

Case No. 157 III

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1874.

HAB. Sporadic in
Yomah, for inst.

(S. S. OBLONGIFLORA
Fl. I. 20
Sep. Bot. 539.

of the Burmese Mora,

71

im, Mergui (Griff.).

SOLOB, Griff. Not. Dicot. 577; Hf. Ind. Fl. I. 175.

-rim, Mergui, in forests (Griff), Fl. Jnii.

Subg. 1. seen specimens, but it cannot be compared with 0, *Salac-*
Leavoi air-vrhkh has small flowers, (cf. SKq, Illustn FL Arch. Ind. 1.1.

Subg.

C. STO-IABTA, L. sp. pi. 720; Roxb. Fl. Ind. II. 563; Jaquem.
oy. Ind. or. t. 22.; Hf. Ind. Fl. I. 177.

11 n. Common along the rocky coast of the Andamam; Pi-gu (Uste
Hl. audTh.). Fl. May.

Crateeva, II.

Conspectus of species.

Flowers corymbose; fruits globular; large tree; ovary globular, ... *C. Roxburghii*.
flowers corymbose; fruits obovate-oblong; ovary oblong, ... *C. namula*.
V low ens solitary, axillary; fruits oblong; meagre shrub, ... *C. It* *phil*.

1. C. EOIBUEGBH, Br. in Douli, ami Clapp. Trav. Append. 224;
Hook. Icon. PL t. 17S; Kura in Trim. Journ. Bot., 1871, 105, t. 148, f.
1-5. (*Capjmrk trifoliata*, liosh, PI. Ind. II. 571.).

ILui. Not unfrequent in the dry forests of the Prome District; Pi-
per Tenasserim. Fl. H. S.; Fr. Close of It. S.

2. C. NATITALA, Ham, in Lian. Trans. XV; Kura in Trim, Journ.
Bat., 1874, 195.

HAB. Tenasserim, Moulmoiu District. PI. Febr. March.

3. C. HTGBORUIIIA, Kurz in Journ. As. Soc. Being., 1872, 292 and in
Trim. Journ. Bot., 1874, 196, t. 118, f. 0-7,

HAB. Not uncommon in tins swamp forests of the Irrawaddi alluvium.
Fl. (De*. or Nov. ?); FT. C. S.

Roydsia, Eoxb.

Conspectus of species.

Subj. 1. *Eu-Roytsia*. Styles 3, short, sessile.
Sepals a line longer, -1 of them free, the 2 others coherent, ... *S. obtusif*
... 2. *Alytotytle*, Ht Style longi terminated by 3 tomentous stigmas. Sepals
Pegu

Sup 2. *X rivango* Eu Hf. and Th. Ind. Fl. I. 180 and *ilatum*, Miq.
pl PI. Sum. I. 3C., 1871, in the swamp forests and a
H.V.B. Frequent in the Irrawaddi and SitK.
Moi rtaban; Tenasserim,
Febr. May; Fr. May.

2. **BIXA.** Capsule 2-valved. Seeds straight, glabrous, with $\sqrt{V/\#}$ 0 *
simple.

Trib. II. WLACOTTRIBM. Petals none, or if present only in
bud, without scales. Anthers opening by valves.

* Petals present.

3. **SCOLOPIA.** Flowers bisexual. Petals 4 to 6. Stamens indefinite.

** Petals none.

4. **FLACOURTIA.** **Flowers** usually dioecious. Ovary 2- to 8-celled.

6. **XTLOSMA.** Flowers dioecious. Ovary **1-celled.** **Seeds glabrous.**

Trib. III. FANGIEJE. Flowers dioecious. **Petals** with an adnate scale or *h* appendage.

* Calyx at first entire, **afterwards** splitting variously.

6. **GYNOCÆDIA.** Calyx cup-shaped. Stamens numerous, free. Styles 3 **with** cordate stigmas.

7. **HYP A ii IA.** Calyx globose, rupturing into 3 to 4 deciduous segments. **Stamens** 4 or 5, united in a tubular column.

Y, y. Sepals distinct already in bud, much imbricated.

8. **HYDNOCAJIPUS.** Sepals 4 or 5. Petals 5—**V.** **Stamens 6 or indefinite!**

Coccolospermum, Kth-

1. **C. GOSSTIUM, DC.** Prod. I. 527; Wight 111. Ind. Bot. Suppl. HO. t. 18; Hi'. Ind. Bot. I. 190. (*Bombax gossypium*, L. j Koxb. Pl. Ind. III. L69.

HAB. In the dry forests on the hills opposite Promo. Fl. March.

Bixa, L.

*1. **B. ORELLANA, L.** sp. pl. 730; Roxb. Fl. Ind. II. 581; Wight III. I. 1.17; Bot. Mag. t. 1456; Griff. Not. Dicot. G10; Hi'. Ind. Fl. 1. 190.

HAB. Frequently cultivated in and around villages all over Burma, and occasionally seen half wild along the courses of mountain, streams in the Pegu Yomah.—Fl. US; FT. CS.

Scolopia, Schreb.

1. **S. HOXBURGII, Clos** in Ann. d. sc. nat. ser. 4. VIII. 250 exel. gyn.; Hf. Ind. Fl. I. 190. (*Ludia spinosa*, Koxb. Fl. Ind. II. 507.)

HAB. Tenasserim, Mergui (Griff. Hell". 211.)

Roxburgh's plant is described as having lucid leaves, but his figure as well as the plant cultivated in the HBC. have them opaque when dried.

Flacourtia, Comm.

Consp. Anacardiaceae
Fl. Ind. II. 449. Fl. I.
16; Hf. Ind. Fl. I.

HATI. Sporadic in the Eng forests along the western slopes of the
;u **Yomah**, for inst. between Pansuay and Myodweng. Fl. Fr. Decbr, Jan,
(\$ 3. S. 013 Murai FOLIA, DC. **Prod. I.** 334 ; Deless. Ie. sel. III. t. 10 ; Hf.
S. M. Fl. I. 207. (*S. obovata*, **Wight** 111. 1.1. 22.; *S. angitlata*, Griff. Not.
jot. 539, t. 585. A. f. 1G?).

F[**HAS.** Tunasserim, Tavoy (Wall).

4. S. CYLTUDBICA, (*Epirhizantles cylindrica*, Bl. Ke^ensb Flor. 1825.
134; **Miq. Fl. Ind. Bat.** 1/2. 12S t. 15; *S. apliylla*, **Griff**, in Linn. **Trans.**
XIX. 312 ; Hf. Ind. **Fl. I.** 207 ; *S. parasitica*, Griff. Not. Dicot. 038. t. 59S.
r. 5).

HAB. Tenasserim, on bamboo-trunlis between decayed wood rather
frequent about Mergui, Palar. (Griff^d). Fl. Octob.

Securidaca, L.

1. S. iXAPIi=NinctLAT.v, Hassk in PL ,Tav. rar. 295, (*S. Tavoymw%*
Wall. Cat. 4106, **nomen nudum**); Hf. Ind. FL I. 20S., *S. scandens* Ham. in
AViill. Cat. 4195, non Janj. <S *panicutata*, liob. Fl. Ind. **III.** 21£), non
Lamk).

HAD. Chittagong ; Arracan (Capt. Marcgrave) ; Tenasserim, Tavoy
(Wall). **FL Aug.**

Xanthophyllum, Roxb.

Conspectus of species,

* Ovary sessile (i. e. the stalk not exerted from the annular disk).

O Piiiuulu remotely supra-axHlury {uiul torminal).

Ij ea ves gin ucous ami m tl L er opaij iu' 1)f I 11 >i III ; **panicles** il i ti' use, glubroti^; <i I y x an d alen (lor
peilicels glubrous; ovarj- miimtoly jinlx'sceit, the stigmaiv **broadly 3-lobed, ...X virens.**

O O **Panicles** or racemes truly axillary (mid **terminal**).

5< Ovary and style villous. (Leaves glimcesceut **beneath**).

Panicles tawny puberalous; pedicels thick, 1^2 lin. loug, puheralous, ...X. *eglandulosum*.

Racemes slender, bo lux **tomentose** panicles; iicdicek slcudur,X. *glaucum*.

y, >C Ovary gluhrows, the style slender pubescent.

Panicle diffuse, greyiah velvety; fruit glabrous; leaves glossy, drying **yellowish** like
Symploeos,X. *jtaveseens*.

* * Ovaiv shortly stalked.

Leaves rather **large**; **racemes** simple or in short robust axillary panicles, greyish velvety;
ovary glabrous with a very thick villous style,X. *ujfme*.

1. X. VIBENS, Roxb. Corom. PL **III.** t. 281 and Fl. Ind. II. 221.

HAB. Not unfreiiuent in the evergreen **tropical** forests of the Pegu
Yomah and Martaban, up to 3000 ft. elevation. Fl. **Febr. March.**

2. X. PLATEscENS, Koxb. Fl. Ind. **II.** 222. {X. *paniculattm*, Miq.
Suppl PL Sum. **I.** 303).

HAB. Frequent in the swamp-forests of Martaban; Tenasserim..
Moulmein down to Tavoy ; also Chittagong. **Fl. Febr. Maj'**; Fr. May.

HAB. Common all over Burma in cultivated **lands**, waste places, on **roads**, etc. Fl. oo.

2. P. *AimiPipA*, L. Manfc. 78 j Roxb. Fl. Ind. II. 464; Wight 111. II. t. 102; Hf. Ind. Pf I. 247. (*C. meridional*, Suppl. 24S; Iloxh. 1. c. 4=03).

HAB. Pegu, in waste places, on roads, etc.; Ava. Fl. C. & R. S.

Talinum, Adans-

1. • T. *cuNEiroLixni*, Willd. sp. pi. II. 864; Roxh. Fl. Ind. II. 465. H\ Ind. Fl. I. 247.

LL\B. Ava, on the Pagodas at Pagha myo (Wall, 6846). •

TAMARISCINEÆ.

Tamarix, L.

Conspectus of species.

"Loaves nppressed to tie terete almost **simple** branehlets and branches j flowers sessile, **rose-coloured, in dense short** spikes, *...T.dioiaa.*

Leaves somcivliat **spreading** on the very short thin and branched brauehlets; flowers jHdiivlli.il, white, in loose slender terminal OP variously **lateral racemes**, *...T. gadica.*

1. T. *ptorca*, Roxh. Fl. Ind. II. 101; **Griff.** Not. Dicot. 465, t. 577. f. 2.; Hf. Ind. Fl. I. 249.

HAB. Ava, in the hills opposite P;ip;ha Myo. Fl. C. S.; Fr. R. S.

2. T. ~~GAMUTICA~~, L. sp. pi. 38G; **Wight** III. t. 24 f. 1.; Hf. Ind. Fl. I. 248. (*T. Indica*, Willd. in Act. Not. Cur. **Berol**, IV. 214; Roxh. FL Ind. II. 100).

HAB. Rather frequent in the tidal savannahs and tidal forests of Lower Pegu. Fl. R. S.; Fr. C. S.

MLATINEM.

Conspectus of genera.

Trib. I Ti'ERQI'EM. Ovary-cells with several ovules. Albumen none. **Perianth complete.** Fruit it **capsule**,

1. IluitGiA. Sepals acute. Flowers usually 5-inerous, Capsule almost crustaceous, **septundal** or **septifiragaL**

Trib. U. JIiri'CUII)F,V. (inch *CaltUrichece?*). Ovary-cells with a solitary ovule. **Perianth complete** or incomplete. Seeds albuminous. Fruit a drupe.

2. MYEiopnYLLUM. Ciilyx trim rate or 4-toothed. **Petals 2—i** or none. Stamens 2—3. Ovtiry **deeply 2- or 4-suleate**; stigmas 2 or 4, blunt or **feathery**. **Drupe separable** into 2 or 4 uut-likr **carpels**.

T. <h. III. CERATOJ'UYLLEM. Flowers unisexual. Perianth 12-phyllous. Ovary 1-cellwl, with a **Bolitary** ovule. Fruit a. nut.

3. CiutAToi-nyi.i,u.u. Stiimens several. Styles 2. Fruit a mit.

Bergia, L.

Conspectus of species.

Glabrous; flowers white, sessile, *...B. vsrtiriUata,*
Pubescent, or hirsute; flowers rose-coloured, shortly ivdicellud, ...B. *ammarioides.*

n. Bot. II. 73; Roxb. Corom. **PI.** III. t.

47; **Griff. Dicot.** t. G57; Hf. Ind, **I.** 115. (*Anneslea*

1 ^{CJ7J,1} .. *t?*. Ind. II. 573; Bot. Reg. t. 618).

Cbittagong, in swamps. Fl, R. S.

Nelumbo, Ad.

1. N. NUCIEEBA, Gaertn. Fruct. **1.73**; Casp. in **Miq.** Ann. Mus. Lugd. Bat. II. 242. (*Nelwmhium Bpecwewn, WiRd.* sp. pi. II. 1:5S; Roxb. FL **Ind.** II. 647; Bot. Mag. t. 903; Wight 111. I. t. 9 j Hf. Ind. Fl. I. **116**),

HAB. Not unfrequent in stagnant waters of the alluvial plains of Pegu; frequently cultivated in tanks, pagodas, etc. Fl. Apr. May.

CRUCIFERAE.
Conspectus of genera.

PAPATEH. Capsules **opening** by short vulres or pores. **Stigmas** 4 or more, g on a sessile disk.

2. ABCBHOXB. Capsules opening by short valves. Stigmas 4 to 6, radiating from the top <ti> depressed style,

Papaver, L.

* 1. P. soitNTFEHUii, L. sp. pi. 726 ; Roxb. PI. Ind. II. 571 ; EngL Bot. t. 2145; Sibth. Fl. Gra;c. t. 491; R<jhb. Fl. Germ. III. t. 17; Hf. andTh. Fl. Ind. I. 250.

HAH. Not much cultivated in Burmah, especially in Ava. Fl. **Febr.** March, FT. Apr. May.

Argemone, L.

• 1. AUG. MEXH-ANA, L. sp. pi. 727 ; Roxb. Fl. Iud. II. 571; Wight 111. I. t. **11.**; Bot. Mag. t. 243; Bot. Reg. t. 1343 j Gray. Gen. t. 47; llf. Ind. Fl. I 117.

HAB. Domesticated in lower Ava (J. Anderson); **in** cultivated lands near Rangoon, sporadically. Fl. Jan.

CRUCIFERJE.

Compcct'us of genera.

- Pods elongate or short, dehiscing along their whole length, not jointed, rarely indehiscent at tin? Buntmit, Septa and valves equally broad and parallel. O Cotyledons accmnbent.

1. NASTURTIIUM. Tods long or shorty the valves turgid or not. *Seeds* small, in 2 rows. Flowers usually yellow.

2. CAHDAITINE. Pods narrow, elongate linear, the valves flit an 1 elastic. Seeds in 2 rows. Flowers usually white.

O 0 Cotyledons longitudinally conduulusvte.

3. BRASSICA

* * Pods short, **dehiscing along**
valves flat, at right angles to i

4. LERIMM. Pods **oblong; notched, 2- rarely J-seeded.**

* * * Pods elongate, in dehiscence, not jointed but **contracts.**
in **between the seeds, Cotyledons** incumbent.

5. ItAriiAXUS. Flowers pale lilac or white with coloured veins.

[No, 2]

laos, on

Nasturtium, L.

Conspectus of species.

ht III.

Pods rather thick, 2 to 5 times longer than the pedicels, more or less curved, *N. Indicum*.

Pods very slender, straight or nearly so, 1 to 1^ in. long, ... *N. montanum*.

1. *N. INDICUM*, L. Mant. 93; Hf. and Th. in Linn. Proc. V. 138.
(*JT. Madagascariense*, WA. Prod. I. 19; Wight III. 1.1. 13 j *divaricate*, Roxb. Fl. Ind. III. 123).

Var. */?*. *BENGHALENSE* (*ZV. Benghaleme* DC. Syat, II. 198; Hf. and Th. in Linn. Proc. V. 139).

Var. *y*. *OLABETM*, quite glabrous, the flowers thrice as large; pods larger and on longer pedicels; racemes bracted. Habit of *Sinapis*,

HAB. Var. */3*. very common on muddy banks of rivers, in rubbishy places round villages, all over Pegu and Martaban; also Chittagong and Tenasserim; var. *y*. in the dried up bed of streamlets in the swamp-forests of the Irrawaddi alluvium, Fl. January to June; Fr. Febr. July.

Var. *y*. is a very distinct form and will probably have to be separated, but unfortunately there are no ripe pods.

2. *N. DIFFIRSUIR*, DC. Prod. I. 139; Miq. Fl. Ind. Bat. 1/2. 94 and 111. Fl. Arch. Ind. 1870, 14. (*JT. jfLonlumun*, Wall, in Linn. Proc. V. 139; Bth. Fl. Hongk. 1G.; *Smapis pusilla*, Eoxb. Fl. Ind. III. 125?).

HAB. Ava (Wall.).

Cardamine, L.

1. *C. PIRSTIHA*, L. sp. pi. 915; Engl. Bot. t. 492, Hf. and Th. in Linn. Jour. V. 14G.

Vflr. */3*. *STLTATICA*, Hf. and T. And. Ind. Fl, I. 138.

HAB. Ava, Bhamo (J. Anderson); Martaban, Toukyeghat, in shady muddy places (only one specimen!). Fl. Febr. March.

Brassica, Jj.

Conspectus of species.

Stem-leaves at base stem-clasping with their auricles, ... —*B. campestris*,

Stem-leaves often petioled, not stem-clasping,

Stem-leaves narrow at base or petioled; How era yellow, *B. juncea*.

Stem-leaves broad at base and sessile but not stem-clasping; petals white or yellowish

white with violet veins, *B. oleracea*.

1. B. YEBTTCILLATA, Willd. sp. pi. II. 770 ; Roxb. Fl. Ind. II. 45G ; Hf. Ind. Fl. I. 252. (*B. aquatica*, Roxb Corom. PL II. t. 1-12).

HAB. Ava (Wall.) ; Pegu, Rangoon. Fl. R. S.; Fr. C. S.

2. 13. AMMA-raioiDES, Roxb. Fl. Ind. II. 457 ; Hf. Ind. Fl. I. 251. (*JBlatine ammannioides*, WA. Prod. I. 41 ; Wight 111. t. 25. A. and Suppl. 48. t. 28.).

HAB. Frequent all over Pegu in rice-fields, along river-banks, etc.; Tenasserim, Tavoy (Wall.). Fl. R. S.; Fr. C. S.

Myriophyllum, L.

Conspectus of species.

Carpels almost smooth, about J lin. long, only at base connate, the back obtuse,
...*M. tetrandrum*.

Carpels tubercled and nmricate, sometimes almost echinate, wholly connate, about a line long, the back sharply angled,*M. tuberculatum*.

1. M. TETBANDBUM, Roxb. Fl. Ind. I. 451 ; DC. Prod. III. 69 ; W. A. Prod. I. 339 ; Miq. Fl. Ind. Bat ; I, 634 ; Griff. Not. Dicot. 686. t. 644, f. 5.

HAB. Frequent in swamps and stagnant waters of the alluvial lands of Pegu; Chittagong, in ponds. Fl. Fr. Oct. to Jan.

2. M. TUBECULATUM, Roxb. Fl. Ind. I. 471 ; DC. Prod. III. 69 ; Miq. Fl. Ind. I. 635. (ilf. *Indicwn*, Griff. Not. Dicot. 687.)

HAB. Chittagong, in ponds. Fl. Fr. Oct.—Decb.

Ceratophyllum, L.

1. C. DEMEBSTIM, L. sp. pi. 1109 ; DC. Prod. III. 73 ; Bth. Fl. Austr. II. 491.

Var. a. DEMEBSUM, (*C. de-merswn*, L. 1. c), nuts smooth.

Var. f3. TUBECULATUM, (*C. tuberculatum*; Chain, in Linnsea IV. 501. t. 5. f. 6. d.; WA. Prod. I. 309 ; Miq. Fl. Ind. Bat. I. 799 ; Wight Ic. t. 1948. f. 3. ; *C. verticillatum*, Roxb. PL Ind. III. 624).

HAB. Only var. /?. not uncommon in ponds and stagnant waters of Chittagong ; also in choungs and lakes of Pegu. Fr. Decb. Jan,

RYPEBICIJSfEJE.

Conspectus of genera.

Trib. I. HYPERICJE/E. Capsules dehiscing septicidally. Seeds not winged.

1. HYPEMCUM. Flowers 5-merous. Herbs or shrubs.

Trib. II. CRATOXYLEJE. Capsules dehiscing loculicidally or sometimes both loculicidally and septicidally. Seeds winged.

2. CRXVTOXYLON. Flowers 5-merous. Stamens 3-adclphous. Ovules 4 or more to the cell.

- # Anthers oblong or ovate, opening by longitudinal slits or pores.
 # Stamens of male flowers in 4 bundles under the rudimentary ovary.
 Berries 4- to 10-celled, the stigma radiating-lobed, smooth or nearly so.
- Female flowers with staminods round the ovary; berries on a short peduncle; stigma radiately - lobed and adnate, *G. Mangostana*.
 Female flowers without staminods; berries sessile; stigma large, peltate, slightly lobed, sessile, *G. cornea*.
 Flowers on rather long pedicels, nearly 2 in. in diameter; stigma in male flowers large, peltate, entire, *G. speciosa*.
 # * Stamens in 4 polyandrous bundles in a ring round the rudimentary ovary; stigma peltate, discoid, more or less rough from wrinkles or radiating veins. Ovary 2-celled.
 Peduncle rather long, bearing 2 or rarely 1 leafy bract, *G. anomala*.
 Peduncle short or wanting, without bracts, *G. Merguensis*,
 # # # Anthers almost sessile on a column or 4-sided fleshy mass seldom dividing into 4 somewhat distinct lobes. Stamens in female flowers in a single complete or interrupted ring. Stigmas tubercled or tubercled-wrinkled. Ovary 4—12-celled.
 O Stigma in fruit raised on a short thick style.
 Berry convex at top, the style not on a separate nipple, *G. cowa*.
 Berry terminated by a nipple-shaped protuberance, *G. Kydia*.
 O O Stigma in fruit quite sessile.
 Leaves acuminate or cuspidate, leathery ; flowers sessile, *G. lancecefolia*.
 Leaves blunt, succulent when dry thin herbaceous; flowers pedicelled, ...#. *succifolia*.
 * # Anthers peltate, opening by a circular slit.
 Leaves large, coriaceous; female flowers almost sessile, the stigma small, verrucose
 *G. elliptica*.
- Subg. 2. XanthocJiymus*, Roxb. Flowers 5-merous.
 Pedicels about an in. long; flowers expanded, *G. XantJiocJiymus*.
 Pedicels 3 to 4 lin. long; flowers almost closed, doubly smaller, *G. dulcis*.

* 1. *G. MANGOSTANA*, L. sp. pi. 635 ; Eoxb. Fl. Ind. II. 618 ; Hook. Eot. Mag. t. 4847 : Hf. Ind. Fl. I. 260.

HAB. Only cultivated, Tenasserim. Fr. May, June.

2. *G. SPECTOSA*, Wall. PI. As. rar. III. t. 258 ; Hf. Ind. Fl. I. 260.

HAB. Frequent in the tropical forests of the Andamans; also Tenasserim, Moulmein district. Fl. Febr, Apr.

Wallich's figure above cited very much resembles *G. cornea*. My plants resemble in foliage much more *G. Mangostana*, from which they are readily distinguished by the entire but not lobed stigma of the male flowers. The flowers are very much larger than Wallich figures them, agreeing in size more with the analysed flower on the plate.

3. *G. CORNEA*, L. sp. pi. 561; Eoxb. Fl. Ind. II. 629 ; Wight Ic. t. 105; Hf. Ind. Fl. 1.260.

HAB. Not uncommon in the tropical forests of Martaban and the

southern slopes of the Pegu Yomali above Rangoon falso Tenasserim. Fr. Begin of E. S.

The Burmese plants differ, as it seems constantly, in having the stigma G-lobed and the ovaries 6-celled.

4. *G. ANOMALA*, PL and Trian. in Ann. d. sc. nat. Bot. ser. 4. XIV. 329; Hf. Ind. Fl. I. 266.

HAB. Not uncommon in the damp and dry hill-forests of Martaban E. of Tounghoo, at elevations from 4000 to 6000 ft. Fl. probably Apr. (buds in March).

5. *G. MEEGUENSIS*, Wight 111. 122. and Ic. t. 116 ; Hf. Ind. Fl. I. 267.

HAB. Tenasserim, Mergui (Griff.)

6. *G. COWA*, Roxb. Fl. Ind. II. 622. (*G. Roxlurghii*, Wight Ic. t. 104).

HAB. Chittagong (Roxb.)

7. *G. KTDIA*, Roxb. Fl. Ind. II. 623 ; Wight Ic. t. 118. (? sp. Griff. Not. Dicot. 609. t. 585. A. f. 12 P).

HAB. Frequent in the moister upper mixed and in the tropical forests all over Burmah, from Chittagong, Pegu and Martaban down to Tenasserim and the Andamans. Fl. March to May; Fr. May June,

G. lohulosa, Wall. Cat. 4868 from Amherst is *G. Kydia*, the Singapore specimen is quite different but too incomplete for identification.

The Andamanese specimens called in my And. Report *G. pwyurea*, will probably turn out to be the same as the Singapore plant, but they are too badly preserved to enable me to give a definite opinion.

8. *G. LANCEJEFOLIA*, Roxb. Fl. Ind. II. 623; Wight Ic. 163; Hf. Ind. Fl. I. 263.

HAB. Chittagong hills.

9. *G. SUCCIFOLIA*, Kurz in Journ. As. Soc. Beng. 1872. 293. (*G. loniceroides*, T. And. in Hf. Ind. Fl. I. 264).

HAB. Frequent in the swampy forests of the alluvial lands of the Sittang and Irrawaddi rivers. Fl. Apr.

10. *G. ELLIPTICA*, Wall. Cat. 4869 ; Wight 111. I. 126 and Icon. t. 120. (*Garcinia heterandra*, Wall. Cat. 4856 ; Hf. Ind. Fl. I. 265).

HAB. Frequent in the tropical forests of the eastern slopes of the Pegu Yomah and Martaban down to Tenasserim, up to 3000 ft. elevation. Fr. Febr. March.

I consider *G. elliptica*, Wall. Cat. 4869 from Silhet identical with the *G. heterandra* of the same author, but other specimens distributed from the Kew Herbarium look different; in any case it cannot go into *G. Morella*. From the contradictory statements of authors with regard to Wallich's species, one is tempted to believe that much confusion must have occurred

in the distribution. We have in the H. B. C. at least two *3Iorellas*, the Hindustani one (*G. pictoria*, Roxb.) with a large conspicuous calyx under the fruit, and the Malacca one (Griff. 859) which has very minute sepals. *G. Choisyana*, Wall. ap. Hf. Ind. Fl. I. 268 from Tavoy, is known to me only from a wretched young leaf-branch and the description would agree so far with *G. elliptica* except in the sessile male flowers.

21. *G. XANTIOCHYMUS*, Hf. Ind. Fl. I. 269. (*G. Roxburglii*, Kurz in Pegu Report; *Xanthochymus pictorius*, Roxb. Corom. Pl. 51. t. 196 and Fl. Ind. II. 633).

HAB. Frequent in the tropical forests of Martaban and Pegu; also Chittagong, Arracan and Tenasserim; Ava. Fl. March Apr. ; Fr. R. S.

12. *G. DULCIS* (*Xanthochymus dulcis*, Roxb. Corom. Pl. III. t. 270 and Fl. Ind. II. 631 ; Bot. Mag. t. 3088 ; Wight Ic. t. 192).

HAB. Rather frequent in the tropical forests of South Andaman and adjacent islands. Fr. March-May ; Fr. May, June.

Ochrocarpus, Thouars.

1. *O. SIAMENSIS*, T. And. in Hf. Ind. Fl. I. 270. (*Calysaccion Siamense*, Miq. in Ann. Mus. Lugd. Bat. I. 209^).

HAB. Rather rare in the Eng forests of Martaban; Prame hills (Wall. Cat. 414S, quoad specimen e Prome). Fl. Sept. Oct.

Calophyllum, L.

Conspectus of species.

* Sepals 4, often the 2 inner ones or all petal-like; petals none.
 Flowers about 8 lin. across, in peduncled or almost sessile umbel-like cymes...*O. specfalile*.
 Flowers small; racemes short and strong, few-flowered, *C. amoenum**
 * * Sepals 4; petals 4 to 8.
 Leaves at both ends acuminate, *C. polyanthum*.
 Leaves rounded or retuse at the apex, *C. Inophyllum*.

1. *C. SPECTABILE*, Willd. Mag. Berl. 1811.80 ; Hf. Ind. Fl. I. 271. (*C tetrapetalum*, Roxb. Fl. Ind. II. G08).

HAB. Not unfrequent in the tropical forests of the Andamans ; also Tenasserim. (Falconer).

2. *C. AMENUM*, Wall. Cat. 4849; Planch. & Trian. in Ann. d. sc. nat. ser. 4. XV. 263.

HAB. Tenasserim, from Moulmein down to Tavoy. Fr. Febr.

3. *C. POLYANTHUM*, Wall, Cat. 4844; PI. & Trian. in Ann. d. sc. nat. Bot. 4 ser. XV. 278 ; Hf. Ind. Fl. I. 274.

HAB. Not unfrequent in the damp hill forests of the Martaban hills, E. of Tounghoo, at 3000 to 4000 ft. elevation.

4. *C. IXOPHYLLUM*, L. sp. pi. 732 ; Wight Ic. t. 77, and 111. Ind; Bot. Suppl. 35 t. 17 ; Roxb. Fl. Ind. II. G06; Hf. Ind. Fl. I. 273 ; Griff. Not. Dicot. 609. (*C. Bitangor*, Roxb. 1. c. 607).

HAB. Frequent along the sandy sea-shores in the beach-forests of the An damans and Tenasserim,* also often cultivated in villages. Fr. Apr. May.

Kayea, Wall.

I. K. NEBTOSA, T. And. in Hf. Ind. Fl. I. 277. (*Mesua nervosa*, Plane]]. 4 Trian. in Ann. d. sc. nat. 13ot. ser. 4, xv. 307)'. .

HAB. Tenasserim, Moulmein district (Falc.) down to Mergui (Griff.)' Fr. Apr.

Mesua, L.

1. M. FERBEA, L. sp. pi. 734 ; Wight Ic. t. 118 ; Roxb. Fl. Ind. IT. 605 ; Hf. Ind. Fl. I. 277. (*M. speciosa*, Chois in DC. Prod. I. 502 ; Wight Spicil. 27. t 30 and 31 ; and Icon. t. 961 ; *M. pedunculata*, Wight Ic. t. 119).

HAB. Frequent in tropical forests of the Andaman islands and all over Tenasserim ; Chittagong. Fl. March ; Fr. May, June.

TERN&TJMEMIACEJE.

Conspectus of genera.

Trib. I. TEUNSTRCEMIACJS2E. Anthers basifix. Fruit indchiscnt. Seeds usually few. Albumen fleshy, usually scanty. Embryo curved, the cotyledons shorter than the radicle and nearly as broad.

1. ANXESLEA. Ovary half-immersed in the torus. Fruit inferior.

2. TERNSTRCEMIA. Petals united at base. Anthers glabrous. Ovules 2 to i in each cell. Fruit superior.. Seeds large.

3. ADINANDRA. AS preceding, but anthers pilose. Seeds numerous, small.

4. CLEYERA. Petals free or hardly united. Anthers pilose. Ovules many. Fruit superior.

5. EURYA. Flowers dioecious. Petals united at base. Anthers glabrous. Ovules many. Fruit superior.

Trib. II. SA URA UJJSJE. Anthers versatile. Fruits usually pulpy, rarely almost dehiscent. Seeds numerous, small. Albumen copious. Embryo straight, the radicle longer than the cotyledons.

6 SAURAUJA. Flowers 5-merous, usually hermaphrodite. Styles 3—5.

Trib. III. GORDONIE/E. Anthers versatile. Fruit indehiscent or loculicidal. Albumen scanty or none, rarely copious. Embryo curved or straight, the cotyledons large, the radicle short.

X Fruit a dehiscent capsule.

7. SCIIIMA. Sepals somewhat unequal. Seeds flat, winged. Radicle inflexed. inferior.

8. GORDONIA. Sepals very unequal. Seeds winged. Radicle superior.

9. CAMELLIA. Sepals very unequal. Outer stamens monadelphous. Seeds few, large, not winged. Radicle superior.

X % Fruit an indehiscent drupe.

10. PYRENARIA. Sepals very unequal. Seeds large. Cotyledons folded or convolute. Radicle inferior.

Anneslea, Wall.*Conspectus of species.*

Leaves less coriaceous, bluntish, the nerves distinct; peduncles slender, ...*C.fragrans*.
Leaves thick coriaceous, acute, nerves almost obsolete; peduncles very thick, *C. monticola*.

1. *A. FHAGRAXS*, Wall. PI. As. rar. I. 5. t. 5; Griff. Not. Dicot. 567. t. 585. A. f. 17; Hf. Ind. Fl. I. 280.

HAB. Not unfrequent in the Eng forests of Pegu and Prome, and more so in the bill Eng forests of Martaban up to 2000 ft. elevation; also Tenasserim, Moulmein. Fl. March, -Apr.

2. *A. MONTICOLA*, Kurz in Journ. As. Soc. Beng. 1873, 59.

