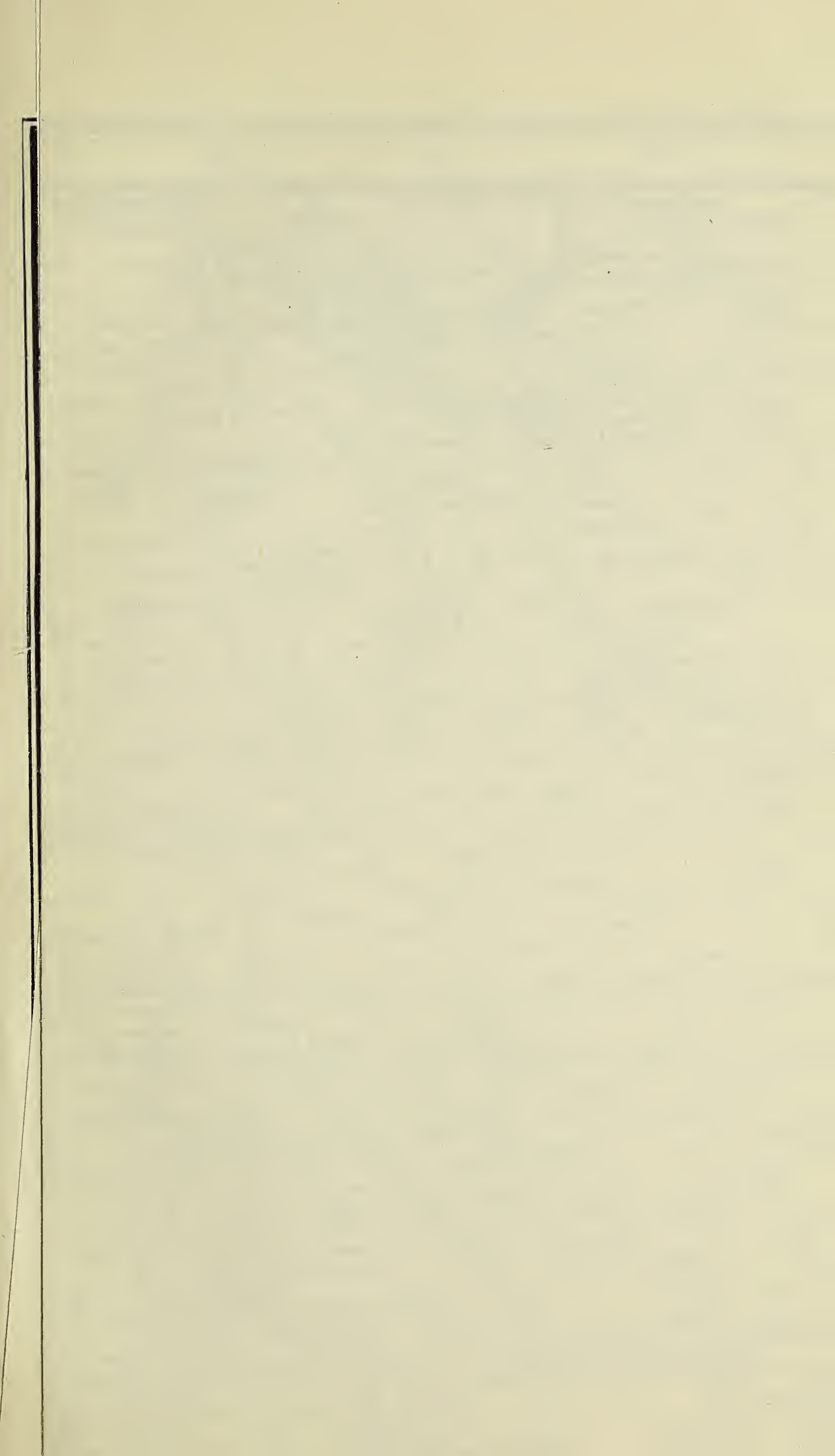
WRITING in 1903 in the preface to his *FLORA OF THE BOMBAY PRESIDENCY*, COOKE remarked :—"It can hardly be expected that the present 'Flora' will be an absolutely exhaustive one, although I have every reason to believe that the plants which still remain undiscovered are few." At that time, Gujarat was and indeed until now has remained, the least explored part of the Presidency. All the best known collectors—LAW, STOCKS, RITCHIE, GRAHAM, DALZELL and GIBSON, COOKE, Prof. GAMMIE, WOODROW and Mr. TALBOT—have worked the Konkan. Most of them have worked the Deccan and Karnatak. STOCKS worked parts of Sind, and Mr. TALBOT has very thoroughly worked North Kanara. But Gujarat, and especially North Gujarat, has hitherto been touched only by flying visits, and whereas the notes on geographical distribution within the Presidency of the various species described by COOKE are fairly complete for the other regions mentioned above, the flora of Gujarat is very inadequately indicated. This can perhaps be best demonstrated by citing one or two particular genera. Thus our list which follows gives five species of *Grewia*, only two of which are mentioned by COOKE as occurring in Gujarat. Of *Crotalaria* (truly wild species) we have seven. Of these, only four are mentioned by COOKE under Gujarat, and only one from North Gujarat. Of *Indigofera* we have seven species, only three of which are mentioned by COOKE from Gujarat, and those all from stations in South or Central Gujarat. Of

Phyllanthus our list gives five species, only one of which is mentioned by COOKE under a station in Central Gujarat. These examples, which are taken quite at random, could be multiplied almost indefinitely, while for the families *Cyperaceæ* and *Gramineæ*, COOKE'S Flora very rarely mentions Gujarat at all. On the whole, seeing that we have been working such an inadequately explored region for more than two years, COOKE'S prophecy that undiscovered species were few has been justified, since we have been able to add only twenty-two truly wild and three alien species not mentioned by him, and to raise to the rank of genuine members of the Bombay Flora ten species excluded in his work.* But from the point of view of enlarging our knowledge of the distribution of species within the Presidency and of plant associations this paper may, it is hoped, be of some value.

2. Gujarat—Physical and Administrative Divisions.

Unlike the Konkan, which is a homogeneous area of uniform soil and uniform climate, Gujarat even more than the Deccan is from a scientific point of view an unsatisfactory geographical unit. Administratively the term is conveniently used to include the Northern Division of the Bombay Presidency (excluding the Thana district, which is regarded as part of the Konkan) and the Agencies of Rewa Kantha, Mahi Kantha and Palanpur. Linguistically it includes all the country within which Gujarati is the vernacular. But as used hitherto in connection with the Botanical Survey, the area included by the term is a collection of heterogeneous tracts, differing essentially in soil, climate and vegetation. In the southern parts of the Surat district the rainfall is heavy and the clay soil yields rice; the conditions are like those of the Konkan. The northern parts of the Surat district, and the whole of the Broach district are an almost unbroken plain of black soil with a moderate rainfall. The Panch Mahals is a country of mainly stony or gravelly soil; while from Ahmedabad to the Rann of Cutch and Deesa is a tract of pure sand, the rainfall in the west of which is scanty and uncertain. It would be difficult to imagine a more diverse collection of climates and surface soils. A roughly satisfactory division would be:—(i) North Gujarat,—all the country on the right bank of the Mahi as far as Kathiawar and the Rann, (ii) Central Gujarat West,—all the country between the Mahi and the Tapti, not being included in (iii), (iii) Central Gujarat East,—the Panch Mahals District and the Rewa Kantha Agency, and (iv) South Gujarat,—the country south of the Tapti. This is, of course, all merely

* For lists of these species see Sec. 7, p. 219.



72° 30' 95' 10' 45' 50' 55' 73' 5' 10' 15' 20' 25' 73° 30'

MAP ILLUSTRATING FLORA OF NORTH GUJARAT

Scale of English Miles



Note—Kharaghoda is 55 miles W.N.W. of Ahmedabad outside the map.

Reference

1. Luniyada (Rova Kantha)
2. Mahikantha
3. Baroda
4. Porsani (Ahmedabad Dist.)
5. Rewakantha
6. Thora (Kani Dist.)
7. Daskera (Ahmedabad Dist.)
8. Kapadvanj (Kani Dist.)
- T.R. Travellers Bungalow
- M. Misra, (Hunda)
- D. Unipud



1890

1890

1890

1890

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a suggestion and it would be outside the scope of this paper to discuss the point any further. Suffice it to say that the area worked by us is only a very small fraction of the region defined as North Gujarat above. And the title of this paper is not intended to imply that the list of plants given below is in any way a complete flora of any region. The area worked will now be more fully described.

3. *The Area worked—Topography and Soil.*

The attached map shows the north-east portions of the Ahmedabad District, consisting of the Talukas of Daskroi North and South, the Taluka of Prantij and the Mahal or Petha of Modasa, with the adjacent portions of Native States. It will be seen that Prantij and Modasa form not one or two, but many islands of British possession amid a sea of foreign territory. Of this foreign territory some parts belong to Baroda, others to Idar, and others again to the heterogeneous mass of small States that constitute the Mahi Kantha Agency.* All this is within the limits of the Bombay Presidency for the purposes of the Botanical Survey and of Northern Gujarat as tentatively defined above. The Idar State runs some considerable way north beyond the limits of the map, and there is no doubt a rich haul awaiting any botanist who will explore as far north as Khed Brahma, the terminus of the Ahmedabad-Prantij Railway,—rich in the sense that he will add to the Bombay flora many Rajputana and North Indian species.

Our own explorations have been for obvious reasons confined to British territory. But the foreign territory included in the map has been repeatedly traversed though not camped in. It differs in no way from the other and the floras of both are identical. The areas specially worked and alluded to in the list are as follows:—(1) Ahmedabad and its immediate environs, (2) Prantij, (3) Talod, (4) Sonasan, (5) Bavsar, (6) Ghadi, (7) Raipur, (8) Raesan, (9) Modasa, (10) Dhansura, (11) Watrak R., by which is meant the point of intersection of that river and the provincial road running south from Modasa, (12) a plateau or upland of red laterite just east of Talod, and (13) Kharaghoda. Some of these places have been more thoroughly worked than others. They are all marked on the map and their position in the general configuration and surface geology of the country will now be explained.

Excluding Kharaghoda, which lies at a distance from the rest, it will be seen that the general slope of the land is steadily from north-east to

* The name Mahi Kantha is misleading as the territories under the Agency nowhere touch the river Mahi.

south-west. All the streams shown in the map drain sooner or later into the Sabarmati. The region represented by the western half of the map is practically stoneless. The bed of the Sabarmati though deep (100 ft. below its banks near Ahmedabad and 200 ft. a little north of Prantij) is entirely sand. South of Ahmedabad city is a tract containing rice fields, partly original and partly rendered possible by the Khari Cut Canal. North of the city rice fields become fewer until they entirely disappear, except for a patch around Sonasan, where water is taken from the Hathamati Canal. A word is required regarding these canals, which form one system. The head works consist of a dam across the Hathamati River close to Himmatnagar (late Ahmednagar), the modern capital of the Idar State. Thence the water is taken southwards and what is not absorbed by the lands under command is let off into the Bokh on the west and the Bhujawa on the east, through both of which it finds its way into the Khari. This river is dammed lower down to form the Khari Cut Canal, water from which is distributed to South Daskroi, and also stored in the Chandola Tank, which is itself then used as an irrigation source; while the Khari is again sluiced lower down outside our limits. These irrigation works, while they profoundly modify the vegetation under their immediate influence, do not materially affect the distribution of species since in the areas crossed by the canals natural lakes and swamps are common. To revert to the general character of the country, the sand area may be taken as fairly accurately embracing the basins of the Sabarmati, Khari and Meshwa, and the basin of the right bank of the Majham as far north as a line drawn from Himmatnagar to Bavsar. North of that point stony hills commence and continue northwards to beyond Mount Abu. In addition to being intersected from north to south by the above-mentioned rivers and smaller streams, the sand area is crossed by several depressions which do not naturally contain running water. Of these the principal are the Bokh, the Bhujawa and the Harsol Tank Chain. The Bokh is a narrow valley with escarped banks, which has all the appearance of being an old river bed, and thereby bears out the very strong local tradition that it was the original bed of the Hathamati, the waters of which were artificially diverted into the Sabarmati, by the early Ahmedabad kings in order to beautify their capital. At present it is throughout the year a marsh with two permanent lakes in it. The marshy conditions are still further accentuated by its annual conversion by the Irrigation Department into a storage reservoir during the monsoon. This has not, however, had any marked botanical effect. The Bhujawa may be described as a natural drainage channel, which is annually converted into a stream in the winter by the Irrigation

Department. Both these depressions contain deep and shifting ooze, consisting of very fine clay particles. The Harsol Tank Chain is a series of shallow tanks, which are liable to dry, some every year and others only in years of deficient rainfall. Besides these, there are other smaller depressions and tanks.

It is not to be supposed that this sand region is entirely flat. On the contrary the land rises and falls slightly in most places, while at many points definite hills occur where the sand is harder and more coagulated.

Wherever there is an outlet for storm water, the sand denudes with amazing rapidity. The banks of the rivers and streams in the sand area are complicated by a network of small cañon-like nallahs, called "wānghâs" in the vernacular, which further ramify and extend with each succeeding monsoon. Villages on the banks of these rivers are constantly compelled to remove further inland.

Within the sand area there are three types of aberrant soil, *viz.* :— (1) uplands of darker soil, which constantly subsides in small waterholes varying from one to ten feet broad and one to four feet deep; these lands are covered with stretches of magnificent fodder grasses, the association of which will be discussed more fully below,*—(2) valleys of salt-encrusted loam, on which the vegetation is very scanty, the only grasses being dwarf forms such as *Chloris villosa*, etc.,—and (3) an entirely isolated plateau or upland between Talod and Harsol formed by an outcrop of red laterite. This abnormal geological formation is marked by a fair number of species which do not occur elsewhere in our area but are found on laterite in other parts of the Presidency. The top of this plateau is a clay layer of varying depth liable to subside in water holes as described under (1) above.

East of the Majam R. the conditions change, black soil becoming frequent, especially in the south, and stony hills, especially in the north. In the west and south of this area, which is thinly populated, are vast stretches of Savannah, dominated by stunted trees, seldom above twelve feet high, of *Butea frondosa*. But by the time Modasa is reached, xerophytic woodland has begun to appear, characterised at first by stunted teak, then by *Sterculia urens* and lastly by *Terminalia tomentosa*. As would be expected, the beds of the Majam and the Watrak are rocky, and their floras, and especially that of the Watrak, differ essentially from the floras of the rivers in the sand area.

Kharaghoda stands somewhat apart from the rest of the country worked. But it is desirable to include it, both because otherwise many

* See Part II, Sec. VI, pp. 232-233.

interesting plants would have to be excluded, and also because, whereas in the rest of the area we get sand passing into stony hills, in Kharaghoda we get sand passing from sweet to completely brackish. Kharaghoda is about the same distance from Ahmedabad as Modasa, and though we have not worked the intervening country it would add little to our list.

4. Climatic Conditions.

The climate of our area is characterised by the combination of a comparatively heavy but brief monsoon with a long, and normally completely rainless, dry season, culminating in an intensely hot summer. There is no part of India in which the rainy season is shorter. The May thunderstorms of the Deccan are absent, and the retreating monsoon period ceases much earlier than it does further south. The influence of the north-east monsoon is, of course, nil, while the winter depressions that pass over North India affect us only in temperature, wind and cloud, but give no precipitation. Thus any rainfall, say, from the 5th October to the 31st May is entirely abnormal, and the amounts put down in the table below for that period represent not regular light showers but very occasional cyclones passing along abnormal paths. Such abnormal rainfall cannot modify the character of a regional flora, which has to accommodate itself to normal conditions. Consequently, rain in winter or spring either has no effect, or only an adverse effect, resulting in rapid fall of seed, or blighting of flowers.

The average rainfall for the years 1876-1902 * was as follows :—

	Civil Hospital, Ahmedabad.	Prantij.	Modasa.
January to May	0·26	0·56	0·54
June	4·56	5·45	5·08
July	10·84	12·26	13·03
August	8·58	8·63	8·56
September	6·31	5·59	6·99
October	0·51	0·25	0·21
November to December	0·31	0·28	0·33
Total	31·37	33·02	33·74

Thus there is a slight but perceptible increase from south-west to north-east, the increased precipitation at Prantij and Modasa being probably due to the proximity of the hills already described. At Kharaghoda the annual rainfall is about 24 inches only and indeed at the Rann semi-desert conditions begin to set in. Humidity is high in July and August and diminishes until March, when the air is intensely dry.

* From the latest edn. of the Statistical Atlas of the Bombay Presidency, 1906.

During April and May westerly or south-westerly winds prevail through the local indraught from the shores of the Arabian Sea, and humidity rises a little. In June the wind is changeable owing to the general disturbance of the climate which precedes the setting in of the monsoon. From July to September the climate is under the influence of the south-west monsoon drift, varied by the passage westward of occasional cyclonic storms from the Bay of Bengal. The drift is, however, much less vigorous and the temperature consequently much higher than in the Konkan or Deccan. In October and early November the wind is again changeable. From late November to January northerly winds blow down from the Himalayas, but these as they have to pass over a wide land area before they reach us are far less cold than in the Punjab or Sind. Indeed there are few days in the winter when the cold is at all noticeable. In February and March dry and changeable winds prevail.

Temperature has been partly indicated above. The actual maximum ever recorded at Ahmedabad is 120° (in May 1912), and the ordinary annual absolute maximum is from 113° to 117° . These are, of course, readings far lower than those of the Punjab or even the United Provinces. But on the other hand, our winter temperatures both by day and by night are far higher. Frost occurs at ground level very rarely indeed, say on one night in ten years. Consequently, the mean annual temperature of the country from Ahmedabad to Deesa (the latter station being slightly warmer) is one of the highest in India. We have not taken any readings of the temperature of the soil, but there is no doubt that in the hot weather it is very high, and having regard to the light sandy nature of the surface soil and its great depth there is every reason to believe that if a series of readings could be taken of the temperature at depths from one to three feet or more it would be found that in no part of India is the permanent mean temperature of the soil higher than in the sand tract of North Gujarat.

It will be necessary to refer to the climate again in the next paragraph.

5. Vegetation.

Perhaps the most interesting feature of the vegetation is that it marks the dividing line between the Perso-Arabian flora (to which the flora of Sind belongs) and the Indo-Malayan flora proper. DRUDE, in the map in his HANDBUCH DER PFLANZENGEOGRAPHIE, 1890, makes the line of demarcation pass up through the gulf of Cambay northward along the Aravali Hills, thus exactly traversing our area. Our own list is in close

conformity with this view. Thus many of our most conspicuous forms, especially sand-loving xerophytes, are essentially Perso-Arabian and occur in almost no other area. A more or less complete list of these is as follows :—*Capparis aphylla*, *Bergia odorata*, *Zizyphus rotundifolia*, *Crotalaria Burhia*, *Alhagi camelorum*, *Prosopis spicigera*, *Acacia Senegal*, *Salvadora oleoides*, *Leptadenia Spartium*, *Leucas Cephalotes*, *Cenchrus biflorus*, *C. catharticus*. A considerable number of the remainder will be found to belong to a type which though primarily Perso-Arabian are able to find sufficiently dry habitats in the Deccan, and therefore straggle across the line into the Indo-Malayan region proper, and even into Ceylon, the flora of which is notoriously cosmopolitan. Some examples of these are as follows :—*Polygala erioptera*, *Grewia populifolia*, *Corchorus trilocularis*, *Indigofera linifolia*, *I. cordifolia*, *Cassia obtusa*, *Giseckia pharnaceoides*, *Salvadora persica*, *Cordia Rothii*, *Heliotropium supinum*, *Tecomella undulata*, *Leucas urticifolia*, *Boerhaavia verticillata*, *Digera arvensis*, *Cyperus arenarius*, *Scirpus quinquefarius*, *Eragrostis cynosuroides*, *Gracilea Royleana*, *Chloris tenella*, *C. villosa* and *Eleusine aristata*. On the other hand, there are a fair number of species which are essentially Indian or Indo-Malayan, and are not likely to be found much further north-west. Among these may be cited the following :—*Bombax malabaricum*, *Sterculia urens*, *Helicteres Isora*, *Ægle Marmelos*, *Balanites Roxburghii*, *Celastrus paniculata*, *Vitis trifolia*, *Abrus precatorius*, *Butea frondosa*, *Bauhinia racemosa*, *Dichrostachys cinerea* (which is a curious instance, as this plant is of the same habit and appearance as *Acacia Senegal*, and *Prosopis spicigera*), *Terminalia tomentosa*, *Trichosanthes cucumerina*, *Momordica dioica*, *Ixora parviflora*, *Plectronia parviflora*, *Diospyros melanoxyton*, *D. cordifolia*, *Carissa Carandas*, *Holarrhena antidysenterica*, *Marsdenia volubilis*, *Ipomœa obscura*, *I. pes-tigridis*, *Solanum xanthocarpum*, *Bonnaya brachiata*, *Striga euphrasioides*, *Tectona grandis*, *Anisomeles ovata*, *Polygonum serrulatum*, *Phyllanthus Emblica*, *Bridelia retusa*, *Fimbristylis quinquangularis*, *F. complanata* and *Andropogon annulatus*. Without being, therefore, particularly rich in species, our flora is very varied and cosmopolitan, and includes many forms which find here either their eastern or their western limit.

With a rainfall of only 30-35 inches crowded into four or less than four months, and a rapidly draining soil, the period during which the perennial species are compelled to adapt themselves to physically xerophytic conditions is a long one, and as would be expected, xerophytes are prominent. Our rainy season is, however, regular and we have not, as in Sind, desert conditions, where rain may occur hardly at all for several years. On the contrary in nine years out of ten, there are long wet spells

in July and August, when the whole country side is sodden. The country is, therefore, well adapted to annuals. The species mentioned at the beginning of the last paragraph as being exclusively Perso-Arabian are all xerophytes, except *Alhagi camelorum* which will be mentioned again below. Of these, *Acacia Senegal* inhabits stony or gravelly hills, while all the rest are purely sand plants. This is perhaps a convenient place to correct the prevalent but quite erroneous view that *Acacia arabica*, the "bâbhul" or "bâval" is a xerophyte. On the contrary this species is not only unable to subsist in places where there is not a constant supply of subsoil water, but is only able to reach its normal development in places such as river banks and tank beds, and can thrive with the lower part of its stem submerged for several months every year. It is true that *Acacia arabica* is abundant in Sind, but then marshes are abundant in Sind, and in Sind as with us it is only in marshes, by tanks and on the banks of the Indus and the canals that it thrives. The true fact is that this tree is ombrophobous but not xerophytic; and of this, there are other examples, for instance, *Alhagi camelorum*, which inhabits tank beds and river beds. Marshes and tanks being common in our area *Cyperaceæ* are very well represented, especially the genera *Cyperus*, *Fimbristylis*, and *Scirpus*. On the other hand, true meadows and damp shady woods are entirely absent,* which fact accounts for the entire absence of *Orchidaceæ*, *Araceæ*, *Amaryllidaceæ*, *Scitamineæ*, *Urticaceæ* herbs and *Liliaceæ* herbs (except *Asphodelus*, which finds its necessary moisture in irrigated fields). Touching as it does, only the fringe of the very dry Malwa forest system, it is natural that the tree flora of our area should be scanty, and the more important tree-bearing families such as *Guttiferae*, *Rutaceæ*, *Anacardiaceæ*, *Combretaceæ*, *Myrtaceæ*, *Ebenaceæ*, *Laurineæ*, and others should be very thinly represented. The *Gramineæ* are very strongly represented, both in number of individuals and in number of species. But there is a predominance of the tougher and more xerophytic forms. Thus while delicate shade-loving genera such as *Isachne* and *Arundinella* are entirely absent, stiff-stemmed and stiff-leaved genera such as *Cenchrus*, *Chloris* and *Eleusine* are particularly prominent. Grasslands † are a feature of North Gujarat, and Ahmedabad is the head-quarters of the incipient dairy and butter-making industry. The association of these grasslands will be described below (Part II, Sec. vi, pp. 232-233).

* See, however, our mesophytic associations described in Part II, pp. 236-237.

† Such grasslands invariably contain a small proportion of trees or large shrubs and hence, must all be included under the general oecological type of Savannah.

6. Systematic Synopsis.

Except for *Cyperaceæ* and *Gramineæ*, the Monocotyledons are very poorly represented. The numbers of families, genera and species in each class (using species as including recognised varieties) are as follows :—

	Dicotyledons.	Monocotyledons.	Total.
Families	74	14	88
Genera	278	68	346
Species	442	172	614

Of the 172 species of Monocotyledons 148 belong to the two families mentioned above. The ratio of genera to species is 1 : 1.77. The ratio of Monocotyledons to Dicotyledons is 1 : 2.56.

The largest families, including all with eight or more species are as follows :—

Family	Species	Genera
Gramineæ	with 103 species in 39 genera.	
Leguminosæ	83	41
Cyperaceæ	45	8
Compositæ	23	20
Convolvulaceæ	24	9
Euphorbiaceæ	23	8
Acanthaceæ	21	15
Malvaceæ	20	8
Scrophulariaceæ	13	11
Amarantaceæ	13	9
Tiliaceæ	13	3
Cucurbitaceæ	11	10
Labiataæ	11	6
Asclepiadaceæ	10	8
Boraginaceæ	10	5
Solanaceæ	10	5
Rubiaceæ	8	7
Capparidaceæ	9	6

The largest genera, including all with four or more species, are as follows :—*Cyperus* 20, *Panicum* 13, *Eragrostis* 12, *Ipomœa*, *Fimbristylis* and *Andropogon* 11 each, *Euphorbia* 10, *Acacia* and *Crotalaria* 9 each, *Hibiscus*, *Alysicarpus* and *Scirpus* 8 each, *Indigofera* 7, *Corchorus*, *Cassia* and *Chloris* 6 each, *Grewia*, *Zizyphus*, *Ammannia*, *Solanum*, *Leucas*, *Phyllanthus*, *Ficus*, *Sporobolus*, and *Eleusine* 5 each, *Sida*, *Heliotropium*, *Merremia*, *Pennisetum* and *Digitaria* 4 each.

Of the 346 genera no less than 254* are represented by only a single species, while the same is true of 27 † families out of 88.

* Not including *Limnanthemum* and *Pandanus* which are doubtfully determined.

† Excluding *Pandanaceæ* for the same reason.

7. Species not mentioned or excluded by Cooke.

The following species or varieties in our list are regarded by us as truly wild whether indigenous or naturalized aliens, but are either not mentioned at all by COOKE (Fl. Bomb. Presy.) or are definitely excluded by him :—

(i) Not mentioned by COOKE—

Ammannia auriculata Willd., *Cordia Perrottetii* Wight., *Convolvulus pluricaulis* Choisy., *Ruellia patula* Jacq., var. *alba* Saxton, *Justicia diffusa* Willd. var. *orbiculata* C. B. C., *Achyranthes aquatica* Br., *Euphorbia prostrata* Ait., *Chrozophora prostrata* Dalz. var. *parviflora* Klotz. ex. Schwienf. *Cyperus articulatus* Linn., *Fimbristylis tenera* R. & S. var. *oxylepis* C. B. C., *Scirpus mucronatus* Linn., *Panicum Crus-Galli* Linn., *P. distachyum* Linn., *P. psilopodium* Trin., *Saccharum Munja* Roxb., *Andropogon Schænanthus* Linn., *A. Schænanthus* Linn. var. *caesius* Hack., *Sporobolus tremulus* Kunth., *Eragrostis interrupta* Beauv. var. *tenuissima* Stapf, *Chloris pallida* Hook. f., *C. virgata* Benth., *Eleusine verticillata* Roxb.

(ii) Excluded by COOKE—

Pentapetes phœnicea Linn., *Ipomœa hederacea* Linn., *I. dasysperma* Jacq., *Merremia dissecta* Hallier. f. *Martynia diandra* Glox., *Sesamum indicum* Linn., *Lantana Camara* Linn., *Cyperus esculentus* Linn., *Andropogon squarrosus* Linn., *Oryza sativa* Linn.

The following species in our list which are regarded by us as occasional escapes from cultivation, or introduced weeds, *i.e.*, similar to COOKE'S "excluded species", but are not mentioned at all by him :—

Ruellia tuberosa Linn., *Dioscorea sativa* Linn., *Leptochloa filiformis* R. & S.

The following species given in our list are "excluded species" in COOKE'S Flora and are regarded by us in the same light :—

Guazuma tomentosa H. B. & K., *Casalpinia coriaria* Willd., *Pithecolobium dulce* Benth., *Terminalia Catappa* Linn., *Psidium guyava* Linn., *Passiflora fetida* Linn., *Opuntia elatior* Mill., *Fœniculum vulgare* Gaertn., *Millingtonia hortensis* Linn. f., *Nerium odorum* Linn., *Thevetia neriifolia* Juss., *Gomphrena globosa* Linn., *Euphorbia Tirucalli* Linn., *E. heterophylla* Linn., *Jatropha gossypifolia* Linn., *Ricinus communis* Linn., *Aloe vera* Linn., *Borassus flabellifer* Linn., *Panicum miliare* Lamk.

8. *Vernacular Names.*

We have with no little reluctance, and purely to conform with tradition, given the local vernacular names for a few of the commonest plants, either being useful trees or herbs possessed of burrs which are noticeable from their unpleasantness. COOKE has given throughout his *Flora* vernacular names without stating the vernacular, which is in almost every case Marathi. In our area the vernacular is, of course, Gujarati. If enquiry were made it would be found that the vernacular names in Kanarese and Sindi are again different, while even within the limits of a single language the local names vary from tract to tract. Those who are acquainted with ornithological works are familiar with the waste of space which is necessitated by the insertion of innumerable vernacular names. And our own opinion is that in strictly scientific works, at any rate botanical works, all reference to vernacular names would be best avoided, except in those rare cases where the vernacular names afford a further argument in the elucidation of some systematic puzzle.

9. *Record of Specimens.*

Future workers will find specimens of very nearly all the species recorded in the list, and from the habitats recorded in it, in the Herbarium of the Gujarat College at Ahmedabad.

PART II.

OECOLOGY.

THE assignation of associations of plants found in India to the various classes, formations and associations of WARMING* and other authors is rendered more difficult by the fact that this country is so very rarely mentioned in works dealing with plant oecology. Work done hitherto in India appears to have been mainly systematic, and as late as 1909 the English edition of WARMING's work contains only a very few unelaborated references to India proper.

Accepting WARMING's classification as our guide, we find that the plant formations of our area can be assigned to the following classes (*loc. cit.* p. 136) :—

- Class 1.—Hydrophytes.
- Class 2.—Helophytes.
- Class 5.—Halophytes.
- Class 6.—Lithophytes.
- Class 7.—Psammophytes.
- Class 10.—Psilophytes.
- Class 13.—Mesophytes.

Of our whole area at least 95 per cent. comes into classes 7 and 10, and, as will be explained later, there is some doubt whether our Psammophytic associations are not really Psilophytic (Savannah).

These various classes will now be considered in the order given.

Class 1. Hydrophytes.

A feature of the area is the frequent occurrence of shallow sheets of fresh water ranging from extensive tracts to water holes a foot or two across, some perennial and some only containing water during the monsoon. These except the smallest, are, in accordance with Anglo-Indian usage, generally known as "Tanks". Several rivers also traverse the region, an account of which has already been given above (pp. 211—213).

In these various tracts of water a number of water plants are found, of which those mainly or wholly submerged appear to us best united into one formation whether they are free-floating or attached. Since the rivers flow only slowly, except on the few occasions when they are in flood, and

* WARMING E., OECOLOGY OF PLANTS, English edition, 1909.

the tanks are of standing water, the difference between the two, at no time marked, cannot be maintained. Thus we unite here the "Hydrocharid" (free-floating) and "Limnæa" (attached) Formations of WARMING and include as one formation all the water plants which either have their vegetative organs entirely submerged, or have at most floating leaves.

The associations of these are rather variable, and we have thought it best to include them together as one list, though by no means all would be found in any one locality. The following list includes all the plants we have noted:—

(a) Abundant—

Nymphaea Lotus, *Ipomæa aquatica*, *Hydrilla verticillata*, *Vallisneria spiralis*, *Zannichellia palustris*, *Potamogeton pectinatus*, *Azolla* sp., *Chara* (2 or 3 species), *Nitella* sp., and various other algæ.

(b) Common —

Nelumbium speciosum, *Potamogeton perfoliatus*, *P. crispus*, *Limnophyton obtusifolium*, *Trapa bispinosa*, (Cultivated), *Naias minor*, *Utricularia stellaris*, *Lemna polyrhiza*.

(c) Local—

Limnanthemum sp., *Jussiaea repens*, *Ceratophyllum demersum*.

Class 2. Helophytes.

This class is very well represented in our area. We have no associations which can be referred to WARMING'S Bush-Swamp Formation (*loc. cit.* p. 187), but we have his Reed Swamp Formation, and a second formation entirely distinct from anything mentioned by that author, and very clearly outlined, which we call the Formation of Dried Mud.

I. Reed-Swamp Formation.

A. Typheta.

Where the water is deeper *Typha angustata* is found alone, and forms a belt between the Hydrophytic plants just described and the associations which will follow. The most conspicuous Typheta fringe the Large Bokh at Prantij.

B. Andropogoneta. *A. squarrosi*.

There are tracts bordering some shallow tanks where the vegetation is entirely composed of closely placed clumps of this grass. These

Andropogoneta are not typically under water except for a few months during the monsoon, and by March would normally be quite dry on the surface.

C. Association of *Cyperus laevigatus*.

On some stretches of soft wet mud in the Bokh there is a rather conspicuous association of *Cyperus laevigatus*, *Panicum punctatum*, *Paspalum distichum*, *Fimbristylis dichotoma* and *Eleocharis atropurpurea*.

D. Association of *Herpestis Monniera*.

There are stretches of sandy soil in river beds, and to a lesser extent in tanks, which are covered with a mat of *Herpestis Monniera*, *Lippia nodiflora*, and *Marsilia quadrifolia*, passing as the sand becomes drier into *Blepharis molluginifolia*.

E. Association of *Sporobolus tremulus*.

Forming a grassy fringe to many tanks, and liable to submergence only in the heaviest monsoon period, there are stretches of land covered with *Sporobolus tremulus* and *Cyperus pygmaeus*.

F. *Eleochareta E. plantagineae*.

Some shallow tanks in the north and east have their whole beds almost filled with this species.

G. For the rest it is almost impossible to differentiate associations, and the following is a list of helophytic plants, other than those mentioned above, any of which may occur in any particular stretch of marsh or in any water hole. The *Cyperaceae*, which predominate, are given first, and rare plants are omitted.

1. *Cyperaceae* (in order of helophytism)—

Cyperus alopecuroides, *C. Iria* var. *paniciformis*, *C. eleusinoides*, *C. difformis*, *C. tegetum*, *Scirpus litoralis*, *S. maritimus* (type and variety) *Fimbristylis ferruginea*, *F. dichotoma*, *F. complanata*, *F. quinqueangularis*, *Puirena glomerata*, *Cyperus globosus*.

2. *Gramineae* (in order of helophytism)—

Oryza sativa, *Coix Lachryma-Jobi*, *Eriochloa polystachya*, *Diplachne fusca*, *Eragrostis gangetica*, *Ischoemum rugosum*, *Iseilema Wightii*, *Panicum colonum*, *P. psilopodium*.

3. Other Spermophyta—

Monochoria hastæfolia, *Polygonum serrulatum*, *Glossostigma spathulatum*, *Eriocaulon trilobum*, *Ammannia baccifera*, *A. salicifolia*, *A. tenuis*, *A. auriculata*, *A. multiflora*, *Aeschynomene indica*, *Hygrophila polysperma*, *Ludwigia parviflora*, *Asteracantha longifolia*, *Hydrolea zeylanica*, *Melochia corchorifolia*, *Sesbania aculeata*, *Corchorus* spp. *Caesulia axillaris*, *Blumea eriantha*, *Sphenoclea zeylanica*, *Tamarix dioica*, *Alternanthera triandra*.

II. Dried Mud Formation.

This includes only one association, differing but slightly in different localities. It is excluded by the Reed-Swamp associations from places where the more upright and vigorous plants just described can gain a footing. The two factors which tend to exclude the Reed-Swamp, and clear the way for the present association appear to be (1) proximity of *Acacia arabica*, and (2) repeated trampling of the ground by cattle drinking and buffaloes wallowing. The prejudicial effect exercised on other vegetation by *Acacia arabica* is well known, and the extensive tracts covered by that tree in the regions north and west of Ahmedabad are very poor in herbaceous plants. This fact is also recognized by the cultivators who prefer to remove *Acacia arabica* from the borders of their fields. As regards the second factor mentioned above it is to be noted that the country near Ahmedabad is both thickly populated and overstocked with cattle, especially buffaloes, which are maintained for the milk supply of the city. The small tanks in this region are, therefore, usually occupied by this association. The members are all prostrate, and are provided with a long tap root. They are all capable of enduring a period of submergence, which varies from one to nine months, and they seem to be almost indifferent as to its length. In fact there is little doubt that in years of very light rainfall these plants re-appear on ground which for several years has not been free of water. We are not certain whether they are annuals or perennials but it seems at least probable that a majority must be perennial. There are good reasons for assuming that these are plants which have been driven into their present habitats through competition, and have acquired their prostrate rosette habit after reaching those habitats. This was borne out by observations made in 1915-16 in tank beds not usually cultivated, but in which cultivation of wheat was allowed that season on account of the quasi-famine conditions, when it was noticed that under the stimuli of decreased light intensity, competition from surrounding crops, and continual gentle irrigation, *Trigonella occulta*, *Gnaphalium indicum*

and *Polygonum plebejum* assumed an upright habit with longer internodes and larger leaves and other characteristics of shade plants, and even *Gnaphalium pulvinatum* showed a tendency in that direction.

The following plants belong to this association, and are given more or less in order of frequency, though none can be regarded as dominant :—

Polygonum plebejum (of various types, but specially one with short and brittle internodes and very long, prominent stipules), *Coldenia procumbens*, *Mollugo hirta*, *Grangea maderaspatana*, *Sphaeranthus indicus*, *Eclipta erecta*, (prostrate, dwarf form), *Chrozophora prostrata*, (and possibly other spp.), *Euphorbia microphylla*, *Gnaphalium indicum*, *G. pulvinatum*, *Heliotropium supinum*, *Trigonella occulta*.

Class 5. Halophytes.

There is little true halophytism in our area, though if the Rann of Cutch were more fully explored, extensive halophytic tracts would certainly be met with. Besides Kharaghoda there are a few loamy valleys in the Prantij Taluka which produce enough salt efflorescence to render the collection of the salt and its sale to the small Prantij soap factories possible. These associations have not been at all adequately studied by us at present.

I. Association of Halophytic Savannah at Kharaghoda.

This occurs on the margin of the Rann of Cutch, and must be regarded as under maritime influence.

The most prominent shrubs (and very stunted trees) are *Indigofera paucifolia* and *Acacia* sp. (? *A. arabica*), and *Sueda nudiflora* is common as a decumbent undershrub. *Corchorus Antichorus* is much less common but of the same type, while *Launea pinnatifida* and *Physalis minima* are found under bushes of the *Indigofera*. In the wetter parts *Blumea amplexans* is found, as also various grasses; of the latter *Aeluropus villosus* is occasionally the only plant found in small wet areas. *Tamarix gallica* is frequent in water courses and ditches, and seems to be decidedly halophytic in some cases, though not necessarily so.

II. Halophytic semi-desert at Prantij.

All vegetation is scanty, and to the eye the tracts, which are small, present little but white salt efflorescence, and, in the monsoon and autumn, the weak panicles of *Sporobolus*.

The following are the chief plants which occur :—

Sporobolus orientalis, *Chloris villosa*, *Eleusine ægyptiaca* (stunted form), *Diplachne fusca* (in wetter places), *Fimbristylis spathacea*.

Class 6. Lithophytes.

We have on the city walls at Ahmedabad a well recognizable but small association containing the following:—

(a) Very common, and always present—

Lindenbergia urticifolia, *Linaria ramosissima*, *Eragrostis tenella*,
Arthraxon microphyllus, *Aristida adsenscionis*, *Andropogon contortus* (small form).

(b) Occasional—

Acalypha indica, *Alternanthera triandra*, *Launea pinnatifida*.

These plants are presumably lime-loving, and therefore find the plaster of the wall a favourable habitat. It is to be noted that the inside of these old Indian fortification walls is simply loose rubble, not masonry, so that wherever a crack is available the roots of plants have free play below the crust of the wall. It is noteworthy that *Lindenbergia polyantha* which scarcely differs from *L. urticifolia* except in its more stunted habit, is found with us on gravelly and sandy banks of Nallahs; it would be interesting to attempt to cultivate both plants on the habitat characteristic of the other species, and thereby to ascertain whether the two species are truly distinct.

The city walls at Ahmedabad are stronger and have been more recently repaired than those of Surat and Bassein, which would afford a better scope for study of the mural associations.

Classes 7 and 10. Psammophytes and Psilophytes.

We now come to the much more difficult task of classifying the ordinary dry land vegetation, which, as mentioned above amounts to about 95 per cent. of the whole. There can be little doubt that, generally speaking, our area comes into the Savannah Formation. WARMING's description of true Savannah (*loc. cit.* page 295) exactly applies to those parts of the Indian plains which are untouched by the north-east monsoon or the winter storms. WARMING writes, "Savannah is associated with moderately rainy tropical places; most closely allied to grass-steppe, it owes its distinction from this solely to the tropical climate. The vegetation has only one resting period—the dry season—during which it shows itself yellowish-grey and parched, though by no means devoid of flowers. The plants are endowed with xerophytic epigeous organs, and withstand this dry season, during which the Savannah is often devastated by fires.* The rainy season coincides

* Fires only rarely occur in our area, and are not regularly recurring.

with summer ; at its commencement all the vegetation becomes fresh-green, and there is a great increase in the display of flowers:.....”

WARMING even includes under the psilophytic formations, as Savannah forest, the Indian jungles (*loc. cit.* p. 299). He does not, however, differentiate the evergreen from the deciduous forests. We have no evergreen forest in our area, and the little forest that touches the extreme north-east corner is essentially xerophytic and deciduous. The rainfall of our area is about the minimum on which forest can obtain a footing, and there is no evidence to indicate that any part of the Savannah formations was previously occupied by forest. From the opposite point of view the planting and protection of mango, tamarind and other trees has an important effect, and entirely changes the face of the country. This can be very well seen from the train between Talod and Himmatnagar. Between Talod and Prantij is a tract of waste land with scanty trees. From Prantij to Sonasan the country is more thickly cultivated, and is under the influence of the canal, with the result that wherever the eye turns there are huge trees of mango, tamarind, *Mimusops*, *Ailanthus*, etc. After Sonasan the influence of the canal ceases, and cultivation is scanty, and the train passes over vast tracts of sandy waste, almost bushless and covered with *Saccharum spontaneum*, *Perotis latifolia*, *Tephrosia*, and other unattractive plants. Another tree, the cultivation and protection of which has modified the appearance of a part of our area, namely the country north and west of Ahmedabad, is *Acacia arabica*. The origin of the plentiful Babbul forests is stated by the country people to have been the great flood of September 21, 1875, when the Sabarmati overflowed and the inundation spread far inland. Masses of Babbul branches and pods carried down by the river were deposited in all lowlying places. Many rice fields went out of cultivation through the upgrowth of Babbul, and the position was further accentuated by the grant of leases to persons who would undertake to preserve and protect the trees until they should attain maturity. Yet another feature in which human agency has changed the character of the country is the colour and constitution of the soil. In our sand areas, wherever land has been under cultivation for long periods, the sand is a much darker colour, due to the repeated doses of manure and to the ploughing in of crop remains.

Accepting Savannah as the type of our Formations, we find the following transitions which result solely from edaphic causes. In the extreme north-east deciduous forest, which we call more strictly xerophytic woodland, occurs on the hill tops. This, on rocky hills, passes into Savannah woodland ; thence into thorn Savannah where the soil is gravelly, and into Butea Savannah where the soil is rich and loamy,

and thence into the sand associations of herbs and low bushes. Where this sand is at all elevated and forms ridges and dunes we recognise a change to the psammophytic class of formations. There is little doubt that further north-east in Cutch and Sind and Rajputana the oecological conditions give rise to WARMING'S psammophytic class, but with us, owing perhaps to our higher rainfall, psammophytic conditions are confined to elevated sandy ground and merge insensibly into Savannah.

I. Xerophytic Woodland.

This occurs on the hills north-east of Modasa, and is of the deciduous forest type well known on the Satpuras in Khandesh and the Panch Mahals districts. Owing to its inaccessibility it has been insufficiently studied by us. It differs from the Savannah woodland which follows mainly in the taller type of tree and in the more closed nature of the arboreous association. The species which especially distinguishes it is *Terminalia tomentosa*, and we also noted trees of *Boswellia serrata* and *Phyllanthus emblica*. *Aegle Marmelos* and *Tectona grandis*, also, are more prominent and taller than in the association which follows.

Wherever the ground is level and the soil, therefore, deeper, this woodland gives way to a grass association essentially the same as that described below, with the exception that whereas the grassland of the Savannah proper contains interspersed small trees and shrubs, the grassland of the Woodland Formation contains interspersed trees of *Terminalia*, *Bassia*, etc.

II. Woodland Savannah.

This occurs on stony hills west and south of Modasa, where there are extensive outcrops of rocks such as steatite and large and small boulders of the same.

In this association, intermediate in type between true Savannah and Xerophytic Woodland various trees and shrubs are met with which do not occur further west—

(i) TREES. All fairly common but none abundant :—

Tectona grandis, *Mitragyna parviflora*, *Aegle Marmelos*, *Morinda citrifolia*, *Sterculia urens*, *Diospyros melanoxylon*, *Odina Wodier*, *Anogeissus pendula* (in one place only where it was dominant and almost exclusive), *A. sericea*.

(ii) SHRUBS AND UNDERSHRUBS of which none are abundant except the first :—

Helicteres Isora, *Carissa Carandas*, *Holarrhena antidysenterica*, *Alangium Lamarckii*, *Wrightia tinctoria*, *Nyctanthes Arbor-tristis*, *Flacourtia sepiaria*, *Grewia hirsuta*. *Grewia pilosa* is also common, but is likewise fairly common in Savannah.

These form a much larger proportion of the vegetation than is the case with the trees and shrubs of Butea Savannah, but rarely sufficiently large to be regarded as true woodland. Some interesting herbs and low under-shrubs are also characteristic of the association, e.g., *Neuracanthus sphaerostachys*, *Tubiflora acaulis* and *Desmodium gangeticum*. In proportion as the prevalence of trees and shrubs increases the number of grasses decreases, and in this association grasses are quite subordinate.

III. Thorn Savannah.

This type of vegetation—frequent thorny bushes and small thorny trees—with low ground herbage in between—covers large tracts. It only occurs where the ground is fairly hard and gravelly or where the sand is very coagulated. Just as Woodland Savannah occupies hills with outcrop of large rock masses and boulders, so Thorn Savannah occupies gravelly stretches. There are many such near Modasa, but the type is also found near Bavsar on stony hills, near Raesan on gravelly portions of the Sabarmati banks and elsewhere. Often the bushes, though widely spaced, are almost impenetrable on account of their rambling branches and strong thorns.

The principal woody members of the Thorn Savannah are :—

Zizyphus rotundifolia, *Z. Oenopia*, *Z. Jujuba*, *Gymnosporia montana*, *Cassia auriculata*, *Capparis aphylla*, *C. sepiaria*, *Balanites Roxburghii*, *Acacia Senegal*, *A. leucophlœa*, *A. Jacquemontii*, *Mimosa hamata*, *Plectronia parviflora*, *Bauhinia racemosa*, *Grewia populifolia*, (only noted at Raesan), *G. villosa*.

All of these plants will not be present in any one locality. The first three are, however, almost ubiquitous. About three to five miles west of Modasa there are large stretches of country so exclusively dominated by *Zizyphus rotundifolia* that they constitute practically a Zizyphetum. *Capparis aphylla* also, especially near towns, constitutes Cappareta. There is no doubt that if ever the country became depopulated, Thorn Savannah, which is an aggressive type, would soon cover much of it. *Zizyphus rotundifolia* is a troublesome weed and hard to eradicate. We have seen land recently passed out of cultivation covered with this plant, associated with *Cassia auriculata* and *Calotropis procera*.

Common lianes in this association are *Asparagus racemosus*, *Leptadenia reticulata* and *Cocculus villosus*.

The undervegetation of the Thorn Savannah is composed of very low herbage. *Lepidagathis trinervis* is universal together with *Convolvulus pluricaulis*, both of them very hardy xerophytes. *Aristida ad-senscionis* occurs, as also *Andropogon annulatus* and *A. contortus*, not in strong colonies but as wide, hardy tufts with few flowering stems, and the dwarf grasses *Tragus racemosus* and *Gracilea Royleana* are also met with. We noted near Bavsar an association of *Chloris pallida*, *Zornia diphylla*, *Convolvulus pluricaulis* and *Evolvulus alsinoides*.

Altogether this is one of our most xerophytic formations. The hard gravelly nature of the soil and the fact that it is often sloping militates against moisture penetrating very deep.

IV. *Butea* Savannah.

On the numerous stretches of black soil which occur east of the Majham River and on the clayey stretches in the Talod region below the Laterite Plateau, *Butea frondosa* is the dominant small tree. It is always met with in a stunted form about 10 feet high (rarely exceeding 15 feet). The soil, especially where it is black, would amply repay cultivation, but the country is sparsely inhabited. This formation has been very inadequately investigated from the oecological standpoint. The commonest undershrubs are the ubiquitous *Cassia auriculata*, and *Triumfetta rotundifolia*, both of which are very abundant. In places, patches of *Ophiurus corymbosus* are prominent, but for the most part the grasses are those of the grass association and occasionally become dominant and colonize. Large trees such as *Bassia latifolia* and *Bombax malabaricum*, occur sporadically.

This association requires further study.

V. *Butea-Dichrostachys* Thorn Savannah of the Laterite Plateau, Talod.

The association found on the Laterite Plateau, Talod, differs from the Savannahs previously described in the entire absence of large trees, the increased proportion of shrubs and small trees, the presence of several plants not found in the rest of our area, and in the entirely distinct gramineous vegetation.

- (i) TREES:—The dominant tree of the association is *Butea frondosa*, which assumes the same stunted form as before described, while *Acacia arabica* and *A. leucophlœa* are also frequent.

- (ii) SHRUBS:—Of shrubs *Dichrostachys cinerea* is the most frequent, and is very noticeable from its numerous racemes of multicoloured flowers, while *Mimosa hamata*, *Grewia villosa*, *Capparis aphylla* and *Zizyphus rotundifolia* are also not uncommon, and *Neptunia triquetra* is rather rare.

Thus a considerable proportion of the larger plants of the association are leguminous, and of these all but one belong to *Mimoseæ*.

- (iii) CLIMBERS:—Trailing in the undergrowth and climbing over the trees and shrubs are several twiners, of which the most abundant is *Cocculus villosus*, while *Pentatropis microphylla* is also quite common and *Rhynchosia minima*, *Marsdenia volubilis* and various species of *Ipomœa* (*I. dissecta*, *I. calycina*, *I. obscura* and *I. hederacea*) are less frequent.

- (iv) HERBS :—

- (a) Of the herbaceous plants, GRASSES predominate, the following being the more common species :—

Digitaria pedicellaris, *D. Royleana*, *D. longiflora*, *Manisuris granularis*, *Andropogon contortus* (small form), *Iseilema laxum*, *Aristida funiculata*, *Eragrostis bifaria*, *E. pilosa* (small form).

The first four of these, which, in the rest of our area, either do not occur at all or are quite unusual, here form an important intra-association (if we may use the term) over large parts of the plateau, and are so intermingled that almost any handful of grasses gathered at random will contain all four species.

- (b) Among the grasses are a considerable variety of HERBACEOUS DICOTYLEDONS, none of which, however, are in any sense dominant, the majority being only occasional, and some occurring very sparingly. The following list is arranged approximately in the order of frequency in which the plants appear to occur :—

Lepidagathis trinervis, *Blepharis molluginifolia*, *Glossocardia linearifolia*, (these three are especially abundant on the rocky edges of the plateau, and are much less common in its central part), *Phyllanthus maderaspatensis*, *Crotalaria linifolia*, *Hibiscus esculentus*, *H. punctatus*, *Polygala erioptera*, *Leucas stricta*, *Volutarella divaricata*, *Alysicarpus bupleurifolius*, *Ionidium heterophyllum*, *Sesamum indicum*, *Hibiscus micranthus*, *Crotalaria orizensis*, *Indigofera trita*, *Cleome simplicifolia*, *Indigofera glandulosa*, *Polygala chinensis*. Finally, *Striga euphrasioides* is a common root parasite on many of the grasses.

Swampy hollows, varying from a foot or two to several yards in diameter, are frequent on the plateau, and form small tanks in the monsoon in which *Characeae* are abundant and *Oryza sativa* and some *Cyperaceae* are prominent. As the water dries up, other vegetation appears, including some of the herbs mentioned above, and also a number of marsh loving plants ; we have noted the following :—

Sesbania aculeata, *Aeschynomene indica*, *Melochia corchorifolia*,
Hoppea dichotoma, *Fimbristylis dichotoma*, *F. ferruginea*,
F. complanata, *F. schoenoides*, *Eleocharis atropurpurea*,
Eriocaulon trilobum, (the last two are much alike, and can scarcely be distinguished in the field ; we believe the last-named is much the less common of the two), *Butomopsis lanceolata*, *Limnophila graticloides*, *Ammannia multiflora*,
Hydrolea zeylanica, *Andropogon squarrosus*, *Scleria* sp.,
Oryza sativa.

The Savannah association described above has been named the Butea-Dichrostachys Thorn Savannah Association from its two most conspicuous members, and from the fact that a majority of the larger plants are thorny. After several months of drought *Capparis aphylla* and *Zizyphus rotundifolia* were noted as conspicuous, but from August to October these seem to occupy a more subordinate position than in most of the surrounding types of vegetation, where they are more or less ubiquitous.

VI. Association of Savannah with tall Grasses.

The tall grasses associated in wide grasslands are a conspicuous feature of North Gujarat. Locally, these grasslands are known as "birs", although this word is not carefully confined, as it should be, to grasses sufficiently tall for cutting. There are, of course, many square miles of grazing land occupied by the associations of sand wastes, and Butea Savannah, which are very useful for grazing, but the true "birs", which occur near Harsol and in the north of the Modasa Petha are particularly valuable. Two cuttings are made in an ordinary year, one towards the end of the monsoon, and one after the Divali, but in a year of light rainfall like 1915-16, only one cutting is possible.

The principal herbaceous members of this association are as follows :—

Ischæmum rugosum, *Andropogon Schænanthus*, *A. foveolatus*, *A. annulatus*, *A. contortus*, *Apluda varia*, *Iseilema Wightii*.
Anthistiria (Themeda) ciliata.

Of these, *Andropogon contortus* is useless as fodder, because cuttings are made too late. *Andropogon Schænanthus* is too strongly scented to be of much value, but it is fed to buffaloes. *Apluda varia* is a weak grass and does not form colonies so freely as the others. *Andropogon foveolatus* is rather patchy. The remainder constitute the bulk of the finest bales of cut grass. *Anthistiria ciliata*, which is probably the best fodder in India, is not so universally prevalent here as it is south of the Tapti. Locally, the "jhinjawa" (*Andropogon annulatus*) is preferred to all other kinds. It is an extremely slow grower, and matures in the early winter. Consequently, while the monsoon cuttings contain chiefly *Ischæmum rugosum*, *Iseilema Wightii* and *Anthistiria ciliata*, the winter cuttings contain mainly "jhinjawa" (*Andropogon annulatus*).

The habitats of these grasses differ. While the bulk are xerophytic, *Ischæmum rugosum* and *Iseilema Wightii* prefer the wetter and more low-lying portions of the "birs" and especially the places where the ground has given way in waterholes. So regular is this characteristic, that when riding over "birs" when the grass is up, a horseman is almost safe from the fear of landing his horse in a hole if he threads his way among the patches of "jhinjawa", easily distinguishable by its paler colour and finer stems.

Andropogon Schænanthus is a particularly xerophytic species, both physically and physiologically. It matures very early and with the minimum of rainfall, and thereafter maintains itself without appreciable dryage for months. No doubt the oily products which it contains act as reserve material and maintain turgidity. This grass can be seen along the banks of the Bombay, Baroda and Central India Railway on the Ajmer line a little north of Ahmedabad.

These grasslands are nowhere treeless. Besides the trees mentioned under Xerophytic Woodland, and Butea Savannah, we have noted *Capparis grandis*, *Moringa pterygosperma*, *Dolichandrone falcata* and others. In fact any tree or shrub found in our area may occur.

VII. Other types of Savannah on Sandy Soil.

The vagaries of the associations found on sand are so numerous that different types cannot be distinguished. We regard such associations as belonging to true Savannah, with the reservations made above and more fully elaborated below. One of the difficulties in the way of a natural classification of the sand associations is the human element, the sand area being more densely populated and more extensively cultivated than the associations just described.

The following is a fairly complete list of plants occurring in this formation :—

(i) TREES :—

(As it is very uncertain how far trees are planted and how far spontaneously regenerated we include only the common trees here)—

Mangifera indica, *Ailanthus excelsa*, *Azadirachta indica*,
Mimusops hexandra, *Bassia latifolia*, *Cordia Myxa*,
Acacia arabica.

(ii) SHRUBS AND UNDERSHRUBS :—

(a) More or less abundant, though sometimes only locally so—

Cassia auriculata, *Calotropis procera*, *Abutilon indicum*,
Zizyphus rotundifolia.

(b) Locally common, but not so abundant or wide-spread as the former—

Balanites Roxburghii, *Pavonia zeylanica*, *Acacia Jacquemontii*,
Gymnosporia montana, *Capparis aphylla*,
Waltheria indica, *Ocimum canum*, *Crotalaria Burhia*,
Cassia obtusa, *Grewia pilosa*, *Tephrosia purpurea*, *T.*
villosa, *Crotalaria medicaginea* var. *neglecta*.

The last three, and sometimes also *Cassia auriculata*, are liable to form dense colonies, dominating the entire vegetation.

(c) Fairly common, but rarely or never becoming in any way dominant—

Trichodesma indicum, *Triumfetta rhomboidea*, *T. rotundifolia*,
Leptadenia Spartium.

(iii) CLIMBERS :—

(a) Abundant—

Leptadenia reticulata (often occurring also as a decumbent shrub), *Cocculus villosus*.

(b) Common—

Asparagus racemosus (this is much more abundant in the Thorn Savannah), *Pentatropis microphylla*, *Gloriosa superba*.

(iv) HERBS (or plants mainly herbaceous) not persisting through the dry weather but more or less fugaceous :—

(a) Abundant—

Indigofera linifolia, *I. cordifolia*, *I. enneaphylla*,
Alysicarpus vaginalis, *Cassia Tora*, *Oldenlandia corymbosa*,
Justicia diffusa var. *orbiculata*, *Leucas Cephalotes*,
Commelina nudiflora, *Cenchrus catharticus*,
Perotis latifolia, *Eragrostis tremula*, *Eleusine aegyptiaca*.

(b) Common—

Cleome viscosa, *Polygala erioptera*, *Ionidium heterophyllum*, *Sida cordifolia*, *S. veronicifolia*, *Heylandia latebrosa*, *Zornia diphylla*, *Crotalaria linifolia*, *Alysicarpus hamosus*, *Spermacoce stricta*, *Enicostema littorale*, *Striga euphrasioides*, *Leucas urticifolia*, *Phyllanthus Niruri*, *Euphorbia pilulifera*, *Cyperus niveus*, *C. arenarius*, *C. conglomeratus*, *C. Iria*, *C. aristata*, *Kyllinga triceps*, *Stenophyllus barbata*, *Setaria glauca*, *Panicum ramosum*, *P. distachyum*, *P. trypheron*, *Digitaria sanguinalis* var. *ciliaris*, *Saccharum spontaneum*, *S. Munja*, *Andropogon foveolatus*, *A. contortus*, *Aristida redacta*, *Tragus racemosus*, *Sporobolus diander*, *Eragrostis tenella* var. *plumosa*, *E. pilosa*, *E. cynosuroides*, *Gracilea Royleana*, *Cynodon dactylon*, *Chloris villosa*, *C. barbata*, *C. incompleta*, *Eleusine verticillata*, *E. aristata*.

(c) Occasional—

Hibiscus esculentus, *Corchorus olitorius*, *C. acutangulus*, *Crotalaria mysorensis*, *C. pusilla*, *C. retusa*, *Indigofera hirsuta*, *Tephrosia tenuis*, *Alysicarpus monilifer*, *Gisekia pharnaceoides*, *Blainvillea rhomboidea*, *Martynia diandra*, *Ruellia patula* var. *alba*, *Blepharis molluginifolia*, *Salvia aegyptiaca* var. *pumila*, *Phyllanthus maderaspatensis*, *Euphorbia hypericifolia* var. *parviflora*, *Sopubia delphinifolia*.

(v) HERBS (or plants mainly herbaceous), which continue their reproductive functions through at least a considerable period of dry weather:—

(a) Abundant—

Lepidagathis trinervis, *Convolvulus pluricaulis*, *Evolvulus alsinoides*, *Boerhaavia diffusa*, *Vernonia cinerea*, *Tribulus terrestris*.

(b) Common—

Volutarella divaricata, *Bergia odorata*, *Launea nudicaulis*.

This type of Savannah covers wide areas, and remains but little altered from Ahmedabad westward to Kharaghoda.

VIII. Psammophytes.

The above are all members of the community which we regard as Savannah on Sandy Soil. But where the sand is very deep and permeable

and where, therefore, especially xerophytic conditions are present, we distinguish a Psammophytic Formation. This occurs on (1) hills (dunes) of softer sand, and (2) the more elevated portions in river beds. The bed of such a river as the Sabarmati, if seen in cross section, would exhibit four levels:—(a) the permanent stream or streams which change their position from time to time, (b) the ordinary bed, mainly devoid of vegetation, (c) a sort of higher level bed (not always present), and (d) gravelly bank with thorn scrub (not always present). It is where (c) is present that the psammophytes occur. (c) would only be submerged on perhaps two days in every third year, and the sand being soft and of great depth surface water would be usually more or less absent.

(1) DUNES :—

These are dominated either by *Saccharum Munja* or by *Crotalaria Burhia*, and associated with these are *Cyperus niveus*, *C. arenarius*, *C. conglomeratus*, and many members of the Sand Savannah.

(2) RIVER BED :—

The usual association is *Acacia Jacquemontii*, *Leptadenia Spartium* and *Cassia auriculata*.

These psammophytic associations may, with further study, have to be amalgamated in Sand Savannah; but just as our flora shows the meeting point of the Perso-Arabian and Indo-Malayan floras, so our oecological conditions show the meeting point of the psammophytic formations of the desert with the psilophytic formations of central and western India. None of the associations and formations indicated in this paper can be regarded as finally settled. They must wait to take their place in the general oecology of the Indian continent as it is gradually studied.

Class 13. Mesophytes.

Generally speaking the water content of the soil is so low throughout the greater part of the year, in our area, that mesophytic conditions are not met with, and nothing suggestive of the typical "tropical jungle" is found as a rule. We have noted only two examples of mesophytic associations, both quite exceptional and both occupying an area of negligible extent.

The first, which we may call Mesophytic Bushland, occurs round the margin of a tank, near Kharaghoda, which is probably kept at a nearly constant level by means of a perennial spring. This association forms a belt about fifty yards wide all round the tank, the circumference of the latter being about half a mile.

The following is a list of some of the plants :—

(i) TREES :—

Azadirachta indica, *Cordia Rothii* and others.

(ii) SHRUBS :—

Grewia populifolia, *Gymnosporia montana*, *Clerodendron Phlomidis*, *Abutilon indicum*, *Trichodesma indicum*, *Zizyphus Jujuba*.

(iii) CLIMBERS :—

Dæmia extensa, *Ipomœa calycina*, *I. pilosa*, *I. dasysperma*, *Merremia pentaphylla*, various *Cucurbitaceæ*, *Cocculus villosus*, *Pupalia lappacea*, *Achyranthes aspera*, *Pentastropis microphylla*.

(iv) HERBS :—

Corchorus olitorius, *Abutilon ramosum*, *Commelina nudiflora* and others.

While the plants enumerated are mainly those found in other more xerophytic associations, yet the general aspect of the vegetation is quite different, the whole forming a dense tangle of small trees, bushes, climbers and straggling herbs, through which progress is slow and difficult. This was the aspect of the association as seen in the middle of October, when the surrounding Savannah was already very dry, but no doubt it would be considerably modified later on in the dry weather.

Unfortunately we have had no further opportunity of studying this type.

The second mesophytic association is found on small patches of ground kept constantly moist by springs. This association was noted on the bank of the Watrak River, and in the beds of one or two streams flowing through Woodland Savannah in Modasa, and consisted of the following :—

Cyathocline lyrata, *Emilia sonchifolia*, *Blumea eriantha*, *Hygrophila Serpyllum*, *Hemigraphis elegans*, *Leucas biflora*, *Canscora decurrens*, *Etacum pedunculatum*, *Gnaphalium indicum*.

Two associations remain to be described which do not definitely belong to any of the groups indicated above. These are, (1) Weeds of cultivation, and (2) Hedge plants. Both are to a certain extent artificial, and may conveniently be considered in this place.

1. Weeds of cultivation.

The weeds of cultivated and garden land form a more or less definite association, which has, however, two quite distinct aspects :—(a) during and shortly after the monsoon (August-October) and (b) on irrigated land only during the cold weather (December-March).

The following are some of the commoner species shown in each of these aspects respectively :—

(a) MONSOON ASPECT :—

(i) Abundant—

Spermacoce hispida, *Vernonia cinerea*, *Justicia diffusa* var. *orbiculata*, *Leucus Cephalotes*, *Digera arvensis*, *Celosia argentea*, *Commelina nudiflora*, *Cyperus rotundus*, *Stenophyllus barbata*, *Eragrostis tenella* var. *plumosa*, *Cenchrus catharticus*.

(ii) Very common—

Gynandropsis pentaphylla, *Polycarpæa corymbosa*, *Portulaca quadrifida*, *Alysicarpus longifolius*, *Vicoa auriculata*, *Lochnera pusilla*, *Heliotropium zeylanicum*, *Phyllanthus Niruri*, *Eragrostis minor*.

(iii) Common—

Bergia odorata, *Tribulus terrestris*, *Trianthema monogyna*, *Dicoma tomentosa*, *Sopubia delphinifolia*, *Euphorbia pilulifera*, *E. prostrata*.

(b) COLD WEATHER ASPECT :—

(i) Abundant—

Chenopodium album, *Asphodelus tenuifolius*, *Gynandropsis pentaphylla*.

(ii) Very common—

Melilotus indica, *Datura fastuosa*, *D. fastuosa* var. *alba*.

(iii) Common—

Argemone mexicana, *Oxalis corniculata*, *Anagallis arvensis*, *Feniculum vulgare*.

(iv) Occasional—

Saponaria Vaccaria, *Amarantus polygamus*, *Convolvulus arvensis*.

2. Hedge Plants.

The hedge associations are in all cases partly artificial, as they occur along the lines of boundaries marked out by human agency. Nevertheless, probably very few members of the hedge flora are actually planted, but their seeds find favourable conditions for germination in the shade of the one or more species actually planted in the first place, of which by far the commonest is *Euphorbia nerifolia*.

The following are found as hedge plants :—

(i) SMALL TREES, SHRUBS AND UNDERSHRUBS, such as form the upper storey of self-supporting plants, and scandent shrubs :—

(a) Very common, though none can be called dominant, except, in a very artificial sense, the planted *Euphorbia* in new hedges—

Euphorbia nerifolia (planted), *Zizyphus Oenopia*, *Capparis sepiaria*, *Clerodendron Phlomidis*, *Phyllanthus reticulatus*.

(b) Common, but not invariably present—

Salvadora oleoides, *S. persica*, *Capparis aphylla*, *Abutilon indicum*, *Pavonia zeylanica*, *Zizyphus rotundifolia*, *Plumbago zeylanica*.

(c) Fairly common—

Maerua ovalifolia, *Cadaba indica*, *Streblus asper*, *Zizyphus Jujuba*.

(d) Occasional, or sometimes locally common—

Lawsonia inermis (usually planted, and only found near towns), *Dodonæa viscosa* (planted near towns), *Euphorbia Tirucalli* (planted), *Diospyros cordifolia*, *Fluggea Leucopyrus*, *Anona squamosa*, *Cæsalpinia Bonducella*, *Plectronia parviflora*, *Lantana Camara*, *Euphorbia ligularia* (planted).

(e) Rare—

Lycium barbarum, *Acacia Intsia*, *Flacourtia sepiaria*.
F. Ramontchi, *Capparis grandis*.

(ii) CLIMBING PLANTS:—

(A) Herbaceous annuals, generally seen only during and immediately after the rains. All, with one exception, are *Cucurbitaceæ* :—

(a) Abundant—

Trichosanthes cucumerina, *Coccinia indica*.

(b) Common—

Melothria maderaspatana, *Momordica dioica*, *Cardiospermum Halicacabum*.

(c) Fairly common—

Kedrostis rostrata, *Blastania Garcini*.

(d) Occasional, or locally common—

Luffa acutangula, *Momordica Balsamina*.

(B) Perennial from an underground tuber, but ærial parts as above :—

Gloriosa superba (fairly common).

(C) More or less woody, at least below, and in most cases perennial. Persistent long after the rains have ceased in any case :—

(a) Abundant—

Cocculus villosus, *Pupalia lappacea*, *Achyranthes aspera*.

(b) Very common—

Clitoria Ternatea, *Leptadenia reticulata*, *Abrus precatorius*, *Rivea hypocrateriformis*, *Canavalia ensiformis*, *Daemia extensa*.

(c) Common—

Boerhaavia verticillata, *Telosma pallida*, *Rhynchosia minima*, *Ipomoea obscura*, *Teramnus labialis*, *Ipomoea pes-tigridis*.

(d) Occasional, or local—

Ipomoea sepiaria, *Vitis trifolia*, *Calonyction muricatum*, *Cuscuta reflexa*.

(e) Rare—

Merremia dissecta, *Mucuna pruriens*, *Cuscuta chinensis*, *Cissampelos Pereira*, *Boerhaavia repanda*.

(ii) HERBS :—

Many herbs may be found in the shade of hedges, but the following are specially characteristic of such situations :—

Tridax procumbens, *Ruellia patula*, *Peristrophe bicalyculata*, *Ionidium heterophyllum*, *Sclerocarpus africanus*, *Anisomeles ovata*, *Panicum antidotale*, *Aplula varia*.

PART III.

FLORA.

IN the following list of plants from our area we have included all indigenous plants collected by us, and all aliens which seem to us to be well established and likely to remain so. We have not included garden plants, not found as escapes, nor trees found exclusively in compounds, but garden weeds are included as well as road-side trees, although the latter are, of course, usually planted. We have not distinguished by differences of type between species regarded by us as truly indigenous and species regarded by us as introduced, but it will always be apparent from the notes on habitat and distribution.* The decision as to the point at which a species may be regarded as so well established as to take rank as a member of the local flora is always difficult, and probably no two workers would agree in the case of all species.

A word is necessary as regards the flowering and fruiting periods given. These are by no means exhaustive and could doubtless be considerably extended in many cases. Of non-aquatic plants in our area there are for the most part three types of flowering period, *viz.* :—mid-monsoon, post-monsoon, and pre-monsoon (mainly trees). But there are plants which do not even fit into any of these. Moreover, if a rare plant were found in flower, say, in late February or early March, it would be difficult to decide whether it was a late-flowering individual of the post-monsoon type or an early-flowering individual of the pre-monsoon type. We have, therefore, almost invariably restricted the notes on flowering and fruiting to months in which we have actually observed those phenomena. In a few cases, however, where a species has been found in flower in, say, August, October, December and January, we have not hesitated to draw the conclusion that its flowering period is continuous between the first and last of those months, and have, therefore, entered August-January. Since there is no reason to believe that any plants in our area have two distinct flowering periods, as is the case in some parts of the world, the conclusion seems justified. The difficulty of ascertaining flowering periods was considerably enhanced this last season (1915) by the abnormal character of the monsoon, which appeared to

* See Part I, Sec. 7.

have ended definitely on about the 10th August, but recommenced vigorously on about the 25th September and continued beyond its normal date.

We have adopted mainly the nomenclature of COOKE'S FLORA OF THE BOMBAY PRESIDENCY, both because it is the official Flora of the Botanical Survey and because botanists in this Presidency must inevitably use that work for many years to come.

PHANEROGAMIA.

DICOTYLEDONEÆ.

I. MAGNOLIACEÆ.

1. *Michelia* Linn.

1. *Michelia Champaca* Linn. F. B. I. I, 42 ; Fl. Bomb. I, 7.
Occasional. Not truly wild. Flowers September.

II. ANONACEÆ.

2. *Polyalthia* Blume.

2. *Polyalthia longifolia* Benth. & Hook. f. F. B. I. I, 62 ; Fl. Bomb. I, 12.

Thrives in Ahmedabad, where it is commonly planted. Flowers April and later.

3. *Anona* Linn.

3. *Anona squamosa* Linn. F. B. I. I, 78 ; Fl. Bomb. I, 14.
Naturalised and well established. Flowers August. Fruits November.

III. MENISPERMACEÆ.

4. *Cocculus* DC.

4. *Cocculus villosus* DC. F. B. I. I, 101 ; Fl. Bomb. I, 21.
Common everywhere. Flowers and fruits October—March.

5. *Cissampelos* Linn.

- Cissampelos Pereira* Linn. F. B. I. I, 103 ; Fl. Bomb. I, 22.

Fairly common in Modasa and Prantij. Flowers August and September.

Bracts much enlarged in fruit.

IV. NYMPHÆACEÆ.

6. *Nymphæa* Linn.

6. *Nymphæa Lotus* Linn. F. B. I. I, 114; Fl. Bomb. I, 25.

Common in tanks, and appears to be truly indigenous. Flowers October.

7. *Nymphæa Lotus* Linn. var. *pubescens* Hook. f. & Thoms. F. B. I. I, 114; Fl. Bomb. I, 25.

Not observed by us, but known to occur in or near our area. It grows in the Nal, a very large shallow tank on the western boundary of the Ahmedabad district.

Used as a famine food.

7. *Nelumbium* Juss.

8. *Nelumbium speciosum* Willd. F. B. I. I, 116; Fl. Bomb. I, 26. Commonly cultivated.

V. PAPAVERACEÆ.

8. *Argemone* Linn.

9. *Argemone mexicana* Linn. F. B. I. I, 117; Fl. Bomb. I, 27.

A common introduced weed on sandy soil. Flowers most of the year.

VI. CAPPARIDACEÆ.

9. *Cleome* Linn.

10. *Cleome simplicifolia* Hook. f. & Thoms. F. B. I. I, 169; Fl. Bomb. I, 37.

Occasional in the east of the district. Flowers August—September.

11. *Cleome viscosa* Linn. F. B. I. I, 170; Fl. Bomb. I, 39.

Very common throughout. Flowers August.

10. *Gynandropsis* DC.

12. *Gynandropsis pentaphylla* DC. F. B. I. I, 171; Fl. Bomb. I, 40.

A very common weed of cultivated land. Flowers August—January.

11. *Mærua* Forsk.

13. *Mærua ovalifolia* Cambess. Fl. Bomb. I, 41.

M. arenaria H. f. & T. var. *scabra*, F. B. I. I, 171.

Common in hedges. Flowers December and later. Fruits February.

12. *Cratæva* Linn.

14. *Cratæva religiosa* Forst. var. *Roxburghii* Hook. f. & Thoms. F. B. I. I, 172. Fl. Bomb. I, 42.

Occasional throughout our area. Flowers in March when bare of leaves or nearly so.

13. *Cadaba* Forsk.

15. *Cadaba indica* Lam. F. B. I. I, 172; Fl. Bomb. I, 43.

Common in hedges. Flowers September—November, rarely later.

14. *Capparis* Linn.

16. *Capparis aphylla* Roth. F. B. I. I, 174; Fl. Bomb. I, 46.

Abundant throughout. Flowers at various times, and sparsely or abundantly in inverse ratio to the rainfall.

The fruit is used as a spice.

17. *Capparis grandis* Linn. f. F. B. I. I, 176; Fl. Bomb. 47.

In hedges and Savannah, but not common. Old fruits March. Flowers April—May.

18. *Capparis sepiaria* Linn. F. B. I. I, 177; Fl. Bomb. I, 48.

Common in hedges. Flowers February—May.

VII. VIOLACEÆ.

15. *Ionidium* Vent.

19. *Ionidium heterophyllum* Vent. Fl. Bomb. I, 52.

I. suffruticosum Ging. F. B. I. I, 185.

Common under hedges and in open grounds, but always solitary. Flowers August.

VIII. BIXACEÆ.

16. *Flacourtia* Comm.

20. *Flacourtia Ramontchi* L'Herit. F. B. I. I, 193; Fl. Bomb. I, 55.
♀ plants not infrequent around Modasa. One ♂ plant near Talod.
Flowers March.

21. *Flacourtia sepiaria* Roxb. F. B. I. I, 194; Fl. Bomb. I, 56.

Only ♀ plants seen. Common at Modasa, and one plant near Ahmedabad. Flowers February. Fruits March.

IX. POLYGALACEÆ.

17. *Polygala* Linn.

22. *Polygala erioptera* DC. F. B. I. I, 203; Fl. Bomb. I, 60.
(Determined at Kew.)

Common on sandy soil. Flowers August—October.

Very variable in habit. The flowers vary from yellowish pink to reddish purple; we have never observed them yellow. (Compare Cooke, Fl. Bomb. loc. cit.)

23. *Polygala chinensis* Linn. F. B. I. I, 204; Fl. Bomb. I, 60.
(Determined at Kew.)

Laterite plateau, Talod. Not found elsewhere. Flowers yellow.
Flowers August.

X. CARYOPHYLLACEÆ.

18. *Saponaria* Linn.

24. *Saponaria Vaccaria* Linn. F. B. I. I, 217; Fl. Bomb. I, 62.
An occasional weed of cultivation. Flowers December.

19. *Polycarpæa* Lamk.

25. *Polycarpæa corymbosa* Lam. F. B. I. I, 245; Fl. Bomb. I, 66.

Common in cultivated land. Flowers September and onwards.

XI. PORTULACACEÆ.**20. Portulaca Linn.**

26. Portulaca oleracea Linn. F. B. I. I, 246 ; Fl. Bomb. I, 68.
A common weed in compounds. Flowers October.

27. Portulaca quadrifida Linn. F. B. I. I, 247 ; Fl. Bomb. I, 68.
A common weed in garden land. Flowers October.

28. Portulaca suffruticosa Wight. F. B. I. I, 247 ; Fl. Bomb. I, 69.
Recorded from Ahmedabad by Woodrow, has not been found by us.

XII. TAMARICACEÆ.**21. Tamarix Linn.**

29. Tamarix gallica Linn. F. B. I. I, 248 ; Fl. Bomb. I, 70.
Common at Kharaghoda. Flowers October.

30. Tamarix dioica Roxb. F. B. I. I, 249 ; Fl. Bomb. I, 71.
Solitary specimen seen in a flooded cutting by the railway line at Talod. Flowers August.

31. Tamarix ericoides Rottl. F. B. I. I, 249 ; Fl. Bomb. I, 72.
Common in the bed of the Watrak River. Flowers December.

XIII. ELATINACEÆ.**22. Bergia Linn.**

32. Bergia odorata Edgew. F. B. I. I, 251 ; Fl. Bomb. I, 73.
Common. Flowers November and onwards.

XIV. MALVACEÆ.**23. Sida Linn.**

33. Sida veronicifolia Lam. Fl. Bomb. I, 92.

S. humilis Willd. var. *veronicaefolia* Lam. F. B. I. I, 322.

Common. Flowers August—September.

Usually erect. We have only once collected the trailing form.

34. *Sida spinosa* Linn. F. B. I. I, 323 ; Fl. Bomb. I, 92. (Determined at Kew.)

Occasional on dry or swampy ground. Flowers September.

35. *Sida grewioides* Guill. & Perr. F. B. I. I, 323 ; Fl. Bomb. I, 93. (Determined at Kew.)

Frequent. Flowers July—August.

We have three collections of this species, but all are awnless. (Cf. Cooke's description in Fl. Bomb.)

36. *Sida cordifolia* Linn. F. B. I. I, 324 ; Fl. Bomb. I, 94.

Occasional. Flowers August and onwards.

24. *Abutilon* Gaertn.

37. *Abutilon indicum* Sweet. F. B. I. I, 326 ; Fl. Bomb. I, 96.

Abundant everywhere. Flowers and fruits most of the year.

38. *Abutilon ramosum* Guill. & Perr. F. B. I. I, 328 ; Fl. Bomb. I, 98. (Determined at Kew.)

One collection only, in a moist shady place under trees near Kharaghoda. Flowers October.

39. *Abutilon fruticosum* Guill. & Perr. F. B. I. I, 328 ; Fl. Bomb. I, 98. (Determined at Kew.)

Kharaghoda. One collection only. Fruits October.

25. *Urena* Linn.

40. *Urena sinuata* Linn. F. B. I. I, 329 ; Fl. Bomb. I, 100.

Sonasan. Common along canal banks. Flowers October.

26. *Pavonia* Cav.

41. *Pavonia zeylanica* Cav. F. B. I. I, 331 ; Fl. Bomb. I, 102.

Common. Flowers August—September. Fruits December—January.

27. *Hibiscus* Linn.

42. *Hibiscus micranthus* Linn. F. B. I. I, 335 ; Fl. Bomb. I, 107.

Not common. Fruits October.

43. *Hibiscus lobatus* C. Kze. (Determined at Kew.)

H. Solandra L'Herit. F. B. I. I, 336 ; Fl. Bomb. I, 107.

Fairly common in moist sheltered localities. Flowers August—October.

In our specimens the pure white corolla is $\frac{1}{2}$ inch long, not $\frac{3}{16}$ th inch as stated by Cooke in Fl. Bomb.

44. Hibiscus cannabinus Linn. F. B. I. I, 339 ; Fl. Bomb. I, 109. (Determined at Kew.)

Occasionally found as an escape from cultivation. Flowers October.

45. Hibiscus cæsius Garcke. Fl. Bomb. I, 109.

H. Gibsoni Stocks. F. B. I. I, 339.

Occasional in the north-east of our area. Flowers August—September.

46. Hibiscus punctatus Dalz. F. B. I. I, 340 ; Fl. Bomb. I, 110.

One collection only. Fruits August.

47. Hibiscus Sabdariffa Linn. F. B. I. I, 340 ; Fl. Bomb. I, 110.

The Roselle. Replaces *H. cannabinus* Linn, south of the Watrak River, and is occasionally found as an escape.

48. Hibiscus Abelmoschus Linn. (?) F. B. I. I, 342 ; Fl. Bomb. I, 112.

Talod, as an escape. Fruits October.

49. Hibiscus esculentus Linn. F. B. I. I, 343 ; Fl. Bomb. I, 112. (Determined at Kew.)

Extensively cultivated and well established as an escape. Flowers October.

28. Gossypium Linn.

50. Gossypium herbaceum Linn. F. B. I. I, 346 ; Fl. Bomb. I, 116.

Some varieties are found as escapes from cultivation, and then occur as large scandent shrubs. Fruits October.

29. Adansonia Linn.

51. Adansonia digitata Linn. F. B. I. I, 348 ; Fl. Bomb. I, 119.

One large tree on the Maidan at Ahmedabad.

30. Bombax Linn.

52. Bombax malabaricum DC. F. B. I. I, 349 ; Fl. Bomb. I, 120.

Abundant in the Watrak River valley and southwards, planted elsewhere. Flowers March.

XV. STERCULIACEÆ.**31. Sterculia Linn.**

53. *Sterculia urens* Roxb. F. B. I. I, 355 ; Fl. Bomb. I, 123.
Hilly jungles, Modasa. Common. Flowers March.

54. *Sterculia villosa* Roxb. F. B. I. I, 355 ; Fl. Bomb. I, 124.

There is a sheet of this in the Gujarat College Herbarium, collected in Modasa, but we have not seen the tree there.

32. Helicteres Linn.

55. *Helicteres Isora* Linn. F. B. I. I, 365 ; Fl. Bomb. I, 128.
Hilly jungles, Modasa. Common. Flowers October.

33. Guazuma Plum.

56. *Guazuma tomentosa* H. B. & K. F. B. I. I, 375 ; Fl. Bomb. I, 136.

Roadsides, occasional, presumably planted. Flowers August.

34. Pentapetes Linn.

57. *Pentapetes phœnicea* Linn. F. B. I. I, 371 ; Fl. Bomb. I, 136.

Ghadi. Margin of a small tank, far from any habitation, and, therefore, probably wild. Flowers November.

35. Melochia Linn.

58. *Melochia corchorifolia* Linn. F. B. I. I, 374 ; Fl. Bomb. I, 134.
Fairly common on swampy land. Flowers August. Fruits October.

36. Waltheria Linn.

59. *Waltheria indica* Linn. F. B. I. I, 374 ; Fl. Bomb. I, 135.

Fairly common by roadsides and on swampy land. Locally abundant on sandy waste by the Watrak River. Flowers September—October.

XVI. TILIACEÆ.**37. Grewia Linn.**

60. *Grewia populifolia* Vahl. F. B. I. I, 385 ; Fl. Bomb. I, 140.

In Thorn Savannah on Sabarmati River banks, 10 miles above Ahmedabad, and amongst bushes, Kharaghoda. Flowers October and after. Fruits February.

61. *Grewia asiatica* Linn. F. B. I. I, 386 ; Fl. Bomb. I, 142.
Modasa, not common. Flowers March.

62. *Grewia pilosa* Lam. F. B. I. I, 388 ; Fl. Bomb. I, 142.
Fairly common. Flowers August. Fruits October. The flowers are yellow.

63. *Grewia villosa* Willd. F. B. I. I, 388 ; Fl. Bomb. I, 143.
Fairly common. Fruits October.

64. *Grewia hirsuta* Vahl. F. B. I. I, 391 ; Fl. Bomb. I, 144.
(Determined at Calcutta.)
Modasa. Not found elsewhere. Flowers October.

38. *Triumfetta* Linn.

65. *Triumfetta rhomboidea* Jacq. F. B. I. I, 395 ; Fl. Bomb. I, 147.
Common on sandy soil. Flowers September.

66. *Triumfetta rotundifolia* Lam. F. B. I. I, 395 ; Fl. Bomb. I, 148.
Common. Flowers August—January.

39. *Corchorus* Linn.

67. *Corchorus capsularis* Linn. F. B. I. I, 397 ; Fl. Bomb. I, 148.
(Determined at Kew.)
Marshy ground, Talod. Perhaps introduced with rice seed. Fruits October.

68. *Corchorus olitorius* Linn. F. B. I. I, 397 ; Fl. Bomb. I, 149.
Common. Flowers September. Fruits October.

69. *Corchorus trilocularis* Linn. F. B. I. I, 397 ; Fl. Bomb. I, 149.
Sandy field south of Watrak River. Fruits December. Kharaghoda. Fruits March.

70. *Corchorus fascicularis* Lam. F. B. I. I, 398 ; Fl. Bomb. I, 149.

Common. Flowers October.

71. *Corchorus Antichorus* Raensch. F. B. I. I, 398 ; Fl. Bomb. I, 150.

On dry salt land at Kharaghoda. Not common. Fruits October.

72. *Corchorus acutangulus* Lam. F. B. I. I, 398 ; Fl. Bomb. I, 150
Common. Flowers August—September. Fruits March.

XVII. ZYGOPHYLLACEÆ.

40. *Tribulus* Linn.

73. *Tribulus terrestris* Linn. F. B. I. I, 423 ; Fl. Bomb. I, 160

An abundant weed. Flowers July—September.

Vern. 'Gokru'.

41. *Fagonia* Linn.

74. *Fagonia cretica* Linn. F. B. I. I, 425 ; Fl. Bomb. I, 164.

Kharaghoda, fairly common. Fruits and late flowers March.

Vern. 'Jowasa' (being confused by the people with *Alhagi camelorum* Fisch.)

The plants are said to be used like *Alhagi camelorum* Fisch. for making screens for the hot weather.

XVIII. GERANIACEÆ.

42. *Oxalis* Linn.

75. *Oxalis corniculata* Linn. F. B. I. I, 436 ; Fl. Bomb. I, 167.

A frequent weed. Flowers in the cold weather.

XIX. RUTACEÆ.

43. *Feronia* Corr.

76. *Feronia Elephantum* Corr. F. B. I. I, 516 ; Fl. Bomb. I, 191

Common on sandy soil, but only found near civilization. A doubtful native. Flowers April. Fruits October onwards.

Vern. 'Kothi'.

44. *Aegle* Corr.

77. *Aegle Marmelos* Corr. F. B. I. I, 516 ; Fl. Bomb. I, 192.
Frequent in hilly jungles, Modasa. Fruits August—September.

XX. SIMARUBACEÆ.

45. *Allanthus* Desf.

78. *Allanthus excelsa* Roxb. F. B. I. I, 518 ; Fl. Bomb. I, 193.
A very common tree on sandy soil. Flowers January. Fruits March.

46. *Balanites* Delile.

79. *Balanites Roxburghii* Planch. F. B. I. I, 522 ; Fl. Bomb. I, 195.
Common throughout our area. Flowers April. Fruits October.

XXI. BURSERACEÆ.

47. *Boswellia* Roxb.

80. *Boswellia serrata* Roxb. F. B. I. I, 528 ; Fl. Bomb. I, 198.
Jungles north of Modasa. Not common. Flowers March.

XXII. MELIACEÆ.

48. *Melia* Linn.

81. *Melia Azedarach* Linn. F. B. I. I, 544 ; Fl. Bomb. I, 205.
Occasional near habitations, but perhaps always planted. Flowers irregularly.

49. *Azadirachta* A. Juss.

82. *Azadirachta indica* A. Juss. Fl. Bomb. I, 207.
Melia Azadirachta Linn. F. B. I. I, 544.
Well established and abundant. Flowers March.

XXIII. CELASTRACEÆ.

50. *Celastrus* Linn.

83. *Celastrus paniculata* Willd. F. B. I. I, 617; Fl. Bomb. I, 231.
Modasa. Flowers May. Fruits August—September.

51. *Gymnosporia* W. & A.

84. *Gymnosporia montana* Benth. F. B. I. I, 621; Fl. Bomb. I, 233.
Very common. Flowers October.

XXIV. RHAMNACEÆ.

52. *Zizyphus* Juss.

85. *Zizyphus Jujuba* Lamk. F. B. I. I, 632; Fl. Bomb. I, 240.
Common everywhere. Flowers October.

86. *Zizyphus trinervia* Roxb. Fl. Bomb. I, 241.

Z. glabrata Heyne. F. B. I. I, 633.

Ahmedabad. Flowers June.

Collected by Mr. R. K. Bhide in 1909, and previously by other collectors. We have at present failed to find it, though we have seen it in S. E. Kathiawar.

87. *Zizyphus rotundifolia* Lamk. Fl. Bomb. I, 241.

Z. nummularia W. & A. F. B. I. I, 433.

Very common. Flowers October. Fruits December—January.

88. *Zizyphus Oenopia* Mill. F. B. I. I, 634; Fl. Bomb. I, 242.

Common in hedges. Flowers September and onwards. Fruits January.

89. *Zizyphus xylopyra* Willd. F. B. I. I, 634; Fl. Bomb. I, 242.

Common in black soil Savannah, south-east of Watrak River.
Fruits November.

XXV. VITACEÆ.

53. *Vitis* Linn.

90. *Vitis latifolia* Roxb. F. B. I. I, 652; Fl. Bomb. I, 253.

Modasa. Flowers September.

91. *Vitis trifolia* Linn. Fl. Bomb. I, 254.
V. carnosia Wall. F. B. I. I, 654.
 Common in hedges at Ahmedabad. Flowers August.

XXVI. SAPINDACEÆ.

54. *Cardiospermum* Linn.

92. *Cardiospermum Halicacabum* Linn. F. B. I. I, 670; Fl. Bomb. I, 263.
 Common in hedges. Flowers August.

55. *Sapindus* Linn.

93. *Sapindus laurifolius* Vahl. Fl. Bomb. I, 266.
S. trifoliatus Linn. F. B. I. I, 682; Prain, Beng. Pl. 344.
 Occasional near habitations. Flowers December. Fruits March.
 The 'Soap-nut' tree. Vern. 'Ritha'

56. *Dodonæa* Linn.

94. *Dodonæa viscosa* Linn. F. B. I. I, 697; Fl. Bomb. I, 269.
 Commonly cultivated as a hedge plant, but perhaps nowhere truly wild in our area. Flowers Fêbruary.

XXVII. ANACARDIACEÆ.

57. *Mangifera* Linn.

95. *Mangifera indica* Linn. F. B. I. II, 13; Fl. Bomb. I, 273.
 Common and widely spread. Flowers February—March.

58. *Odina* Roxb.

96. *Odina Wodier* Roxb. F. B. I. II, 29; Fl. Bomb. I, 277.
 Frequent in woodland Savannah at Modasa. Flowers March.

XXVIII. MORINGACEÆ.

59. *Moringa* Lamk.

97. *Moringa pterygosperma* Gaertn. F. B. I. II, 45; Fl. Bomb. I, 232.

Occasional as an escape. Flowers March. Old fruits August—September.

Indians distinguish between sweet and bitter varieties.

XXIX. LEGUMINOSÆ.

60. *Heylandia* DC.

98. *Heylandia latebrosa* DC. F. B. I. II, 65 ; Fl. Bomb. I, 291.
Very common on sandy soil. Flowers August.

61. *Crotalaria* Linn.

99. *Crotalaria Burhia* Ham. F. B. I. II, 66 ; Fl. Bomb. I, 292.
Fairly common on sandy hills. Flowers August.

100. *Crotalaria mysorensis* Roth. F. B. I. II, 70 ; Fl. Bomb. I, 294.
Sonasan, in sandy fields. Flowers and fruits October.

101. *Crotalaria pusilla* Heyne. F. B. I. II, 70 ; Fl. Bomb. I, 296.
Bavsar, in a sandy field. Flowers and fruits October.

102. *Crotalaria linifolia* Linn. f. F. B. I. II, 72 ; Fl. Bomb. I, 297.
Very common. Flowers August.

103. *Crotalaria* sp. near *linifolia*. (Determined at Kew.)

Common at Kharaghoda. Flowers October.

The leaves are much smaller than in the common form of *C. linifolia* Linn.

104. *Crotalaria retusa* Linn. F. B. I. II, 75 ; Fl. Bomb. I, 298.
Sonasan, in sandy fields. Flowers and fruits October.

105. *Crotalaria juncea* Linn. F. B. I. II, 79 ; Fl. Bomb. I, 301.
Occasional as an escape. Flowers October.
Vern. 'San'.

106. *Crotalaria medicaginea* Lamk. var. *neglecta* Baker. F. B. I. II, 81 ; Fl. Bomb. I, 302.

The most abundant weed in sandy pasture land, and one of the most troublesome. Flowers August—September.

107. *Crotalaria orixensis* Willd. F. B. I. II, 83; Fl. Bomb. I, 303.
(Determined at Kew.)

Once collected at Bavsar, and a narrow leaved form once from the laterite plateau, Talod. Flowers and fruits October.

62. *Trigonella* Linn.

108. *Trigonella occulta* Delile. F. B. I. II, 87; Fl. Bomb. I, 305.
Fairly common near Ahmedabad on dried mud. Flowers February.

63. *Melilotus* Juss.

109. *Melilotus indica* All. Fl. Bomb. I, 305.

M. parviflora Desf. F. B. I. II, 89.

Fairly common as a weed, in gardens and garden lands. Flowers January—May during irrigation.

64. *Cyamopsis* DC.

110. *Cyamopsis psoralioide* DC. F. B. I. II, 92; Fl. Bomb. I, 308.

Occasional as an escape. Flowers October.

65. *Indigofera* Linn.

111. *Indigofera linifolia* Retz. F. B. I. II, 92; Fl. Bomb. I, 310.
Fairly common on sandy soil. Flowers September.

112. *Indigofera cordifolia* Heyne. F. B. I. II, 93; Fl. Bomb. I, 311.

Common on open sandy soil. Flowers August.

113. *Indigofera glandulosa* Willd. F. B. I. II, 94; Fl. Bomb. I, 311.

Frequent on Talod plateau. Flowers August—September.

114. *Indigofera enneaphylla* Linn. F. B. I. II, 94; Fl. Bomb. I, 312.

Abundant in the rains. Flowers July—August.

115. *Indigofera paucifolia* Delile. F. B. I. II, 97; Fl. Bomb. I, 313.

Locally very common on dry salt land at Kharaghoda. Flowers and fruits October.

A low spreading shrub. The wings of the corolla are salmon coloured, and the rest of the corolla yellow with salmon lines. Cf. Cooke, Fl. Bomb.

116. *Indigofera trita* Linn. f. F. B. I. II, 96; Fl. Bomb. I, 315.
Occasional. Flowers August. Fruits October.

117. *Indigofera hirsuta* Linn. F. B. I. II, 98; Fl. Bomb. I, 319.
Sandy fields near Ghadi and elsewhere. Flowers and fruits
November.

66. *Tephrosia* Pers.

118. *Tephrosia tenuis* Wall. F. B. I. II, 111; Fl. Bomb. I, 323.
Fairly common. Flowers September—October.

119. *Tephrosia purpurea* Pers. F. B. I. II, 112; Fl. Bomb. I, 325.
A very common weed. Flowers September and onwards.

120. *Tephrosia purpurea* Pers. var. *pumila* Baker. F. B. I. II, 113;
Fl. Bomb. I, 325.
Ahmedabad and Bavsar. Frequent. Flowers September.

121. *Tephrosia villosa* Pers. F. B. I. II, 113; Fl. Bomb. I, 326.
Common. Flowers August.

67. *Sesbania* Pers.

122. *Sesbania aculeata* Poir. F. B. I. II, 114; Fl. Bomb. I, 328.
Very common. Flowers August—September.

The common form has the standard conspicuously dotted with dark brown spots, not red as stated by Hooker, in F. B. I. and by Cooke, in Fl. Bomb. A form with uniformly yellow flowers has also been collected at Ahmedabad.

68. *Taverniera* DC.

123. *Taverniera nummularia* DC. F. B. I. II, 140; Fl. Bomb. I,
331.
Kharaghoda, dry ground. Flowers October.

69. *Alhagi* Desv.

124. *Alhagi camelorum* Fisch. Fl. Bomb. I, 339; Prain, Beng. Pl.
416.

maurorum Desv. F. B. I. II, 145.

Common, especially in river beds and tank edges. Flowers April—May. But often does not flower.

Vern. 'Divâsa', 'Jhavâsa'

The whole plants are used instead of "khas-khas" grass (*Andropogon squarrosus* Linn. f.) roots to make screens for the hot weather.

70. *Zornia* Gmel.

125. *Zornia diphylla* Pers. F. B. I. II, 147; Fl. Bomb. I, 334.
Common. Flowers September.

71. *Aeschynomene* Linn.

126. *Aeschynomene indica* Linn. F. B. I. II, 151; Fl. Bomb. I, 340.
Edges of water holes, Talod. Flowers and fruits August.

72. *Eleiotis* DC.

127. *Eleiotis sororia* DC. F. B. I. II, 153; Fl. Bomb. I, 342.
In a field of pulses, Ghadi, abundant, and one specimen in a chili field, Raesan.

The lower pair of leaflets is distinct in our specimens and is attached well up the petiole.

73. *Uraria* Desv.

128. *Uraria picta* Desv. F. B. I. II, 155; Fl. Bomb. I, 344.
Modasa. Rare. Flowers August—September.

74. *Alysicarpus* Neck.

129. *Alysicarpus monilifer* DC. F. B. I. II, 157; Fl. Bomb. I, 345.
Ahmedabad. Not common. Fruits September.

130. *Alysicarpus hamosus* Edgew. F. B. I. II, 157; Fl. Bomb. I, 346.
Common on sandy soil. Flowers August—September.

131. *Alysicarpus vaginalis* DC. F. B. I. II, 158; Fl. Bomb. I, 346.

Not so common as the next. Flowers September.

132. *Alysicarpus vaginalis* DC. var. *nummularifolius* Baker.
F. B. I. II, 158; Fl. Bomb. I, 346.

Very common on sandy soil. Flowers August.

133. *Alysicarpus bupleurifolius* DC. F. B. I. II, 158; Fl. Bomb. I, 347.

Occasional at Bavsar and on laterite plateau, Talod. Flowers August-October.

134. *Alysicarpus longifolius* W. & A. F. B. I. II, 159; Fl. Bomb. I, 347.

Common. Flowers September.

135. *Alysicarpus rugosus* DC. var. *styracifolius* Baker. F. B. I. II, 159; Fl. Bomb. I, 348.

In the bed of a dried tank, Ghadi. Not seen elsewhere. Fruits November.

136. *Alysicarpus tetragonolobus* Edgew. F. B. I. II, 159; Fl. Bomb. I, 349.

Bank at Ghadi. Not seen elsewhere. Fruits November.

75. *Desmodium* Desv.

137. *Desmodium triflorum* DC. F. B. I. II, 173; Fl. Bomb. I, 355.
Fairly common. Flowers and fruits September—October.

138. *Desmodium gangeticum* DC. F. B. I. II, 168; Fl. Bomb. I, 356.

Modasa and Bavsar, and probably all along the foot hills. Fruits September—November.

76. *Abrus* Linn.

139. *Abrus precatorius* Linn. F. B. I. II, 175; Fl. Bomb. I, 359.
Frequent in hedges. Flowers August. Fruits December—January.

77. *Teramnus* Sw.

140. *Teramnus labialis* Spreng. F. B. I. II, 184; Fl. Bomb. I, 363.

Common. Flowers September—October.

The hairs on the stem are, in some cases at least, quite erect.

78. *Mucuna* Adans.

141. *Mucuna pruriens* DC. F. B. I. II, 187; Fl. Bomb. I, 365.
Occasional in hedges. Fruits October and onwards.

79. Erythrina Linn.

142. Erythrina indica Lamk. F. B. I. II, 188; Fl. Bomb. I, 366.
Occasional, but perhaps always planted. Flowers February.

143. Erythrina suberosa Roxb. F. B. I. II, 189; Fl. Bomb. I, 367.
Rare. Roadside south of Watrak River. Possibly planted. Flowers
March.

80. Butea Roxb.

144. Butea frondosa Konig. F. B. I. II, 194; Fl. Bomb. I, 371.

A conspicuous feature of Savannah east of the Majham River and on the laterite plateau, Talod. Almost absent on sand. Flowers February—March.

Vern. 'Khâkrâ.'

81. Canavalia Adans.

145. Canavalia ensiformis DC. F. B. I. II, 195; Fl. Bomb. I, 373.

Frequent in hedges. Flowers pink. Flowers August. Fruits November.

82. Phaseolus Linn.

146. Phaseolus trilobus Ait. F. B. I. II, 201; Fl. Bomb. I, 376.

Fairly common. Flowers September—October.

147. Phaseolus aconitifolius Jacq. [F. B. I. II, 202; Fl. Bomb. I, 378.

Occasional as an escape from cultivation. Flowers October.

83. Vigna Savi.

148. Vigna Catjang Endl. F. B. I. II, 205; Fl. Bomb. I, 380.

(Determined at Kew.)

Occasional as an escape from cultivation. Flowers October.

84. Clitoria Linn.

149. Clitoria Ternatea Linn. F. B. I. II, 208; Fl. Bomb. I, 380.

Very common in hedges during and after the rains. Flowers July.

85. Dolichos Linn.

150. Dolichos lablab Linn. F. B. I. II, 209; Fl. Bomb. I, 381.

In a hedge, Sonasan. An escape which had reverted to perennial type, with much smaller leaves and flowers. Flowers October.

86. Rhynchosia Lour.

151. Rhynchosia minima DC. F. B. I. II, 223; Fl. Bomb. I, 388.
Fairly common. Flowers August—October

Hooker's statement in F. B. I., that the stipules are caducous, is incorrect, as far as our specimens are concerned.

87. Pongamia Vent.

152. Pongamia glabra Vent. F. B. I. II, 240; Fl. Bomb. I, 402.

Indigenous on the banks of streams, Modasa, as a small tree. Common as a larger tree on roadsides, but possibly always planted in this case. Flowers June—July.

88. Cæsalpinia Linn.

153. Cæsalpinia Bonducella Fleming. F. B. I. II, 254; Fl. Bomb. I, 410.

Occasional in hedges. Flowers September.

154. Cæsalpinia coriaria Willd. Fl. Bomb. I, 413.

In Ahmedabad city, introduced. Flowers September—December. Fruits March.

89. Poinciana Linn.

155. Poinciana elata Linn. F. B. I. II, 260; Fl. Bomb. I, 414.

Not uncommon in villages. Flowers December—February.

90. Parkinsonia Linn.

156. Parkinsonia aculeata Linn. F. B. I. II, 260; Fl. Bomb. I, 415.

Well established near Kharaghoda. Occasional elsewhere. Flowers October—March.

Vern. 'Thal-bával' (see No. 171.)

91. Cassia Linn.

157. Cassia occidentalis Linn. F. B. I. II, 262; Fl. Bomb. 418.

Very common on roadsides and waste lands. Flowers October.

158. Cassia Tora Linn. F. B. I. II, 263; Fl. Bomb. I, 420.

C. obtusifolia Linn. Fl. Bomb. I, 420.

Abundant on roadsides and waste lands. Flowers October.

Some plants have a gland between the lower pair of leaflets only, so that the main distinction between this species and *C. obtusifolia* L. is not maintained.

159. Cassia auriculata Linn. F. B. I. II, 263; Fl. Bomb. I, 421.

Very common. Flowers most of the year.

160. *Cassia obtusa* Roxb. Fl. Bomb. I, 421.

C. obovata Collad. F. B. I. II, 264.

Similar localities to the last. Frequent. Flowers August—March.

161. *Cassia holosericea* Fresen. Fl. Bomb. I, 422.

Occasional. Flowers November.

162. *Cassia pumila* Lamk. F. B. I. II, 266 ; Fl. Bomb. I, 424.

Common. Flowers August—September.

92. *Tamarindus* Linn.

163. *Tamarindus indica* Linn. F. B. I. II, 273 ; Fl. Bomb. I, 429.

A very common tree, but perhaps usually planted. Flowers July.

Vern. 'Âmlî.'

93. *Bauhinia* Linn.

164. *Bauhinia racemosa* Lamk. F. B. I. II, 276 ; Fl. Bomb. I, 431.

Savannah east of Majham River, common. Occasional elsewhere.

Fruits October—January.

165. *Bauhinia purpurea* Linn. F. B. I. II, 284 ; Fl. Bomb. I, 433.

Round villages, occasional. Not indigenous. Flowers March.

94. *Neptunia* Lour.

166. *Neptunia triquetra* Benth. F. B. I. II, 286 ; Fl. Bomb. I, 436.

(Determined at Kew.)

Rare. Laterite plateau, Talod. Flowers August.

The leaves of this species are extremely sensitive, at least as much so as the well known *Mimosa pudica* Linn.

95. *Prosopis* Linn.

167. *Prosopis spicigera* Linn. F. B. I. II, 288 ; Fl. Bomb. I, 439.

Frequent. Flowers March.

Vern. 'Khîjada.'

95A. *Dichrostachys* DC.

167A. *Dichrostachys cinerea* Wight & Arn. F. B. I. II, 288 ; Fl. Bomb. I, 440.

Common in Savannah. Flowers August—October.

96. *Mimosa* Linn.

168. *Mimosa hamata* Willd. F. B. I. II, 291 ; Fl. Bomb. I, 442.

Frequent in the Modasa Petha. Flowers September.

97. *Acacia* Willd.

169. *Acacia arabica* Willd. F. B. I. II, 293 ; Fl. Bomb. I, 443.

Locally abundant. Flowers August--December.

Vern. 'Bâval,' 'bâbhul'

170. *Acacia arabica* Willd. var. *cupressiformis* Stewart. Fl. Bomb. I, 444.

One tree, apparently referable to this variety, has been seen by the railway south of Talod.

171. *Acacia arabica* Willd. var. *vediana* Cooke. Fl. Bomb. I, 444.

Not uncommon in the Bâval growing areas around Ahmedabad, especially to the north and west.

Vern. 'Thal-bâval,' which is, however, also the name of No. 156.

The variety is well recognised by the people, who say that the wood is useless for agricultural implements, as it splits. It is, however, even more useful as fuel, and in view of the importance of the fuel industry in the city of Ahmedabad there is no clearly recognized difference in value between the two kinds of the tree.

We have noted the two following points of varietal difference, in addition to those mentioned by Cooke :—

"Sutures of the pod thickened and prominent ; pod sparsely tomentose, sometimes quite glabrous and shining."

172. *Acacia Jacquemontii* Benth. F. B. I. II, 293 ; Fl. Bomb. I, 446.

Locally abundant throughout our area. Flowers February—March.

Vern. 'Dev-bâval.'

173. *Acacia leucophlœa* Willd. F. B. I. II, 294 ; Fl. Bomb. I, 447.

Savannah, common. Flowers October. Fruits December.

Vern. 'Nhâd.'

174. *Acacia Catechu* Willd. var. *Sundra* Prain. Fl. Bomb. I, 448.

A. Sundra DC. F. B. I. II, 295.

Mc lasa, edge of a small stream in woodland. Fruits December.

175. *Acacia Senegal* Willd. F. B. I. II, 295 ; Fl. Bomb. I, 449.

Common in Savannah. Flowers August-September.

Vern. 'Padpad'

176. *Acacia Intsia* Willd. F. B. I. II, 297 ; Fl. Bomb. I, 450.

Occasional. Flowers October.

177. *Acacia pennata* Willd. F. B. I. II, 297 ; Fl. Bomb. I, 451.

Bank of a Nallah on black soil Savannah south-east of Watrak River. Fruits December.

98. *Albizzia Durazz.*

178. *Albizzia Lebbek* Benth. F. B. I. II, 298 ; Fl. Bomb. I, 452.

Frequent throughout the district, mainly in and about villages. Fruits October—February.

99. *Pithecolobium* Mart.

179. *Pithecolobium aulce* Benth. F. B. I. II, 302 ; Fl. Bomb. I, 456.

Villages. Introduced. Flowers December.

XXX. SAXIFRAGACEÆ.

100. *Vahlia* Thunb.

180. *Vahlia viscosa* Roxb. F. B. I. II, 399 ; Fl. Bomb. I, 463.

Ahmedabad, H. M. Chibber ! Flowers November. Not found by us.

XXXI. COMBRETACEÆ.

101. *Terminalia* Linn.

181. *Terminalia tomentosa* W. & A. F. B. I. II, 447 ; Fl. Bomb. I, 479.

Woodland, Modasa. Common. Flowers and fruits September.

182. *Terminalia Catappa* Linn. F. B. I. II, 444 ; Fl. Bomb. I, 481.

Occasional in Ahmedabad city. Not wild. Flowers September.

102. *Anogeissus* Wall.

183. *Anogeissus sericea* Brandis, Indian Trees (1907), 315 ; Fl. Bomb. I, 482. (*Anogeissus acuminata* Wall. var. *sericea* and determined under that name at Calcutta.)

Modasa Petua. Not very common. Flowers March.

For the sake of uniformity we have retained Cooke's nomenclature, without in any way wishing to imply that we hold any definite opinion as to the validity or otherwise of Brandis' species, of which we have had no opportunity of judging.

184. *Anogeissus pendula* Edgew. F. B. I. II, 451 ; Fl. Bomb. I, 483.

Woodland, north of Modasa, locally abundant, and by a temple a little north of Prantij. Flowers September.

185. *Anogeissus coronata* Stapf. Kew Bull. No. 4, 1914, 153.

There seems to be a possibility that this species if genuine may occur in our area. A specimen gathered in leaf only by the Watrak River seems to be referable here. But as there was a specimen of *A. sericea* Brandis within a few feet and no other similar specimens have been found, the point must await further study.

XXXII. MYRTACEÆ.

103. *Eugenia* Linn.

186. *Eugenia Jambolana* Lamk. F. B. I. II, 499 ; Fl. Bomb. I, 492.
A common tree, but perhaps always planted. Flowers March.

187. *Eugenia Heyneana* Duthie. F. B. I. II, 500 ; Fl. Bomb. I, 493.

Common in the Watrak River bed and in other streams. Flowers March.

104. *Psidium* Linn.

188. *Psidium Guyava* Linn. F. B. I. II, 468 ; Fl. Bomb. I, 498.
Commonly planted in orchards, but not indigenous. Flowers August.

XXXIII. LYTHRACEÆ.

105. *Ammannia* Linn.

189. *Ammannia tenuis* C. B. Clarke. F. B. I. II, 567 ; Fl. Bomb. I, 506.

Locally common on rocks in the bed of the Watrak River and one of its tributaries. Flowers December—March.

190. *Ammannia multiflora* Roxb. F. B. I. II, 570 ; Fl. Bomb. I, 509. (Determined at Kew.)

Laterite plateau, Talod. Flowers October.

191. *Ammannia baccifera* Linn. F. B. I. II, 569 ; Fl. Bomb. I, 509.
Common in swampy ground. Flowers September.

192. *Ammannia salicifolia* Monti. F. B. I. II, 569; Fl. Bomb. I, 509.

Common in muddy river beds. Flowers February.

193. *Ammannia auriculata* Willd. (Determined at Kew.)

A. senegalensis Lamk. F. B. I. II, 570; Prain, Beng. Pl. 501.

Ahmedabad, swampy land, fairly common. Flowers October.

106. *Woodfordia* Salisb.

194. *Woodfordia floribunda* Salisb. F. B. I. II, 572; Fl. Bomb. I, 510:

Occasional on banks of Nallahs in Modasa. Not seen elsewhere. Flowers in the hot weather.

107. *Lawsonia* Linn.

195. *Lawsonia inermis* Linn. Fl. Bomb. I, 511.

L. alba Lamk. F. B. I. II, 573; Prain, Beng. Pl. 502.

Common, but doubtfully indigenous. Flowers December—March.

XXXIV. ONAGRACEÆ.

108. *Jussiaea* Linn.

196. *Jussiaea repens* Linn. F. B. I. II, 587; Fl. Bomb. I, 516.

In a tank near Bavsar; Khari River, near the Khari Cut, and along the canal, common. Seen both with and without floats. Flowers November.

109. *Ludwigia* Linn.

197. *Ludwigia parviflora* Roxb. F. B. I. II, 588; Fl. Bomb. I, 517.

Common in swampy ground and tank edges. Flowers October.

110. *Trapa* Linn.

198. *Trapa bispinosa* Roxb. F. B. I. II, 590; Fl. Bomb. I, 518.

Common in tanks, but apparently always cultivated. Fruits October-December.

Vern. 'Shingodá.'

XXXV. PASSIFLORACEÆ.

111. *Passiflora* Linn.

199. *Passiflora foetida* Linn. F. B. I. II, 599.; Fl. Bomb. I, 524.
Occasional as an escape. Flowers August.

XXXVI. CUCURBITACEÆ.

NOTE.—Many *Cucurbitaceæ* are cultivated, and it is often doubtful if they are truly indigenous.

112. *Trichosanthes* Linn.

200. *Trichosanthes cucumerina* Linn. F. B. I. II, 609; Fl. Bomb. I, 527.
Abundant in hedges. Flowers August.

113. *Momordica* Linn.

201. *Momordica Balsamina* Linn. F. B. I. II, 617; Fl. Bomb. I, 529.
Ahmedabad, in a hedge. Not common. Flowers August.

202. *Momordica dioica* Roxb. F. B. I. II, 617; Fl. Bomb. I, 529.
Common in hedges. Flowers July.