HAB. Not unfrequent in the drier bill forests of Martaban at 5000 to 7200 ft. elevation. Fl. Febr. March.

May possibly turn out to be a stunted bill-form of the preceding species.

Ternstrcemia, L. f.*Conspectus of species.*

* Anthers apiculate.

Fruiting calyx smooth; berries about 1 in. thick,, ..*T. Japonica*.

* # Anthers not apiculate.

Fruiting calyx thick and wrinkled; berries about 1—1\ in. thick,*T. Fencingiana*.

1. *T. JAPONICA*, Thunbg. in Linn. Trans. II. 335; Hf. Ind. Fl. I. 280. (*Cleyera gymnanflicra*, VVA. Prod. I. 87; Wight Ic. t. 47; Eedd. FL Sylv. t. 91.; *Ternstrcemiacea*, Griff. Not. Dicot. 568. t. 604. f. 1 ?).

HAB. Common in the damp hill-forests of Martaban at elevations from 3000 to 7200 ft.; Tenasserim, Moulmein. Fl. Apr.

2. *T. PENANGIAKA*, Chois. in Mem. Soc. Phys. Génév. XIV. 108; Hf. Ind. Fl. I. 28L. (*Erythroclitron Wallichianum*, Griff. Not. Dicot. 565. t. 585. A. f. 7. ' *T. macrocarpa*, Scheff. Obs. Phyt. 15. & Tydschr. Ned. Ind. 1874. 60-61 in adn.).

HAB. Not unfrequent in the tropical forests of the Andamans; Tenasserim, from Moulmein to Mergui. Fr. Apr. May.

A more careful study of the *Ternstrcemias* will probably shew the validity of Griffith's genus *Jerythrocliiton*, a name already preoccupied. I am by no means sure that the Griffithian and Wallichian plants are the same. The Burmese specimens agree with the former. Dyer seems to have confounded two very marked species, viz., the wrinkled-sepalled Cboisyan plant and the smooth-sepalled *T. coriacea*, Scheff. (Hb. Maingay No. 183 from Malacca).

Adinandra, Jack.

1. *A. YILLOSA*, Chois Mém. Ternst. 24; Hf. Ind. Fl. I. 283.

HAB. Not unfrequent in the open especially the Eng forests of the Irrawaddi zone, Pegu -, Tenasserim, Tavoy (Wall.).

Adult leaves glabrous, except the puberulous midrib; peduncles short, scaly puberulous ;
stamens about 50; flowers lazuli-blue, *S. Roxburghii*.

As preceding, but leaves finely setose-serrate; stamens about 20; flowers said to be white,
...*S. tristyla*.

All parts except upper side of leaves covered with long tawny or brown spreading hairs;
peduncles short but slender, rusty-hirsute, *S. macrotricha*.

1. *S. ARMATA*, Kurz in Journ. As. Soc. Beng. 1873. 59. (#. *cerea*.
Griff, ap. Dyer in Hf. Ind. Fl. I. 283 ?).

HAB. Ava, Kbakyen-hills, Ponsee (J. Anderson). Fl. Apr.

2. *S. PUNDUANA*, Wall. Pl. As. rar. II. 50; Hf. Ind. Fl. I. 287. •

HAB. Not unfrequent in the tropical forests of Martaban at 2000 to
8000 ft. elevation ; Ava, Khakyen hills, Ponsee (J. Anderson). Fl. Apr.

3. *S. KOXBUEGHII*, Wall. Pl. As. rar. II. 40; Hf. Ind. Fl. I. 287.
(*Ternstroemia serrata*, Roxb. Fl. Ind. II. 521).

HAB. Rather frequent in the tropical and damp hill forests along
cloungs of the Martaban hills, E. of Toungoo, at 2000 to 6000 ft.
elevation; also Chittagong. Fl. Apr May.

4. *S. TRISTYLA*, DC. Mém. Ternst. 31. t. 7. ; Hf. Ind. Fl. I. 287.
(*Ternstroemia bilocularis*, Koxb. Fl. Ind. II. 522 ?).

HAB. Tenasserim (Helf.)

Included on the authority of Dyer. Specimens thus named in HBC.
hardly differ from the preceding.

5. *S. MACJUOTICIA*, Kurz in Journ. As. Soc. Beng. 1873. GO; ill',
Ind. Fl. I. 287.

HAB. Ava, Khakyen hills, Ponsee (J. Anderson) ; Durunga, at 1000
ft. elevation (Griff*). Fl. Apr.

Pyrenaria, Bl.

Conspectus of species.

* Bracts large, leafy, dissimilar to the sepals.

Leaves yellowish in a dried state, pubescent beneath, *P. diospyrica* Vj

* * Bracts small, much shorter than the sepals and similarly shaped.

Leaves glabrous, yellowish in a dried state, petioles hardly 2 lin. long, puberulous-
glabrous; fruits obovate, waxy-yellow, *T. camelliceja* U

Leaves glabrous, in a dried state liver-coloured; petioles glabrous, 6 to 8 lin. IOL
fruits globular or elliptical, green, *P. sericea*

1. *V. BIOSPYEICABPA*, Kurz in Journ. As. Soc. Beng. 1873. GO

HAB. Not unfrequent in the stunted and drier hill-forests of Martaban
E- of Toungoo, at 6000 to 7200 ft. elevation. Fl. Fv. March.

2. *P. CAMELLIÆFLORA*, Kurz in Journ. As. Soc. Beng. 1871. 4G; Hf.
Ind. Fl. I. 290.

HAB. Frequent in the drier hill-forests of Martaban at elevations
from 3000 to 5000 ft., rarely lower down. Fl. March Apr.; Fr. Apr. May.

3. P. SEIKATA, Bl. Bydr. 1120; Miq Fl. Ind. Bat 1/2. 493. (P. *ittcnnata*, Seem, in Bonpl. VII. 49 ; Linn. Trans: XXII. 340 ; Hf. Ind. Fl. I. 290. ; P. *lanceolata*, T. and B. in Nat. Tydsch. Nat. Ver. Ned. Ind. XXV)

HAB. Tenasserim, Tavoy (Wall.)

Schima, fewdt.

Conspectus of species,

% Peduncles usually very short and stout, usually not longer than the petioles.

"Peduncles short and straight (rarely long in Wall. Cat. 1455 fr. Nepal), usually lenticellate, rather strong, the nerves beneath prominent, the reticulation distinct, leaves glabrous or slightly pubescent beneath, *...Sc7i. Wallichll.*

Peduncles 1 in. long, lenticellate; leaves pubescent beneath ; the nerves and net-venation prominent and distinct, *...Sch. mollis.*

Jb^Mjccles thick, lenticellate; leaves very coriaceous, glossy above, crenate, on both sides green, the net-venation indistinct, immersed, *...Sch. monilcola.*

Peduncles short and straight, smooth; flowers larger than in *Sch. crenata*; leaves glaucescent beneath, often entire, the lateral nerves prominent, the net-venation obsolete, *.. Sch. Noronhce.*

% X Peduncles elongate, and often slender, always much longer than the petioles, smooth.

Peduncles slender, usually more or less curved; leaves glaucous beneath, usually crenate-serrate, the nerves and net-venation beneath distinct, *.. Sch. oblala.*

Peduncles strong, but still slender, 1—1\ in. long; leaves very coriaceous, on both sides impressed-reticulate and almost rugulose, entire or crenate, the lateral nerves entirely or nearly impressed; capsules smaller, *...Sch. Bancana**

1. Sen. WALLTCHII, Chois. (in Zoll. Cat. 144 ?). *Gordonia Wallichii*, DC. Prod. I. 528 ; *Gordonia integrifolia*, Eoxb. Fl. Ind. IT. 572).

JIAB. Chittagong; Ava, Khakyen-hills, Ponsee (J. Anderson). Fl.

2. Sen. MOLLIS, Dyer in Hf. Ind. Fl. I. 288.

HAD. Ava, Taong-dong (Wall. Cat. 1458) ; Dyer gives Tavoy as habitat, but this is an error. I fear that it is hardly more than a pubescent ^ty of the preceding.

3. Sen. MONTICOLA, Kurz MS.

> HAB. Martaban, on the highest crests of the Nattoung mountains, in stunted hill forests, at 6000 to 7200 ft. elevation. Fr. March.

May possibly be a hill-form of *Sch. Noronlioe*, but looks, very different even structurally. The leaves much resemble those of *Pyg'ewn lucidum*.

k SCIT. NOROSILE, liwdt. in Bl. Bydr. 129; Korth. Verb. U4. t. 29. f. 21—27 ; Miq. Fl. Ind. Bat. 1/2. 492. (*Gordonia integrifolia*, Eoxb. Fl. Ind. II. 572 ; *Gordonia jiorihunda*, Wall. Cat. 1457, B only.)

HAB. Frequent in the drier hill-forests of the Martaban hills at 1500 to 4000 ft. elevation, entering also the hill Eng-forests ; Tenasserim (Helf. 763). Fl. Febr. March ; Fr. March, Apr.

Schima, Griff. No. 768 has the peduncles of the above, but the leaves very much resemble those of *Sch. oblata*, I think that they are abnormal and produced after an unusual fall of leaves.

5. Sen. OBLATA, Kurz in Journ. As. Soc. Beng. 1870. 05. (*Sch. crenata*, Korth. Verh. Nat. Gesch. 143. t. 29; Hf. Ind. FL I. 289; *Qordonia oblata*, Roxb. Fl. Ind. II. 572).

HAB. Pegu, Rangoon; Tenasserim (Helf. 763).

6. SCH. BANCANA, Miq. Ann. Mus. Lugd. Bat. IV. 413.

HAB. Tenasserim (Helf. 761); common in the Eng forests of the lower hills of Tenasserim and Martaban, also in the pine forests up to 3000 ft. elevation. (Dr. Brandis.)

The differences between the species of *Schima* are very slight, but the logical consequence of the reduction of any of the above forms would be a combination as *Sch. Noronhce* and *Sch. Wallichii*.

Camellia, L.

Conspectus of species.

Sub//. 1. *Thea*, L. Stamens of inner series equal in number to the petals.

All parts quite glabrous; flowers large; leaves coriaceous, ... *C. Japonica*

Subg. 2. *Camellia*, L. Stamens of inner series twice the number of the petals.

Young parts and midrib of the membranous leaves pilose; flowers nodding on a line-long scaly peduncle; filaments glabrous, ... *O. caudata*.

All parts glabrous; leaves coriaceous; peduncles not scaly; filaments glabrous, ... *C. Thea*

Glabrous; leaves coriaceous; flowers almost sessile, erect; filaments glabrous, *Cdruptferct*

*1. C. THEA, Lk. in Stend. Nomencl. Bot. (*Thea Chinensis*, L. sp. pi. ed. 1. 515; Sims. Bot. Mag. t. 998; Seem, in Linn. Trans. XII. 349. t. 61; *Thea Bohea* and *T. viridis*, L. sp. pi. ed. 2. 735; *Thea Cochinchinensis*, Lour. Fl. Coch. 1. 38; *G. theifera*, Griff. Not. Dicot. IV. 558. t. & f. 1 and 3; Trans. Agr. Hort. Soc. Bengal V. t. C.; Hf. Ind. Fl. I. 292)

HA33. Cultivated in Chittagong and Arracan.

2. C. CAUDATA, Wall. Pl. As. Ear. III. 336; Griff. Not. Dicot. ar t. 601. f. 2; Trans. Agri. Hort. Soc. Ind. V. 1838 t. A.; Hf. Ind. Fl. I. i/

HAB. Not unfrequent in the drier hill-forests of the Martaban along clioungs, as for instance near the Chinchona plantation on Shan toiL_{fc}, gyee tounge at about 3500 ft. elevation. Fl. March ?

I fear that I am wrong in my identification and, unfortunately, the OIB two withered flowers met with by me have been lost by the glue-men. It has much larger and shorter acuminate leaves, and the habit of *G. assimilk* as figured by Seemann. It is a small tree with white wood. N. B. *C. Japonica*, L., is often met with in gardens of Europeans.

3. C. DUUPIFIKA, Lour. Fl. Coch. I. 411; Seem, in Linn. Trans XXII. 344 j Hf. Ind. Fl. I. 293. (G *Kissi*, Wall, in Asiat. lies. XIII^s

429 and **Journ. As. Soc. Beng. IV. 48. t. 2. and Pl. As. rar. III. 30. t. 250;**
C. mplicifolia, Grill'. Not. Dieot. **IV. 560. t. 004. f. 2).**

HAB. **Tenassorim** (and Andaman islands ? ?) (Helf. teste **Dyer**).

DIPTEROCARPEÆ.

Conspectus of genera.

Stihord. I. ANCISTROCLADEJE. Ovary 2-celled, **with** a single erect ovule; **fruit**
 adnate to **the enlarged** calyx. **Scaudent shrubs.**

1. ANCISTHOCLADUS. All **the** 5 calyx lobes more or less enlarged.

Stihord. II. BIPTEROCARPEJE. Ovary 3-rarely 1-celled, with 2 **pendulous** ovules
 in *navh* cell. Trees, **rarely** erect shrubs.

• Ovary inferior or nearly so, or with a **broad base adnate** to the calyx-tube:
nuts therefore to **J** of their length adnate to the **enlarged calyx tube,**

2. **AsradPTBBA.** Connective terminating in a bristle or acute gland; 2 of the 5
 calyx-lobes enlarging into long wings.

•• Ovary free, superior; nuts free, either, enclosed in the enlarged calyx-tube
 or exposed and the calyx tube hardly enlarged.

O Calyx-tube in fruit very **enlarged, completely** enclosing the **nut.**

3- DiPTKROCAitrus. **Two of the** calyx lobes enlarging into long wings.

O O Calyx-tube in fruit not or almost not enlarged, the nuts either quite
 exposed or closely surrounded by the enlarged **calyx-wings,**
 t Calyx-lobes valvate in bud.

4. PATAsnoKEA. Stamens 12—15, the connective niucronulate; calyx-lobes all
 almost equally enlarging and wing-like, stellately spreading, the nut quite exposed.

f f Calyx-lobes imbricate and **usually** also twisted in **the** bud.

X The 3 outer calyx-lobes in fruit longer than **the 1 inner** ones.

6. SnOBEA. Corolla-lobes **spreading;** stamens 35—50 or more; anther-tills blunt,
 the connective terminating in a bristle or pecticellate sharp point.

6. PKNTAOIE. **Corolla-lobes infracted at middle** and forming a **hemispherical**
 closed cup leaving only an **opening for** the prot rudi njr an OUTS and **style;** stamens ID;
 ••jjhers 4-celled, **the** ceUs bristly, diverging from the subiliate-pouitett **connective** (auther,
Vierefore 5-setose).

% % The outer calyx-lobes in fruit much longer than the 3 inner
 very small ones.

V. HIOPEA. Stamens 15; anther-cells entire at top, aitate to the more or less
prolonged connective.

>^ % % All **the** 5 calyx-lobes in fruit equally enlarged ^{nhrt*}
 longer than the fruit **itself.** IX. t.

8. VATICA. Stamens 15. Capsules **by** abortion 1- rarely 2-secded.

Ancistrocladus, **W¹T***

*Conspect** ^ ^ s .

All the 5 lobes of the fruiting **ea. Vern, ^y-enlarged, short** and coriaceous, stel^{lately}
 spreading, leaves chartaceorp. ...

Lobes of fruiting calyx unequal, chartaceous, 1-1J in. long; leaves of a thicker
 texture, *Q. Griffithii.*

1. A. GRTFrrur, Planch, in Ami, d. sc. nat. ser. 3. XIII 318- DC J
 I"nod. XVI. G03; Ind. Fl. I. 300. * ;

II.us. **Common** in the swamp-forests and along muddy river banks of Pegu and **Martaban** down to Tenuyserini, chiefly in the alluvial **plains**. **Fl. FT. Apr. May.**

2. A. WALLTCHII, Planch, in-Ann. i, se. Nat. 3 ser. XIII. 319; Hf. **Ind. R I. 300.** (J. **KCtensw**, Wall. Cat. 3052 ; DC. Prodr. **XVI. 602 j I** If. Ind. Fl. I. 299; A. *stelltgems*, Wall. ap. DC. Prod. L c. G03 **P**; A. sp. **Giiff.** Nat. Dicot. 5GS.)

li.\ is. **Frequent** in the **tropical** forests of the Pegu Yomah and **Martaban** down to **Tenasserim** and the Andainans; also Chittagong. **Fl. Febr March ; Fr. Apr. May.**

The **wings** are described as **subequal** but all those that I saw were very **unequal**, and it is possible that A. *Wallichii* of Dyer is the same as A. *Grijft'ithii*. At least several **specimens** of A. *stelligerw*, Wall. Cat. **belong** to the latter, Wallich's specimens 1052-2 in HJ3C. from **Silhet**, in very unripe **fruit** only, have the wings unequal. The plants are **dimorphophyllous**, having elongate **leaves** 1 to 1/2 and 2 ft. long and others hardly 6 in. long on **different** branches of the same stock (lowering at the **same time**. The panicles, too, vary from robust to slenderly-branched.

Doubtful species.

1. A. ATTEJIT/ATUS, Dyer in Hf. Ind. **Fl. I. 300.**

HAB. Tenasserim and Andaman islands (Hef. 721.)

The **specimen** in IIBC. is in panicle less the **flowers** and fruits and has the habit of A. *Gnjithii*'; the fruits, however, as described by Dyer, **agree with** those ascribed by me to A. *extensus*.

Anisoptera, Korth.

Conspectus of species.

Subg. 1. *Stwaptea*. Stamens only 15—18, the connective **terminated in an acute** gland; style filiform; nuts only to about **1/2 of their** length ante to the **calyx-tube**.

Young SILODN covered by **mealy** or aenrvy tomentum, *A. odorata*.

Subg. 2. *Anisoptera*. **Stamens** numerous, the connective produced into a **bristle, atyle** thick and **ovoid**; nuts inferior or nearly so,

GOh t. *A. glahm*.

1. *Stwaptea odorata*, Griff. Not. Dicot. 5!G. t. 085. A. f. 5 ; *Ropea* **nud.**; DC. Prodr. **XVI. 634** ; *Btfmptea grandiflora*, Knrz in Journ. **Fl. Ind. I. 301.** **^floatiofi**

HAB. Tenasserim, from Moulmeian **unfrequent**.

N. B. *Valica faginea* Dyer in Hf. Ind. **Fl. J?01 iyom ^ergui** seems not to **differ** from the above as far as the description **Sopea faginea** or, as it is marked in **11LJC, Siorea Penangiana, Wai Cat. 063**, is from Penang and a true *Anisoptera* with quite inferior **fYii**

• Asiat.

2. A. GLABEA, Kurz in Journ. AJS. SOC. Beng. 1873. 61; Hf. Ind. PL I. 301.

HAB. Frequent in the tropical forests of the eastern slopes of the Pegu Yomah and Martaban, E. of Tounghoo. Fr. Apr. May.

3. A. OBLONOA, Dyer in Hf. Ind. PL. I. 301.

HAB. Tenasserim, Mergui (Griff.). Unknown to me, said to differ from the preceding in the Unequally prominent nerves of the calyx-wings.

Dipterocarpus, Gsertn. f.

Conspectus of species.

* Calyx-tube in fruit more or less globular, ovoid to turbinate, without any ribs or longitudinal wings on its belly.

O Calyx-tube in fruit towards the top produced into 5 compressed knobs each situated between 2 lobes.

Leaves glabrous or puberulous beneath; stipules puberulous, ...X>. *tuberculatus*.

O O Calyx-tube in fruit perfectly terete.

X Leaves glabrous and glossy.

Stipules velvety; fruiting calyx smooth and more or less pruinous, #. ...D. *Imvis*.

Stipules glabrous; fruiting calyx sprinkled with minute stellate hairs, ...D. *Hasseltii*.

X % Leaves beneath or on both surfaces variously hairy.

Leaves acuminate, beneath along with the petioles pubescent, ...D. *turbinatus*.

All softer parts greyish pubescent, the leaves blunt, ...D. *obtusifolius*.

Leaves acuminate, often large; petioles, young branchlets and stipules strigose from short tawny brush-like fascicled hairs, ...D. *pilosus*.

* * Calyx-tube in fruit longitudinally marked by 5 ribs or as many wings.

f Wings of fruiting calyx-tube broad (about half as broad as the belly or broader).

Calyx greyish-tomentose, when in fruit sparingly stellate-puberulous j petioles long; leaves greyish pubescent, ...D. *alatus*.

Calyx pruinous, quite glabrous; petioles only 2—2½ in. long, ...D. *Griffithii*.

f f Wings of the fruiting calyx-tube narrow or reduced to ribs.

O Leaves blunt.

All softer parts greyish-villous, ...D. *incanus*.

O O Leaves acuminate.

Branchlets tomentose, the belly of the calyx narrowly 5-winged and sparingly hairy, ...D. *costatfw*.

1. D. TUBERCULATUS, Roxb. Fl. Ind. II. 614 and Icon. ined. IX. t. 82; DC. Prod. XVI. 614; Hf. Ind. FL I. 297.

HAB. Forming the principal constituent of the Eng and hill Eng* forests all over Ava, Prome, Pegu and Martaban down to Tenasserim; also Chittagong. Fl. Apr.; Fr. May.

2. D. LIYIS, Ham. in Wern. Soc. Trans. VI. 299; DC. Prod. XVI. 607. (-D. *turbinatus*, Roxb. Corom. PL III. 3. t. 213 and Fl. Ind. II. 612; D. *grandiflorus*, Griff. Not. Dicot. 515.)

HAB. Frequent all over Burma from Arracan, Pegu and Martaban down to Tenasserim. FL Apr.; Fr. May.

2. S. KOBUSTA, Gsertn. Fr. III. 48 t. 186; Roxb. Corom. PL III. t. 212 and Fl. Ind. II. 615; Bedd. Fl. Sylv. Madr. t. 4.; Hf. Ind. Fl. I. 306.

HAB. Said to grow in Ava.

3. S. HELFEKI (*Vatica Helferii*, Dyer in Hf. Ind. Fl. I. 302).

HAB. Tenasserim, Mergui (Griff. 716/1).

Referred here on account of habit.

There is another *Shorea*, in leaf only, very much resembling *JDurio Oxley anus* from Tenasserim, Moulmein (Falc. 438), which differs from *Sh. leprosula* in having the upper side of the leaves not scabrous and generally in the different clothing and nervation.

4. Sn, FLOEIBUNDA, Kurz in Journ. As. Soc. Beng. 1873. 60; Hf. Ind. Fl. I. 304.

HAB. Tenasserim, Tavoy. Fl. Decb.

Pentacme, DC.

1. P. SIAMENSIS, Kurz in Journ. As. Soc. Beng. 1870, 66. (*Shorea Siamensis*, Miq. Ann. Mus. Lugd. Bat. I. 21 fc; Hf. Ind. Fl. I. 384).

HAB. Very frequent in the Eng and dry forests more especially in Ava and the Prome ditrict, less frequent from Pegu and Martaban down to Tenasserim. FL March; Fr. Apr. May.

The Siamese specimens have the young leaves beneath white-tomentose, but differ in no other respect.

Hopea, Roxb.

Conspectus of species.

* Connective terminated by a short point.

Calyx greyish tomentose j leaves bluntish acuminate,*H. odorata*.
Leaves oblong, blunt,*scaphula*,

* # Connective terminated by a bristle longer than the anther-eel Is.

Calyx greyish tomentose j flowers somewhat larger,*gratissima*.
Calyx almost glabrous j flowers very small,*H. Griffithii*.

1. H. ODORATA, Roxb. Corom. PL III. t. 210 and Fl. Ind. II. 609. Hf. Ind. Fl. I. 308. (*H. vasta*, Wall. ap. DC. Prod. XVI. 633).

HAB. Common in the tropical forests all over Burma from Chittagong and Martaban down to Tenasserim. Fl. March, Apr.; Fr. May, June.

NB. *Hopea eglandulosa*, Roxb. is a *Cyclostemon* and differs from the above by the white bark as indicated by Roxburgh himself.

2. H. SCAPHULA, Roxb. Fl. Ind. II. 611; DC. Prod. XVI. 635. (*Vatica scaphula*, Dyer in Hf. Ind. Fl. I. 301).

HAB. Chittagong, on Mascal Island (Roxb.). Fl. Jan.

3. H. GEATISSIMA, Wall. Cat. 060; Kurz in Journ. As. Soc. Beng. 1873* 61. (*H. oblongifolia*, Dyer in Hf. Ind. Fl. I. 309? ; *Shorea gratissima*, Dyer l. c. 307).

HAB. Tenasserim (Griff. 714/1).

4. H. GBIFEITHII, Kurz in Journ. As. Soc. Beng., 1873, GO ; Hf. Ind. Fl. I. 310.

HAB. Tenasserim, Mergui (Griff.)..717/1).

Vatica, L.

1. V. LANCE[^]FOLIA, Bl. Mus. Lugd. Bat. II. 31 ; DC. Prod. XVI. 618; Hf. Ind. Fl. I. 302. (*Yateria lanceafolia*, Eoxb. Fl. Ind. II. 001).

HAB. Chittagong (Eoxb.); Burma (Griff.). Fl. May; Fr. Jul. Aug.

Doubtful species.

1. V. TEIGTNA, Griff. Not. Dicot. 514.

"^T*B. Tenasserim, Mergui, on the summit of the hillock Pator, at 600—800 ft. elevation (Griff.).

Griffith's description is a very complete and good one, but still I cannot guess the plant. The ovary-like style would indicate *Anisoptera*, but the ovary itself is stated to be superior and free.

MALYAGEJE.

Conspectus of genera.

A. *Carpels whorled in a single roiv, not united into a capsule.*

Trib. I. MALVE2E. Staminal column bearing the filaments at the summit. Style-branches as many as cells to the ovary. Mature carpels separating more or less from the axis.

Ovules solitary, ascending.

X Stigmas linear.

1. ALTHJSA. Bracteoles 6—9, united at base; fruit-axis not longer than the carpels.

2. MALVA. Bracteoles 3, distinct. Carpels not beaked.

X X Stigmas capitate or clavate.

3. MALVASTRUM. Bracteoles 1 to 3, distinct, or none. Carpels usually beaked.

* *. Ovules suspended, solitary.

4. ANODA. Bracteoles none. Carpels broadly stellate, not beaked.

5. SIDA. Carpels converging with their points or beaked. Bracteoles none, or very rarely 1 or 2 and bristle-like.

Ovules 2 or more, ascending or pendulous or both.

6. ABUTILON. Bracteoles none. Carpels 5—20, without spurious partitions.

Trib. II. UKEXEJL Staminal column truncate or 5-toothed at apex bearing the anthers or filaments on the outside. Style-branches twice as many as ovary-cells. Carpels 1-seeded.

7. UEENA. Bracteoles 5, connate at base. Carpels opposite the petals, *muricate* or *glochidiate*.

8. PAVONIA. Bracteoles 5 or more, usually free, herbaceous or bristle-like. Carpels opposite the sepals, variously armed or smooth.

B. *Fruit a capsule, dehiscent or rarely indehiscent.*

HAB. Not unfrequent on sandy soil chiefly, as well in the leaf-shedding forests as in shrubberies" of the lower lands of Pegu and Arraeon. Fl. Fr. Oct. Decb.

5. S. GLUTINOSA, Eoxb. Fl. .III. 172. (*S. Mysurensis*, WA. Prod. I. 59 ; Hf. Ind. Fl. I. 322).

HAB. Frequent in the mixed and open forests all over Pegu and Martaban ; also Tenasserim and Ava, Khakyen hills. Fl. Fr. Febr., May.

6. S. HUMILIS, Willd. sp. pi. III. 744; Eoxb. Fl. Ind. Fl. I. 322.

HAB. Frequent all over Pegu, more especially in the Prome District, in leaf-shedding forests and rubbishy places; also Ava. Fl. Fr. Oct. March.

Albutilon, Gsertn.

Conspectus of species.

* Carpels more than 10, usually about 20.

Tomentum close and dense, without spreading hairs; capsule truncate, the carpel-points very short, *A. Indicum*.

Tomentum dense, intermixed with long spreading hairs; capsule at the top contracted and angular, the carpels not pointed, *A. graveolens*.

** Carpels fewer than 10, usually 5 or 7.

Tomentum consisting of short glandular hairs, intermixed with long simple and spreading ones,... .. *A. polyandrum*.

1. A. INDICUM, G. Don. Gen. Syst. I. 504; Wight Ic. t. 12; Hf. Ind. Fl. 325. non Miq. Fl. Ind. Bat. (*Sida Indica* L. sp. pi. 964 ; Eoxb. Fl. Ind. III. 179 ; *Sida populifolia*, Eoxb. Fl. Tnd. III. 179 ; *Sida Asiatica*, L. sp. pi. 964 ; Eoxb. Fl. Ind. III. 179; Hf. Ind. Fl. I. 326).

HAB. Frequent along road sides, around villages, along the banks of rivers, etc., all over Prome and Pegu ; also Ava. Fr. Decb. Jan.

2. A. GRAVEOLENS, WA. Prod. I. 56 ; Hook. Comp. Bot. Mag. I. t. 2 ; Hf. Ind. Fl. I. 327. (*Sida graveolens*, Eoxb. Fl. Ind. II. 179 ; Bot. Mag. t. 4134).

HAB. In uncultivated places, amongst shrubbery etc., especially around villages in Pegu. Fl. CS.; Fr. H. S.

3. A. POLYANDRUM, Schlecht. in Link En. Hort. Berol. II. 264 ; Hf. Ind. Fl. I. 325. (*Sidapolyandra*, Eoxb. Fl. Ind. III. 173 ; *Sida Fersica*, Burm. Fl. Ind. t. 47. f. 1; Cav. Diss. I. t. 4. f. 1).

HAB. Pegu (Brandis).

The Burmese plant differs chiefly in the more glandular pubescence and in having the carpels constantly by 7, not by 5.

Doubtful species.

1. *Sida*, sp. Griff. Not. Dicot. 523.

HAB. Tenasserim, Moulmein, in jungles and along roads.

Urena, L.

Conspectus of species,

* Capsules longer than the sepals, gloehidiate and bristly tomentose,

... *XJ, lohata.*

* # Carpels included in the calyx, smooth or net-veined.

O Petals 1½ to nearly 2 in. long, forming a large funnel-shaped corolla.

Leaves almost rotundate, very scabrous on both surfaces; flowers forming dense leafy terminal heads, *U. rigida.*

Leaves underneath softly tomentose, scabrous above, the lower ones usually lobed; flowers in loose spreading terminal racemes, *U. speciosa.*

O O Petals about 4 lin. long, forming a rotate corolla; involucre longer than the calyx.

Flowers sessile or nearly so in the axils of the leaves, or along axillary short leafy bivaichlets, *U. repanda.*

1. *U. LOBATA*, L. sp. pi. 974; Eoxb. Fl. Tnd. III. 182; Bot. Mag. t. t3; Griff. Not. Dicot. 522; Hf. Ind. Fl. I. 329. (*Z11 reticulata*, Cav. i. VI. 335. t. 183. f. 1.; *77. viminea*, Cav. 1. c. t. 184. f. 1; *IF. microca, i*, DC. Prod. I. 441; *U. ribesia*, Sm. in Rees. Cycl. 37. No. 5; DC. 1. c. j *77. Stvartzii*, DC. 1. c.; *£7. scabriuscula*, DC. 1. c.).

Var. *p. SINUATA* (*77. sinuata*, L. sp. pi. 974; Eoxb. Fl. Ind. III. 182; Hf. Ind. Fl. I. 329).

Var. *y. LANOSA*, leaves larger, usually with shorter lobes and less scabrous, sometimes almost softly tomentose; involucre and calyx rather flaccid, densely tomentose.

HAB. All three forms common, especially in uncultivated places, in shrubberies, toungyas, etc., but also in leaf-shedding forests all over Burma from Cliittagong and Ava down to Tenasserim up to 3000 ft. elevation; Var. *a.* rarer than (*3.* and *y.* Fl. Fr. oo).

2. *U. ETGIDA*, Wall. Cat. 1929; Hf. Ind. Fl. I. 330.

HAB. Not uncommon in the open, especially the low, forests of Pegu and Martaban; also Tenasserim, chiefly on stiff clay and laterite. Fl. Oct. to J**

.. *SPECIOSA*, Wall. PI. As. rar. I. t. 26.

HAB. Not unfrequent in the low and mixed forests all over Pegu; also Ava. Fl. Fr. C. S.

Pavonia, Cav.

*Co-lispectus of species**

Secb. 1. *Lebretonia*. Bracteoles 5-6. Carpels indehiscent.

Flowers yellow; carpels inuricate, *...T.glecliomifolia.*

Sect. 2. *Eupavonioi*. Bracteoles 10 or more. Carpels dehiscent.

Flowers pink; carpels unarmed, the margins slightly but sharply produced, *P. zei/lanica.*

1. *P. GLECHOMIEOLIA*, A. Eich. Fl. Abyss. I. 51-; Hf. Ind. Fl. I. 330. (*Lebretonia procwnlens*, Wall. Cat. 1883; Wight Ic. t. 1).

HAE. Ava. Segain. (Wall.).

2. *P. ZEYLANICA*, Willd. sp. pi. III. 838 ; Eoxb. Fl. Ind. III. 214 ; Hf. Ind. Fl. I. 331.

HAB. Banks *of the Irrawaddi in Ava, apparently not unfrequent.—Fl. Fr. Sept.—Jan.

All the Burmese specimens seen by me (including *P. rosea*, Wall. Cat. 1887, with hairy carpels) belong to the above species, none to *P. odorata*, "Willd., for which Masters gives Birma as a habitat.

Kydia, Roxb.

1. *K. CALYCIS-A*, Eoxb. Corom. PL III. t. 215 and Fl. Ind. III. 188; Wight. Ic. t. 879-880; Bedd. Fl. Sylv. t. 3. ; Hf. Ind. Fl. I. 348. (*K. fraterna*, Eoxb. Corom. PL III. t. 216 and Fl. Ind. III. 189).

HAB. Not uncommon in the mixed and open forests of Pegu and Prome ; also Ava. Fl. Jan. ; Fr. H. S.

There really may be two different species in India, the one with smaller smooth seeds, the other with larger furrowed seeds. The indument of the Burmese plants is much more floccose, the involucre-leaflets broader ; seeds, unripe, appear smooth and smaller.

Decaschistia, WA.

Conspectus of species.

Leaves beneath shortly but densely whitish tomentose; involucre > much shorter than the calyx, puberulous; petals about 1 in. long, *D. parvijlora*.
All parts thickly tomentose; involucre nearly as long as the calyx, densely tomentose; petals nearly 2 in. long, *D. crassiuscula*.

D. PAKVIFLOEA, Kurz in Journ. As. Soc. Beng. 1870. 6G.

HAB. Found in the adjoining Siamese province of Kanburi, most probably occurring also in Tenasserim. Fl. Fr. Apr. May.

1. *D. CKASSIUSCULA*, Kurz in Journ. As. Soc. Beng. 1873. 227.

HAB. Prome District (Col. Eyre).

Masters describes but does not name another large-flowered (flowers pink, 4 in. in diameter) species from Rangoon.

Hibiscus, L.

Conspectus of species.

A. *Leaflets of involucre free, sometimes adnate to the calyx but not connate with one another, or altogether wanting.*

Subg. 1. Solandra. Involucre wanting. Herbs with small flowers.

Flowers white, on long slender pedicels, usually forming terminal racemes, ... *Solandra*.

Subg. 2. Hibiscus. Calyx regular, not spathaceous, 5-cleft, more or less persistent, surrounded by a more or less persistent involucre, the leaflets of which are either quite free or sometimes adnate to the calyx.

* Capsule rounded, obtuse or truncate.

0 Capsules truncate, winged.

- Velvety-pubescent -, calyx and involucre tomentose; flowers large, yellow with a dark-purple eye, *H. vitifolias*.
- 0 O Capsules rounded or obtuse, not winged.
- Capsules glabrous; flowers white, hardly an in. in diameter, the petals reflexed; scabrous herb, *H. micranthus*.
- Capsules hirsute; all parts, also calyx and involucre densely scurfy tomentose; involucre-leaflets 10; flowers large, white then rose-coloured; a large shrub, ... *H. mutabilis*.
- As preceding, but all parts softly tomentose; involucre and calyx densely pubescent; involucre-leaflets in Burin, spec. 7, linear (in Malayan 5, ovate-lanceolate), ... *H. venustus*,
- * * Capsules acuminate or acute, not winged.
- X Calycine lobes 1-3-nerved, without thickened margins.
- f Leaves densely and softly tomentose.
- All parts, also calyx and involucre densely tomentose; pedicels shorter than the peduncles; seeds pubescent, *H. jpanuraformis*.
- f f Leaves glabrous or roughish puberulous.
- A Annual herbs. Flowers yellow with dark-purple eye.
- Seeds tubercled; leaves glabrous; stem and petioles prickly, *H. procerus*.
- Seeds smooth; all parts and more especially the calyx and involucre very tubercled-hispid, *H. diversifolius*.
- Seeds smooth; young parts densely and shortly hispid; involucre-leaflets puberulous or almost glabrous, *H. lunarifolius*.
- A A Shrubs. Flowers from purple to rose-coloured and white.
- Leaves glabrous, longer than the petioles.
- Pedicels shorter than the petioles, *H. Si/riacu?*.
- Pedicels elongate, longer than the petioles, *H. Rosa Siuensis*.
- X Y> Calycine lobes with a prominent midrib and (especially when in fruit) with thickened usually indurated borders.
- O Involucre-leaflets bearing on the back an oblong or linear appendage.
- A Appendage of involucre-leaflets leafy, oblong; flowers pale sulphur with crimson eye.
- Flowers about 2 in. in diameter, shortly peduncled; stipules lanceolate; stems stiff-hairy and usually prickly, *H. furcatus*.
- Flowers about an in. in diameter, on long slender peduncles; stipules large, leafy, semi-lunar; stems prickly, *H. Surratteusis*.
- A A Appendage of involucre-leaflets linear, rarely wanting.
- Flowers white or pale-sulphur with a purple eye, or purple, the calyx-lobes without a gland on the midrib, *H. radialis*.
- O O Involucre-leaflets entire, without any appendage.
- Calyx dry, horny in fruit, the lobes prickly ciliate, with a large gland on the midrib; seeds glabrous, *H. cannedinus*.
- Calyx fleshy, red, the lobes without prickles, usually a little hairy but soon glabrescent; seeds shortly hispid, *H. Sabdarijfa*.
- Subg. 3. *AhebnoscJius*. Calyx spathaceous, 5- rarely 3-toothed, deciduous, surrounded by 5- to 20-leaved free often very deciduous involucre. Seeds glabrous.
- X Involucre-leaflets short and small, deciduous already before opening of the flowers.
- Flowers rather small, uniform white, ... * *H. jicuhieus*.
- % Ys Involucre-leaflets narrow linear, often numerous and long; flowers

large, yellow with purple eye.

O Capsules short, 5-angled

f Involucre-leaflets about 10-12.

All parts minutely scabrous; peduncles about twice as long as the capsule, slender; flowers about 1[^] in. in diameter, *...H. sagittifolius.*

All parts spreadingly setose; peduncles as long or shorter than the capsule, strong; flowers 2 to 3 in. in diameter, *...H. Abelmoschus.*

t f Involucre-leaflets 15 to 20.

Stems hirsute; leaves lobed, tomentose and sprinkled with stiff hairs; involucre-leaflets rather persistent, *...if. eancellatiis.*

O O Capsule elongate-conical, 7-angular.

Involucre-leaflets 10; all parts slightly hairy, *...H. esculentus.*

*% % % Involucre-leaflets broad and leafy, usually large, 4 to 6; flowers yellow with purple eye. Stems setose.

O Involucre-leaflets 4.

Leaves almost glabrous; involucre-leaflets glabrous, along the borders shortly tomentose, *...H. Manihot.*

Leaves beneath sprinkled with 3-forked short hairs; involucre-leaflets appressed pubescent and setose-ciliate, *H. hostilis.*

O O Involucre-leaflets 6.

Leaves hirsute; involucre-leaflets sprinkled with long stiff hairs, *...H. pungens,*

Ji. *Leaflets of the involucre united up to the middle or at least at the base, sometimes forming a cup-shaped involucre.*

Subg. 4. *Paritium.* Trees, shrubs or woody climbers.

* Trees or erect shrubs. Seeds glabrous. Flowers large, yellow with purple eye.

Leaves deeply 3-lobed, *...H. hastatus.*

Leaves not divided, entire or crenulate, *... // . liliaceus.*

* # Seeds woolly or pubescent.

f Woody climbers.

All parts velvety tomentose, leaves glabrescent above; involucre-leaflets 4-7, velvety, .. *H. scandens.*

f f Trees.

All parts tawny setose; leaves entire, tawny tomentose; involucre-leaflets 10, hirsute, *...H. macrophyllus.*

1. *H. SOLANDRA*, L'Her. Stirp. I. 103. t. 49; Eoxb. Fl. Ind. III. 197; Hf. Ind. Fl. I. 336.

HAB. Ava, Taong dong and Segain (Wall.)

2. *H. VITIFOLIUS*, L. Mant. 509; Eoxb. El. Ind. III. 200; Hf. Ind. Fl. I. 338. (*H. truncatus*, Eoxb. Fl. Ind. III. 200).

HAB. Not uncommon along borders of fields, in shrubberies, rubbishy places round villages, etc., also in the dry forests, all over Burma from Chit-tagong and Ava down to Pegu. Fl. E. and C. S. j Fr. H. S.

3. *H. MICBANTHUS*, L. f. Suppl. 308; Hf. Ind. Fl. I. 335. f 77'. *rigidus*, L. f. Suppl. 310; Eoxb. Fl. Ind. III. 195.)

HAB. Ava, Pagha myo (Wall.).

*4. *H. MUTAELIS*, L. sp. pi. 977; Eoxb. Fl. Ind. III. 201 : Bot. Reg. t. 589 ; Hf. Ind. Fl. I. 344.

HAB. Only cultivated in gardens.

5. *H. VENUSTIJS*, Bl. Bydr. 71 ; Miq. Fl. Ind. Bot. 1/2. 155.

Var. *ft.* BBANDISII, involucre-leaflets constantly 7, narrow linear.

HAH. Upper Tenasserim, Doyoo Kyee Pass (Brandis). Fl. Fr. March.

0. *H. PANDURIFORMIS*, Burm. Fl. Ind. 151. t. 47. f. 2 ; Hf. Ind. Fl. 338. (*H. tuhulosus*, Cav. Diss. III. 1Gl. t. 68. f. 2 ; Roxb. Fl. Ind. III. 196).

HAB. Ava (Wall.); Prome, Meaday (R. Scott). Fr. Apr.

7. *H. PBOCEBUS*, Wall. Cat. 2G92 ; Hf. Ind. Fl. I. 339. .

HAB. Ava (Wall).

8. *H. DIVEESIROLIUS*, Jacq. Ic. rar. t. 551 ; Eoxb. Fl. Ind. III. 208 ; Bot. Reg. t. 381 ; Hf. Ind. Fl. I. 339.

HAB. Ava (Wall.).

9. *H. LUNARIFOLIUS*, Willd. sp. pi. III. 811 ; Wight Ic. t. 6 ; Hf. Ind. Fl. I. 338. (*H. prurient*, Roxb. Fl. Ind. III. 196 ; *H. racemosus*, Ldl. Bot. Beg. t. 917).

HAB. Ava, Segain and towards the Taong dong (Wall.),

*10. *H. SYRIACIJS*, L. sp. pi. 978 ; Roxb. Fl. Ind. III. 195 ; Bot. Mag t. 83 ; Hf. Ind. Fl. I. 344. (*H. Storckii*, Seem. Flor. Vit. 17. t. 4.)

HAB. Occasionally cultivated by the Karens of Martaban.

*11. *H. ROSA SESTENSIS*, L. sp. pi. 977 ; Roxb. Fl. Ind. III. 194 ; Bot. Mag. t. 158 ; Bot. Reg. t. 1S26 ; Hf. Ind. Fl. I. 344.

HAB. Much cultivated in native gardens and villages and occasionally seen in neglected lands round villages. Fl. oo .

12. *H. FURCATUS*, Roxb. Fl. Ind. III. 204 ; Hf. I. 345. (& *aculeatus*, Roxb. 1. c. 206 teste Masters).

HAB. Ava, Irrawacli (Wall.) ; Arracan, frequent on the lower hills of Koladyne District. Fl. Octob.

13. *H. SUEBATTEBTSIS*, L. sp. pi. 979 ; Roxb. Fl. Ind. III. 205 ; Bot. Mag. t. 1356 ; Wight Ic. t. 197 ; Hf. Ind. FL I. 334. (*H. heterophyllus*, Griff. Not. Dicot. 520.)

HAB. Frequent all over Burma and adjacent provinces, in the leaf-shedding forests, especially the low ones ; also in savannahs and deserted tounggyas, etc. Fl. Fr. C. S.

H. aculecdus, Roxb. differs chiefly by the much smaller stipules which, however, pass into those of *H. Surrattensis*.

*14. *H. EADIATTIJS*, Cav. Diss. III. 150. t. 54. f. 2 ; Bot. Mao, t. 1)11 ; Roxb. Fl. Ind. III. 209 ; Hf. Ind. Fl. I. 335. (#. *sp. MirZria*, Griff. Not. Dicot. 521).

IZ' » r. ^{a.} 11 a wWt0 « P^«lphnr with a purple eye.
 t. H , xt. uiciiatus, Bot. Mag. t. 5008 ?) Pl. As. rar. I. t. 4; Bot. Reg.
 down ^ Te ^ t i r r ; ^ ! ^ Burma fora < * * * * > a d ATM
 c . Tenasseiun, and often like wild in deserted toungyas. » PL Fr.

*15. H. CANNABINUS, L. sp. pl. 979 ; Roxb. Corom. Pl. II. t. 190 and
 Fl. Ind. III. 208 ; Hf. Ind. Fl. I. 339.
 HAB. Cultivated in toungyas of Pegu and Martaban, and often as
 wild in deserted ones.

16. V ^ A f FFA L SP I 978
 to Pe ^ , L » ^ ^ aU oVei> Burma from Chitting and Ava down
 Pegu so^ehmes as wild in deserted toungyas. Fl. Fr. C. S.
 » i i o l b . F * ; p d . i i i 2 0 8 . V i 978 ; H V n d F l L 340 - (/ / * * * -
 Wight Ic. t. 154 ; i j z ^ : : ? ^ n e u s , W A _ p r o d _ L 53 ;

HAB. Jlarely cultivated in native gardens of PeCU
 18. H. SAGITTTMPOIIUS, Kurz in J^o-n. As. SoV Beng., 3871, 46.
 (H. JbdTM sr
 hast t , Cav _ Diss _ III 144. t. 50 f. 1? non- Linn f) .

HAB. Ava, Moaong (Wall.); Pegu (Brandis). Fl. Sept.
 r - / x t . " ^ A B f T M o s c " ^ . L. sp. pi. 980; Eoxb. Fl. Ind. III. 202;
 Gnff. Not. Dicot. 541 ? ; Hf. Ind. Fl. I. 342. (Abchnosohus mosahatus,
 Moench; Wight Ic. t. 399 ; Abelmoschus pseudo-Abelmoschus, Wzlp. Ilep.
 I. 808).

HAB. Not unfrequent in the mixed, especially the upper-mixed, forests
 of Arracan and Pegu; also Tenasserim, Moulmein j Ava, Se-ain. Fl Fr.
 Nov.—Jan.

20. H. CANCELLATUS, L. f. Suppl, 811; Roxb. Fl. Ind. III. 20J ;
 Hf. Ind. Fl. I. 342. (Ahelmoschus crinitus, Wall. Pl. As. rar. I. 39. t. 44).

HAB. Not unfrequent in the dry forests of Promo and Ava; also in
 the low forests of the Irrawadi zone, Pegu. Fr. January.

Only the form figured by Wallich occurs in Burma, the other with
 overlapping leaf-bases, more obtuse lobes, and different tomentum seems to
 be restricted to Hindustan.

*21. H. ESCULEOTUS, L. sp. pi. 980 ; Cav. Diss. III. t. 61. f 2; Hf.
 Ind. Fl. I. 313. (Hibiscus longifolius, Wild. sp. pi. III. 827 ; Roxl/ Fl.
 Ind. III. 210).

HAB. Cultivated in Burma (accord. Eevd. F. Mason).

*22. H. MANIHOT, L. sp. pi. 980; Bot. Mag. t. 1702 and t. 3152|;
 Hf. Ind. Fl. I. 341. (H.pentaphyllus, lloxb. Fl. Ind, III. 212 ; A l e l -
 moschus Manihot, Walp. Kep. I. 311). -

HAB. Rarely cultivated by natives in Pegu.

23. H. HOSTILIS, Wall. ap. Mast, in Hf. Ind. PL I. 342.

HAB. Not uncommon in the upper mixed forests of the Pegu Yomah ; also Ava (Wall.) Fl. Fr. C. S.

24. H. PUNGENS, Eoxb. Fl. Ind. III. 213; Hf. Ind. Fl. I. 341.

HAB. Upper mixed forests of the northern parts of the Pegu Yoinali at about 1200 to 2000 ft. elevation. Fr. C. S.

*25. H. HASTATUS, L. f. Suppl. 310 (non Cav.) (H. *tricuspis*, Cav. Diss. III. 1*52. t. 55. f. 2 ; Roxb. FL Ind. III. 202; Hf. Ind. Fl. I. 344).

HAB. Rarely cultivated in gardens. Fl. R. S.

26. H. TILIACEUS, L. sp. pi. 976; Roxb. Fl. Ind. III. 192; Hf. Ind. Fl. I. 343. (*Paritium tiliaceum*, A. Juss. in St. Hil. Fl. Bras. 1.198 ; Wight Ic. t. 7 ; Griff. Not. Dicot. 523.)

Var. ? TORTUOSUS, Mast, in Hf. 1. c. (*H. tortuosus*, Roxb. Fl. Ind. III. 192 ; Bot. Reg. t. 232).

HAB. Common in the beach and tidal forests all along the shores from Chittagong down to Tenasserim and the Andamans, ascending the rivers as far as the tidal waves. Fl. Fr. oo.

27. H. MACROPHYLLUS, Roxb. Hort. Beng. 1814. 51; Wall. PL As. rar. I. 44. t. 51; Hf. Ind. Fl. I. 337. (*H. vulpinus*, Rwdt. Cat. Buitenz. 88 ; Miq. FL Ind. Bat. 1/2. 157 ; *H. spathaceus*, 131. By dr. 72 ; *H. setosue*, Roxb. FL Ind. III. 193.)

HAB. Frequent in the tropical forests all over Burma from Chittagong and Martaban down to Tenasserim. FL Fr. R. S.

If the principle of the priority of the name first accompanied by a description be adhered to, Blume's name will have to be adopted. Unlike Wallich, Roxburgh described and figured the plants that lie named, and unfortunate circumstances beyond his control and finally death prevented their publication: hence I consider that his *Hortus Benghialensis* claims priority.

28. H. SCANDENS, Roxb. Fl. Ind. III, 200; Hf. Ind. Fl. I. 337.

HAB. Frequent in the tropical forests of Martaban. Fl. Fr. March, Apr.

Thespesia, Corr.

Conspectus of species.

All younger parts and unripe capsules covered with rusty coloured scales; leaves glabrous; a tree, *T. populnea*.

All younger parts and usually the leaves beneath shortly stellate tomentose; unripe capsules densely hirsute, a meagre shrub, *La'mpas*.

1. Til. POPULNEA, Corr. Ann. Mus. IX. 290; Wight Ic. t. 8; Hf. Ind. Fl. I. 345; Becl. FL Sylv. t. G3. (*Hibiscus populneus*, Roxb. FL

Ind. III. 190; *Hibiscus populneoides*, Roxb, 1. c. 191; *Tliesp. macroptyl' la*, Bl. Bydr. 73; Miq. Fl. Ind. 1/2. 151).

HAB. Common in the beach and tidal forests all along the shore from Chittagong down to Tenasserim and the Andamans; Ava, Bhamo and Sabado (J. Anderson). Fl. Sept. Fr. March, May.

The occurrence of this saltloving tree in Ava is unique and requires explanation. Brine springs are numerous in Prome and Ava, and may possibly account for such an exceptional re-appearance of a sea-shore plant in the interior of Burma.

2. TH. LAMPAS, Dalz. in Dalz. and Gibs. Bombay Fl. 19; HX I. 1. Fl. I. 345. (*Hibiscus Lampas*, Cav. Diss. III. 151. t. 56. f. 2; Roxb. Ind. III. 197; Wight Ic. t. 5; *H. tetralocularis*, Eoxb. 1. c. 108?; *J. Zollingeri*, Alef. in Bot. Zeit. 1861, 298).

HAB. Frequent in all leaf-shedding forests, especially the mixed also in savannahs; all over Burma. Fl. Fr. C. & H. S.

Gossypium, L.

Conspectus of species.

Annual; seeds free, clothed with firmly adhering silky down, ... *O. herbaceum*.
Shrubby; perennial; seeds black, free or cohering, devoid of adhering pubescence,
.. *G. Barbadense*.

*1. G. HEKBACEUM, L. sp. pi. 975; Roxb. Fl. Ind. III. 184; Boyle 111. Him. PL 98. t. 23. f. 1; Wight Ic. t. 10; Hf. Ind. Fl. I. 346.

Var. a. HERBACEUM, (*G. herbaceum*, L. 1. c.; *G. hirsutum*, Roxb, Fl. Ind. III. 187; *G. Barbadense*, Wight 111. t. 28/c.) lobes of leaves acuminate. Var. *liirsiitum*. Mast, in Hf. 1. c. (*G. hirsutum*, L. sp. pi. 975; DC. Prod. 1.456; *G. obtusifolium*, Roxb: Fl. Ind. III. 183; *G. herbaceum*, Wight Ic. t. 9.), leaves with usually blunt lobes, the upper ones often undivided, with or without a gland on the midrib beneath; involucre-leaflets entire or serrate; capsules when ripe green; cotton white. •

HAB. Var. a. and *f3*. much cultivated all over Burma, and often seen as wild in deserted toungyas and neglected lands. Fl. Fr. C. and H. S.

*2. G. BARBADENSE, L. sp. pi. 975; Roxb. Fl. Ind. III. 187; Hf. Ind. Fl. I. 347. p. p.

HAB. Rarely seen in gardens in Pegu.

Bombax, L.

Conspectus of species.

Leaflets on a 10 to 12 lin. long petiolule; staminal bundles consisting of 15 to 20 strong and thick filaments, ... AB. *Maliharicum*.
Leaflets decurrent on the short 2 to 3 lin. long petiolule; staminal bundles consisting of 50 or more long filiform filaments,B. *insigne*.

1. *B. MALABAKICUM*, DC. Prod. I. 479 ; Bedd. Fl. Sylv. Madr. t. 82 ; Hf. Ind. Fl. I. 249. (*Salmalia Malabarica*, Schott. Melet. 35 ; *B. heptaplylla*, Cav. Diss. V. 296 ; Koxb. Corom. Pl. III. t. 247 and Fl. Ind. III. 167 ; Wight 111. t. 29. a. b.).

HAB. Frequent in all leaf-shedding forests, especially the mixed ones, all over Burma from Chittagong and Ava down to Tenasserim. Fl. H. S. Fr. C. S.

2. *B. INSIGNE*, Wall. Pl. As. rar. I. 71. t. 79 and 80; Hf. Ind. Fl. I. 349.

HAB. Frequent in the upper mixed forests of the Pegu Yomah and the Andamans ; also Ava. FL H. S. Fr. C. S.

Eriodendron, DC.

1. *E. PENTAISDRUM* (*Bomhaxpentandrum*, L. sp. pi. 989 ; Cav. Diss. V. 293. t. 151 ; Koxb. Fl. Ind. III. 165 ; *U. anfractuosum*, DC. Prod. I. 479 ; Wight Ic. t. 400 ; Griff. Not. Dicot. 533 ; Hf. Ind. Fl. I. 350).

HAB. Hare (one tree only seen) in the coast forests of South Andaman ; here and there cultivated in Pegu and Tenasserim.

One of those trees that are stated to be very frequent in the Indian jungles, but I myself have never succeeded in seeing it in a truly wild sfcats, although the loftiness of the tree and the decussate ternation of its branches would render it recognizable from a long distance.

Durio, L.

1. *D. ZOETHINUS*, L. sp. pi. 698 ; Koen. in Trans. Linn. Soc. VII. 266 ; t. 14—16; Eoxb. Fl. Ind. III, 399 ; Griff. Not. Dicot. 528. t. 596 ; Hf. Ind. Fl I. 351.

HAB. Tenasserim. Fr. May, June.

Heifer writes in his second report on the resources of Tenasserim : " This tree does not grow so far north as Moulmein, some few trees excepted which are grown as a rarity on the island of Beloo. Its sphere begins at Tavoy ; large plantations occur to the E. of Mount Burney, and very fine specimens in the valley of Taunbiaun. Lower down on the Tenasserim, the tree begins to grow almost spontaneously, and in lat. 14° it forms large forests."

The Burmese specimens in Dr. Brandis' herbarium, although destitute of corolla, do not differ from the Malayan durian, and the calyx is the same in size as well as in shape.

STEBCULIACJEJE.

Conspectus of species,

Trih. L STEBCULIE2E. Flowers unisexual or polygamous. Petals none, Anthers 5-15, sessile, surrounding the stalked ovary or in males the top of a shorter or longer column, or shortly polyadelphous. Mature carpels distinct, sessile or stalked.

* Anthers irregularly clustered, numerous. Fruit dehiscent.

1. STERCULIA. Ovules 2 or more in each cell. Carpels follicular.

* * Anthers 5, in a ring. Carpels indehiscent.

2. HERITIERA. Ovules solitary. Carpels often of a firm texture.

Trib. II. HELICTEHEM. Flowers hermaphrodite. Petals deciduous. Anthers 5-15, sessile or on short filaments, situated on the margin of the cup-like dilated summit of the column and usually alternating with staminods.

3. HELICTERES. Anther-cells divaricate or confluent into one. Fruit a capsule, sometimes twisted. Seeds not winged.

4. PTEROSPERMUM. Anther-cells parallel. Capsule woody, terete or 5-angular. Seeds winged.

Trib. III. EHIOLMNE. Flowers hermaphrodite. Petals deciduous. Anthers numerous on the outside of the tubular or conical column from the middle to the top. Staminate none.

5. ERIOLANA. Capsules woody, 5-valved.

Trib. IV. BOMBEYEJE. Flowers hermaphrodite. Petals usually persistent, flat. Anthers 10 to 20, rarely 5, united into a short cup at or near the top of the column. Staminate 5 or none.

Ys Anthers 15, rarely 10.

6. PENTAPETES. Bracteoles caducous. Sepals herbaceous. Ovary-cells with several ovules. Style simple.

X % Anthers 5.

7. MELHANIA. Bracteoles 3, persistent. Stamens united into a cup, with 5 intervening elongate staminate.

Trib. V. KERMAKIEZE. Flowers hermaphrodite. Petals marcescent, flat. Stamens 5, shortly united or rarely tubular at base only. Staminate usually none.

Y* Ovary 5-celled.

8. MELOCHIA. Capsules almost globular. Seeds wingless. Herbs or undershrubs.

9. VISENIA. Capsules deeply 5-lobed. Seeds winged at their extremities. Trees.

Ys X Ovary 1-celled

10. WALTHERIA. Calyx campanulate. Staminate none.

Trib. VI. BUETTNERIA. Flowers hermaphrodite. Petals concave at base, usually appendaged at top. Anthers 5-15, rarely numerous, introrse, the filaments united into a shorter or longer tube, solitary or in groups alternating with the staminate.

O Anthers by 2-4 alternating with a staminate.

11. ABROMA. Petals with a clawed ovate blade. Capsule 5-winged.

12. GUAZUMA. Petals clawed, with a linear 2-cleft blade. Fruit globular, woody tubercled.

13. LEPTONYCHIA. Petals concave, not clawed. Filaments long, only at base connate, alternating by 2 with the short staminate, at the back augmented by a series of subulate staminate.

O O Anthers singly alternating with the staminate.

14. BUTYRARIA. Petals cucullate at the clawed base. Staminate short and blunt. Capsules woody, variously armed.

Sterculia, L.

Conspectus of species.

Subg. 1. Sterculia. Seeds without wings, 2 or more along the suture of the coriaceous carpels, never inserted at the base.

* Leaves digitate.

Leaves glabrous; calyx rather large, the lobes spreading,*St. fetida*.
 Leaves cyanescent tomentose beneath; calyx small, the lobes conniving, short,
*St. versicolor*.

* * Leaves palmately lobed or cut. Leaf-shedding trees.

Carpels densely covered with stiff fragile hairs; flowers small,*St. urens*.
 Carpels shortly tomentose from stellate hairs,*St. villosa*.
 Carpels densely covered with stiff short hairs, glabrescent; flowers nearly $\frac{1}{2}$ in. in
 diameter,*St. ornata*.

* * * Leaves all entire. Small evergreen trees or meagre shrubs.

O Leaves quite glabrous.

X Calyx-lobes not spreading, almost erect or more usually conniving with their tips.

Calyx shortly tubular, striate, the lobes of the length of the tube,*St. longifolia*.

Y > X Calyx almost rotate.

Calyx lobes from a broader base linear, very long and somewhat twisted,*St. coccinea*.

O O Leaves more or less tomentose or puberulous, at least beneath.

X Flowers more than $\frac{1}{2}$ in. long, in simple brown tomentose racemes.

Leaves beneath and petioles softly rusty pubescent,*St. mbiginosa*.

X X Flowers in panicles.

Leaves tomentose; calyx-lobes free and spreading; flowers long-pedicelled,
*St. angustifolia*.

Leaves beneath minutely stellate-puberulous; calyx-lobes short and connivent; flowers shortly pedicelled,*St. partiflora*.

Subg. 2. Firmiana. Calyx tubular. Seeds without wings. Carpels chartaceous and expanded leaflike, bearing 1 or 2 seeds along the marginal sutures at about $\frac{1}{2}$ of their length.

Leaves more or less lobed, occasionally almost entire, glabrous or puberulous beneath; calyx about 8-9 lin. long,*St. colorata*.

Leaves very large, much lobed, pubescent beneath; calyx about 1 to 1 $\frac{1}{2}$ in. long,*St. fulgens*.

Subg. 3. Scaphium. (incl. *Pterocymbium* and *Carpophyllum*). Calyx more or less campanulate. Seeds without wings, solitary, laterally adnate to the base of the boat-shaped chartaceous or membranous follicles.

* Follicles produced below at about the middle into an additional bluntish sac-like lobe.

Leaves more or less tomentose or puberulous beneath; calyx campanulate, green,*St. campanulata*.

* * Follicles not produced into an additional lobe.

Leaves coriaceous, glabrous, glossy; calyx almost rotate, yellowish,*St. scaphigera*.

Subg. 4i. Pterygota. Seeds numerous, winged along their upper end, enclosed in a woody-large follicle.

Leaves entire, glabrous, 5-nerved at base; follicles as large as the fist,*St. alata*.

1. *ST. FETIDA*, L, sp. pi. 1131; Eoxb. PI. Incl. III. 151; Wight Ic. t. 181 and 364; Hf. Ind. Fl. I. 354.

HAB. Not unfrequent in the upper mixed forests of the Pegu Yomah. Fl. Apr. May 3 Fr. Febr. March..

2. ST. VERSICOLOE, Wall. Pl. As. rar. I. 48. t. 59 ; Hf. Ind. ^{F1} - I- 355.

HAB. Ava, on limestone hills on the right side of the Irrawaidi near Segain (Wall.) Fl. Octob.

3. ST. TJRENS, Eoxb. Corom. Pl. I. t. 24 and Fl. Ind. III. I⁴⁵ >> ^{if} Ind. Fl. I. 355.

HAB. Not unfrequent in the drier upper mixed forests of the ^{reg} Pegu Yomah and Martaban j and in the mixed dry forests of Prome ; also Tenasserim. Fr. March.

4. ST. YILLOSA, Eoxb. Fl. Ind. III. 153 ; Hf. Ind. FL I. 355.

HAB. Frequent in the upper mixed forests of the Pegu Yomah an ^d Martaban ; Tenasserim ; Andamans. Fl. H. S. ; Fr. Begin of E. S.

5. ST. ORNATA, Wall. ap. Voigt Hort. Calc. 105 ; Kurz in Journ. As. Soc. Beng. 1873. 228.

HAB. Not unfrequent in the tropical forests of the Pegu Yomah and Martaban down to Tenasserim. FL Febr. ; Fr. March, Apr.

6. ST. LONGIFOLIA, Vent. Malm. II. No. 91. in adnot. ; DC. Prod. I- 482 ; Miq. Fl. Ind. Bat 1/2. 173. (*St. striatiflora*, Mast, in Hf. Ind. ^{*L} I. 356).

HAB. Birma (Griff. 586) ; probably Tenasserim.

7. ST. COCCIKEA, Eoxb. Fl. Ind. III. 151 ; and Hook. Bot. Misc. I. 286 ; Hf. Ind. Fl. I. 357.

HAB. Frequent in the tropical forests of the Pegu Yomah and Martaban down to Tenasserim. Fl. March ; Fr. Apr.

Masters refers my Pegu specimens to a species which he calls *St. l&vis*, Wall., but my plant is certainly Roxburgh's.

8. ST. RUBIGINOSA, Vent. Hort. Malm. II. 91 in adn. ; Hf. Ind. FL I. 358.

HAB. Birma (teste Masters).

9. ST. ANGUSTIFOLIA, Eoxb. FL Ind. III. 143 ; DC. Prod. I. 482 ; Walp. Eep. V. 100.

Var. a. *AJSTGUSTIFOLIA*, leaves on petioles 8 to 10 lin. long, lanceolate or broadly lanceolate, acuminate.

Var. /3. *MOLLIS* (*St. mollis*, Wall. Cat. 1131 ; Walp. Eep. V. 101), leaves obovate oblong, on petioles 4 to 5 lin. long, shortly acuminate, rounded at the narrowed base ; tomentum almost velvety ; pedicels much shorter.

HAB. Both varieties in Tenasserim (Wall. Falc. Helf.) Fl. Febr. ; Fr. Apr.

10. ST. PARYIFLORA, Eoxb. FL Ind. III. 147 ; Hf. Ind. FL I. 359. ^{HAI}

S, Andamans, in the coast-forests. Fr. Apr. May.

My specimens being in fruit only the identification is somewhat doubtful, but they agree otherwise with Malacca specimens. Masters mentions *St. gutfata*, Roxb. as growing on the Andamans.