114. *Luffa* Cav.

203. *Luffa acutangula* Roxb. F. B. I. II, 615; Fl. Bomb. I, 532.
In hedges. Common east of Modasa. Fruits November.

115. *Cucumis* Linn.

204. *Cucumis trigonus* Roxb. F. B. I. II, 619; Fl. Bomb. I, 535.
Kharaghoda, in cultivated ground. Flowers October.

116. *Citrullus* Schrad.

205. *Citrullus Colocynthis* Schrad. F. B. I. II, 620; Fl. Bomb. I, 537.
Ahmedabad, in fields. Occasional. Flowers August.

117. Coccinia W. & A.**206. Coccinia indica** W. & A. Fl. Bomb. I, 538.*Cephalandra indica* Naud. F. B. I. II, 621.

Ahmedabad, very common in hedges. Flowers July-August.

118. Melothria Linn.**207. Melothria maderaspatana** Cogn. Fl. Bomb. I, 539.*Mukia scabrella* Arn. F. B. I. II, 623.

Common. Flowers August—September.

119. Blastania Kotschy & Peyr.**208. Blastania Garcini** Cogn. Fl. Bomb. I, 542.*Ctenoclepis Garcini* C. B. Clarke. F. B. I. II, 629.

Fairly common. Flowers August.

120. Kedrostis Medic.**209. Kedrostis rostrata** Cogn. Fl. Bomb. I, 543.*Rhynchocharpa fatida* C. B. Clarke. F. B. I. II, 627.

Frequent. Flowers August—September.

121. Corallocarpus Welw.**210. Corallocarpus epigæus** C. B. Clarke. F. B. I. II, 628;
Fl. Bomb. I, 543. (Determined at Kew.)

Kharaghoda, cultivated land. Flowers and fruits October.

XXXVII. CACTACEÆ.**122. Opuntia Haw.****211. Opuntia elatior** Mill. Gard. Dict. ed. 8, (1768), No. 4;
Records, Bot. Survey, IV, No. 6 (1911), 313, 316.Naturalised and fairly frequent at Modasa, but not otherwise common
in our area. Flowers October.**XXXVIII. FICOIDEÆ.****123. Trianthema Linn.****212. Trianthema monogyna** Linn. F. B. I. II, 660; Fl. Bomb.
I, 554.

A common weed. Flowers July.

213. *Trianthema triquetra* Rottl. & Willd. Fl. Bomb. I, 555,
T. crystallina W. & A. (not of Vahl.) F. B. I. II, 660.

Open barren ground in a valley bottom, Ghadi. Fruits November.

214. *Trianthema pentandra* Linn. F. B. I. II, 660; Fl. Bomb. I,
555.

Common on waste land. Flowers August.

124. *Mollugo* Linn.

215. *Mollugo hirta* Thunb. F. B. I. II, 662; Fl. Bomb. I, 557.

Frequent on open sandy ground, and very common on dried mud in tank beds. etc. Flowers January-March.

216. *Mollugo Spargula* Linn. F. B. I. II, 662; Prain, Beng. Pl.,
533. (Determined at Kew.)

Mollugo oppositifolia Linn. Fl. Bomb. I, 558.

Bank of a lane, Sonasan. Flowers October.

125. *Gisekia* Linn.

217. *Gisekia pharnaceoides* Linn. F. B. I. II, 664; Fl. Bomb. I,
559.

Sandy land. Not uncommon. Flowers August. Fruits October.

XXXIX. UMBELLIFERÆ.

126. *Foeniculum* Adans.

218. *Foeniculum vulgare* Gaertn. F. B. I. II, 695; Fl. Bomb. I,
572.

Largely cultivated, and sometimes found as an escape. Flowers February.

Vern. 'Variari'.

XL. CORNACEÆ.

127. *Alangium* Lamk.

219. *Alangium Lamarckii* Thw. F. B. I. II, 741; Fl. Bomb. I,
575.

Frequent in Modasa Petha and Watrak River. Flowers March.

XLI. RUBIACEÆ.

128. *Mitragyna* Korth.

220. *Mitragyna parvifoli* Korth. Fl. Bomb. I, 581.

Stephegyne parvifolia Korth. F. B. I. III, 25.

Frequent in woodland in Modasa Petha. . Flowers August.

129. *Oldenlandia* Linn.

221. *Oldenlandia corymbosa* Linn. F. B. I. III, 64; Fl. Bomb. I, 588.

Very common in Savannah. Flowers September-October.

130. *Randia* Linn.

222. *Randia dumetorum* Lamk. F. B. I. III, 110; Fl. Bomb. I, 599.

In a hedge near Modasa. Fruits March.

131. *Plectronia* Linn.

223. *Plectronia parviflora* Bedd. Fl. Bomb. I, 607.

Canthium parviflorum Lamk. F. B. I. III, 136.

Fairly common from Talod eastwards. Flowers August-September.

A fruiting specimen with poorly developed (possibly diseased) fruit was referred to Kew, and was incorrectly determined as *Randia* sp. We have since obtained good specimens both in flower and fruit, and corrected the name. The fruit is about $\frac{1}{2}$ -inch in diameter.

132. *Ixora* Linn.

224. *Ixora parviflora* Vahl. F. B. I. III, 142; Fl. Bomb. I, 611.

Banks of a stream, Modasa. Flowers March.

133. *Morinda* Linn.

225. *Morinda citrifolia* Linn. F. B. I. III, 155; Fl. Bomb. I, 613.

Hill slopes, Modasa. Occasional. Fruits September.

134. *Spermacoce* Linn.

226. *Spermacoce stricta* Linn. f. F. B. I. III, 200; Fl. Bomb. I, 623.

Common on dry sandy soil. Flowers August.

We have noted many plants in which all the flowers had only three corolla lobes. This is associated with a dwarf habit, the plants being frequently only 1--2 inches high.

227. *Spermacoce hispida* Linn. F. B. I. III, 200; Fl. Bomb. I, 624.

Very common as a weed on cultivated and waste land.

We have noted it as frequently erect, less commonly procumbent, and with a corolla tube from $\frac{1}{2}$ to $\frac{7}{8}$ -inch long. Cooke, Fl. Bomb., says $\frac{1}{8}$ to $\frac{1}{6}$ inch.

XLII. COMPOSITÆ.

135. *Vernonia* Schreb.

228. *Vernonia cinerea* Less. F. B. I. III, 233; Fl. Bomb. II, 10.
An abundant weed. Flowers all the year round.

136. *Cyathocline* Cass.

229. *Cyathocline lyrata* Cass. F. B. I. III, 246; Fl. Bomb. II, 15.
Banks of Majham and Watrak Rivers. Flowers December-March.

137. *Grangea* Adans.

230. *Grangea maderaspatana* Poir. F. B. I. III, 247; Fl. Bomb. II, 16.

Muddy tank beds and dried mud. Common. Flowers January—April.

138. *Blumea* DC.

231. *Blumea amplexans* DC. F. B. I. III, 260; Fl. Bomb. II, 19.

Tank margins and other wet places in the district. Common. Flowers October.

232. *Blumea eriantha* DC. F. B. I. III, 266; Fl. Bomb. II, 22.

Marshy places on banks of Watrak River, and banks of the Khari Cut canal at the water's edge. Flowers December-January.

139. *Sphaeranthus* Linn.

233. *Sphaeranthus indicus* Linn. F. B. I. III, 275; Fl. Bomb. II, 28.

Muddy tank beds, associated with *Grangea maderaspatana* Poir. Flowers January-April.

Sticky with glandular hairs, and with an aromatic smell when fresh.

140. *Gnaphalium* Linn.

234. *Gnaphalium indicum* Linn. F. B. I. III, 289; Fl. Bomb. II, 30.

The Bokh, Prantij. Dry tank beds, Dhansura and elsewhere. Bed of the Majham and other streams, Modasa Petha. Flowers March.

235. *Gnaphallum pulvinatum* Delile. F. B. I. III, 289; Fl. Bomb. II, 31.

Dry tank beds, Dhansura and elsewhere. Flowers March.

141. *Vicoa* Cass.

236. *Vicoa auriculata* Cass. F. B. I. III, 297; Fl. Bom. II, 32.

A common weed on cultivated land. Flowers September-February

142. *Pulicaria* Gaertn.

237. *Pulicaria angustifolia* DC. F. B. I. III, 299; Fl. Bomb. II, 34.

Kharaghoda, cultivated land, and Ahmedabad. Flowers October-November.

238. *Pulicaria foliolosa* DC. F. B. I. III, 298; Fl. Bomb. II, 34.

Bed of the Sabarmati, Ahmedabad. Flowers May.

143. *Caesulia* Roxb.

239. *Caesulia axillaris* Roxb. F. B. I. III, 291; Fl. Bomb. II, 35.

Common on swampy land. Flowers October.

144. *Eclipta* Linn.

240. *Eclipta erecta* Linn. Fl. Bomb. II, 38.

E. alba Hassk. F. B. I. III, 304.

Wet places in compounds, beds of Nallabs, rice-fields and dried up muddy tank beds. Common. Flowers August-January.

145. *Sclerocarpus* Jacq.

241. *Sclerocarpus africanus* Jacq. F. B. I. III, 305; Fl. Bomb. II, 39.

Shady places, Prantij and Modasa Talukas. Not uncommon. Flowers August.

146. *Blainvillea* Cass.

242. *Blainvillea rhomboidea* Cass. Fl. Bomb. II, 40.

B. latifolia DC. F. B. I. III, 305.

Prantij and Bavsar, dry fields and waste land. Fairly common. Flowers August.

147. Glossocardia Cass.

243. Glossocardia linearifolia Cass. F. B. I. III, 308 ; Fl. Bomb. II, 43.

Very common on the rocky outcrop edging the laterite plateau, Talod. Fruits October.

148. Tridax Linn.

244. Tridax procumbens Linn. F. B. I. III, 311 ; Fl. Bomb. II, 45.

Abundant in hedges and waste places. Flowers September-October.

149. Emilia Cass.

245. Emilia sonchifolia DC. F. B. I. III, 336 ; Fl. Bomb. II, 49.

Prantij, Savannah. Flowers August. Watrak River banks, flowers December.

150. Echinops Linn.

246. Echinops echinatus Roxb. F. B. I. III, 358 ; Fl. Bomb. II, 54.

Common in dry sandy soil. Flowers February-March.

151. Volutarella Cass.

247. Volutarella divaricata Benth. & Hook. f. F. B. I. III, 383 ; Fl. Bomb. II, 57.

Very common in sandy fields. Flowers October-February.

152. Dicoma Cass.

248. Dicoma tomentosa Cass. F. B. I. III, 387 ; Fl. Bomb. II, 58.

Cultivated land at Kharaghoda and elsewhere. Flowers October and later.

153. Sonchus Linn.

249. Sonchus oleraceus Linn. F. B. I. III, 414 ; Fl. Bomb. II, 61.

A garden weed. Flowers January.

154. Launaea Cass.

250. Launaea nudicaulis Hook f. F. B. I. III, 416 ; Fl. Bomb. II, 63.

Common. Flowers August-February.

XLIII. CAMPANULACEAE.

155. *Sphenoclea* Gaertn.

251. *Sphenoclea zeylanica* Gaertn. F. B. I. III, 438 ; Fl. Bomb. II, 75. (Determined at Kew.)

Locally abundant in swampy ground at Talod. Not seen elsewhere. Flowers October.

XLIV. PLUMBAGINACEAE.

156. *Plumbago* Linn.

252. *Plumbago zeylanica* Linn. F. B. I. III, 480 ; Fl. Bomb. II, 78. Frequent in hedges. Flowers October-January.

XLV. PRIMULACEAE.

157. *Anagallis* Linn.

253. *Anagallis arvensis* Linn. F. B. I. III, 506 ; Fl. Bomb. II, 80.

The blue flowered form. Found sparingly in irrigated garden land. Flowers February.

XLVI. SAPOTACEAE.

158. *Bassia* Linn.

254. *Bassia latifolia* Roxb. F. B. I. III, 544 ; Fl. Bomb. II, 92.

Abundant. Flowers April-May.

Vern ' Mâhudha '.

One of the most useful of trees. The flowers, besides being distilled for liquor are largely eaten as a vegetable throughout the hot weather. The seeds are pressed for oil which is used in soap making.

159. *Mimusops* Linn.

255. *Mimusops hexandra* Roxb. F. B. I. III, 549 ; Fl. Bomb. II, 95.

Fairly common. Flowers October-January.

Vern. ' Gundo,' ' rayan.

XLVII. EBENACEÆ.**160. Diospyros Linn.**

256. Diospyros melanoxylon Roxb. F. B. I. III, 564 ; Fl. Bomb. II, 99.

Modasa, not uncommon. Fruits September.

Vern. 'Timru'.

The leaves are used for "bidis."

257. Diospyros cordifolia Roxb. F. B. I. III, 555 ; Fl. Bomb. II, 105.

Hedges in the sand country, frequent, and on the Sambarmati River banks. Old fruits January. Young ♂ Flowers February. Flowers ♂ & ♀ and young fruits April.

The male flowers agree with Cook's description. In the female flowers of which many were dissected at Prantij, the number of staminodes varies from 6 to 10 and is most commonly 8. The number seems to be normally twice the corolla-segments. The leaves are always narrow and the base almost always markedly cordata. The old leaves are glabrescent.

XLVIII. OLEACEÆ.**161. Nyctanthes Linn.**

258. Nyctanthes Arbor-tristis Linn. F. B. I. III, 603 ; Fl. Bomb. II, 115.

Common near Modasa, and southwards to the Watrak River. Flowers September.

We have found this in considerable quantities in places where it was almost certainly not planted, and we, therefore, regard it as truly wild.

XLIX. SALVADORACEÆ.**162. Salvadora Linn.**

259. Salvadora persica Linn. F. B. I. III, 619 ; Fl. Bomb. II, 121.

Common in hedges as a small tree with drooping branches, rarely with the branches sub-erect. Flowers January-February.

260. *Salvadora oleoides* Dene. F. B. I. III, 620 ; Fl. Bomb. II, 121.

Somewhat less common than the last, except in the drier western districts. Flowers February-April.

L. APOCYNACEÆ.

163. *Carissa* Linn.

261. *Carissa Carandas* Linn. F. B. I. III, 630 ; Fl. Bomb. II, 124.

Fairly common in the hilly parts of Modasa Petha. Flowers March.

164. *Lochnera* Reichb.

262. *Lochnera pusilla* K. Schum. Fl. Bomb. II, 129.

Vinca pusilla Murr. F. B. I. III, 640 ; Prain, Beng. Pl. 1277.

A common weed in cultivated land. Flowers August.

165. *Holarrhena* R. Br.

263. *Holarrhena antidysenterica* Wall. F. B. I. III, 644 ; Fl. Bomb. II, 133.

Open woodland, Modasa. Flowers and fruits September.

166. *Wrightia* R. Br.

264. *Wrightia tinctoria* R. Br. F. B. I. III, 653 ; Fl. Bomb. II, 137.

Watrak River banks. Fruits December-March.

The leaves in our specimens are markedly tomentose scabrid at all ages, but the fruit agrees exactly with *W. tinctoria* R. Br. and not with *W. tomentosa* R. & S.

167. *Nerium* Linn.

265. *Nerium odorum* Soland. F. B. I. III, 655 ; Fl. Bomb. II, 143.

Cultivated and occasionally established as an escape.

168. *Thevetia* Linn.

266. *Thevetia neriifolia* Juss. Fl. Bomb. II, 144 ; Prain, Beng. Pl. 669.

Occasionally planted in towns and villages.

LI. ASCLEPIADACEÆ.

169. *Calotropis* R. Br.

267. *Calotropis gigantea* R. Br. F. B. I. IV, 17 ; Fl. Bomb. II, 151.

Not common. Similar to the next.

Vern. 'Ākh'.

268. *Calotropis procera* R. Br. F. B. I. IV, 18 ; Fl. Bomb. II, 152.

Abundant. Flowers August-February.

Vern 'Ākh'.

170. *Oxystelma* R. Br.

269. *Oxystelma esculentum* R. Br. F. B. I. IV, 17 ; Fl. Bomb. II, 152.

Edges of stream, Watrak and Meshwa Rivers. Flowers September.

171. *Pentatropis* R. Br.

270. *Pentatropis microphylla* W. & A. F. B. I. IV, 20 ; Fl. Bomb. II, 154.

Common on laterite plateau, Talod. Less common elsewhere. Flowers August-October and after.

172. *Dæmia* R. Br.

271. *Dæmia extensa* R. Br. F. B. I. IV, 20 ; Fl. Bomb. II, 155.

Common in hedges. Flowers August February. Fruits October onwards.

173. *Telosma* Coville.

272. *Telosma pallida* Craib (Determined at Kew.)

Pergularia pallida W. & A. F. B. I. IV, 33 ; Fl. Bomb. II, 164.

Fairly common in hedges, Ahmedabad. Flowers July-August.

174. *Marsdenia* R. Br.

273. *Marsdenia volubilis* T. Cooke. Fl. Bomb. II, 166.

Climbing over trees, laterite plateau, Talod. Probably elsewhere. Fruits and late flowers October.

175. *Leptadenia* R. Br.

274. *Leptadenia reticulata* W. & A. F. B. I. IV, 63 ; Fl. Bomb. II, 172.

Abundant Flowers June-July. Fruits October.

275. *Leptadenia Spartium* Wight. F. B. I. IV, 64 ; Fl. Bomb. II, 173.

Occasional near Ahmedabad. Locally common in sand in other places. Flowers August-October.

176. *Ceropegia* Linn.

276. *Ceropegia bulbosa* Roxb. F. B. I. IV, 67 ; Fl. Bomb. II, 176.
Rare. Modasa. Flowers September.

LII. GENTIANACEÆ.

177. *Exacum* Linn.

277. *Exacum pedunculatum* Linn. F. B. I. IV, 97 ; Fl. Bomb. II, 188.

Marshy places on the Watrak River banks. Flowers December.

178. *Enicostemma* Blume.

278. *Enicostemma littorale* Blume. F. B. I. IV, 101 ; Fl. Bomb. II, 189.

Common. Flowers August-October.

Chewing the leaves, which are bitter, is believed to be a good antidote for malaria.

179. *Hoppea* Willd.

279. *Hoppea dichotoma* Willd. F. B. I. IV, 100 ; Fl. Bomb. II, 190.

Marshy depression in laterite plateau, Talod. Frequent, but minute and easily overlooked. Flowers August. Fruits October.

180. *Canscora* Lamk.

280. *Canscora decurrens* Dalz. F. B. I. IV, 103 ; Fl. Bomb. II, 192.

Marshy ground on the banks of the Watrak River ; banks of the Sabarmati at Raesan (badly developed). Flowers September and February.

181. *Limnanthemum* Gmel.

281. *Limnanthemum* sp. or spp.

We have noted at least one species of this genus on a rather inaccessible tank in the Modasa region, but were not able to collect specimens.

LIII. HYDROPHYLLACEÆ.**182. Hydrolea Linn.**

282. Hydrolea zeylanica Vahl. F. B. I. IV, 133; Fl. Bomb. II, 197.

Occasional in swampy ground.

LIV. BORAGINACEÆ.**183. Cordia Linn.**

283. Cordia Myxa Linn. F. B. I. IV, 138; Fl. Bomb. II, 199.

A common tree. Flowers March-April.

Vern. 'Wadgundo.'

284. Cordia Rothii R. & S. F. B. I. IV, 138; Fl. Bomb. II, 202.

Frequent, but not nearly so common as the last. Flowers irregularly.

285. Cordia Perrottetii Wight. F. B. I. IV, 138. (Determined at Calcutta.)

Occasional in villages. Flowers January.

184. Ehretia Linn.

286. Ehretia lævis Roxb. F. B. I. IV, 141; Fl. Bomb. II, 203.

Occasional. Flowers February-March.

185. Coldenia Linn.

287. Coldenia procumbens Linn. F. B. I. IV, 144; Fl. Bomb. II, 205.

Common on muddy beds of dried up tanks. Flowers and fruits September—February.

186. Heliotropium Linn.

288. Heliotropium zeylanicum Lamk. F. B. I. IV, 148; Fl. Bomb. II, 207.

A common weed in cultivated land. Flowers September—December.

289. Heliotropium supinum Linn. F. B. I. IV, 149; Fl. Bomb. II, 209.

On dried mud, frequent. Flowers January.

290. *Heliotropium ovalifolium* Forsk. F. B. I. IV, 150; Fl. Bomb. II, 211.

Savannah, Modasa. Flowers September.

291. *Heliotropium marifolium* Retz. F. B. I. IV, 152; Fl. Bomb. II, 213.

Very common on dry sandy soil. Flowers June—September.

187. *Trichodesma* R. Br.

292. *Trichodesma indicum* R. Br. F. B. I. IV, 153; Fl. Bomb. II, 214.

Common. Flowers August.

LV. CONVULVACEÆ.

188. *Cuscuta* Linn.

293. *Cuscuta reflexa* Roxb. F. B. I. IV, 225; Fl. Bomb. II, 224.

Not very frequent, but locally abundant where found. Flowers December-January.

294. *Cuscuta chinensis* Lamk. F. B. I. IV, 226; Fl. Bomb. II, 225.

Not common. Ahmedabad. Flowers September.

189. *Cressa* Linn.

295. *Cressa cretica* Linn. F. B. I. IV, 225; Fl. Bomb. II, 228.

Locally common in dry tank beds, but seldom flowering. Flowered freely in September, 1915, after partial failure of the monsoon.

190. *Evolvulus* Linn.

296. *Evolvulus alsinoides* Linn. F. B. I. IV, 220; Fl. Bomb. II, 229.

Abundant on dry sandy soil. Flowers August onwards to at least March.

191. *Convolvulus* Linn.

297. *Convolvulus arvensis* Linn. F. B. I. IV, 219; Fl. Bomb. II, 234.

Trailing in irrigated land, Raipur. Flowers January.

298. *Convolvulus pluricaulis* Choisy. F. B. I. IV, 218; Prain, Beng. Pl. 728. (Determined at Kew.)

Abundant on dry sandy soil. Flowers from August to at least March.

Remarkably xerophytic.

192. *Merremia* Dennst.

299. *Merremia emarginata* Hallier. f. Fl. Bomb. II, 236; Prain, Beng. Pl. 730.

Ipomœa reniformis Choisy. F. B. I. IV, 206.

Talod, on a dry ridge between two tanks, and in water holes on black soil, Bavsar and elsewhere. Flowers October.

300. *Merremia tridentata* Hallier. f. Fl. Bomb. II, 237; Prain, Beng. Pl. 730.

Ipomœa tridentata Roth. F. B. I. IV, 205.

Frequent. Flowers and fruits September.

301. *Merremia pentaphylla* Hallier. f. Fl. Bomb. II, 239.

Ipomœa pentaphylla Jacq. F. B. I. IV, 202.

Frequent. Flowers October.

302. *Merremia dissecta* Hallier. f. Fl. Bomb. II, 240.

Ipomœa sinuata Ortego. F. B. I. IV, 214.

Ahmedabad, in a hedge. Flowers September. Old fruits August.

193. *Operculina* Silva Manso.

203. *Operculina Turpethum* Silva Manso. Fl. Bomb. II, 240; Prain, Beng. Pl. 731.

Ipomœa Turpethum Br. F. B. I. IV, 212.

Banks of a Nallah, Modasa Petha. Flowers December.

194. *Ipomœa* Linn.

304. *Ipomœa calycina* C. B. Clarke. F. B. I. IV, 201; Fl. Bomb. II, 242.

Frequent. Flowers and fruits October.

305. *Ipomœa eriocarpa* R. Br. F. B. I. IV, 204; Fl. Bomb. II, 243.

In fields, Bavsar. Flowers October.

306. *Ipomœa sindica* Stapf. Fl. Bomb. II, 244.

Ahmedabad and Modasa. Flowers September.

Much like the last, probably more common. The corolla is sometimes white and sometimes purple in our specimens.

307. *Ipomœa pilosa* Sweet. F. B. I. IV, 213; Fl. Bomb. II, 244.

Ahmedabad, and near Kharaghoda. Flowers and fruits October.

308. *Ipomœa aquatica* Forsk. F. B. I. IV, 210; Fl. Bomb. II, 246.

Very common in tanks. Flowers October onwards.

309. *Ipomœa sepiaria* Koenig. F. B. I. IV, 209; Fl. Bomb. II, 246.

In a hedge, Ahmedabad. Flowers January.

We have var. *stipulacea* C. B. Clarke collected from the same plant, and it, therefore, seems clear that the variety cannot be maintained.

310. *Ipomœa obscura* Ker-Gawl. F. B. I. IV, 207; Fl. Bomb. II, 248.

Occasional. Flowers September-October.

311. *Ipomœa dissecta* Willd. F. B. I. IV, 200; Fl. Bomb. II, 249.

Frequent, Ahmedabad and Talod. Flowers August-September.

Compare Cooke, Fl. Bomb. We have collected *I. laciniata* Dalz. at Khandala, and find it quite different from the true *I. dissecta* Willd., our specimens of which have also been verified at Kew.

312. *Ipomœa pes-tigridis* Linn. F. B. I. IV, 204; Fl. Bomb. II, 250.

Ahmedabad, fairly common. Flowers September.

313. *Ipomœa hederacea* Jacq. F. B. I. IV, 199; Fl. Bomb. II, 252.

(Determined at Kew.)

Laterite plateau, Talod. Flowers October.

314. *Ipomœa dasysperma* Jacq. F. B. I. IV, 215; Fl. Bomb. II, 252.

Mausar, near Kharaghoda. Not common. Flowers October.

195. *Calonyction* Choisy.

315. *Calonyction muricatum* G. Don. Fl. Bomb. II, 253.

Ipomœa muricata Jacq. F. B. I. IV, 197.

Ahmedabad, in hedges. Occasional. Flowers September

196. Rivea Choisy.

316. Rivea hypocrateriformis Choisy. F. B. I. IV, 184; Fl. Bomb. II, 254.

Fairly common. Flowers August—October.

LVI. SOLANACEÆ.**197. Solanum Linn.**

317. Solanum nigrum Lind. F. B. I. IV, 229; Fl. Bomb. II, 263.

An abundant weed in waste places. Flowers October. Fruits November-December.

318. Solanum xanthocarpum Schrad. & Wendl. F. B. I. IV, 236; Fl. Bomb. II, 265.

A fairly frequent weed.

319. Solanum incanum Linn. Fl. Bomb. II, 267.

S. coagulans Forsk. F. B. I. IV, 236.

Kharaghoda. Flowers and fruits October.

320. Solanum trilobatum Linn. F. B. I. IV, 236; Fl. Bomb. II, 267.

In a hedge in a village north of Ahmedabad. We have not seen it elsewhere, but the villagers stated that it grew in other places in the village lands. Flowers February.

321. Solanum albicaule Kotschy. Fl. Bomb. II, 268.

Kharaghoda, in a hedge. Only one specimen seen in flower and young fruit, October.

198. Physalis Linn.

322. Physalis minima Linn. F. B. I. IV, 238; Fl. Bomb. II, 270.

Occasional. Flowers August—October.

199. Withania Pauq.

323. Withania somnifera Dunal. F. B. I. IV, 236; Fl. Bomb. II, 271.

Common in gardens, and found as an escape, in garden land, and as a weed in Ahmedabad city. Not infrequent in old wells. Flowers most of the year.

200. *Lycium* Linn.

324. *Lycium barbarum* Linn. F. B. I. IV, 241 ; Fl. Bomb. II, 272. Kharaghoda, in a hedge. Only one plant seen. Flowers October.

201. *Datura* Linn.

325. *Datura fastuosa* Linn. F. B. I. IV, 242 ; Fl. Bomb. II, 273. Common in waste places. Flowers chiefly in the cold weather.

326. *Datura fastuosa* Linn. var. *alba* C. B. Clarke. F. B. I. IV, 243 ; Fl. Bomb. II, 273.

As the last.

LVII. SCROPHULARIACEÆ.

202. *Celsia* Linn.

327. *Celsia coromandeliana* Vahl. F. B. I. IV, 251 ; Fl. Bomb. II, 281.

The ordinary yellow flowered plant has not been seen, but we have a white flowered variety from the bed of the Watrak River. Not common. Flowers and fruits March.

203. *Linaria* Juss.

328. *Linaria ramosissima* Wall. F. B. I. IV, 251 ; Fl. Bomb. II, 282.

On walls, Ahmedabad. Very common. Flowers August-May.

204. *Herpestis* Gærtn. f.

329. *Herpestis Monniera* H. B. & K. F. B. I. IV, 272 ;

Moniera cuneifolia Michaux. Fl. Bomb. II, 285.

Common in sandy river beds. Flowers pale bluish purple. Flowers August-February

A form from Kharaghoda with white flowers and larger leaves and an erect habit was referred by us to Kew, and determined as above.

205. *Limnophila* R. Br.

330. *Limnophila gratioloides* R. Br. F. B. I. IV, 271 ; Fl. Bomb. II, 291.

Dried up water holes and hollows in river banks, frequent. Flowers and fruits October-December.

206. Vandellia Linn.

331. Vandellia crustacea Benth. F. B. I. IV, 279; Fl. Bomb. II, 295.
Swampy land, Talod. Flowers October.

207. Ilysanthes Rafin.

332. Ilysanthes hyssopioides Benth. F. B. I. IV, 283; Fl. Bomb. II, 296.
Swampy land, Ahmedabad. Flowers October.

208. Bonnaya Link & Otto.

333. Bonnaya brachiata Link & Otto. F. B. I. IV, 284; Fl. Bomb. II, 297.
Swampy land, Talod. Flowers October.

209. Glossostigma Arn.

334. Glossostigma spathulatum Wight & Arn. F. B. I. IV, 283; Fl. Bomb. II, 299. (Determined at Kew.)
Talod, sandy edges of a tank. Flowers October.

NOTE.—Probably some or all of the last four species are fairly common, but all are small and easily overlooked.

210. Striga Lour.

335. Striga orobauchioides Benth. F. B. I. IV, 299; Fl. Bomb. II, 302.
Open ground under trees, Modasa and Bavsar. Flowers September—October.

336. Striga euphrasioides Benth. F. B. I. IV, 299; Fl. Bomb. II, 303.

Common everywhere on dry sandy soil. Parasitic on a species of *Eleusine*, and doubtless on various other grasses. Flowers August—October.

211. Sopuhia Buch-Ham.

337. Sopuhia delphinifolia G. Don. F. B. I. IV, 302; Fl. Bomb. II, 305.

Very common in cultivated land and Savannah from Ahmedabad westwards. Flowers September—October.

212. Lindenbergia Lehm.

338. Lindenbergia urticæfolia Link & Otto. F. B. I. IV, 262 ; Fl. Bomb. II, 307.

Very common on walls. Flowers August-May.

339. Lindenbergia polyantha Royle. F. B. I. IV, 262 ; Fl. Bomb. II, 307.

Banks of Nallahs, occasional. Flowers February.

LVIII. OROBANCHACEÆ.**213. Cistanche** Hoffm. & Link.

340. Cistanche tubulosa Wight. F. B. I. IV, 324 ; Fl. Bomb. II, 313.

Kharagheda, on roots of *Salvadora persica* Linn. Not seen elsewhere. Flowers October.

214. Orobanche Linn.

341. Orobanche cernua Loeff. var. *desertorum* Ritter. Fl. Bomb. II, 314.

Orobanche nicotianæ Wight. F. B. I. IV, 326.

On tobacco plants in cultivated land. Not uncommon. Flowers February-March.

LIX. LENTIBULARIACEÆ.**215. Utricularia** Linn.

342. Utricularia stellaris Linn. f. F. B. I. IV, 328 ; Fl. Bomb. II, 316.

Common in swamps and water holes. Flowers October.

XX. BIGNONIACEÆ.**216. Millingtonia** Linn. f.

343. Millingtonia hortensis Linn. f. F. B. I. IV, 377 ; Fl. Bomb. II, 334.

Not indigenous, but widely planted

217. Dolichandrone Seem.

344. Dolichandrone falcata Seem. F. B. I. IV, 380 ; Fl. Bomb. II, 329.

Occasional in Savannah east of Majham River.

218. Tecomella Seem.

345. Tecomella undulata Seem. Fl. Bomb. II, 328.

Tecoma undulata G. Don. F. B. I. IV, 378.

Occasional throughout our area. Flowers December—March. Fruits March.

LXI. PEDALIACEÆ.**219. Martynia Linn.**

346. Martynia diandra Glox. F. B. I. IV, 386 ; Fl. Bomb. II, 339.

Fully established, and common on roadsides and waste ground. Flowers August.

220. Pedalium Linn.

347. Pedalium Murex Linn. F. B. I. IV, 386 ; Fl. Bomb. II, 337.

Occasional on sandy soil. Flowers August.

221. Sesamum Linn.

348. Sesamum indicum Linn. F. B. I. IV, 387 ; Fl. Bomb. II, 338.

Fully established and very common as an escape in cultivated and waste land. Flowers August—September.

LXII. ACANTHACEÆ.**222. Tubiflora Gmel.**

349. Tubiflora acaulis O. Kuntze. Fl. Bomb. II, 345.

Elytraria crenata Vahl. F. B. I. IV, 394.

Fairly common at Modasa and Bavsar, occasional at Ghadi, but not on sand. Fruits and late flowers October.

This is recorded from Ahmedabad (Stocks, 250) but this probably means the district of Ahmedabad, as we do not think it is likely to occur in the immediate vicinity of the city, nor indeed anywhere on sand.

223. Blepharis Juss.

350. *Blepharis boerhaviaefolia* Pers. F. B. I. IV, 478 ; Fl. Bomb. II, 349.

Near Watrak River. Not seen elsewhere by us, but easily overlooked from its resemblance to large specimens of the next species. Flowers and fruits December.

351. *Blepharis molluginifolia* Pers. F. B. I. IV, 479 ; Fl. Bomb. II, 349.

Common on sandy soil, and very common on the laterite plateau, Talod. Flowers August-November.

224. Asteracantha Nees.

352. *Asteracantha longifolia* Nees. Fl. Bomb. II, 352.

Hygrophila spinosa T. Anders. F. B. I. IV, 408.

Everywhere common in swamps. Flowers September-October.

225. Hygrophila R. Br.

353. *Hygrophila polysperma* T. Anders. F. B. I. IV, 406 ; Fl. Bomb. II, 353. (Determined at Kew.)

Marshy ground, Talod. Locally abundant. Flowers October.

354. *Hygrophila Serpyllum* T. Anders. F. B. I. IV, 406 ; Fl. Bomb. II, 354.

Watrak and Majhan River banks. Flowers December-March.

226. Ruellia Linn.

355. *Ruellia patula* Jacq. F. B. I. IV, 412 ; Fl. Bomb. II, 356.

Frequent in hedges. Flowers September-October.

Corolla always purplish blue. Plant straggling.

356. *Ruellia patula* Jacq. var. *alba* Saxton. (n. var.)

Differs from the type in the erect, not straggling, habit, and in the pure white colour and larger size of the flowers. Ahmedabad, Saxton, 456, Prantij, Saxton 288, Modasa, Saxton 1093.

357. *Ruellia tuberosa* Linn. Prain, Beng. Pl. 803. (Determined at Kew.)

Mabommedan burial ground, Ahmedabad. Probably planted. Flowers September.

227. Hemigraphis Nees.

358. Hemigraphis elegans Nees. var. *crenata* C. B. Clarke. F. B. I. IV, 425 ; Fl. Bomb. II, 359.

Banks of a small stream, Modasa. Flowers March.

228. Petalidium Nees.

359. Petalidium barlerioides Nees. F. B. I. IV, 416 ; Fl. Bomb. II, 359 ;

Banks of a stream, Modasa. Flowers March.

229. Andrographis Wall.

360. Andrographis paniculata Nees. F. B. I. IV, 501 ; Fl. Bomb. II, 374.

A weed in a bungalow compound at Sonasan. Flowers October.

361. Andrographis echioides Nees. F. B. I. IV, 505 ; Fl. Bomb. II, 374.

Ahmedabad. Frequent, but always solitary. Flowers September.

230. Barleria Linn.

362. Barleria Prionitis Linn. F. B. I. IV, 482 ; Fl. Bomb. II, 379.

Frequent on roadsides and villages, and in Savannah east of Majham River. Flowers October-March.

231. Neuracanthus Nees.

363. Neuracanthus sphaerostachys Dalz. F. B. I. IV, 491 ; Fl. Bomb. II, 387.

Modasa, locally common on shady hill sides. A form with pure white flowers was also collected in the same locality. Flowers September.

The specific name is spelt differently in Hooker's F. B. I. as "*sphaerostachyus*".

232. Lepidagathis Willd.

364. Lepidagathis trinervis Nees. F. B. I. IV, 517 ; Fl. Bomb. II, 393

Fairly common, and sometimes locally abundant, especially on coagulated sand, banks of "wanghas" (see p. 213), etc. Flowers October-May.

A particularly xerophytic plant found in very barren places long after its associates have all been dried up.

233. Rungia Nees.

365. Rungia elegans Dalz & Gibs. F. B. I. IV, 549. ; Fl. Bomb. II, 401.

Hole in black soil Savannah, south-east of Modasa Petha. Not seen elsewhere. Flowers December.

234. *Justicia* Linn.

366. *Justicia diffusa* Willd. var. *orbiculata* C. B. Clarke. F. B. I. IV, 538; Prain, Beng. Pl. 818. (Determined at Kew.)

Abundant in Ahmedabad, less so to the east. Flowers August-October.

367. *Justicia procumbens* Linn. F. B. I. IV, 539; Fl. Bomb. II, 412.

Sonasan and Bavsar, common. Prantij, occasional. Flowers October-November.

235. *Adhatoda* Nees.

368. *Adhatoda vasica* Nees. F. B. I. IV, 540; Fl. Bomb. II, 414.
Often planted and occasionally established as an escape.

236. *Peristrophe* Nees.

369. *Peristrophe bicalyculata* Nees. F. B. I. IV, 554; Fl. Bomb. II, 415.

Common. Flowers October-December.

LXIII. VERBENACEÆ.

237. *Lantana* Linn.

370. *Lantana Camara* Linn. F. B. I. IV, 562; Fl. Bomb. II, 419.
Common in hedges at Ahmedabad, and fully naturalized. Flowers July—December.

238. *Lippia* Linn.

371. *Lippia nodiflora* Michaux. F. B. I. IV, 563; Fl. Bomb. II, 420.

Common in river beds and Nallahs. Flowers August—September.

239. *Tectona* Linn. f.

372. *Tectona grandis* Linn. f. F. B. I. IV, 570; Fl. Bomb. II, 424.

First appearing as a small roadside tree about five miles west of Modasa, and gradually increasing in size and abundance eastwards, until it becomes an important constituent of the woodland formation in the

jungles east of Modasa, which is north of the limits assigned to it by Brandis ex Cooke. Flowers August—September.

Vern. 'Sag'.

240. *Vitex* Linn.

373. *Vitex Negundo* Linn. F. B. I. IV, 583; Fl. Bomb. II, 428.

Beds of Majham and Watrak Rivers, locally abundant. Flowers August—November.

241. *Clerodendron* Linn.

374. *Clerodendron Phlomidis* Linn. f. Fl. Bomb. II, 431.

C. phlomoides Linn. f. F. B. I. IV, 590; Prain, Beng. Pl. 835.

Common in hedges. Flowers November—January.

Vern. 'Arni'.

LXIV. LABIATÆ.

242. *Ocimum* Linn.

375. *Ocimum canum* Sims. F. B. I. IV, 607; Fl. Bomb. II, 440.

Very common on dry sandy soil. Flowers August.

376. *Ocimum gratissimum* Linn. F. B. I. IV, 608; Fl. Bomb. II, 441.

Modasa and villages near. Flowers August—September.

243. *Moschosma* Reichb.

377. *Moschosma polystachyum* Benth. F. B. I. IV, 612; Fl. Bomb. II, 445.

Ahmedabad, (Cooke, etc.)

We have not collected this within our area, but we have specimens collected just outside it, and there can be no doubt of its occurrence.

244. *Anisomeles* R. Br.

378. *Anisomeles ovata* R. Br. F. B. I. IV, 672; Fl. Bomb. II, 461.

In lanes, Ahmedabad. Cuttings by the road, Watrak River. Not uncommon. Flowers September.

245. *Leucas* R. Br.

379. *Leucas urticifolia* R. Br. F. B. I. IV, 680; Fl. Bomb. II, 464.

Common. Flowers October and later.

380. *Leucas aspera* Spreng. F. B. I. IV, 690; Fl. Bomb. II, 465.

Fields, Sonasan and Ghadi. Replaces *L. Cephalotes*, which it resembles. Flowers October—November.

381. *Leucas Cephalotes* Spreng. F. B. I. IV, 689; Fl. Bomb. II, 466.

Abundant in cultivated and waste land. Flowers August—February.

382. *Leucas stricta* Benth. F. B. I. IV, 688; Fl. Bomb. II, 467.

Talod, sandy soil. Rare. Flowers August.

383. *Leucas biflora* R. Br. F. B. I. IV, 683; Fl. Bomb. II, 469.

Shady banks of rivers and streams, the Majham River and eastwards. Flowers September—December.

246. *Leonotis* R. Br.

384. *Leonotis nepetifolia* R. Br. F. B. I. IV, 691; Fl. Bomb. II, 471.

Not uncommon throughout our area. Flowers in the cold weather.

247. *Salvia* Linn.

385. *Salvia ægyptiaca* Linn. var. *pumila* Hook. f. F. B. I. IV, 656; Fl. Bomb. II, 474.

Prantij, dry ground, not uncommon. Not seen elsewhere. Flowers August.

LXV. NYCTAGINACEÆ.

248. *Boerhaavia* Linn. (*Boerhavia*).

386. *Boerhaavia diffusa* Linn. Fl. Bomb. II, 480.

B. repens Linn. F. B. I. IV, 709.

B. repens L. var. *diffusa* Hook. f. & var. *procumbens* Hook. f. F. B. I. IV, 709.

One of the commonest and most variable plants in our area. Flowers nearly all the year.

387. *Berhaavia repanda* Willd. F. B. I. IV, 709; Fl. Bomb. II, 480.

Similar to the next, but less common. Flowers and fruits January.

388. *Berhaavia verticillata* Poir. F. B. I. IV, 710; Fl. Bomb. II, 480. (Determined at Kew.)

Occasional in hedges, Ahmedabad. Flowers August—September.

The flowers are, as far as we have seen, always pink when fresh, though white when dried, which may account for Cook's description, "usually white", in Fl. Bomb.

LXVI. AMARANTACEÆ.

249. *Celosia* Linn.

389. *Celosia argentea* Linn. F. B. I. IV, 714; Fl. Bomb. II, 485.
Common in fields. Flowers October.

250. *Digera* Forsk.

390. *Digera arvensis* Forsk. F. B. I. IV, 717; Fl. Bomb. II, 487.
A very common weed in cultivated land. Flowers October—March.

251. *Amarantus* Linn.

391. *Amarantus spinosus* Linn. F. B. I. IV, 718; Fl. Bomb. II, 488.

Very common in compounds and on waste ground. Flowers August.

392. *Amarantus polygamus* Linn. F. B. I. IV, 721; Fl. Bomb. II, 491.

A weed of irrigated lands. Flowers February—April during irrigation.

393. *Amarantus tenuifolius* Willd. F. B. I. IV, 722; Fl. Bomb. II, 491. (Determined at Kew.)

Prantij, common in waste land. Flowers August.

252. *Aerua* Forsk.

394. *Aerua javanica* Juss. F. B. I. IV, 727; Fl. Bomb. II, 492.

Very common in compounds, and on roadsides and waste ground. Flowers September—November and sometimes later.

395. *Aerua lanata* Juss. F. B. I. IV, 728; Fl. Bomb. II, 493.
Ahmedabad. Not common. Flowers October.

253. *Nothosærua* Wight.

396. *Nothosærua brachiata* Wight. F. B. I. IV, 726; Fl. Bomb. II, 495.
Ahmedabad. Occasional. Flowers October.

254. *Achyranthes* Linn.

397. *Achyranthes aspera* Linn. F. B. I. IV, 730; Fl. Bomb. II, 495.

Roadsides and waste places. Abundant. Flowers September—January.

We have found fruiting spikes nearly 30 inches in length.

398. *Achyranthes aquatica* Br. F. B. I. IV, 730.

Half-dry tank bed near Ghadi, in a situation where, in ordinary years, it would be submerged for long periods. Flowers November.

Sedgwick, 1129.

255. *Pupalia* Juss.

399. *Pupalia lappacea* Moq. F. B. I. IV, 724; Fl. Bomb. II, 497.
Abundant in hedges. Flowers September.

256. *Alternanthera* Forsk.

400. *Alternanthera triandra* Lam. Fl. Bomb. II, 499.

A. sessilis R. Br. F. B. I. IV, 731.

Damp places. Common. Flowers October.

257. *Gomphrena* Linn.

401. *Gomphrena globosa* Linn. F. B. I. IV, 732; Fl. Bomb. II, 499.

Once found as an escape near Kharaghoda.

LXVII. CHENOPODIACEÆ.

258. *Chenopodium* Linn.

402. *Chenopodium album* Linn. F. B. I. V, 3; Fl. Bomb. II, 501.

A common weed of waste and cultivated (especially irrigated) land.
Flowers January—February.

259. Suaeda Forsk.

403. Suaeda nudiflora Moq. F. B. I. V, 14; Fl. Bomb. II, 505.

Common on dry salt land, Kharaghoda. Flowers October.

A characteristic plant of the salt desert.

260. Salsola Linn.

404. Salsola foetida Del. F. B. I. V, 18; Fl. Bomb. II, 507.

(Determined at Kew.)

Kharaghoda, on the railway embankment. Flowers October.

LXVIII. PHYTOLACCACEÆ.**261. Rivina Plum.**

405. Rivina humilis Linn. Prain, Beng. Pl. 883. (Determined at Kew.)

Has been found as an escape in the Sabarmati River bed. Flowers October.

LXIX. POLYGONACEÆ.**262. Polygonum Linn.**

406. Polygonum plebejum Br. F. B. I. V, 27; Fl. Bomb. II, 512.

Very common in dry tank beds. Flowers October—March.

Various forms of this Protean species occur, but appear to us to merge insensibly into one another. We have not been able to assign our gatherings to definite varieties. Most of our forms seem, however, to be referable to var. *Griffithii* Hook. f.

407. Polygonum serrulatum Lagasca. F. B. I. V, 38; Fl. Bomb. II, 515.

The Bokh, Prantij. Watrak River. Flowers December—April and after, according to moisture.

263. Rumex Linn.

408. Rumex dentatus Linn. F. B. I. V, 59; Fl. Bomb. II, 518.

The Bokh, Prantij. Flowers April.

LXX. LORANTHACEÆ.**264. Loranthus Linn.**

409. Loranthus longiflorus Desrouss. F. B. I. V, 214; Fl. Bomb. II, 548.

On mango trees, Modasa. Late flowers and young fruits March.

LXXI. SANTALACEÆ.**265. Santalum Linn.**

410. Santalum album Linn. F. B. I. V, 231; Fl. Bomb. II, 555. Modasa, occasional, presumably introduced. Flowers December.

LXXII. EUPHORBIACEÆ.**266. Euphorbia Linn.**

411. Euphorbia ligularia Roxb. Fl. Bomb. II, 563.

E. neriifolia (not of Linn.) Hook. f. F. B. I. V, 255.

Not nearly so common as the next.

412. Euphorbia neriifolia Linn. F. B. I. V, 255; Fl. Bomb. II, 565.

E. Nivulia Buch-Ham. in part. F. B. I. V, 255.

Very commonly planted as a hedge plant. Flowers February—March.

413. Euphorbia dracunculoides Lamk. F. B. I. V, 262; Fl. Bomb. II, 564.

Sandy fields, Prantij and Sonasan. Occasional. Flowers October—April.

414. Euphorbia hypericifolia Linn. var. *parviflora* Hook. f. F. B. I. V, 250; Fl. Bomb. II, 567.

Common. Flowers August.

415. Euphorbia pilulifera Linn. F. B. I. V, 250; Fl. Bomb. II, 568.

Abundant. Flowers September onwards.

416. *Euphorbia thymifolia* Linn. F. B. I. V, 252; Fl. Bomb. II, 569.

Sandy waste, Sonasan. Flowers October.

417. *Euphorbia prestrata* Ait. F. B. I. V, 266.

Abundant in various situations especially near habitations. Flowers September—March.

418. *Euphorbia microphylla* Heyne. F. B. I. V, 252; Fl. Bomb. II, 570.

Sandy bed and bank of the Sabarmati R., Raesan. Dried mud, common. Flowers January—February.

419. *Euphorbia Tirucalli* Linn. F. B. I. V, 254; Fl. Bomb. II, 570.

Common in hedges, though not truly indigenous.

420. *Euphorbia heterophylla* Linn. Fl. Bomb. II, 571.

Occasional as an escape.

267. *Bridelia* Willd.

421. *Bridelia retusa* Spreng. F. B. I. V, 268; Fl. Bomb. II, 572.
Village near Modasa. Flowers September.

268. *Fluggea* (*Flueggea*) Willd.

422. *Fluggea Leucopyrus* Willd. F. B. I. V, 328; Fl. Bomb. II, 581.

Occasional from Ahmedabad eastwards to Modasa. Flowers June. Fruits September—December.

We are unable to distinguish this from *F. microcarpa* Blume, and suspect they are only climatic forms, and not specifically distinct. The leaves of our specimens vary from $\frac{1}{2}$ -inch to $1\frac{1}{4}$ -inch. We have never found thorns on the specimens collected within the limits of our area, but have collected specimens outside it, agreeing in every respect except in the presence of thorns. If the two species are really genuine, the absence of thorns will place our specimens in Blume's species.

269. *Phyllanthus* Linn.

423. *Phyllanthus reticulatus* Poir. F. B. I. V, 288; Fl. Bomb. II, 585.

Common in hedges throughout our area. Flowers most of the year.

424. *Phyllanthus Emblica* Linn. F. B. I. V, 289; Fl. Bomb. II, 585.

Dhansura, and woodland north of Modasa. Flowers March. Fruits September.

425. *Phyllanthus maderaspatensis* Linn. F. B. I. V, 292; Fl. Bomb. II, 586.

Common. Flowers August—October.

426. *Phyllanthus simplex* Retz. F. B. I. V, 295; Fl. Bomb. II, 587.

Bavsar. Occasional. Flowers October.

427. *Phyllanthus Niruri* Linn. F. B. I. V, 298; Fl. Bomb. II, 587. Cultivated and waste land. Very common. Flowers September.

270. *Jatropha* Linn.

428. *Jatropha gossypifolia* Linn. F. B. I. V, 383; Fl. Bomb. II, 597.

Very common in gardens, and spreading freely as an escape. Flowers all the year round.

271. *Chrozophora* Neck.

NOTE.—One or other of the species of *Chrozophora* is common throughout our area, but they are difficult of discrimination.

429. *Chrozophora plicata* A. Juss. F. B. I. V, 409; Fl. Bomb. II, 607.

Dry tank near Dhansura. Flowers September-March.

The leaves have two glands beneath.

430. *Chrozophora prostrata* Dalz. F. B. I. V, 410; Fl. Bomb. II, 607.

Same locality as the last. Flowers March.

431. *Chrozophora prostrata* Dalz. var. *parvifolia* Klotz. ex Schwiens. (Determined at Calcutta.)

Ahmedabad, on dried up mud. Common. Flowers January—April.

272. *Acalypha* Linn.

432. *Acalypha indica* Linn. F. B. I. V, 416; Fl. Bomb. II, 610.

Ahmedabad, on walls. Common. Flowers August.

273. Ricinus Linn.

433. Ricinus communis Linn. F. B. I. V, 457 ; Fl. Bomb. II, 627.
Sometimes met with as an escape.

LXXIII. URTICACEÆ.**274. Holoptelea Planch.**

434. Holoptelea integrifolia Planch. F. B. I. V, 481 ; Fl. Bomb. II, 629.

A very common tree. Flowers January. Fruits January—April.
Vern. ' Kanji '.

275. Streblus Lour.

435. Streblus asper Lour. F. B. I. V, 489 ; Fl. Bomb. II, 642.
Occasional. Flowers February.

276. Ficus Linn.

436. Ficus bengalensis Linn. F. B. I. V, 499 ; Fl. Bomb. II, 645.
A common roadside tree. Fruits January.

437. Ficus religiosa Linn. F. B. I. V, 513 ; Fl. Bomb. II, 649.
Occasional, perhaps always planted.
Vern. ' Pîpal '.

438. Ficus infectoria Roxb. F. B. I. V, 515 ; Fl. Bomb. II, 651.
Frequent, especially in villages, and by roads.
Vern. ' Pîplî '.

439. Ficus hispida Linn. f. F. B. I. V, 522 ; Fl. Bomb. II, 653.
Banks of small streams in woodland, Modasa. Not uncommon.
Fruits December.

440. Ficus glomerata Roxb. F. B. I. V, 535 ; Fl. Bomb. II, 654.
Ahmedabad, and banks of the Watrak River, and in old wells. Not
infrequent. Fruits December—January.

LXXIV. CERATOPHYLLACEÆ.**277. Ceratophyllum Linn.**

441. Ceratophyllum demersum Linn. F. B. I. V, 639 ; Fl. Bomb. II, 663.

Talod, filling a small water hole. Not seen elsewhere. Fruits October.

MONOCOTYLEDONEÆ.**LXXV. HYDROCHARITACEÆ.****278. Hydrilla Richard.**

442. Hydrilla verticillata Presl. F. B. I. V, 659 ; Fl. Bomb. II, 668. (Determination verified at Kew.)

Abundant in tanks and rivers. Flowers October onwards.

The pedicels of the ♂ flowers are about $\frac{3}{4}$ " long, and, so far as we have seen, the flowers never break off as they do in *Vallisneria*, though such behaviour is apparently implied in the descriptions in Hooker, F. B. I. and Cooke, Fl. Bomb.

279. Vallisneria Linn.

443. Vallisneria spiralis Linn. F. B. I. V, 660 ; Fl. Bomb. II, 669.

Very common in rivers. Flowers December—February.

LXXVI. DIOSCOREACEÆ.**280. Dioscorea Linn.**

444. Dioscorea sativa Linn. F. B. I. VI, 295. (Determined at Calcutta.)

D. bulbifera Linn. var. *sativa* Prain, Beng. Pl. 1066 ; Fl. Bomb. II, 758.

Modasa, as an escape. Flowers and fruits September.

LXXVII. LILIACEÆ.**281. Asparagus Linn.**

445. Asparagus racemosus Willd. var. *javanica* Baker. F. B. I. VI, 217 ; Fl. Bomb. II, 762.

Common throughout our area. Flowers November-December or not at all.

The scent of the flowers is quite overpowering.

282. Gloriosa Linn.

446. *Gloriosa superba* Linn. F. B. I. VI, 358 ; Fl. Bomb. II, 766.

Fairly common throughout our area on sandy soil. Flowers August-September.

283. Asphodelus Linn.

447. *Asphodelus tenuifolius* Cav. F. B. I. VI, 332 ; Fl. Bomb. II, 770.

Common on cultivated (especially irrigated) land. Flowers December-January.

284. Aloe Tourn.

448. *Aloe vera* Linn. Fl. Bomb. II, 774.

Thorn Savannah on the Sabarmati River banks, Raesan. Apparently wild. Flowers February.

LXXVIII PONTEDERIACEÆ.

285. Monochoria Presl.

449. *Monochoria hastifolia* Presl. F. B. I. VI, 362 ; Fl. Bomb. II, 777.

In a tank at Bavsar. Flowers October-November.

LXXIX. COMMELINACEÆ.

286. Commelina Linn.

450. *Commelina nudiflora* Linn. F. B. I. VI, 369 ; Fl. Bomb. II, 781. (W. Indian form Determined at Calcutta.)

Abundant during and just after the monsoon. Flowers August—November.

451. *Commelina benghalensis* Linn. F. B. I. VI, 370 ; Fl. Bomb. II, 782. (Determined at Calcutta.)

Bungalow compound at Sonasan. Not seen elsewhere. Flowers November.

287. Aneilema R. Br.

452. Aneilema nudiflorum R. Br. F. B. I. VI, 378 ; Fl. Bomb. II, 788.

Prantij, Savannah.. Not seen elsewhere. Flowers August.

LXXX. PALMÆ.

NOTE.—The country is peculiarly destitute of palms, which do not thrive.

288. Phoenix Linn.

453. Phoenix sylvestris Roxb. F. B. I. VI, 425 ; Fl. Bomb. II, 801. Occasional. Planted or escaped.

289. Borassus Linn.

454. Borassus flabellifer Linn. F. B. I. VI, 482 ; Fl. Bomb. II, 811.

Rare. Planted.

LXXXI. PANDANACEÆ.

290. Pandanus Linn. f.

455. Pandanus sp. or spp.

Planted, rare. By the upper Khari River, possibly truly wild. We have not succeeded in getting this in flower.

LXXXII. TYPHACEÆ.

291. Typha Linn.

456. Typha angustata Bory & Chaub. F. B. I. VI, 489 ; Fl. Bomb. II, 815.

In the Sabarmati River, Ahmedabad, and in tanks, common. Flowers August and March.

LXXXIII. LEMNACEÆ.**292. Lemna Linn.**

457. Lemna polyrhiza Linn. F. B. I. VI, 557 ; Fl. Bomb. II, 832.
Common in tanks.

LXXXIV. ALISMACEÆ.**293. Limnophyton Miquel.**

458. Limnophyton obtusifolium Miq. F. B. I. VI, 560 ; Fl. Bomb. II, 833.

Abundant in tanks at Talod and elsewhere. Flowers October.

294. Butomopsis Kunth.

459. Butomopsis lanceolata Kunth. F. B. I. VI, 562 ; Fl. Bomb. II, 835.

Damp ground of drying water hole, Talod. Not seen elsewhere. Flowers October.

LXXXV. NAIADACEÆ.**295. Potamogeton Linn.**

460. Potamogeton perfoliatus Linn. F. B. I. VI, 566 ; Fl. Bomb. II, 838.

Rivers. Flowers December.