11. ST. COLOHATA, Roxb. Corom. PL I. t. 23 and Fl. Ind. III. 116; Hook. Ic. pi. t. 143 ; Hf. Ind. Fl. I. 359.

HAB. Frequent in all leaf-shedding forests all over Burma from Chittagong and Ava down to Tenasserim and the Andamans. Fl. H. S.; Fi\ H. and begin of II. S.

12. ST. FULGENS, Wall. Cat. 1135 (*Firmiana colorata*, (*S. fulgens*, R. Br. and Benn. in Horsf. PI. Jav. rar. 235 ; Walp. Rep. V. 104).

HAB. Ava, Taong dong ; Tenasserim, Moulmein (Wall.)

I know not what Masters describes under the above name, unless it be the N. W. Indian *St. pollens*, Wall. ap. Voigt Cat. H. Bot. Calc. 135, a totally different tree with pale yellowish softly tomentose smaller and more campanulate flowers and different leaves.

13. ST. CAMPANULATA, Wall. ap. Voigt. Hort. Calc. 105 ; Kurz in Flora 1872. 495.; Hf. Ind. Fl. I. 362. (*P. terocymUnm Javanicum*, R. Br. in Horsf. PI. Jav. rar. 219. t. 45 ; Miq. Fl. Ind. Bat. 1/2. 179).

HAB. Frequent in the tropical forests along the eastern slopes of the Pegu Yomah and Martaban. Fl. March ; Fr. Apr.

14. ST. SCAPHIGERA, Wall. Cat. 1130; Hf. Ind. Fl. I. 361. (*Seaphium Wallichii*, Schott and Endl. Melet. 33 ; Walp. Rep. V. 104 ; *Carpophyllium macropodum*, Miq. Suppl. Fl. Sumatr. 401).

HAB. Frequent in the tropical forests along the eastern and central slopes of the Pegu Yomah and Martaban; also Tenasserim. Fl. Febr. March ; Fr. March, Apr.

15. ST. ALATA, Roxb. Corom. PI. III. 84. t. 257 and Fl. Ind. III. 182; Hf. Ind. Fl. I. 360. (*St. Heynii*, Bedd. Fl. Sylv. t. 230),

HAB. Frequent in the tropical forests all over Chittagong, Pegu and Martaban down to Tenasserim ; also on the Andamans. Fl. Febr. March, Fr. Apr. May,

Doubtful species.

1. ST. LINGUIFOLIA, Mast, in Hf. Ind. Fl. I. 357.

HAB. Tenasserim, Tavoy (Parish).

2. ST. ENSIFOLIA, Mast, in Hf. Ind. Fl. I. 359.

HAB. Tenasserim, Mergui (Griff.)

Heritiera, Ait.

Conspectus of species.

* Carpels glossy or at least smooth, brown; leaves shortly petioled.

Leaves usually cordate or rounded at base j carpels strong-crustaceous, obliquely ovoid with a sharp keel pointed at the summit, j£% *Tothila*.

Calyx-lobes 1*-2 in. long; style glabrous, ... p. *aceroides*.

* * Capsules terete or nearly so.

Flowers 3 in. ? Leaves semi-sagittate at base; stipules pinnatifid.

s in. 1¹/₂ or longer; bracteoles large, divided into several many-cleft and jaggy lobes, forming an involucre, ... *J semisoghtatum*.

O O Leaves never semi-sagittate, usually small, entire or shortly lobed; stipules small, entire or 2-3-cleft; flowers not above 2 in. long.

T t Pedicels much longer than the petioles.

Leaves usually greyish or whitish tomentose beneath, acuminate; stipules and bracteoles & *- rarely 5-cleft. Capsules greyish or whitish velvety, ... *P. lancefolium*.

t t Pedicels short, about the length of the petioles or rarely a little longer.

Leaves entire, acuminate, beneath rusty coloured (rarely greyish) tomentose; stipules and bracteoles linear-subulate, with a cucullate basal appendage; capsules brown - seruvy-wntose, glabrescent, ... % *Lnamomeum*.
leaves usually small, stipules and bracteoles entire, lanceolate, ... *p. Blumeanum*.

l'R \ f_w ^{ACEEFOLIUM} Willd. sp. pl. III. 729; Roxb. Pl. Ind. III. 108; Bot. Map. t. 620; Wight Ic. t. 631; Hf. Ind. PL I. 368. p. p.

-HAB J frequent in the tropical and moirter upper mixed forests along choungs all over Burma from Chittagong aud Ava dovm to Tenasaerim and the Andamans. Pl. H. S.; Fr. C. S.

¹⁰⁻⁷⁰/₁₀₀ ²/₁₀₀ ^R ^{ACEE0IDES} > Wall. Cat. 1171; Kurz in Journ. As. Soc. Bong.

HAB. Tenasserim, and Andamans, in tropical forests. PL H. S.

Pt. diversifohum, Bl. appears to be an intermediate form between *Ft. acenfohum* and *Pt. aceroides*, having the flowers and styles of the former but smaller, and the bracteoles of the latter.

3. PT. SEMISAGITTATUM, Eoxb. Hort. Beng. 50 and Fl. Ind. III. 160; Hf. Ind. PL I. 368.

HAB. Frequent in the mixed and dry forests all over Burmah from Chittagong and Ava down to Tenasserim. Fl. H. S. ; Fr. C. S.

4. PT. LAKCEEFOLIUM, Roxh. Fl. Ind. 111. 163; Hf, Ind Fl. I. 368.

HAB. Chittagong; Tenasserim, Tavoy (Wall, teste Mast.)

5. P. CINNAMOMEUM, 110V. Sp.

HAB. Not unfrequent in the tropical forests of Martaban ; also Tenasserim. Fr. March.

I attempted to identify the above species with *Pt. fuscum*, Korth. when I had only fruits, but Khasya flowering specimens shew its complete distinctness. Some Khasya specimens in leaf distributed from Kew under the name *Pt. lancecefoliim* belong here. It is nearest to *P. rubiginosum*.

6. PT. BIUMEANUM, Korth. Ned. Kruidk. Arch. I. 311 ; Miq. Fl. Ind. Bat. 1/2. 191.

HAB. Tenasserim (Helf. 569).

Eriolsena, DC

1. *E. CANDOLLEI*, Wall. PI. As. rar. I. 51. t. 64; Hf. Ind. Fl. I. 370.

HAB. Not unfrequent in the dry and low, rarely in the mixed, forests of Prome and Ava down to Martaban and Pegu. Fl. H. S.; Fr. C. S.

Pentapetes, L.

1. *P. PIKENICEA*, L. sp. pi. 958; Eoxb. Fl. Ind. III. 157; Bot. Keg. t. 525; Hf. Ind. Fl. I. 371. (*Eriorhaphe punicea*, Miq. PI. Jungh. I. 289).

HAB. In cultivated plains, along rice-fields, etc., in Pegu, Ava and Prome. Fl. II. S.

Melhania, Forsk.

1. *M. HAMILTONIAKA*, Wall. PI. As. rar. I. 69. t. 77; Walp. Rep. 1.349; Hf. Ind. FL I. 372.

HAB. Ava, frequent along the sandy dry banks of the Irrawaddi; also Taong-dong (Wall.). Fl. Sept. Oct.; Fr. Nov.

Melochia, L.

1. *M. CORCHOEIPOLIA*, L. sp. pi. 944; Eoxb. Fl. Ind. III. 139; Hf. Ind. Fl. I. 374.

HAB. Common as well in cultivated lands, waste places around villages, long-grassed pastures, etc., as in the leaf-shedding forests, all over Burma and adjacent provinces. Fl? Fr. Sept. to Octob.

Visenia, Houtt.

1. *V. ISDICA*, Houtt. Syst. Linn. VI. 287. t. 46; Miq. Fl. Ind. Bat. 1/2. 189. (*F. unibellata*, Bl. Bydr. 88; Wight Ic. t. 509; *Biedlela velutina*, DC. Prod. I. 491; *Melocliia velutina*, Bedd. Fl. Sylv. t. 5; Hf. Ind. Fl. I. 374).

HAB. Rather rare in the tropical forests of Pegu, Martaban and Tenasserim (Brandis). Fl. R. S.

Waltheria, L.

1. *W. AMERICANA*, L. sp. pi. 941; DC. Prod. I. 492. (*W. Inclica*, L. 1. c. 941; Hf. Ind. Fl. I. 374).

HAB. Not uncommon on the lower hills of the Irrawaddi valley from Ava (Segain) to Prome. Fl. Sept. Oct.

Guazuma, Plum.

*1. *Gr. TOEFTOSA*, H. B. K. Nov. Gen. V. 320; Wight 111. t. 31; Bedd. Fl. Sylv. Madr. t. 107; Hf. Ind. Fl. I. 375.

HAB. An American tree sometimes seen planted as an avenue-tree. Fl. II. S.; Fr. C. S.

Leptonychia, Turcz.

Conspectus of species. •

Outer staminods 15, the inner staminods ciliate ; capsule 1-celled, rugose, ^..*L.glabra*.
Outer staminods 10, the inner not ciliate; ovary and capsule 3-5-celled and lobed, the
latter minutely tubercled,
...*L.heteroclita*>*

1. L. GLABRA, Turcz in Bull. Mosc. 1858. 222 ; Hf. Ind. Fl. I. 379,
excl. syn.

HAB. Tenasserim (Helf. 658) ; Moulmein (Lobb. teste Mast.)-

2. L. HETEROCLITA, Kurz in Journ. As. Soc. Beng. 1870. 67. excl.
syn. Turcz. (*Greivia heteroclita*, Eoxb. Fl. Ind. II. 590 ; *Binnendylcia*
trichostylis, Kurz in Tydsch. Nat. Ver. Ned. Ind. ser. 3. III. 164 ; *L.*
moacurroides, Bedd. Fl. Sylv. Madr. t. 114 ; Hf. Ind. Fl. I. 379 ; *Greivia*
acuminata, Bedd. in Linn. Trans. XXV. 210 ? ; Hf. Ind. I. 393 ?).

HAB. South Andaman, in tropical forests.

Buettneria, L.

Conspectus of species.

% Leaves cordate-oblong, entire.

Capsules large, greyish velvety, covered with strong woody prickles, ...2?. *aspera*.

X X Leaves more or less lobed or angular. Capsules the size of a cherry.

More or less roughish stellate-tonientose; capsules densely covered with brown setose
flexible bristles,
...*B.pilosa*.

Glabrous or almost so ; capsules covered with long stiff smooth bristles, *B. Andamanensis*.

1. B. ASPERA, Colebr. ap. Wall, in Eoxb. Fl. Ind. ed. Car. II. 383 ;
Hf. Ind. Fl. I. 377.

HAB. Not unfrequent in the tropical forests from Pegu and Martaban
down to Tenasserim and the Andamans. Fl. Apr. May.

2. B. PILOSA, Eoxb. Fl. Ind. I. 618 ; Hf. Ind. Fl. I. 377.

HAB. Frequent in tropical and mixed forests all over Burma and adjacent
provinces. Fr. C. S.

3. B. AISDAMANENSIS, Kurz in Andam. Eep. App. B. p. 3. and
Journ. As. Soc. Beng. 1871. 47 ; Hf. Ind. Fl. I. 377.

HAB. Frequent in the coast forests of South Andaman ; also Upper
Tenasserim, along the Thoungyeen and Attaran rivers (Brandis) ; Moul-
mein (Lobb). Fr. H. S.

Doubtful species.

I. B. CRENTILATA, Wall. Cat. 1150 ; Hf. Ind. Fl. I. 376.

HAB. Pegu (^McLelland) ; Tenasserim, Attaran and Salween (Wall.)
ex Masters.

Wall. Cat. 1152 is mentioned in the Lith. List as *Kleinliovia liospita*.
l\$. catalpifolia, as represented in the Wallichian Herb, in H. B. C, is a
Caracas plant, cultivated and collected in H. B. C. and bears no number.

-5. *ecliinata* Wall. Cat. 1149 is the only No. which I have myself seen, and consists of loose leaves and a piece of a capsule, the former differing from his *St. parviflora*, Wall. Cat. 1121 from Silliet only in size, the latter almost indistinguishable from *B. Andamanensis*. Nipal is also given as a locality but Wallicli's Nos. cited are all Burmese.

TILIAGE2E1.

Conspectus of genera,

A. Anthers opening by slits.

Trib. I. BMOWNLOWIJZM. Sepals united into a boll-shaped 3- to 5-cleft calyx. Anthers short, usually globular or didymous, the cells ultimately confluent at the top.

* The 5 inner stamens reduced to staminods.

1. BEOWNLOWTA. Carpels distinct, globular, 2-valved.
2. PENTACE. Fruits 3-5-winged, indehiscent, by abortion 1-seeded.

* Anthers all anther-bearing,

3. BEREYA. Capsule 3-4-valved; with twice as many wings. Styles 1-4, filiform.
Trib. II. GREWIEJE. Sepals distinct. Petals with a basal scale more or less adnate, inserted round the base of a more or less raised torus bearing at the top the stamens. Anthers short, the cells parallel and distinct.

* Fruit dry, winged.

4. COLUMBIA. Fruit 3-5-celled, separating into as many 2-winged cocci.

* Fruit more or less drupaceous, not winged.

O Fruit unarmed, tomentose to glabrous. ,

5. GEEWIA. Drupes more or less lobed or globular.

O O Fruits prickly.

6. TEIUMFETTA. Drupe usually small, globular, indehiscent or separating into cocci.

Trib. III. TILIH2E. Sepals distinct. Petals without a scale at base, inserted directly round the stamens.

* Capsule opening loculicidally, almost pod-like or globular, many-seeded.

7. COECHOEUS. Stamens all anther-bearing. Capsules pod-like or globular, striate or muricate.

* * Fruits globular, indehiscent, usually 1-seeded.

8. SCHOUTENIA. Calyx enlarged under the fruit, membranous, spreading. Stamens free, all anther-bearing.

B. Anthers opening by apical pores.

Trib. IV. SLOANE2E. Anthers linear. Staminal disk flat or cushion-like, the sepals and petals inserted directly round the stamens.

9. ECHINOCÆPUS. Sepals 4, imbricate in 2 series. Petals 4, gashed, almost imbricate. Disk thick and broad. Capsule woody, 4-valved, echinate setose or velvety.

Trib. V. ELJEOCABPEJE. Anthers linear. Petals inserted round the base of a raised torus from the top of which the stamens spring,

10. EL^OCAEPUS. Sepals 4-5. Petals induplicate-valvate, lactuiate or rarely entire, Drupes fleshy.

Brownlowia, Roxb.

Conspectus of species.

* Leaves deeply peltate.
 Leaves oblong or rotundate; calyx velvety, • • %- P^{eltata}
 * * Leaves not peltate.
 Leaves cordate-oblong; calyx velvety, • • ^ e^{ltata}
 Leaves lanceolate j calyx scaly, B. lanceolate*.

1. B. PELTATA, Bth. in Linn. Proc. V. Suppl 56.

HAB. Tenasserim (Helf. 624).

Apparently merged by Masters into *B. elata* and possibly rightly so.

2. B. ELATA, Eoxb. Corom. PL III. t. 265 ; Bot. Eeg. t. 1472.
 Wall. PI. As. rar. III. 45 ; Hf. Ind. Fl. I. 381. (*Rumea elata*, Roxb;
 Fl. Ind. II. 640).

HAB. Chittagong ; Tenasserim, Moulmein.

3. B. LANCEOLATA, Bth. in Linn. Proc. V. Suppl. 57 ; Hf. IIKI. Fl. I. 381.

HAB. Rather frequent in the tidal forests and mangrove swamps from Arracan (Akyab) and Rangoon down to Tenasserim (Moulmein). FL Febr.—May.

Pentace, Hassk.

1. P. BTJEMANICA, Kurz in Journ. As. Soc. Beng. 1871. 47 ; Hf. Ind. Fl. I. 381.

HAB. Frequent in the tropical forests of the eastern and southern slopes of the Pegu Yomah and Martaban down to Upper Tenasserim. Fl. Jan. ; Fr. Febr. March.

Berrya, Roxb.

1. B. MOLLIS, Wall. Cat. 1186 ; Kurz in Journ. As. Soc. Beng. 1873. 62. (*B. Ammonilla*, var. *mollis*, Mast, in Hf, Ind. Fl. I. 3S3).

HAB. Not unfrequent in the drier upper mixed and hill Eng forests of Martaban and the Pegu Yomah up to 3000 ft. elevation. Fr. March.

Columbia, Pers.

Conspectus of species.

Leaves cordate-oblong; fruits £-1 in. across, *CJlonbimda*.
 Leaves lanceolate; fruits 1£ in. across, *C. Merguensis*.

1. C. FLOXBUNDA, Kurz in Journ. As. Soc. Beng. 1873. 63 ; Hf. Ind. Fl. I. 393. (*Grewia florilunda*, Wall. ap. Voigt (not Voight) Cat. Hort. Calc. 128).

HAB. Martaban, in Toukyeghat E. of Tounghoo ; also Ava, on Taong dong. Fr. Nov. Jan.

2. C. MEBGTTENSIS, Planch, in Hf. Ind. Fl. I. 394.

HAB. Tenasserim, Mergui (Griff.)

Grewia, L.

Subg. 1. Microcos. Stigma shortly toothed. Flowers forming terminal panicles, involucred while in bud.

? Endocarp of drupes fibrous-woody.

Leaves entire, almost coriaceous, quite glabrous; ovary and torus velvety-tomentose, ...*G. calophylla*.

Y> X Endocarp of drupes crustaceous or *honj*.

Leaves thin chartaceous, glabrous or beneath puberulous, not sinuate; ovary and torus glabrous, - ...*G. microcos*.

As preceding but flowers and leaves much smaller, the latter sinuate-lobed, ...*G. sinuata*.

Leaves thick chartaceous and rugose, tomentose beneath; ovary and torus villous, ... *G. paniculata*.

Subg. 2. Grewice verce. Stigmas dilated and fringed, radiating. Flowers in axillary or leaf-opposed cymes or clusters.

O Cymes or clusters axillary.

X Leaves at base 3-nerved, rarely with an additional lateral one.

f Drupes deeply 2-4-lobed from the top, by abortion sometimes 1-lobed.

Cymes and sepals shortly rusty tomentose; leaves on both surfaces very scabrous from minute stellate hairs; drupes deeply 4-lobed, *G. scalarida*.

Cymes sprinkled with stiff hairs, glabrescent; sepals greyish or tawny velvety; leaves glabrous, or sprinkled with simple short hairs, rarely puberulous beneath; drupes didymous, *G. Icevigata*,

f f Drupes entire or only slightly and obtusely lobed at the top.

Leaves beneath and young parts greyish velvety; drupes globular, grey-pubescent, ...*G. excetea*.

Leaves at base 3- or 4-nerved; cymes rather long peduncled; drupes obsoletely 4-lobed red, sparingly hirsute, *G. hirsuta*.

As preceding, but more densely pubescent or tomentose; drupes obsoletely 2-lobed, red sparingly hirsute, *G. humilis*.

Leaves at base 3- or 4-nerved, scabrous; flowers in short dense sessile clusters; stamens 16, ... *G. microstemma*.

X Y» Leaves usually broad, at base 5-7-nerved, the upper ones often only 3-nerved or 3- and 5-nerved ones mixed,

f Peduncles slender, much longer than the petioles.

Leaves obliquely lanceolate, especially while young greyish or whitish tomentose beneath, ... *G. elastica*.

Leaves broadly obovate or almost rotundate, on both sides sprinkled with stellate hairs, or pubescent beneath, often scabrous, *G. Asiatica*.

f f Peduncles very short or almost reduced and the flowers appearing clustered.

Leaves very variable in shape, tomentose to pubescent; drupes from the top deeply 4- or only by abortion fewer-lobed, *G. abutilifolia*.

Leaves very scabrous and harsh; drupes the size of a cherry, almost globular,

...6†. *sclerophylla*,

O 0 Cymes opposite the leaves, *G. oppositifolia*.

1. *G. CALOPHTLLA*, Kurz in *And. Rep. App. B. 3*; and in *Flora 1872 398 j Hf. Ind. VI 1,392*.

HAB. Not uncommon in the tropical coast-forests of South Andaman. FL May, June.

2. *G. MICROCOS*, L. sp. pi. ed. 12. 602 ; Wight 111. t. 33 ; Hf. Ind. Fl. I. 392. (*G. ulmifolia*, Eoxb. FL Ind. II. 591 ; Wight Ic. t. 84).

HAB. Frequent all over Burma from Chittagong and Ava down to Tenasserim, in the mixed forests, especially the lower ones. Fl. Apr.—June.

Like a few other *Grewia* perplexingly variable in size and shape, here a well-shaped tree 40 to 50 ft. high, there a meagre shrub of only a few feet in height; the latter form growing chiefly on deep alluvium, in savannahs and similar localities.

3. *G. sinuata*, Wall. Cat. 1108; Hf. Ind. Fl. I. 392.

HAB. Frequent in the swamp-forests of the Irrawaddi and Sittang alluvial plains in Pegu and Martaban ; also Tenasserim as far down as Mergui. FL May.

Possibly only a marsh-form of the preceding.

4. *G. scabrada*, Wall. Cat. 11,13. p. p. ; Kurz in Journ. As. Soc. Beng. 1873. 63; Hf. Ind. Fl. I. 398, excl. syn.

HAB. Tenasserim, from Moulmein (Falconer) and Tavoy (Wall.) down to Mergui (Helf.). Fl. Sept.; Fr. Febr.

5. *G. myigata*, Vhl. Symb. I. 34; Hf. Ind. Fl. I. 389. (*G. didyma*, Eoxb. FL Ind. III. 591).

Var. a. *GLABRA*, leaves glabrous, or tufted-hairy in the nerve-axils beneath.

Var. *ft. pubescens* leaves beneath minutely puberulous or densely downy.

HAB. Var. */?*. not uncommon in the upper mixed forests all over Pegu and adjacent provinces down to Tenasserim; var. a. in Arracan. FL Sept. Oct. ; Fr. March Apr.

6. *G. excelsa*, Vhl. Symb. III. 35 ; Eoxb. FL Ind. II. 586 ? j Hf. Ind. FL I. 385. (*G. salvifolia*, Eoxb. 1. c. 587).

HAB. Chittagong (teste Masters).

I have not seen specimens; the occurrence of such a xeroclimatic form in Chittagong is exceptional.

7. *G. hirsuta*, Vhl. Symb. I. 34 ; DC. Prod. I. 509 ; Eoxb. FL Ind. II. 587 ; Wight Ic. t. 76; Hf. Ind. Fl. I. 391. (*G. pilosa*, Eoxb. FL Ind. II. 588).

Var. a. *GENTESA*, leaves green, 3-nerved, more or less sprinkled with short stiff hairs.

Var. */?*. *YIMINEA*, (*G. viminea*, Wall. Cat. IV), as the preceding, but the leaves longer and narrower, very long acuminate.

Var. *y. helicterifolia* (*G. helicterifolia*, Wall. MS.), leaves acuminate, at base 3- or almost 4-nerved, thinly hirsute or tomentose above, beneath clothed with a whitish velvety tomentum.

HAB. Var. a. and /?. frequent all over Burmah in the mixed forests, especially in the upper ones ; var. y. not yet found. Fl. H. and R. S.; Fr. **as.**

8. *G. HTJHILIS*, Wall. ap. Yoigt Cat. Hort. Beng. 128; Hf. Ind. Fl. I. 390.

Var. a. *WALLICHII*, tomentum more villous, leaves acute.

Var. /3. *RETUSIFOLIA*, (*G. retusifolia*, Kurz in Journ. As. Soc. Beng. 1872. 294), tomentum velvety; leaves deeply retuse and broader.

HAB. Var. a. Ava, Segain hills (Wall.); var. *ft.* not unfrequent in savannahs, especially along the borders of swamp forests of the Irrawaddi alluvium in Pegu. Fr. C. S.

The drupes are normally 4-lobed, but by abortion usually 2- rarely 1-or 3-lobed. The species is hardly more than an extreme form of *G. hirsuta*, Vhl.

9. *G. MICKOSTEMMA*, Wall. ap. Voigt Cat. Hort. Calc. 128 ; Kurz in Journ. As. Soc. Beng. 1873. 63; Hf. Ind. Fl. I. 390.

HAB. Ava; Prome hills (Wall.) Fl. Sept. Oct.

10. *G. ELASTICA*, Eoyle 111. Him. Pl. 104., t. 22 ; Walp. Rep. I. 361. (*G. asiatica*, var. *vestita*, Mast, in Hf. Ind. Fl. I. 387.)

HAB. Frequent in the upper mixed forests of the Pegu Yomah and Martaban ; also Chittagong. Fl. Nov. Decb.

11. *G. ASIATICA*, L. Mant. 122 ; Roxb. Fl. Ind. II. 586; Hf. Ind. FL I. 386.

Var. /?. *NANA*, (*G. nana*, Wall. Cat. 1102), stunted and low, possibly the result of jungle fires.

HAB. Only the stunted variety appears to grow in Burma (Griff. 656) probably Ava ?

12. *G. TILJEFOLIA*, Vhl. Symb. I. 35 ; Roxb. Fl. Ind. II. 587 ; Bedd. Fl. Sylv. Madr. t. 108; Hf. Ind. Fl. I. 386.

HAB, Birma (teste Masters).

13. *G. ABUTILIFOLIA*, Juss. Ann. II. 92; DC. Prod. I. 511; WA. Prod. I. 79 ? Miq. Fl. Ind. Bat. 1/2. 201 ; Hf. Ind. Fl. I. 390. (*G. aspera*, Eoxb. Fl. Ind. II. 591).

Var. a. *ASPERA*, (*G. aspera*, Roxb. 1. c.) leaves all rotundate and often somewhat lobed towards the summit; sepals only 2| lin. long or a little longer, pubescent from stiff appressed hairs ; petals $\frac{1}{2}$ lin. long ; bracteoles short, oblong, acute. A low shrub, 2 to 3, often only 1 foot high, the tomentum usually short.

Var. *p.* *YIRXDESCENS*; as the preceding, but the leaves of a very thin chartaceous texture and very large, green, acuminate, above hirsute from simple, beneath from stellate, tawny hairs; flowers usually larger ; sepals tawny pubescent; petals as in the preceding variety, but the lamina more acute ; ripe drupes glabrous. Low shrub, 2-3 ft. high.

Var. *y. sclerophylloides*, a low shrub, 3-4 ft. high, more or less branched, the younger parts densely rusty-coloured villous; leaves very variable in shape on the same branch, the lower ones usually ovate-oblong, up to nearly one foot long, the upper and uppermost ones gradually smaller and narrower, from ovate to lanceolate, doubly and sometimes bristly serrate, acuminate, scabrous or thinly pubescent above, beneath more or less stellate-pubescent or almost tomentose; bracteoles linear-lanceolate, acuminate, pubescent externally, longer or as long as the flower-buds; petals a line long, the lamina acuminate, pubescent outside; drupes deeply 4-lobed, often remaining sparingly hirsute during ripeness. A laterite form.

HAB. Var. *a.* Pegu (Col. Eyre); var. *f3.* not unfrequent in the upper mixed forests of the Pegu Yomali; var. *y.* frequent in the open, especially the low and Eng forests of Pegu, Prome and Martaban. Fl. May.

A very variable plant of which I entertained some hope of being able to separate var. *y.* (which is also a common Assam plant) specifically. It resembles in size of flowers *G. sclerophylla*, but the deeply 4-lobed drupes at once separate it.

14. *G. sclerophylla*, Wall. Cat. 1095; Wight Ic. t. 89. (*G. scabrophylla*, Roxb. FL Ind. II. 584 [nomen latino-graecum]; Hf. Ind. Fl. I. 387).

HAB. Ava and Chittagong (teste Masters).

Doubtful species.

1. *G. lanceolata*, Roxb. Fl. Ind. IE. 586.

HAB. Chittagong (Roxb.)

Possibly the same as *G. vlminea*, Wall.

Triumfetta, L.

Conspectus of species.

Sect. 1. Zappula. Capsules indeliquescent or nearly so, globular, echinate, the cells usually 1-seeded.

Leaves rotundate, not lobed, blunt, beneath greyish-tomentose like the sepals,

... *T. rotundifolia**

Leaves rotundate, acuminate, often lobed; the sepals stellate-hairy, ... *T. rhomboidea*.

Sect. 2. Bartramia. Capsules when ripe separating into 3-4 cocci, densely covered by long bristles, the cells usually 2-seeded.

Leaves slightly hirsute; capsules and bristles glabrous, *T. annua*.

Leaves at least beneath densely tomentose or pubescent; capsules tomentose, the bristles more or less pilose, straight or curved, *T. pilosa*.

1. *T. RHOMBOIDEA*, Jacq. Am. 147. t. 90; Mast. Fl. Trop. Afr. I. 257 and Hf. Ind. Fl. I. 395. (*T. angulata*, Lamk/Dict. III. 41; Wight Ic. t. 320; *T. Bartramia*, Roxb. FL Ind. II. 403; *T. cana*, 131. By dr. 110, uoxi Mast.).

HAB. A common weed not only in cultivated lands but also in all leaf-shedding forests all over Burma and adjacent provinces. *FL II.* and *C. S.*; *Fr. C. S.*

2. *T. semitriloba*, L. *Mant.* 73 ; *Hf. Ind. Fl. I.* 396.

HAB. Tenasserim, Tavoy (teste Masters \

3. *T. BOTTJNDIEOLIA*, Lamk. *Diet III.* 421 ; *Hf. Ind. Fl. I.* 395.

HAB. Ava (Wall.)

4. *T. ANNUA*, L. *Mant.* 73 ; *Bot. Mag. t.* 2296 ; *Hf. Ind. Fl. I.* 396

HAB. Not unfrequent in the upper-mixed and dry forests all over Pegu, also frequent in deserted hill-toungyas; Ava. *Fr. Nov.—Febr.*

5. *T. PILOSA*, Roth *Nov. sp.* 223 ; *Hf. Ind. Fl. I.* 394.

Var. /3. *OBLOKGA*, (*T. oblonga*^VzW. in *Don I. Prod. Rep.* 227; *T. tomentosa*, Mast, in *Hf. Ind. Fl. I.* 394, non Boj. ; *T. octandra*, Griff. *Nat. Dicot.* 512 ?) the bristles of the carpels somewhat shorter and straight or nearly so.

HAB. Var. /?. common all over Burma and adjacent provinces, in the mixed forests and deserted toungyas. *Fr. Nov. Jan.*

Masters, in *Fl. trop; Afr. and Fl. Ind.*, identifies var. *ft.* of this species with *T. tomentosa*, Boj. The Mauritian plant, which for a long time was cultivated in H.B;C. but is now apparently lost, has a velvety tomentum and small globular fruits not larger than those of *T. rhomboidea*, while Masters describes them as being as large as a cherry.

Doubtful species.

1. *T. CANA*, Masters in *Hf. Ind. Fl. I.* 396, non BL

HAB. Chittagong (teste Masters).

Corchorus, L.

Conspectus of species.

§ 1. Capsules globular or nearly so, more or less muricate.

Lower pairs of serratures of leaves produced into five bristles : capsules 10-sulcate, truii^
cute, ~ *C+ capsularis*,

§ 2. Capsules more or less elongate or linear, cylindrical or angular, but not winged.

* Capsules 1 to 2 in. long or longer. Stamens very numerous..

O Lower pair of serratures of leaves produced into long bristles.

Capsules 2 in. long, 5-celled and 5-ribbed, longitudinally pitted, the partitions within very distinct, *a oUtorius.*

O O Leaves without basal bristles, usually small and blunt.

Capsules about 2 in. long, sparingly and minutely tubercled, glabrous, simply beaked, *C. 3-locutaris.*

As preceding, but capsules only about 1 in. long, thinly pilose, *C. urticifollus.*

Capsules 1-1½ in. long, almost terete, not wrinkled, 3-4-celled, 3-4-toothed at apex, without partitions inside, *C. trident.*

* * Capsules about ½ in. long. Stamens 5 to 10.

Capsules almost terete, tomentose, 3-celled, without partitions inside, $C. \wedge \wedge \wedge$
 § 3. Capsules elongate, thick, truncate, 6-angled, the alternate angles wing \wedge
 Stamens 15 to 20. Leaves without bristles. Capsules $\backslash - \backslash$ in. long, terminating \llcorner
 simple or 2-cleft spreading points, *...O. acutangul^{is}*

1. *C. CAPSTILAEIS*, L. sp. pi. 746; Roxb. Fl. Ind. II. 581; **Wight**
 Ic. t. 311; Hook. Journ. Bot. II. 92. t. 3, Hf. Ind. Fl. I. 397.

HAB. Cultivated[^] all over Burma, and frequently seen in deserte^d
 toungyas, along the borders of forests, around villages, etc. FL C. S.; *¹*
 H. S.

2. *C. OLTORIUS*, L. sp. pi. 746; Roxb. PL Ind. II. 581; Bot. Mag.
 t. 2810; Griff. Not. Dicot. 512; Hf. Ind. Fl. I. 397. (*C. decemangularis*,
 Boxb. 1. c. 582).

HAB. Ava, Pegu, cultivated and wild in rubbishy places and agrarian
 lands. " Fl. R. S.; Fr. C. S.

3. *C. TRILOCTILAMS*, L. Mant. 77; Eoxb. Fl. Ind. II. 582; Hf. Ind^{*}
 Fl. I. 397.

HAB. Burma (according to Dr. Mason).

4. *C. UBTICAFOLIUS*, WA. Prod. I. 73; Hf. Ind. Fl. I. 397.