461. Potamogeton crispus Linn. F. B. I. VI, 566 ; Fl. Bomb. II, 838.

The Watrak River. Not seen in flower.

462. Potamogeton pectinatus Linn. F. B. I. VI, 567 ; Fl. Bomb. II, 838.

Common in tanks and rivers. Sometimes locally abundant. Flowers October—January.

296. *Zannichellia* Linn.

463. *Zannichellia palustris* Linn. sub-sp. *pedicillata* Syme. F. B. I. VI, 568 ; Fl. Bomb. II, 840.

Abundant in rivers. Flowers December—February.

297. *Naias* Linn.

464. *Naias minor* All. F. B. I. VI, 569 ; Fl. Bomb. II, 840.
Common in tanks. Flowers October.

LXXXVI. ERIOCAULACEÆ

298. *Eriocaulon* Linn.

465. *Eriocaulon trilobum* Buch.-Ham. F. B. I. VI, 588 ; Fl. Bomb. II, 848. (Determination verified at Calcutta.)

Occasional in swampy places. Flowers October.

LXXXVII. CYPERACEÆ

NOTE.—The *Cyperaceæ* being mainly helophytic plants it is to be assumed that where not otherwise stated the various species flower as long as moisture is sufficient.

299. *Cyperus* Linn.

466. *Cyperus hyalinus* Vahl. Fl. Bomb. II, 857.

Pycneus pumilus Nees. F. B. I. VI, 591.

Sonasan, by a small tank, (type), Nullah on the Sabarmati Road, Ahmedabad (a densely caespitose form). Red soil upland, Talod (depauperated form). Flowers monsoon.

467. *Cyperus globosus* All. Fl. Bomb. II, 857. (Determined at Kew under the first synonym.)

Pycneus globosus Reich. Index Kewensis, IV, 664.

Pycneus capillaris Nees. F. B. I. VI, 591.

Sonasan, margins of marshy land, in close association with *Fuirena glomerata* Lam. The Watrak River, marshy places on the bank.

468. *Cyperus pygmaeus* Rottb. Fl. Bomb. II, 859.

Juncellus pygmaeus C. B. Clarke. F. B. I. VI, 598.

Grassy edges of tanks,—Chandola Tank, Ahmedabad, the Bokh. Flowers when exposed by the subsidence of the water, and right on through the dry season (cf. *Sporobolus tremulus* Kunth.).

469. *Cyperus laevigatus* Linn. Fl. Bomb. II, 860.

Juncellus laevigatus C. B. Clarke. F. B. I. VI, 596.

Muddy edges of tanks and rivers, in close association with *Paspalum distichum* Linn. and *Panicum punctatum* Burm.

470. *Cyperus alopecuroides* Rottb. Fl. Bomb. II, 860.

Juncellus alopecuroides C. B. Clarke. F. B. I. VI, 595.

In standing and running water Common.

Both Mr. R. K. Bhide and we have found that the styles of the specimens from our area are indiscriminately bi-fid or tri-fid. Clarke, in Hooker's Flora of British India, defined the genus *Juncellus* as differing from *Cyperus* "by having a bi-fid style and a more or less compressed, not equilaterally trigonous nut." The character of the nut is, *teste* the founder of the genus, obscure; and the only clear and definite character having broken down there would seem to be no further justification for the retention of *Juncellus* as a genus.

471. *Cyperus flavidus* Retz. F. B. I. VI, 600; Fl. Bomb. II, 862.

Rice-fields, appearing after the rice is removed, and the ground has begun to dry. Tank edges, Talod.

472. *Cyperus difformis* Linn. F. B. I. VI, 599; Fl. Bomb. II, 862.

In the edges of standing and running water. Common.

473. *Cyperus niveus* Retz. F. B. I. VI, 601; Fl. Bomb. II, 864.

On sandy hills and banks. Fairly common. Flowers monsoon.

A xerophyte and member of the sand flora.

474. *Cyperus arenarius* Retz. F. B. I. VI, 602; Fl. Bomb. II, 864.

As the last.

475. *Cyperus conglomeratus* Rottb. F. B. I. VI, 602; Fl. Bomb. II, 865.

Sand country in both wet and dry places. Common. Flowers monsoon.

476. *Cyperus aristatus* Rottb. F. B. I. VI, 606 ; Fl. Bomb. II, 866.
Ahmedabad, common. Nullah on the Sabarmati Road, Ahmedabad
(a small caespitose form). Flowers monsoon.

477. *Cyperus Iria* Linn. F. B. I. VI, 606 ; Fl. Bomb. II, 867.
Very common. Flowers monsoon.

478. *Cyperus Iria* var. *paniciformis* C. B. Clarke. F. B. I. VI, 607 ;
Fl. Bomb. II, 867.

In standing and running water. Common.
A beautiful and distinct variety, much taller than the type.

479. *Cyperus eleusinoides* Kunth. F. B. I. VI, 608 ; Fl. Bomb. II,
868.

In standing and running water, common.

480. *Cyperus tegetum* Roxb. F. B. I. VI, 613 ; Fl. Bomb. II, 870.
Marshy ground, the Watrak River banks, the Sabarmati River bed,
the Bokh.

481. *Cyperus articulatus* Linn. F. B. I. VI, 611 ; Prain, Beng. Pl.
1144.

River bed, Ahmedabad. Only seen in one place.

482. *Cyperus bulbosus* Vahl. F. B. I. VI, 611 ; Fl. Bomb. II, 871.
Sandy banks. Not uncommon. Flowers monsoon.

The bulbs under the name " thek " are dug up and eaten in famine times.

483. *Cyperus rotundus* Linn. F. B. I. VI, 614 ; Fl. Bomb. II, 871.

A pestilential and superabundant weed.

The length of the stolons is much understated by Cooke.

484. *Cyperus exaltatus* Retz. F. B. I. VI, 617 ; Fl. Bomb. II, 872.
(Determined by Mr. Bhide.)

Marshy place on the Watrak River banks. Not seen elsewhere.

485. *Cyperus esculentus* Linn. F. B. I. VI, 616 ; Fl. Bomb. II, 876.
(Determined at Kew.)

Edge of the tank, Talod, August 1914 ; never again seen. One plant
only, a viviparous form.

This plant is now firmly established on both sides of the Colaba Road, Bombay,
where it crosses over the Bombay, Baroda and Central India Railway. There also the
plants are often viviparous.

300. Kyllinga Rottb.

- 486. *Kyllinga triceps* Rottb.** F. B. I. VI, 587 ; Fl. Bomb. II, 877.
A member of the sand flora. Very common. Flowers monsoon.

301. *Fimbristylis* Vahl.

- 487. *Fimbristylis schoenoides* Vahl.** F. B. I. VI, 634 ; Fl. Bomb. II, 880.

Dhansura. Red earth upland, Talod.

- 488. *Fimbristylis dichotoma* Vahl.** F. B. I. VI, 635 ; Fl. Bomb. II, 880

Common on sand and on the red soil plateau, Talod.

Roots of plants collected by the Khari River are noted as very highly aromatic.

- 489. *Fimbristylis argentea* Vahl.** F. B. I. VI, 640 ; Fl. Bomb. II, 881.

Grassy edges of small tanks, Sonasan, and a little south of Prantij. Flowers December.

- 490. *Fimbristylis ferruginea* Vahl.** F. B. I. VI, 638 ; Fl. Bomb. II, 881.

Red earth upland, Talod. The Watrak River banks.

- 491. *Fimbristylis spathacea* Roth.** F. B. I. VI, 640 ; Fl. Bomb. II, 882.

Loamy and salt encrusted valleys. Not uncommon.

- 492. *Fimbristylis quinquangularis* Kunth.** F. B. I. VI, 644 ; Fl. Bomb. II, 883.

Rice fields. Common.

- 493. *Fimbristylis miliacea* Vahl.** F. B. I. VI, 644 ; Fl. Bomb. II, 883.

Rare. By the side of a pathway through rice fields near Ahmedabad. Never again seen.

- 494. *Fimbristylis tenera* Roem. & Schult. var. *oxylepis* (Steud.) C. B. Clarke.** F. B. I. VI, 642 ; Prain, Beng. Pl. 1154. (Determined at Kew.)

Talod and Ahmedabad. Frequent on sand.

495. *Fimbristylis monostachya* Hassk. F. B. I. VI, 649 ; Fl. Bomb. II, 885.

Dhansura.

496. *Fimbristylis complanata* Link. F. B. I. VI, 646 ; Fl. Bomb. II, 885.

Red earth upland, Talod, in water holes (small form). Marshy places on the Watrak River banks (very tall form).

497. *Fimbristylis junciformis* Kunth. F. B. I. VI, 647 ; Fl. Bomb. II, 886.

Red earth upland, Talod. Rare.

302. *Eleocharis* R. Br.

498. *Eleocharis plantaginea* R. Br. F. B. I. VI, 625 ; Fl. Bomb. II, 888.

In small tanks, Dhansura, Modasa, and near Harsol.

499. *Eleocharis atropurpurea* Kunth. F. B. I. VI, 627 ; Fl. Bomb. II, 889.

Red earth upland, Talod Dry rice fields, Ahmedabad. Muddy places in the Bokh.

303. *Stenophyllus* Rafin.

500. *Stenophyllus barbata* (Rottb.) Cooke. Fl. Bomb. II, 887

Bulbostylis barbata Kunth. F. B. I. VI, 651.

In sandy fields. An abundant weed. Flowers monsoon.

304. *Scirpus* Linn.

501. *Scirpus articulatus* Linn. F. B. I. VI, 656 ; Fl. Bomb. II, 891.

In tanks, Sonasan, Talod.

502. *Scirpus supinus* Linn. var. *uninodis* C. B. Clarke. F. B. I. VI, 656 ; Fl. Bomb. II, 892.

By a small tank, Sonasan.

503. *Scirpus quinquefarius* Ham. F. B. I. VI, 657 ; Fl. Bomb. II, 892.

Rice-fields, Ahmedabad, Talod, etc.

504. *Scirpus mucronatus* Linn. F. B. I. VI, 657 ; Prain, Beng. Pl. 1161. (Determined at Calcutta.)

In the Bokh, Prantij.

505. *Scirpus maritimus* Linn. F. B. I. VI, 658 ; Fl. Bomb. II, 898.

River beds in the sand area. Very common. Also Kharaghoda and the Bokh.

One specimen at Ahmedabad with dark nuts and very long styles.

506. *Scirpus maritimus* Linn. var. *affinis* C. B. Clarke. F. B. I. VI, 659 ; Fl. Bomb. II, 893.

Same habitats as the last. Very common.

507. *Scirpus littoralis* Schrad. F. B. I. VI, 659 ; Fl. Bomb. II, 894. River beds, common. Also at Kharaghoda.

508. *Scirpus Kysoor* Roxb. Fl. Bomb. II, 894.

S. grossus Linn. f. var. *Kysoor* C. B. Clarke. F. B. I. VI, 660. Prain, Beng. Pl. 1160.

Not observed by us, but known to occur in or near our area.

It grows in the Nal, a very large shallow lake on the western boundary of the Ahmedabad district, and the tubers are there dug up and eaten under the name of "bid."

305. *Fuirena* Rottb.

509. *Fuirena glomerata* Lam. F. B. I. VI, 666 ; Fl. Bomb. II, 898.

Sonasan, on the drier edges of rice lands, in close association with *Cyperus globosus* All.

306. *Scleria* Berg.

510. *Scleria Stocksiana* Boeck. F. B. I. VI, 687 ; Fl. Bomb. II, 906.

Water holes on the red earth upland, Talod.

Apparently a local form of *S. Stocksiana*, with nut perforately reticulated.

LXXXVIII. GRAMINEÆ.

307. *Pennisetum* Pers.

511. *Pennisetum Alopecuros* Nees. F. B. I. VII, 84 ; Fl. Bomb. II, 914.

Rare. On a sandy hill near Sonasan.

512. Pennisetum pedicellatum Trin. F. B. I. VII, 86; Fl. Bomb. II, 916.

Ahmedabad, on land where imported famine grass had been stored in the 1911-12 famine. Presumably an alien.

513. Pennisetum setosum Rich. F. B. I. VII, 87; Fl. Bomb. II, 916.

As the last.

514. Pennisetum cenchroides Rich. F. B. I. VII, 88; Fl. Bomb. II, 916.

Common in the sand area, resembles *Cenchrus biflorus*, Roxb. and inhabits similar localities. Flowers June and long after.

308. *Cenchrus* Linn.

515. Cenchrus biflorus Roxb. F. B. I. VII, 89; Fl. Bomb. II, 917.

Very abundant. Flowers practically throughout the year. (Cf. *Pennisetum cenchroides* Rich.)

516. Cenchrus catharticus Delile. F. B. I. VII, 90; Fl. Bomb. II, 918.

Very abundant in the sand area.

The deciduous spikelets, locally known as "bantio," constitute the most painful and troublesome burrs in our area.

309. *Setaria* Beauv.

517. Setaria glauca Beauv. F. B. I. VII, 78; Fl. Bomb. II, 920.

Very common, especially in shady places. Depauperated forms occur, in which the spikes are reduced to one or two spikelets. Flowers monsoon.

518. Setaria intermedia Roem. & Schult. F. B. I. VII, 79; Fl. Bomb. II, 920.

Meadow land and hedges. Common. Grows luxuriantly in the back gardens of houses in villages. Flowers monsoon and after.

519. Setaria verticillata Beauv. F. B. I. VII, 80; Fl. Bomb. II, 921.

A weed in the Victoria Gardens, Ahmedabad. Probably as common as the last and found in similar localities, but easily

passed over, since to the naked eye the two species are indistinguishable.

310. *Axonopus* Beauv.

520. *Axonopus cimicinus* Beauv. F. B. I. VII, 64; Fl. Bomb. II, 925.

Frequent. Flowers monsoon.

311. *Oplismenus* Beauv.

521. *Oplismenus Burmanni* Beauv. F. B. I. VII, 68; Fl. Bomb. II, 927.

In the shade of trees, Sonasan. Not seen elsewhere.

312. *Panicum* Linn.

522. *Panicum flavidum* Retz. F. B. I. VII, 28; Fl. Bomb. II, 929. Compounds, Ahmedabad. Common. Flowers monsoon

523. *Panicum punctatum* Burm. F. B. I. VII, 29; Fl. Bomb. II, 929.

Standing and running water. Common.

524. *Panicum Crus-galli* Linn. F. B. I. VII, 30.

P. stagninum Retz. Fl. Bomb. II, 930.

In the Bokh and other standing water, Prantij Taluka. Common. A tall long-awned grass; ligule entirely absent.

525. *Panicum colonum* Linn. F. B. I. VII, 32; Fl. Bomb. II, 931.

Very common in low-lying, damp places. Thrives only in years of heavy rainfall.

Vern. 'Samo.'

This is the famous "samo" grass, which was so extensively eaten in the second year of the great famine, 1900-1901 all through Gujarat. It is to be noted that in that year the rains did not fail as in the first famine year, 1899-1900, but a copious fall was crowded into a short period in July-August. These climatic conditions, while almost useless to crops, suited the "samo" very well. It is, therefore, not a true famine food. This year (1915) it failed entirely, and had the famine, which at one time seemed inevitable, turned into a reality, it would have afforded no assistance.

The millet crop known locally as "banti" appears to be a cultivated variety of *Panicum colonum* Linn, and not of *P. Crus-galli* Linn. as often supposed.

526. *Panicum Isachne* Roth. F. B. I. VII, 28 ; Fl. Bomb. II, 931.
Famine grass plot, Ahmedabad, and therefore, probably an alien.

527. *Panicum prostratum* Lamk. F. B. I. VII, 33 ; Fl. Bomb. II, 932.

Dhansura, Ghadi, Victoria Gardens and famine grass plot, Ahmedabad.

528. *Panicum ramosum* Linn. F. B. I. VII, 36 ; Fl. Bomb. II, 932. (Determined by Mr. R. K. Bhide.)

Ahmedabad and elsewhere in hollows and margins of fields. Flowers early monsoon.

This grass is evidently with difficulty distinguishable from *Panicum setigerum* Retz., and was listed as that species in the Journal of the Bombay Natural History Society, XXIII (June, 1914), 112, ("A list of Grasses from Surat and Ahmedabad," by L. J. Sedgwick).

529. *Panicum javanicum* Poir. F. B. I. VII, 35 ; Fl. Bomb. II, 933.

Compounds, etc. Frequent. A grass of human habitations. Flowers monsoon.

530. *Panicum distachyum* Linn. F. B. I. VII, 37 ; Prain, Beng. Pl. 1178. (Determined at Kew.)

Hedges, banks and the margins of fields around Ahmedabad. Frequent. Flowers monsoon.

531. *Panicum miliare* Lamk. F. B. I. VII, 46 ; Fl. Bomb. II, 939.
Famine grass plot, Ahmedabad. An alien.

532. *Panicum psilopodium* Trin. F. B. I. VII, 46 ; Fl. Bomb. II, 939. (Determined at Kew.)

Shady wet places in the monsoon, Ahmedabad and elsewhere. Frequent.

533. *Panicum trypheron* Schult. F. B. I. VII, 47 ; Fl. Bomb. II, 936.

Sand areas, Prantij and Sonasan. Frequent. Flowers monsoon.

534. *Panicum antidotale* Retz. F. B. I. VII, 52 ; Fl. Bomb. II, 937.

Occasional throughout the area, usually among other vegetation.
Flowers monsoon.

313. *Digitaria* Heist.

535. *Digitaria sanguinalis* Scop. var. *ciliaris* Prain, Beng. Pl. 1181; Fl. Bomb. II, 940.

Paspalum sanguinale var. *ciliaris* Hook. f. F. B. I. VII, 15.

Abundant. One of our commonest grasses. Flowers very early.

536. *Digitaria pedicellaris* Prain, Beng. Pl. 1182; Fl. Bomb. II, 941.

Paspalum pedicellare Trin. F. B. I. VII, 19.

Red earth upland, Talod, and nowhere else. Flowers monsoon.

537. *Digitaria longiflora* Pers. Fl. Bomb. II, 941; Prain, Beng. Pl. 1181.

Paspalum longiflorum Retz. F. B. I. VII, 17.

Red earth upland and other places near Talod. Flowers monsoon.

538. *Digitaria Royleana* Prain, Beng. Pl. 1182; Fl. Bomb. II, 942.

Paspalum Royleanum Nees. F. B. I. VII, 18.

Red earth upland, Talod, the Sabarmati River banks, and elsewhere throughout our area. Not uncommon. Flowers monsoon.

314. *Paspalum* Linn.

539. *Paspalum distichum* Linn. F. B. I. VII, 12; Fl. Bomb. II, 943.

On wet mud. Frequent. (Cf. *Cyperus laevigatus* Linn.)

315. *Eriochloa* H. B. & K.

540 *Eriochloa polystachya* H. B. & K. F. B. I. VII, 20; Fl. Bomb. II, 944.

Standing and running water. Very common. Flowers mid-monsoon.

316. *Imperata* Cyrill.

541. *Imperata arundinacea* Cyrill. F. B. I. VII, 106; Fl. Bomb. II, 946.

Grassy banks. Not uncommon. Flowers monsoon.

Always in a stunted form, and nowhere assuming the aggressive habit described in the œcological works.

317. *Saccharum* Linn.

542. *Saccharum spontaneum* Linn. F. B. I. VII, 118 ; Fl. Bomb. II, 948.

Very common and conspicuous on sand. Flowers towards the end of the monsoon.

543. *Saccharum Munja* Roxb. Fl. Ind. I, 246. (Determined at Kew.)

S. arundinaceum Retz. var. *ciliaris* Prain, Beng. Pl. 1189.

A very common grass on sand, and a conspicuous feature of the landscape. Flowers after the monsoon has completely ceased, and throughout the early winter.

Vern. 'Sarkhat,' 'Hadol'.

This is the grass listed as *Erianthus Ravennae* Beauv. in the Journal of the Bombay N. H. Soc. XXIII (1914), 113.

The stalks are used to construct roofing for huts. In some places near Ahmedabad the clumps are in straight lines, and seem, therefore, to have been planted. The species is, however, so universal on sand throughout our area that it can hardly be regarded otherwise than as a denizen. Large flocks of munias feed on the silvery spikelets in the winter.

318. *Ophiurus* Gært. n.

544. *Ophiurus corymbosus* Gært. n. f. F. B. I. VII, 160 ; Fl. Bomb. II 951.

On black soil, Butea Savannah. Occasional.

319. *Rottboellia* Linn. f.

545. *Rottboellia compressa* Linn. f. F. B. I. VII, 153 ; Fl. Bomb. II, 952.

River beds in the sand area. Banks of the Kankaria tank, Ahmedabad.

546. *Rottboellia exaltata* Linn. f. F. B. I. VII, 156 ; Fl. Bomb. II, 955.

Road side near Talod. Fields, Ahmedabad, occasional.

320. *Manisuris* Sw.

547. *Manisuris granularis* Linn. f. F. B. I. VII, 159 ; Fl. Bomb. II, 955.

Red earth upland, Talod. Flowers monsoon.

321. *Apluda* Linn.

548. *Apluda varia* Hack. F. B. I. VII, 150 ; Fl. Bomb. II, 956.
Everywhere. Flowers monsoon.

322. *Ischaemum* Linn.

549. *Ischaemum rugosum* Salisb. F. B. I. VII, 127 ; Fl. Bomb. II, 959.

In wetter places on grassland Savannah, and *Butea* Savanna Common. Flowers monsoon.

550. *Ischaemum pilosum* Hack. F. B. I. VII, 130 ; Fl. Bomb. II, 961.

Roadsides and other waste places east of the Majham River. Occasional.

551. *Ischaemum laxum* Br. F. B. I. VII, 136 ; Fl. Bomb. II, 964.
East of the Majham River. Occasional.

323. *Arthraxon* Beauv.

552. *Arthraxon lanceolatus* Hochst. F. B. I. VII, 143 ; Fl. Bomb. II, 968.

Exclusively confined to the perpendicular faces of lanes and 'wanghas' (see p. 213) in the sand area, and not uncommon in such localities. Flowers winter.

The spikelets are smaller than those of specimens collected in the Western Ghats.

553. *Arthraxon microphyllum* Hochst. F. B. I. VII, 147, Fl. Bomb. II, 970.

On old walls. Common. Flowers monsoon.

554. *Arthraxon ciliaris* Beauv. F. B. I. VII, 145 ; Fl. Bomb. II, 970.

Famine grass plot, Ahmedabad. An alien.

324. *Thelepogon* Roth.

555. *Thelepogon elegans* Roth. F. B. I. VII, 143 ; Fl. Bomb. II, 971.

One plant only in a compound, Ahmedabad, 1913. Probably an alien imported with horse's grass.

325. *Andropogon* Linn.

556. *Andropogon Schoenanthus* Linn. F. B. I. VII, 204; Fl. Bomb. II, 991; Prain, Beng. Pl. 1203. (Determined at Calcutta.)

Cymbopogon Schoenanthus Spreng. Otto Stapf in Kew Bull. 1906, 303, 352.

Common. Flowers July—December.

Two forms occur, one with broad and one with narrow leaves.

557. *Andropogon Schoenanthus* Linn. var. *cæsius* Hack. F. B. I. VII, 205. (Determined at Calcutta.)

Cymbopogon cæsius Stapf, Kew Bull. 1906, 360.

On sandy and gravelly hills and banks, Ahmedabad and Prantij. Flowers August and September.

This grass is very distinct, and does not form colonies as the type.

558. *Andropogon pumilus* Roxb. F. B. I. VII, 170; Fl. Bomb. II, 976.

Occasional in the north and east. Flowers late monsoon.

559. *Andropogon foveolatus* Del. F. B. I. VII, 168; Fl. Bomb. II, 977.

Savannah grasslands. Common. Flowers late monsoon.

560. *Andropogon pertusus* Willd. F. B. I. VII, 173; Fl. Bomb. II, 978.

Not common. Flowers early monsoon.

561. *Andropogon halepensis* Brot F. B. I. VII, 182; Fl. Bomb. II, 983.

Modasa Petha, in hedges. Fairly common.

562. *Andropogon purpureo-sericeus* Hochst. F. B. I. VII, 185; Fl. Bomb. II, 984.

Famine grass plot, Ahmedabad. An alien.

563. *Andropogon squarrosus* Linn. f. F. B. I. VII, 186; Fl. Bomb. II, 991.

In shallow water and marshy places throughout the area. Very common, and indubitably indigenous.

Vern. 'Khas-khas'.

Tatties are made from the roots.

564. *Andropogon Monticola* Schult. F. B. I. VII, 192 ; Fl. Bomb. II, 985.

On rocks on the Watrak River banks, and nowhere else.

565. *Andropogon annulatus* Forsk. F. B. I. VII, 196 ; Fl. Bomb. II, 988.

Grassland Savannah. Very common. Flowers late monsoon.

Vern. 'Jhinjawa.'

566. *Andropogon contortus* Linn. F. B. I. VII, 199 ; Fl. Bomb. II, 990.

Common.

326. *Anthistiria* Linn. f.

567. *Anthistiria ciliata* Linn. f. F. B. I. VII, 213 ; Prain, Beng. Pl. 1207.

Themeda ciliata Hack. Fl. Bomb. II, 994.

Grassland Savannah. Common.

Vern. 'Ratadio' (meaning red).

327. *Iseilema* Hack.

568. *Iseilema Wightii* Anders. F. B. I. VII, 218 ; Fl. Bomb. II, 996.

Wet places in grassland Savannah. Common. Flowers monsoon.

569. *Iseilema laxum* Hack F. B. I. VII, 218 ; Fl. Bomb. II, 996.

Red earth upland, Talod, common. Elsewhere occasional.

328. *Coix* Linn.

570. *Coix Lachryma-Jobi* Linn. F. B. I. VII, 100 ; Fl. Bomb. II, 997.

In standing water. Fairly common.

329. *Polytoca* R. Br.

571. *Polytoca barbata* Stapf. F. B. I. VII, 102 ; Fl. Bomb. II, 998.

About four miles west of Bavsar. Only once seen.

330. *Phragmites* Trin.

572. *Phragmites Karka* Trin F. B. I. VII, 304 ; Fl. Bomb. II, 1007.

Banks of the Khari and the Watrak Rivers.

331. Aristida Linn.

573. Aristida Adscencionis Linn. F. B. I. VII, 224; Fl. Bomb. II, 1008.

On old walls, and on stony uplands, near Bavsar

574. Aristida funiculata Trin. & Rupr. F. B. I. VII, 226; Fl. Bomb. II, 1010.

Red earth upland, Talod.

575. Aristida redacta Stapf. F. B. I. VII, 227; Fl. Bomb. II, 1010.
(Determined by Mr. R. K. Bhide.)

Sandy waste land. Common.

The differentiation of these two species, if indeed they really are separate, is extremely difficult and doubtful, and the above records must therefore be accepted with reservation.

332. Tragus Haller.

576. Tragus racemosus Scop. F. B. I. VII, 97; Fl. Bomb. II, 1014.

On sandy waste, especially where the sand has coagulated. Common.

333. Perotis Ait.

577. Perotis latifolia Ait. F. B. I. VII, 93; Fl. Bomb. II, 1016.
Common. Flowers monsoon.

Cooke's flowering time, "Oct.-Aug." is presumably a misprint for "Aug.-Oct."

334. Sporobolus R. Br.

578. Sporobolus diander Beauv. F. B. I. VII, 247; Fl. Bomb. II, 1017.

Very common. Flowers monsoon.

579. Sporobolus glaucifolius Hochst. F. B. I. VII, 250; Fl. Bomb. II, 1019.

In a dried rice field near the Chandola Tank, Ahmedabad. Only once seen.

580. Sporobolus tremulus Kunth. F. B. I. VII, 250; Praia, Beng. Pl. 1213.

Grassy margins of tanks liable to be submerged in the monsoon. Flowers when the water subsides.

581. *Sporobolus orientalis* Kunth. F. B. I. VII, 251; Fl. Bomb. II, 1020.

Salt-incrusted valleys in the north-east of our area. Common. Flowers monsoon.

582. *Sporobolus coromandellianus* Kunth. F. B. I. VII, 252; Fl. Bomb. II, 1021.

Shady places under the trees in the Modasa Petha. Occasional. Flowers monsoon.

335. *Eragrostis* Beauv.

583. *Eragrostis ciliaris* Link. var. *brachystachya* Boiss. F. B. I. VII, 315; Fl. Bomb. II, 1023.

Roadsides and other barren places. Occasional.

It is open to question whether the type does not also occur with us, and further whether intermediate forms do not occur, in which latter case the validity of the variety would be doubtful.

584. *Eragrostis tenella* Roem. & Schult. var. *plumosa* Stapf. F. B. I. VII, 315; Fl. Bomb. II, 1024; Prain, Beng. Pl. 1221.

An abundant weed in fields. Flowers monsoon, and long after.

585. *Eragrostis tenella* Roem. & Schult. var. *viscosa* Stapf. F. B. I. VII, 315; Fl. Bomb. II, 1024; Prain, Beng. Pl. 1222.

Open margins of a tank near Harsol.

586. *Eragrostis interrupta* Beauv. var. *Koenigii* Stapf. F. B. I. VII, 316; Fl. Bomb. II, 1024; Prain, Beng. Pl. 1222.

Water holes, etc. Occasional. Flowers late monsoon.

587. *Eragrostis interrupta* Beauv. var. *tenuissima* Stapf. F. B. I. VII, 316; Prain, Beng. Pl. 122. (Determined at Kew.)

Fields, Ahmedabad. Occasional.

588. *Eragrostis amabilis* Wight & Arn. F. B. I. VII, 317; Fl. Bomb. II, 1025; Prain, Beng. Pl. 1222.

Compounds, etc, Ahmedabad. Not uncommon.

589. *Eragrostis gangetica* Steud. Fl. Bomb. II, 1025 ; Prain, Beng. Pl. 1222. (Determined by Mr. R. K. Bhide.).

E. elegantula Stapf, in F. B. I. VII, 318.

Common in the grassy edges of tanks and rice fields.

590. *Eragrostis minor* Host. F. B. I. VII, 321 ; Fl. Bomb. II, 1027.

Compounds, etc., Ahmedabad. Common.

591. *Eragrostis tremula* Hochst. F. B. I. VII, 320 ; Fl. Bomb. II, 1027.

A typical member of the sand flora. Abundant. Flowers monsoon.

592. *Eragrostis pilosa* Beauv. F. B. I. VII, 323 ; Fl. Bomb. II, 1028. (Determined at Kew.)

Compounds and waste land, very common. Red earth upland, Talod (a small and delicate form with fewer and larger spikelets.) Flowers monsoon.

593. *Eragrostis cynosuroides* Beauv. F. B. I. VII, 324 ; Fl. Bomb. II, 1028.

A very common grass in fields. Flowers mid-monsoon.

Vern ' Dabh ' (from the Sanskrit " darbha ").

594. *Eragrostis bifaria* Wight. F. B. I. VII, 325 ; Fl. Bomb. II, 1029.

Red earth upland, Talod.

336. *Diplachne* Beauv.

595. *Diplachne fusca* Beauv. F. B. I. VII, 329 ; Fl. Bomb. II, 1030.

Marshes. Abundant. Flowers early and mid-monsoon.

337. *Gracilea* Koen.

596. *Gracilea Royleana* Hook. f. F. B. I. VII, 284 ; Fl. Bomb. II, 1031.

Common. Flowers monsoon.

338. *Cynodon* Pers.

597 *Cynodon dactylon* Pers. F. B. I. VII, 288 ; Fl. Bomb. II, 1032.

Very common. Flowers throughout the year.

Vern. 'Dura'.

This grass is not with us a pestilential weed in cultivated fields in the way that it is, for instance, in the Southern Maratha Country.

339. *Chloris* Sw.

598. *Chloris pallida* Hook. f. F. B. I. VII, 289; Prain, Beng. Pl. 1227.

On barren patches in grassland Savannah. Not uncommon. Flowers monsoon.

599. *Chloris tenella* Roxb. F. B. I. VII, 290; Fl. Bomb. II, 1033.

In compounds and on old walls, Ahmedabad. Common. Flowers early monsoon.

The spikelets are frequently binate, and they are quite invariably deflexed and not erect as described by Cooke.

600. *Chloris villosa* Pers. F. B. I. VII, 291; Fl. Bomb. II, 1034.

Barren waste lands. Common. Can endure a good deal of salt.

601. *Chloris incompleta* Roth. F. B. I. VII, 290; Fl. Bomb. II, 1034.

In the shade of trees, Bavsar and near Harsol. Flowers autumn and winter.

602. *Chloris virgata* Sw. F. B. I. VII, 291; Prain, Beng. Pl. 1228.

Edges of roads and barren places. Very common. Flowers monsoon.

603. *Chloris barbata* Sw. F. B. I. VII, 292; Fl. Bomb. II, 1035.

Marshy or semi-marshy places. Common. Flowers monsoon.

340. *Eleusine* Gaertn.

604. *Eleusine indica* Gaertn. F. B. I. VII, 293; Fl. Bomb. II, 1037.

Damp places near habitations. Frequent.

605. *Eleusine coracana* Gaertn. F. B. I. VII, 294; Fl. Bomb. II, 1089.

An occasional escape from cultivation.

606. *Eleusine verticillata* Roxb. F. B. I. VII, 295; Prain, Beng. Pl. 1229.

Compounds, lanes and banks, Ahmedabad. Common. Flowers early. It appears to be able to develop on the minimum of rainfall, as it was in the 1915 monsoon very conspicuous in August.

607. *Eleusine aegyptiaca* Desf. F. B. I. VII, 295; Fl. Bomb. II, 1038

Abundant everywhere.

Varies from a depauperated form with one or two spikelets, to a luxuriant form with ten or twelve full spikes.

608. *Eleusine aristata* Ehrenb. F. B. I. VII, 296; Fl. Bomb. II, 1039.

Waste and sandy land and fields, Ahmedabad. Frequent. Flowers monsoon.

341. *Dinebra* Jacq.

609. *Dinebra arabica* Jacq. F. B. I. VII, 297; Fl. Bomb. II, 1039. Fields. Not common.

342. *Leptochloa* Beauv.

610. *Leptochloa filiformis* Roem. & Schult. F. B. I. VII, 298; Prain, Beng. Pl. 1225.

Victoria Gardens, Ahmedabad. Only once seen. An alien.

L. polystachya Benth. recorded in Journal of the Bomb. N. H. Soc., XXIII (June 1914). 116, was not preserved and may have been this species.

343. *Oryza* Linn.

611. *Oryza sativa* Linn. F. B. I. VII, 92; Fl. Bomb. II, 1042.

A long awned wild rice is common in waterholes and still water, and is probably a well established escape of the long awned coarse variety known locally as "vari", which is grown extensively in inferior lands, especially where the water is deep and is not transplanted.

344. *Elytrophorus* Beauv.

612. *Elytrophorus articulatus* Beauv. F. B. I. VII, 306; Fl. Bomb. II, 1044.

Rice fields and tanks, appearing after the crop is removed and the water has dried.

345[346]. Aeluropus Trin.

613 [614]. Aeluropus villosus Trin. F. B. I. VII, 334 ; Fl. Bomb. II, 1045.

Shores of the Rann, Kharaghoda, and almost the only plant on wet saline soil. Sandy margins of the Bokh, Prantij.

This last is an interesting record, as the species is essentially maritime.

CRYPTOGAMIA.

The Cryptogamic flora of our area is peculiarly scanty except in the rivers. Of **PTERIDOPHYTA**, we have *Ceratopteris thalictroides* Linn., once seen in a hollow in the Watrak River bed, *Equisetum debile* Roxb., once seen on the Sabarmati River banks, *Marsilia quadrifolia* Linn. very common on sandy beds of rivers, and *Azolla* one sp. very common on water both running and stagnant. Of **BRYOPHYTA**, we have a stunted and always sterile form of some Pottiaceous moss (probably a *Hyophila* on the walls of wells, and one other Acrocarpous moss once seen on the Watrak River banks. This was sent to Mr. H. N. Dixon who determined it as a new and distinct species of *Splachnobryum*, for which he proposes the name of *S. procerrimum*. We have also noted one Thalloid hepatic as common on the ground in the mid-monsoon period on open patches in sand Savannah association. Otherwise, it would be difficult to conceive of a region, other than desert, which is more completely destitute of Bryophytic vegetation. Of **FUNGI**, we have noted one (perhaps a *Coprinus*) as common on sand Savannah. A few others occur but have not been studied. Of **ALGAE**, Characeae are abundant in the streams of the rivers, particularly the rocky Watrak. Other algae also occur in streams and stagnant water.

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RECORDS
OF THE
BOTANICAL SURVEY OF INDIA

VOLUME VI—No. 8

THE SPECIES OF OXALIS NOW WILD IN INDIA
and
A NEW INDIAN VERNONIA

BY

C. C. CALDER, B.Sc., B.Sc.(AGRIC.), F.L.S.

ON TRICHODESMA INDICUM R. Br. and
TRICHODESMA AMPLEXICAULE Auctt.
A NEW INDIAN IMPATIENS. A NEW
INDIAN HABENARIA

BY

L. J. SEDGWICK, B.A., F.L.S., I.C.S.



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List of Plates for No. 8 of Vol. VI.

- No. 1. *Oxalis Acetosella* L.
„ 2. „ *Griffithii* Edgew. & Hook. f.
„ 3. „ *variabilis* Jacq. var *rubra*.
„ 4. „ *Pes-caprae* L.
„ 5. „ *corniculata* L.
„ 6. „ *pubescens* H. B. & K.
„ 7. „ *tetraphylla* Cav.
„ 8. „ *latifolia* H. B. & K.
„ 9. „ *corymbosa* DC.
„ 10. *Vernonia Fysoni* Calder.
„ 11. { *Trichodesma amplexicaule* ~~Edgew.~~ DC.
„ { „ *indicum* R. Br.

THE SPECIES OF OXALIS NOW WILD IN INDIA.

BY

C. C. CALDER

INTRODUCTION

THE genus *Oxalis* was defined by Linnaeus in his first edition of the *Genera Plantarum* in 1737. Since then steady increase in the number of its species has brought the total to about 300 at present. Only four or five species are almost cosmopolitan, while the majority of the remainder are restricted to South Africa, including Madagasoar, and to tropical and sub-tropical America. Very few occur in Asia, Europe, Australia, Tropical Africa and North America. Within the limits of British India only three species were hitherto known to be wild, but during the last few years several exotic species have established themselves so thoroughly in many favourable situations that the following attempt to give a concise account of all the species now found wild has been rendered necessary.

Of the following nine species of *Oxalis* described below as being now well-established in India, four are tropical American, two South African, one North temperate, one Himalayan and the last cosmopolitan. Strictly speaking then, only one species is indigenous to India.

The paper consists of three parts:—1st, an artificial key to facilitate the recognition of species, both indigenous and non-indigenous; 2nd, a history and description of all the species so far known to be wild; 3rd, the intra-Indian distribution of the species as revealed by existing examples in the Calcutta Herbarium.

The synonymy cited has been based on that maintained in the *Index Kewensis*.

Artificial Key to the species now wild in India.

A. Peduncles 1-flowered.

Bulbless, rootless creeping. Petals white.

- Stipules large; leaflets broadly obcordate, outlines roundish . . . (1) *O. Acetosella*
 Stipules small; leaflets distinctly triangular, outlines straight . . . (2) *O. Griffithii*
 Bulb solitary, black. Petals red . . . (3) *O. variabilis*
VAR. *rubra*

B. Peduncles two—many-flowered.

Petals yellow or orange,

- Stemless; leaves all radical, rising from the rootstock . . . (4) *O. Pes-caprae*
 Stems usually creeping, rarely erect; leaves rising from the nodes.
 Flowers in simple umbels . . . (5) *O. corniculata*
 Flowers in broad umbelliform falsely-racemose branches . . . (6) *O. pubescens*

Petals blueish-purple or purple-violet.

- Leaflets four . . . (7) *O. tetraphylla*
 Leaflets three, broadly and distinctly triangular . . . (8) *O. latifolia*
 Leaflets three, obcordate, roundish at the sides . . . (9) *O. corymbosa*

Descriptions and History.

1. *Oxalis Acetosella* Linn. Sp. Plant. 433.

Oxalis alba Steud. Nom. ed. I. 578; ed. II. ii, 238.

Oxalis americana Bigel. ex DC. Prod. i, 700.

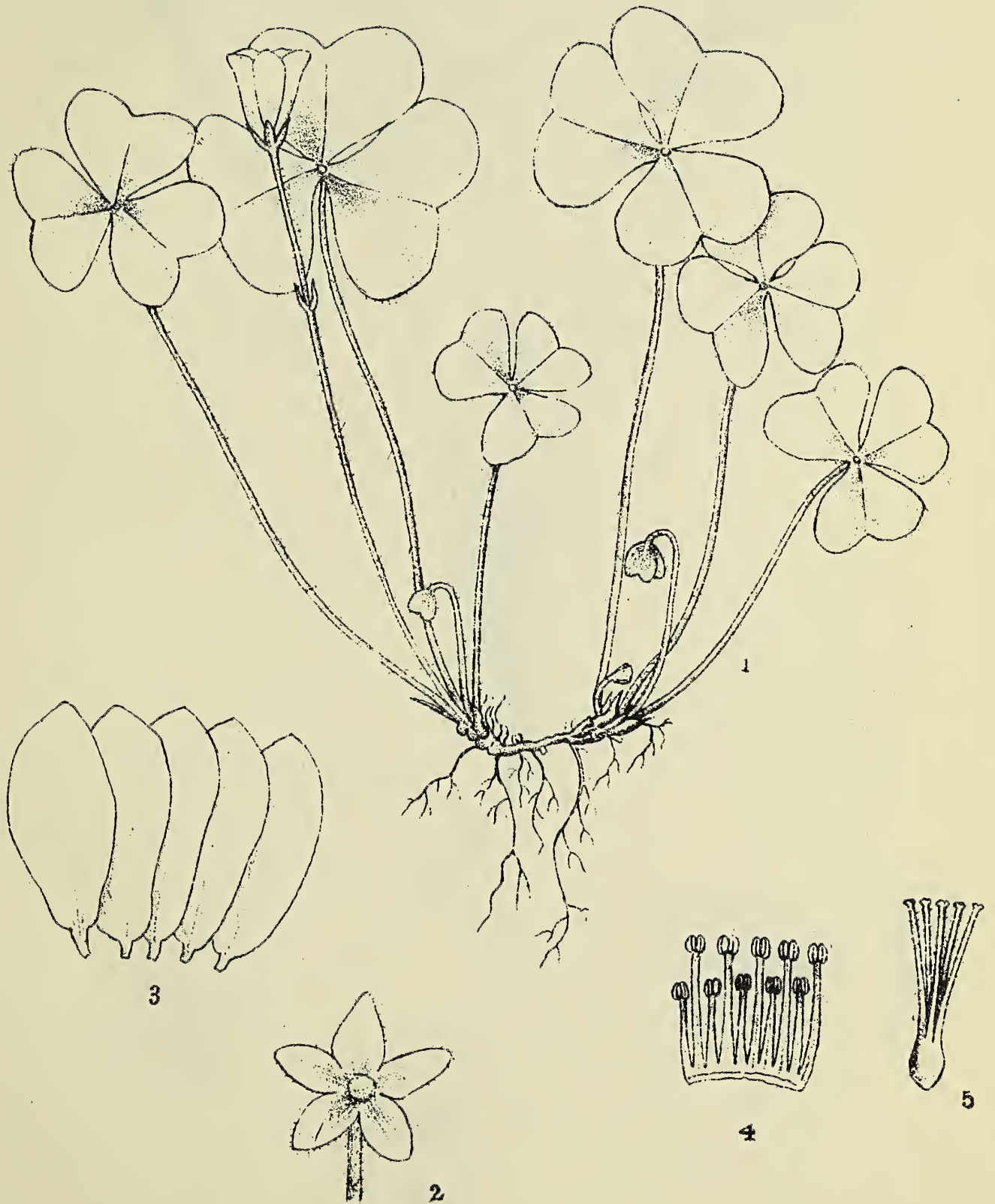
Oxalis montana Rafin. in Am. Monthly Mag. (1818), 266; Ann. Nat. 12.

Oxalis nemoralis Salisb. Prod. 321.

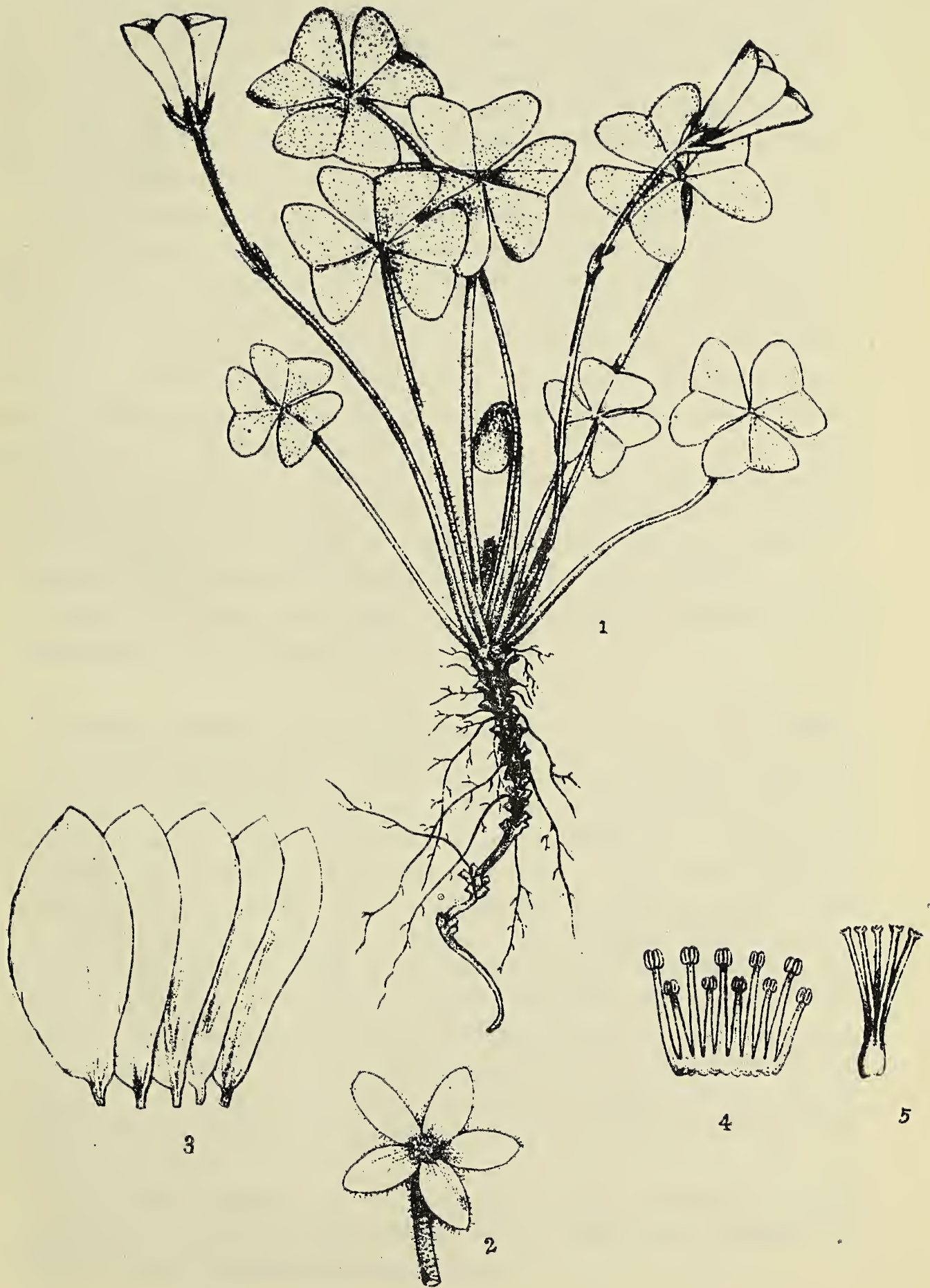
Oxalis parviflora Lej. Fl. Spa. ii, 307.

Oxalis vulgaris S. F. Gray. Nat. Arr. Brit. Pl. ii, 630.

A small delicate perennial herb 5-15 cm. high, stemless but with a longer or shorter horizontally creeping reddish knotty scaly rhizome. Leaves radical, numerous, stipulate, trifoliolate with elongated 5-15 cm. long petioles; petioles somewhat thickened and often purple at base, higher up light-green and grooved; leaflets broadly obcordate, light-green with frequently a tinge of purple beneath, hairy and showing marked nyctotropic movement; stipules large, broad and membranous. Flowers solitary, 1-1.8 cm. in diam., on elongated slender peduncles; peduncles



Oxalis Acetosella Linn.



Oxalis Griffithii Edgew. & Hook. f.

longer than petioles, axillary, furnished with two scaly opposite bracteoles above the middle. Calyx gamosepalous, deeply divided; sepals 5, small, .4 cm. long, .2 cm. broad, oblong or ovate. Petals 5, inserted by a short claw and cohering above it, obovate blunt, white or pale-rose veined with purple, yellowish at base, four times the length of the sepals. Stamens 10, in two whorls, the five exterior shorter, .7 length of the longer which are .4 cm. long. Ovary ovoid, five angled, erect, glabrous; cells 2-3-seeded, styles 5, slender, a little longer than the stamen; stigmas blunt.

Oxalis Acetosella has its natural distribution throughout the world in northern temperate latitudes. It succeeds in America north of the 41°N line, is present throughout Europe and into Siberia but is absent at least in the wild state in South America, in Africa and in Australia. According to Small, who has revised the genus for the "North American Flora," the new-world form of the plant would seem to differ from nearly all the Indian specimens examined in having the peduncles shorter than the petioles. It is a temperate or cold-loving plant the presence of which in India can be accounted for only through the modifying influence on climate which the presence of the Himalayas brings to latitudes bordering on the tropics. An analysis of Calcutta herbarium records shows no instance of the presence of *O. Acetosella* in India below 10,000 ft.

Plate I.—1, plant, nat. size; 2, calyx \times 10; 3, corolla \times 10; 4, androecium \times 20; 5, gynæceum \times 25.

2. *Oxalis Griffithii* Edgew & Hook. f. in Hook. f. Fl. Brit. Ind. i, 436.

A small perennial herb, 5-15 cm. high, with a creeping thickened rootstock bearing numerous fibrous roots and densely clothed with the persistent bases of the leaf stalks. Leaves trifoliolate, radical with somewhat thickened hairy 5-12 cm. long more or less ridged petioles; leaflets broadly triangular, slightly retuse, hairy; stipules small, ovate lanceolate. Flowers solitary, axillary on elongated stoutish hairy pedicels; pedicels, when fully developed as long as or longer than the petioles, with two linear oblong hairy bracteoles above the middle. Sepals 5, narrowly ovate to oblong, pubescent especially on the margins, .4 cm long. Petals 5, narrowly obovate, 1 cm. long. Stamens 10, the longer .5 cm. long, the shorter two-thirds the length of the longer. Ovary obtusely five angled, glabrous; styles 5, diverging, as long as the longer stamens.

Since the discovery of *O. Griffithii* in the Himalayas and its publication in the Flora of British India, it has been collected by Henry in the highlands of Central China.

Plate II.—1, plant nat. size ; 2, calyx \times 13 ; 3, corolla \times 15 ; 4, androecium \times 15 ; 5, gynœceum \times 10.

3. *Oxalis variabilis* Jacq. Oxal. 89.

Oxalis breviscapa Eekl. & Zeyh. Enum. 91.

Oxalis grandiflora Jacq. Oxal. 91, t. 54.

Oxalis inscripta E. Mey. in Drège Zwei Pfl. Docum. 103 nomen.

Oxalis laxula Jacq. Oxal. 94, t. 57.

Oxalis reptatrix Jacq. Oxal. 54.

Oxalis rigidula Jacq. Oxal. 96.

Oxalis speciosa Jacq. Oxal. 97, t. 60.

Oxalis suggillata Jacq. Oxal. 98, t. 61.

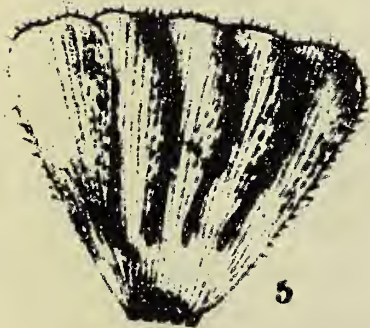
A small bulbous herb almost stemless, 6-8 cm. high with generally 8-12 long-petioled leaves and 2-3 solitary large purple flowers on longer scapes, all rising more or less from above the bulb. Roots many, filiform. Bulb small, globose but acute at both ends, 1.4 cm. long, 9 mm. in diameter, dull black, shining ; scales few. Petioles slender, widened at the base and sheathing, 3-8 cm. long, with sparsely scattered shining hairs. Leaves 3-foliolate, with inconspicuously pulvinate leaflets ; medial leaflet larger than the lateral two, cuneate at the base, subrotund, 1.2 cm. long, 1.4 cm. broad at the broadest part, emarginate faintly, membranous, punctate with dark glands, ciliate on the margin and sparsely hairy on the nerves on the under surface ; secondary nerves obscure, 4-6 pairs, very oblique ; lateral leaflets unequal-sided, also subrotund, not emarginate, .8 cm. long, 1 cm. broad at the broadest part, otherwise exactly like the medial. Scapes 2, slightly longer than the petioles, 4 cm. long, almost glabrous, with two small subulate bracteoles below the middle ; bracteoles 2 mm. long, laxly hairy. Flowers solitary, large, 2.5-3 cm. long, about 2 cm. in diameter. Sepals 5, lanceolate, unequal (two being slightly larger than the rest) 4-6 mm. long, 1.2-1.5 mm. broad, acute, pilose on the upper surface, with elongate dark spots arranged longitudinally. Petals 5, cohering almost to a third of their length into a wide funnel-shaped tube with very short free claws, the upper half purple, the lower very faintly so, covered when in bud with dense shining hairs, less so when open, 2.4-2.9 cm. long. Stamens 10, united at base into a cup ; filaments considerably flattened, membranous, alternately longer and shorter ; longer filaments 5, 8 mm. long, glabrous, with dorsal scale ; shorter filaments 5, 4-5 mm. long anthers glabrous oblong, 2-celled, introrse. Ovary elongate, distinctly 5-lobed, 3 mm. long, narrowed slightly at the apex, quite



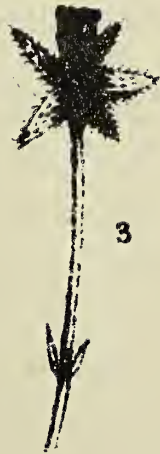
2



1



5



3



6



4



9



8



7

Oxalis variabilis Jacq. var. *rubra*

glabrous but appearing spotted with black elongate markings as in sepals, 5-celled; cells many-ovuled; styles 5, one from the apex of each lobe of the ovary, very short, reflexed, minutely hairy; stigmas 5, laciniiform.

In his "Monographie der Gattung Oxalis," published in Vienna in 1794, Jacquin established this species from a collection from South Africa where the plant is indigenous. Ecklon and Zeyher had it published from the same region at a later date (1835) as *O. breviscapa* Jacq. and it figures in all subsequent Cape lists and Floras. Of the two known forms the Ecklon Zeyher-plant seems to have been the white variety. It was brought to British gardens about the time of its discovery and is now fairly well known as a garden introduction in Europe. The plant needs protection, but both this and the white variety appear to flourish in the open at La Mortola, Italy. Apart from the present records in India the only other references to the plant on the road to naturalisation outside Africa come from Australasia. It is given in the Auckland flora as an escape from gardens and Ewart in his "Alien Plants of Victoria" (1909) says it was first taken note of as naturalised in this part of the world in the Journ. of Pharmacy (1887). He gives it as widely spread but not plentiful. Its establishment in India is therefore of special interest. As a garden plant it has been known here for over 60 years. Voigt gives it in his "Hortus Suburbanus Calcuttensis" in 1845, but the records from the Nilghiri and Pulney Hills, Bourne No. 6115 and Sauliere No. 1165, show that this species, given waste land no longer requires garden protection.

Plate III.—1 and 2, plant nat. size; 3, flower *minus* corolla, nat. size; 4, calyx, nat. size; 5, corolla, nat. size; 6, androecium, nat. size; 7, stamens $\times 7$; 8, gynæceum $\times 10$; 9, gynæceum, nat. size.

4. *Oxalis Pes-caprae* Linn. Sp. Pl. 434.

Oxalis abyssinica Turcz. in Bull. Nat. Mosc. xxxi, (1858) i, 432.

Oxalis anthelmintica A. Rich. Tent. Fl. Abyss. i, 124.

Oxalis biflora Burm. f. Fl. Cap. Prod. 13.

Oxalis caprina Thunb. Diss. Oxal. 13; Prod. Fl. Cap. 82.

Oxalis cernua Thunb. Diss. Oxal. 14.

Oxalis dentata Eckl. & Zeyh, Enum. 82.

Oxalis erecta Savign. in Lam. Encyc. iv, 685.

Oxalis macrophylla Hornem. Hart. Hafn. i, 428.

A small herb with an obconical rootstock, 16-20 cm. high and with 20-25 leaves all rising directly from the bulbous rootstock; petioles slender, terete, glabrous, 6-10 cm. long. Leaves trifoliolate, with

obscurely pulvinate sessile leaflets; the latter obcordate-bilobed, cuneate at base, 8 mm. long, 1.4 mm. broad at the broadest part, membranaceous, glabrous above and somewhat villous underneath; secondary nerves 3-4 pairs, divergent from the base of the midrib, straight. Scapes elongate, longer than the petioles, 16 cm. long, glabrous. Umbels few- or many-flowered, minutely bracteate; bracts few, minute, involucrate, hairy, persistent; pedicels unequal, 1-2.2 cm. long, cernous when young, erect in flower, pilose. Flowers 1.5 cm. long. Sepals 5, lanceolate, 5 mm. long, 1.2 mm. broad, considerably shorter than the petals, acute, membranous, glabrous, with hyaline margins and two contiguous glands towards the apex. Petals 5, golden-yellow, united a little above the base only, shortly clawed, oblong, cuneate at the base, 1.4 cm. long, 2 mm. broad, glabrous. Stamens 10, alternately longer and shorter, united into a tube for a considerable way, then free above; longer filaments 6 mm. long, shorter filaments 4 mm. long; anthers oblong. Ovary ovate, 5 mm. long. Styles 5, very short, hairy; stigmas 5, capitellate.

We first know of this species from Linnaeus in the first edition of his *Species Plantarum* 1753, where he very briefly describes the plant as Aethiopian. It is therefore one of the earliest known members of the genus. Thunberg—in his *Dissertationes on the Oxalidaceæ* 1781—describes and figures it as *Oxalis cernua* from South African material and its frequency and variability in this its native habitat would appear to be responsible for Ecklon and Zeyher in their *Enumeratio Plantarum* including it three times under different names. If Abyssinia be excluded its presence in the tropical African flora is questioned. Oliver (*Flora of Tropical Africa*) enters it but does not seem certain that it is truly indigenous. More than a century ago it was already establishing itself in North Africa and South Europe and is now quite at home along the Mediterranean littoral. Boissier mentions it as in Asia Minor in 1867 but it seems unlikely that it had not already established itself in that region before this period. On its European introduction Muschler remarks that it was brought to Malta in 1806 and probably propagated with the culture of the mandarine. Sickenberger (*Contrib. Flor. d'Egypt*) notes that in Egypt not only the generally distributed microstylous form is found but also at Cairo (Botan. Garden) the macrostylous one. Of American records we have but one, that of Gray in his *Synoptical Flora of North America* where he refers to it as an escape from gardens in Florida but not yet (1895) hardy. An interesting point in its distributional history is its presence in the Bermudas in 1873 where it was collected during the voyage of H.M.S. Challenger Towards the middle of last century *O. Pes-capra* had found its way



Oxalis Pes-caprae *Linn.*

to Australasian gardens. In 1866 we have a record of the plant in the Sydney Botanic Gardens and Moore in his Census of Plants of New South Wales says it was naturalised by 1881. Apparently it took longer to establish itself in Victoria, for its naturalisation was not recorded in that province till 1907. Ewart says "it is a highly obnoxious weed, especially in gardens. It prefers slightly sour soil and, though it likes moisture, tides over drought by the aid of its underground parts. These produce bulbils freely and since the seed is also abundant the plant is difficult to eradicate."

The naturalisation of *O. Pes-caprae* in India now reported for the first time must therefore be considered late. It comes in 1913 in a collection made by Lady Bourne (No. 5336) in the Pulney Hills. In 1914 Sauliere (No. 315) had it among his Madura plants and now Professor Fyson (No. 3328) sends it from the Nilgiris where he mentions its altitudinal range as very restricted 7,000-7,200 ft.

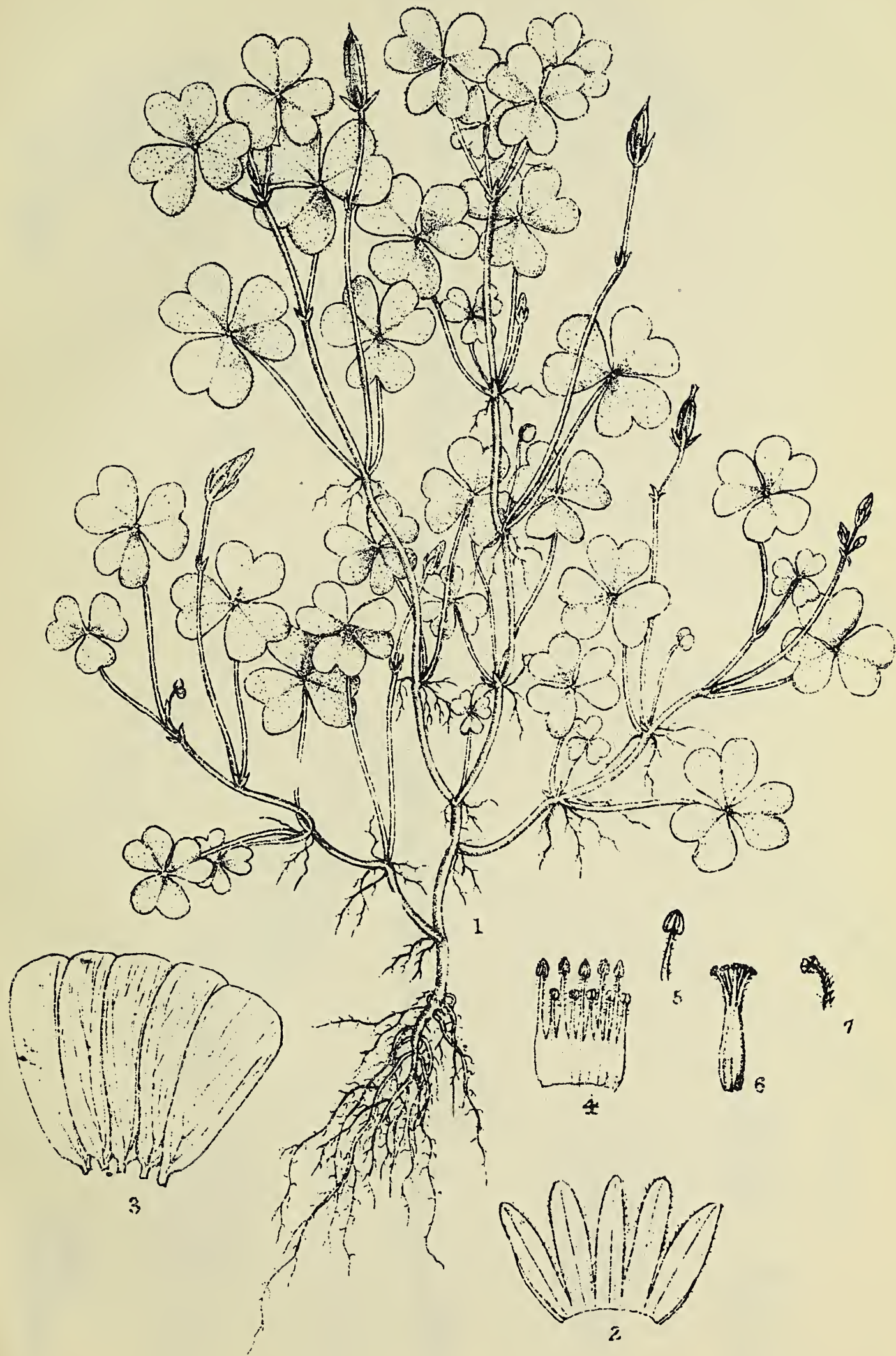
Plate IV.—1, plant, nat. size; 2, calyx and gynæceum $\times 7$; 3, corolla $\times 7$; 4, andrœcium $\times 7$; 5, gynæceum $\times 10$.

5. *Oxalis corniculata* Linn. Sp. Pl. 435.

- Oxalis Acetosella* Blanco Fl. Filip. ed. I. 388.
Oxalis ambigua A. Rich. Bot. Voy. Astrol. i, 296.
Oxalis ambigua Salisb. in Trans. Linn. Soc. ii, (1794) 242.
Oxalis ceratilis E. Mey. in Drege Zwei Pfl. Docum. 72, nomen.
Oxalis cespitosa Rafin. New. Fl. Am. ii, 27.
Oxalis ciliifera A. Cunn. in Ann. Nat. Hist. Ser. I. iii (1839), 316.
Oxalis cognata Steud. in Lehm. Pl. Preiss. i, 160.
Oxalis crassifolia A. Cunn. in Ann. Nat. Hist. Ser. I. iii (1839), 317.
Oxalis diffusa Bor. Fl. Centr. Fr. ed. III. ii, 136.
Oxalis Dillenii Jacq. Oxal. 28.
Oxalis divergens A. Cunn. in Ann. Nat. Hist. Ser. I. iii, (1839), 316.
Oxalis europæa Jord. in F. Schultz Arch. Fl. Fr. et Allem. 309, 311.
Oxalis exilis A. Cunn. in Ann. Nat. Hist. Ser. I. iii (1839), 316.
Oxalis florida Salisb. Prod. 322.
Oxalis fontana Bunge in Mem. Sav. Etr. Peters. ii (1835), 87.
Oxalis glauca Rafin. ex. DC. Prod. i, 692.
Oxalis humistrata Willd. ex. Steud. Nom. ed. II. ii, 240.
Oxalis lacicola A. Cunn. in Ann. Nat. Hist. Ser. I. iii (1839), 316.
Oxalis lupulina H. B. & K. Nov. Gen. et. Sp. v, 243.
Oxalis lutea Steud. Nom. ed. I. 579.
Oxalis Lyoni Pursh. Fl. Am. Sept. i, 322.
Oxalis micrantha Boj. ex. Prog. in Mart. Fl. Bras. xii, II, 493.

- Oxalis microphylla* A. Cunn. ex. Hook. f. Handb. New. Zeal. Fl. 83.
Oxalis microphylla Poir. Encyc. Suppl. iv, 248.
Oxalis minima Steud. Nom. ed. I, 579.
Oxalis monadelphæ Roxb. ex. Wight & Arn. Prod. 142.
Oxalis perennans Haw. Misc. 181.
Oxalis pilosa Nutt. ex. Torr. & Gray. Fl. N. Am. i, 212.
Oxalis pilosiuscula H. B. & K. Nov. Gen. et. Sp. v, 243.
Oxalis Preissiana Steud. in Lehm. Pl. Preiss. i, 160.
Oxalis procumbens Steud. ex. A. Rich. Tent. Fl. Abyss. i, 123.
Oxalis propinqua A. Cunn. in Ann. Nat. Hist. Ser. I. iii (1839), 316.
Oxalis prostrata Haw. Misc. 183.
Oxalis pubescens Stokes Bot. Mat. Med. ii, 558.
Oxalis pumila Nutt. ex. Torr. & Gray. Fl. N. Am. i, 212.
Oxalis pusilla Salisb. Prod. 322.
Oxalis radicata A. Rich. Tent. Fl. Abyss. i, 123.
Oxalis recurva Ell. Sketch. i. 526.
Oxalis repens Thunb. Diss. Oxal. 16; Prod. Fl. Cap. 82.
Oxalis Richardiana Steud. Nom. ed. II, ii, 241.
Oxalis rubens Haw. Misc. 182.
Oxalis stricta Linn. Sp. Pl. 435.
Oxalis tenuicaulis A. Cunn. in Ann. Nat. Hist. Ser. I, iii (1839), 316.
Oxalis tropæoloides Hort. ex. Vilm. Fl. Pl. Terre. ed. I, 584.
Oxalis Urvillei A. Cunn. in Ann. Nat. Hist. Ser. I, ii (1839), 315.
Oxalis villosa Bieb. Fl. Taur. Cauc. i, 355.

A small procumbent trailing or more or less erect herb, variable in size, 6-25 cm. high, annual or perennial. Roots fibrous. Stems rooting at the nodes, pubescent with adpressed hairs. Leaves few, palmately 3-foliolate; petioles 3.5-9 cm. long, very slender, pubescent; leaflets 7 mm. long, 1 cm. broad, subsessile, entire, roundly obovate, base cuneate, apex emarginate, margins ciliate, otherwise glabrous except in young state. Stipules 2, small, oblong, adnate to base of petiole. Flowers axillary, subumbellate, two or more to the peduncle; peduncle solitary, elongated, 9 cm. long, more or less pubescent, deflexed in fruit, with lanceolate hairy bracts below the pedicels; pedicels .4-1 cm. long, pubescent. Sepals 3-5 mm. long, obtuse, persistent, adpressed pubescence on anterior surface, posterior glabrous. Petals 5, yellow, oblong, rounded at the apex, emarginate, about twice the length of the sepals. Stamens 10, united, longer 5 mm. long, shorter 4 mm. long; anthers dehiscing longitudinally. Ovary 2.5 cm. long, linear oblong, sulcate, 5-lobed, 5-locular, short beaked and slightly tomentose. Seeds numerous in each loculus, fixed to the central axis, somewhat pendulous, broadly ovoid, transversely striate, dark brown.



Oxalis corniculata Linn.



Vernonia Fysoni *Calder.*

Oxalis corniculata is the most widely distributed member of the genus. It was established by Linnaeus in the first edition of the *Species Plantarum* and, subsequent to its description there, met the earliest botanical exploration in most parts of the world. Recently B. L. Robinson in the *Journal of Botany*, Vol. XLIV, p. 386, has shown that the Linnean species was composite. Indian representatives of the plant show very considerable variation but we have followed the lead of Hooker's "*Flora Novæ-Zelandiæ*" in not attempting to raise specific differences. Within India it is the best known member of the group and from notes on sheets would appear to be found most frequently at elevations varying between three and six thousand feet.

Plate V.—1, plant, nat. size; 2, calyx $\times 20$; 3, corolla $\times 15$; 4, andrœcium $\times 10$; 5, stamen $\times 20$; 6, gynœccum (young state) $\times 10$; 7, style $\times 20$.

6. *Oxalis pubescens* H. B. & K. Nov. Gen. et Sp. v, 240.

Oxalis lifida Willd. ex Zucc. in Denksch. Akad. Muench. ix, (1823-24), 162.

Oxalis Cummingii Herb. in Bot. Reg. t. 1545.

A small procumbent herb, rarely erect bulbless, with fibrous roots and stem rooting at the nodes. Leaves elongated, stipules oblong, acute, 5 mm. long, hairy, scarious; petioles 3.7-6.4 cm. long, sparsely hairy; leaflets 3, unequal, medial leaflet obcordate, cuneate at the base, 2.2 cm. long, 1.9 cm. broad, very sparsely hairy above, adpressed hairy below, membranaceous. Peduncles very long, solitary, axillary, 15-17 cm. long, arising chiefly towards the apices of the stems. Cymes umbelliform with irregular branches having the flowers arranged in a pseudo-raceme. Bracts minute, subulate, 2-3 mm. long, pubescent. Flowers small, orange-yellow, of the same size as in *O. corniculata*; peduncle hairy, 5-7 mm. long. Sepals 5, lanceolate, acute, 4 mm. long, 1 mm. broad, pubescent, membranaceous, persistent. Petals 5, twice as long as the sepals, 8 mm long, connate in the middle, bases and apices free. Stamens 10, 5 long, 5 short, exactly as in *O. corniculata*, quite glabrous. Ovary sessile, oblong but tapering towards the top, glabrous, 5-lobed and 5-celled; styles 5, erect, capillary, pubescent; stigmas 5, subcapitate and distinctly 10-rayed.

In their great South American expedition 1799-1804 Humboldt and Bonpland collected this with other species of the same genus in the rich oxalidaceous country of Peru. It was not published until some twenty years later when it figured in their *Nova Genera et Species Plantarum* 1821. Progel (1872-77) includes it in his account of the Oxalidaceæ (*Flora Braziliensis*) but cites it as belonging to the Andes and extra-Brazilian.

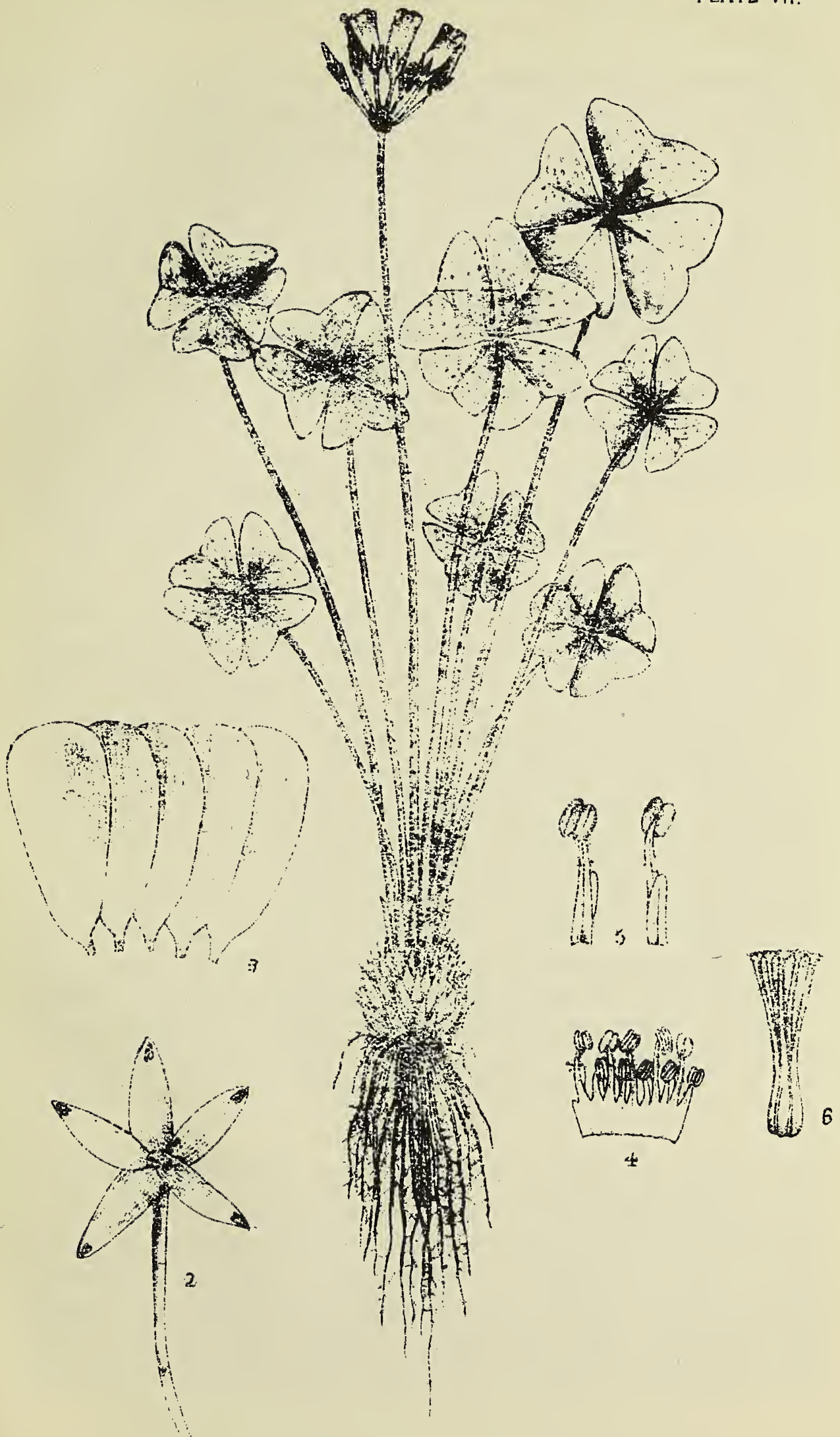
With the exception of the mention by Reiche in his Flora de Chile of *Oxalis Cummingii* Herb. a synonym, the species does not figure in other South American lists. It is therefore native of the Andes and Chile and would appear to be limited to these areas in the American continent. It was introduced to European gardens about 1832 and is probably still found with certain Oxalis fanciers though it is not a common garden plant. The species does not figure in the list and floras of indigenous plants of any of the continents beyond America. Its non-occurrence cannot, however, be accepted without some reserve. The species is only with difficulty distinguished from the worldwide *O. corniculata* and considering the ease with which many species of the genus have succeeded after emigration it may have on occasion been passed as this species. When first the specimen which justifies this note was examined it was reported as *Oxalis corniculata* var? and indeed subsequent examination at Kew still leaves some doubt as to its identity. We base its inclusion among Indian immigrants on the record of Prof. Fyson of Madras who found the plant in the Pulneys. He says he has no doubt that his Nos. 2028, 3327 and 3336 and Lady Bourne's 5351 are all *O. pubescens* and that the species varies with situation. It figures for the first time as an Indian plant in his Flora of the Nilghiri and Pulney Hill tops (p. 56) where it is mentioned as a garden escape.

Plate VI.—1, plant, nat. size; 2, flower $\times 12$; 3, calyx and gynæceum $\times 15$; 4, corolla $\times 40$; 5, andræcium and gynæceum $\times 10$; 6, andræcium $\times 40$; 7, gynæceum $\times 20$; 8, style and stigma $\times 50$.

7. *Oxalis tetraphylla* Cav. Ic. iii, 19, (1794).

Oxalis Deppei Schlecht. ex Hemsl. Biol. Centr. Am. Bot. i, 165.

A herb 25-30 cm. high, stemless, with 6-7 long petiolate quadrifoliate leaves and a solitary longer scape. Tap root short and abruptly tapering, 4-5 cm. long; secondary roots many, fibrous. Bulbs large, flatly globose, 2 cm. long, 2.4 cm. in diameter; scales (really the old bases of the petioles) many, brownish-white, lanceolate, acuminate, distinctly 7-nerved, 2 cm. long, 3 mm. broad, outer larger, inner smaller and narrower; margins of scales broadly scarious, densely ferruginous-ciliate in the upper half. Leaves long, quadrifoliolate, with almost sessile leaflets; pulvinus small, bristly; petioles 19-23 cm. long, 2 mm. in diameter, flattened; leaflets equal, deltoid approaching to triangular, sub-bilobed, 2.5 cm. long, 3.6 cm. broad, membranaceous, somewhat glaucous and punctate on the under-surface, marked by a V-shaped band of darker colour a little below the middle, adpressed hairy on the nerves below, otherwise perfectly glabrous; secondary nerves 4-6 pairs, divaricate from the midrib at the base,



Oxalis tetraphylla Cav.

straight but arching in the end towards it, prominent on the undersurface. Scape solitary, terete, longer than the petioles, 25 cm. long, puberulous. Umbels 6-10-flowered, bracteate; bracts many, involucrate, lanceolate acute, scarious, 2 mm. long, 9 mm. broad, persistent; pedicels subequal, slender 1.5-2 cm. long. Flowers 1.4 cm. long. Sepals 5, ovate, acute, 5 mm. long, 2 mm. broad, 5-7-nerved, puberulous, herbaceous, with two contiguous linear glands at the apex, persistent. Petals 5, mauve, united to a fourth of their length from below excepting the very short free claws, cuneate at the base and rounded at the apex, 1.2 cm. long, 3 mm. broad, glabrous. Stamens 10, alternately longer and shorter, united below into a shallow membranous cup; longer filaments densely hairy, 2 mm. long very shortly appendaged; shorter filaments 1 mm. long, glabrous; anthers oblong. Ovary narrow, obscurely 5-angled, 2 mm. long, glabrous; styles 5, erect, three times as long as the ovary, distinct, with short bristles densely arranged; stigmas 5, peltate.

Alike with *O. corymbosa* and *O. latifolia* herein dealt with this is a native of America (Mexico). We find it first mentioned in Cavanilles "Icones et Descriptiones" published in 1794, a time at which much exploration was being undertaken in the American continent. Cavanilles got it to flower in Madrid, the description and figures he gives being probably derived from European productions of the plant. His figure shows both the three and four partite nature of the leaves and is remarkably accurate as indeed most of his Icones are. If Progel is right in excluding it from the indigenous flora of Brazil it would appear to be endemic in the region from which it was first known. The plant is now fairly common in gardens throughout Europe and the East and would appear to have become recently naturalised in Victoria, Australia. The present records—Bourne No. 5982, Nilghiris, described as from waste lands; Sauliere No. 704 from the Pulneys and Burkill and Banerjee No. 59 from Shillong—are the first evidences of the naturalised state in India and among the first for naturalisation outside America.

Plate VII.—1, plant, nat. size; 2, calyx \times 10; 3, corolla \times 10; 4, andrœcium \times 15; 5, stamens \times 40; 6, gynœceum \times 10.

8. *Oxalis latifolia* H. B. & K. Nov. Gen. et Sp. v, 237 and 467.

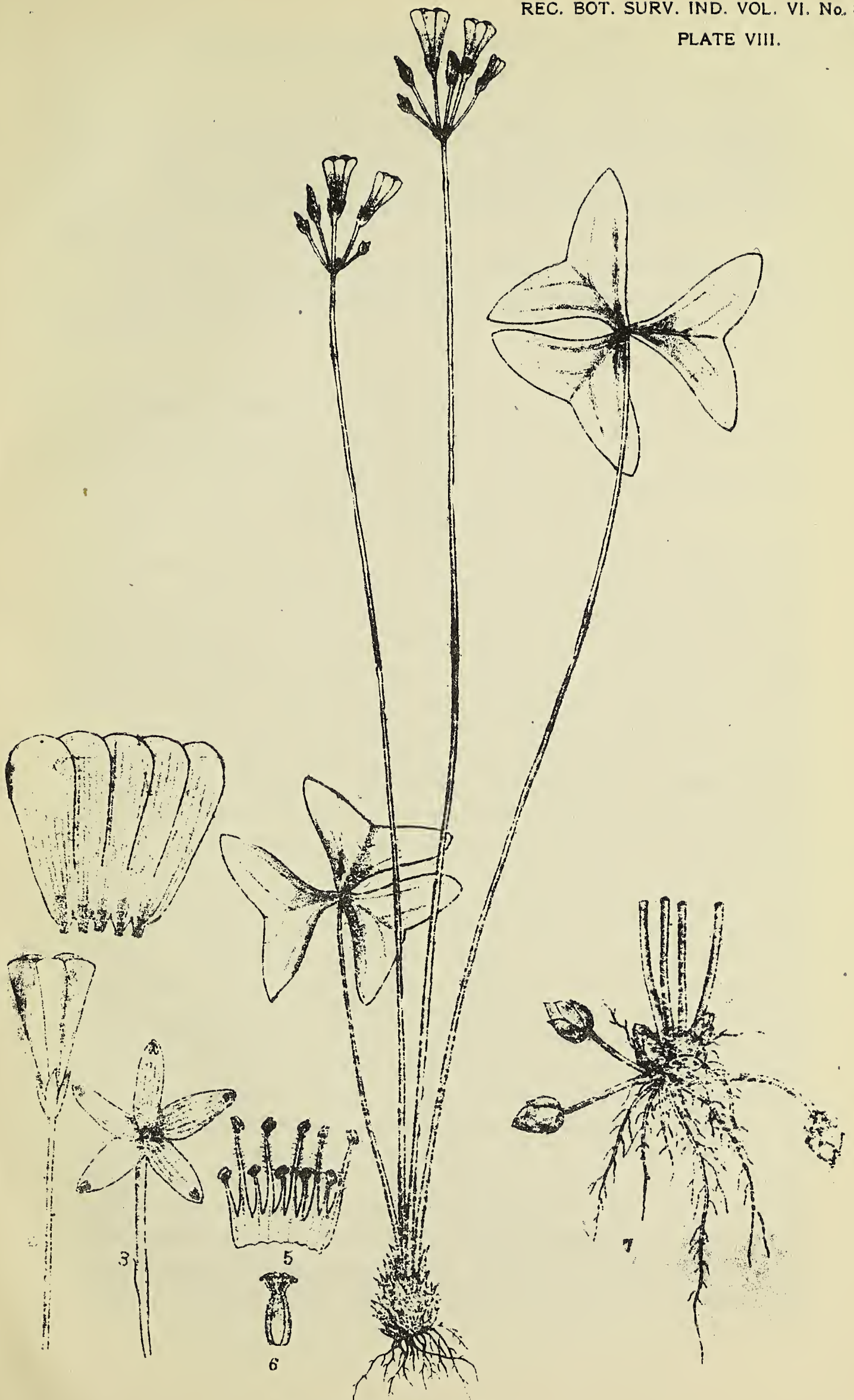
A herb, 15-25 cm. high, stemless, with 2-6 long-petioled radical ternate leaves and 2-3 scapes, all rising from a solitary bulb which sends forth 3-4 offsets terminating in smaller bulbs. Roots few, filiform. Bulb ovate, 1.2 cm. long, 9 mm. in diameter, base fibrous; outer scales (really the old bases of the petioles) ovate-oblong, acute, imbricate, longitudinally 3-5-ribbed on their outer surface, membranaceous, dirty-brown,

glabrous; inner scales fleshy, light-brown. Petioles slender, 13-22 cm. long, puberulous. Leaves trifoliolate with almost sessile leaflets; leaflets equal, broadly deltoid, sub-bilobed with lobes divergent and acute, broadly but distinctly cuneate at the base, 1.4 cm. long, 3 cm. broad at the broadest part, thin, membranaceous; margin undulate; secondary nerves 2 pairs, divaricate from the midrib at the base, straight but arching in the end towards it. Scapes 1 or 2, filiform, puberulous, 12-25 cm. long; umbels 5-6-flowered, bracteate; bracts minute, involucrate, less than 1 mm. in length, persistent. Flower pedicelled, 8-9 mm. long; pedicels slender, somewhat unequal, .6-1.2 cm. long, puberulous. Sepals 5, elliptic-oblong, equal, 4 mm. long, 1.5 mm. broad, glabrous, distinctly 5-nerved, persistent, biglandular towards the apex; glands narrow, contiguous, not divergent. Petals 5, violet, united up to a fourth of their length (corolla infundibuliform), with very short free claws and rounded apices, 1 cm. long. Stamens 10, alternately longer and shorter, united below into a membranous cup; filaments with very short ascending bristles, longer 4 mm. long, shorter 2 mm. long; anthers oblong. Ovary elongate, almost 5-lobed, 2.5 mm. long, glabrous; styles 5, distinct, glabrous, bent outwards; stigmas 5, discoid, with wavy margins. Ovules 4 in each cell, elliptic.

This species belongs to the indigenous flora of Mexico, from which country it was first introduced to science by Humboldt Bonpland and Kunth in their *Nova Genera et Species Plantarum* 1821-22. Progel in the *Flora Braziliensis* (1872) claims its presence in the chief American home of *Oxalis* but mentions its origin as extra-Brazilian. Reiche (*Flore de Chile*) does not know it from that country but it would appear to be present to some extent in the continent north of Mexico (Rose *U. S. Nat. Herb. Contrib.* Vol. X. 1906 p. 113). The *O. latifolia* described by Trelease from several of the more northern states has, however, now been referred to *O. divergens* var. *amplifolia*. Although quite a showy *Oxalis* it does not appear to be generally cultivated in greenhouses in Europe. Like nearly all the American species it is absent from the Cape flora. Apart from European garden records the only mention we have of *O. latifolia* outside America appears in a Java horticultural list dated 1866 but this throws no light on how the plant thrives at Buitenzorg (Java) or on the question of its possible naturalisation there. An examination of herbarium material brings to light the interesting fact that this species has begun to wander from gardens in several localities throughout India. Nearly fifty years ago Kurz noted and collected it as a weed at Sibpur. Schlich had it from Simla, King in 1869 from Mussoorie and Saxton No. 949 quite recently from the same locality. More recently it has been



Oxalis pubescens H. B. & K.



Oxalis latifolia H. B. & A.

reported from Kumaon, Gill No. 5. Burkill (No. 215) some years ago came across it in Shillong, Assam, but its presence due to misidentification of the specimen was not at the time noted. In Southern India it is reported from the Pulney Hills in 1913 by Lady Bourne (No. 5983).

Plate VIII.—1, plant, nat. size; 2, flower $\times 4$; 3, calyx $\times 16$; 4, corolla $\times 14$; 5, andrœcium $\times 18$; 6, gynœceum $\times 20$; 7, bulbils, nat. size.

9. *Oxalis corymbosa* DC. Pd. i, 696.

Oxalis bipunctata R. Grah. in Edin. Nat. Phil. Journ. (April-June 1827) 176; Hook. Bot. Mag. t. 2781.

Oxalis Martiana Zucc. in Denksch. Akad. Muench ix, (1823-24) 144.

Oxalis urbica A. St. Hil. Fl. Bras. Mer. i, 125.

A perennial herb with scaly bulb producing many side bulbils, 23-25 cm. high, with the petioles arising directly from the bulb. Bulb globose, acute at the top, 1 cm. long, 1.4 cm. in diameter, consisting of numerous outer dry thin papery brownish scales (really the old leaf-bases) 3-ribbed above the middle, and of about 12-15 inner fleshy scales which are light brown in colour. Leaves 9-12, basilar, stipulate, trifoliolate; petioles very thin, flexuous, the bases considerably widened forming a sort of involucre to the bulb, 13-24 cm. long, 1 mm. broad above, 3 mm. broad at the base, very sparsely hairy; leaflets equal, broadly obovate with a narrow sinus, base cuneate, 1.2-1.8 cm. long, 1.8-2.5 cm. broad, membranaceous, adpressed-hairy on both surfaces, punctate with black glands; secondary nerves 2-3 pairs, obscure near the margin; pulvini of the leaflets small, very short, pilose. Scapes 2-3 very long and flexuous, 16-21 cm. long, longer than the petioles, sparsely hairy. Cymes umbelliform, cernous, 6-7-flowered, bracteate; bracts very minute, membranaceous, pilose, 1 mm. long, persistent. Flowers 1.4 cm. long, pedicellate; pedicels unequal, slender, flexuose, sparsely hairy, .4-2 cm. long. Sepals 5, distinct, elliptic, erect, 5-6 mm. long, acute, herbaceous, sparsely hairy on the upper surface, with two small orange-coloured divergent glands at the apex; glands .4 mm. long. Petals 5, violet, cuneate-oblique, 1.4 cm. long, 4 mm. broad in the middle, very slightly hairy on the outer surface. Stamens 10, filaments united for about a third of the distance from the base into a short angular 1.5 mm. long tube, alternately longer and shorter; longer free filaments 3 mm. long, narrowed considerably upwards, quite erect, exceeding the styles, hairy; shorter free filaments 1.5 mm. long, flattened, glabrous; anthers yellow, short, oblong. Ovary obtusely 5-angled, oblong, quite glabrous, 3 mm. long;

styles 5, distinct from the base, erecto-patent, with ascending hairs; stigmas 5, spreading, umbilicate.

About 1824 A. De Candolle in the first volume of the *Prodromus* established from material collected in the islands of Bourbon and Mauritius the species which forms the subject of this note. His description was, like those of most of his species published at the time, so fragmentary as to be almost worthless in a genus the species of which differ from one another in minor characters only.

Before the first volume of the *Prodromus* appeared A. De Saint Hilaire had been exploring Brazil and from the region of Sebastianopolim had collected an *Oxalis* to which he gave in his "*Flora Brazilæ Meridionalis*" specific rank under the name of *O. urbica*. The species was published in 1824 and though the author seems to have known that the same plant had already been found in Mauritius he must have been ignorant of its previous description by De Candolle. St. Hilaire's diagnosis, however, is much more complete than De Candolle's and he is aware that the plant was likely to be confused with *O. violacea* Linn.

About the same time Zuccarini in the *Denk. Akad. Muench.* IX, 114 gives the same plant specific rank as *O. Martiana* and in the *Nachtrag* to his *Monograph* (1831) as regards locality remarks "Crescit locis apricis, ad meros, margines viarum per totam Brasiliam australiorem (de Martius, St. Hilaire) nec non in insula Franciæ (St. Hil.) Floret Octobri, Novembri." At a later date (1877) Progel in the *Flora Braziliensis* refers to it under the same name, giving as its localities Rio de Janeiro, Jamaica and Ascension. While first reported therefore from Mauritius and Bourbon the plant is no doubt native of the South American Continent. Indeed Baker (*Flora of Mauritius and Seychelles*) refuses to recognise it as indigenous to the island group from which it was introduced to science and his views have since received support in the notable absence of the species in the tropical African lists not to mention the much richer Oxalidaceous Cape Flora. We are unable to get at any data relative to the exact collection on which De Candolle based his meagre description but it is not unlikely that Sieber originally gathered the plant and the number of non-indigenous species found in that traveller's collections goes to show that he drew his plants to no small extent from gardens and cultivated ground. There is no doubt, however, that the plant has now thoroughly established itself in the Mauritius group.

An analysis of the distribution of this *Oxalis* proves that the plant is far from geographically stable. With the exception of *O. corniculata* and possibly *O. Pes-capræ* it is now more widely distributed than all the other members of the genus.

In the northern half of the new world it is present as an escape from gardens, in some of the Southern States (Florida).

From the second great home of the genus (S. Africa) it is as already noted absent, nor does it appear in the central tropical or northern semi-tropical African lists. In Europe it is present as an introduced garden plant only, unless we accept Ascherson and Graebner's record of it as wild near Potsdam (Flora des Nordostdeutschen Flachlandes). We have records of it in British gardens as early as 1828, but in Europe it is not likely ever to become hardy unless in the warmer districts of the Mediterranean littoral. The date of its advent in Australia is not known with any exactness. It was probably first introduced as a garden plant and its attempts at naturalisation not noted. Before the end of last century its presence in gardens and cultivated ground in this part of the world was already a serious nuisance and it still figures as one of the most difficult weeds to eradicate in Queensland. An interesting phase of its distribution is its presence in Hawaii. Before 1867 there was no record of it for the island, but Mann in his list of that date suggests that it was probably recently introduced and had succeeded in establishing itself. It is very questionable if *O. corniculata*, the only other representative of the genus here, is indigenous, so that the presence of the first species along with the best coloniser of the group is worthy of note and all the more worthy when the high endemic element in the Hawaiian Flora is considered. From Hawaii to Eastern China is no big step. So far as we can find Henry does not include it in his Chinese lists nor would it appear to have become naturalised in Formosa or the Philippines. It was not enumerated in Hinds 1841 collection from Hong Kong—one of the first to reach Kew—but Bentham mentions it in 1861 as "now established as an escape from gardens in the island." Its absence from the other islands and the Asiatic mainland of these latitudes is therefore not likely to be of long duration.

The immediate cause of this discussion of the distribution of *O. corymbosa* is its now noted presence as a well established plant in India. It was cultivated in the Royal Botanic Garden, Calcutta, in 1903, though of how it arrived there is no record and the plant did not again come to the notice of the botanical staff until 1913 when it was sent by the Rev. A. Sauliere from the Pulney Hills and published in his list as No. 525 worked out at the Herbarium. More recent collections Fyson from (No. 72 Yercaud, South India), C. W. Cousins (Mungpoo, E. Himalayas) and H. G. Carter (No. 102 Dibrugarh, Assam) have also come to hand. Cousins refers to it simply as in the neighbourhood of gardens, but Carter reports it as having become one of the worst pests of gardens and cultivated ground in N. Assam, the innumerable

side bulbs produced rendering the plant extremely difficult of eradication. There has been a considerable amount of botanical activity in Assam and it seems strange that the plant should be reported only after it had so firmly established itself. We conclude that it has been introduced at a recent date that it has found climatic and edaphic conditions favourable and that it has already established itself with alarming rapidity.

Plate IX.—1, plant, nat. size ; 2, flower $\times 3$; 3, calyx $\times 8$; 4, petal $\times 8$; 5, andrœcium $\times 12$; 6, stamen $\times 40$; 7, gynœceum $\times 4$; 8, style $\times 40$.

INTRA-INDIAN DISTRIBUTION OF SPECIES.

Oxalis Acetosella Linn.

East Himalaya : Sikkim, Changu, 11,500 ft. *W. W. Smith*, No. 4249 ; Sundookphoo, 1,200 ft. *King's Collector* ; Kaljorinie, 10,000 ft. *King's Collector* ; Chumbi, *Dungboo*, No. 4290 ; Bew-ta-ny, *Dungboo*, No. 235.

A purely Himalayan species in India.

Oxalis Griffithii Edgew. & Hook. f.

East Himalaya—Sikkim, 11,000 ft. *Gammie* ! Lachung, 9,000 ft. *Gammie*, No. 715 ! Chumbi, 8-9,000 ft. *Searight*, No. 49 ! Sikkim, Tongloo, 9,500 ft. *Lister* Nos. 5010 and 5011 and *Watt* No. 7014 ! Sikkim, 8-11,000 ft. *J. D. Hooker* ! Sikkim without definite locality, *Kurz* ! Sikkim, Singalcelah, 8,500-9,000 ft. *Kurz* ! Chundragiri 11,000 ft. without collector's name !

Assam—Manipur, Chingsow, 7-8,000 ft. *Watt*, No. 6442 ! Khasia Hills Maophlang, 6,000 ft. *C. B. Clarke*, No. 38277A !

Oxalis variabilis Jacq var. *rubra*

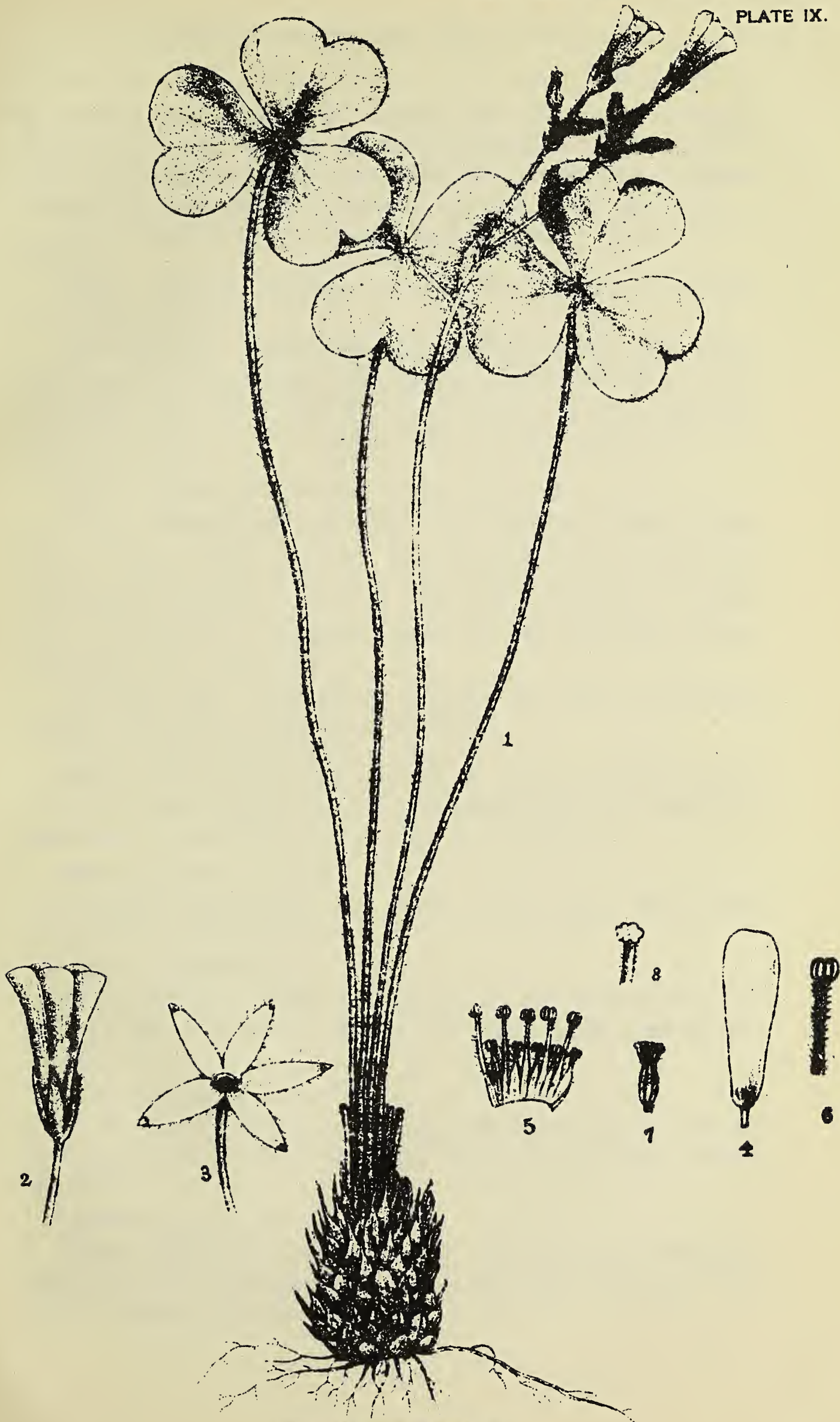
Peninsular India : Nilgiri Hills, *Bourne*, No. 6115 ! Pulney Hills *Saulière*, No. 1165 !

Oxalis Pes-capræ Linn.

Peninsular India : Nilgiri Hills, Ootacamund, *Fyson*, No. 3328 ! Pulney Hills, *Bourne*, No. 5336 ! Madura, *Saulière*, No. 315 !

Oxalis corniculata Linn.

North West Himalaya : Baluchistan, Wamdangi, 4,000 ft. *Lace*, No. 3480 ! Hazara, *Stewart*, No. 14 ! Campbellpore, *Stewart*, No. 63 ! Kurrum Valley, *Aitchieson*, No. 909 ! Peshawar, *Stewart*, No. 74 ! Kashmir, Gilgit, 5,000 ft. *Giles*, No. 249 ! Kulu 4-6,000 ft. *Stoliczka* ! Chamba, 3-10,000 ft. *Stoliczka* ! Simla, Elysium Hill, 7,000 ft. *Gamble*,



Oxalis corymbosa DC.

No. 4174B ! Sirmur, *Webb*, No. 4347 F (Wallichian sheet)!, Pangu, *Stoliczka* ! Kumaon, *Strachey and Winterbottom*, 3-7,000 ft. Nos. 1 & 185 ! Kumaon, *Vicary*, No. 164 ! Vatar, *Brandis*, No. 3635 ! Nachar, *Stoliczka* ! Sirmoor, *Vicary* ! Jambatai, 6,000 ft. *Harris*, No. 15982.

North West Himalaya without definite locality, 1-6,000 ft. *T Thomson* :

Lahore, *Stewart* !, Amritsar *Anderson* No. 54 !, *Prain* Punjab, *C. B. Clarke* No. 95 !.

East Himalaya : Sikkim, Zemu valley, *Smith & Cave*, No. 1023 ! Dumsong, *Lister* ! Kaydong ? (Khendong), *King's Coll*, No. 7000 ! Darjeeling, *Gage* ! Darjeeling, 7,000 ft. *Gamble* No. 10323 ! Kaljorinie, 10,000 ft. *King's Coll.* ! Chumbi, Torsa Valley, *Searight*, No. 70 ! Harmatee, *Lister* !

Assam : Duphla Hills, 3,000 ft. *Lister*, No. 2399 !

Burma : Bhamo, *Toppin*, No. 3071 ! *T. Anderson* ! Upper Burma, Pegu (Pegon), 1-2,000 ft. *Kurz*, No. 36 ! Khoni, *Prazer* ! Maymyo Plateau, *Lace*, No. 3190 ! Southern Shan States, Taungyi and Monay, *Abdul Khatil* ! Martaban, *Kurz*, No. 36 ! Ponkti (Paungdeh) *Wallich*, 4347 ! Lower Burma, Tenasserim, *Gallatly*, No. 887 ! Poonshee, Yunnan Expedition, *D. J. Anderson* !

Peninsular India ; Herb Heyne, *Wallich* No. 4347 D ! Godavari, Rampa, Gunjugudem, *Ramaswami*, No. 2186 !

Central India ; Bundelkhand, *Vicary* !

Bengal ; *Kurz* ! Calcutta Bot. Gardens, *Wallich*, No. 43471 ! Howrah *Anderson* ! Lower Bengal, *Hooker* ! Parasnath, *Clarke*, No. 34716 A ! Pharambari (?), *Buch-Hamilton Wallich*, No. 4347 E !

***Oxalis pubescens* H. B. K.**

Peninsular India; Nilgiri and Pulney Hills, *Fyson*, Nos. 2028 ! 3327 ! 3326 ! *Bourne*, No. 5351 !

***Oxalis tetraphylla* Cav.**

Assam : Shillong, *Burkill & Banerjee*, No. 59 ! Peninsular India ! Nilgiri Hills, Ootacamund, *Bourne*, No. 5982 ! Pulney Hills, *Sauliere* No. 704 !

***Oxalis latifolia* H. B. K.**

N. W. Himalayas : Kumaon, Douglas Dale, *Gill*, No. 5 ! Assam ; Shillong, *Burkill*, No. 215 ! Peninsular India ; Pulney Hills, *Bourne*, No. 5983 !

***Oxalis corymbosa* DC.**

Eastern Himalaya : Mungpoo, *Cousins*, No. 69 ! Assam ; Dibrugarh, *Carter*, No. 102 ! Peninsular India ; Shevaroy Hills, Yercaud, *Fyson*, No. 72 ! Pulney Hills, *Sauliere*, No. 525 !

A NEW INDIAN VERNONIA

BY

C. C. CALDER.

Vernonia Fysoni Calder, sp. nov.

Affinis *V. Wightianae* Arn., et *V. comorinensi* W. W. Smith, a quibus phyllariis glabratis obtusiusculis, achaeniis glandulosis 10-costatis, serie pappi exteriori obsoleta, recedit.

Suffrutex circiter 3 m. altus. *Caulis* subteres, erectus, superne ramosus, striatus, basi lignosus, albo-tomentosus. *Folia* alterna, elliptico-lanceolata, apice acuta, ad basin in petiolum sensim attenuata, 7—9 cm. longa, 2.5—3.3 cm. lata, margine superne serrata, inferne serrata vel integra, supra glabra, atro-viridia (in planta sicca), nervis lateralibus circiter 9-jugis cum nervulis supra impressis subtus prominentibus, plus minusve parallelis, petiolata, petiolo 1 cm. longo, canaliculato. *Inflorescentia* subcorymbosa, terminalis vel in axillis foliorum superiorum. *Capitula* 8-40, campanulata, 1 cm. diametro, 15-flora. *Phyllaria* circiter 4-seriata, ab extra conspicue magnitudine increscentia, extrema valde minuta, exteriora ovata, interiora oblongo-lanceolata, omnia plus minus glabra, apiculata, et apicem versus purpureo-colorata. *Corolla* 8 mm. longa, lobis linearibus circiter 3 mm. longis. *Stamina* fere 4.5 mm. longa, filamenta 1.5 mm. longa, antherae 3 mm. longae. *Receptaculum* convexum, in fructu circiter 1.5 mm. diametro, conspicue reticulatum. *Achaenia* 10-costata, basi angustata, 2.8 mm. longa, .8 mm. lata, inter costas glandulosa. *Pappus* erectus, plus minus albus, circiter 6 mm longus, barbulis minutis praeditus, sine serie exterior e.

Kodaikanal, Pulney Hills in Madura District, South India *Fyson*. No. 4095! Glen Falls shola, Pulney Hills, *Bourne* No. 1106!

An erect undershrub of subscandent habit 2-3 m. high. Stem somewhat angled and lignified at the base, striate and markedly tomentose above, 1 cm. thick in the middle, giving rise at the base and more markedly in the upper region to axillary branches and above to terminal or axillary groups of more or less corymbose capitula. Leaves alternate in a pentastichous arrangement, 9-12 cm. long, 2.5—3.3 cm. broad, lanceolate, acute at apex, acuminate at base, faintly serrate on the upper margin but tending to become entire below; upper surface glabrous, dark-green to brown, with 8-9 pairs of impressed scarcely excurrent primary nerves and distinct more or less parallel secondary nerves; lower

surface white, densely covered with a short woolly tomentum and nerve traces prominent. Petiole 1 cm. long, tomentose, canaliculate above. Corymbs 3-6 cm. broad, 3-5 cm. high, with 8-40 capitula. Pedicels 4-1.5 cm. long, strongly tomentose, terete and slightly thickened towards the capitula. Capitula campanulate, 8 mm. high, 5 mm. in diameter, about 15-flowered, light-rose coloured. Involucral bracts about 4-seriate, markedly increasing in size towards the flowers, the outer ovate apiculate, 1 mm. long, 5 mm. broad, only very faintly and sparsely tomentose on the upper margins, the inner tending to linear, acute, apiculate, 5 mm. long, 1.5 mm. broad, glabrous, all purple coloured towards the tip. Receptacle convex, 1.5 mm. in diameter, plainly reticulate. Corolla glabrous, about 8 mm long, of which the linear lobes 3 mm. Lobes somewhat thickened or folded on the margins with a blunt brownish tip (in dry specimen). Stamens epipetalous on the middle of the corolla and united throughout the whole length of their anthers; filaments short and slender, 1.5 mm. long; anthers twice as long as the filaments. Style slender, as long as the corolla, glabrous throughout $\frac{3}{4}$ of its length, slightly thickened and papillose at the top and diverging into two linear to awl-shaped, arching, stigmatic, papillate lobes. Achaenia ten-ribbed with small amber-coloured glands between the ribs, glabrous, narrowly obovoid but truncate at both ends, 2.8 mm. long, .8 mm. broad at the broadest part. Pappus uniseriate, plentiful, ascending to erect, 6 mm. long, minutely barbate throughout its whole length.

Making a possible exception of the grasses more attention has been paid by systematists to the composites than to any other group of flowering plants, and within the family the section Vernoniae has been subject to that investigation which their world-wide distribution would lead one to infer the group deserved. Nevertheless material still frequently accrues, extending the formerly existing limits of the group or filling up gaps which left it disjointed. At best it is little better than a heterogenous collection of species, the sectional sub-divisions being based on characters at once vague, variable and unreliable. The dependence of individual workers, therefore, on the general facies of a specimen is less a taxonomic error than a practical necessity. Following Clarke (Comp. Indicae, pp. 6, 7) the plant under description would find a place in the section *Gymnanthemum*, would have, on the one hand, the advantage of a place near the well known *V. indica* Clarke, with which it has well marked affinities, on the other, the disadvantage of proximity to *V. saligna* DC, *V. divergens* Bth. etc., with which, in the writer's opinion, it has little connection. Hooker's arrangement (F. B. I. Vol. III p. 229) better suits our plant. It would then come near *V. Wightiana* in the group that author distinguishes by the presence of a dense white or buff woolly tomentum.

Geographical considerations further support the advisability of so placing *V. Fysoni* for the few species defined as above all hail from Peninsular India or Ceylon.

C. B. Clarke (Comp. Indicae) recognised some 41 Vernonias as indigenous to British India. When Hooker revised the genus for the F. B. I. three only were added to the number. Gradual additions, nearly all from Southern India have brought the number to over 50 at present with some material in the Calcutta herbarium still unsatisfactorily placed

and possibly new. The present species was collected by Prof. Fyson at Kodaikanal in thin jungle without high trees where however the lower vegetation was fairly thick, near water and accompanied by *Vaccinium Leschenaultii* Wight, *Rhodomyrtus tomentosa* Wight, *Andrographis* and *Bidens* spp. at an elevation of 7,200 ft. It was previously found by Sir Alfred Bourne near the Glen Falls shola in the Pulney Hills in 1898 and so far as is known these are the only records of the plant. Prof. Fyson suggests that as few collectors are about at the time of year the plant flowers it may be commoner than collections would indicate.

The plate has been prepared from Prof. Fyson's material and from a painting kindly lent by Mrs. Fyson.

Plate X.—1, inflorescence $\times 5$; 2, flower $\times 8$; 3, corolla with stamens $\times 18$; 4, style $\times 20$; 5, stamens $\times 18$; 6, achaenium with pappus $\times 28$; 7, achaenium $\times 75$.

ON TRICHODESMA INDICUM R. Br. and TRICHODESMA AMPLEXICAULE Auctt.

BY

L. J. SEDGWICK, F.I.S., I.C.S.

The question whether there are here two species or not has long been a doubtful point. Clarke, who wrote the account of the *Boragineæ* in the Flora of British India, regarded *T. amplexicaule* Roth as distinct from *T. indicum* R. Br., but discriminated the two species chiefly by the leaves. Cooke, in his Flora of the Bombay Presidency gives *T. amplexicaule* as a variety of *T. indicum*, but again bases the distinction upon the shape and vestiture of the leaves, and remarks of the former "hardly worthy of even varietal rank. I have often tried to find even one reliable character by which to distinguish between *T. indicum* and *T. amplexicaule* but have failed to do so. The amount of hairiness of the lower side of the leaves cannot be relied upon as a constant character. I have seen specimens authoritatively recognized as *T. amplexicaule* which were more densely villous than many of the other species."

A study of these plants during and after the monsoon of 1917 has convinced me that there are certainly two very distinct species, differing always and essentially in the morphology of the androecium, and the shape of the corolla and calyx, and usually in the characteristics of the leaves as well as in habit, habitat and season. I give below in two parallel columns the descriptions of the two species, the more important points being given in italics.

T. INDICUM Br.

Normal Habit

A low, woody herb, with a long taproot and strong woody stem, 4—10 inches high, copiously and diffusely branched from the base.

Normal Leaves

$\frac{1}{2}$ —1 × $\frac{1}{8}$ — $\frac{1}{4}$ in., sessile and sub-amplexicaul, margins strongly revolute, villous (especially beneath) and with a few rougher hairs.

Pedicels

Up to 1 inch.

T. AMPLEXICAULE DC. (not of Roth).

Synonymy will be discussed below.

Normal Habit

An erect herb, 1—2 feet high, branched (not copiously) above.

Normal Leaves

1—1 $\frac{1}{2}$ × $\frac{1}{2}$ —1 in., sessile and sub-amplexicaul, margins not revolute, scabrid (especially beneath) with distant stiff hairs arising from prominent bulbous bases.

Pedicels

Up to 2 inches.

Calyx

Subconiform in outline. *Cordate bases acute, narrow*, often spreading. Lobes longer than the sinus between the corolla lobes.

Corolla

Regular, of five equal segments, pinkish lilac, with ten prominent reddish marks, two at the base of each lobe. Caudæ of the lobes usually conspicuous, twisted. Limb always completely patent.

Stamens

Combined into a long pointed cone, remaining united when the corolla is split open, and impossible to separate even by force, always far exerted beyond the patent limb. Connectives very much produced into very fine flat ligules, which are twisted together at the tip. Back of the connectives densely covered with yellowish-white felted tomentum composed of short, crisped opaque hairs, but no straight hairs. Glabrous tips of the connective naked.

Aestivation

Contorted, dextrorse. Incipient corolla lobes flat, very acute, twisted together with the tips of the andrœcium.

Fruit

$\frac{1}{2}$ inch broad, oblong in outline.

Normal Habitat

Normally a denizen of the driest and stoniest fields and uplands,—a typical member of the xerophytic Deccan flora.

Season

Almost the whole year; conspicuous at the height of the dry season.

Calyx

Ovate in outline. *Cordate bases broad, obliquely truncate* below, never spreading. Lobes shorter than the sinus between the corolla lobes.