HAB. Ava (Wall).

5. *C. TRIDENS*, L. Mant. 566; Hf. Ind. PL I. 398. (*C. trilocularis*,
 Burm. FL Ind. t. 37. f. 2).

HAB. Prome District (Wall.).

6. *C. FASCICULARIS*, Lamk. Diet. II. 104; Roxb. PL Ind. II. 582;
 Hf. Ind. FL I. 398.

HAB. Not unfrequent in dried up river-beds in the swamp forests an^c
 savannahs between the Lhein and Irrawaddi rivers in Pegu. Fr. C. S.

7. *C. ACUTANGULTIS*, Lamk. Diet. II. 104; Wight Ic. t. 739; Hf.
 Ind. FL I. 398. (*C. fuscus*, Roxb. Fl. Ind. II. 582).

HAB. Very frequent not only in rubbishy places, deserted toungyas,
 etc., but also in the leaf-shedding forests, all over Burma up to 3000 feet
 elevation. FL R. S.; Fr. C. S.

Echinocarpus, Bl.

Conspectus of species.

Leaves entire, tufted-hairy in the nerve-axils beneath; prickles of fruit strong, usually
 thickened at base, *JE. Sigicn.*

Leaves crenate-serrate or toothed, at least when young puberulous beneath, the prickles
 longer, all thin and subulate, *JE. sterculiaceus.*

1. *E. SIGTIN*, Bl. Bydr. 56; Miq. FL Ind. Bat. 1/2. 109. \backslash **E.**
waves, Bth. in Linn. Proc. V. Suppl 72; Hf. Ind. Fl. I. 399).

HAB. Tenasserim, Thoungyeen, Ta-oo-road (Brandis). Fr. Apr.

Masters states that the **prickles** of 22. *mwrex* are dilated at the base ; the **Khasya** specimens No. 5. Hb. or. Hf. and Th., however, exhibit not a vestige of dilatation being simply incrassate at base just as those of the Javanese plant. The *sigiui* is a common tree in the hill-forests of western Java and there well-known to Dutch botanists.

2. E. BIEBCULIACEUS, Bth. in Linn. Proc. V. Suppl. 72 ; Hf. Ind. FL I. 400.

HAB, Not unfrequent in the drier hill-forests of Martaban ; Tenasserim, Moulmein District (Falconer) ; Birma (Griff. 675).

Elseoearpus, L.

Conspechis of species.

Buhg. 1. *Monoceras*. Antbev3 cuspidate or aristate. Flowers usually rather large, the petals silky-hairy, fringed or very rarely entire.

- Petals **entire** with a few short teeth at apex or simply fringed, not cut or cleft. Petioles continuous, not geniculato-incrassate.

O Inflorescence and sepals outside almost glabrous,

All parts glabrous,, ..?, *petiolatus*.

O O Inflorescence and sepals outside silky-pubescent.

Glabrous; petals entire, **nctminttej** pedicels f-£ in. long,, *H. Qriffithil*

Glabrous; potuJs deeply but simply fringed; pedicels 3 A- lin. long, ...IT. *Varttnua:*

- * * Petals 2-3-cleft, the lobes jagged or fringed; anthers glabrous or puberulous.

O Petiole geniculate-thickened at apex.

f Inflorescence with long-persistent leafy bracts.

parts also sepals and inflorescence glabrous,, *H. bracteaii's.*

f f Bracts of inflorescence small, very deciduous.

X Racemes and sepals glabrous or nearly so, ...32. *simplex*.

5< X Racemes and sepals more or less tompntose or pubescent.

Jarea 1-H f< long, cuneate-aemmnate at base, acute; anthers shorter than the bristle;

drnpes **puberuloua**, the putamen slightly compressed,, 2S. *grandifolius*.

..eaves i-1 ft. loug, rounded at the narrowed base ; leaves glabrous or nearly so ; puta-

men terete,, *E. rugosus*.

O O Petiole continuous, not geniculate-thickened at apex,

3labrous. Pntamen long recurved-aculeate,, *E.gmndijlonis*

Putamen lacunose-tuborclcd ; leaves blunt, very thick coriaceous, glabrous, . *E. UttoraUs*.

Sulg. 2. *Elaocarpi veri*. Authors blunt, or the longer valve sliarply produced; flowers small; petals glabrous.

f Putamen even and usually slightly rimose, or obsoletely wrinkled, Calyx and pedicels glabrous.

Leaves glabrous, blistered-speckled and opaque; petioles long, thickened at the summit; anthers boarded,, *J.B.jfori&undu9*,

Leaves glabrous, opaque, acuminate; petiole not geniculate-thickened, .., 1\$. *lamcemfolita*.

Leaves glabrous, blunt or rounded at apex; petioles short but slender, not thickened; anthers naked\ drupes unknown,, 22. *hygrophilus*.

f f Putamen wrinkled or tubercled. Calyx and pedicels puberulous.

Y, Petioles not geniculate-thickeuetl at apex.

Leaves and petioles glabrous ; style long, exerted ; the longer anther-cell acute ; drupe^s
 globular, *...f. O^{anitrut}8,*
 Leaves beneath along the nerves and the short petioles densely puberulous ; style short^t
 anther-cells equal, blunt ; drupes oblong, *E- lacunosus.*

X X Petioles thickened at summit.

Leaves beneath and the rather short petioles densely puberulous, .. *E. Wallichⁿi*
 Leaves and the long petioles glabrous ; drupes oblong, *...# rootisw^s*
 All parts densely and shortly pubescent ; drupe globular, *...E- st'qndariS'*

1. *E. GRIFFITHII*, Kurz in Journ. As. Soc. Beng. * 1870. 68 ; Hi. Ind. Fl. I. 408. (*Monoceras trichanthera*, Griff. Not. Dicot. 518. t. 619. f. 2).

HAB. Tenasserim, Mergui, in shrubberies (Griff.). Fl. Dec. Jan.

2. *E. PETIOLATUS*, (*Monocera petiolata*, Jack. Mai. Misc. in Hook. Bot. Misc. II. 86 ; *E. Integra*, Wall. Cat. 2GG8 ; Hf. Ind. Fl. I. 408 ; *E. ovalis*, Miq. in Suppl. Fl. Sum. 406).

HAB. Tenasserim (Helf. teste Masters).

3. *E. BRACTEATUS*, Kurz in Journ. As. Soc. 1871. 48 ; Hf. Ind. Fl. I. 406).

HAB. Tenasserim, in tropical forests of Thoungyeen (Brandis) ; Moulmein (Falconer). Fl. March, Apr.

4. *E. simplex*', Kurz MS.

HAB. Tenasserim (Griff. 701).

Evidently nearly allied to *E. aristatus*, *l'oxb.* but differing in the shape[#] of the leaves and the glabrous racemes. The flowers conform to those of the preceding species. Griffith's specimens from E. Bengal (No. 7C₂) differ only by a puberulous inflorescence and may also belong here.

5. *E. GRANDIFLORUS*, Smith in Kees Cycl. No. 5. (*Monoceras lur^{*}ceolatum*, Hassk. Cat*. Bog. 208 ; Miq. Fl. Ind. Bat. 1/2. 212 ; *Monocera grandijiora*, Hook. Bot. Mag. t. 4680 ; *E. lanceolatus*, Bl. Bydr. 129).

HAB. Martaban, not rare along the banks of rivers in Toukyeghat District E. of Tounghoo.

6. *E. GRANDIFOLIUS*, Kurz in Journ. As. Soc. Beng. 1872, 294.

HAB. Frequent in the tropical forests of the eastern slopes of the Pegu Yomah and Martaban down to Tenasserim. Fr. Febr. March.

7. *E. RUGOSA*, Eoxb. Fl. Ind. II. 59G ; Wall. Cat. 2658. A. C. ; Hf. Ind. Fl. I. 405. (*Monocera rugosa*, Wight 111. I. 83 and Ic. t. 61).

HAB. Frequent in the tropical forests, especially along choungs, of the eastern slopes of the Pegu Yomah and Martaban. Fl. March, Apr.

Masters refers Wallich's *E. rugosus* to *E. tuberculatus*, Roxb. without giving his reasons for so doing.

8. *E. LITTORALIS*. T. and B, MS.

HAB. Tenasserim, Moulmein (Falconer). Fr. Febr.

iv^r. J3.—What I have from the Botanical Gardens, Buitenzorg, under

the name of *Monoceras obtusum*, Hassk. belongs to *E rugostis*. The Tenasserim plant (with which Griffith's No. 700 is identical) has very thick and obtuse leaves, and is in my opinion a distinct species. I have therefore retained the MS. name of Teysm. and Binnend. for the plant.

9. E. VARFNITA, Ham. ap. Hf. Ind. Fl. I. 407.

HAB. Chittagong (teste Masters).

Differs from *E. prunifolius*, Wall, solely by the silvery silk-hairy inflorescence and larger flowers.

10. E. FLORIBUNDUS, Bl. Bydr. 120; Miq. Fl. Ind. Bat. 1/2. 210; Hf. Ind. Fl. I. 401. (*E. serratus*, Koxb. Fl. Ind. II. 596).

HAB. Frequent in the tropical forests, along choungs, of the Martaban hills E. of Tounghoo down to Tenasserim; also Chittagong. Fl. Apr.

The species is easily recognised in a dried state by its peculiar blister-gd opaque leaves.

11. E. HYGROPHILUS, Kurz, MS.

HAB. Frequent in the swamp forests of the alluvial plains of Pegu and Martaban; also Upper Tenasserim (Falc.) Fl. Jan. March.

I looked for some time upon this species as a variety of *E. pjiotinicefolius*, but the habitat as well as the structure of the leaves are inconsistent with such a view. It is nearest to *E. lancecefolius*, Koxb., but differs by obtuse or rounded leaves and beardless anthers.

12. E. LANCEIFOLIUS, Koxb. Fl. Ind. II. 598; Hf. Ind. Fl. I. 402.

HAB. Tenasserim (teste Masters.)

13. E. GANITRUS, Koxb. Fl. Ind. II. 592; Hf. Ind. Fl. I. 400. (*Ganitrus splicericus*, Gsertn. fruct. II. 271. t. 139; Wight Ic. t. 56; *E. cyanocarpus*, Mast, in Hf. Ind. Fl. I. 406).

HAB. Chittagong.

14. E. LACUNOSUS, Wall. Cat. 6858.

HAB. Not unfrequent in the tropical forests and along choungs in the moister upper mixed forests of Pegu and Martaban down to Tenasserim. Fl. May, July; Fr. March, Apr.

15. E. WALLICHII, (*E. longifolius*, Wall. Cat. 6682; Hf. Ind. Fl. I. 409: non Bl.)

HAB. Not unfrequent in the Eng and low forests from Martaban (Toukyeghat) down to Upper Tenasserim; also base of Pegu Yomah; Ava (Wall.)

I have often met with the tree, but always without flowers or fruit. The leaves generally resemble *E. Ganitrus* but are puberulous all over or, in very old ones, only beneath along the nerves, and so are the petioles and branchlets. It appears to be a distinct species.

16. E. ROBUSTUS, Eoxb. Fl. Ind. II. 597; Wight Ic. t. 64; Hf. Ind. Fl. I. 402. (*E. Helferi*, Kurz And. Eep. ed. 2. 32. and Mast. in. Hf.

Ind. Fl. I. 402 E. sp. Griff. Not. Dieot. 517. t. 592. f. 2).

HAB. Frequent in the tropical forests of Martabau and Tenasserim; also Andamans; and Chittagong (teste Mast.) FL Apr. May; Fr. Aug.

2V. -B.—*E. cuneatus*, Wight, is noted by Masters as growing in Chittagong, Birma, and Tenasserim. I do not know the species. Possibly the Burmese localities refer to *E. lacunosus*, Wall.

17. E. STIPULARIS, Bl. Bydr. 121; Miq. Fl. Ind. Bat. 1/2 210; Hf. Ind. FL I. 404.

HAB. In tropical forests of Martaban and Tenasserim, up to 3000 feet elevation; also Rangoon District (Brandis). FL May.

Doubtful species.

1. E. LEPTOSTACITA, Wall. Cat. 2672; Hf. Ind. FL I. 403.

HAB. Tenasserim (Hef. teste Mast.).

Masters states that the species is very like *E. robustus* but that the anthers are bearded, while in *E. robustus* itself he tells us that the anthers are both bearded and beardless.

2. E. LITCIDUS, Mast. in. Hf. Ind. FL I. 403, non Eoxb.

HAB. Chittagong (Griff, teste Mast.).

Masters identifies his specimens with Roxburgh's plant, which the late Dr. Anderson had already recognised as an *Eupliorbiacea* and which is *Cleidion Javanicum*, BL I doubt the correctness of the habitat given for the reason that Griffith had never visited Chittagong.

I have not seen *E. oblongus*, Gsortn. from Moulmein.

LINEM

Conspectus of species.

Trih. I. EULINE2E. Petals twisted. Perfect stamens as many as petals. Capsule opening septeidally. Herbs or small shrubs.

1. HEINWAEDTIA. Calyx glabrous. Styles 3 or 4. Capsule 3-4-celled.

2. LINUM. Calyx glabrous or pubescent. Styles 5. Capsule 5-celled.

Trih. II. ERYTHROXYLJE2E. Petals usually imbricate, rarely twisted, with a basal scale inside. Perfect stamens twice as many as petals. Fruit a drupe. Shrubs or trees.

3. ERYTHROXYLON. Petals with a double basal scale inside. Pedicels 1-flowered, axillary.

Reinwardtia, Dum.

1. R. INDICA, Dum. Comm. Bot. 1822. 19. (*R. trigyna*, Planch, in Hook. Journ. of Bot. VII. 522; Hf. Ind. FL I. 412.; *Linum trigynum*, lioxb. Fl. Ind. II. 3832. 110; Bot. Mag. t. 1100; Sm. Exot. Bot. 31. t. 17; *Linum repens*, Don. Prod. Nep. 1826. 217).

HAB. Martaban, Karen country (Riley); Chittagong.

Erythroxyton, L.

Conspectus of species.

§ 1. *Erythroxyton*. Styles free from the base.

Leaves oblong lanceolate, shortly acuminate glaucescent beneath; pedicels about ½ in. long, ... it *E. Kunthianum*.

§ 2. *Setliia*. Styles united for about 1 of their length.

Leaves obovate or oblong, blunt; pedicels usually 3 lin. long, rarely longer,

...JB. *monogynum*.

Leaves broadly obovate or oblong, retuse; pedicels short, *E. cuneatum*.

1. *E. KUNTHIANUM*, Kurz in Journ. As. Soc. Beng. 1872. 294; Hf. Ind. Fl. I. 414. (*Sethia ? Kunthiana*, Wall. Cat. 6849, nomen chartaceum).

HAB. Not unfrequent in the drier hill-forests, especially the stunted ones, on the Martaban hills E. of Tounghoo, at 5000 to 7200 ft. elevation; also Tenasserim, top of Thoungjeen hills, (Parish). Fl. March.

2. *E. MONOGYNUM*, Koxb. Corom. PI. I. t. 88. and PI. Ind. II. 449; Hf. Ind. Fl. I. 414. (*JE. Indicum*, Bedd. Fl. Sylv. Madr. t. 81; *Sethia Inlica*, DC. Prod. I. 576; Wight 111. t. 48).

HAB. Pegu (accord. Dr. Mason).

3. *E. CUNEATUM*, (*TJrostigma ? cuneatum*, Miq. in Hook. Loud. Journ. VI. 585; i?. *Buvmannicum*, Griff. Not. Dicot. 468. t. 581. f. 3.; Hf. Ind. Fl. I. 414).

HAB. Tenasserim, from Moulmein (Falconer, Wall.) down to Mergui, along the coast of Madamaca (Griff.). Fl. Apr.

MALPIGHIACEJE.

Conspectus of genera.

Trib. I. MALPIGHIACEJE. Carpels never winged, free or united into a fleshy or drupaceous 1- to 3-celled fruit. Usually erect shrubs, with usually opposite leaves and connate stipules.

1. MALPIGHIA. Calyx 6-10-glandular. Filaments at base glabrous. Ovary entire, 2-3-celled, styles terminal and free. Drupes containing 3 or fewer crested nuts.

Trib. II. HIMJEJE. Samaras 1-3, obliquely accumbent to a short pyramidal torus, or the carpels united into a winged indehiscent capsule. Woody climber or rarely erect shrubs or trees, the stipules minute or wanting.

* Stamens definite, usually 10, all perfect.

O Style 1, rarely 2.

2. HIPTAGE. Calyx with a single large gland adnate to the pedicel. Carpels 3-winged. Trees or woody-climbers.

O O Styles 3. Calyx without glands.

3. ASPIDOPTEEYS. Petals not clawed. Stigmas capitellate. Samaras broadly winged all round. Woody climbers.

* # Stamens numerous. Styles 3, consolidated. Calyx minute, without glands.

4. PLAGIOPTERON. Capsules indehiscent, 3-i-winged as in *Hiptage*. Petals re-
• flexed. Woody climbers.

Malpighia, L.

*1. *M. COCCIGERA*, L. sp. pi. 611. (*J/. cocci/era*, L. sp. pi. ed. Echb. II. 371 ; DC. Prod. I. 578 ; Walp. Rep. V. 152 ; Bot. Rag. t. 568. *M. heter anther a*, Wight 111. 138. t. 49).

HAB. Frequently cultivated, and sometimes domesticated in rubbishy places round villages in Chittagong. PL H. and R. S.; Fr. R. S.

Hiptage, Gsertn.

Conspectus of species,

Scandent diffuse shrub, branched almost from the base; leaves larger, more acute and greyish green; bark grey, *...S. Benghalensis.*

A lofty climber, the stem simple, cable-like, up to 100 ft. long; leaves smaller and broader, often bluntish apiculate, glabrous and glossy, dark-green; bark dark-brown, ... *...H. obtusifolia.*

A small tree; flowers often pale pink with the usual yellow basal blotch; capsule not ridged on top, the wings shorter and broader, obliquely truncate j bark dark-brown, *...K.candicans.*

1. *H. BENGHALENSIS*, {*Banisteria Benghialensis*, L. sp. pi. 356 ; *H. Madablota*, Gsertn. Fr. II. 109. t. 116. f. 4; Wight 111. t. 50; Hf. Ind. Fl. 1.418; *Gatrtnera racemosa*, Roxb. Corom. PL I. t. 18 and Fl. Ind. II. 368).

HAB. Not unfrequent in the dry and open, especially the Eng, forests of Prome and Martaban ; also Tenasserim, Moulmein. FL March, Apr ; Fr. Apr. May.

2. *H. obtusifolia*, DC. Prod. I. 583. (*Gcertnera obtusifolia*, Roxb. FL Ind. II. 369).

HAB. Rather rare in the tropical forests in the deep ravines of the Pegu Yomah. Also Ava, Khaliyen hills (J. Anderson) Fl. March.

It is difficult to give good characters for this species, but it is in my opinion certainly distinct.

3. *H. CANDICANS*, Hf. Ind. FL I. 419. (*H. arborea*, Kurz in Pegu Rep. and in Journ. As. Soc. Beng. 1873. 228).

HAB. Frequent in the dry and eng forests of the Prome District and there forming the upper dry forests. FL March ; Fr. March, Apr.

Aspidopterys, A. Juss.

Conspectus of species.

* Gynobase persistent after the fall of the samaras, conical, acute, exserted, surrounded by 3 smooth acute disk-lobes.

Leaves tomentose beneath, acuminate ; ovary hirsute j nucleus of samara with or without a crest, *... A., nutans.*

Leaves tomentose beneath, more or less glabrescent, apiculate; ovary quite glabrous; nucleus of samara with a crest, *... A. tomentosa.*

* Gynobase absent after the fall of the samaras or minute and shorter than the disk-lobes, the thick 3-lobed often cup-shaped disk usually wrinkled.

X Samara nearly as broad as long, with a vertical crest between the wings. All parts, also the ovary, quite glabrous; disk in fruit about 1 lin\ broad, ...*A. concava*. ± Leaves more or less puberulous along the nerves beneath; disk doubly smaller, hardly wrinkled, *A. Helferi*.

Y*. X Samara more than twice as long as broad, not crested.

•All parts glabrous; ovary hirsute, *A. Roxburghii*.
All parts hirsute; ovary glabrous, *A. hirsuta*.

1. *A. NITANS*, Hf Ind. Fl. L 421, non Juss. (*A. lanuginosa*, A. Juss. in Arch. Mus. Nat. Hist. III. 512; *Hircea nutans*, Roxb. Fl. Ind. II. 447, non Wall.).

HAB. Chittagong (Wall. 1057); Ava, Bhamo (J. Anderson). Fr. Jan.

2. *A. TOMENTOSA*, A. Juss. in Arch. Mus. Hist. Nat. III. 511; Walp. **Rep.** V. 299. (*Hircea tomentosa*, Bl. Bydr. 225).

HAB. Not unfrequent in the tropical forests of Martaban E. of Tounghoo; Ava, Khakyen hills (J. Anderson). Fl. March; Fr. May.

3. *A. CONCAVA*, A. Juss. in Arch. Mus. Hist. Nat. III. 509; Hf. Ind. Fl. I. 420.

HAB. Tenasserim, from Moulmein to Mergui. Fl. Fr. Apr.

4. *A. HELFEMANA*, Kurz MS.

HAB. Tenasserim, Moulmein district (Falc, Heif. No. 923.) Phanoë (Wall. No. 1057 not in Cat.) Fl. Febr.

Nearest to *A. concava*, from which it is distinguished by the different leaves and structure of the retuse-narrowed samara-wings, the smaller almost not wrinkled disk-lobes, etc.

5. *A. EOXBEGHIANA*, A. Juss. in Arch. Hist. Nat. III. 511; Hf. Ind. Fl. I. 420. (*Triopteris Indica*, Willd.; Koxb. Corom. Pl. II. 32. t. 160; *Hircea Indica*, Eoxb. Fl. Ind. II. 247).

HAB. Ava; (Tenasserim, Salween river, teste Hf.).

6. *A. HIRSUTA*, A. Juss. in Arch. Mus. Hist. Nat. III. 512. t. 17; Hf. Ind. Fl. I. 421. (*Hircea Mrsuta*, Wall. PL As. rar. I. 13. t. 13).

HAB. Ava, Taong-dong; Prome hills. (Wall.) Fl. Fr. Aug. Nov.

Doubtful species.

1. *A. ROTUNDIFOLIA*, A. Juss. in Arch. Mus. Hist. Nat. III. 514 j Walp. Rep, V. 299. (*Hircea rotundifolia*, Roxb. Fl. Ind. II. 448).

HAB. Chittagong (Roxb.) Fl. March, Apr.

Hooker refers this species to his *A. nutans*, but the description agrees better with *A. tomentosa*,

Plagiopteron, Griff.

1. **P.** STTAVEOLENS, Griff, in Macl. Calc. Journ. IV. 244. t. 13 ; Hf-Ind. PI. I. 399.

HAB. Tenasserim, Mergui (Griff. 679).

ZYGOPRYLLE[^]E.*Conspectus of genera.*

1. TEIBULUS. Stamens 10. Fruits dry, composed of 5-12 cocci, usually winged or spiny. Herbs with pinnate leaves.

Tribulus, L.*Conspectus of species.*

Flowers 1-2 in. in diameter, the peduncles as long or longer than the leaves, *T. cistoides*.
Flowers ½-½ in. in diameter, the peduncles shorter than the leaves, ...21 *lanuginosus*.

1. *T. cistoides*, L. sp.-pi. 554 ; Jacq. Hort. Schcenb. I. t. 103 ; Bot. Keg. t. 791 ; Hf. Ind. PI. I. 423.

HAB. Tenasserim, Mergui (teste Edgew. and Hf.).

2. *T. LAFUGINOSUS*, L. sp. pi. 553 ; Eoxb. Fl. Ind. II. 401 ; Wight Ic. t. 98. (*T. terrestris*, L. sp. pi. 554 ; Sibth. PL Grsoc. t. 372 ; Bclib. PL Germ. V. t. 161 ; Hf. Ind. PL 423).

HAB. Ava, apparently frequent in the Irrawaddi valley ; Promo District. PL March, Apr.

JST. B.—I am not sure whether *T. terrestris*, L. and *T. lanuginosus* are not really different species.

GEEAJSTIACE^uE.*Conspectus of genera.*

Trib. I GERANIE²E. Flowers regular or nearly so. Sepals imbricate. Glands alternating with the petals. Fertile stamens as many or 2 or 3 times as many as petals. Capsules dry, the valves elastically rolled upwards, or rarely indehiscent.

1. GEBANIITM. Perfect stamens 10, or rarely fewer. Ovary-cells 2-ovuled. Capsule dehiscent, beaked.

Trib. II. OXALIDE²E. Flowers regular. Sepals imbricate. Glands none. Stigmas capitate. Ovary-cells with 2 or more ovules.

Capsule dry or nearly so, dehiscent. Herbs.

2. OXALIS. Stamens 10. Capsule dehiscent loculicidally, the valves cohering with the axis. Leaves usually digitately compound.

3. BIOPHYTUM. Stamens 10. Capsule dehiscent loculicidally, the valves usually separating from the axis to the base. Leaves pinnate.

* # Berry fleshy, indehiscent. Shrubs or trees.

4. AVEKRHOA. Stamens 10, of which 5 often reduced to staminods. Styles distinct. Ovary-cells many-ovuled. Seeds arillate or without arillus. Trees with pinnate leaves.

Trib. III. BALSAMINJE²E. Flowers regular, Sepals usually coloured, the posticous spurred. Anthers almost connate.

5. IMPATIEKS. The lateral petals connate in pairs. Capsule elastically dehiscent.
6. HXDEOCEEA. All petals free. Drupes sappy, indehiscent.

Oxalis, L.

1. O. CORNICFLATA, L. sp. pi. 624; Roxb. Fl. Ind, II. 457 ; Wight Ic t. 18 ; Jacq. Oxal. t. 5 ; FL Dan. V. t. 873 and X. t. 1753 ; Engl. Bot. XXIV. t. 1726; Sibth. Fl. GKBC. t. 451; Sturm. Germ. Fl. I. t. 1; Rchb. Fl. Germ. V. t. 199; Hf. Ind. FL I. 436. (*O. pusilla*, Salisb. in Linn. Trans. II. 243; Eoxb. Fl. Ind. II. 457).

HAB. Frequent in rubbishy places, toungyas, garden-lands, along roadsides, etc., all over Burmah up to 3500 ft. elevation Fl. Fr. oo.

Biophytum, DO.

Conspectus of species.

Leaflets nearly straight, in 10-14 pairs; flowers larger; capsule usually much shorter than the calyx ; seeds obliquely transverse-furrowed,*...£. sensitiviwi.*
 Leaflets very unequal at base, in 12-25 pairs ; peduncles with a clubbed mass of bracts at apex,... ..*...g. adiantoides.*
 Leaflets equal, in 10-20 pairs ; flowers smaller; capsule almost as long as or a little longer than the sepals, small; slender herb,*...JB. Reinwardlii.*

1. B. SENSITIVUM, DC. Prod. I. 690; Wight 111. t. 62. f. 9; Hf. Ind. Fl. 436. (*Oxalis sensitiva*, L. sp. pi. 622 ; Eoxb. Fl. Ind. II. 457; Bot. Reg. XXXI. t. 68 ; Jacq. Oxal. t. 78 ; J3. *Candolleum*, Wight 111. t. 62).

HAB. Frequent in rubbishy places, on brick-laid paths, fields and toungyas, etc., all over Burma. FL May, June; Fr. R. S.

2. B. ABIANTOIDES, Wight ap. Hf. Ind. Fl. I. 437.

HAB, Tenasserim, Mergui (Griff.).

3. B. REINWARDTII, Walp. Rep. I. 476 ; Hf. Ind. FL I. 437.

HAB. Not unfrequent on poor and rocky soil in shrubberies and in the dry and open, especially the Eng, forests all over Burma from Chittagong and Ava down to Tenasserim. FL Apr. May.

Averrhoa, L.

Conspectus of species.

Fruits sharply angled; seed arillate,*...A. Carambola.*
 Fruits hluntish angular; seeds without arillus,*...A. jBilimbi.*

*1. A. CARAMBOLA, L. sp. pi. 613; Roxb. Fl. Ind. II. 450; Griff. Not. Dicot. 455. t. 540. f. 4; Bedd. Fl. Sylv. Madr. t. 39 ; Hf. Ind. Fl. I. 439.

HAB. Much cultivated in gardens all over the country. FL H. S. and R. S.; Fr. C. S.

*2. A. BILIMBI, L. sp. pi. 613 ; Roxb. FL Ind. II. 451; Bedd. FL Sylv. t. 117; Hf. Ind. FL I. 439.

ON THE ASIATIC SPECIES OF MOLOSSI.

By G. E. DOBSON, B. A., M. B., F. L. S.

(Read May 7th, 1873.)

The *Ifolossi* are found in all the warmer regions of the earth, but apparently exist in greatest abundance in the tropical and sub-tropical parts of America. They have been divided into several genera of which two only have hitherto been discovered in Asia; of these *Nyctinomus* is alone represented in the Peninsula of India; the other genus *Chiro?nele*§, containing a single species *C. torquatus*, inhabits the Malay Peninsula, Java, Sumatra, Borneo, and probably other islands of the Malay Archipelago.

Although *Nyctinomus* has a distribution equalled only by *Vespertilio*, extending through the warmer parts of the five great continents, a single species only, *Nyctinomus plicatus*, has been known to exist in the Indian Peninsula.

Another species of *Nyctinomus* has been reported from China by Mr. Swinhoe, most probably *N. Cestonii*, Savi, also from Southern Europe.

The total number of Asiatic species of *Molossi* known previous to 1873 was therefore three, and to these I added in January 1873 a new and most remarkable species, *N. Jolwrensis*, which Mr. Wood-Mason's private collector* obtained at Johore in the Malay Peninsula, and in this paper I shall describe another new species from India (preserved in the collection in the Indian Museum) which had been confounded with *N plicatus*.

Genus *NrcTiNonus*, Geoff. *Ears connivent*.

^ 2 1-1 2-2 3-3

Dentition.—in. ~~4~~ c. ~~1-1~~ p. m. ~~2-2~~ m. ~~3-3~~.

a. Ears close together in front, their inner margins having a common point of origin on the forehead; iragus expanded and rounded off above. (Subgenus, *Dinops*).

NTOTINOMUS CESTONIT.

Dinops Cestonii, Savi, Bull. de Sc. Nat., VIII, p. 286.

Dysopes Cestonii, Wagner, Suppl. Sfeber Säugeth., V, p. 702.

Nyctinomus insignis, Blyth, Cat. Mamm. Mus. Asiat. Soc. Beng.

? *Dysopes (Molossus) Riippelii*, Swinhoe, Proc. Zool. Soc. Lond., 1870, p. 619.

A specimen in the Indian Museum labelled by Blyth "*Nyctinomus insignis*, Blyth" sent by Mr. Swinhoe from Amoy, undoubtedly belongs to this species. It is an adult male agreeing in every respect with specimens from Southern Europe, Jiaving also the peculiar throat pore concealed by the long hair of the neck. I have no doubt that the specimen obtained also at

* I have since ascertained that the specimen alluded to by the author was captured by my valued correspondent Mr. James Meldrum of Johore. J. W-M. [Editor].

Amoy by Mr. Swinhoe and referred to by him under the name of *Dysopes Hüppelii* belongs to this species also.

This adds another species to the large number of *Ghiroptera* known to be common to Europe and Asia.

NYCTINOMITS TRAGATUS, n. sp.

The shape of the tragus is similar to that of *N. Cestonii*, and has the same relative size; ears like those of *JV. plicatus* but not connected by a band in front; wing-membrane from the ankles; calcaneum distinct, terminating in a lobe; free portion of the tail shorter than in *N. plicatus*.

This species, though so very well distinguished from *iv. plicatus* by the above-mentioned characters, resembles that species very closely in general aspect, and the measurements of the different parts correspond so closely that on a superficial examination it may be confounded with it.

I found, in a bottle in the Indian Museum which had been labelled *iv. plicatus* by Blyth, two specimens, of which one only was referable to that species, the other presented the characters enumerated above and so has formed the type for my new species. The Indian Museum has since received other specimens of *N. tragatus* from Rajanpur on the north-western frontier of India, and from Jashpur near Chutia Nagpur.

b. JEars conjoined at the base of their inner margins; tragus very small, quadrate. (Subgenus, *Dysopes*).

NYCTINOMUS PLICATUS.

Vespertilio plicatus, Buchanan, Trans. Linn. Soc, 1800, Vol. V, p. 261.

Nyctinomus Bengalensis, Geoff., Desc. de l'Egypte, II, p. 130.

Nyctinomus tennis, Horsf., Zool. Researches in Java. •

Mops Indicus, F. Cuvier, Dents des Maininif., p. 49.

Dysopes plicatus, Temni., Monog. de Mammal., Vol. 1, p. 223.

I have examined Buchanan's type of this species from General Hardwicke's collection in the British Museum, also specimens of *iv. tennis*, Horsfd. from Java. The only perceptible difference consists in the attachment of the wing-membrane. In *iv. plicatus* although a strong rap hé passes from the ankle along the tibia to the margin of the wing-membrane yet the latter can only be said to commence from a point nearly midway between the ankle and the knee joints, while in *JST. tenuis* the wing has its origin from the ankle joint or very close to it. It would be necessary before separating the Indian and Javanese forms into distinct species to examine a large series of specimens as it is probable that intermediate examples exist.

To this section, distinguished by the very small tragus, and by the connection of the ears in front by a low band, belongs also *iv. JEgyptiacus* from Africa.

forest. Dead shells may be sometimes seen in hundreds in the clearings after the cut jungle has been fired, when all the surface vegetable mould is burnt and the ground deeply heated; in this way many local forms of landshells are destroyed off large areas as the country becomes cleared, and many of the more local species no doubt have thus died out.

ALYCJETS INFLATTTS, n. sp., Plate III, Fig. 1.

Shell depressedly turbinate, solid, pale ochreous horny, moderately umbilicated, smooth, finely sculptured on the swollen portion of the last whorl adjacent to the sutural tube. Spire conoid, apex blunt; suture impressed. "Whorls 4J, the last very much swollen for the size of the shell. Constriction smooth, very short. Sutural tube moderate. Aperture oblique, circular; peristome double, solid, united, and reflected. Operculum concave, black, its position far forward at the very *edge* of the aperture.

Dimensions, major diam. 0.28"—0.16," minor diam. 0.19"—0*13," alt. 0.15—0.11," diam. ap. 0.07."

Habitat.—I first noticed this shell in the collection of Mr. F. Stoliczka, who kindly allowed me to take it for figuring; it had been found in Assam, but its exact locality was unknown. In the winter of 1872-73 I was fortunate to find it myself in the Naga Hills under Japvo Peak and again at Yémi, Phúnggum, and Gaziphimi at the head of the Lanier River on the main water-shed. *

This shell in many respects assimilates to *A. conicus*, mihi, but is more openly umbilicated; in another direction it has the character of the sub-genus *Dioryoc* viz. in form of mouth, the short constriction, and position of operculum close to the edge of the aperture.

ALYCJEUS STKIGATirs, n. sp., Plate III, Fig. 2.

Shell pale corneous or amber, finely and evenly costuated throughout. Spire depressed, apex blunt and darker coloured. Suture moderate. Whorls *Si*, the last very little swollen, slightly constricted, with a single low ridge close behind the aperture, the constriction smooth and very finely striated. Sutural tube very short. Aperture slightly oblique, circular; peristome single, simple, continuous, moderately thickened. Operculum... ..?

Habitat.—Assam in collection Ferd. Stoliczka.

Major diam. 0*15⁷ minor diam. 0.11," alt. 0.08," diam. ap. 0.06,".

This is another species of the short-sutural-tubed section of *Ah'cceus*, of which *A. Khasiacus* (vide PL III, Fig. 4, J. A. S. Bengal, Vol. XL, Pt. II, 1871) is a good type. The general and distinct copulation from constriction to apex, particularly the form of constriction and mouth, mark it as a good species. It is more openly umbilicated than *A. Khasiacus*.

I have an *Alycceus* from Darjeeling, found by Mr. F. Stoliczka, but as I possess but a single much worn specimen, I hesitate to describe it more fully: it is very similar to *A. Theobaldi*, Bs. from the Khási Hills, but is smaller with a more expanded aperture; peristome less thickened, and the sculpture appears to have been very fine; I name it *A. lenticulus*, and trust some day to get other specimens. Dimensions, major diam. 0.14," minor diam. 0.11," alt. 0.08"

ALYCCEUS STOLICZKII, n. sp., Pl. III. Fig. 3.

Shell globose turbinate, thick, pale horny, finely and closely ribbed from the swell of the first whorl as far back as the end of the sutural tube, thence to the apex distantly and finely costulated; narrowly umbilicated, spire conoid; apex blunt; suture well impressed. Whorls 4J, rounded, the last swollen, then sharply constricted close to the origin of the sutural tube, again swelling and expanding to the mouth. Constriction smooth with a few distant lines of costulation. The sutural tube peculiarly long. Aperture oblique, circular; peristome double, outer lip small, the inner much produced and expanded into 2 broad shallow channels on the inside of the outer margin separated by a Y-shaped thickening of the same (see Fig. 3^b). Operculum black, concave, of the usual multi-spiral form.

Major diam. 0.31"—C'28," minor diam. 0.24"—0.20," alt. 0.17"—0.15," diam. ap. 0.12," sutural tube 0.15."

Habitat.—Two specimens were obtained for me by Mr. Belletty on Angaoluo Peak, Nágá Hills at 7,000 feet, during field season of 1872-73. I found it again further to the east at Kezakenomih, and at the head of the Lanier River at about 5,000 feet w[^]pre the specimens were much larger. It comes near to the forms of *A. Ingrami*, W. Blf. var. (Pl. IV and V, J. A. S. Beñgal, Vol. XL, Pt. II, 1871) from the same range of mountains, but its tumid shape, and particularly the very produced aperture, render it a very distinct and well marked species. I have named it after that very accomplished conchologist F. Stoliczka* of the Geological Survey of India.

ALYCIEUS GLOBULUS, n. sp., Pl. III. Fig. 4.

Shell moderately umbilicated, globose turbinate, white, finely costulated on the swell of the first whorl, becoming gradually smooth thence to the apex. Spire conoid, apex flat and rounded. Whorls 4J, flat, the last mo-

* Since this paper was written, the sad news has reached us that this highly gifted naturalist—to whom all readers of this Journal and I personally owe so deep a debt of gratitude, and who to many of us was a dear and cherished friend—had succumbed to the exposure when in Yarkund and on his return journey to Leh. It may be truly said of Stoliczka that he gave his life to the very last, and died nobly in the pursuit of Science.

derately swollen, then sharply constricted and again enlarged by a ridge, from which emanate four minor longitudinal ridges on the expanded portion of the peristome. Constriction narrow, close to sutural tube, this is moderate in length and about equal to the distance of its base to lip. Aperture much expanded, oblique, round, angulate above, waved on outer margin^{anc} channelled within; the outer lip of peristome thin, slightly recurved on the inner lower margin. Operculum black, multi-spiral, concave.

Major diam. 0.20," minor diam. 0.16," alt. 0.1-V'

Habitat.—Phunggum, a Naga village at head of the Lanier valley, at 5,000 feet, where it is abundant.

It is near the *crispatus* form described in my last paper. Its large globose form, long sutural tube, and more open umbilicus, mark it as distinct.

ALYCJETTS BICREISTATUS, n. Sp., PL III, Fig. 5.

Shell moderately umbilicated, sub-turbinate, pale corneous or nearly white, fine close ribbing on swell of last whorl, extending to behind the termination of the sutural tube and thence to apex very finely and evenly costulated. Spire depressedly conoid, suture impressed, apex blunt. Whorls $\frac{9}{10}$ the last moderately swollen, constriction rather wide, followed by a single well defined high ridge close behind the expanded portion of the aperture where it is defined by a sharp narrow costulate rib. The expanded portion anterior to this is longitudinally waved on surface, produced by two deep triangular grooves situated well within the aperture and on outer margin. Sutural tube short. Aperture oblique; peristome round, slightly angular above. Operculum, pale horny, concave.

Major diam. 0.14," minor diam. 0.06," alt. 0.09," sutural tube 0.42."

Habitat.—Kopamedza Peak Naga Hill, 8—9,000 feet, in forest.

This shell belongs to the same group as the last and is very close to *A* crenatus*, mihi (vide plate III, fig. 5, J. A. S. 13., Pt. II, 1871), but the longer sutural tube and the strongly crenated peristome of *crenatus* mark the distinction.

ALYCJETTS SEBBATUS, n. sp., PL III, Fig. 6.

Shell very closely umbilicated, turbinate, rather thin, pale corneous or dark brown, finely costulated on tumid portion of last whorl, rest of shell smooth with shining surface, suture moderately impressed. Spire conoid, apex pointed. Whorls 4, rounded, the last very slightly tumid, constricted and enlarged into a low recurved ridge. Sutural tube moderate. Aperture sub-vertical, circular, very finely notched on lower and outer margin; peristome double, thick, the outer reflected on the inner margin. Operculum thin, pale horny, flat in front.

Major diam. 0* 10," minor diam. 0*09," alt. 0-09," sutural tube 0*75/'

Habitat.—Laisen Trigl. station, Manipur Hills; rare, some eight specimens only having been found.

In the thickened rounded form of the peristome this species assimilates to *A. co?iicus*, but the minute notches on the inner margin are peculiar and unlike what is seen in any form I am acquainted with. It seems intermediate between the above and *A. diagonius*.

ALYCEIUS MULTIRUGOSUS, n. Sp., Pl. III, Fig. 7.

Shell depressedly sub-turbinate, rather openly umbilicated, translucent, pale corneous, smooth glistening surface", very minute ribbing near sutural tube. Spire flatly conoid; whorls 4, flat, the last very little swollen, constricted and enlarged again towards the aperture into a zigzag-shaped ridge or what might be described as three parallel and connected ridges. Sutural tube short. Aperture oblique, circular; peristome double, both continuous and the outer slightly reflected. Operculum?

Major diam. 0'12," minor diam. 0-08," alt. 0'08," sutural tube 0.037/'

Habitat.—Hills at head of the Lanier River, Naga Hills, about 5—6,000 feet, rare.

A close ally of *A. Khasiacus*, mihi, but a much smaller shell; the many ridged area near constriction, however, is a wide departure from that form. A large var. of *A. Khasiacus* occurred at Gaziphima and, as an instance of local variability in this genus, a few of the specimens have a slight tendency to a fimbriated peristome as in *A. crenatus*, mihi.

ALYCEIUS (DIOEYX) GBAPHICUS, WJBlf., var. MIJS^TOE, PL III, Fig. 8.

This shell is much smaller than *graphicus* from the Khasi Hills, &c, and is longer in spire with close costulation throughout.

The differences though persistent in Naga Hill specimens are not sufficient to make the form distinct.

Major diam. 0'10," alt. 0-12."

ALYCEIUS BUETII, n. sp., Plate III, Fig. 9.

Shell turbinate, openly umbilicated, thick, pale ochreous; shallow but well marked ribbing on swell of last whorl and finely costulated on the apex. Spire conoid, apex sharp, suture well impressed. Whorls 5, the last moderately swollen, constriction very slight, short, and smooth up to the peristome, sutural tube moderate, rather large at base. Aperture oblique, laterally oval, angular on inner upper margin, with 4 well marked notches on the outer margin; peristome thickened, double, well reflected, inner lip continuous.

Major diam. 0'22," minor diam. 0-19/' alt. 0'15."

Habitat.—Foot of the Bhutan Himalaya at the debouchement of the Barowli River, Assam •, collected by Mr. J. Burt, to whom my thanks are due for this and some other interesting shells.

It is "close to *A. polygonoma*, but the form of constriction is slightly different, the peristome is well crenulated, and the sculpture stronger. At Kamakia hill near Gowhatty, I obtained specimens of an *Alycceus* still nearer in form to *polygonoma*, only that the sutural tube is but about half the length, ending abruptly, while in *polygonoma* it is long and thread-like. I shall describe it in my next paper.

A. crenatus was found as far east as Shiroifurar, also at Kezakenomih and Yémai.

A. Ingrami, var. is the commonest form in the Naga Hills and has a great range in altitude, being found at Dimapur in the Dunsiri valley at 800 feet and as high as 7,000 feet at Kliúinho Peak on the Burrail range, also at Laisen Hill and Sikhámi, and on the east side of the Munipur valley on the slopes of Nongmaiching and Múngching.

A. Nagaensis I have from Kezakenomih, Kopamedza, Provvi, Laisen, and Non[^]maichinsr.

A. Khasiacus occurred as far east as Kopamedza Peak, where it was associated with the nearly allied form above described, *A. multirugosus*.

A. urnula, Bens, is a very abundant shell all along the Burrail range, it retains the type form more persistently than any species of the genus known to me. Very fine large specimens were collected at Kezakenomih, Naga Hills; dimensions, alt. 0'20," diam. 0*20".

A. diagonius and *A. crispatus*,*^l found again in the Dunsiri valley, Dimapur, and lower spurs of the eastern Burrail.

A. prosectus, Bens., so common in the Khasi Hills, is very rare in the eastern Naga Hills and I procured 2 or 3 specimens only; these shew a transition, for they are not quite identical with the type form from Teria Ghat.

Explanation of Plate III,

- Fig. 1, la, lb, \c, Id, Alycceus inflatus.**
 Fig. 2, 2a, 2b, „ *strigatus.*
 Fig. 3, 3a, 3*, „ *Stoliczki*
 Fig. 4, 4a, 4b, „ *globulus.*
 Fig. 5, 5a, 5b, „ *bicrenatus.*
 Fig. 6, 6a, 6b, „ *serratus.*
 Fig. 7, 7a, „ *multirugosus.*
 Fig. 8, 8a, „ *(Diopyx) graphicus, var. minor.*
 Fig. 9, 9a, „ *Burtii.*
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FOURTH LIST OF BIRDS PRINCIPALLY FROM THE NAGA HILLS AND MUNIPUR,
INCLUDING OTHERS FROM THE KIIASI, GRALO, AND TIPPEEAI HILLS.—
*By Major H. H. GODWIN-AUSTEN, F. B. G. S., F. Z. S., &c, Deputy
Superintendent, Topographical Survey of India.*

(With Plates IV—X).

(Road May 6th, 1874).

In adverting to the hope expressed in my former papers, that the lists of birds from the N. E. frontier might be added to by members of the Survey Party ; I have to thank several members of it for the aid they afforded, and especially are my thanks due to Mr. Win. Robert, who was working during the field season of 1872-73 in the Garo Hills.

I must remind all connected with these survey operations that as they penetrate to the eastward, no finer field for ornithological research can be now found in India, as is shewn by the many beautiful new forms, that I was fortunate enough to obtain during *my* visit to the Naga Hills and Munipur in the winter of 1872-73. Ten of these have been described by me in the P. Z. S., one in the 'Annals and Magazine' of Natural History, and Mr. Gould has described one in the 'Birds of Asia.' I have introduced these descriptions again to render the paper of more use to ornithologists in India, into whose hands it is likely to fall.

This fourth list contains 112 species, which with 380 before recorded brings the number collected up to 492*.

I have adhered to my former resolve not to bring into the list any bird which has not been actually bagged, the record of species seen on the wing, especially of the smaller duller birds, not being of any real value. Thus some very common forms are still absent. A few corrections have to be made in my former lists and some further detail is necessary regarding two or three birds that were brought into List No. 3, which was prepared somewhat hastily. I supply figures of seven of the new species, which will go some way, I trust, towards counterbalancing the imperfections which the paper may contain.

In the determination of the species, I have received very cordial assistance from Lord Walden, whose fine collection from British India and Malaya aided most materially. In expressing thanks for assistance afforded, I must also include the name of Mr. R. B. Sharpe, in charge of the ornithological branch at the British Museum, who was always ready to place his time and the collection at my disposal.

20.* HIERAX EUTOLMOS, Hodg.

Garó Hills. Appears never to be a common bird anywhere. I received two skins from the above hills, where it was obtained by Mr. Wm. Robert. I never saw it on the east of the Khasi Hills, where it appears to be replaced by *H. melanoleucos*, Blyth. Their habits are Shrike-like; they sit on isolated dead trees in the forest clearings and sally off from time to time to seize some insect.

37. LIMNAETUS KIENIEEII, De Sparre.

This rare and handsome Hawk Eagle was obtained for me by Mr. W. Robert of the Topographical Survey in the Naga Hills during the cold season.

Length of wing 15*75/ tail 10/ tarsus 395," bill from gape 1'5." There is a fine specimen set up in the British Museum. Rare everywhere it appears to have a great range.

56a. MILYUS MELANOTIS, Tern, and Scilil.

I obtained this species in February in the Manipur valley; but it was not numerous.

80. GLATTCIDIUM BHODLZEI, Burton.

Naga Hills. This bird is not common in these hills; its monotonous call at night is not so often heard as about Mussoorie in the N. W. Provinces.

82a. HIRUXDO CAIIIJUCA, Sav. = HIRUKDO TrTLERi, Jerdon.

My specimens from Manipur are evidently identical with Jerdon's bird. observed at Dacca in June, it was the only form in Manipur in February and March, and very numerous at Imphal the capital; it was then commencing to breed. Darjeeling specimens in the collection of Lord Walden are still more like *Cahirica* from Egypt.

fW. 4-6,* T. 3-4, t". 0.4," Bf. 0'3."

Hirundo futturalis, Scop, is the form I obtained in the Naga Hills at about 5000 feet in January and February, and recorded from the Khasi Hills as *rustica* in my first list. Specimen from Naga Hills measures, W. 4-5," T. 4-3," t. 0*45," Bf. 0 3/' At Shillong I did not notice them in any number until about July.

* The numbers refer to those in "Jerdon's Birds of India."

f Throughout this paper L. stands for Length, \V. Wing, T. tail, t. tarsus, Bf. bill at front, Bg. bill at gape.

100a. CTPSELUS SUBFUECATUS, Blyth.

This is, I think, the first record of the occurrence of this species within the Indian area. I observed a few pairs in June breeding in the cliffs that overhang the falls of the "Umkrau" at Shillong. They were not easy to obtain, and the first I shot fell into grass so far down that it was never found; however, a day or two after I secured one, and after this they soon left the place. I could not get at the nests. My specimen agrees with those from Amoy and Malacca in Lord Wai den's collection.

Wing, 5½" t 0-5' bf. 0-23." It will probably be found in all similar deep valleys with precipitous sides that occur in the Khási hills.

108a. CAPEIMULGUS JOTAKA, \$, Schlegel.

I shot this bird near the Umshirpi falls on the 29th May. It got up off the path and immediately settled again about 10 yards off on the open path, on again putting it up it did the same. Captain Badgley, who was walking behind me, called out that he had found the eggs. I then put the bird up a third time and brought her down. The eggs were laid close in under the rock on side of the path lying on the bare ground with no signs of any thing in the way of preparation for them or the young. The two eggs are of a dull white, blotched with three shades of umber and one shade of ashy brown: in the one they are distributed pretty evenly throughout and this is symmetrical in form, the minor axis being in the centre of the length: in the other the markings are mostly confined to the larger end and the shape is rounder:

1st.	major axis	1*22,	minor axis	0*88.*
2nd.	„	1-15y"	»	001."

Another ? was obtained by me near the village of Sopvomah in the Naga Hills, in January, at an elevation of 5000 feet, which, Lord Walden tells me, is identical with Japanese and Burmese individuals.

Caprimulgus is a common bird at Shillong during May and part of June, after which I did not hear their chukking noise so often, and at the time I started for Calcutta in August, they had apparently left the vicinity of the station owing probably to the increased rain-fall.

114. CAPBIMULGUS MONTICOLUS, Franklin.

From the Garo Hills.

W. 7-55," T. 4-85," t. 0' 83/'

122. NYCTIOENIS ATHEETONI, Jard. and Selby.

Garo and Naga Hills.

126. EUKYSTOMUS OEIENTALIS, Lin.

This beautiful Boiler is essentially a forest bird and was seen on several occasions on the Dunsiri. They frequented the trees that surround the large tanks at Dimapur, and I shot my specimens there.

140. HOIRAIUS BICOENIS, Lin.

Several fine specimens were brought in by Captain Badgley and Mr. Chennell from the Tipperah Hills. In the Naga Hills I observed four large Hornbills, which I believe were this species, near Tellizo Peak, in January,—the only Hornbills seen in that part of the hills, no fruit then being ripe. In the low Dunsiri forest, at that season of the year, Hornbills are very numerous.

The, Tipperah birds were very fine, their dimensions greatly exceeding those given in Jerdon's 'Birds of India'; the largest measured as follows:

Wing 21·5" tail 19·0, tarsus, 3·0"

Length of bill along commissure to gape, 12·0"

Bill in a straight line from point to gape, 10·75"

Length of bill over culmen to posterior of casque, 16·5"

Depth of bill at centre of casque (highest part), 4·5"

Length of casque, 7·0"

Breadth of casque at base, 3·68"

Orange pink above, pinkish yellow on side of upper mandible and very red at the point; the lower is wax-yellow.

156. PICUS CATHPHAKIUS, Hodgson.

One specimen was got in the Naga Hills in the rather open country near Sikhami.

S Description. Upper parts pure black. Primary coverts tipped white secondary wholly white, forming a very large wing patch. The white spots on both webs of the alars are arranged thus :

Primaries.	1st	2nd	3rd	4th	5th	6th	all the rest.
Inner web.	2	3	3	4	4	4	4
Outer web.	15		6	6	6	5	4
			v—————KI—————)				
			tipped white				

Tail coloured diagonally buff on 3 outer tail feathers, which have a subterminal black spot, and the two outer either with a narrow black bar or two spots.—Both above and below the eye pure white, buffish on the ear-coverts and frontal band; white at base of lower mandible, becoming buff on lower throat, and pale ochre on breast and abdomen, much streaked with

black particularly so on former. A black band from base of lower mandible, down side of neck, fading into the streaks of the upper breast. Occiput and side of neck crimson extending rotfnd behind ear-coverts and crossing the black line from the gape forming a gorget in front. Under tail-coverts pale crimson.

It is called " Khupi woi ru" by the Anghámi Nágás.

161. HYPOPICUS HYPEEYTHEUS, Vigors.

Naga Hills.

Wing black, the primary coverts tipped white and the primaries spotted on outer-web. Tail black, two outer feathers barred black at tip, the antepenultimate tipped brown and with a single white spot. Bill pale yellow beneath.

168. MÚLLEEIPICUS PULVEETJLENTUS, Temm.

Mr. Wm. Itobert sent me this large form from the Garo Hills.
Bill greenish grey, lower mandible pale at tip.

176. YENILIA PYEEHOTIS, Hodgs.

Naga Hills.

177. GECINULUS GEANTIA, McClelland.

S and ? from Garo Hills.

The female wants the dull crimson on fore part of head and there is less yellow in the dull green of head and neck, the former in front is dull ochraceous.

201. CUCULUS POLTOCEPHALUS, Latham.

This bird was *very* abundant at Shillong in the early summer months, and I obtained it in every phase of coloration from the intense rufous to the pure ashy. The peculiar loud call is heard all over the Pine forests and I observed that sometimes the bird when perching sat along the branch, after the manner of *Gapriniilgus*.

205. HIEEOCOCCYX VAEIUS, Vall.

Garo Hills.

211^ . CIEYSOCOCCYX XANTHOEITYNCHOS, Horsfd.

This lovely bird from Hill Tippe^ah was obtained there by Mr. Eoss Mangles, by whom it was given to me.

212. COCCYTES MELANOLEUCOS, Gmel.

Was rather a common bird at Shillong in June. I have often witnessed the noisy way in which the males chase the female and Blyth's description is *vary* true; a female measured—

L. 12 6/ W. 5-9," T. 7*25/' t. 115," Bf 08;" irides very dark brown, legs pale plumbeous. The contents of the stomach of this bird were 3 of the large hairy caterpillars (3j- inches long) so common on the grass-lands in the Khasi Hills. This female had at least 10 eggs in dvary, which presented no very great difference of gradation in size. The cseca were 0*95" in length, intestine H'5."

213. COCCTSTES COEOMANDUS, Lin.

I have received this bird from the Garo Hills and from Hill Tipperah.

227. iExnoPYGA GOULDIJE, Vigors.

8 obtained at Mezimih, Naga Hills, at head of the Lanier lliiver, at 6000 feet. L. 5*8/' W. 2*08," T. 3*18, t. 0-55/' Bf 058." It has a steel blue spot below the ear-coverts not noticed by Jerdon. The crimson extends over the eye as a supercilium and the lores are black.

228. iETHOPYGA IGNICAUDA, Hodg.

This was rather a common bird in the Naga Hills at 5000 feet in January ; generally seen in vicinity of the villages, in its winter dress. In my specimen the breast is not dashed with red at all, being quite plain orange yellow towards abdomen, and the female has no red about her at all. My female specimen has a slight trace of red just appearing on the feathers of the nape and back of neck. I fancy they ascend to breed about 9000 feet. *Saturata* was common at that altitude in April.

237. DiCIEUM CHRYSORH(EUM, Temm.

On the Samaguting ridge, *Nectarinidce* were very common in the winter months, and I obtained this comparatively rare bird near the station in December. The irides are bright red, legs black.

L. 3-9," W. 2 3," T. 1' V t. 0*52," Bf. 0'4."

233#. LEPTOCOMA HASSELTII, Temminck.

From Hill Tipperah; added to my collection by Mr. Ross Mangles, B. C. S.

242. PACTGLOSSA MELAKOXANTHA, Hodgson.

Shot at Sopvomah, Naga Hills, in December.

I was fortunate in discovering this curious form so far to the eastward in a new locality, it having been hitherto only known from Nipal and, I think, Ceylon. Jerdon says that the upper tail-coverts are green, in my specimen they are concolorous with the back. The irides are red and the legs dark plumbeous. Bill black.

Wing 2-9/' T. 1-8/ t. 06," Bf. 0*3/'

Description. Above, all dull dusky grey, tail darker and brighter. **Wing** black, the secondaries sepia-brown. Sides of head same as the back. A white streak extends from base of bill down the centre of throat, some white about the sides of breast. Lower breast, abdomen, and under tail-coverts bright yellow. The two outer tail-feathers with a white spot on inner web close to the tip. Inside wing white.

244. CERTITIA NIPALENJIS, Hodgs.

A single specimen from the Naga Hills.

248#. SITTA NAGAENSIS, Godwin-Austen, Plate IV.

Was first noticed at Sopvumah in the Nágá Hills last winter and I obtained several specimens on the watershed at about 6000 feet. It has been described by me in the P. Z. S., 1874. I give a drawing and description.

Description. Above slaty blue, wings and centre tail feathers same colour but paler. Quills dull pale black. A black streak through lores extending to ear-coverts and down side of neck. Beneath dull dirty white, purer on chin and throat, with a few white feathers bounding the ear-coverts. Flanks thighs and under tail-coverts dark rusty chesnut, all the latter with a terminal white spot. Outer tail feathers black, a white patch on inner web of the three outer, which are tipped grey and terminally black on outer web, white on middle portion of the outer web of the outermost tail feather.

Bill black above, grey below. Irides dark brown; legs green black.

L. 4.9," W. 3.0," T. 1.75/ t. 0'68," Bf. 0.58/" spread of foot T2."

260#. LANIUS COLLURIOIDES, Lesson = HYPOLEUCOS, Blyth.

Found in the Iril valley, Manipur, in February and March, rare; this and *L. tephronotus* were the only Shrikes seen in Manipur. L. 7'5/" W. 35," T. 3*8/1.1-0," Bf. 0.58."

• 286. CHIBIA HOTTENTOTA, Lin.

Garo and Khasi Hills.

289. TCHITEEA AFFINIS, A. Hay.

Samaguting, April. 3 in full plumage.

L. 8*5," W. 3(5/ T. 11-25," t. 0'58," Bf 0.65/"

310. MUSCICAPULA SUPERCILIARIS, Jerdon.

Young agrees with a drawing by Dr. Jerdon of the above in immature plumage; my specimen is from the Naga Hills.

331. MUSCICAPULA CESTIGMA, Hodgs.

Dr. Jerdon had told me that he obtained this rare Fly-catcher in the isolated dense patches of forest, on the north side of Shillong Peak in the

Khasi Hills ; on my return to Shillong I looked for and found it tolerably numerous, getting some 8 specimens in May and June.

S Description. Above, side of neck, and upper breast cyaneous blue ; wings and tail are black edged with same. A narrowish white line from base of lower bill to breast, which, with abdomen and under tail-coverts, is pure white; legs dark brown ; bill black. '

L. 4.5," W. 2.4," T. 1-78," t. 0-6," Bf. 0.42."

I did not obtain a female, but it would appear, from a drawing by Dr. Jerdon, to be dull olivaceous above with white throat and breast.

323«. ERYTHROSTERNA SORDIDA, n. sp.

Three specimens of this bird were shot under Japvo Peak in January ; having failed to identify it, I believe it to be undescribed.

Description. Above dull olivaceous brown, ochraceous on rump and upper tail-feathers. Tail umber-brown slightly tinged with ochre on outer web. Quills same as tail and pale-edged. The primary and secondary coverts very slightly tipped pale so as to form an inconspicuous bar on the wing. A pale ring round eye. Lores and ear-coverts dull grey with a rufous tinge. Beneath dull lutescent, darker on flanks. Centre of abdomen and under tail-coverts white.

L. 5.25," W. 2.6," T. 2.1," t. 0.5," Bf. 0.23." It is somewhat similar to *E. leucura* but the white basal half of the tail feathers in this last-named bird distinguishes it at once.

322. SIPIIIA ERYTHIRACA, Blyth and Jerdon.

This rare bird occurred under Japvo Peak, Naga Hills, at 6000 feet.

L. 5.0," W. 2.85," T. 2-2," t. 0.6," Bf. 0.35." A single specimen was procured by Jerdon at Darjeeling.

325. ERYTHROSTERNA ACORNAUS, Hodg.

I have this sombre coloured grey Fly-catcher from the I hang valley in Manipur and from Shillong in the Khasi Hills; the specimen from the former locality measures, L. 4.0," W. 2-2," T. 1-6," t. 0.58," Bf. 0.33."

326. ERYTHROSTERNA MACULATA, Tickell.

Obtained in the Naga Hills by Mr. Win, Kobert, extending its range considerably to the eastward.

3iG. PITTA CUCULLATA, Hartlaub.

Given to me among other specimens from the Tjpperah Hills by Mr. Eoss Mangles. It is worthy of remark that now after 3 years of collecting I have never seen a *Pitta* on or near the northern range of hills south of the Brahmaputra (commencing with the Garos, and thence to the eastward) save the

large dull coloured form of Ground Thrush, *Hydrornis Nipalensis* of Hodgson, which occurs on the Burrail range.

346u. PITTA CYAKEA, Blyth.

Given to me by Mr. Chennell of the Topographical Survey, who obtained it in Hill Tipperah. It is one of the most beautiful of these richly coloured Ground Thrushes.

366. PLANESTICUS FUSCATUS, Pall.

This bird, which agrees well with Jerdon's description, I shot on the Peak of Japvo, the highest point of the Burrail range just under 10,000 feet, during some hard weather in the early part of January ; only one specimen was secured.

Description. Above umber-brown darker on the head, the feathers dark centered ; rump ferruginous. Wing and tail dusky brown, coverts and secondaries edged pale rufous; a well-marked supercilium white, becoming broader behind the eye. Lores dark brown, ear-coverts the same but lighter. A rufous tinge on lower side of the neck ; chin and throat sullied white, with an indistinct stripe, commencing as spots, extending from base of bill, down side of neck, and round to the ear-coverts. A gorget on breast grey brown, with rufous tinge near shoulder of wing and spotted with dark umber. Lower breast and belly pure white ; under tail-coverts pinky ferruginous and pale tipped. Flanks and thighs tinged rufous the former spotted brown. Under wing-coverts rich ferruginous. The inside of quills grey.

Length 8'5/' Tail 34," t. 1-3," Bf. 0*62." Irides dark brown; bill black above, dull yellow below ; legs dull brown.

This bird much resembles *G. unicolor*, but is not so plainly coloured on the back.

373a. PAEADOXOEKCS AUSTENI, n. sp., Gould.

At Kuchai in the Naga Hills, at about 6000 feet elevation, in April, I obtained two specimens of this bird ; I afterwards procured three at Shillong in the summer. They differed so much from my original specimens of *P. flavivirostris* shot in the low marshy country at the base of the hills that I was inclined to consider them distinct. Mr. Gould, to whom I shewed these specimens and who had figured *P. flavivirostris* from the original specimens sent home, pronounced them to be new to him, and has described and figured the species in the 'Birds of Asia,' under the above title. Not having his description, I will only mention that the chief points of difference lie in the pale nearly white colour of the under parts, the paler brown of the back, and a markedly different distribution of the black on side of head and breast. .

My specimens measured—

L. 7-8," W. 3-3," T. 4-1⁷/_{1.1-05}," Bf. 0-67," Bg. 0*4;" which dimensions are smaller than those of *P.flavirostris*.

Legs plumbeous with a slight tinge of green; bill yellow.

385. PTCTOBHIS SINENSIS, Gmel.

This Babbler is very common in Manipur; dimensions of a specimen were:

L. 7-0," W. 2-6/' T. 3-9" t. 105," Bf. 0*48."

390£. TTJKDINUS GABOENSIS, n. sp., Plate VIII.

Above pale rufescent brown, rather richer on head, wings, and tail; feathers of head pale-shafted. Beneath, all pale fulvous, and whitish on abdomen.

L. 45;" W. 2.4;" T. 2'1;" 1.1*0;" Bf. 0'5."

Bill is brown above, pale ochre below, legs pale corneous. Tarsus and claws strong, the hind toe and claw long. It was among the birds collected by Mr. Wm. Hlobert in the Garo Hills, to whom is due the credit of its discovery.

This bird is very similar in coloration to *T. Ahholti*; but the bill differs much in the form of the nostrils, which have, as in *JPnoepyga*, a lunular cover. This and *Turdinus brevicaudatus* would be, perhaps, better placed after *Pnoepyga*, with which they are closely linked through *Pnoepyga longicaudata*.

400. POMATORHINTJS RTJFICOLLIS, Hodg.

This is the most abundant form of the genus in the Ffaga Hills, loving the damp shady sides of the forest-clad hills. It is called by the Anghami Nagas "Moh mera." In coloration it is very close to *P. leucogaster*, Gould, but is much smaller. I give a description with measurements.