Corolla

Irregular, the three dorsal segments smaller than the two ventral, pinkish lilac, with two prominent reddish-brown marks, representing a glandular thickening of the corolla, at the base of the three dorsal lobes. Caudæ of the lobes minute or absent. Limb not patent, always suberect.

Stamens

Merely connivent, but not combined, separating at once when the corolla is split open, always included within the corolla throat. Connectives produced into short ligules, which may be very slightly bent at the tip but not twisted together. Back of the connectives densely penicillate with straight, erect, pure white, opaque hairs, which equal or exceed the tips of the connectives.

Aestivation

Contorted, dextrorse. Incipient corolla lobes broad, obtuse, plicate.

Fruit

$\frac{1}{2}$ inch broad, ovoid in outline.

Normal Habitat

Normally a denizen of rich (but not marshy) ground.

Season

Monsoon; a typical short-lived monsoon annual.

The above are descriptions of the normal habit of the two plants. There is, however, a form of *T. indicum*, which, while showing the conical felted andrœcium of that species, shows also the typical leaves of *T. amplexicaule*, distant, large, with no villosity, but with copious stiff hairs from white tubercles, and the lower leaves narrowed into a short petiole.

The specimens of this form, so far as the material in the Herbarium of the Agricultural College, Poona, is concerned, are mainly from the wet tract of the Konkan. It may therefore be purely a climatic variety. On the other hand it may be a hybrid between the two species. This is what I take to be the *T. amplexicaule* of Roth, as will be explained below, and should for the present be regarded as a variety of *T. indicum*.

As regards synonymy there is no question about Robert Brown's plant. Brown in his *Prodromus Floræ Novæ Hollandiæ* p. 496 merely transferred Linnaeus' *Borrago indica* to his own new genus *Trichodesma*. The description of Brown's *T. indicum* in DeCandolle's *Prodromus*, Part X, p. 172, is quite clearly the description of the plant described in the left hand of the two parallel columns above. In the Sub-sectional heading DeCandolle says—" *Antheræ exsertæ, apice elongato contortæ.*"

When we come, however, to Roth's description of his *T. amplexicaule* in his *Nov. Plant. Sp.* p. 104, we find that it is not the description of the plant of the right hand of the two parallel columns, but is the description of the form of *T. indicum* which I have referred to as VAR. *amplexicaule*, since Roth describes the andrœcium thus:—" *Antheræ erectæ, subulatæ, in fasciculum pyramidalem apice spiralem conniventes.*" This cannot possibly refer to anything but *T. indicum*, while the rest of the description is of the leaves and habit of my VAR. *amplexicaule*.

On the other hand the description of *T. amplexicaule* in DeCandolle's *Prodromus*, (l.c.) is equally clearly the plant described in the right hand of the two parallel columns above. In his heading to the subsection which contains only the one species DeCandolle says:—" *Antheræ inclusæ, apice non contortæ. Corollæ lobi breves, mucronulati.*" And in his description he says:—" *Stamina inclusa, in conum villosum conniventia, apice non contorta, villis erectis apicem glabrum æquantibus.*" This is quite clear. DeCandolle was however wrong in thinking that the aestivation was quincuncial. It is contorted, though the rest of the details of the flower buds are quite different from those of the other species. DeCandolle had only one specimen of Roux to go by, and he says—" *et aestiv. corollæ verisim. diversa, quodequidem mirandum, sed ex 2 floribus solum observare potui.*"

The key to the three plants is then:—

1. Anthers exerted, combined into a complete cone; back of the connectives densely tomentose with short, crisped, yellowish-white hairs; tips elongate, glabrous, spirally contorted.

(a) Leaves crowded, very narrow, villous, with few or no tubercle-based hairs. *T. indicum* R. Br. (type).

- (b) Leaves distant, broadly ovate or oblong, slightly or not at all villous, densely scabrid with stiff hairs arising from white tubercles *T. indicum* R. Br.
Var. *amplexicaule* (sp. Roth).

2. Anthers connivent but free, included; backs of the connectives densely penicillate with straight, erect, glistening white, opaque hairs, which equal or exceed the tips of the connectives. Leaves as 1 (b) *T. amplexicaule* D. C.

The only safe way to sort these out in existing herbaria is by the andrœcium. Usually all forms of *T. indicum* show, even when mounted on sheets, one or more exerted andrœcium-cones. Where such cannot be found the corolla must be partially opened. Specimens in which the andrœcium is missing cannot be *with certainty* allocated.

I would add that specimens of *T. zeylanicum* Br. are liable to become mixed into the bundles of *T. indicum* and *T. amplexicaule* in herbaria. In nature the calyx of *T. zeylanicum* is quite clearly rounded at the base, but under pressure it is liable to assume a slightly cordate form.

As regards distribution *T. indicum* is widely distributed throughout British India, especially in the drier parts; var. *amplexicaule* is probably commoner in the wetter tracts, and in localities subject to local inundation, such as canal regions. Of *T. amplexicaule* D. C. I can say from my own observation that it is a common monsoon plant in the Bombay Carnatic, at any rate in the watershed region which we call the Mallad, and similarly in the above-ghat regions of the Deccan known as the Maval. Of its distribution in the rest of British India I cannot speak.

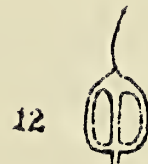
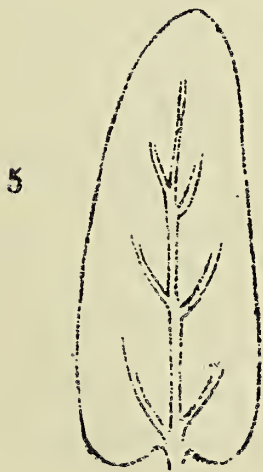
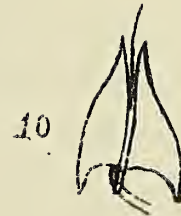
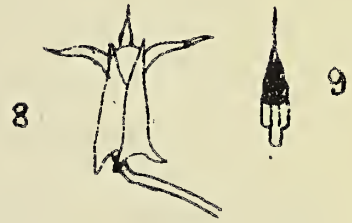
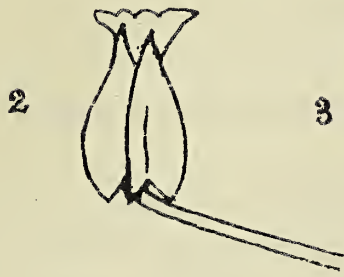
EXPLANATION OF PLATE XI.

Trichodesma amplexicaule D. C.

1. Corolla from above. 2. Flower. 3. Corolla opened. 4. Fruiting calyx.
5. Leaf (normal). 6. Fruit

Trichodesma indicum R. Br.

7. Corolla from above. 8. Flower. 9. Andrœcium with corolla torn off.
10. Fruiting calyx. 11. Leaf (normal). 12. Fruit.



Trichodesma amplexicaule ~~Forst.~~ DC.

Trichodesma indicum R. Br.

A NEW INDIAN IMPATIENS

BY

L. J. SEDGWICK, I.C.S.

Impatiens Kleiniformis L. J. Sedgwick, Sp. nova.

Herba erecta, ramosa, flaccida, ad 25 cm. alta, habitu *I. Kleinii* assimilis. *Folia* opposita, in medii caulis regione maxima, ad 9 cm. longa et ad 2.5 cm. lata, elliptica vel oblonga, ad apicem sensim attenuata, crenata et in crenaturis subulata, in caulis summa regione sessilia et basi cordata, in caulis ima regione basi in petiolos ad 1 cm. longos attenuata, glabra vel subtus in costa et nervis sparse et inconspicue hirsuta, semper eglandulosa et exstipulata. *Pedunculi* axillares, solitarii vel 2-3-fasciculati, per anthesin erecti, postea deflexi, pergraciles, ad 2 cm. longi, duobus oppositis hirticulorum lineis induti. *Flores* ad 6 mm. lati, rosei, sed apud utriusque alle interius latus longitudinali purpurea linea insignati. *Petalum dorsale* paulisper hirsuto-carinatum et basi gibbosum. *Ala* unguibus longis, integra et sine auriculis. *Calcar* ad 9 mm. longum, filiforme, subarcuatum. *Capsula* (nondum maturata) ad 1.5 cm. longa, fusiformis. *Semina* nigra glabra, polita.

Very close to *I. Kleinii* Wt. & Arn., but distinguished by the lines of pubescence on the pedicels, the sessile upper leaves with cordate base, and the absence of glands. It is a slightly larger plant as observed in the field and the flowers were smaller for the size of the plant, paler pink than those of *I. Kleinii*, but with two darker lines on the wings. In connexion with the glands at the base of the leaves of *I. Kleinii* it has been assumed that those glands are metamorphosed stipules; but they are marginal on the leaf base, and often more than one on each side of the leaf. They seem more properly to represent a glandular development of the basal and supra-basal serratures of the leaf-margin.

At Castle Rock, North Kanara District, Western Ghats, at about 1,600 feet elevation, rainfall about 250", in ditches by the railway line and wet places near by, August 1917.*

Balsams being often endemic in small areas it is possible that this species is not widely distributed. But on the other hand since Hooker (followed by other botanists) says that the glands at the base of the leaves of *I. Kleinii* are often absent it is possible that the two species are mixed up in herbaria.

* See the note entitled "Herbaceous monsoon flora at Castle Rock and a new species of Balsam" L. J. Sedgwick, Journal Bomb. Nat. Hist. Soc. xv, 3, p. 482, 15th January 1918.

A NEW INDIAN HABENARIA

BY

L. J. SEDGWICK, I.C.S.

Habenaria (§ Ate) multi-caudata L. J. Sedgwick, sp. nova.

Herba erecta, gracilis, ad 50 cm. alta. *Caulis* ima pars vaginis obtusis appressis; media pars foliosa. *Folia* elliptico-oblonga, acuta, multi-nervia, et inter nervos trabeculata. *Racemus* ad 12 cm. longus, multiflorus. *Bracteae* 15 mm. longae. *Pedicellus* cum ovario ad 23 mm. longus. *Flores* albi, sed calcari brunneo, et labello cito brunnescente. *Sepalum dorsale* erectum, cucullatum, 6 × 4 mm., trinerve. *Sepala lateralialia* 8 × 5 mm., ovata, paulo falcata, acuta, trinervia. *Petala lateralialia* bipartita, lobis superioribus erectis, filiformibus, dorsale sepalum vix excedentibus, lobis inferioribus ad 15 mm. longis, filiformibus, fantastice contortis; *labellum* 3-partitum, lobo medio 10 mm. longo, filiformi, lobis lateralibus ad 25 mm. longis, filiformibus, fantastice contortis, *Calcar* 12 mm. longum, curvatum, gracile sed in clavello ingenti subacuto terminans. *Antherae* loculi valde conspicui, et pro floris magnitudine valde ingentes, supra contigui, infra latius divaricati, tubis projectis. *Pollinia* ingentia, pyriformia, caudiculis vix longioribus, glandula minuta. *Stigmatis* processus elongatae, in labelli basis margines utrinque appressae. *Rostellum* obscurum.

At Gudihalli, a hill close to the sea coast near Kaswar in North Kanara. Alt. 1500'. Rainfall 150". Collected by Mr. T. R. D. Bell, Chief Conservator of Forests, Bombay Presidency, September 1917.

A distinct and curious species, strongly characterized by the fantastic filiform appendages and enormous anther cells, projecting beyond the flower when it is held in profile.

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[Names of new species are in bold type, synonyms are in italics.]

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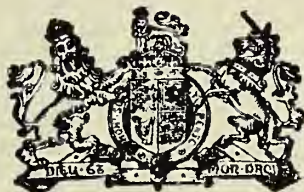
RECORDS
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BOTANICAL SURVEY OF INDIA

VOLUME VI.—No. 9

USEFUL PLANTS OF THE DISTRICT OF LAKHIMPUR IN
ASSAM.

BY
HUMPHREY G. CARTER, M.B., CH.B.,

AND
DORINE N. CARTER.



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EXPLANATION OF ABBREVIATIONS.

Agri. Ledg.	. . .	The Agricultural Ledger.
Ann. R. B. G.	. . .	Annals of the Royal Botanic Garden, Calcutta.
Beng. Pl.	. . .	Bengal Plants, by Sir David Prain.
Camb. Br. Fl.	. . .	Cambridge British Flora, by Dr. C. E. Moss.
DC. Monog. Phan.	. . .	DeCandolle's Monographiae Phanerogamarum.
DC. Prodr.	. . .	DeCandolle's Prodrornus Systematis Naturalis Regni Vegetabilis.
D. E. P.	. . .	Dictionary of the Economic Products of India, by Sir George Watt.
Eng. & Prantl	. . .	Die natürlichen Pflanzenfamilien, by Engler and Prantl.
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Fl. Ind.	. . .	Flora Indica, by William Roxburgh.
Ind. Trees	. . .	Indian Trees, by Sir Dietrich Brandis.
Journ. As. Soc. Beng.		Journal of the Asiatic Society of Bengal.
Man. Ind. Timbs.	. . .	A Manual of Indian Timbers, by J. S. Gamble.
Pharmacog. Ind.	. . .	Pharmacographia Indica, by William Dymock, C. J. H. Warden and David Hooper.
Rec. Bot. Surv.	. . .	Records of the Botanical Survey of India.
Syn. Fil.	. . .	Synopsis Filicum or a Synopsis of all known Ferns, -by Sir William Jackson Hooker.

USEFUL PLANTS OF THE DISTRICT OF LAKHIMPUR IN ASSAM.

BY

HUMPHREY G. CARTER, M.B., CH.B.,

Economic Botanist to the Botanical Survey of India,

AND

DORINE N. CARTER.

INTRODUCTION.

THE district of Lakhimpur forms part of the great Indo-Gangetic plain, and occupies the extreme north-east corner of Assam in the angle between the eastward extension of the Himalayas and the range of mountains running between Assam and Burma. Lakhimpur has a monsoon climate, with a rainfall everywhere over 100 inches per annum.

In 1894 Mr. G. A. Gammie made a botanical tour in the district, and published a short general account of its vegetation in No. 5 of Vol. I of the Records of the Botanical Survey of India. The present paper is restricted to an account of the plants—apart from staple crops and forest trees—used for various purposes by the inhabitants of the district. The specimens and information on which this paper is based were collected during two tours made in the spring and autumn of 1915. The itinerary of those tours is as follows:—

8th to 12th March, 1915	. . .	Dibrugarh and neighbourhood.
14th „ 17th „ „	. . .	Margherita, Ledo and neighbourhood.
19th „ 24th „ „	. . .	Dibrugarh and the islands in the river Brahmaputra.
25th „ 28th „ „	. . .	Jokai jungles.
29th March, 1915	. . .	Dibrugarh.
31st March and 1st April, 1915	. . .	Jaipur jungles and villages.
3rd to 7th April, 1915	. . .	Dibrugarh villages and jungles.
8th „ 10th „ „	. . .	Saikhoa Ghat jungles.
14th October, 1915	. . .	Arrived in Dibrugarh.
15th to 21st October, 1915	. . .	Dibrugarh and surrounding villages.
24th „ 28th „ „	. . .	Sadiya.
30th October to 2nd Nov., 1915	. . .	Dibrugarh neighbourhood.
5th to 10th November, 1915	. . .	North Lakhimpur villages and jungles.
11th November, 1915	. . .	Laluk.
12th „ „ „	. . .	Badoti.

The information which will be found in small type after the purely botanical matter about each plant, has been collected almost entirely

from villagers. To this information are added short popular descriptions of the plants. By means of these popular descriptions, helped out by the vernacular names, it is hoped that non-botanical readers will be able to identify many of the plants. I have taken considerable pains in selecting really useful vernacular names but so many different languages are spoken in Assam that selection has not always been easy. The vernacular names in Italics are well known to speakers of Hindustani almost throughout the north of India. Many of these names have innumerable forms. Wherever possible I have adopted the form written and spoken by educated Hindustani-speaking Indians. Most of those given in Roman type are Assamese. Vernacular names of plants must not be relied upon blindly. Very few of them are used for one plant only.

Readers who do not know India may not know the meaning of the two words *bastī* and *sāg* which occur frequently in the text. A *bastī* is a settlement, colony or village and *sāg* is a term applied to green vegetable usually eaten in curry.

To those to whom some of my notes about medicinal plants may appear trivial or even absurd I would tell the following story:—

A Chuprasi recently came to me complaining of inflammation in his eye. I asked him if he has had any treatment. He took off his turban and showed me a shaved patch on his scalp on which he had been putting castor oil. I told him to put the castor oil into the eye instead of applying it to his head. This treatment repeated twice daily cured him in two days. It was to him and his folk traditional knowledge that castor oil was good for inflamed eyes but that traditional knowledge passing amongst people whose minds had not been invigorated by a liberal education had become distorted.

We are indebted to many people in Lakhimpur for help during our tours, and particularly to Mr. L. Cooper, I.F.S., Mr. W. R. Le G. Jacob, I.F.S., Deputy Conservators of Forests and Mr. W. C. M. Dundas, C.I.E., Political Officer, Sadiya. In collecting information during the tours great help was given by Babu Rajani Kanta Das, and in the preparation of this paper by Babus Uma Charan Pal and Hemendra Chandra Banerji, all of the clerical staff of the Botanical Survey.

While this paper was in the press news reached us of the untimely death of Mr. Evan A. Evans of Dibrugarh. Mr. Evans was a man of wide interests and gave us very great help often accompanying us on our rambles in the jungles. His many friends in Lakhimpur, more particularly those interested in Natural History, will miss him sorely.

SYSTEMATIC LIST.

EMBRYOPHYTA ASIPHONOGAMA

PTERIDOPHYTA.

FILICALES.

I. POLYPODIACEAE.

1. *Nephrodium* Schott.

1. *N. molle* Desv. Syn. Fil., 293; F. B. I. C. 277; Beng. Pl. 1253

Dibrugarh. No. 152.

LOCAL NAME.—Deñkiyā (applied to several edible ferns).

DISTRIB.—Throughout the Indian region from the plains up to 6,000 feet. Also throughout the world in tropical and sub-tropical regions.

A herbaceous fern with pinnate fronds which usually bear short hairs. It is common throughout the district and is eaten as a *sāg*.

2. *Aspidium* Sw.

2. *A. polymorphum* Wall. F. B. I. C., 218; Eng. & Prantl i, 4, 185.

Nephrodium polymorphum Baker Syn. Fil. 297; Beng. Pl. 1254.

Dibrugarh. No. 129.

DISTRIB.—Northern India from Garhwal through Mishmi Hills and Chittagong to Burma. Also western forests of Madras Presidency, very common up to 3,000 feet. Ceylon, Malay Islands, Philippines and Fernando Po.

Cultivated. A fern with twice divided fronds which are borne on hard, polished, grooved stalks. The ultimate divisions of the frond are finely, sharply serrate. Portions of the fronds are chewed to cure sores on the tongue.

3. *Diplazium* Sw.

3. *D. esculentum* Retz. Eng. & Prantl i, 4, 228.

Anisogonium esculentum Presl. F. B. I. C. 192; Syn. Fjl. 244.

Asplenium esculentum Presl. Beng. Pl. 1249.

Dibrugarh. No. 151.

LOCAL NAME.—Denkiyā (applied to several edible ferns).

DISTRIB.—In most of the provinces from Himalaya to Ceylon. Also in China, Hongkong, Formosa and Malay Peninsula.

Cultivated. A tree fern with a trunk about a metre high. It is common especially about Dibrugarh. The fronds are eaten as a *sāg*.

II. OPHIOGLOSSACEAE.

4. *Opbioglossum* Linn.

4. *O. reticulatum* Linn. Syn. Fil. 446; F. B. I. C. 465; Eng. & Prantl i, 4, 469; Beng. Pl. 1264.

Dibrugarh. No. 303.

LOCAL NAME.—Jibha.

DISTRIB.—The Himalayas, South India and Ceylon; also in Malay Peninsula, Tropical America and South Africa.

A small fern resembling the British Adder's Tongue (*Ophioglossum vulgatum* L.), but much smaller in all its parts. Each frond consists of a small leaf-like part and a two-ranked spike of sporangia which is borne on a longish stalk. We saw old women at Dibrugarh gathering this plant from amongst grass at the side of the Red Road. They said that they used it as a *sāg*. The plant is difficult to find, but when once found, is easily distinguished.

EMBRYOPHYTA SIPHONOGAMA

ANGIOSPERMAE.

MONOCOTYLEDONEAE.

III. PANDANACEAE.

5. *Pandanus* Linn.

5 *P. fascicularis* Lam. F. B. I. vi, 485; Eng. & Prantl ii, 1, 191; Beng. Pl. 1101.

P. odoratissimus Roxb. Fl. Ind. iii, 738; Pharmacog. Ind. iii, 535; D. E. P. vi, 1, 5.

Dibrugarh. No. 128.

LOCAL NAME.—Keyākāntāl, *keorā*.

DISTRIB.—Throughout the hotter and moister parts of India, and much planted. Also in Malay Islands, Mauritius and China.

Cultivated. A much branched, low shrub with many aerial roots and spirally arranged leaves whose margins and keels are thorny. The pulp of the stem is used as an ingredient in remedies for pneumonia. The well known *Keorā arq* is distilled from the bracts.

IV. GRAMINEAE.

6. *Zea* Linn.

6. *Z. Mays* Linn. F. B. I., vii, 102; Eng. & Prantl ii, 2, 19; Beng. Pl. 1209; D. E. P. vi, 4, 327; Pharmacog. Ind. iii, 579.

Dibrugarh. No. 8.

LOCAL NAME.—Gom dhān, *bhuttā*, *makaī*. "Maize," "Indian Corn."

DISTRIB.—Native of America. Cultivated throughout India and in the warmer parts of the world.

A very common crop especially among the settlers from the west who plant it on a large scale. It is sown towards the end of November and the grain is ripe in April and May. Another crop is sown in June and reaped in August.

Maize is used in 3 ways in Lakhimpur:—1. The grain is ground and made into bread. 2. The whole cobs are fried and eaten. 3. The grain is eaten half burnt ("pop-corn").

7. *Coix* Linn.

7. *C. Lacryma* Linn. Eng. & Prantl ii, 2, 21; D. E. P. ii, 492; Pharmacog. Ind. iii, 573.

C. Lacryma-Jobi Linn. F. B. I. vii, 100; Beng. Pl. 1210.

Dibrugarh. No. 53.

LOCAL NAME.—*Gargar*. "Job's Tears."

DISTRIB.—Throughout the hotter and damper parts of India, wild or cultivated; Ceylon (not wild) and Trop. Asia; cultivated in Africa and America.

Cultivated. A grass, the fruits of which are the familiar "Job's Tears" which are made into necklaces. It is grown here and there in cottage gardens.

8. *Imperata* Cyrill.

8. *I. arundinacea* Cyrill. F. B. I. vii, 106; Eng. & Prantl ii, 2, 23; Beng. Pl. 1188; D. E. P. iv, 336.

Dibrugarh. No. 64.

LOCAL NAME.—*Khair*.

DISTRIB.—Throughout the hotter parts of India and Ceylon. Cosmopolitan.

A grass about half a metre in height with a narrow silvery panicle of flowers. It is common in the savannas of Lakhimpur. It is used for thatching houses.

9. *Saccharum* Linn.

9. *S. officinarum* Linn. F. B. I. vii, 118; Eng. & Prantl ii, 2, 23; Beng. Pl. 1189; D. E. P. vi, 2, 3; Pharmacog. Ind. iii, 592.

Dibrugarh. Nos. 45 & 91.

LOCAL NAME.—Kuhār, ūkh, gannā. "Sugar-cane."

DISTRIB.—Grown throughout the warmer parts of India. Also in Tropical East Asia, America and West Indies. In Europe in South Spain.

Cultivated throughout the district.

10. *Andropogon* Linn.

10. *A. Sorghum* Brot. F. B. I. vii, 183 ; Beng. Pl. 1204.

A. Sorghum Brot. var. *vulgaris* Eng. & Prantl ii, 2, 27 & 28.

Sorghum vulgare Pers. D. E. P. vi, 3, 289 ; Pharmacog. Ind. iii, 618.

Sadiya. No. 359.

LOCAL NAME.—Jundhrī, ābor dhān. Joār.

DISTRIB.—Cultivated throughout the warmer parts of Asia, Europe and Africa. Introduced into America, Australia, etc

A tall robust grass with a very profuse panicle, cultivated here and there throughout the district. Bread is made of the grain, which is also fried and eaten. Common in Sadiya basti gardens. The plants sometimes reach 6 m. high and the leaves nearly 1 dm. broad. Plants of this size were seen at Sadiya where they call the crop "ābor dhān." It has apparently been introduced from the hill country.

11. *A. halepensis* Brot. Fl. Br. Ind. vii, 182 ; Beng. Pl. 1204.

A. Sorghum wild form (*A. halepensis* Sibth. Eng. & Prantl ii, 2, 27 & 28).

Sorghum halepense Pers. D. E. P. vi, 3, 280.

Dibrugarh. No. 88.

LOCAL NAME.—Mansuria.

DISTRIB.—Throughout India and Ceylon and in most warm countries. Seed used as a grain.

11. *Cymbopogon* Spreng

12. *C. sp.*

Makum Kilā basti. No. 112.

A lemon scented grass, grown occasionally in cottage gardens. An infusion of it is used for fever.

12. *Avena* Linn.

13. *A. sativa* Linn. F. B. I. vii, 275 ; Eng. & Prantl ii, 2, 55 ; Beng. Pl. 1217 ; D. E. P. i, 356.

Dibrugarh. No. 11.

LOCAL NAME.—*Jaī*. “Oats.”

DISTRIB.—Unknown; truly wild. Cultivated in Northern India from Bengal to the Indus and in the Himalayas up to 12,000 feet and almost throughout the extra tropical regions of the world.

In Dibrugarh it is cultivated to some extent during the cold weather for the use of cattle.

13. *Eleusine Gaertn.*

14. *E. coracana* Gaertn. F. B. I. vii, 294; Eng. & Prantl ii, 2, 61; Beng. Pl. 1229; D. E. P. iii, 237.

Sadiya. No. 360.

LOCAL NAME.—*Babāsā dhān*.

DISTRIB.—Cultivated over the greater part of India, and also in N. E. Africa and Japan. This cereal is a cultivated form of *E. indica* Gaertn. See F. B. I. *loc. cit.*

A grass with somewhat flattened stems each surmounted by from two to seven stout, radiating spikes. This is the common *Marūā* of the North and *Ragi* of the South India, which in hilly districts often forms the staple food of the people. We came across a few poorly developed specimens in cottage gardens at Sadiya but saw it nowhere else.

14. *Triticum* Linn.

15. *T. sativum* Lam. Eng. & Prantl ii, 2, 81; Duthie, Grasses, N. Ind. 68; D. E. P. vi, 4, 89; Pharmacog. Ind. iii, 307.

T. vulgare Vill. F. B. I. vii, 357; Beng. Pl. 1231; *T. aestivum* Roxb. Fl. Ind. i, 357.

Dibrugarh. No. 29.

LOCAL NAME.—*Gehūñ*. “Wheat.”

DISTRIB.—Cultivated everywhere in cool countries and in many parts of India up to 13,000 feet.

A cold weather crop about Dibrugarh.

15. *Hordeum* Linn.

16. *H. vulgare* Linn. F. B. I. vii, 371; Beng. Pl. 1231; D. E. P. iv, 274; Pharmacog. Ind. iii, 615 (under *H. hexastichum* Linn.). *H. sativum vulgare* (Hackel) Eng. & Prantl ii, 2, 87.

Dibrugarh. No. 58.

LOCAL NAME.—*Jau*. “Barley.”

DISTRIB.—Not known, wild. Cultivated in Upper India and in most cool regions.

In Dibrugarh cultivated to a small extent during the cold weather.

V. PALMAE.

Several palms are common throughout the district such as *Cocos nucifera* L. "Cocoanut palm," *nāriyal*; *Borrassus flabellifer* L. "Palmyra Palm," *tār*; and *Phoenix sylvestris* Roxb. "Wild Date," *khajūr*. The uses of these palms are well known.

Caryota urens L. seems worthy of special notice.

16. *Caryota* Linn.

17. *C. urens* Linn. F. B. I. vi, 422; Eng. & Prantl ii, 3, 54; Beng. Pl. 1093; D. E. P. ii, 206.

LOCAL NAME.—Siwa. "Maiden-hair or Fish-tail Palm."

DISTRIB.—Throughout India from the Sikkim Himalaya and Assam southwards to Ceylon, also in Singapore, Malaya, and Tropical Asia.

The maiden-hair or fish-tail palm. The names allude to the form of the leaf. A beautiful palm with a tall smooth stem and much divided leaves whose ultimate segments are wedge-shaped. It is particularly common near Sadiya. There are two good specimens in front of the Dibrugarh Club. The stem is full of bulky edible pith. The outside of the stem furnishes good wood useful for spear shafts, plough shafts or lattis. The young parts are eaten as a vegetable and are good (*teste* Dundas). About the base of the leaf is much fibre which the Miris use for tinder.

VI. ARACEAE.

17. *Pothos* Linn.

18. *P. sp.*, may be *P. Cathcarti* Schott. F. B. I. vi, 552.

Dibrugarh. No. 135.

LOCAL NAME.—Hāthī denkiyā.

A climber with curious leaves each consisting of a blade-like stalk ending in two blunt lobes from between which the lance shaped leaf blade arises. It is commonly seen on trees in the forests. The leaves are fried in *ghee* and eaten to cure various pains.

18. *Acorus* Linn.

19. *A. Calamus* Linn. F. B. I. vi, 555; Eng. & Prantl ii, 3, 118; D. E. P. i, 99; Pharmacog. Ind. iii, 539.

Saikhoa. No. 321.

LOCAL NAME.—*Bach*. "Sweet Flag."

DISTRIB.—Throughout India and Ceylon, wild and cultivated, ascending to 6,000 ft. Europe, N. Asia and N. America.

A herb with sweet scented, grass-like leaves. It usually grows in damp, grassy places near villages and is particularly common in the neighbourhood of Sadiya. It is used for fevers, but it is said to benefit only those which have been caused by ghosts. Pieces of the rootstock which is the most aromatic part of the plant, are tied round the neck to keep away evil spirits. At Saikhoa we were told that the plant was used for inflammations. Plants looked upon with superstitious reverence usually have medicinal properties. For an account of the active principles of this plant see Pharmacog. Ind. (*loc. cit.*)

19. *Amorphophallus* Blume

20. *A. campanulatus* Blume. F. B. I. vi, 513 ; Eng. & Prantl ii, 3, 126 ; Beng. Pl. 1109 ; D. E. P. i, 225 ; Pharmacog. Ind. iii, 546.

Sadiya. No. 387.

LOCAL NAME.—*Ol*.

DISTRIB.—Wild and cultivated throughout the plains of India and Ceylon.

A tall herb with beautiful, much branched leaves borne on spotted, snake-like stalks. The whole plant is very acrid. This acidity being due to the presence of raphides, can be destroyed by adding acid substances. A paste or jelly of the tuber (*Ol kachū*) and tamarind pulp is sometimes eaten. Leaves mixed with tamarind pulp are eaten as *sāg*.

20. *Alocasia* Schott.

21. *A. macrorrhiza* Schott. F. B. I. vi, 526 ; Eng. & Prantl ii, 3, 138 ; Beng. Pl. 1111.

A. odorum Roxb. Fl. Ind. iii, 499 ; D. E. P. i, 178.

Dibrugarh. No. 149.

LOCAL NAME.—*Kālā kachū*.

DISTRIB.—Tropical and sub-tropical India, wild and cultivated. A native of Tropical Asia, Australia and the Pacific Islands.

A large herb with handsome dark leaves borne on black stalks. The tubers are said to be excellent to eat. Cottagers near Dibrugarh said that they might be eaten raw.

22. *A. indica* Schott. F. B. I. vi, 525 ; Eng. & Prantl ii, 3, 138 ; Beng. Pl. 1111 ; D. E. P. i, 178 ; Pharmacog. Ind. iii, 544.

Arum indicum Roxb. Fl. Ind. iii, 498.

LOCAL NAME.—*Mān kachchū*.

DISTRIB.—In Tropical Asia native and cultivated ; cultivated in the other parts of the tropics.

An aroid resembling the common Kachu (*Colocasia antiquorum* Schott) but the leaves of *Alocasia* are much larger. It is apparently not cultivated in Lakhimpur but occurs occasionally near dwellings. The rootstock is eaten by the Kacharis.

21. *Colocasia* Linn.

23. *C. antiquorum* Schott. F. B. I. vi, 523 ; Eng. & Prantl ii, 3, 139 ; Beng. Pl. 1112 ; D. E. P. ii, 509.

Arum Colocasia Roxb. Fl. Ind. iii, 494.

Dibrugarh. No. 30.

LOCAL NAME.—*Kachū*.

DISTRIB.—Throughout the hotter parts of India and Ceylon, wild and cultivated. Cultivated in all hot countries.

This is the common Kachū seen by every road-side in India. It is cultivated for its tubers. The leaves are eaten as a *sag*.

22. Typhonium Schott.

24. T. trilobatum Schott. F. B. I. vi, 509.

Dibrugarh. No. 355.

LOCAL NAME.—Sāmā kosā.

DISTRIB.—Bengal to Burma and in the Eastern and Western Peninsulas to Ceylon. Also Siam and Malay Islands.

The tubers, eaten with bananas, cure stomach complaints.

VII. COMMELINACEAE.**23. Floscopa Lour.**

25. F. scandens Lour. F. B. I. vi, 390; Eng. & Prantl ii, 4, 68; Beng. Pl. 1086.

North Lakhimpur. Nos. 41445 and 41454.

LOCAL NAME.—Kana himlu.

DISTRIB.—Throughout tropical India and Ceylon; Eastern Asia, tropical Australia.

Very common throughout the district, particularly on grass-lands in N. Lakhimpur. A herb with sheathing leaf-bases, fleshy stems creeping below and rising upwards to bear pyramidal hairy inflorescences of lilac or pink flowers. In N. Lakhimpur the juice of the stem is put into sore eyes.

VIII. LILIACEAE.**24. Allium Linn.**

26. A. Cepa Linn. F. B. I. vi, 337; Eng. & Prantl ii, 5, 56; Beng. Pl. 1075; D. E. P. i, 169.

Margherita. No. 104.

LOCAL NAME.—*Piyāz*. "Onion."

DISTRIB.—Cultivated in all countries. Native country unknown.

Cultivated. The common onion, much grown in cottage gardens. The leaves and the bulbs are used in curry.

27. A. sativum Linn. F. B. I. vi, 337; Beng. Pl. 1076; D. E. P. i, 172; Pharmacog. Ind. iii, 488; Eng. & Prantl ii, 5, 55.

Margherita. No. 105.

LOCAL NAME.—*Nihuru, lahsan*. "Garlic."

DISTRIB.—Cultivated everywhere.

Cultivated. The common garlic is a smaller plant than the onion with flat leaves and inflorescence borne on a slender stalk. The plant is used as a condiment.

IX. AMARYLLIDACEAE.

25. *Crinum* Linn.

28. *C. asiaticum* Linn. F. B. I. vi, 280 ; Eng. & Prantl ii, 5, 108.
Dibrugarh. No. 125.

LOCAL NAME.—Kanaripat.

DISTRIB.—Throughout tropical India and Ceylon, common on the sea coasts.

The leaves are applied to skin diseases.

29. *C. amœnum* Roxb. F. B. I. vi, 282 ; Beng Pl. 1061 ; D. E. P. ii, 589.

Lakhimpur. No. 41171.

LOCAL NAME.—Bihu Lily.

DISTRIB.—Temperate Himalaya ; from Nepal eastward to Burma.

26. *Curculigo* Gaertn.

30. *C. orchoides* Gaertn. F. B. I. vi, 279 ; Beng. Pl. 1059 ; D. E. P. ii, 650 ; Pharmacog. Ind. iii, 462.

Jokai jungle. No. 190.

LOCAL NAME.—Nagini.

DISTRIB.—Sub-tropical Himalaya from Kumaun eastwards to Bengal and Assam, the Western Ghâts, Java.

A herb with narrow, membranous leaves which are traversed by numerous fine strong veins. The plant is common in the jungles. The powdered rhizome put into cuts is said to stop bleeding and to dry up the wound. This rhizome is a well known Indian drug called "*mūslī siyāh*."

X. DIOSCOREACEAE.

27. *Dioscorea* Linn.

31. *D. sp*, probably *D. spinosa* Roxb. F. B. I. vi, 291.

Dibrugarh. No. 333.

LOCAL NAME.—Mo ālū, sutnī ālū.

Cultivated. The branches straggle on the ground. The leaves are long-petioled with broadly cordate, acuminate lamina. There is a conspicuous swelling at the base of the petiole. The tubers, which are white and about the size of small potatoes, are eaten. Several wild species of *Dioscorea*, some of which have remarkably large tubers, are eaten by the more primitive tribes of the province.

XI. IRIDACEAE.

28. *Belamcauda* Adams.

32. *B. chinensis* Leman. F. B. I. vi, 277.

Belamcauda chinensis Leman. Eng. & Prantl ii, 5, 150. *Pardanthus chinensis* Ker in Koen. & Sims. Ann. Bot. 1, 246.

Dibrugarh. No. 143.

LOCAL NAME.—Sūrja kānti.

DISTRIB.—A native of China but cultivated all over India. Said to be wild in the Himalayas up to 6,000 ft. but very doubtful.

The pulp of the stem is said to cure stomach ache.

XII. MUSACEÆ.

29. *Musa* Linn.

33. *M. sapientum* Linn. F. B. I. vi, 262 ; Eng. & Prantl ii, 6, 8 ; Beng. Pl. 1050 ; D. E. P. v, 290 ; Pharmacog. Ind. iii, 443 (under *M. paradisiaca* Linn.)

LOCAL NAME.—*Kelā*. “Banana.”

DISTRIB.—Cultivated throughout India and the tropics, indigenous in Behar, the Eastern Himalayas, and Ceylon.

In N. Lakhimpur the leaf bases of the Banana are dried in the sun and then burned. An infusion of the ashes called *Khār* is filtered and kept in bottles. *Khār* is put in small quantities into curries to bring out the flavour.

XIII. ZINGIBERACEÆ.

30. *Curcuma* Linn.

34. *C. longa* Linn. F. B. I. vi, 214 ; Eng. & Prantl ii, 6, 19 ; Beng. Pl. 1042 ; D. E. P. ii, 659 ; Pharmacog. Ind. iii, 407.

Dibrugarh. No. 338.

LOCAL NAME.—*Haldī*. “Turmeric.”

DISTRIB.—Cultivated in India and throughout the tropics.

Cultivated in fields and in gardens throughout the district. It may be recognised by its bright yellow root-stock and long-stalked oblong leaves. The root-stock (Turmeric) is perhaps the most widely used condiment in India and is the chief constituent of curry powder. We were told by some cottagers that *Haldī*, if not transplanted, after two or three years gives rise to small, black, egg-shaped tubers called *kachūr* which are used in Yunani Medicine. The name *kachūr* properly belongs to *C. zedoaria* Rosc. the “Zedoary.”

35. *C. sp.* probably *C. aromatica* Salisb. F. B. I. vi, 210 ; Eng. & Prantl ii, 6, 19.

North Lakhimpur. No. 393.

LOCAL NAME.—Kitūri.

DISTRIB.—Throughout India from the Eastern Himalaya to Ceylon. Wild or cultivated.

A kind of turmeric. Its rhizome is used to colour oxen at the time of the Bihu ceremony, a festival held on the day on which the sun enters Aries. (Cf. *Crinum*.)

31. *Alpinia* Linn.

36. *A. malaccensis* Rosc. F. B. I. vi, 255.

Makum Kila. No. 110.

DISTRIB.—Eastern Himalayas to Assam and Chittagong; also in Malabar.

Very common in the jungles throughout the district. The plant and leaves are given to elephants.

32. *Clinogyne* Salisb.

37. *C. dichotoma* Roxb. F. B. I. vi, 258 ; Eng. & Prantl ii, 6, 39 ; Beng. Pl. 1048.

Phrynium dichotomum Roxb. Fl. Ind. i, 2 ; D. E. P. v, 216.

Jokai. No. 169.

LOCAL NAME.—Pāṭi dai.

DISTRIB.—Eastern Bengal through Assam to Burma, Malay Peninsula.

A straggling shrub with repeatedly forked stems, very common in the jungles of Lakhimpur. The stems are much used by the natives who split them up and weave them into excellent sleeping mats, known as *sital pati*.

33. *Phrynium* Willd.

38. *P. capitatum* Willd. F. B. I. vi, 258 ; Eng. & Prantl ii, 6, 39 ; Beng. Pl. 1049.

Jokai. No. 170.

LOCAL NAME.—Kowai, kudali.

DISTRIB.—Eastern Himalayas to Assam ; also in Malabar and Travancore, Ceylon and Malay Peninsula.

A herb with large oblong leaves which are used as plates and for thatching. It is common in the jungles.

XIV. MARANTACEAE.

34. *Maranta* Linn.

39. *M. arundinacea* Linn. Eng. & Prantl ii, 6, 41 ; Beng. Pl. 1048 ; D. E. P. v, 180.

Dibrugarh. No. 345.

LOCAL NAME.—Tar ālū. "Arrowroot."

DISTRIB.—A native of Tropical America and of the West Indies. Cultivated in India.

Cultivated on a small scale near Dibrugarh.

DICOTYLEDONEAE.

XV. PIPERACEAE.

35. Piper Linn.

40. *P. Betle* Linn. F. B. I. v, 85; Eng. & Prantl iii, 1, 10; Beng. Pl. 893; D. E. P. vi, 1, 247; Pharmacog. Ind. iii, 183.

Saikhoa. No. 318.

LOCAL NAME.—*Pān*. "Betel."

DISTRIB.—Cultivated in the hotter and damper parts of India and Ceylon, and in the Malay Islands.

Much cultivated. It is sometimes made to climb up trellises. sometimes it is grown on the Areca palm (*Areca Catechu* L.) which yields the nut which is chewed with the *pān* leaves. It is then known as *gāchh pān*.

XVI. MORACEAE.

36. Morus Linn.

41. *M. indica* Linn. F. B. I. v, 492; Beng. Pl. 968; D. E. P. v, 281.

Dibrugarh. No. 14.

LOCAL NAME.—*Tūt, shahtūt*. "Mulberry."

DISTRIB.—Temperate and sub-tropical Himalayas from Kashmir to Sikkim, wild or cultivated in Bengal, Assam, Burma to China and Japan.

A small mulberry tree with sharply serrated leaves which, like the leaves of the mulberry common in English gardens (*M. nigra* Linn.) shows great variations in lobing, so that leaves of quite different form occur on the same branch. *M. indica* Linn. is a common cottage shrub in Lakhimpur. The fruits are sold in the bazars, but we did not hear of its leaves being used for feeding silkworms (see *Ricinus* and *Machilus*).

37. Artocarpus Forst.

42. *A. integrifolia* Linn. f. F. B. I. v, 541; Beng. Pl. 971; D. E. P. i, 330; Pharmacog. Ind. iii, 355.

A. integrifolia Forst. Eng. & Prantl. iii, 1, 82.

Dibrugarh. No. 85.

LOCAL NAME.—*Kathal*. “Jack Fruit.”

DISTRIB.—Cultivated throughout the hotter parts of India and Eastern Asia.

The jack fruit tree with its bark variegated with red and white lichens, its dense crown of dark shining leaves and its gigantic fruit is familiar to all dwellers in India. It is nearly as common in Lakhimpur as it is in Bengal. The fruit is a favourite food with coolies who often go on eating it till they are incapable of work.

43. *A. Lakoocha* Roxb. F. B. I. v, 543; Beng. Pl. 971; D. E. P. i, 333; Pharmacog. Ind. iii, 355.

Dibrugarh and Sadiya. Nos. 148 and 365.

LOCAL NAME.—Barha barhat.

DISTRIB.—Tropical Himalaya, from Kumaun eastwards to Burma, and southwards to Travancore and Ceylon, also Malacca.

This species grows into a large tree and has small yellow velvety fruits. It is grown here and there. The leaves are very variable. The fruits are used in curries. The bark which is known as *dewā sali* is chewed with *pān*.

44. *A. incisa* Linn. f. F. B. I. v, 539; D. E. P. i, 330.

A. incisa Forst. Eng. & Prantl iii, 1, 82.

Ledo. No. 106.

LOCAL NAME.—Sām kathal. “Bread Fruit Tree.”

DISTRIB.—A native of the Pacific Islands. Occasionally cultivated in the hottest parts of India.

A tree with very rough, pinnately lobed leaves. Only one example was seen and that in a village near Ledo. The villagers said that the fruits were red, as large as the first, and very good to eat.

38. *Ficus* Linn.

45. *F. criniervia* Miq. F. B. I. v, 529; King. Ann. R. B. Gard. i, 2, 138 and fig. 173.

Sadiya. No. 373.

LOCAL NAME.—Tapar sāli.

DISTRIB.—Assam and Chittagong, also Malay Islands.

A creeper abounding in yellow juice. Its bark is chewed with *pān*.

XVII. URTICACEAE.

39. *Laportea* Gaud

46. *L. crenulata* Gaud. F. B. I. v, 550; Eng. & Prantl iii, 1, 106; D. E. P. iv, 587.

DISTRIB.—Tropical Himalaya; from Sikkim eastwards, the Concan, Malabar, Travancore and Ceylon. Also in Malay Islands and Sumatra.

A tall herb with divaricately branched axillary panicles of flowers. The plant stings very severely. In N. Lakhimpur the juice of the root is used in long standing fevers and the flowers are used in curries.

40. *Girardinia* Gaud.

47. *G. heterophylla* Dene. F. B. I. v, 550; Eng. & Prantl iii, 1, 107; Beng. Pl. 961; D. E. P. iii, 498.

Sadiya. No. 382.

LOCAL NAME.—Chūruṭ pāt, kukur sutā; also known as sīsnū.

DISTRIB.—Temperate and sub-tropical parts of India, Burma, and Ceylon.

A stinging coarse fibre plant. Some plants were seen in gardens at Sadiya.

41. *Boehmeria* Jacq.

48. *B. nivea* Hook. & Arn. F. B. I. v, 576; Eng. & Prantl iii, 1, 111 & 112; Beng. Pl. 964; D. E. P. i, 468

Urtica nivea Linn. Sp. Pl. 985. *U. tenacissima* Roxb. Fl. Ind. iii, 590.

Jokai. No. 177.

LOCAL NAME.—Rihā. "Rhea or China-grass."

DISTRIB.—A native of the Malay Islands, China and Japan. Cultivated chiefly in Assam and N. Bengal.

A nettle-like shrub with coarsely serrate leaves which are white beneath. It is grown in cottage gardens and yields the well known Rhea fibre which is extracted from the plant in October.

42. *Sarcochlamys* Gaud.

49. *S. pulcherrima* Gaud. F. B. I. v, 588; Eng. & Prantl iii, 1, 113; Beng. Pl. 966; D. E. P. vi, 2, 476.

Urtica pulcherrima Roxb. Fl. Ind. iii, 588.

Above Dibrugarh. No. 313.

LOCAL NAME.—Notke (Miri).

DISTRIB.—Assam, from East Bengal through Chittagong to Tenasserim. Also Sumatra.

A curious shrub occurring throughout the district, especially near rivers. The leaves are long and narrow, dark above and white beneath, and traversed from end to end by 3 strong nerves. Most of the people in Lakhimpur know of no use for the plant but the Miris eat the young leaves in curry.

XVIII. PROTEACEAE.

43. *Grevillea* R. Br.

50. *G. robusta* A. Cunn. Man. Ind. Timbs. 576; Ind. Trees, 544.

Dibrugarh. No. 41181.

LOCAL NAME.—“Silk Oak” or “Silver Oak.”

DISTRIB.—Indigenous in Queensland and New South Wales, cultivated in Dehra Dun, the Nilgiris and elsewhere.

A tree with hard pinnately divided leaves which are dark above and covered with brownish felt beneath, and bottle-brush like inflorescences. Introduced by the Forest Dept. and much planted about Dibrugarh.

XIX. LORANTHACEAE.

44. *Loranthus* Linn.

51. *L. ligustrinus* Wall. F. B. I. v, 207; Eng. & Prantl iii, 1, 185; Beng. Pl. 911.

Dibrugarh. No. 156.

LOCAL NAME.—Banda.

DISTRIB.—Tropical Himalaya, from Kumaun to Sikkim, and Chittagong.

A parasite especially common on *Melia Azedarach* (Bakāyan). *L. ligustrinus* Wall. is used for tanning.

XX. POLYGONACEAE.

45. *Rumex* Linn.

52. *R. vesicarius* Linn. F. B. I. v, 61; Eng. & Prantl iii, 1a, 19; Beng. Pl. 889; D. E. P. vi, 1, 592; Pharmacog. Ind. iii, 157.

Dibrugarh. Nos. 25 and 168.

LOCAL NAME.—Sūkāhāk, *chūkā*.

DISTRIB.—Indigenous in the Western Punjab, and Mediterranean Region.— Found in most other parts of India either cultivated or as an escape.

A small glabrous succulent dock with 3-5 nerved leaves. It is commonly cultivated in gardens about Dibrugarh. The whole plant is eaten cooked and has a pleasant acid, sorrel-like flavour.

46. *Polygonum* Linn.

53. *P. plebejum* Br. F. B. I. v, 27; Eng. & Prantl iii, 1a, 27; Beng. Pl. 885; D. E. P. vi, 1, 319.

Dibrugarh and on river bank. Nos. 41138, 41179 and 369

LOCAL NAME.—Ban jaluk.

DISTRIB.—Throughout tropical India, the Indo-Malayan region and Africa.

A weed common everywhere but especially on river sand. It has prostrate stems and very small leaves. The plant is dried, powdered and taken internally for pneumonia.

54. *P. flaccidum* Meissn. F. B. I. v, 39; Beng. Pl. 887;

P. flaccidum Roxb. Eng. & Prantl iii, 1a, 28.

Sadiya. No. 374.

LOCAL NAME.—Mau mau bhelagnī.

DISTRIB.—Indo-Malay region. Common throughout India in wet places.

Cultivated in gardens at Sadiya.

When bruised the plant at first has a pleasant smell and then an unpleasant soap-like smell. It is used as a spice.

55. *P. chinense* Linn. F. B. I. v, 44; Eng. & Prantl iii, 1a, 28; Beng. Pl. 887.

Sadiya and Dibrugarh. Nos. 596, 368 and 41176.

LOCAL NAME.—Múdhūri tēngā.

DISTRIB.—Sub-tropical and Temperate Himalayas, from Bhotan through Assam to Chittagong and Burma. The Deccan, Ceylon, Malacca, and Sumatra.

A very common weed especially on river sand. The whole plant has a reddish tinge. It is used in curry.

56. *P. glabrum* Willd. F. B. I. v, 34; Beng. Pl. 886; D. E. P. vi, 1, 318; Pharmacog. Ind. 152.

Dibrugarh. No. 119.

LOCAL NAME.—Pathūrua bhelagnī.

DISTRIB.—From Burma and Assam through Bengal westward to the Indus and in the Temperate Himalaya, Ceylon, Tropical Asia, Africa, America.

A glabrous erect annual with reddish stem almost as thick as a finger. It grows in ditches and swamps.

The juice of the plant mixed with other ingredients is said to cure pneumonia.

57. *P. perfoliatum* Linn. F. B. I. v, 46; Beng. Pl. 887.

Dibrugarh. No. 163.

DISTRIB.—Central and Eastern Himalayas (in Assam and Bengal found in the jhils). Java, China and Japan.

A curious species. The stem has recurved prickles. The leaves are triangular and are borne on very long stalks. The stipules are circular and embrace the stem. A not uncommon weed. No use is made of it but it has a pleasant acid taste and is probably wholesome.

58. *P. Fagopyrum* Linn. Camb. Br. Fl. ii, 110; Fl. Ind. ii, 292.

Fagopyrum esculentum Moench. F. B. I. v, 55; Eng. & Prantl iii, 1a, 29; D. E. P. iii, 310.

Dibrugarh. No. 21.

LOCAL NAME.—“Buckwheat.”

DISTRIB.—Cultivated throughout the Western and Eastern Himalayas to Western Tibet, also the Nilgiri Hills in the Deccan, Central Europe and North Asia.

An annual glabrous herb with triangular leaves, much cultivated about Dibrugarh. A kind of bread is made of the grain.

XXI. CHENOPODIACEAE.

47. Beta Linn.

59. B. vulgaris Linn. F. B. I. v, 5; Eng. & Prantl iii, 1a, 57; Beng. Pl. 879; Pharmacog. Ind. iii, 148.

B. vulgaris L. var. *maritima* Koch. Eng. & Prantl iii, 1a, 58; D. E. P. i, 448. *B. bengalensis* Roxb. Fl. Ind. ii, 59.

Dibrugarh. Nos. 7 and 33.

LOCAL NAME.—Biṭ Palang, Pālak (this name really belongs to *Spinacia*). “Beet.”

DISTRIB.—Cultivated in various parts of India, Europe and North Asia.

Two forms of the common Beetroot are common in cottage gardens. The form which has green leaves is used as a *sāg*, but its root is not eaten. The form which has red leaves is cultivated only for its root.

48. Chenopodium Linn.

60. C. album Linn. F. B. I. v, 3; Eng. & Prantl iii, 1a, 61; Moss. Camb. Brit. Flora ii, 157; Beng. Pl. 879; D. E. P. ii, 265; Pharmacog. Ind. iii, 148.

Dibrugarh. Nos. 77 and 165.

LOCAL NAME.—*Bathwā sāg*. The common “Goose-foot” of English gardens.

DISTRIB.—Cosmopolitan, sometimes cultivated in India.

A very variable, mealy annual with thick clusters of small, green flowers. Many forms of the plant occur in cottage gardens varying in height from 1 dm. to 3 m. No steps are taken to cultivate the plant which is merely allowed to seed. The leaves are eaten as *sāg*. Formerly in Great Britain this and other species of *Chenopodium* were used as pot-herbs but they now seem to have fallen out of use. Some cottagers told us that if it were eaten too often it caused diarrhoea and weakness. A closely allied species, *C. quinoa* L., yields one of the most esteemed grains of S. America.

61. C. ambrosioides Linn. F. B. I. v, 4; Eng. & Prantl iii, 1a, 61; Beng. Pl. 879; D. E. P. ii, 267; Pharmacog. Ind. iii, 148.

Dibrugarh. Nos. 36 and 301.

LOCAL NAME.—“Mexican Tea Weed.” “Herba Santa Maria” in Brazil.

DISTRIB.—Common in many parts of India. Widely spread both in the Old World and in America.

A stinking weed. The leaves are alternate, narrow and distantly toothed and the inconspicuous green flowers are arranged in small sessile clusters. All parts of the plant have a remarkably strong smell.

It is now a common weed throughout Lakhimpur. Though used medicinally in many parts of the world, the natives of India have never found any use for it.

American oil of Chenopodium (Baltimore Oil) is obtained from *C. ambrosioides* var. *anthelminticum* Gray, which does not, as far as is known, occur wild in India. There is a good figure of this variety, which is often considered specifically distinct and then known as *C. anthelminticum* L, in Bentley and Trimen's Medicinal Plants, Vol. iii, 216.

49. *Spinacia* Linn.

62. *S. oleracea* Linn. F. B. I. v, 6; Eng. & Prantl iii, la, 64; Camb. Brit. Fl. ii, 64; Beng. Pl. 880; D. E. P. vi, 3, 330; Pharmacog. Ind. iii, 146.

Dibrugarh. No. 97.

LOCAL NAME.—Palang, *pālak* (this name is also applied to *Beta*).
“Spinach.”

DISTRIB.—Cultivated throughout India. Native country unknown.

Frequently grown as a *sāg*. Apparently wild forms of the plant with very small leaves were sometimes found about dwellings.

XXII. AMARANTACEAE.

50. *Amaranthus* Linn.

Several species of *Amaranthus* are grown in gardens and are used as *sāg* among which the most important are:—

63. *A. paniculatus* L. F. B. I. iv, 718; Eng. & Prantl iii, la, 103; Beng. Pl. 870; D. E. P. i, 214.

Dibrugarh. Nos. 26, 78 and 106.

DISTRIB.—Cultivated throughout India and Ceylon. Also in East and West Asia and N. Africa.

64. *A. gangeticus* Linn. F. B. I. iv, 719; Beng. Pl. 870; D. E. P. i, 212.

Dibrugarh. No. 167.

LOCAL NAME.—Marsā.

DISTRIB.—In India cultivated or found as an escape. Also in Tropical Asia, Africa and America.

65. *A. mangostanus* Linn. F. B. I. iv, 720 ; Beng. Pl. 871 ; D. E. P. i, 213.

Dibrugarh. No. 27.

DISTRIB.—Throughout India and Ceylon.

51. *Achyranthes* Linn.

66. *A. bidentata* Bl. F. B. I. iv, 730 ; Eng. & Prantl iii, 1a, 112 ; Beng. Pl. 875.

Dibrugarh. No. 353.

LOCAL NAME.—Apāmārga, bankhat.

DISTRIB.—Temperate and sub-tropical regions in India, abundant in Ceylon. Also in China, Java and Japan.

The villagers state that a bit of the plant tied on the waist of pregnant women is said to induce safe delivery.

XXIII. BASELLACEAE.

52. *Basella* Linn.

67. *B. alba* Linn. Eng. & Prantl iii, 1a, 126 ; Fl. Ind. ii, 104

B. rubra Linn. F. B. I. v, 20 ; Beng. Pl. 882 ; D. E. P. i, 403 ; Pharmacog. Ind. iii, 148.

Dibrugarh. No. 2.

LOCAL NAME.—*Poī sāg*.

DISTRIB.—Throughout India, wild or cultivated and in Ceylon. Also in tropical Asia and Africa.

A glabrous, succulent twiner often grown by the country people on cottages and sheds and used by them as a *sāg*.

XXIV. PORTULACACEAE.

53. *Portulaca* Linn.

68. *P. oleracea* Linn. F. B. I. i, 246 ; Eng. & Prantl iii, 1b, 59 ; Beng. Pl. 240 ; D. E. P. vi, 1, 329 ; Pharmacog. Ind. i, 158.