Above, olive green rather rusty on back of neck, head darker, tail uniform with back and distinctly barred. A white superciliary, 1*6 inches in length, extends from base of bill to far back on neck. Lores and ear-coverts black, a rufous patch on side of neck behind the latter. Wings coloured like back and tail. Throat pure white sullied on breast with a few pale brown streaks. Flanks, abdomen, and under tail-coverts pale olivaceous; inside of wing grey. Bill yellow; irides red-brown; legs yellowish grey.

L. 7-25," W. 3*0," T. 3*4," t. T09," Bf.0'8."

408. GABRULAX CEBULATUS, Hodg.

This would appear to be a rather common Laughing Thrush in the Naga Hills; and I saw specimens that had been caught by bird-lime, the natives then, still further spoil them by pulling out the quills and tail-feathers. Jerdon does not mention the grey on lower part of the ear-covert

which forms a pale spot; nude space round the eye dark grey, and a rufous patch from base of bill to under the eye.

L. 10-5," W. 4-0" T. 4-75/' t. 1-G," Bf. 0'90."

409c. GARRULAX ALBOSTIPERCILIARIS, Godwin-Austen, Plate VI.

Described in the P. Z. S. for 1874 as follows : " Above head and forehead reddish umber-brown paling on back of neck into dull olivaceous brown of the rump and whole of the wing ; tail pale red brown ; lores, a patch below eye, under ear-coverts, and supercilium which extends backwards for 1½ inches from the lores, white ; upper portion of ear-coverts dark brown ; chin and throat ruddy brown, paling on the breast into very pale dingy olivaceous, and into pale earthy ochre on abdomen and flanks ; under tail-coverts rufous."

Bill black ; legs fleshy brown ; irides dull red.

Length 9-0" W. 3'8," T. 4*2," t. 1-38," bill at front 07."

One specimen obtained in the Manipur valley, near Kaibi.

This dull coloured *Garrulax* is very similar in coloration to *G. rufifrons*, Sw., from Java, which is a larger bird and has no white supercilium nor white lower ear-coverts. Another similar form is *P. cinereifrons*, Blyth, from Ceylon.

409&. GARRULAX GALBANTTS, Godwin-Austen.

Figured and described in P. Z. S. for 1874 as follows: " Above pale pure olivaceous on head, with a brown tinge on the back ; tail pale ashy-brown, the four central feathers tipped umber brown and barred, the four outer of the same colour in middle and broadly tipped with white ; wing concolorous with back ; quills pale umber brown edged grey. Very narrow frontal band, base of lower mandible, lores through eyes and ear coverts rich black ; beneath dull yellow, purer on the throat passing into the olivaceous on the flanks ; under tail-coverts white. Bill black ; legs ash grey ; irides red brown."

L. 9·0," W. 3*65," T. 4-1," t. 1-35," Bf. 0·8."

I first obtained this very handsome bird in the Manipur valley under the Koupru range, in February 1873. It associates in large flocks of from thirty to eighty or more, very noisy, following each other in a long string through the high grass, which they seem to frequent and prefer to the denser forest. When on the flight the white of their tail-feathers and under tail-coverts makes them very conspicuous. I observed it, also, on the head waters of the Barak and other streams that flow into the Manipur valley on the north-east. The nearest allied species is *G. gularis*, McClelland, which is also yellow on the breast ; but is dark slate grey above, with rufous on upper tail-coverts, flanks, abdomen, and vent.

413a. GARRULAX MERULINUS, Blyth.

This fine dull plumaged bird was obtained at the head of the Thobal valley in March; it presents a good deal the character of *Tricliaatoma Ahbotti* in its coloration, and approaches *Turdus* in the spotted breast. No description being included in Jerdon's 'Birds of India' I give one here. It was described by Blyth (J. A. S. B., Vol. XX., p. 521 for 1851) from Cherrapoonjee.

Above umber with a rufescent tinge, head darker brown; wings and tail dark brown, both plain, the former having no pale edges. Forehead pale grey, a very narrow short white streak above the ear-coverts, commencing just behind the eye. Beneath dull pale rufescent ochre, the throat and upper breast spotted dull black, each feather having the black spot at the central extremity. Under tail-coverts rusty. Inside of wing and underside of tail feathers grey. Tarsus very strong. Bill thick and blunt, grey horny; Legs dull fleshy purple. Irides pale reddish brown, nude skin round the eye grey.

In Anghami Naga "Moh mdpeh."

418a. TROCHALOPTERO[^] AFFERACEUM, Godwin-Austen.

Described in the P. Z. S. for 1874, with plate.

Above pale ashy olivaceous, greyer on the tail which is black for 0*7 inches at the terminal end, then tipped broadly white. Quills pale black, edged hoary grey; the secondaries tipped black, and their square tips edged white in keeping with the tail; Primary coverts near the bastard wing black forming a wing spot. Top of head black, extending in a narrow line down back of neck; lores and a broad band over eyes and ear-coverts dingy white; a few pure white feathers below eyes merging into ear-coverts; a narrow black line extends from posterior corner of eye over the ear-coverts and a moustachial streak of the same colour merges into indistinct spots. Chin white with a few black streaks; breast and under parts sullied white with a slight vinous tinge on the former and a dash of ruddy rufous on side of the neck, ochraceous on belly and under tail-coverts.

Bill pale yellow shaded dark above; legs fleshy brown; irides pale ruddy ochre.

Length 8-75", W. 3-22", T. 40", t. 1-25", Bf. 0-68".

In general style of coloration this bird approaches *T. variegatum*, Vigors. Its yellow bill and much smaller, weaker legs and feet, make it a very marked form of this genus.

Anghami Nagas call it "Lèhú."

426a. TROCHALOPTERON YIRGATUM, Godwin-Austen.

Described in P. Z. S., for 1874, as follows:

Head dark rufous brown, olivaceous on back,* paler and greyer on rump ; tail olive brown, with a slight tinge of rusty on basal half, finely and indistinctly barred ; wing, three first quills grey on outer web, the rest and secondaries pale ferruginous, merging into rich chesnut at their base; coverts of the latter colour, narrowly tipped ochre, feathers of the wingfeathers conspicuously white centred. Lores chesnut, a white supercilium; ear coverts pale rusty; chin and throat rich dark chesnut; breast and abdomen bright ochraceous; under tail-coverts darker brown. As viewed from below, the tail is grey brown, each feather faintly tipped with white.

All the feathers of the head, upper back flanks, and breast are centred white or pale ochre, and those of head and neck are rigid.

Bill black ; legs pinky grey ; irides pale brown.

L. 9-0", W. 3-5", T. 4-85", t. 1-3", Bf. 0-6".

I obtained a single specimen near the village of Rázámi under the Kopamedza ridge at 5,000 feet in Naga Hills ; in the month of January. Starting just after sunrise for the peak above the village, I observed first one and then another bird, not familiar to me, cross the path in front into some thick scrub. In this we could only perceive their whereabouts now and then by the moving twigs. Followed about, they became separated and the specimen in my collection got into a low tree where it uttered a very sweet call of a few notes, which was answered by its mate ; my Shikari then managed to get sight of-it and shot it. I never saw the species again.

This strikingly plumaged bird is very close to *T. setafer*, Hodgson, with which I have compared it, but it differs materially. *T. lineatum*, Vigors, is another allied form which extends to the N. W. Himalayah while *setafer* is from Nipal and Bhutan.

427 #. ACTINODURA WALDENI, Godwin-Austen.

Described P. Z. S. for 1874, with figure by Smit., it is thus described.

Head full crested, extending back for more than an inch, hairy grey edged pale ; back rich brown, with a greenish hue, becoming more rufous on the rump and upper tail-coverts ; base of tail feathers chesnut, for half their length narrowly barred with black, then black for terminal inch, the three outer tipped white ; quills black, outer web chesnut at base, then barred with black, and the narrow terminal portion grey ; primary coverts black, the winglet feathers grey, barred black ; ear coverts hoary ; side of head hair grey ; chin, breast, and abdomen rufous brown, paler on chin and throat, the whole having a streaky appearance, the feathers being centered with a darker shade.

Bill grey ; legs and feet fleshy brown ; irides pale grey.

L. 8*0", W. 3-48", T. 3*45", t. 1-2", BL 0*62".

I first shot this bird on the peak of Japvo at about 9000 feet on the Burraill range, Naga Hills. It keeps to the tops of the forest trees.

This is a small form of *A. Egertoni*, Gould, which occurs in the same locality; every character is repeated in the two forms, modified yet each distinct; no better example of gradual change in size and coloration could well be found.

430&, SIEIA PULCHRELLA, Godwin-Austen, PI. VII.

I shot two specimens only of this new and beautiful subdued coloured *Sihia* in April 1873, when making the ascent of the Peak of Khunho, Eastern Burraill range, Naga Hills, at about 8000 feet. In companies of about half a dozen, they haunted the tops of the Rhododendron trees, busily searching for insects in the flowers, and covering their foreheads and throats with the pollen.

I described it in the 'Annals and Mag. of Nat. History,' February, 1874, as follows.

Description. Above ashy grey, bluer on the head, the two centre tail feathers umber-brown terminating (each colour $\frac{1}{2}$ inch) in rich black, followed sharply by dark grey. The outer tail feathers are tipped in like manner with grey, but the black increases on each feather outwards, and on the last extends to its base. Shoulders of wing blue grey, with a bar of pale chocolate-brown coming in at the base of the black primary and secondary coverts. Quills grey-black, the primaries edged pale hoary blue; the secondaries blue grey, the last three are umber brown and the two last are edged narrowly on outer web with black. A narrow frontal band and lores black extending both over and below the eye to base of the ear-coverts. Beneath ashy blue with a vinous brown tinge upon the lower breast and abdomen. Bill black; legs horny brown; hides ?

Length 95", W. 4-1", T. 4*85", t. 1'3", Bf. 0'75".

In the general distribution of the coloration and in form it resembles *S. gracilis*, which is extremely common in the same hills, but seldom met with above 6000 feet.

437a. HATACOCIRCUS (LAYARDIA) BOBIGINOSUS, Godwin-Austen, PI. V.

I have described this in P. Z. S. for 1874: "Above rich rusty brown, darker on the head, with black shafts to the feathers; wings and tail of same colour, the latter distinctly barred; lores white, beneath pale rufescent, nearly white under chin, and pale on centre of abdomen.

Bill black, well curved; legs pale corneous or dull grey brown, irides nearly white.

L. 9-5", W. 3-0", T. 4-8", t. 1-6", Bf. 0.62".

The first two specimens of this bird I shot in long grass near the Logtak Lake, Manipur, and again obtained specimens near Kaibi in the same valley. It is essentially a grass-bird, with all the habits of *M. terricolor*, Hodgson. It associates about a dozen together, flying through the grass,

one after the other, in a scattered line, never abiding long in one place. A near ally of this bird, *M. subrufus* from Malabar, is not so intensely rufous, has no white on the throat, is greyish on the head, and has a yellow lower mandible.

538a. *PmiiA ETJEULA*, Godwin-Austen, PI. IX, Fig. 1.

Described in P. Z. S. for 1874. I copy the original description from that Journal. Above, head ashy brown, becoming more russet on back and pale rufous on rump and upper tail coverts ; tail brown indistinctly barred, tipped white on the outer tail-feathers with a subterminal dark spot ; wing dark brown, with pale rusty brown edgings to primaries and secondaries ; lores, round eye and ear-coverts pale ash, below chin sullied white, greyer white on breast ; ochraceous on abdomen ; flanks and thighs pale brown.

Bill black, both above and below ; legs pale corneous, with darker claws ; irides ruddy ochre.

L. 4*75", W. 1*82", T. 2*4", t. 075", Bf. 0-4" ..

This species was common in the Naga Hills and Manipur, and replaces *Hodgsoni*, Blyth, on the Khasi Hills side. It is quite distinct from *P. gracilis*, Franklin, which has a marked pale rufous forehead, and can be distinguished at a glance from the former bird, which is remarkably ashy with dark ear-coverts.

539a. *CISTICOLA MELANOCEPIALA*, And.=*KUFICOLLIS* Walden, PL X, Fig. 1.

I obtained several specimens of this form in the Manipur Hills, where it appeared common in the grassy valleys at head of the Barak ; some specimens do not shew the rufous on the neck so much as others. My specimens are identical with Lord Walden's from Assam, named by him *ruficollis*, but Dr. Anderson's title has priority.

539f. *CISTICOLA MUNIPUHENSIS*, Godwin-Austen, PI. IX, Fig. 2.

Described in P. Z. S. 1874; the original description follows.

" Above darft umber brown, feathers margined pale ochre on head, "broader and more rufous on back ; upper tail-coverts plain rufous brown, the feathers on nape are paler rufous and dark shafting is subdued; tail dark umber, the two centre feathers margined rufous brown, viewed from below tipped whitish, with subterminal dark spots; white on chin, throat, and centre of abdomen, rufescent on breast and flanks. Pale round eye.

Bill black above, pale beneath j legs fleshy brown.

L. 4-25' V W. 2-0", T. 1-65", t. 0-76", Bf. 0'40".

I obtained four specimens of this species on the reedy sides of the Logtak Lake, Manipur valley. It differs on comparison with *C. schoenicola* (PI. X, fig. 2) and *melanocephala*, which I also obtained, being intermediate in coloration, and may be known at once by the dark edging along

the shafts of the centre tail-feathers, which in *melanocephala* are wholly dark, and in *schoenicola* are banded broadly rufous, terminating in black and white. It is very near *Cis. russica*, Wall., from the Island of Bouroo, Malay Archipelago, which is more rufous on the head and breast.

471#. OKIOLTJS TENITIROSTRIS, Blyth.

Two specimens were shot by my collector in a thick wood near Lum-langtong or Bishunpur, Manipur, on the 18th February.

S L. 100", W. 5-8", T. 3-65", t. 1-0", Bf. 12".

481. PRATTNCOLA CAPRATA, Lin.

\$ In open grass of Manipur^ valley, in February; may be known at once from *Indica* and *leucura* by its rufous upper tail-coverts.

500, KUTICILLA ATJROREA, Pallas.

This Redstart was numerous in the stubble of the rice-fields bordering the Barak valley near its sources in the Naga Hills, during the month of January.

531a, ORTHOTOMUS FLAYOYIRIDIS, Moore, = EDELA apud Blyth.

The common Malaccan Tailor-bird, I met with in the forest of the Dunsiri near Dimapur, and it agrees well with Malayan specimens. The bill alone being rather shorter and more slender.

The discovery of this bird in Assam extends its range considerably.

W. 1-85", T. 1-70", t. 0-70", Bf. 0-60".

I also got it at the base of the Garo Hills near Shushang, so that it, no doubt, extends all through Tipperah, Arracan, &c.

538. PRIXIA HODGSONI, Blyth.

This little Wren-warbler is common enough in the hills about Shillong. Jerdon's description being short, I give that of the Khasi form in more detail.

Description. Above ashy brown, greyer on head* tail pale brown indistinctly barred, with black subterminal spots and white tipped. Wings pale brown edged pale rufescent. Pure white on chin, grey on throat and breast and white on abdomen and under tail-coverts. Some specimens have a faint tinge of ochre on the flanks and thighs. Orbits brown, irides orange ochre. Bill black above and below, legs yellow brown.

L. 4-35", W. 18-2, T 215", t. 068", Bf. 0-4".

538<>. PRINIA RUFESCENS, Blyth.

This bird agrees with specimens of *P. rufescens* from upper Burmah collected by Dr. Anderson when on the Yunan Mission, but it is somewhat larger and more intensely rufous.

W. 185, T. 2-55, t. 0-9", Bf. 04".

542. *GBA* *ISTCOLA BENGALENSIS*, Jerdon.

This bird is not easy to bag, it shifts about through the grass seldom rising, and if once scared gets low down near the ground and hides. I obtained one specimen at the head of the Barak valley, Manipur.

548. *SUTA PULIGINOSA*, Hodgson.

Is quite distinct from *S. atrogularis*[^] and I obtained several specimens at Shillong.

Bill above black, beneath palish, legs pale flesh, feet brown. Lores and supercilium pale. Irides ochre, tarsus stout.

L. 6-4", W. 2-0", T. 3*27 to 4*4, t. 08", Bf. 0-42.

Suya atrogularis, Moore, its nearest ally, has the bill black above, dark horny below, legs orange fleshy, irides pale ochre, white on upper margin of eye and a few of the dark ashy feathers of the supercilium tipped white.

552«. *NEOKISTS ASSIMILIS*, Hodgson.

I shot this bird both in the Naga Hills and at Shillong; it is Blyth's *Drymoeca brevicauda*. As it is a bird little known, a description here may be useful.

Above brownish olivaceous, tail umber brown and rather more rusty brown on wing, pale line through lores over eye. Below dusky whitish brown, paler on chin. A pale ring round eye, and a slight tinge of yellow on inside of shoulder of wing.

L. 4'75", W. 2-1", T. 2'3", t. 0-8", Bf. 0-38".

568. *EEGULOIDES EEOCIBOA*, Hodgson.

Naga Hills. February.

568a. *REGULOIDES FULYOVENTER*, n. sp.

Above centre of head, light yellow green bounded on either side by broad dusky bands; and nape pale greenish ash. Pure ash on back, upper tail-coverts grass green as well as the two central tail feathers and outer edge of all the others. The two outermost as viewed from below have a narrow pale yellow edging on outer web. Shoulder of wing ash grey, coverts ash brown with a narrow white bar. Quills dusky brown, the secondaries well marked with grass green. A pale yellow supercilium. Ear-coverts pale, chin very pale yellow; throat, breast, and abdomen pale pearly white, under tail-coverts bright yellow.

L. about 3-75", W. 2'0", T. 1'4, t. 070", Bf. 04".

Bill above dark brown, below orange; legs and feet grey. This Warbler is so distinct from any I have been able to look over, that I think it is a distinct species. I obtained it when in the low country of the Duusiri, Assam.

566. EEGULOIDES CHLOEONOTUS, var. Hodgson.

This form was very common in the opener forests on the slopes of the Burraill range.

W. T85", T. 1*35", t. 0·7", Bf. 0-25".

It is very similar to *chloronotus*, but the band on rump in my three skins is nearly white.

574. ABEOEISTS FLAYIVENTEIS, Jerdon.

From the Garo Hills ; one specimen only.

578. ABEOENIS CASTA^EOCEPS, Hodgson.

This pretty little *Abrornis* I saw several times in the Naga Hills when the forest was pretty open, and I shot a specimen at the head of the Iril valley in Munipur; I believe it has only been previously procured in Nipal and JSikkim.

Description. Crown of head dark chesnut with some darker feathers towards nape, which is dark ash. Back grassy green, upper tail-coverts pale yellow; centre tail feathers pale dusky brown, the two outer white with a dusky edging on the terminal frds. of their length. Wing grass green, the coverts tipped yellow forming one distinct and lower band and one indistinct upper one. Beneath, chin and breast bluish white. Flanks, inside shoulder of wing, belly and under tail-coverts canary-yellow. Bill above dark brown, below orange; legs olive brown.

L. 30", W. 1-95", T. TO", t. 0-66", Bf. 0-29".

58Sa. EtficũEFS LECHENAULTII, Temm. = CHINENSIS, Gould.

This bird was given to me by Capt. Badgley of the Topographical Survey, who shot it in the Lushai Hills in company with *G. immaculatus*. Obtaining this species in this locality so far west is very interesting, and marks its extreme limit on the Indian side.

Length about 10", W. 42", T. 5*8", t. 1-28", Bf. 0'9".

The measurements of the Hill Tipperah *K immaculatus*, Hodgson, are—
Length about 8", W. 36", T. 4*9", t. IT', Bf. O61".

589. MOTACILLA MADEEASPATANA, Briss.

On the upper Barak river, in February, a pair were shot.

595. NEMOEICOLA INDICA, Gmel.

Shillong, Khasi Hills.

614. LEIOTHRIX LUTEUS, Scopoli.

Slrillong, Khasi Hills.

It is not so common on these hills as *L. argentauris*, and I seldom came across it.

618. MINLA. iGNOTiffCTA, Hodgson.

Was very numerous in the woods about Sikhamih, Naga Hills, iu January.

622. PROPARUS VENTPECTUS, Hodg.

This "Plain brown hill Tit" was only seen on the highest part of the Burrail range on Japvo Peak, about 9,000 feet.

Bill black, irides pale ochre, legs and feet pale umber-grey.

L. 4-5", W. 2-2", T. 2T', t. 0.9", Bf. 0-3".

624. IXXILTIS CASTANICEPS, Horsfield.

This is not an uncommon bird in the Naga Hills east of the Burrail at 5—6,000 feet, and as there is no description of it in Jerdon I give one here. Above dark 'olivaceous, tail brown, forehead rufous merging into the olivaceous brown of the top of head. Wing umber-brown. A white supercilium from above eye extending to the neck, fading into some* streaky buff and black feathers behind the ear-coverts. A black band borders the white above. Lores and ear-coverts sooty. Chin, throat, and upper breast huffy white, sullied white on abdomen, flanks olivaceous. Irides dark red-brown; legs and feet pale fleshy. Bill grey-brown, feathers of head scale-like.

L. 5-58", W. 2-2", T. 2-5", t. 0'95", Bf. 0-45".

628. YUIIINA NIGRIMENTUM, Hodg.

Sent to me by Mr. Robert from the Naga Hills.

632. SYLYIPARUS MODESTUS, Burton.

This very small form of Tit was numerous, in April, on the high parts of the Eastern Burrail range, just under tliQ peaks of Japvo and Khunho, in small parties together. It moves rapidly and actively about the upper branches, and round and up perpendicular branches like *Sasia*, which its long hind-toe enables it to do. It was busy feeding about the Rhododendrons then in bloom.

The tips of the secondary coverts are pale, forming an inconspicuous band on wing; feathers of the head rather stiff, broad, and long, nearly hiding the bright yellow supercilium.

L. 3-5", W. 2-3", T. 1-5", t. 0'58".

634. (EGITIALISCTTS ERYTHROCEPHALUS, Vigors.

Legs orange, irides yellow-ochre or yellow.

W. 1-87", T. 2-05", t. 06", Bf. 0-2".

Naga Hills, several specimens obtained near Kohiinah in •January.

644. PARUS MONTICOLUS, Vigors.

Common enough in the Naga Hills.

The outer web of the outer tail-feather is white.

660. CORYTTS CULMINATUS, Sykes.

Shot in the Naga Hills, the only Crow seen there, and at Sopvohmah was extremely numerous in January, associating together in large flocks.

672a. UROCISSA MAGNIROSTRIS, Blyth.

Shot at Sikhami, Naga Hills, at 5,000 feet, in February.

L. 26", W. 7-4", T. 17", t. 2*15", Bf. 1*46".

Irides dark brown, bill and legs orange red. Primaries dull cobalt-blue.

691. SARAGLOSSA SPILOPTERA, Vigors.

Both *g* and *§* received from Garo Hills from Mr. W. Robert.

699[^]. MUNIA SUBUNDXILATA, Godwin-Austen.

Described in P. Z. S. for 1874.

" *§*. Above pale umber-brown, darker on the head, pale grey on rump, a few feathers edged paler; the upper tail-coverts dull yellow; tail-feathers olivaceous umber-brown, faintly edged with same yellow tint; quills pale chesnut on outer web, umber-brown on the inner, and indistinctly barred. Sides of head umber-brown becoming dark chesnut on chin and throat; breast and flanks white, feathers very narrowly barred or margined rufous-brown; abdomen and under tail-coverts dull white, the latter sparingly streaked with brown; feathers of the back finely pale-shafted.¹

Bill dark grey; feet plumbeous; irides red.

L. 4-3", W. 2-10", T. 1-70", t. 0-55", Bf. 0-45".

[^] is a duller brown above, with no white shafts to the feathers, a distinct green tinge upon the tail feathers, otherwise as in *M. undulata*.

Change of coloration in young males commences on the centre of the throat, extending towards the base of bill into the dark chesnut, and towards the breast into the undulated colouring of those parts.

Obtained in the Manipur valley, both on the Logtak Lake and head of the Barak river. It is a very close to, but distinct from *M. undulata*, Latham, in which the undulations are broad, the general coloration is more rufous, and the tail more pointed. It is also close and intermediate to *M. nisoria* from Java and Malacca; but in that bird the tail-coverts are grey, with no trace of the fulvescent tinge common to the two continental forms. Lord Waklen was the first to notice it as distinct, in specimens in his collection received from Burmah which are identical with my own from Manipur, and he kindly allowed me to describe it.

703. MTUSTA MALABARICA, Lin.

Specimens were obtained at Kooslitia, in November.

708. PASSER COTNAMOMEUS, Gould.

Under Burreil range, Naga Hills; not often seen. At Shillong it is commoner.

L. 5-2", W. 2*63", T. T9S", t. 0.G8, Bf. 0*42".

710. PASSER MONTANTTS, Lin.

Garo and Khasi Hills.

719. EMBERIZA FUCATA, Pallas.

This bird from head of the Barak valley differs from Jerdon's description in colour of legs and feet, which have no tinge of yellow, being a dull flesh-colour. The outer tail-feather is white on basal end, extending as a diagonal bar through inner to the outer web; the penultimate is tipped white on inner web. Centre tail-feathers rufous with black centre, and the rump is rufescent with small black streaks.

L. &±5, W. 2.9", T. 2-62", t. 0*85", Bf. 0'42".

724. MELOPIIUS MELANTCTERUS, Gmelin.

During February and March, this handsome Bunting was very numerous in the high grass skirting the river Iril, Manipur valley, particularly about Kaibi.

§ L. 6-5", W. 3-35", T. 2-85", t. 0-75", Bf. 0;4S".

7G2. ALAUDALA RAYTAL, Bueh. Hamilton.

Occurs abundantly on the sandy churs of the Brahmaputra, and I shot it near Gwalpara, in November.

L. 5-25", W. 3-35", T. 20", t. 0*75", Bf. 040".

On the same churs, among low bushes, *JPratincola leucura* was very common; *Cotyle sinensis* and *Brinia Jlaviventris* were also procured.

771. TRERON NIPALENSIS, Hodgson.

I have compared my specimens with the above from Sumatra and Malacca, and they are identical. It was not uncommon in the Dunsiri forest between Dimapur and Golaghat, and I shot it again on the road to Shillong near Gowhatty. It does not appear to range above 1,000 feet.

^measures L. 10", W. 5'55", T. 3'86', t. 0-83", Bf. 0*56".

782. ALSOCOMUS PUNICEUS, Tickell.

This beautiful Wood-pigeon was shot at the hot springs of the Namba on the Dunsiri river in April. These springs are saline and attract enormous numbers of *Carpopliagce (insignis and sylvatica)* to their waters to drink ;

and when the above bird was picked up, a quantity of the saline water poured out of its mouth.

797. TURTUE HUMILIS, Temminck.

Garro Hills.

SOGa. CEBIOBNIS BLTTHII, Jerdon.

tf described in the J. A. S. B. 1870, p. GO.

This bird is very difficult to obtain, and I failed to get the female, which has never yet been seen by any European. I heard them in the forest on the ascent to Khunho, but although I offered 20 Es. for a bird, the Nagas only once succeeded in getting one; this, a male, was snared near the village of Viswémah, but thinking that I wanted the feathers only, the natives had, to my utter disgust, picked and eaten it. Another male was brought to Captain Butler, the Political Agent of the Naga Hills, when passing through the village of Jotsomah (also under the Burrail range), but it had been skinned so badly that it was falling all to pieces and the most we could do was to save a few of the better pieces of the skin for the sake of the feathers. The Burrail range is the extreme western limit of this bird, and it has not been got even there, west of the peak of Paona, where the specimen in my collection was obtained by Mr. Wm. Ilobert, a most assiduous collector, whom I have to thank for very many good birds. Its haunts are in the dense forest from 6000 to 10,000 feet, and this renders it such a difficult bird to bag, and the only chance of shooting a specimen would be by coming upon it suddenly along a more open bit of ridge, or in one of the higher clearings. It was unknown to the Nagas of Asalu. It probably extends some distance to the eastward until it meets its near ally *C. Caboti*. Jerdon was the first to notice it in the < Ibis' (1870, p. 147) from the Suddya Hills.

823«. BAMBUSICOLA HOPKINSONI, nov. sp., Godwin-Austen.

S Description. Above head plain dull brown, becoming rufous on back of neck, back dull olivaceous grey. The feathers of upper back and scapulars centered with dark chesnut, the secondary coverts more broadly so and terminated in black. The feathers of the back have one or more small white spots on the outer margin, giving the back a well-speckled appearance. The rump feathers are indistinctly barred white with a single black spot and increase in size to the upper tail-coverts where the spots are conspicuous, heart-shaped with chesnut centres. Quills ruddy chesnut, the secondaries and tertiaries mottled with dark brown. Tail ruddy-brown, feathers narrowly barred with pale ochre having dark mottled edgings. Lores pale buff extending as a supercilium; ear-coverts, chin, and upper throat pale ferruginous; a black streak extends from posterior margin of the eye down side of neck; from lower part of neck for a short distance the feathers are centred rufous with

pale spots on outer margin, rest of breast buff, lighter on abdomen and sides ; barred on centre of breast and flanks with black, the barring not shewn but each feather has a terminal black heart-shaped spot, which is a conspicuous character.

Legs pale grey with green tinge ; bill pile horny-black, pale beneath, Tides dark brown.

L. 14-5," W. 6-25/"T. 5-0," t. 1%" Bf. 0-9/'

Through the kindness of Dr. J. Anderson, I have examined a specimen of *Fytcliii* 2 from the Yunan Hills, and with this the Khasi bird is evidently very closely allied, if indeed it should not turn out to be identical; but between my bird and *JB. Fytcliii* there are differences which, though perhaps small, separate them, and until birds of the same sex are placed side by side, we cannot well decide whether they are two *good* species or not. To begin the enumeration of the points of difference, the Yunan bird (A) is much smaller than the Khasi one (B) :

(A) *JB. Fytcliii*, t. 1-7," mid-toe 1'7".

(B) *B. HojpJeinsoni*, t. 2-1," ,, 2*1".

Other dimensions of (B.) L. 14-5," W. 6.25" T. 5" Bf. 0'9".

In (B) the feathers on the flanks have the black terminal spot invariably heart-shaped, whereas in (A ?) the corresponding feather is a diamond form {*vide* also the figure of \$ in P. Z. S., 1871, PI. XI).

In (A) the whole of the lower back is plain olivaceous with a few of the longest upper tail-coverts having a black triangular (isosceles-shaped) terminal spot followed by a white base.

In (B) these spots are much larger and broader and extend up over the rump, and the feathers are more distinctly barred with brown and have a rufous tinge at the base.

In (B), and I think this is the most important difference, all the feathers of the upper back are spotted with white, and this feature extends to the wing coverts and shoulder of wing. In (A) there is no tendency to this coloration nor is there any trace of it in the plate in the P. Z. S.

(A.) is dark brown on chin, (B.) very pale.

(A.) tail not distinctly barred, (B.) tail well-barred and the pale bars edged with black.

(A.) tail beneath dull brown, (B.) tail ruddy brown.

However, whether they be separable or not, and a larger series will decide this, one important point is finding this bird so far to the westward, within Indian limits ; it has never before been recorded. My specimen was shot at Shillong on grassy slopes at 5000 feet. Before I had seen the bird in hand, I had twice seen it running on the pathway and noticed its very different flight from that of the Black Partridge, which at first I thought it was. Now that attention is called to it, other specimens will no doubt turn up.

825£. ARBORICOLA INTERMEDIA, Blyth.

In my 2nd list I recorded *A. rufogularis*, Blyth, from N. Cachar; this I now find, on obtaining another specimen in the Naga Hills, to be *intermedia*, originally described as probably from Arakan (J. A. S. B., XXIV, p. 377). But *A. rufogularis* will still remain on the list with a new locality, -the Naga Hills, where Captain Butler obtained a 2, which at the time I could not make out from never having met with it before. *Intermedia* may be known at once by the plain, unbarred back and by the absence of the black separating the rufous of the neck from the grey of the breast; it is in front spotless, but has large round black spots on the side of neck. Dimensions of *intermedia*, Blyth, from Naga Hills :

W, 5*75/' T. 2*6," t. 1*7," Bf. 0*7, mid-toe and -claw, 1*82."

Legs red. Bill black.

A. rufogularis, \$, from Naga Hills, legs pale fleshy violet, measures—

W. 5*32/' T. 2*5/' t. T58," Bf. 0*5/' mid-toe and -claw, 175."

I found the nest of *Arboricola* in the forest at the head of the Jhiri River, N. Cachar, constructed close in under the large root of a tree near the base; it was lined with dry leaves which then (March) strewed the ground and contained three eggs of a light brown colour.

833. TURNIX OCELLATUS, Scop.

Shillong, Khasi Hills.

834. TURNIX DUSSTJMERII, Temm.

Naga Hills.

835. TURNIX STKESII, A. Smith.

Khasi Hills.

895. TOTANUS STAGNATILIS, Bechstein.

Munipur, in March.

908fl. PORZANA BICOLOR, Walden.

The original specimen, from which the description was made by Lord Walden, came from Darjiling. It was very interesting to find it a^o-ain occurring in the Khasi Hills (June). I got it in a small piece of marshy ground in the station of Shillong, together with the species of *Porzana* that follow. Bill glaucous green with slight tinge of red near base of mandibles and tipped grey; irides crimson-red, orbits red; legs pale dullish vermilion.

L. 8*75," W. 4*4/' T. 2*4," t. 1%" Bf. 0*9."

Mid-toe and -claw, 175," hind-toe and -claw, 0*65."