LOCAL NAME.—*Noniyā*. “Purslane.”

DISTRIB.—Common in waste ground throughout India and in all warm countries.

A much branched succulent herb with wedge-shaped leaves and inconspicuous yellow flowers. Purslane is common in Lakhimpur especially on cultivated ground and near dwellings. The plant is eaten as a *sāg* and is said to have the property of absorbing and retaining the flavour of herbs with which it is cooked. This is one of the various plants formerly used as a pot-herb in Britain but now no longer used.

XXV. CARYOPHYLLACEAE.

54. *Stellaria* Linn.

69. *S. media* Linn. F. B. I. i, 230; Eng. & Prantl iii, 1b, 79; Beng. Pl. 237; D. E. P. vi, 3, 358.

Dibrugarh. No. 69.

LOCAL NAME.—“Chickweed.”

DISTRIB.—Throughout the temperate regions of India. Also in Arctic and North Temperate regions. Elsewhere doubtful native. It is probably introduced in India.

A very common and most variable weed. The chickweed is nearly as common in Lakhimpur as it is in England. It may be distinguished from all weeds like it by the lines of hairs which run on alternate sides of the stems in each succeeding internode. The dwellers in Lakhimpur are as ignorant as the English are of the fact that chickweed is very good to eat. Most cottagers told us that it was only eaten by cattle but at Ledo we met with people who knew its virtues as an article of diet. We found no local name for it.

55. *Drymaria* Willd.

70. *D. cordata* Willd. F. B. I. i, 344; Eng. & Prantl iii, 1b, 86; Beng. Pl. 238.

Dibrugarh. Nos. 28 and 80.

LOCAL NAME.—Lai jābari.

DISTRIB.—Tropical and sub-tropical India and Ceylon, in Sikkim up to 7,000 ft. Tropical Asia, Africa and America.

A very common way-side weed with opposite, cordate 3-5 nerved leaves, and interpetiolar stipules. The flowers are white and inconspicuous; the small green fruits cling to the clothes. It is known to all cottagers as a medicinal plant. The plant is heated, or more rarely, boiled, and the vapours given off are inhaled through the nose to cure headache. It is also said to be wholesome and cleansing when taken internally.

XXVI. MAGNOLIACEAE.

56. *Magnolia* Linn.

71. *M. pterocarpa* Roxb. Ann. R. B. G. Cal. iii, 2, 207 & fig. 53. Beng. Pl. 197.

M. sphenocarpa Roxb. F. B. I. i, 41; D. E. P. v, 107. *Liriodendron grandiflorum* Roxb. Fl. Ind. ii, 653.

North Lakhimpur and jungles near Dibrugarh. Nos. 307, 394.

LOCAL NAME.—Balom tūri.

DISTRIB.—Tropical East Himalayas and from Nepal through Assam to Chittagong.

A forest tree. The large fleshy cylindrical buds are chewed with *pān* and said to blacken the mouth. The broken surface of the buds soon becomes black. Pieces chewed by us had a pleasant, pungent flavour.

XXVII. ANONACEAE.

57. *Artabotrys* R. Br.

72. *A. odoratissima* (Roxb.) R. Br. Eng. & Prantl iii, 2, 37.

A. odoratissimus R. Br. F. B. I. i, 54; Beng. Pl. 202; D. E. P. i, 322. *Uvaria odoratissima* Roxb. Fl. Ind. ii, 666. *Uvaria hamata* Roxb. (*loc. cit.*)

Dibrugarh. No. 344.

DISTRIB.—Indigenous in Burma and Ceylon but cultivated throughout India. Also Java and South China.

Cultivated at Dibrugarh. Old women collect its scented flowers but we were unable to discover for what they used them. See D. E. P. (*loc. cit.*)

58. *Anona* Linn.

73. *A. squamosa* Linn. F. B. I. i, 78; Eng. & Prantl iii, 2, 37 and 38; Beng. Pl. 206; D. E. P. i, 259; Pharmacog. Ind. i, 44.

Dibrugarh. No. 56 A.

LOCAL NAME.—*Sharīfa*, ātā. “Custard apple.”

DISTRIB.—A native of Tropical America naturalised throughout India.

Cultivated for its fruits and generally found in association with *A. reticulata* L. (see below).

74. *A. reticulata* Linn. F. B. I. i, 78; Eng. & Prantl iii, 2, 38; Beng. Pl. 206; D. E. P. i, 258.

Dibrugarh. No. 56.

LOCAL NAME.—*Nonā*. “Bullock’s Heart.”

DISTRIB.—Naturalised in Bengal and elsewhere. Very common near villages.

A tree with narrow 2-ranked leaves. It is common by road-sides and in cottage gardens throughout the district. Planted, but oftener self-sown. The fruit is eaten.

XXVIII. MENISPERMACEAE.

59. *Stephania* Lour.

75. *S. hernandifolia* Walp. F. B. I. i, 103; Beng. Pl. 208; D. E. P. vi, 3, 359; Pharmacog. Ind. i, 54.

Dibrugarh. No. 131.

DISTRIB.—Bengal, Ceylon, Malay Peninsula, Australia and Africa.

A climber with finely grooved stems. The leaf stalk is attached some distance from the edge of the triangular leaf blade. A paste of the leaves is applied to the head for its cooling effect. The juice of the leaves is used as a cure for impotence.

XXIX. LAURACEAE.

60. *Cinnamomum* Bl.

76. *C. tamala* Nees & Eberm. F. B. I. v, 128; Eng. & Prantl iii, 2, 114; Beng. Pl. 899; D. E. P. ii, 319; Pharmacog. Ind. iii, 209.

Laurus Cassia Roxb. Fl. Ind. ii, 297.

Dibrugarh. No. 337.

LOCAL NAME.—*Tējpāt*.

DISTRIB.—Tropical and sub-tropical Himalaya from near the Indus to Bhotan, Sylhet and Khasi Hills, cultivated in other parts.

A tree with aromatic 3-nerved leaves which are used as a condiment. Cultivated on a small scale. This is one of the trees whose bark is sold as 'Cassia Lignea' or 'Cassia Cinnamon' which is inferior to the bark of the true Cinnamon (*Cinnamomum zeylanicum* Breyn.).

61. *Machilus* Nees.

77. *M. bombycina* King mss. F. B. I. v, 861; Beng. Pl. 900; Ind. Trees, 531.

Jokai. No. 171.

LOCAL NAME.—*Sūm*.

DISTRIB.—According to Hooker (*loc. cit.*) it is said to be cultivated in the Assam Valley and along the Lower Himalaya as far west as Nepal. Brandis (*loc. cit.*) states that it forms extensive forests in the Sibsagar District. According to Prain (*loc. cit.*) it is also found in Chittagong.

The tree on which the muga silk worm feeds. It is extensively planted in orchards (*bāris*). In March the trees are covered with fresh green leaves and look very beautiful.

62. *Litsea* Lamk.

78. *L. polyantha* Juss. F. B. I. v, 162; Beng. Pl. 903; D. E. P. v, 82.

Tetranthera monopetala Roxb. Fl. Ind. iii, 821.

Margherita. No. 111.

DISTRIB.—From the Punjab and the Salt Range eastwards chiefly along the foot of the Himalaya ascending to 3,000 feet to Assam, and through Chittagong to Burma; also in the Coromandel and Penang, Java and China.

This is a common tree in Upper Assam and is planted about Dibrugarh. There are some good specimens of it on the Red Road which look very lovely when laden with masses of yellow flowers. Its leaves are sometimes used for the muga silk worm but it is much less used than *Sūm* (*Machilus bombycina* King).

XXX. CRUCIFERAE.

63. *Lepidium* Linn.

79. *L. sativum* Linn. F. B. I. i, 159; Eng. & Prantl iii, 2, 161; Beng. Pl. 223; D. E. P. iv, 627; Pharmacog. Ind. i, 120.

Dibrugarh. No. 83.

LOCAL NAME.—*Chānsur*. “Cress.”

DISTRIB.—Not known wild. Cultivated in many countries.

This is the common cress. It is grown in cottage gardens and eaten as a vegetable.

64. *Brassica* Linn.

80. *B. juncea* Hook. f. & Thom. F. B. I. i, 157; Beng. Pl. 220; D. E. P. i, 528; Pharmacog. Ind. i, 123.

Dibrugarh. No. 5.

LOCAL NAME.—*Rāi* (lāi). “Indian Mustard.”

DISTRIB.—Largely cultivated throughout India.

A favourite crop of the up-country settlers in Lakhimpur. Mustard oil is expressed from the seeds.

65. *Raphanus* Linn.

81. *R. sativus* Linn. F. B. I. i, 166; Eng. & Prantl iii, 2, 179; Beng. Pl. 224; D. E. P. vi, 1, 393; Pharmacog. Ind. i, 129.

Dibrugarh. Nos. 37 and 38.

LOCAL NAME.—*Mūlī*. “Radish.”

DISTRIB.—Cultivated in all temperate and warm countries.

In Lakhimpur grown in cottage gardens. We met two forms of the plant which the natives, however, do not distinguish. One form has pale foliage and white flowers, the other has dark foliage and mauve flowers. The seeds yield an oil.

XXXI. CAPPARIDACEAE.

66. *Cleome* Linn.

82. *C. spinosa* Jacq. Enum. Pl. Carib. 26; Linn. Sp. Pl. 939.

C. spinosa Linn. Eng. & Prantl iii, 2, 223. *C. heptaphylla* L. F. B. I. i, 168.

Margherita, found in railway station and on river banks. Nos. 124 and 41123.

DISTRIB.—Native of the West Indies. Now found in many parts of India.

A tall glandular herb with 7-foliolate leaves and handsome purple flowers, with conspicuous stamens. The whole plant gives out a curious fox-like smell. A native of the West Indies, this plant is now extensively naturalised in Upper Assam, thriving especially on river sand, often far from human habitations. It is sometimes grown in cottage gardens. A paste of the seeds applied locally is said to cure headache.

67. *Pedicellaria* Schrank.

83. *P. pentaphylla* (L.) Schrank. Eng. & Prantl iii, 2, 223.

Gynandropsis pentaphylla DC. F. B. I. i, 171; Beng. Pl. 225; D. E. P. iv, 190; Pharmacog. Ind. i, 132. *Cleome pentaphylla* Linn. Fl. Ind. ii, 126.

Dibrugarh. No. 89.

LOCAL NAME.—*Hurhur*, *hulhul*. Both names are applied to this and several allied herbs.

DISTRIB.—Abundant throughout the warm parts of India and all tropical countries.

A weed with 5-foliolate leaves, and 3-foliolate bracts, common throughout India. A paste of the seeds is applied locally in headache.

68. *Crataeva* Linn.

84. *C. religiosa* Forst. F. B. I. 172; Eng. & Prantl iii, 2, 228; Beng. Pl. 227; D. E. P. ii, 583; Pharmacog. Ind. i, 133.

Capparis trifoliata Roxb. Fl. Ind. ii, 571.

Dibrugarh. No. 137.

LOCAL NAME.—*Barūnī*.

DISTRIB.—Throughout India, Burma and Ceylon. Also in Tropical Africa. According to Hooker indigenous in Malabar and Canara, cultivated elsewhere.

A tree with 3-foliolate leaves and conspicuous inflorescences of yellowish flowers. It is common throughout Lakhimpur near water. The bark is pounded and applied to painful parts (especially so used in headache).

XXXII. MORINGACEAE.

69. *Moringa* Juss.

85. *M. oleifera* Lam. Encyclop. i, 398; Eng. & Prantl iii, 2, 244.

Moringa pterygosperma Gaertn. F. B. I. ii, 45; Beng. Pl. 357; D. E. P. v, 276; Pharmacog. Ind. i, 396.

Dibrugarh. No. 46.

LOCAL NAME.—*Sahajnā*. "Horse Radish Tree."

DISTRIB.—Wild in the forests of the Western Himalaya and Oudh. Cultivated throughout India and in many other tropical countries.

An untidy tree with 2-3 pinnate leaves, white flowers and very long pods. The plant is pungent and all parts of it, even the twigs, are used in cooking. Because of the tearing and hacking it thus suffers, a good specimen of the tree is seldom seen.

XXXIII. CRASSULACEAE.

70. *Bryophyllum* Salisb.

86. *B. calycinum* Salisb. F. B. I. ii, 413; Eng. & Prantl iii, 2a, 34; Beng. Pl. 470; D. E. P. i, 543; Pharmacog. Ind i, 590.

B. pinnatum Kurz. Jour. As. Soc. Beng. 1876, ii, 309. *Cotyledon rhizophylla* Roxb. Fl. Ind. ii, 456.

LOCAL NAME.—Ass, do-pahar tēngā (acid at noon).

DISTRIB.—In all tropical countries. Probably originally native of Africa.

A stout succulent herb with pinnate upper leaves from whose crenatures young plants readily arise. Common near houses. The leaves are eaten as *sāg*. They are said to taste more strongly acid at noon than at any other time of the day.

XXXIV. ROSACEAE.

71. *Rubus* Linn.

87. *R. moluccanus* Linn. F. B. I. ii, 330; Eng. & Prantl. iii, 3, 30; D. E. P. vi, 1, 583.

North Lakhimpur. No. 396.

LOCAL NAME.—Chitūli pakā.

DISTRIB.—From the Central and Eastern Himalayas to Burma, Deccan and Ceylon. Malay.

Very common in North Lakhimpur. The fruits are good to eat and the young leaves are used for sores about children's mouths. A hill plant not usually found below 3,000 ft.

72. *Eriobotrya* Lindl

88. *E. japonica* Lindl. F. B. I. ii, 370; Eng. & Prantl iii, 3, 25; Beng. Pl. 468; D. E. P. iii, 257.

Dibrugarh. No. 24.

LOCAL NAME.—“Loquat.”

DISTRIB.—Cultivated in many parts of India. Indigenous in China and Japan.

A tree with stout, crooked twigs bearing rosettes of tough, elliptic leaves which are woolly beneath. It is common in cottage gardens where it is grown for its fruits which are known as loquats.

73. *Prunus* Linn.

89. *P. persica* Benth. & Hk. f. F. B. I. ii, 313; D. E. P. vi, 1, 349.

P. persica (Linn.) Sieb. & Zucc. Eng. & Prantl iii, 3, 53.

Dibrugarh. No. 1.

LOCAL NAME.—Hambarua. "Peach."

DISTRIB.—Cultivated in the cooler parts of India and in all cool countries. Probably native of China.

Very commonly cultivated in cottage gardens. Though we never saw it far from cultivation we were interested to see how much at home the peach is in Upper Assam. It will be remembered that De Candolle in his "Origin of Cultivated Plants" concludes that the peach is a native of China and that the Chinese carried it into Kashmir, Bokhara and Persia : with the last of these countries it is generally associated in the minds of Europeans.

90. *P. triflora* Roxb. F. B. I. ii, 315.

P. trifolia Roxb. Fl. Ind. ii, 501.

Dibrugarh. No. 63.

LOCAL NAME.—Nara bogri.

DISTRIB.—Burma also in China.

A small tree in cottage gardens. The fruit is glabrous and red when ripe.

XXXV. LEGUMINOSAE.

SUB-FAMILY—MIMOSOIDEAE.

74. *Leucaena* Benth.

91. *L. glauca* Benth. F. B. I. ii, 290; Eng. & Prantl iii, 3, 115; Beng. Pl. 455; D. E. P. iv, 632.

Jokai. No. 182.

LOCAL NAME.—Toira kadam.

DISTRIB.—Probably indigenous only in Tropical America. Now common in India, tropical Asia and Africa.

A low tree or shrub with 2-pinnate leaves and whitish flowers in dense globose heads. The bark is eaten for internal pain. The wood is hard. The young fruits and ripe seeds are edible. It has been recently pointed out that a substitute for coffee can be made from the ripe seeds.

SUB-FAMILY—CAESALPINIOIDEAE.

75. *Tamarind* Linn.

92. *T. indica* Linn. F. B. I. ii, 273; Eng. & Prantl iii, 3, 139; Beng. Pl. 444; D. E. P. vi, 3, 404; Pharmacog. Ind. i, 532.

Dibrugarh. No. 54.

LOCAL NAME.—*Imli*. "Tamarind."

DISTRIB.—Throughout India and the Tropics.

A beautiful tree with graceful pinnate leaves which sleep at night; and fragrant flowers. The fruit has a brittle shell which encloses the pulp and the seeds. Common throughout the district. The pulp of the fruit is sold in the bazars and used medicinally for various purposes (see *Amorphophallus*). There are many superstitions about this tree in which ghosts are supposed to abide.

76. *Bauhinia* Linn.

93. *B. purpurea* Linn. F. B. I. ii, 284; Eng. & Prantl iii, 3, 151; Beng. Pl. 442; D. E. P. i, 421.

Saikho a No. 319.

LOCAL NAME.—Kōinār sāg.

DISTRIB.—From the foot of the West Himalayas and Khasi Hills to Ceylon and Burma. Also in Penang and China. Often planted.

Bauhinias are familiar to all dwellers in India. The curious two-lobed leaf characteristic of the genus was the occasion for naming it after the Brother Bótanists, Johann and Caspar Bauhin. *B. purpurea* Linn. is often grown in cottage garden hedges. The young leaves are used as a sāg.

77. *Caesalpinia* Linn.

94. *C. bonducella* Roxb. Eng. & Prantl iii, 3, 174; Fl. Ind. ii, 357.

C. Bonducella Fleming. F. B. I. ii, 254; Beng. Pl. 449; D. E. P. ii, 3; Pharmacog. Ind. i, 496.

LOCAL NAME.—Nata leta guti, *kaṭ karanj*.

DISTRIB.—Throughout India. Cosmopolitan in the Tropics

A shrub with large 2-pinnate leaves. All parts of the plant, especially the pods, are covered with prickles. It is common in hedges. The large round seeds are used for many medicinal purposes, especially for stomach ache. It is often compounded with lemon.

95. *C. sappan* Linn. F. B. I. ii, 255; Eng. & Prantl iii, 3, 175; Beng. Pl. 449; D.-E. P. ii, 10; Pharmacog. Ind. i, 500.

Jaipur, Phākial basti. No. 194.

LOCAL NAME.—Māk.

DISTRIB.—Eastern and Western Peninsulas and Burma. Also in Malaya.

A shrub with twice pinnate leaves and smooth, flat, woody pods. The Phākials take a paste of the seeds internally to cure fevers.

SUB-FAMILY—PAPILIONATAE.

78. *Trigonella* Linn.

96. *T. Foenum-graecum* Linn. F. B. I. ii, 87; Eng. & Prantl iii, 3, 244; Beng. Pl. 414; D. E. P. vi, 4, 86; Pharmacog. Ind. i, 401.

Dibrugarh. No. 95.

LOCAL NAME.—*Methī* (see also No. 97). “Fenugreek.”

DISTRIB.—Kashmir, Punjab and the Upper Gangetic Plain. Widely cultivated in India. Also in West Asia and Southern Europe.

Cultivated as a *sāg* about Dibrugarh. The whole plant, especially when dried, has a strong smell. It is used in Switzerland for flavouring cheese. The ancients attributed many medicinal properties to this plant which is still much used in Egypt; but present dwellers in Lakhimpur look upon it merely as a *sāg*. They moreover confuse it with *Melilotus indica* All. a plant readily distinguished by its long racemes of yellow flowers and inconspicuous pods. The pods of fenugreek are about 3 inches long, often strongly curved, and have a long beak.

79. *Melilotus* Juss.

97. *M. indica* All. Eng. & Prantl iii, 3, 248; Beng. Pl. 413.

M. parviflora Desv. F. B. I. ii, 89; D. E. P. v, 225; Pharmacog. Ind. i, 405.

Dibrugarh. No. 94.

LOCAL NAME.—*Methī sāg* (this name properly belongs to *Trigonella Fœnum-græcum* L. (No. 96).

DISTRIB.—From the Punjab eastwards to Bengal, in the Western Peninsula and Afghanistan. Also in Europe and West Asia. Introduced in many other regions.

An annual herb with 3-foliolate leaves and racemes of small yellow flowers. The pods are inconspicuous. It is used as a *sāg* but is often confused with *Trigonella Fœnum-græcum* Linn.

80. *Cyamopsis* DC.

98. *C. tetragonoloba* Linn. Eng. & Prantl iii, 3, 259.

C. psoralioides DC. F. B. I. ii, 92; Beng. Pl. 429; D. E. P. ii, 673.
Dolichos fabaeformis Roxb. Fl. Ind. iii, 316.

Sadiya. No. 80.

LOCAL NAME.—*Gūār*.

DISTRIB.—From the Himalaya to the Western Peninsula and Ceylon, but perhaps always cultivated. Also in Afghanistan.

A hairy annual with 3-foliolate leaves and dentate leaflets. It is grown in cottage gardens at Sadiya where the Marwaris have introduced it. The pods are eaten as a vegetable.

81. *Indigofera* Linn.

99. *I. anil* Linn. DC. Prod. ii, 225; F. B. I. ii, 99; Eng. & Prantl iii, 3, 262; Prain & Baker in Journ. Bot. 1902, 136—44; D. E. P. iv, 383.

I. suffruticosa Mill. Beng. Pl. 432.

Jokai. No. 176.

LOCAL NAME.—*Ilāngōni*. “West Indian Indigo.”

DISTRIB.—Native of America, cultivated in India.

A shrub with simple leaves, flowers in racemes and very numerous curved pods. It is grown in cottage gardens. The pounded bark is taken internally for stomach complaints.

82. *Sesbania* Pers.

100. *S. aegyptiaca* Pers. F. B. I. ii, 114; Eng. & Prantl iii, 3, 278; Beng. Pl. 403; D. E. P. vi, 2, 543; Pharmacog. Ind. i, 474.

Dibrugarh. No. 147.

LOCAL NAME.—Jintri, *jyantī*.

DISTRIB.—Throughout India, from the Himalayas to Ceylon. Cosmopolitan in the tropics of the Old World.

A shrub with yellow or red flowers and long flexible pods. This plant is a common cottage ornament. The flowers are used in certain Pujas. A well known medicinal plant.

83. *Aeschynomene* Linn.

101. *A. indica* Linn. F. B. I. ii, 151; Eng. & Prantl iii, 3, 319; Beng. Pl. 418; D. E. P. i, 126.

Hedysarum Neli-Tali Roxb. Fl. Ind. iii, 365.

Dibrugarh. No. 330.

LOCAL NAME.—*Sholā*.

DISTRIB.—Throughout India and Ceylon and Siam. Cosmopolitan in the tropics.

A glabrous shrub with fine, pinnate leaves, yellowish flowers, and rough 7-9-jointed pods. The pith is the Sola used for making hats: it is also used for tinder. This plant is not uncommon in wet places.

84. *Cicer* Linn.

102. *C. arietinum* Linn. F. B. I. ii, 176; Eng. & Prantl iii, 3, 350; Beng. Pl. 366; D. E. P. ii, 274.

Dibrugarh. No. 51.

LOCAL NAME.—*Chanā*. "Gram."

DISTRIB.—Extensively cultivated throughout India, especially in the Northern Provinces. Also in other temperate and tropical countries.

A small vetch-like herb whose leaflets are serrate towards their ends. It is occasionally cultivated about Dibrugarh for fodder but it never ripens fruit.

85. *Vicia* Linn.

103. *V. faba* Linn. F. B. I. ii, 179; Eng. & Prantl iii, 3, 351; Beng. Pl. 367; D. E. P. vi, 4, 234.

Dibrugarh. No. 162.

LOCAL NAME.—*Baqla*.

DISTRIB.—Origin unknown. Cultivated in prehistoric times.

In Lakhimpur occasionally cultivated in cottage gardens.

86. *Lathyrus* Linn.

104. *L. sativus* Linn. F. B. I. ii, 179 ; Eng. & Prantl iii, 3, 353 ; Beng. Pl. 368 ; D. E. P. iv, 590.

Dibrugarh. No. 19.

LOCAL NAME.—*Kisārā*.

DISTRIB.—Cultivated all over India. Also in West Asia, Tropical Africa and parts of Europe.

Much cultivated throughout the province. A small vetchling. The stems and petioles are winged. The flowers are usually sky blue and the upper border of the pod has two wings. Peasants about Dibrugarh told us that regular use of the grain caused paralysis. One man went so far as to say that no one should eat it oftener than once in two months. Animals are apparently immune from its evil effects as cows fatten kindly on it and give much milk. For the poisonous properties of this pulse see Report on Lathyrism in the Central Provinces in 1896—1902, by Major Andrew Buchanan, I.M.S. (1904).

87. *Pisum* Linn.

105. *P. sativum* Linn. F. B. I. ii, 181 ; Eng. & Prantl iii, 3, 355 ; Beng. Pl. 369 ; D. E. P. vi, 1, 277 ; Pharmacog. Ind. i, 489.

Dibrugarh. No. 10.

LOCAL NAME.—*Maṭar*. “Garden Pea.”

DISTRIB.—Cultivated throughout the world.

The ordinary green pea of English vegetable gardens recognised by its huge stipules. It is commonly cultivated throughout the district.

88. *Cajanus* DC.

106. *C. indicus* Spreng. F. B. I. ii, 217 ; Eng. & Prantl iii, 3, 372 ; Beng. Pl. 383 ; D. E. P. ii, 12 ; Pharmacog. Ind. i, 489.

Dibrugarh. No. 20.

LOCAL NAME.—*Arhar*. “Pigeon Pea.”

DISTRIB.—Extensively cultivated throughout India up to an altitude of 6,000 ft. in the Himalayas. Cosmopolitan in the tropics, probably a native of the Old World.

An erect shrub with 3-foliolate leaves and silky branches. Cultivated here and there for its seeds which are used as pulse.

89. *Phaseolus* Linn.

107. *P. mungo* Linn. Eng. & Prantl iii, 3, 380 ; Beng. Pl. 387.

P. mungo Linn. var. *radiatus* Linn. F. B. I. ii, 203 ; D. E. P. vi, 1, 191 ; Pharmacog. Ind. i, 488.

P. radiatus Roxb. Fl. Ind. iii, 296.

Dibrugarh. No. 341.

LOCAL NAME.—*Māṭī kalāṅ, māsh*.

DISTRIB.—Extensively cultivated all over India and in tropical regions.

An extensively cultivated pulse, with 3-foliolate leaves and bright yellow flowers. It is particularly common about Sadiya where it is grown to pay off debts. The leaves are very variable.

90. *Vigna Savi.*

108. *V. sinensis* Endl. var. *sesquipedalis* Hassk. Pl. Jav. Rar. 386 ; Eng. & Prantl iii, 3, 381.

V. Catiang Endl. F. B. I. ii, 205 (in part) ; Beng. Pl. 389 ; D. E. P. vi, 4, 236 ; Pharmacog. Ind. i, 489.

Dibrugarh. No. 388.

LOCAL NAME.—Lasar māh.

DISTRIB.—Cosmopolitan in the tropics but mainly cultivated.

In Lakhimpur occasionally grown in cottage gardens. The foliage resembles that of the scarlet runner. The pods are long and usually arranged in pairs. The seeds are eaten as a pulse.

109. *V. Catjang* Walp. Linnaea, xiii, 533 ; Ind. Kew. iv, 1199.

Sadiya. No. 381.

LOCAL NAME.—It is locally called “Moth,” a name which properly belongs to *Phaseolus aconitifolius* Jacq.

DISTRIB.—Cosmopolitan in the tropics.

A bean brought by Marwaris to Sadiya. Used as a vegetable. The seeds are pounded to make sweetmeats.

91. *Pachyrrhizus* Rich.

110. *P. bulbosus* (L.) Britton Eng. & Prantl iii, 3, 383.

P. angulatus Rich. F. B. I. ii, 207 ; Beng. Pl. 390 ; D. E. P. vi, 1, 1.

Dolichos bulbosus Roxb. Fl. Ind. iii, 309.

Dibrugarh. No. 356.

LOCAL NAME.—Pānī ālū.

DISTRIB.—Cultivated throughout India, but not known in a wild state. In Tropical Asia and America.

This is the common “Sankh ālū” of Bengal. It may be recognised by its flattened, hairy pods with wavy margins. The large tuberous root is eaten both raw and cooked. No other part of the plant is of use.

92. *Dolichos* Linn.

111. *D. lablab* Linn. F. B. I. ii, 209 ; Eng. & Prantl iii, 3, 383 ; Beng. Pl. 391 ; D. E. P. iii, 183 ; Pharmacog. Ind. i, 489.

Dibrugarh. No. 3.

LOCAL NAME.—*Sem*

DISTRIB.—Universally cultivated throughout India, ascending in the Himalayas to 6-7,000 ft. Said to be found wild. Cultivated also in the tropics of the Old World.

A twiner whose curious coarse pods are used as *sāg*. The plant is common in cottage gardens.

XXXVI. OXALIDACEAE.

93. *Oxalis* Linn

112. *O. corniculata* Linn. F. B. I. i, 436; Eng. & Prantl iii, 4, 20; Beng. Pl. 294; D. E. P. v, 658; Pharmacog. Ind. i, 246.

Dibrugarh. No. 101.

LOCAL NAME.—Tengā se tengā.

DISTRIB.—Cosmopolitan. In India common everywhere by road-sides and on cultivated ground.

A common wood-sorrel with 3-foliate leaves and bright yellow flowers, very common by road-sides. It is eaten as a vegetable but some say that it purges.

113. *O. corymbosa* DC. Prodr. i, 696; Rec. Bot. Surv. vi, 1, 8, & fig. ix.

O. Martiana Zucc. Denkschr. Akad. Muench. ix, 144.

Dibrugarh. No. 102.

LOCAL NAME.—Tengā se tēnga.

DISTRIB.—Native of Madagascar. Introduced into India and recorded from Darjeeling and other temperate parts of India.

This plant also called “tengā se tengā” is a larger species than *O. corniculata* Linn. and it has larger pink flowers. It is a curse in the European gardens throughout Upper Assam. The underground parts of the plant consists of numberless small tubers budding off a central tuberous mass. These young tubers fall into the soil as the plant is uprooted rendering its extermination impossible. The tubers are eaten by cottagers and have a pleasant flavour.

XXXVII. LINACEAE.

94. *Linum* Linn.

114. *L. usitatissimum* Linn. F. B. I. i, 410; Eng. & Prantl iii, 4, 31; Beng. Pl. 289; D. E. P. v, 2; Pharmacog. Ind. i, 239.

Dibrugarh. No. 50.

LOCAL NAME.—*Alsī*. “Linseed” and “Flax.”

DISTRIB.—Believed to be a native of the Mediterranean region. Cultivated in both eastern and western hemispheres. In India grown chiefly for its oil seeds.

The flax plant. A slender herb with narrow leaves and pretty blue flowers. It is often grown along the borders of fields. Oil is expressed from the seeds. The flax of Europe which yields the linen fibre is another variety of this plant which has never been successfully cultivated in India.

XXXVIII. **RUTACEAE.**95. **Zanthoxylum** Linn.

115. **Z. Hamiltonianum** Wall. F. B. I. i, 494; D. E. P. vi, 4, 325; Pharmacog. Ind. i, 256.

Dibrugarh. No. 127.

LOCAL NAME.—Teza mui, tej-moi.

DISTRIB.—From Sikkim through Assam to Burma.

A prickly, foetid shrub with pinnate leaves each with 2 or 3 pairs of glossy leaflets. It occurs in the jungle and is fostered by herbalists. The root is used for toothache, stomach ache and boils.

96. **Murraya** Linn.

116. **M. Koenigii** Spreng. F. B. I. i, 503; Eng. & Prantl iii, 4, 188; Beng. Pl. 302; D. E. P. v, 288; Pharmacog. Ind. i, 262.

Dibrugarh. No. 145 and Jokai No. 188.

LOCAL NAME.—Maskoita.

DISTRIB.—Along the foot of the Himalayas from Garhwal to Sikkim up to 5,000 ft., Bengal and Burma southward to Travancore and Ceylon. Often cultivated.

A very ornamental tree often grown in cottage gardens. It has long pinnate leaves and dense, corymbose inflorescences of beautiful white flowers. The juice of the root is said to be good for pain associated with the kidney.

97. **Aegle** Correa.

117. **A. marmelos** Correa. F. B. I. i, 516; Eng. & Prantl iii, 4, 194; Beng. Pl. 305; D. E. P. i, 117; Pharmacog. Ind. i, 277.

Dibrugarh. No. 86.

LOCAL NAME.—*Bel*.

DISTRIB.—Throughout India, often cultivated for the fruit.

A tree with strong straight thorns and 3-foliolate, deciduous leaves. The fruits are as large as pumelos and have a woody rind. The bel tree is very commonly cultivated in cottage gardens throughout the district. The fruits are used in dysentery.

98. **Citrus** Linn.

118. **C. aurantium** L. F. B. I. i, 515; Eng. & Prantl iii, 4, 198; D. E. P. ii, 335; Pharmacog. Ind. i, 269.

Sadiya. No. 376.

LOCAL NAME.—Sakulā tengā. A similar name is, in the list of cultivated plants of Assam (*teste* Agri. Dept. Ass. Bul. i.) given to a variety of Citron. "Orange."

DISTRIB.—Hot valleys along the foot of the Himalayas extending to Sikkim and the Khasi Hills. Cultivated in many countries.

119. *C. medica* L. var. *genuina* Engl. Eng. & Prantl iii, 4, 200.

C. medica L. var. *proper* Hook. f. F. B. I. i, 514; D. E. P. ii, 350.

C. medica L. var. *typica* Prain. Beng. Pl. 306.

Sadiya. No. 384.

LOCAL NAME.—Ass, jhara tengā, *turung*. “Citron.”

DISTRIB.—Throughout the warm moist regions of India generally cultivated but said to be found wild in parts of the Central and Eastern Himalayas also in Chittagong and the Western Peninsula.

Cultivated in Sadiya. The fruits are eaten.

120. *C. medica* L. var. *acida* Hook. f. F. B. I. i, 515; Eng. & Prantl iii, 4, 200 Beng. Pl. 306; D. E. P. ii, 355; Pharmacog. Ind. i, 269.

C. hystrix DC. var. *acida* (Roxb.) Bonavia. Eng. & Prantl iii, 4, 200. *C. acida* Roxb. Fl. Ind. iii, 390.

Sadiya. No. 375.

LOCAL NAME.—Nimū tengā. “Sour Lime.”

DISTRIB.—Cultivated throughout India and Burma, said to be wild in the warm valleys of the outer Himalayas from Gharwal through Sikkim to Assam and Chittagong. Cultivated in many countries.

The fruits are used along with the seeds of *Caesalpinia bonducella* for stomach ache.

XXXIX. MELIACEAE.

99. *Melia* Linn.

121. *M. azedarach* Linn. F. B. I. i, 544; Eng. & Prantl iii, 4, 288; Beng. Pl. 313; D. E. P. v, 221; Pharmacog. Ind. i, 330.

LOCAL NAME.—Bakāyan, ghorā nim. “Persian Lilac.”

DISTRIB.—Persia, China. Naturalised throughout India and Burma, said to be wild in the Himalayan tract; cultivated elsewhere.

The so-called “Persian Lilac.” A tree with large twice pinnate, fern-like leaves and panicles of beautiful lilac flowers. It is common throughout the district and is often infested with *Loranthus* (*q. v.*). The fruits are poisonous but are sometimes used medicinally. The stones of the fruits are used as beads.

100. *Azadirachta* Juss.

122. *A. indica* A. Juss. Eng. & Prantl iii, 4, 288; Ind. Trees, 139.

Melia Azadirachta Linn. F. B. I. i, 544; Beng. Pl. 314; D. E. P. v, 211; Pharmacog. Ind. i, 322.

LOCAL NAME.—*Nīm*.

DISTRIB.—A common tree throughout the greater part of India, often planted, as it is in all hot climates.

A tree with simply pinnate leaves. The leaflets are very oblique. It is common throughout India and all parts of it are used medicinally.

101. Dysoxylum Blume.

123. D. Hamiltonii Hiern F. B. I. i, 548; Eng. & Prantl iii, 4, 292; D. E. P. iii, 199.

Dibrugarh. No. 126.

LOCAL NAME.—Gendheli pama.

DISTRIB.—Darjeeling Terai to Assam and Sylhet.

A tall tree found in the jungles. All parts are strongly foetid of garlic. The pinnate leaves are very long and the leaflets are oblong and very oblique at the base. The bark is used internally for pains in the stomach.

XL. EUPHORBIACEAE.**102. Phyllanthus Linn.**

124. P. reticulatus Poir. F. B. I. v, 288; Eng. & Prantl iii, 5, 19; Beng. Pl. 935; D. E. P. vi, 1, 223; Pharmacog. Ind. iii, 261.

Dibrugarh. No. 123.

LOCAL NAME.—Henkotia.

DISTRIB.—Throughout tropical India, Burma and Ceylon. Also Tropical Africa, China and Malay Islands.

A much branched shrub with oblong leaves. The juice is used for diarrhoea in infants.

125. P. emblica Linn. F. B. I. v, 289; Eng. & Prantl iii, 5, 20; Beng. Pl. 935; D. E. P. vi, 1, 217; Pharmacog. Ind. iii, 261.

Phakyal basti. No. 195.

LOCAL NAME.—Amloki, *amlā*, auñla. “Emblie Myrobalan.

DISTRIB.—Throughout Tropical India and Burma wild or planted, Ceylon, Malaya Peninsula and China.

A tree with numerous very small leaves, which are arranged in one plane so that the branchlets look like pinnate leaves. It is often grown in cottage gardens. The fruits, known as the Emblic Myrobalans, are astringent and are eaten.

103. Baccaurea Lour.

126. B. sapida Muell. Arg. F. B. I. v, 371; Eng. & Prantl iii, 5, 30; Beng. Pl. 940; D. E. P. ii, 362.

Pierardia sapida Roxb. Fl. Ind. ii, 254.

Jokai. No. 178.

LOCAL NAME.—Leteka tēngā.

DISTRIB.—Base of the Eastern Himalayas through Assam to Burma, Malaya Peninsula and Andamans.

One tree seen in the cottage garden in Jokai. Fruits are eaten.

104. *Antidesma* Linn.

127. A sp. probably *A. Bunius* Spreng. F. B. I. v, 358; D. E. P. i, 269; Beng. Pl. 938.

Dibrugarh. No. 154.

LOCAL NAME.—Hengas tēgā.

A large tree with mouse-tail like inflorescences. The acid fruits are eaten.

105. *Bischofia* Blume.

128. *B. javanica* Blume. F. B. I. v, 345; Beng. Pl. 926; D. E. P. i, 454.

B. trifoliata Eng. & Prantl iii, 5, 33. *Andrachne trifoliata* Roxb. Fl. Ind. iii, 728.

Dibrugarh. No. 158.

LOCAL NAME.—Uriya ām.

DISTRIB.—Indo-Malay region and Pacific Islands.

A common forest tree. The leaves are trifoliate and the flowers are dioecious in copious panicles. The natives attribute many properties to it. The juice, which becomes red on keeping, cures sores.

106. *Croton* Linn.

129. *C. caudatus* Geisel. F. B. I. v, 388; Eng. & Prantl iii, 5, 39; Beng. Pl. 943; D. E. P. ii, 615.

C. drupaceus Roxb. Fl. Ind. iii, 683.

Jungles near Dibrugarh. No. 305 also No. 185.

LOCAL NAME.—Latā māhudi.

DISTRIB.—Eastern Himalayas to Assam and Burma, the Deccan, Malacca, Ceylon, Java, Philippines.

A scurfy shrub, often climbing, with long inflorescences of whitish flowers. It is common in the jungles about Dibrugarh and very common about Jaipur. The young leaf buds are pounded up with the leaves of *Caesalpinia sappan* Linn. and used for liver diseases.

130. *C. tiglium* Linn. F. B. I. v, 393; Eng. & Prantl iii, 5, 39; Beng. Pl. 943; D. E. P. ii, 617; Pharmacog. Ind. iii, 281.

North Lakhimpur. No. 398.

LOCAL NAME.—Kanī bhī, *jaipāl*. “Croton-oil-plant.”

DISTRIB.—Cultivated or naturalised in Eastern Bengal, Assam and Burma. According to Haines it is found wild in British Bhutan in forests remote from any cultivation. Believed to be a native of the Malay Archipelago. Found also in Ceylon and China.

A low tree. The seeds yield the well known croton oil. In Lakhimpur the seeds are ground in water and the infusion is used to kill insect pests.

107 Ricinus Linn.

131. R. communis Linn. F. B. I. v, 457; Eng. & Prantl iii, 5, 71; Beng. Pl. 952; D. E. P. vi, 1, 506; Pharmacog. Ind. fii, 301.

Dibrugarh. No. 32.

LOCAL NAME.—*Arand*. “Castor-oil Plant.”

DISTRIB.—Cultivated throughout India and naturalised near habitations. Probably indigenous in Africa.

The common castor oil plant, A huge, rapidly growing annual with red or green palmately lobed leaves. It is grown very extensively in cottage gardens. The leaves are used as a food for the Eri silk worm.

108. Manihot Adans.

132. M. utilissima Pohl. F. B. I. v, 239; Eng. & Prantl iii, 5, 79; Beng. Pl. 940; D. E. P. v, 157; Pharmacog. Ind. iii, App. 203.

Sadiya. No. 362.

LOCAL NAME.—Himlū ālū. “Cassava.”

DISTRIB.—Native of South America. Cultivated in nearly all tropical regions.

A large shrub with palmately lobed leaves. It is a native of Brazil, but now forms the chief food of many tropical countries. The tubers yield “tapioca.” In Lakhimpur grown in basti gardens.

109. Euphorbia Linn.

133. E. hirta Linn. Sp. Pl. 454; Amoen. Acad. iii, 114.

E. pilulifera Linn. F. B. I. v, 250; Eng. & Prantl iii, 5, 104; Beng. Pl. 925; D. E. P. iii, 298; Pharmacog. Ind. iii, 247, 261. *E. hirta* Willd. Fl. Ind. ii, 472.

Dibrugarh. No. 75.

LOCAL NAME.—Dūdyā (a name applied to many plants with milky juice).

DISTRIB.—Throughout all the hotter parts of India and Ceylon. Found in all tropical and sub-tropical countries.

Commonly, but wrongly, known as *E. pilulifera* Linn. A very common weed with opposite leaves which are very oblique at the base and very dense conical inflorescences. The whole plant is covered with crisped hairs. The milk which flows freely from the broken plant is applied locally to stop bleeding. In some parts of India this plant is collected on a large scale for sale in America where it is used in the preparation of proprietary medicines.

XLI. ANACARDIACEAE.

110. *Spondias* Linn.

134. *S. mangifera* Willd. F. B. I. ii, 42; Eng. & Prantl iii, 5, 151; Beng. Pl. 356; D. E. P. vi, 3, 338; Pharmacog. Ind. i, 395, 549. Margherita. No. 117.

LOCAL NAME.—*Amrā*. “Hog-Plum.”

DISTRIB.—Throughout India, wild and cultivated; Tropical Asia.

A small tree all parts of which have a peculiar penetrating mango-like smell. The leaves are pinnate, each leaflet has a strong vein running near to and parallel with the margin. This tree is fairly common throughout Lakhimpur. The bark when cut is spongy, pink, and very strong smelling. The trees are generally much cut and slashed by the natives but we could not find out the reason for this. The fruits, “Hog plums” are eaten and have medicinal reputation.

XLII. HIPPOCASTANACEAE.

111. *Aesculus* Linn.

135. *A. punduana* Wall. F. B. I. i, 675; Eng. & Prantl iii, 5, 276; D. E. P. i, 128.

Jokai. No. 172.

LOCAL NAME.—Kaman bi.

DISTRIB.—Eastern Himalayas to Assam and Burma. Also in Siam.

A beautiful tree readily recognised by its resemblance to the common Horse Chestnut (*A. hippocastanum* L.) from which, however, it differs by its more delicate appearance and by the absence of prickles from the fruits. *A. punduana* Wall. when flowering in March is one of the glories of the Brahmaputra Valley and is common throughout Lakhimpur. The powdered bark is used as a fish poison.

XLIII. SAPINDACEAE.

112. *Sapindus* Linn.

136. *S. mukorossi* Gaertn. F. B. I. i, 683; Eng. & Prantl iii, 5, 315; Beng. Pl. 344; D. E. P. vi, 2, 468; Pharmacog. Ind. i, 370.

S. detergens Roxb. Fl. Ind. ii, 280.

Sadiya. No. 377.

LOCAL NAME.—*Haithā gūṭi* (i.e., green pigeon food), *rīṭhā*. “Soap-nut Tree.”

DISTRIB.—From North-west India through Bengal to Sylhet and Assam, generally cultivated. Said to be found wild on the Arakan Yoma and Minbu District, Burma. Also in China and Japan.

A tree with long, pinnate leaves. The leaflets are narrow, pale green and have an almost white midrib which projects on the under surface of the leaflet. This plant is apparently not common in the district. We saw a specimen in a cottage garden at Sadiya. The nut lathers in water and is used for washing clothes. A paste of the nut is used internally in fevers.

XLIV. BALSAMINACEÆ.

113. *Impatiens* Linn.

137. *I. tripetala* Roxb. F. B. I. i, 470; Fl. Ind. ii, 453.

Dibrugarh. Nos. 358, 41158

LOCAL NAME.—Karyā bijal, dām dokā.

DISTRIB.—Tropical Himalaya, from Sikkim to Assam.

An annual herb with long-stalked leaves and purple flowers. It is common about Dibrugarh especially by the Red Road. The juice of the root is used in hæmaturia. One tola of the juice is mixed with one tola of milk.

XLV. RHAMNACEÆ.

114. *Zizyphus* Juss.

138. *Z. Jujuba* Lamk. F. B. I. i, 632; Eng. & Prantl iii, 5, 402; Beng. Pl. 333; D. E. P. vi, 4, 367; Pharmacog. Ind. i, 351.

Dibrugarh. No. 49.

LOCAL NAME.—*Ber*.

DISTRIB.—Throughout India, wild and extensively cultivated. Also in Malay Archipelago, China, Tropical Africa and Australia.

A small tree beautiful in all its parts, common by roadsides and in cottage gardens. The leaves are 3-nerved, dark green above and covered with brownish pink wool beneath. This wool reddens the light beneath the curiously bent and drooping branches. The ripe fruits look like large cherries and taste not unlike crab-apples. The unripe fruits are put into curries.

XLVI. VITACEÆ.

115. *Leea* Linn.

139. *L. crispa* Willd. F. B. I. i, 665; Beng. Pl. 340; D. E. P. iv, 616; Pharmacog. Ind. i, 365.

L. crispa Linn. Eng. & Prantl iii, 5, 455.

Above Dibrugarh. No. 314.

LOCAL NAME.—Beju.

DISTRIB.—Sikkim Himalaya through East Bengal, and Chittagong to Assam. Konkan.

A tall, perennial herb common throughout the district. The stems and petioles bear beautifully crisped, membranous wings which make the plant look very curious. The stems readily break off clean at the nodes so that the plants fall to pieces when men or large animals walk about among them. The berries are eaten and stain the mouth purple. The dainty young shoots appear above the ground in March; the berries are ripe in October.

XLVII. ELAEOCARPÆ.

116. *Elæocarpus* Linn.

140. *E. serratus* Linn. F. B. I. i, 401; D. E. P. iii, 206.

Dibrugarh. No. 134.

LOCAL NAME.—Jal-pai.

DISTRIB.—Tropical Himalaya, Bengal to Assam and from North Kanara to Travancore and Ceylon. Also in Java.

A large tree with coarsely serrate leaves. The acid fruits are eaten.

XLVIII. TILIACEÆ.

117. *Corchorus* Linn.

141. *C. capsularis* Linn. F. B. I. i, 397; Eng. & Prantl iii, 6, 22; Beng. Pl. 286; D. E. P. ii, 535.

Dibrugarh. No. 329.

LOCAL NAME.—Mārā sāg, tītā marā, *pāṭ*. (Beng.) "Jute."

DISTRIB.—Throughout the hotter parts of India, Burma and the Malay Peninsula. Extensively cultivated in Bengal. Grown in most tropical countries.

This is the kind of jute which has much wrinkled fruits which are about as broad as long. The lower pair of serratures of the leaves are long as in the other kind (*C. olitorius* Linn.)

This plant is much grown in cottage gardens. An infusion of the leaves is a well known remedy for dyspepsia.

118. *Triumfetta* Linn.

142. *T. rhomboidea* Jacq. F. B. I. i, 395; Eng. & Prantl iii, 6, 28; Beng. Pl. 285; D. E. P. vi, 4, 202; Pharmacog. Ind. i, 238.

Sadiya. No. 378.

LOCAL NAME.—Okṛā gūtī, ban-okṛā (see *Urena*).

DISTRIB.—Common throughout tropical and sub-tropical India and Ceylon. Also in Malay Islands, China and tropical Africa.

A herb with variously shaped leaves, yellow flowers and clinging fruits. It occurs in hedges. Its root is used as a diuretic in the same way as *Urena lobata* L. but is inferior to it.

XLIX. MALVACEÆ.

119. *Malva* Linn.

143. *M. verticillata* Linn. F. B. I. i, 320; Beng. Pl. 256; D. E. P. v, 143.

Dibrugarh. No. 23.

LOCAL NAME.—Lafā sāg.

DISTRIB.—Temperate Himalaya through Sikkim to Assam, and Nilgiris. Sometimes cultivated. Europe, the Mediterranean region, Amoor land and China.

One of the commonest and perhaps the most characteristic cold weather crop of Upper Assam. The leaves are circular in outline and long-stalked. The flowers are in dense clusters. The seeds are sown in November and the leaves are ready for eating in February. This plant is such a favourite sāg among the Assamese that we tried its use as a vegetable but were disappointed in it. The plant abounds in slime. It is probable that the Assamese never use it by itself.

120. *Sida* Linn.

144. *S. rhombifolia* Linn. F. B. I. i, 323; Eng. & Prantl iii, 6, 43; Beng. Pl. 259; D. E. P. vi, 2, 681.

Dibrugarh. No. 354.

LOCAL NAME.—San bareil.

DISTRIB.—Widely distributed throughout India and the tropics of both hemispheres.

The roots are taken internally to help child-birth. The herb is also tied round the abdomen for the same purpose. It should be borne in mind that the use of a plant as a charm is often derived from the knowledge possessed at a former epoch of its medicinal properties. As far as we know all plants used as charms are pharmacologically active. The interest of this plant is that it is both taken internally and used as a charm for the same purpose.

121. *Urena* Linn.

145. *U. lobata* Linn. F. B. I. i, 329; Eng. & Prantl iii, 6, 45; Beng. Pl. 261; D. E. P. vi, 4, 212; Pharmacog. Ind. i, 228.

Sadiya. No. 379.

LOCAL NAME.—Okrā gūtī, ban-okrā (see *Triumfetta*).

DISTRIB.—Generally distributed throughout the hotter parts of India and the tropics of both hemispheres.

One of the commonest wayside herbs. The leaves are nearly circular in outline and have from five to seven angles. The flowers are pink and the fruits are beset with numerous short bristles so that they cling to the clothes. The root of this plant is a very popular diuretic.

122. *Hibiscus* Linn.

146. *H. sabdariffa* Linn. F. B. I. i, 340; Eng. & Prantl iii, 6, 48; Beng. Pl. 267; D. E. P. iv, 243; Pharmacog. Ind. i, 212.

North Lakhimpur. No. 397.

LOCAL NAME.—Tengā marā. “Rozelle.”

DISTRIB.—Cultivated in all tropical countries.

This is the “rozelle” of West Indies. A herb with neither hairs nor prickles. The stems are often red. The leaves are narrow entire or slightly lobed. In cottage gardens not infrequent. All parts of the plant are eaten as *sāg*.

147. *H. canuabinus* Linn. F. B. I. i, 339; Eng. & Prantl iii, 6, 48; Beng. Pl. 267; D. E. P. iv, 231; Pharmacog. Ind. i, 213.

Dibrugarh. Nos. 90, 336. Dibrugarh Island No. 337.

LOCAL NAME.—Pātūā, belāti pātūā. “Deccan Hemp.”

DISTRIB.—Apparently wild east of Northern Ghats. Cultivated in most tropical countries.

A prickly shrub with entire lower leaves and deeply lobed upper leaves. The calyx is seated on an involucre of 7–10 narrow bracteoles. In Lakhimpur little, if at all, cultivated, but occasionally seen in cottage gardens. It furnishes a fibre. All parts of the plant are edible.

148. *H. esculentus* Linn. F. B. I. i, 343; Beng. Pl. 265; D. E. P. iv, 237; Pharmacog. Ind. i, 210.

Abelmoschus esculentus (L.) Mey. in Eng. & Prantl iii, 6, 50. *H. longifolius* Roxb. Fl. Ind. iii, 210.

Dibrugarh. No. 331.

LOCAL NAME.—*Bhindī*. “Ladies’ Fingers.”

DISTRIB.—Believed to be originally a native of India. Cultivated in all tropical countries.

A tall herb, hairy but never prickly, with 3-5 lobed leaves. The flowers are yellow with a crimson eye. Fine crops of it may be seen near Dibrugarh. The plants grown for seed reach 2 meters in height.

123. *Gossypium* Linn.

149. *G. obtusifolium* Roxb. Fl. Ind. III, 183; Watt, Wild and Cultivated Cotton Plants of the World, 139.

G. herbaceum L. var. *obtusifolium* Roxb. F. B. I. i, 347.

Dibrugarh. No. 310.

DISTRIB.—Believed to be a distinctly oriental species. Cultivated in India, Ceylon, Malay Archipelago, Philippines, and Upper Egypt.

This cotton is grown by the Miris. It has small blunt leaves and is shrubby in habit. Its flowers are somewhat tinged with red.

150. G. sp.

Khāmtī basti. No. 193.

LOCAL NAME.—Kāpā.

It has large leaves with 3-5 lobes and very large bracteoles almost enclosing the flowers when not fully open. It is very like Pernambuco cotton but we could find no mature bolls nor seeds. Both Khāmtīs and Miris cultivate some kinds of *Gossypium*.

L. STERCULIACE.E.**124. Abroma Linn.**

151. A. augusta Linn. F. B. I. i, 375; Beng. Pl. 278; D. E. P. i, 3; Pharmacog. Ind. i, 233.

Abroma augustum Linn. f. Eng. & Prantl iii, 6, 86.

Dibrugarh. No. 161. Sadiya. No. 361.

LOCAL NAME.—Gunakhia karāi, *ulatkañwal*.

DISTRIB.—Throughout the hot and moist parts of Upper India, wild or cultivated. Also in Java, Phillipines and China.

An untidy shrub with downy branches, large purplish flowers and curious membranous 5-winged fruits. It is not uncommon near cottages. This plant is much used in Ayurvedic medicine for diseases of women. The bark is used for sores. A paste of the root is used internally and externally to cure abscess. The bark affords a strong white bast fibre.

125. Sterculia Linn.

152. S. villosa Roxb. F. B. I. i, 355; Beng. Pl. 274; D. E. P. vi, 3, 365.

Saikhoa. No. 317.

LOCAL NAME.—Udal.

DISTRIB.—Sub-Himalayan tract from the Indus eastwards to Burma, also in Malabar.

A tree with white bark and large 3-7 lobed leaves occasionally grown in cottage gardens. A fibre is obtained from the bark.

153. S. coccinea Roxb. F. B. I. i, 357; D. E. P. vi, 3, 361.

North Lakhimpur. No. 399.

LOCAL NAME.—Kūtārī dabūa māh.

DISTRIB.—Tropical Eastern Himalaya from Sikkim to Assam and Burma.

A tree with entire leaves and curious flowers with narrow incurved sepals which often curve by their tips. In N. Lakhimpur the fruits are eaten.

LI. THEACEÆ.

126. *Thea* Linn.

154. *Thea sinensis* L. Seem. Trans. Linn. Soc. xxii. t. 61 ; Eng. & Prantl iii, 6, 182-3.

T. assamica Masters in Journ. Agri. Horti. Soc. Ind. iii, 63. *Camellia theifera* Griff. F. B. I. i, 292 ; D. E. P. ii, 70 & vi, 3, 417-79 ; *Camellia Thea* Link Ind. Kew. i, 400.

Jaipur forest. No. 41156.

LOCAL NAME.—*Chāe, chā.* “Tea.”

DISTRIB.—Indigenous in Assam and Cachar. Largely cultivated in India, Ceylon, China and Java.

We found this plant growing wild in the Jaipur jungles.

LII. GUTTIFERÆ.

127. *Garcinia* Linn.

155. *G. lanceæfolia* Roxb. F. B. I. i, 263 ; Eng. & Prantl iii, 6, 235 ; D. E. P. iii, 470.

Dibrugarh. No. 41144. Near Jokai. No. 188.

LOCAL NAME.—*Rūpohī takrā.*

DISTRIB.—East Bengal to Assam.

A tree with narrow leaves which taper very markedly at both ends. It grows near cottages. The fruit is eaten.

LIII. FLACOURTIACEÆ.

128. *Taraktogenos* Hassk.

156. *T. Kurzii* King in Journ. As. Soc. Beng. lix, ii, 630 ; Beng. Pl. 232 ; Agri. Ledg. No. 5 of 1905.

Hydnocarpus Kurzii Warb. Eng. & Prantl. iii, 6a, 21.

Dibrugarh. No. 315.

LOCAL NAME.—*Chaulmugra.* “True Chaulmugra.”

DISTRIB.—East Bengal through Assam to Burma.

Common by the river about six miles above Dibrugarh. A tree with oblong leaves which have a swelling where the blade meets the stalk, and round fruits as large as cricket balls. These fruits are full of large seeds whose adjacent surfaces are faceted. The well known Chaulmugra oil is expressed from these seeds.

129. *Flacourtia* Comm.

157. *F. cataphracta* Roxb. F. B. I. i, 193 ; Beng. Pl. 231 ; D. E. P. iii, 398.

F. jangomas Miq. Eng. & Prantl iii, 6a, 43.

Dibrugarh. No. 132.

LOCAL NAME.—Mota kalin, *paniyālā*.

DISTRIB.—Bengal and Assam to Burma and South India, often cultivated; Malay Peninsula and China.

A thorny tree. A decoction of the bark is used for biliousness. The fruits are eaten.

LIV. PASSIFLORACEÆ.

130. *Passiflora* Linn.

158. *P. edulis* Sims. Eng. & Prantl ii, 1, 133 Fig. 88 H and iii, 6a, 91.

Makum Kila basti. No. 114.

LOCAL NAME.—Loṭā bel. "Passion flower."

DISTRIB.—A native of America, grown in Assam and parts of Bengal.

A passion flower with less showy flowers than the species (*P. coerulea* Linn.) commonly covering house walls in England. It is met with here and there in cottage gardens where it is grown for its fruit. Numberless species of *Passiflora* have edible fruits: we ourselves have eaten the fruits of *P. coerulea* L. ripened in the south of England.

LV. CACTACEÆ.

131. *Cereus* Haw.

159. *C. sp.*

Dibrugarh. No. 140.

LOCAL NAME.—Hār ghūnasa.

A climber whose fleshy, cylindrical stems have ribs which bear small tufts of thorns. A native of America fairly common in the jungle near cottages. The plant is pounded and applied to broken limbs to heal them. This use was perhaps suggested by the way in which it binds together the branches of the trees on which it grows.

LVI. ELAEAGNACEÆ.

132. *Elaeagnus* Linn.

160. *E. latifolia* Linn. F. B. I. v, 202; Eng. & Prantl iii, 6a, 251; Beng. Pl. 908; D. E. P. iii, 205.

E. conferta Roxb. Fl. Ind. i, 440.

Jokai. No. 184.

LOCAL NAME.—Mirika ṭenga.

DISTRIB.—Distributed throughout sub-tropical and temperate regions of India and Burma. Also Malay Islands and China.

A shrub with silver spangled leaves, often cultivated in cottage gardens. The fruit ripens in April. It is acid and much relished by the people of Lakhimpur.

LVII. PUNICACEAE.

133. *Punica* Linn.

161. *P. granatum* Linn. F. B. I. ii, 581; Eng. & Prantl iii, 7, 25; Beng. Pl. 505; D. E. P. vi, 1, 368; Pharmacog. Ind. ii, 44.

Dibrugarh. No. 48.

LOCAL NAME.—*Anār*. “Pomegranate.”

DISTRIB.—Cultivated in India and Burma as well as throughout the warmer parts of the world. Believed to be wild in the extreme north-western regions of India, in Afghanistan and Persia.

A small tree with familiar orange-red flowers. Often seen in cottage gardens especially about Dibrugarh. The fruits are eaten and believed to be medicinal.

LVIII. MYRTACEAE.

134. *Psidium* Linn.

162. *P. Guajava* Linn. Ind. kew. iv, 641.

P. Guayava Linn. F. B. I. ii, 468; Beng. Pl. 487; D. E. P. vi, 1, 351; Pharmacog. Ind. ii, 30. *P. Guayava* Raddi. Eng. & Prantl iii, 7, 68, fig. 36, 69.

Dibrugarh. No. 57.

LOCAL NAME.—*Amrūd*. “Guava.”

DISTRIB.—A native of Mexico and of tropical and sub-tropical America. Naturalised throughout India.

A small tree with curious smooth bark and flowers resembling those of a *Eugenia*. It is very common in cottage gardens throughout the district. The fruits (guavas) are cooked and eaten.

135. *Eugenia* Linn.

163. *E. jambos*. Linn. F. B. I. ii, 474; Beng. Pl. 490; D. E. P. iii 7.

Jambosa vulgaris DC. Eng. & Prantl iii, 7, 84.

Dibrugarh. No. 70.

LOCAL NAME.—*Gulāb jāman*.

DISTRIB.—Largely cultivated throughout India, the Indo-Malayan region and elsewhere in the tropics.

LIX. MELASTOMATACEAE.

136. *Melastoma* Linn.

164. *M. malabathricum* Linn. F. B. I. ii, 523; Eng. & Prantl iii, 7, 153; Beng. Pl. 496; D. E. P. v, 210.

LOCAL NAME.—Phutki. “Wild or Indian Rhododendron.”

DISTRIB.—Throughout the Indo-Malayan region. Abundant in the eastern part of India.

A shrub with rough leaves and mauve-purple flowers. Four of the stamens are much longer than the other four. It is very common especially on deserted tea gardens and cleared jungle. Planters call this plant “Wild Rhododendron.” Apparently no part of it is of any use. It has been said that ink can be prepared from the fruits.

137. *Osbeckia* Linn.

165. *O. nepalensis* Hook. F. B. I. ii, 521 ; Beng. Pl. 495.

North Lakhimpur. No. 395.

LOCAL NAME.—Bagā phatkalā.

DISTRIB.—Subtropical Himalaya from Nepal eastwards to Burma.

A shrub occurring here and there throughout the district. It is generally thought, both by natives and Europeans, to be a white flowered variety of *Melastoma malabathricum* L. Its eight stamens are all equal in length. In N. Lakhimpur the flowers are pounded and applied to sores in children's mouths.

LX. ARALIACEÆ.

138. *Tetrapanax* K. Koch.

166. *T. papyrifera* (Hook.) Koch. Eng. & Prantl iii, 8, 34.

Dibrugarh. No. 347.

LOCAL NAME.—“Rice-paper tree” of China and Japan.

DISTRIB.—Formosa, China and Japan. Introduced in India.

This plant has escaped from Mr. Haddow's garden at Dibrugarh where it was cultivated. It yields the well known “Rice-paper.”

139. *Acanthopanax* Dene., & Planch.

167. *A. aculeatum* Seem. F. B. I. ii, 726.

A. aculeatus (Ait.) Seem. Eng. & Prantl iii, 8, 50.

Sadiya. No. 363.

LOCAL NAME.—Pechi chū.

DISTRIB.—Assam to China, Japan.

Rather common in the jungle but not cultivated. A climber with digitate leaves and small flowers arranged in dense umbels. All parts of the plant are fragrant. An ink is prepared from the fruits.

140. *Heteropanax* Seem.

168. *H. fragrans* Seem. F. B. I. ii, 734 ; Eng. & Prantl iii, 8, 53 ; Beng. Pl. 542 ; D. E. P. iv, 226.

Panax fragrans Roxb. Fl. Ind. ii, 76.

Sadiya. No. 367.

LOCAL NAME.—Keserū pāt.

DISTRIB.—From the Siwaliks in the Sub-Himalayan tract to Burma. Abundant in Bengal. Also Tonquin, Java and China.

A tree with large, pinnately compound leaves, and flowers in umbels which are arranged in long panicles. The leaves are used for feeding the Eri silk worm but are not so good as the leaves of the castor-oil plant.

LXI. UMBELLIFERÆ.

141. *Hydrocotyle* Linn.

169. *H. rotundifolia* Roxb. F. B. I. ii, 668 ; Eng. & Prantl iii, 8, 119 ; Beng. Pl. 535.

Dibrugarh. No. 61.

LOCAL NAME.—Mānī mūnī.

DISTRIB.—North-west Himalayas, Bengal and Sikkim to Khasia, Malabar hills and Ceylon. Throughout Malaya and in Guinea.

A very common wayside herb very well known as a medicinal plant. The stems are prostrate and root at the nodes. The leaves are circular. They are applied to boils to draw out the pus.

170. *H. asiatica* Linn. F. B. I. ii, 669 ; Beng. Pl. 535 ; D. E. P. iv, 311 ; Pharmacog. Ind. ii, 107.

Centella asiatica Linn. Eng. & Prantl iii, 8, 119.

Dibrugarh. No. 60.

LOCAL NAME.—Mānī mūnī.

DISTRIB.—Throughout tropical and sub-tropical regions.

This is also a common wayside herb like the above. Its leaves are usually much larger and darker green than those of *H. rotundifolia* Roxb. The leaves are also applied to boils to draw out pus. The leaves of this plant have been given internally for leprosy. They contain a substance called *vellarin*, which is probably a mixture of a resin and a fatty body (see Pharmacog. Ind. *loc. cit.*) In view of the recent work done on the treatment of leprosy and tuberculosis by salts of fatty acids this *vellarin* should be investigated chemically and pharmacologically.

142. *Eryngium* Linn.

171. *E. foetidum* Linn. Eng. & Prantl iii, 8, 142.

Dibrugarh. No. 84 and Ledo. No. 107.

LOCAL NAME.—Barmā dhaniyā.

DISTRIB.—Brazil, West Indies and Florida.

A much branched prickly herb, very aromatic when bruised. The flowers are arranged in numerous small conical heads. This plant is an alien, but it is now very common all over Lakhimpur reaching far into the jungle wherever roads have been made. It is well known to all the country people who add one or two of the very aromatic leaves to their carries. It is difficult to know why they associate the plant with coriander (dhaniyā). They often showed us the two plants together saying this dhaniyā (*Coriandrum*) is the *desi* one and this (*Eryngium*) the *belāṭī* or Burmese one.

143. Coriandrum Linn.

172. *C. sativum* Linn. F. B. I. ii, 717 ; Eng. & Prantl iii, 8, 159 ; Beng. Pl. 540 ; D. E. P. ii, 567 ; Pharmacog. Ind. ii, 129.

Dibrugarh. No. 55.

LOCAL NAME.—*Dhaniyā*. “Coriander.”

DISTRIB.—Native country not known. Cultivated almost everywhere.

Most cottagers grow a plot of *dhaniyā* which is one of the most keenly relished spices in Lakhimpur. The people when speaking of it show evident signs of pleasure and often explain that its flavour is better than that of the Burmese kind (*Eryngium*). The powdered ripe fruits are used in curries. The unripe infructescences are sometimes fried and eaten.

144. Daucus Linn.

173. *D. Carota* Linn. F. B. I. ii, 781 ; Eng. & Prantl iii, 8, 249 ; Beng. Pl. 541 ; D. E. P. iii, 43 ; Pharmacog. Ind. ii, 134.

LOCAL NAME.—*Gājar*. “Carrot.”

DISTRIB.—Cosmopolitan. Cultivated everywhere.

Occasionally cultivated but extremely common on river sand which is dry during the cold weather.

LXII. ALANGIACEAE.**145. Alangium Lamk.**

174. *A. begoniæfolium* Harms. Eng. & Prantl. iii, 8, 261.

Marlea begoniaefolia Roxb. F. B. I. ii, 743 ; Beng. Pl. 546 ; D. E. P. v, 186.

Dibrugarh. No. 160.

LOCAL NAME.—Bhelū.

DISTRIB.—From Northern India to Bengal and Burma. Also China and Japan.

A small tree with horizontal branches. The leaves are nearly circular and often form a beautiful mosaic. The flowers are inconspicuous. There is hardly a cottage garden in the northern part of the district without a specimen of this tree. It is much used for hedging.

LXIII. SAPOTACEAE.**146. Chrysophyllum Linn.**

175. *C. Roxburghii* G. Don. F. B. I. iii, 535 ; Eng. & Prantl iv. 1, 148 ; D. E. P. ii, 273.

Dibrugarh. No. 153.

LOCAL NAME.—Ban pita.

DISTRIB.—Assam to Burma, also in the Deccan from Konkan to Ceylon, Malay Peninsula, Java and Sumatra.

An evergreen tree not uncommon in the district. The leaves are leathery, oblong, lanceolate and end in a rather abrupt point. When mature they are quite glabrous. The fruits are eaten and have a pleasant flavour, but the pulp is so sticky that it is difficult to enjoy them.

LXIV. OLEACEAE.

147. *Nyctanthes* Linn.

176. *N. arbor-tristis* Linn. F. B. I. iii, 603 ; Eng. & Prantl iv, 2, 15 ; Beng. Pl. 660 ; D. E. P. v, 434 ; Pharmacog. Ind. ii, 376.

Dibrugarh. No. 139.

LOCAL NAME.—Sewali phul, *harsinhār*.

DISTRIB.—From Central India to Bundelkhand and Burdwan, also in Oudh and North-western Terai. Cultivated throughout India and in other hot countries.

A bush or small tree with opposite, ovate, very rough, leaves which often show irregular lobing, and clusters of white flowers. It occurs in cottage gardens here and there. The juice of the leaves is used internally for fevers. The flowers yield a dye.

LXV. GENTIANACEAE.

148. *Exacum* Linn.

177. *E. tetragonum* Roxb. F. B. I. iv, 95 ; Eng. & Prantl iv, 2, 64 ; Beng. Pl. 706 ; D. E. P. iii, 306 ; Pharmacog. Ind. ii, 517.

Sadiya. No. 371.

LOCAL NAME.—Debī phūl.

DISTRIB.—Northern India through Assam to Burma, also in Malaya and China.

A beautiful herb with 4-winged stems, opposite, narrow leaves and large gentian-blue flowers. It grows amongst grass and is particularly common at Sadiya. The flowers are much used for religious purposes.

LXVI. APOCYNACEAE.

149. *Alstonia* R. Br.

178. *A. scholaris* R. Br. F. B. I. iii, 642 ; Eng. & Prantl iv, 2, 138 ; Beng. Pl. 672 ; D. E. P. i, 197 ; Pharmacog. Ind. ii, 386.

Sadiya. No. 385.

LOCAL NAME.—Chhātūn, sityana.

DISTRIB.—Throughout the tropical parts of the Indo-Malayan region and China.

A handsome tree. The leaves are arranged in whorls of 7 and are whitish beneath. The flowers smell like the Sweet-flag. This tree is common throughout the district. Its bark is the *Alstonia* of the British Pharmacopœia. The people of Lakhimpur use the plant only in superstitious ways such as tying the young leaves of it round children's necks to cure bowel complaints.

150. *Tabernaemontana* Linn.

179. T. coronaria Br. F. B. I. 646 ; Eng. & Prantl iv, 2, 148 ; Beng. Pl. 673 ; D. E. P. vi, 3, 401 ; Pharmacog. Ind. ii, 413.

Jaipur. No. 302.

LOCAL NAME.—*Tagar*.

DISTRIB.—Cultivated throughout India and Burma. Native country unknown.

A small shrub with much forked branches, glossy leaves, and white flowers. The Phākials grow it in their villages and use it for some medicinal purpose but show much secrecy about it and will not tell us exactly how or for what they use it.

151. *Thevetia* Linn.

180. T. neriifolia Juss. Eng. & Prantl iv, 2, 159 ; Beng. Pl. 669 ; D. E. P. vi, 4, 47 ; Pharmacog. Ind. ii, 406.

Dibrugarh. No. 136.

LOCAL NAME.—Karbi. "Yellow Oleander."

DISTRIB.—A native of America, cultivated extensively and almost naturalised in India.

The so-called Yellow Oleander, a native of America, is now very common in the plains of India. It is a shrub with narrow leaves and large bright yellow flowers. There are good examples on the Red Road at Dibrugarh. The milky juice is very poisonous but the natives apply it for pain. We were even told that it was applied to sores in children's mouths, but such treatment must be very dangerous.

LXVII. ASCLEPIADACEAE.

152. *Calotropis* R. Br.

181. C. gigantea R. Br. F. B. I. iv, 17 ; Eng. & Prantl iv, 2, 239, Beng. Pl. 688 ; D. E. P. ii, 34 ; Pharmacog. Ind. ii, 428.

Margherita. No. 103.

LOCAL NAME.—*Āk, madār*.

DISTRIB.—Throughout India to Malay Islands and S. China.

A shrub abounding in milky juice. The leaves are thick and cottony beneath, and the flowers are fleshy and pale purple. It is common on waste places. The milk is applied to inflamed parts.

LXVIII. CONVULVULACEAE.

153. *Argyreia* Lour.

182. *A. argentea* Choisy. F. B. I. iv, 185 ; Eng. & Prantl iv, 3a, 2i ; Beng. Pl. 741.

Jokai. No. 186.

LOCAL NAME.—Tolkeyā ālū.

DISTRIB.—From Bengal through Assam to Chittagong, Khasi Hills.

A climber with broadly ovate leaves which are hairy above and silky beneath, and with rose-purple trumpet-shaped flowers. The plant has milky juice. The tuber in the form of a paste is applied externally in abscess of the stomach. Leaves are applied to boils.

154. *Ipomoea* Linn.

183. *I. batatas* Lamk. F. B. I. iv, 202 ; Eng. & Prantl iv, 3a, 31 ; Beng. Pl. 735 ; D. E. P. iv, 478.

Dibrugarh. Nos. 12 and 13.

LOCAL NAME.—Rang ālū. “ Sweet potato.”

DISTRIB.—Presumably a native of America but naturalised in India and extensively cultivated.

A widely creeping herb with angular leaves. There are two varieties. One with white, the other with red tubers. Both are favourite crops with cottagers throughout the district. The plants thrive particularly well on the sandy soil of the island at Dibrugarh.

155. *Cuscuta* Linn.

184. *C. reflexa* Roxb. F. B. I. iv, 225 ; Eng. & Prantl iv, 3a, 40 ; Beng. Pl. 23 ; D. E. P. ii, 671 ; Pharmacog. Ind. ii, 584.

Dibrugarh. Nos. 66 and 41145.

LOCAL NAME.—Amar latī, *akkas bel*.

DISTRIB.—Throughout India and Ceylon. Also in Malaya.

A common parasite whose fleshy, thread-like stems form dense yellow masses in various shrubs. On the Red Road at Dibrugarh it is especially in evidence on shrubs of *Thevetia nerifolia* Juss. It also frequently infests *Zizyphus Jujuba* Lamk. An infusion of the plant is said to make an excellent wash for sores. The natives say that it cleanses and brings about rapid healing.

LXIX. BORRAGINACEÆ.

156. *Cordia* Linn.

185. *C. myxa* L. F. B. I. iv, 136 ; Eng. & Prantl iv, 3a, 83 ; Beng. Pl. 714 ; D. E. P. ii, 563 ; Pharmacog. Ind. ii, 518.

Dibrugarh. Nos. 155 and 173.

LOCAL NAME.—Karboal, *lasorā*. “Sebestens.”

DISTRIB.—Throughout the Indo-Malayan region and Egypt. Often cultivated.

A common forest tree with ovate or oblong leaves and smallish white flowers. An infusion of the charcoal of the wood is used for indigestion and constipation. The fruits are eaten. Europeans sometimes call them “Sebestens.”

157. *Cynoglossum* Linn.

186. *C. glochidiatum* Wall. F. B. I. iv, 156; Eng. & Prantl iv, 3a, 103.

Dibrugarh. Nos. 121 and 144.

LOCAL NAME.—Dhalā bianī sābtā.

DISTRIB.—From Assam to Burma.

A rough herb with narrow leaves, inconspicuous flowers and prickly clinging fruits. The juice of the root is given to stop the vomiting of infants.

LXX. VERBENACEÆ.

158. *Vitex* Linn.

187. *V. negundo* L. F. B. I. iv, 583; Beng. Pl. 833; D. E. P. vi, 4, 248; Pharmacog. Ind. iii, 73.

Jokai. No. 179.

LOCAL NAME.—*Sanbhālū*.

DISTRIB.—Throughout India and Ceylon, Afghanistan and East Asia to the Philippines.

Not uncommonly grown in cottage gardens. A small tree with opposite leaves each hairy 3-5 narrow leaflets which are dark above and white beneath. The inflorescences are covered with a white felt. A well known medicinal plant. The leaves eaten with salt are said to cure stomach troubles.

LXXI. LABIATÆ.

159. *Gomphostemma* Wall.

188. *G. lucidum* Wall. var. *canescens* Prain Ann. R. B. G. iii, 2, 263. Dibrugarh. No. 130.

DISTRIB.—East Himalayas.

A coarse, densely woolly herb common by roadsides, etc. The root is used in pneumonia.

160. *Lencas* R. Br.

189. *L. linifolia* Spreng. F. B. I. iv, 690; Eng. & Prantl iv, 3a, 252; Beng. Pl. 856; D. E. P. iv, 633; Pharmacog. Ind. iii, 423.

Dibrugarh. No. 92.

LOCAL NAME.—Guma.

DISTRIB.—From Bengal and Assam to Burma and in the Deccan from Concan to Travancore. Also Malaya and Mauritius.

An annual with narrow leaves and white flowers. Perhaps the commonest weed in Assam. It is one of the plants which has a habit of growing in pure communities on cultivated land, looking very much like a crop, but it is never cultivated. The children pull off the corollas and suck the honey just as European children do with *Lamium album* L. (White Dead-Nettle). In native medicine it is used for loss of appetite. The leaves are wrapped in a plantain leaf and heated and then eaten. The first effect of this treatment is that the appetite decreases to such an extent that the patient is unable to take any food at all. On the 2nd day this passes off and he takes food with avidity. The use of the plant in this way is probably an introduction from up-country. Many natives of Assam told us that the plant was good for nothing. We met with no one who knew of the plant being used in the ways mentioned by Watt in the Dictionary of Economic Products.

161. *Mentha* Linn.

190 *M. arvensis* Linn. F. B. I. iv, 648 ; Eng. & Prantl iv, 3a, 319 ; D. E. P. v, 228 ; Pharmacog. Ind. iii, 104.

M. sativa Willd. Roxb. Fl. Ind. iii, 7.

Dibrugarh. No. 71.

LOCAL NAME.—*Podina*. "Mint."

DISTRIB.—Throughout Upper India and the warmer regions of Europe and North America.

This is the common mint grown in cottage gardens.

162. *Perilla* Linn.

191. *P. ocimoides* L. F. B. I. iv, 646 ; Eng. & Prantl iv, 3a, 326 ; Beng. Pl. 851 ; D. E. P. vi, 1, 140.

Dibrugarh. No. 392.

LOCAL NAME.—Bagā til.

DISTRIB.—Throughout Upper India to Burma, particularly in the eastern provinces, often cultivated. Also Cochin China to Japan.

A coarse, hairy, strong-scented annual. The flowers are in pairs on long, one-sided racemes. The Khāmtis grow this plant about their dwellings. They fry and eat the seeds which they say taste excellent, like oil.

163. *Elsholtzia* Willd.

192. *E. blanda* Benth. F. B. I. iv, 643 ; Eng. & Prantl iv, 3a, 328. Dibrugarh. Nos. 82, 312 and 41185.

LOCAL NAME.—Bantulukī, ban tulsī.

DISTRIB.—From Central Himalayas to Burma. Also Sumatra.

A deliciously scented herb, with long, spike-like inflorescences. It is common in cleared jungle. It is known to cottagers as a "tulasi substitute." The volatile oil of this plant should have market value.

164. Ocimum Linn.

193. Ocimum basilicum L. F. B. I. iv, 608; Eng. & Prantl iv, 3a, 369; Beng. Pl. 843; D. E. P. v, 440; Pharmacog. Ind. iii, 83.

Dibrugarh. No. 42; Sadiya. No. 372; Khāmtī basti. No. 193.

LOCAL NAME.—Ādā kūrī. "Sweet Basil."

DISTRIB.—Throughout the warmer parts of India and Malaya. Also W. Asia and Africa.

A strong smelling herb. The flowers are in whorls. The calyxes when bent down in fruit give the plant a curious appearance. It is common throughout the district in gardens and apparently wild. It is used as a spice in curry.

194. Ocimum sanctum L. F. B. I. iv, 609; Eng. & Prantl. iv, 3a, 371; Beng. Pl. 843; D. E. P. v, 443; Pharmacog. Ind. iii, 86.

Sadiya. No. 364.

LOCAL NAME.—*Tulsī*.

DISTRIB.—Indo-Malayan region, West Asia to Arabia.

The sacred *tulsī* of the Hindus. Distinguished from the last by its much smaller flowers arranged in slender spikes. It is looked upon with great reverence and much care is taken to keep clean and smooth the plot of earth on which it grows. When plants are looked upon with superstitious reverence they generally have medicinal value.

LXXII. SOLANACEÆ.**165. Capsicum Linn.**

195. C. annum L. Eng. & Prantl iv, 3b, 20; Beng. Pl. 748; D. E. P. ii, 134.

LOCAL NAME.—Lāl jhalakiya. "Chillie."

DISTRIB.—Throughout the warmer parts of the world but generally under cultivation.

The common "Chillie." The ripe fruits are bright red. Seen in nearly every cottage garden in the district.

166. Solanum Linn.

196. S. nigrum L. F. B. I. iv, 229; Eng. & Prantl iv, 3b, 22; Beng. Pl. 745; D. E. P. vi, 3, 623; Pharmacog. Ind. ii, 549.

Dibrugarh. No. 118.

LOCAL NAME.—Lat kosi, *makoh*. "Common Nightshade."

DISTRIB.—All temperate and tropical regions.

The common "Nightshade" of England. A herb or small shrub with stalked inflorescences and black or red berries. A decoction of the leaves is taken internally for inflammation. The fruits are eaten.

197. *S. spirale* Roxb. F. B. I. iv, 230; Beng Pl. 745; D. E. P. vi, 3, 264.

Sadiya. No. 369.

LOCAL NAME.—Teta kusī.

DISTRIB.—From East Bengal to Burma.

A small shrub with neither thorns nor hairs. The flowers are arranged in short racemes, each flower having a rather long stalk.

Common, especially at Sadiya. The leaves are eaten in curry.

198. *S. tuberosum* L. F. B. I. iv, 229; Eng. & Prantl iv, 3b, 22; Beng. Pl. 745; D. E. P. vi, 3, 265.

Dibrugarh. No. 93.

LOCAL NAME.—Bambai ālū. "Potato."

DISTRIB.—Cultivated throughout the world.

Potatoes thrive in Lakhimpur especially on the sandy soil near the river. They are generally sown in October and dug up in February.

199. *S. melongena* L. F. B. I. iv, 235; Eng. and Prantl iv, 3b, 23; Beng. Pl. 746; D. E. P. vi, 3, 258.

Dibrugarh. Nos. 15, 16, 17, and 81. Sadiya. No. 366.

LOCAL NAME.—Benga, *baingan*. "Brinjal," "Egg Plant."

DISTRIB.—Cultivated throughout India and the warmer regions of the globe. Native land not known.

The brinjal is cultivated throughout Lakhimpur especially by settlers from up-country.

The three chief varieties are :—

- (i) "Dangar bengā."—A stout annual form with large leaves and very large purple fruits.
- (ii) A perennial form with small dark fruits.
- (iii) A perennial form with small white fruits.

200. *S. torvum* Sw. F. B. I. iv, 234; Beng. Pl. 746; D. E. P. vi, 3, 264; Pharmacog. Ind. ii, 560.

Dibrugarh. Nos. 346 and 41184.

LOCAL NAME.—Hāthī bhekūrī.

DISTRIB.—Throughout tropical parts of India, very common in Bengal and Assam. Also Malaya, China, Philippines and Tropical America.

A shrub with prickly stems; there are no prickles on the leaves which bear star-like hairs. This species has been a great pest in Upper Assam; it is said that the military outpost at Saikhoa was deserted chiefly because it was overwhelmed by this plant. It is now common at Saikhoa and Sadiya but not elsewhere. The fruits are eaten as a vegetable and said to be good for enlarged spleen.

201. *S. lycopersicum* L. Eng. & Prantl iv, 3b, 24.

Lycopersicum esculentum Mill. F. B. I. iv, 237; Beng. Pl. 743; D. E. P. v, 100.

Dibrugarh. Nos. 9 and 40.

LOCAL NAME.—Belātī bengā. “Tomato.”

DISTRIB.—Native of Tropical America, cultivated throughout the warmer parts of the world.

Mr. G. A. Gammie in his Report on A Botanical Tour in the Lakhimpur District of Assam, 1894 (Rec. Bot. Surv. i, 74) remarked on the way in which tomatoes thrived in the district. They do especially well on the sandy tracts near the river. In addition to the kind ordinarily grown in England there is also a kind with very small fruits which have an excellent flavour.

202. *S. indicum* Linn. F. B. I. iv, 234; Eng. & Prantl iv, 3b, 25, Beng. Pl. 746; D. E. P. vi, 3, 258; Pharm. Ind. ii, 555.

Sadiya. No. 366.

LOCAL NAME.—Titā bhekūrī.

DISTRIB.—Throughout India and Malaya. Also Philippines and China.

A shrub found in basti gardens. It has thorns on the stems and leaves. The fruits are eaten when ripe.

167. *Datura* Linn.

203. *D. suaveolens* Humb. Eng. & Prantl iv, 3b, 27.

Saikhoa. No. 320.

DISTRIB.—A native of South America, now naturalised in India.

A shrub or small tree up to twelve feet in height. The flowers are pendulous and often as much as a foot in length. The fruit is a large pendulous berry. Grown in *basti* gardens. It is generally found as a garden plant but is becoming naturalised throughout Upper India.

This plant contains scarcely any active principle and must not be substituted for *D. fastuosa* Linn.

204. *D. fastuosa* Linn. F. B. I. iv, 242; Eng. & Prantl iv, 3b, 28; Beng. Pl. 751; D. E. P. iii, 32; Pharmacog. Ind. ii, 585.

Dibrugarh. No. 100.

LOCAL NAME.—*Dhatūrā*. “*Datura*.”

DISTRIB.—Throughout India, particularly in waste places. Malay, Trop. Africa.

An annual herb, common in waste places, usually not more than four feet in height. The flowers are erect and much smaller than those of *D. suaveolens* Humb. The fruit is a prickly capsule. This is the common *Datura* and is now official in the British Pharmacopœa. There is an occasional demand for the dried leaves of this plant.

168. *Nicotiana* Linn.

205. *N. tabacum* L. F. B. I. iv, 245; Eng. & Prantl iv, 3b, 32; Beng. Pl. 752; D. E. P. v, 353; Pharmacog. Ind. ii, 632.

Jokai. No. 174.

LOCAL NAME.—*Tānbākū*.

DISTRIB.—A native of America, cultivated throughout India as well as in all warmer countries.

206. *N. rustica* Linn. F. B. I. iv, 245; Eng. & Prantl iv, 3b, 32; Beng. Pl. 725; D. E. P. v, 352.

Jokai. No. 175.

LOCAL NAME.—*Belāfī tanbākū*.

DISTRIB.—A native of Mexico, now cultivated everywhere.

Both very commonly grown in country gardens for home use. *N. tabacum* L. is the larger of the two plants, it has large sessile elliptic leaves with wedge-shaped base. *N. rustica* L. which is now preferred to *N. tabacum* L. by the natives, has smaller stalked leaves and the base of the lamina is cordate or obtuse.

LXXIII. SCROPHULARIACEAE.

169. *Bonnaya* Link & Otto.

207. *B. reptans* Spreng. F. B. I. iv, 284; Beng. Pl. 770.

Dibrugarh. No. 352.

LOCAL NAME.—*Kāsī daryā*.

DISTRIB.—Eastern India to Burma, in the Deccan, Konkan and Madras. Also Java and the Philippine Islands.

A creeping herb with opposite, finely serrate leaves and small purplish flowers. It occurs at Dibrugarh but is apparently not common. The herb is applied externally for worms in the skin.

LXXIV. PEDALIACEAE.

170. *Sesamum* Linn.

208. *S. indicum* DC. F. B. I. iv, 387; Eng. & Prantl iv, 3b, 262; Beng. Pl. 792; D. E. P. vi, 2, 502; Pharmacog. Ind. iii, 26.

Sadiya. Nos. 386 and 41450.

LOCAL NAME.—*Til*. "Sesame."

DISTRIB.—Cultivated in the warmer parts of India and in all tropical countries. Native country doubtful, probably Asiatic.

The common sesame. In Sadiya it is cultivated here and there but apparently it is not a successful crop.

LXXV. ACANTHACEAE.

171. *Strobilanthes* Blume.

209. *S. flaccidifolius* Nees. F. B. I. iv, 468; Eng. & Prantl iv, 3b, 305; D. E. P. vi, 3, 375.

Phākial basti near Jaipur. No. 199. Khāmtī basti, Dibrugarh. No. 391 also No. 141.

LOCAL NAME.—Lampat. "Assam Indigo plant."

DISTRIB.—North and East Bengal through Assam to Burma. Also South China.

A glabrous shrub with opposite leaves acute at both ends and panicles of purple flowers. It is cultivated on a small scale by the Phākials and Khāmtīs throughout the district who extract from it a blue dye. The herb is left in water till it rots, then lime is added to the water and the fabric dipped into it. The fabric is then taken out and dried in the sun and again immersed. This is repeated several times. The colour is deep and lasting. The Khāmtīs near Dibrugarh grow a large field of it and call it "Ram Ghas."

172. *Phlogacanthus* Nees.

210. *P. Jenkinsii* Clarke. F. B. I. iv, 513.

Dibrugarh. No. 44.

LOCAL NAME.—Titā phul or titā gāchh.

DISTRIB.—Confined to Assam and Burma.

A shrub with opposite leaves which are acute at both ends, and short axillary panicles of red flowers. It is commonly planted in hedges and about dwellings. The natives propagate it by cuttings. A decoction of the leaves is used for diseases of the spleen and liver, and for fevers.

173. *Justicia* Linn.

211. *Justicia gendarussa* L. F. B. I. iv, 532; Eng. & Prantl iv, 3b, 347; Beng. Pl. 818; D. E. P. iv, 557; Pharmacog. Ind. iii, 48.

Dibrugarh. No. 142.

LOCAL NAME.—Bari sūndari, hur jaurā.

DISTRIB.—Throughout India and Ceylon. Also Malaya, China and Philippines.

An erect herb with narrow leaves and terminal spikes of flowers. The plant is often grown about cottages and has reputation of being good for asthma.

212. *Justicia Adha toda* L. Eng. & Prantl iv, 3b, 349; Fl. Ind. i, 126.

Adhatoda Vasica Nees. F. B. I. iv, 540; Beng. Pl. 819; D. E. P. i, 109; Pharm. Ind. iii, 50.

Dibrugarh. Nos. 43 and 138.

LOCAL NAME.—Baga bahek, *aṛūsa*.

DISTRIB.—Throughout India and Ceylon. Also Malaya and S. E. Asia.

A shrub with short spikes of white and pink two-lipped flowers. Common in hedges and round about dwellings. The entire plant is boiled and the expressed juice, sometimes mixed with honey, is used as a remedy for cough.

LXXVI. RUBIACEÆ.

174. *Hedyotis* Linn.

213. *H. stipulata* Br. F. B. I. iii, 63.

Oldenlandia hirsuta Linn. f. Eng. & Prantl iv, 4, 25.

Dibrugarh. No. 350.

LOCAL NAME.—Barālī bokoā.

DISTRIB.—Temperate Himalayas to Assam. Also Java and Japan.

A slender sticky herb. Wrapped in a plantain leaf and given to cattle, it is said to cure them of worms and sores in the skin (probably the larvæ of a Blue-bottle, *Pycnosoma*, which not infrequently breeds in wounds and sores in Assam.)

175. *Uncaria* Schreb.

214. *U. sessilifructus* Roxb. F. B. I. iii, 30; Fl. Ind. 1, 520; Beng. Pl. 553.

Jungle near Dibrugarh. No. 306.

LOCAL NAME.—Būrūkhti akhūhā.

DISTRIB.—From East Bengal to Burma.

A creeper found in the jungle about Dibrugarh. As in other *Uncarias* some of the inflorescences are modified to form stout recurved-hooks. The cut stems give water freely with which wanderers in the jungle quench their thirst. The bark is boiled and the water, strained off, is used as a mordant.

176. *Gardenia* Linn.

215. *G. campanulata* Roxb. F. B. I. iii, 118; Eng. & Prantl iv, 4, 77; Fl. Ind. i, 710; Beng. Pl. 565; D. E. P. iii, 479.

Margherita. Nos. 115 and 116.

LOCAL NAME.—Bimana.

DISTRIB.—From the Eastern Himalayas to Burma.

A shrub with opposite branches most of which end in stout thorns, and yellow globular fruits about 2 inches in diameter. The juice of the fruit is used as a fish poison.

177. Vangueria Juss.

216. V. edulis Vahl. F. B. I. iii, 136; Eng. & Prantl iv, 4, 91; Beng. Pl. 575; D. E. P. vi, 4, 221.

Sadiya. No. 370.

LOCAL NAME.—Kaṭkarā ṭengā.

DISTRIB.—Native of Madagascar. Cultivated in India and China and also found in Africa.

A small tree which bears many apple-like fruits. This plant is native of Madagascar. It is very common about Sadiya. The fruits are good to eat and are very greedily devoured by goats.

217. V. spinosa Roxb. F. B. I. iii, 136; Eng. & Prantl iv, 4, 91; Beng. Pl. 575; D. E. P. vi, 4, 221.

Dibrugarh. No. 351.

LOCAL NAME.—Kūtkūrā, kaṭkarā.

DISTRIB.—From Northern Bengal to Burma.

A bush or tree with straight opposite thorns. The powdered leaves are said to be good for diphtheria.

178. Coffea Linn.

218. C. arabica L. F. B. I. iii, 153; Eng. & Prantl iv, 4, 104; Beng. Pl. 572; D. E. P. ii, 460; Pharmacog. Ind. ii, 215.

Dibrugarh. No. 146.

DISTRIB.—Believed to be native of Arabia, cultivated in many of the tropical regions.

The cultivated Coffee plant, occasionally planted about cottages.

179. Paederia Linn.

219. P. foetida L. F. B. I. iii, 195; Eng. & Prantl iv, 4, 125; Beng. Pl. 578; D. E. P. vi, 1, 2; Pharmacog. Ind. ii, 225.

Above Dibrugarh. No. 309.

LOCAL NAME.—Beveli latā.

DISTRIB.—From Central and Eastern Himalayas to Burma; Malaya; to Borneo.

A twiner with opposite, long-petioled leaves and tubular flowers whitish without and purple within. It is distinguished from other plants by its extremely filthy smell. The bitter juice is much valued as a remedy for diarrhoea.

LXXVII. CUCURBITACEAE.**180. Melothria Linn.**

220. M. heterophylla Cogn. Monog. Fhan. iii, 618; Eng. & Prantl iv, 5, 15.

Zehneria umbellata Thwaites. F. B. I. ii, 625; Beng. Pl. 527; D. E. P. vi, 4, 355; Pharmacog. Ind. ii, 89. *Momordica umbellata* Roxb. Fl. Ind. iii, 710.

Dibrugarh. No. 308.

DISTRIB.—Indo-Malayan region, China and Japan.

A common climbing herb with very variously shaped leaves. Medicinal properties are attributed to the root which is often given with *Croton caudatus* Geisel (No. 130).

181. *Momordica* Linn.

221. *M. charantia* L. F. B. I. ii, 616; Eng. & Prantl iv, 5, 24; Beng. Pl. 521; D. E. P. v, 256; Pharmacog. Ind. ii, 78.

Dibrugarh. No. 72.

LOCAL NAME.—Karelā.

DISTRIB.—In the tropical parts of the world, generally cultivated in India.

A weak gourd growing in loose patches, often apparently wild. The leaves are variously lobed. The small fruits, which are curiously corrugated and tubercled, are used in curries. The plant is often grown in cottage gardens.

182. *Luffa* Cav.

222. *L. cylindrica* Roem. Eng. & Prantl iv, 5, 25.

L. aegyptiaca Mill. F. B. I. ii, 614; Beng. Pl. 520; D. E. P. v, 96; Pharmacog. Ind. ii, 280. *L. pentandra* Roxb. Fl. Ind. iii, 714.

Dibrugarh. Nos. 59, 87 and 332.

LOCAL NAME.—Bhūl.

DISTRIB.—Cultivated throughout the tropics. Native country unknown.

A hairy climber with nearly circular 5-lobed leaves. It is common in hedges throughout the district. The seeds are used medicinally. The skeleton left by the fruit after the decay of the soft parts forms the well known bath-luffa. Bath luffas are largely imported into India from Japan.

223. *L. acutangula* Roxb. F. B. I. ii, 615; Eng. & Prantl iv, 5, 25; Roxb. Fl. Ind. iii, 713; Beng. Pl. 520; D. E. P. v, 94; Pharmacog. Ind. ii, 280.

LOCAL NAME.—Nasyā tarūi.

DISTRIB.—India, Ceylon and Malaya.

A gourd with rough leaves and characteristic elongate ten-angled fruits. It is commonly cultivated as a vegetable.

183. *Cucumis* Linn.

224. *C. trigonus* Roxb. F. B. I. ii, 619; Fl. Ind. iii, 722; Beng. Pl. 522; D. E. P. ii, 635; Pharmacog. Ind. ii, 65.

Dibrugarh. Nos. 150 and 342.

LOCAL NAME.—Gurmī.

DISTRIB.—Indo-Malayan region.

Generally wild. The fruits are eaten when ripe. The green fruits are sometimes dried and fried.

225. *C. sativus* Linn. F. B. I. ii, 620 ; Eng. & Prantl iv, 5, 28 ; Beng. Pl. 523 ; D. E. P. ii, 632.

Lakhimpur. No. 164.

LOCAL NAME.—*Khira*. “Cucumber.”

DISTRIB.—Cultivated in all warm and warm temperate countries in the world. Native country unknown.

Grown in gardens.

184. *Lagenaria* Seringe.

226. *L. vulgaris* Ser. F. B. I. ii, 613 ; Eng. & Prantl iv, 5, 30 ; Beng. Pl. 519 ; D. E. P. iv, 580 ; Pharmacog. Ind. ii, 67.

Cucurbita lagenaria Linn. Fl. Ind. iii, 718.

Dibrugarh. No. 35.

LOCAL NAME.—Lau. “Bottle gourd.”

DISTRIB.—Apparently wild in India and Abyssinia. Now cultivated throughout the tropical and warm temperate regions of the world.

Very commonly cultivated. A large softly hairy climbing herb. The tendrils divide into two branches. The flowers are large and white and the fruit though very variable in shape always has a woody rind. The unripe fruits are boiled and eaten. The seeds are sown in November and the fruits are ripe the following February.

185. *Trichosanthes* Linn.

227. *T. anguina* L. F. B. I. ii, 610 ; Eng. & Prantl iv, 5, 31 ; Beng. Pl. 518 ; D. E. P. vi, 4, 81.

Sadiya. No. 389.

LOCAL NAME.—Dhūndolī, chichengā. “Snake gourd.”

DISTRIB.—Cultivated in India. Also in Malaya and China.

Recognised by its white fimbriated corolla and long snake-like fruits traversed from end to end by white stripes. Extensively cultivated as a vegetable.

186. *Hodgsonia* Hk. f. & T.

228. *H. heteroclita* Hk. f. & T. F. B. I. ii, 606 ; Beng. Pl. 516.

H. macrocarpa (Bl.) Cogn. Eng. & Prantl iv, 5, 32. *Trichosanthes heteroclita* Roxb. Fl. Ind. iii, 705.

LOCAL NAME.—Āstepa (Phākial).

DISTRIB.—From the Eastern Himalayas through Assam to Burma. Also Malaya.

A large climber with leathery, 3-5 lobed leaves and brownish yellow petals which end in a long fringe. The fruits are globular. The Phākials apparently prepare some article of food from the seeds of this plant.

187. *Cucurbita* Linn.

229. *C. maxima* Duch. F. B. I. ii, 622 ; Eng. & Prantl iv, 5, 33 ; Beng. Pl. 524 ; D. E. P. iii, 638.

Dibrugarh. No. 34.

LOCAL NAME.—Lāl kumrā, kadū. "Giant pumpkin."

DISTRIB.—Cultivated in all warm and temperate countries. Native country unknown.

Cultivated in garden throughout the district on account of its fruit.

188. *Cephalandra* Schr.

230. *C. indica* Naud. F. B. I. ii, 621 ; Beng. Pl. 523 ; D. E. P. ii, 252 ; Pharmacog. Ind. ii, 286.

Coccinea cordifolia Cogn. Monog. Phanerog. iii, 529 ; Eng. & Prantl iv, 5. *Coccinea indica* W. & A. Prod. 347. *Momordica monadelphæ* Roxb. Fl. Ind. iii, 708.

Makum Kila basti. No. 113 : above Dibrugarh. No. 311 ; and Dibrugarh. No. 340.

LOCAL NAME.—Bhāt karelā, kundūrū.

DISTRIB.—Throughout India. Also in Malaya and Africa.

A climbing herb with unbranched tendrils, white flowers and scarlet fruit which is commonly eaten as a vegetable. The green fruits can also be eaten raw and taste somewhat like-cucumber. The juice of the root of this plant is used in diabetes.

LXXVIII. COMPOSITAE.

189. *Xanthium* Linn.

231. *X. strumarium* L. F. B. I. iii, 303 ; Eng. & Prantl iv, 5, 223 ; Beng. Pl. 607 ; D. E. P. vi, 4, 318 ; Pharmacog. Ind. ii, 262.

Dibrugarh. No. 120.

LOCAL NAME.—Agara.

DISTRIB.—In all the warmer regions in the world. Probably originally American.

A very common weed in Lakhimpur especially in sandy places. It is believed by some to cure the bite of a mad dog ; for this purpose the root is made into a paste and applied to the wound. *Xanthium* belongs to a small group of *Compositae* which differ markedly from the rest of the family. *Xanthium* itself has staminate and carpellary flowers in separate heads. The involueral bracts of the carpellary head, which contains but two flowers, are united together to form a nearly closed shell which in fruit is covered with hooked spines. This plant is now common in most of the warmer regions of the northern hemisphere. It is probably a native of America and owes its present wide distribution to the ease by which the bristly infructescences are carried about by animals and in wool. In S. Africa legislative measures have to be adopted to exterminate *Xanthium spinosum* Linn. as wool infested with these burs fetches a lower price.

190. Siegesbeckia Linn.

232. S. orientalis L. F. B. I. iii, 304 ; Eng. & Prantl iv, 5, 231 ; Pharmacog. Ind. ii, 264.

Dibrugarh. Nos. 31 and 349.

LOCAL NAME.—Ban tulsī (a name applied to many fragrant plants), gawāl bahalgañī.

DISTRIB.—All warm countries.

A common weed. The leaves are opposite and toothed. The outer involucre bracts are club-like and remain densely glandular after the fruits are ripe, thus aiding in their dispersal. The whole plant has a curious aroma and is said to have some medicinal uses. The term "Ban tulsī" is applied to several plants. *Siegesbeckia orientalis* L. has the habit of *Xanthium strumarium* L. but even when not in flower can be readily distinguished by its opposite leaves. The autumn form has more foliage and flower heads than the spring form.

191. Eclipta Linn.

233. E. alba Hassk. F. B. I. iii, 304 ; Eng. & Prantl iv, 5, 231 ; Beng. Pl. 610. ; D. E. P. iii, 201 ; Pharmacog. Ind. ii, 266.

Dibrugarh. No. 65.

LOCAL NAME.—Ghenrāg.

DISTRIB.—All warm countries.

A common weed with opposite leaves usually covered with stiff white hairs. The flower heads are inconspicuous and the fruits are 3-angular in section and devoid of pappus. The leaves are reputed to cure sores when applied to them. A Dibrugarh Kaviraj calls the plant 'Kāhar'rāj' and says that the roots merely tied to the belly cures all kinds of ills in it.

192. Wedelia Jacq.

234. W. Wallichii Less. F. B. I. iii, 307 ; Beng. Pl. 612.

W. biflora DC. Eng. & Prantl iv, 5, 235. *Verbesina biflora* Roxb. Fl. Ind. iii, 440.

Dibrugarh. Nos. 66 and 41178.

DISTRIB.—From Kumaon to Burma. Also Java.

An untidy weed with opposite leaves and inconspicuous heads of yellow flowers. It is said to heal wounds when applied to them.

193. Spilanthus Linn.

235. S. acmella L. F. B. I. iii, 307 ; Eng. & Prantl iv, 5, 237 ; Beng. Pl. 614 ; D. E. P. vi, 3, 329 ; Pharmacog. Ind. ii, 283.

Spilanthus Amella Roxb. Fl. Ind. iii, 410.

Khāmtī basti, Jokai. No. 187 ; and near Railway Station, Jaipur, No. 102.

LOCAL NAME.—Pī rāz hā.

DISTRIB.—All warm countries.

An inconspicuous wayside herb common throughout the district. The leaves are opposite and 3-nerved and the conical heads are borne on long stalks. It is also sometimes grown in

gardens. The flower heads are used for toothache. When chewed they make the mouth first tingle then become numb. The Assamese attribute the introduction of the plant to the Khāmtis. The Khāmtis certainly do grow it. Apparently the plant is sometimes administered to women after child-birth.

194. *Saussurea* DC.

236. *S. affinis* Spreng. F. B. I. iii, 373 ; Beng. Pl. 624.

S. carthamoides Ham. Eng. & Prantl iv, 5, 320. *Aplotaxis carthamoides* Ham. DC. Prod. vi, 540. *Serratula carthamoides* Roxb. Fl. Ind. iii, 407.

Dibrugarh. No. 120.

LOCAL NAME.—Gangā mūlā.

DISTRIB.—From Bengal to Burma. Also China and Japan.

A tall annual herb very common by the river at Dibrugarh. The plant resembles a thistle but it has no prickles. The juice of the root is given with other medicines for diseases of women.

195. *Carthamus* Linn.

237. *C. tinctorius* L. F. B. I. iii, 386 ; Eng. & Prantl iv, 5, 332 ; Beng. Pl. 625 ; D. E. P. ii, 183 ; Pharmacog. Ind. ii, 308.

Dibrugarh. No. 6.

LOCAL NAME.—*Kusum*. "Safflower."

DISTRIB.—Cultivated throughout India. Perhaps a cultivated form of *C. oxyacantha* Bieb. found from Lahore westwards to the Caucasus.

A thistle-like plant with beautiful orange coloured flower heads. Stray plants were seen on cultivated ground. This plant yields a well known dye.

196. *Lactuca* Linn.

238. *L. sativa* L. DC. Prod. vii, 138 ; Eng. & Prantl iv, 5, 372 ; Fl. Ind. iii, 403 ; Beng. Pl. 628.

L. Scariola Linn. var. *sativa* Hook. f. F. B. I. iii, 404 ; D. E. P. iv, 578 ; Pharm. Ind. ii, 313.

Dibrugarh. No. 39.

LOCAL NAME.—Salad. "Lettuce."

DISTRIB.—Cosmopolitan.

The common garden lettuce. Cultivated by some cottagers in their gardens. It is sown in October and is ready to be eaten in March.

197. *Crepis* Linn.

239. *C. japonica* Benth. F. B. I. iii, 395 ; Eng. & Prantl iv, 5, 374 ; Beng. Pl. 627.

Khāmti basti, Jaipur. No. 197.

LOCAL NAME.—Masī jo kang (Khāmti).

DISTRIB.—Indo-Malayan region, China and Japan.

An annual, rather succulent herb with lobed leaves and numerous small flower-heads crowded together. It is common throughout the district. The Khāmtis grow it in their gardens and eat the leaves.

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[Synonyms and species incidentally mentioned are in italics.]

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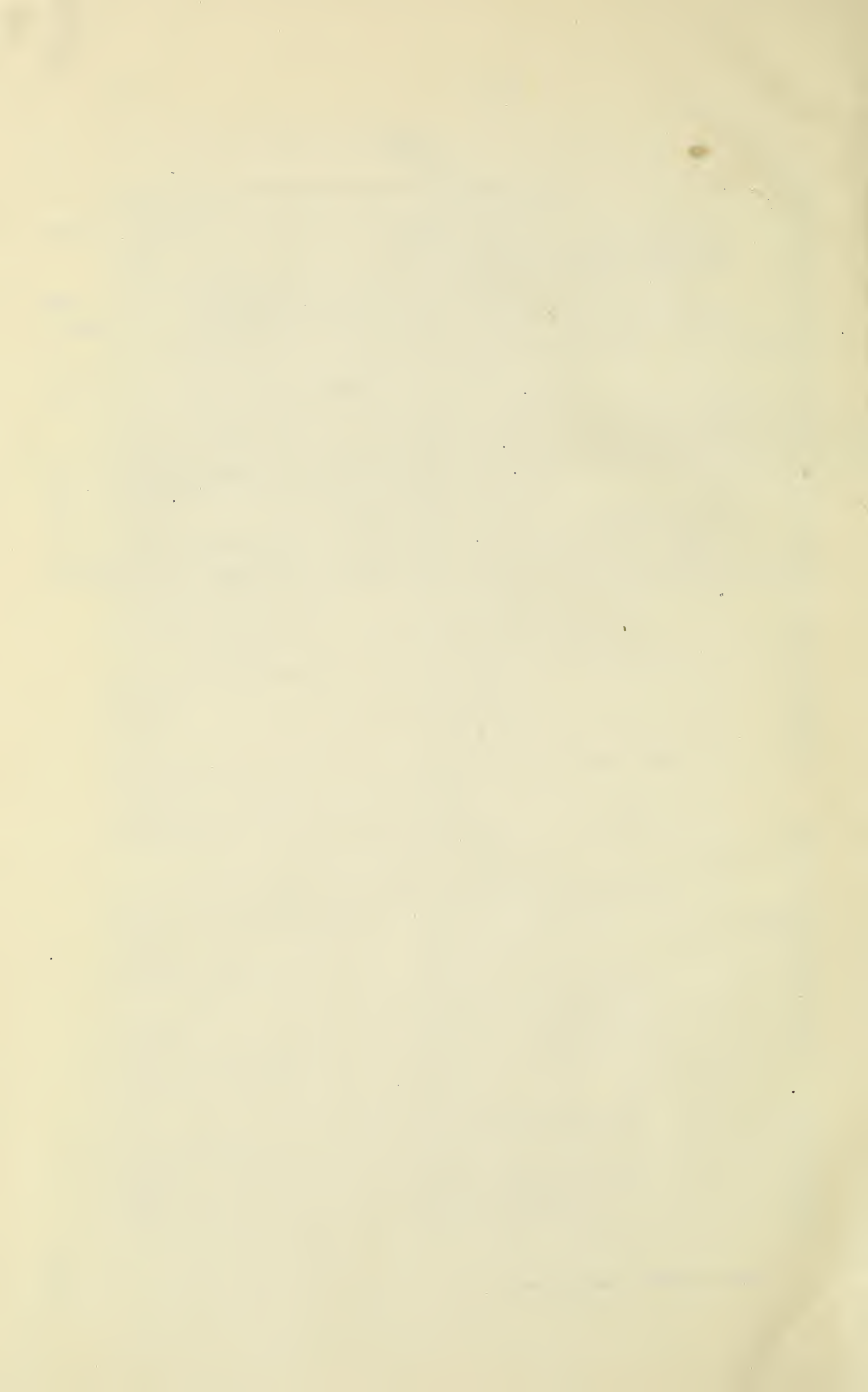
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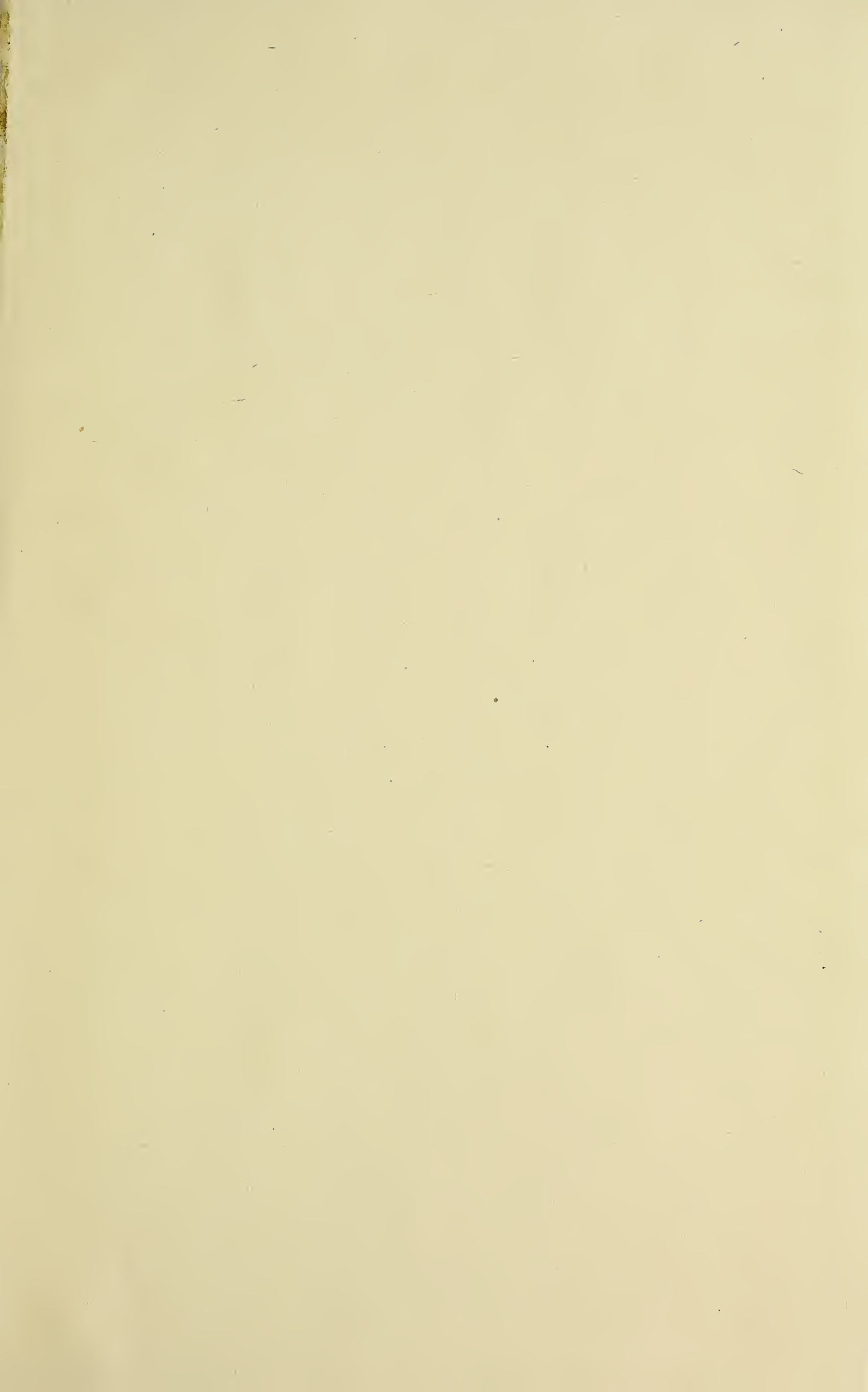
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