Two specimens were brought to me alive by a Khasia with one egg, which he said was that of this bird; it measures 1«4" in major diameter,

1*0" in minor diameter, is of a creamy white colour, unspotted on the smaller end, distantly so on the lower -frds., closely on the larger end, the spots all pale grey, with light and dark shades of sepia. The birds did not live long in confinement, although they ate greedily of earth-worms.

Captain Elwes tells me that he procured this bird in the interior of Sikkim, at Choongtam, at an elevation of 5000 feet, in September 1870; to him therefore belongs the credit of being the first to discover it. This specimen, with others, was lent by him to Mr. A. O. Hume for description, but the box containing them appears to have been lost on its way to Agra. Captain Elwes found this Rail in rice-fields which are the highest in Sikkim; my bird was found in similar ground, and at the same elevation.

911. POEZANA FUSCA, Linnaeus.

Obtained at Shillong in June.

L. 7-5," W. 4-0," T. 2-2," t. 1-35, Bf. 0*75."

Mid-toe and -claw 1*6". Bill dull dark green, orbits vermilion, irides orange, legs pale vermilion. The under tail-coverts are dark umber-grey in my specimen (not olivaceous as stated in Jerdon), and closely barred with white.

913. EALLUS STKIATUS, Linnaeus.

Dimensions are smaller than those given in Jerdon, but the bird does not differ in coloration from specimens from the rest of India.

L. 9-5," W. 4-75," T. 2 0," t. 1 65," Bf. 1-4."

Mid-toe and-claw 1 5," hind-toe and-claw 0 62," irides sienna-brown, legs and feet ash-grey. Bill pink at base, pale grey-brown at tip, brown above.

The bill is much lengthened, and in the presence of a shield-like expansion at base above, approaches nearer*to the Water Hens (*Gallinula*) than other Kails. The tarsus is very stout and the feet are shorter and stouter than in *Forzana*.

It occurred in the same swamp with the two preceding forms.

917. MXCTEEIA ATJSTEALIS, Shaw.

Bisnath, Assam; in December.

920. CICONIA LEUCOCEPHALA, Gmelin.

On Brahmaputra.

949. ANSEE INDICTS, Gmelin.

In large flocks on the Logtak Lake, in February; they leave the water to feed in the stubble of the rice-fields in the morning and evening.

955. CASARCA LETTCOPTERA, Blyth.

I got this bird at Dimapur on the Dunsiri River ; it appears to prefer sluggish streams like this flowing through forest, for I once flushed this bird in such a haunt in the interior of the Garo Hills. I am' informed by Mr. James of the Police at Samaguting that it breeds on the Dunsiri, and that he had shot the young birds.. It is called the " Deo Hans" in Assam, Mr. J. Burt of Tezpur informs me that the white-winged Sheldrake perches on trees, and that one was killed thus sitting by Mr. J. Martin of Pani-puta Tea plantation near Tezpur.

The habits and haunts of this species are as completely the reverse of its congeners *rutila* &c. as they well can be.

962. DAFILA ACUTA, Lin.

Tolerably abundant on the Beels in Manipur, in February.

963. MARECA PENELOPE, Linn.

Very numerous in Manipur, in February.

971. FULIGULA CRISTATA, Ray.

Manipur, on the Lamphel.

975. PODICEPS PHILIPPENSIS, Gmelin.

Beels, Manipur.

Anas pectoratorhyncha, Pennant was a very common duck on the Lo^o"tak Lake, in February. -I have nowhere seen it so numerous.

General notes on other species.

The specimens of *Ephialtes* that I have hitherto procured in the Naga Hills and Asalu, are undoubtedly *lempigi*, Horsfield, like birds from Java, &c, of which the very rufous one mentioned in my first list is in that particular phase of plumage.

Micropternus phaiiceps, Blyth.

I have two specimens in my possession, one of which is from the Tipperah Hills, the other from Dimapur, Assam; both are much darker and much more distinctly barred on back than others, and have at the same time stronger bills; and both are smeared all over the head, tail, and feet with some dark gummy substance that they are evidently fond of getting into.

Cyanops Asiaiica, Lath.

I notice that all the specimens in my collection from these Eastern Hills, have a small triangular patch of scarlet (0*3" wide) at the gape, a point not noticed in any description I can find, nor is it shewn in the figure of this species in " The Marshalls'" monograph of the Barbets,

Pl. 26. I pointed this out to Lord Walden, and having looked at his specimens from the N. W. Provinces and Nipal, found in them the slightest trace of a few very minute red feathers near the gape; these are so small that in a stuffed specimen they might be easily overlooked; in birds from Assam and Munipur this red spot is so well developed that it could not escape attention.

JEumyias onelanops, Vigors.

Breeds in the Khasi Hills, on the Shillong or northern side, in April. Young birds well-fledged were brought in to me in the middle of May.

Harp actes Hodgsoni.

Two specimens of this species, from the Garo Hills, have the crown of the head whitish-grey mixed with pink and whitish towards the nape, in other respects they are identical with the above species. Are they in immature plumage?

jPomatorhinus McClellandi.

Birds from the Naga Hills, I notice, have a longer bill, and the spottings on the breast are darker and occasionally form a demi-collar.

I have received a specimen of *Araclineclithra Asiatica*, Latham (= *carrucaria*, Lin.) from Hill Tipperah, which I considered at first to be *intermedia*, Hume. However, on comparing it carefully with specimens from Candeish Gwalior, Manbhoom, Umbala, Lower Bengal, Garo Hills, and Tonghú, I can detect no difference whatever in coloration, and their bills run so close in size that I do not consider it a species that will stand,—certainly not on the very small and sole difference of a slightly longer bill. If such single characters are to be allowed weight, we should have species multiplied *ad injinitum*, and if the Tipperah form of *A. Asiatica* should be larger, it is sufficient to notice the peculiarity as a large variety, but why encumber nomenclature when no other differences exist, with another name and create a new species.

A female *Niltava* in young plumage shot under the peak of Japvo, Naga Hills, in January, when it would nearly have arrived at maturity, differs so much from the dimensions of *N. grandis* (to which it is nearest in size) and *N. sundara* that I am inclined to consider it an intermediate new form. Females of *grandis* and *sundara*, irrespective of size, have a very similar coloration; the species I have before me, differs slightly from both, a difference it is not easy to explain in writing, and so often to be noticed in allied forms. The inside of the wing is pearly grey, and the tail is not so ruddy dark a brown as in *grandis*. A young *grandis* j in my collection, with the head still well spotted with pale rufous, closely equals in size birds in full plumage, with the greyer head and nape. My bird has no sign of the blue shoulder-spot, and the first primary

is proportionally much smaller and shorter than in undoubted *young grandis*. I give a full description so that the next collector visiting the Naga Hills may be on the look out for an intermediate form of *Niltava*, and if such there be, obtain the male.

Description. *Niltava* ? ♂ of first year. Above olivaceous with an ochre tinge. Ashy on head, more rufous on upper tail-coverts. Tail ruddy dark brown. A pale ring round eyes, less conspicuous above than below, wing feathers closed, umber brown. Lores tinged pale rufous. Beneath chin pale rufous, with a few pale grey bars, breast to abdomen rufescent ashy, thighs pale ash-brown, a pale dull streak extends from chin to upper breast, ending suddenly, abdomen sordid white, under tail coverts" pale ochre brown, darker centered and tipped pale, inside shoulder of wing dull ochre. Quills inside pearly-grey. Shot in underwood on ascent to Japvo peak January 1873, three were seen together. The bill is black, shorter and stouter than in *grandis*, Irides dark brown.

JST. grandis. = L. — , W. 3.05", T. 3*9", t. 0.92", Bf. 0.52'.

N. ? = L. 7'4" W. 3-9", T. 3-5", t. 078", Bf. 0*44'.

N. sundara. = L. — W. 31", T. 25', t. -80", Bf. 042".

JPnoepyga longicaudata, Moore.

Is very numerous in August in the large woods below the peak of Shillong, and I got several in that locality. There can be no doubt that the bird in Griffith's collection came from the north-east frontier, and not from Afghanistan. It is a shy bird keeping to the dense underwood. The irides are dark crimson.

358«. *Turdulus pattens*, Pallas.

Was frequently noticed in the Kaga Hills, and I obtained a specimen on Japvo Peak, close under 10,000 feet, in January. They agree well with specimens in Lord Walden's collection.

Above pale umber-brown, a white supercilium extends to over the ear-coverts. Lores and ear-coverts dark umber. A white patch under eye, and white on chin extending down centre of throat to upper breast, very narrowly defined in some birds; side of throat first mottled with umber passing into two indistinct streaks on either side. Breast pale rufous-brown above, white below to abdomen. Under tail-coverts pure white. Flanks rusty; no rufous inside wing, which is all grey.

L. 9-0", W. 5-0", T. 3 6", t. 1-2", Bf. 0.7".

A nest of *Fycnonotus pygceus*, Hodg., brought in by my shikari at Shillong in June, contained 3 eggs of a pale madder ground, spotted and speckled with darker madder-brown, pale neutral grey, and a few dark brown spots,—all pretty evenly distributed.

The nest is 4 inches across, neatly made with a foundation of dry old leaves and broad blades of grass; the sides of thin stalks of a thistle and thin sticks, and lined within with very fine grass; taken in a low tree.

Spiziccos canifrons breeds in the neighbourhood of Shillong, in May. Young birds are seen in June.

Enicurus nigrifrons of 1st List, Yol. XXXIX., Pt. II., p. 107, is *J&. maculatus*, Vigors, in immature plumage.

584 of same list is, I find, *guttatus*, Gould, in which the white markings on the back are all circular, this would appear to replace *maculatus* in all these Eastern Hills, for I have never yet shot a specimen, like this last north-west form.

Up to March, when we left Manipur, I did not observe any Parrots or Hornbills in any part of the valley, or hills bounding it. The natives say that later in the season parrots are very numerous and do considerable injury to the crops. Of Swifts I saw only one, a large species, which I failed to secure. *Cypselus infumatus*, Sclater, occurred in the Naga villages, and was very numerous in the large one of Padhang. *JPnoepyga* must be rare, for I did not get a single skin anywhere in N. E. Manipur. The country gets much drier on that side and the forest less dense, with a good deal of grass. Buntings were very plentiful and *Mmberiza pusilla* appeared everywhere to be the commonest bird in the Naga Hills, at 3—5,0(30 feet.

In the pine forest that covers the slopes of the hills descending into the Umiam valley, one of my men marked a nest "on June 25th ; I proceeded to the spot soon after I had heard of it, and on coming up to the tree, a pine, saw the female fly off out of the head of it. But the nest was so well hidden by the boughs of the fir, that it was quite invisible from below. ' The bird after a short time came back, and I then saw it was *Sibia gracilis*[^] but was very shy and seeing us went off again, and hung about the trees at a distance of some 50 yards ; while thus waiting, some 4 or 5 others were also seen. The female, however, would not venture back, and I sent one of my Goorkhas up, to cut off the head of the fir, nest and all, first taking out the eggs.* It contained three of a pale sea-green, with ash-brown streakings and blotchings all over.

The nest was constructed of dry grass, moss, and rootlets, and the green spinules of the fir were worked into it, fixing it most firmly in its place in the crown of the pine, where it was much forked.

Sibia has habits very like *Phyllornis*: they hang about the outer branches much in the same manner, and there is again a certain likeness in general coloration between *S. gracilis* and *Otocompsa jocosa* barring the colored under tail-coverts of the last. However, in *Sibia* the form of

* This nest is in the Indian Museum.

nostril is very different. I have heard *gracilis* rather noisy in the spring, uttering a loud single note, repeated three or four times in succession.

453a. *Thyllornis Cochinchinensis.*

Of 2nd List is *P. chlorocephalus*, Walden; I obtained another pair at Dimapur, on the Dunsiri River, in December.

It was described by Lord Walden from Burmah) its extreme known western range is, therefore, now the Garo Hills.

Trochalopteron Auste?ii, Jerdon.

Was bagged again near the eastern extension of the main water-shed, on Kopamedza Peak, at the same altitude as before. It has been beautifully figured by Gould in the 'Birds of Asia,' Plate 187.

Explanation of the Plates.

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- PI. IV. *Sitta JS^Tagaensis*, Godwin-Austen, p. 157.
 PL V. *Malacocircus (Layardia) robiginosus*, Godwin-Austen, p. 164.
 PI. VI. *Garridax albosipecularis*, Godwin-Austen, p. 161.
 PI. VII. *Sibia pulchella*, Godwin-Austen, p. 164.
 PI. VIII. *Turdinus Garoensis*, n. sp., p. 160.
 PI. IX. Fig. 1. *Cisticola Mmiipiirensis*, Godwin-Austen, p. 165.
 ————Fig. 2. *JPrinia rufula*, Godwin-Austen, p. 165.
 PL X. Fig. 1. *Cisticola melanocephala*. And., p. 165.
 •——> Fig. 2. *Cisticola schcenicola*, Bonap., p. 165.
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DESCRIPTIONS OF A FEW INDIAN PLANTS.—By S. KURZ.

(Received Nov. 1st, 1874.)

1. MILITTA TRISTIS, Kurz in Journ. As. Soc. Beng., 1874, 58.

Arbor novellis fulvo-puberulis ; folia ampla, oblonga, petiolo 1-2 lin. longo puberulo suffulta, abrupte acuminata, basi acuta et subobliqua, chartacea, glabra v. subtus secus reticulationem laxam parce puberula ; flores solitarii, axillares et oppositifolii, pedicellis J pollicaribus fulvo-pubescentibus unibracteatis ; calyx corollaque appresse fulvo-pubescentes ; sepala ovato-subulata, c. 2 lin. longer; petala exteriora duplo longiora, lanceolata acuminata, interiora f-1 poll, longa, oblonga, obtusiuscula.—*Ava*.

2. MITREPHORA VANDJBFLORA, Kurz in Journ. As. Soc. Beng., 1874, 57.

Arbor decidua, novellis ramulisque pubescentibus ; folia oblonga v. ovato-oblonga ad elliptica, 5-6 poll, longa, petiolo birvi puberulo, basi rotundata v. acuta, chartacea v. subcoriacea, acuminata v. acuta, v. utrinque minute puberula v. supra nitida et subtus secus nervjs minute puberula ; flores plus quam poll, in diametro, pedicellis poll, longis sursum incrassatis fulvo-tomentosis sub calycis basi bractea semi-amplexicauli rotundata vestitis suffulti et vulgo 2-ni v. plures e pedunculis reductis lateralibus crassis squamatis erumpentes ; sepala rotundata, dense fulvo-pubescentia ; petala 3 exteriora lineari-oblonga, undulata, extus parce fulvo-pubescentia, flava v. flava et rubescenti-striata, interiora ungui brevi et lato, conniventia, extus puberula, secus margines tomentosa, flava, apice albo- et rubro-punctata.—*Pegu ; Martabaniam*.

N. B. *Melodorum parviflorum*, Scheffer = *M. latijolium*, Hf. and Th. ; *Jlfeled. Bancanum*, ejusd. = *JK, manubriatum*, Hf. and Th.

3. CAPPARIS SIKKIMENSIS, sp. nov.

Frutex scandens, habitu *C. Roxburghii*, novellis parce pubescentibus, mox glaber ; folia elliptica ad elliptico-ovata, basi subacuta, obtusiuscula, petiolo gracili parce appresse pubescente ^-f poll, longo suffulta, 2-3 poll, longa, coriacea, glabra ; flores mediocres, pedicellis poll, circiter longis appresse pubescentibus suffulti, umbellati ; pedunculi 1-1^ poll, longi, parce appresse pubescentes, compressiusculi, ex foliorum superiorum axillis erumpentes et ssepius in paniculam terminalem dispositi ; sepala concavo-ovali-rotundata, minute puberula et secus margines hyalinos tomentella, -^ poll, longa ; petala intus lanata, extus glabra ; ovarium ovoideum, acutum, et gynophorum 1^2 poll, longum glabra.—*Silckim-Himalaya*, 4000-5000 ped. s. m.

4. SCHIMA MONTICOLA, Kurz in Journ. As. Soc. Beng., 1874, 90.

Arbor glabra, gemmis sericeo-pubescentibus, ramulis parce lenticellatis ; folia oblonga v. elliptico-oblonga, basi rotundata v. obtusa, 3-4 poll.

longa, petiolo J-f poUicari lato suffulta, acuta v. subobtusa, grosse crenato-serrafca, valde coriacea, supra nitida, glabra, reticulatione indistinctâ impressâ ; capsulee depresso-globosse, peduneulo crasso lenticellato 1^ poll, longo suffultfle.—*JMartabania*.

5. PTEROSPERMUM CLNNAMOMEUM, Kurz in Journ. As, Soc. Beng., 1874, 120.

Arbor, novellis ferrugineo-tomentosis ; folia oblique oblonga ad ovato-obJonga, basi uno latere inaequali-cordata v. rotundata, altero acuta, petiolo crasso 1-2 lin. longo tomentoso suffulta, 2-2*5 lin. longa, acuminata y. cuspidata, chartacea, supra glabra et nitentia, subtus dense* fulvo- v. cinnamomeo-raro canescenti- tomcntosa; stipulse subulatae, usque ad poll, longse, simplices v. frequitius basi appendice cucullatâ auctse ; flores magni, albi, pedunculis ^-1 poll, longis fulvo-floccoso-tomentosis suffulti, solitarii, axillares ; bracteolco subulatse basi cucullato-appendiculatsa ; sepala c. 1-1 poll, longa v. paullo longiora, lintaria, extus 3-nervia et fulvo-tomentosa, intus subglabra ; filaraenta et stylus glaber ; ovarium dense ful^o-villosum ; capsule oblongoe, obtuse 5-gonjB, utrinque attenuate, lignosas, 2 poll. longa3, fugacissime ferrugineo- v. fulvo-tomentosse.—*Martdbwi, Teaasservnv*.

6. ELJEOCAEPUS SIMPLEX, Kurz in Journ. As. Soc. Beng., 1874, 132.

Arbor gemmis parce¹ sericeo-puberulis ; folia oblonga v. oblongo-lanceolata, petiolo poUicari glabro geniculato-incrassato suffulta, basi obtusa, 5-6 poll, longa, obtusa v. obtusiuscule acuminata, chartacea, crenato-dentata, glabra ; flores majusculi, pedicellis poll, longis v. longioribus glabris, in racemos laxos axillares sub anthesi ebracteatos foliis breviores dispositi ; sepala c. 6 lin. longa, lineari-lanceolata, acuminata, glabra, intus secus marginem angustum velutina ; petala sequilonga, lato-cuneata, vulgo biMda, lobis sectis et valde fimbriatis, extus parce sericea, intus basin versus sericea, villosa ; antherse glabrso ; ovarium argenteo-tomentosum. *Tenasserim*.

7. ELJEOCABPIJS LITTORALIS, T, and B. ap. Kurz in Journ. As. Soc# Beng., 1874, 132.

Arbor glabra ; folia obovato-oblonga, in petiolum gracilem £-1 poll, longum continuum attenuata, 3-5 poll, longa; repando-serrata, obtusa, valde coriacea, glabra, supra nitentia ; flores majusculi, pedicellis pollicaribus parce puberis, in racemos; axillares puberos foliis paullo brevioribus collecti, sepala lineari-lanceolata, 6-7 lin. longa, canescenti-velutina; petala a3quilonga, cuneato-oblonga, extus dorso sericeo-pubeseentia, secta et fimbriata; antherse puberulse ; ovarium fulvo-villosum ; drurße c. poliiem longa3, oblongse, lseves, putamine valde lacunoso-tuberculato compressiusculo. *Tenasserim*.

8. E. HYGITOPHILUS, Kurz in Journ. As. Soc. Beng., 1874, 133.

Arbor genimis argenteo-sericeis; folia obovato-ad cuneato-oblonga, petiolo $i-\frac{1}{2}$ pollicari glabro geniculato-incrassato suffulta, basi attenuata, 2-3 poll, longa, obtusa v. rotundata, crenato-serrata, chartacea, glabra; flores parvi, pedicellis 2|-3 lin. longis parce argenteo-sericeis, racemos argenteo-sericeos glabrescentes axillares foliorum longitudine v. breviores efficientes; sepala 3 lin. longa, lanceolata, acuta, sericea, glabrescentia; petala paullo longiora, lato-cuneata, usque ad median partem fimbriata, glabra; antheris puberulis; ovarium sericeo-tomentosum.—*Pegu; Martaban; Tenasserim.*

N. B. *Elcdoearpus Acronodia*, Mast, species est valde diversa et nequaquam cum *Acronodia punctata*, Bl. conjungenda. *E. punctatus*, Masters, *Parinari* est species; *E. glabrescens*, Mast. = *E. Jackiana*, Wall. (*Monocera ferruginea*, Jack.) ; *JE. pedunculata*, Wall = *JE. Palembangicus*, Miq.

9. MELIA BIEMANICA, nov. sp.

Arbor novellis canescenti v. flavescenti furfuraceo-tomentosis; folia bipinnata, petiolo longo et tereti, pinnis 5-3-paribus; foliola ovata v. ovato-lanceolata, basi rotundata v. acuta, saepius sub-inajqualia, 1J-2 poll, longa, breviter acuminata, integra, petiolulis brevibus gracilibus vulgo puberulis suffulta; flores virescenti-albi, parviusculi, pedicellis brevissimis furfuraceo-tomentosi v. subsessiles, in paniculas flavescenti- v. canescenti-furfuraceo-tomentosas corymbiformes axillares folio breviores dispositi; calyx profunde 5-fidus, lobis oblongo-lanceolatis acutis farinaceo-puberulis; petala c. 3 lin. longa, extus velutina, intus dense puberula; tubus stamineus c. 2 lin. tantum longus, albus, intus pilosus et apice inter antheras valde lanata; drupae globosae v. subglobosae, c. 1 poll, crasso v. crassiores, flavescentes, leves, putamine obtuse 5-8-angulari et 5-8-oculari globoso.—*JUartaban.*

10. SCHMIEDELIA CHARTACEA, nov. Sp.

Frutex novellis appresse puberulis; folia uni-foliata, petiolo $1-\frac{1}{2}$ pollicari utrinque incrassato suffulta, oblonga ad oblongo-lanceolata, brevissime petiolulata, basi acuta, grosse et remote repando-serrata, 1-1J ped. longa, chartacea, acuminata, glabra; flores parvi, fasciculati, pedicellis capillaribus $i-J$ lin. longis suffulti et racemos graciles axillares folio breviores formantes; sepala i lin. longa, concavo-rotundata, parce ciliolata; baccae solitariae raro binae), pisi majoris magnitudine, leves, coccineae.—*SikJcim.*

N. B. Fructus *N. hypoleuci*, Ky. in diario hocce (1871, 50) ad *JST. lappaceum* probabiliter referendi sunt; fructus veri *JV. hypoleuci*, a me nuper in Martabanla collecti, iis *Euphorias Litchi* simillimi.

11. ASPIDOPTERYS HELFERIANA, Kurz in Journ. As. Soc. Beng., 1874, 137.

Frutex scandens, novellis appresse fulvo-pubescentibus; folia orbiculari-ovata ad lato-obovalia, breviter cuspidata v. apiculata, petiolo J-i pollicari pubescente glabrescente suffulta, 3-5 poll, longa, vulgo glaucoviridia; flores parvi, glabri, pedicellis c. 2 lin. longis glabris filiformibus, paniculam axillarem et terminalem laxam dum juvenilem ferrugineo-pubescentem mox glabrescentem formantes; petalac. 2 lin. longa; ovarium glaberrimum; gynobasis decidua; disci lobi vix rugosi; samarse ovoidese, pollicem circiter longae, apice attenuato retuse, hyalino-membranaceae, pallide brunneae, radiato-nervosae, alato-crisatae, glabrae.—*Tenasserim.*

12. INDIGOFERA DEBILIS, Grab, in Wall, Cat., 5466.

Herba annua v. perennis, 1-2-pedalis, sparse appresse birsuta; stipulae lineari-subulatae, 3-4 lin. longae; folia impari-pinnata, subsessilia, 1-1 1/2 poll, longa; foliola 1-2-juga cum impari longius petiolulato, alterna, rhomboideo-obovata ad sub lanceolata, brevissime petiolulata, basi subcuneato-attenuata, obtusiuscula et mucronata v. acuta, 1/2-1 poll, longa, integra, membranacea, supra glabra, subtus tenuissime appresse pubescentia; flores minimi, brevissime pedicellati, bractea persistente subulata. In racemum longum muniti, in racemum gracillimum parce pubescentem v. glabrum multiflorum axillarem folio multo longiorem digesti; calyx lin. longus, jace appresse pilosus, dentibus subulato-filiformibus; corolla paullo longior; legumina linearia, subcylindrica cum suturis pallide coloratis prominentibus, c. 1/2 poll, longa, oblique acuminata, brunnea, parce appresse hirsuta, 5-6-sperma; semina cylindrico-oblonga, utrinque truncata.—/. viscosae affinis.—*Ava.*

13. DESMODIUM (PITLLODITUM) GRANDE, nov. sp.

Frutex erectus, ramulis molliter fulvo-tomentellis; stipulae et stipellae strictae, breves, lineares, subulato-acuminatae; folia pinnato-3 v. raro 1-foliata, petiolo 1-1 1/2 pollicari fulvo-tomentoso suffulta; foliola 3-5 poll, longa, breviter petiolulata, ovata v. sub-ovata, longiuscule et obtusiuscule acuminata cum mucrone, integra, chartacea, supra puberula, subtus molliter sub-fulvo-pubescentia; flores...in racemos foliatis axillares et terminales digesti et paniculam terminalem efformantes; rhachis fulvo-tomentosa; folia floralia bifoliolata, petiolo 2-3 lin. longo tomentoso in aristam longam desinente suffulta; foliola oblique ovalia ad suborbicularia, retusa v. rotundata cum mucrone, puberula, pollicem circiter longa; legumina 2-3 articulata, tomentoso-pubescentia, iis *D. pulchelli* duplo majora.—*D. vestito* affine.—*Ava.*

N. B. Flores *Lespedeza pinetorum* nee *eyanei* nee *rosei*, ut in diario *liocce* 1873, 231 descripti, sed ilavescentes carinii apice rosollae.

14. PUERARIA BRACIYCAEPA, Kurz in Journ. As. Soc. Beng., 1873, 232.

Herba perennis diffusa v. volubilis, ramis acute angularibus 2~4-pedali-
bus, secus angulos retrorse appresse hirsuta; stipulae lanceolatae, acumi-
nae, parvae; folia pinnato-3-foliolata, petiolo secus angulos retrorse appresse
pubescente 1-1¹/₂ pollicari suffulta; foliola ovata ad ovato-lanceolata (latera-
lia valde obliqua), breviter petiolulata, acuminata, 1-2¹/₂ poll, longa, charta-
cea, utrinque parce appresse hirsuta; flores desunt, racemos solitarios v.
raro geminos strictos canescenti-pubescentes axillares formantes; bractea
minutae, subulatae, persistentes; pedicelli sub fructu lin. circiter longi;
calyx appresse pubescens, lineam fere longus, lobis acutis; legumina lineari-
oblonga, torosa, compressa, pollicaria v. paullo longiora, 2¹/₂ lin. lata, pallida,
parce appresse hirsutula, 5-6-sperma; semina transverse ovoidea, 2 lin. lata
olivacea.—Pegu.

N. B. *JPhaseolus Ince?is, Walp.* *Ph. dohchoides*, Roxb., et *Ph. gran-*
dis, Wall, apud Bentham PI. Jungh. I 239 in adnot. endocarpio secedente
dein semina arete includente (quamobrem beat. Roxburghius semina arillata
descripsit) gaudent et a me ad *Canavaliam* reducuntur,

15. VIGNA BRACHYCARPA, nOV. Sp.

Herba perennis, volubilis, habitu *V. vexillatae*, caulibus filiformibus 3-4
ped. longis parce hirsutis; stipulae peltato-lineari-oblongae, 3-4 lin. longae?
folia pinnato-3-foliolata, petiolo gracili 1-1¹/₂ poll, longo hirsuto suffulta;
foliola deltoideo-lanceolata ad linearia (lateralia vulgo inaequalia), breviter
petiolulata, acuminata, 1-2 poll, longa, chartacea, utrinque parce hirsuta;
flores minores, flavi, brevissime pedicellati, pauci, pedunculum gracilem parce
hirsutum axillarem petiolis longiorem v. cequilongum terminantes; calyx
amplus, 1¹/₂ lin. tantum altus, glaber, dentibus latis, acutis, brevibus; corol-
la c. 1 poll, longa; legumina lineari-oblonga, stricta, utrinque obtusiuscula,
usque ad pollicem longa, 2¹/₂ lin. lata, compressa, nigrescentia, sparse sed
longe hirsuta, polysperma; semina crassa, sub-4-gona, lin. lata et longa,
opaca, nigra.—Arracan.

N. B. *Dolichos Gangeticus*, Roxb., generi *Vignae* adnumerandus est.

16. DUNBARIA PODOCARPA, nOV. Sp.

Herba perennis, volubilis, flavescenti puberula; folia pinnato-3-foliola-
ta, petiolo flavescenti pubescenti 1-1¹/₂ pollicari instructa; foliola lato-ovata
(lateralia obliqua), petiolulis brevibus pubescentibus suffulta, acuminata,
utrinque (imprimis subtus) puberula, subtus pallida, lutescentia, aurantiaeo- v.
luteo-resinosa; flores mediocres, pedicellis 2 lin. longis pubescentibus vulgo
bini pedunculo brevissimo appresse fulvo-pubescenti axillari instructi; calyx
c. 3 lin. altus, appresse flavo-pubescentis, dentibus lanceolatis: ovarium stipi-
tatum, appresse pubescens; legumina stipito 3-5 lin. longo suffulta, lineari-

lanceolata, plana et vix torosa, acuminata, 1½-2 poll, longa, 4 lin. lata, puberula, pleiosperma; semina latiora quam longa, compressa, c. 2 lin. lata, nigra.—*Tenasserim*.

N. B. *JPhaseolus fuscii*, Wall. *Dunbariis* est adnumerandus.

17. ATYLOSIA CANDICANS, (*Cajanus ? candicans*, Wall., Cat., 5576 et 5567).

Herba perennis, erecta, molliter albido-tomentolla; folia pinnato-3-foliolata, petiolo 1-li pollicari pubescenti instructa; foliola lato-ovata (lateralia obliqua), obtusiuscula v. obtusiuscule acuminata, 1-2 poll, longa, basi subcordata, utrinque pubescentia, subtus albida; flores mediocres, pedicellis 2-3-lin. longis albo-pubescentibus, racemum albo-tomentosum axillarem folio breviorum efformantes; calyx fere 5 lin. longus, albo-pilosus, usque ad basin fere 5-fidus, lobis linearibus, acuminatis; corolla calycis lobis paullo longior; legumina transverse impressa et torosa, dense pilosa.—*Ava*.

N. B. *Duixbaria calycina*, Miq., *Atylosice* est species. *Dolichos tomentosus*, Hottb (*D. hractatus*, Wall., Cat., 554<) *Ilhynciosicd* a me adiminetur.

18. FLEMINGIA SERICANS, nov. sp. (*F. nana*, Wall., Cat., 5747. B. non Roxb.).

Herba perennis, 2-2[^]-pedalis, caulibus angulatis canescenti-pubescentibus; folia digitato-3-foliolata, petiolo crasso 3-angulari anguste alato -|1 poll, longo suffulta; foliola magis minusve rhomboideo-ovato-lanceolata (lateralia obliqua), breviter petiolulata, obtusiuscula cum mucrone v. acuta, 2-3 poll, longa, utrinque molliter puberula, supra velutina, subtus sparse nigro-resinoso-punctata; flores parvi, purpurascens, pedicellis lin. longis v. subsessiles, racemos breviores v. longiores argenteo-sericeos solitarios v. fasciculatos axillares efficientes; bracteae parvae, ovatae, sericeae, valde deciduae; calyx argenteo-sericeus, 2[^]-3 lin. longus, lobis lineari-subulatis, infimo longissimo; corolla glabra, paullo longior; legumina ovoideo-oblonga, puberula, vix sparse coccineo-resinoso-punctata, vulgo 2-sperma.—*Frame*; *JbLartdban*.

19. MUCIFLORA BIPLICATA, Teysman et Binnendyk, Cat. Hort. Bog., 1866, 261.

Legumen oblongum, sessile, c. 3-4 poll, longum, 1-3-spermum, utrinque bialatum, transverse plicatum, plicis duplici serie digestis apice horizontali cartaceo explanatis.—*Insula Borneo*,—Legumina vetusta tantum exstant, sed species distinctissima baud cum *If. angioina*, Wall. (= *M. monosperma*, Hoxb.) conjungenda (cf Scheffer Obs. pbyt. 91).

20. MUCUNA MOLLTSSIMA, Teysman and Binnendyk, Cat. Hort. Bog., 18GG, 2G1.

Frutex scandens, molliter pubescens ; folia pinnatim 3-foliolata, petiolo piloso 1J-2J pollicari suffulta ; foliola rhomboideo-ovata, (lateralia valde obliqua), petiolulis 1-2 lin. longis pubescentibus instructa, obtusa cum mucrone v. acufiuscula, membranacea, 2-3 poll, longa, molliter pubescentia ; stipellse subulatae, lin. longSB ; flores mediocres, pedicellis 4-5 lin. longis pubescentibus, racemum longiuscule (i-2 poll, longum) pedunculatum pubescentem folio breviorum axillarem formantes ; calyx velutinus cum setis fulvis urentibus interspersus, amplus, ½ poll, in diametro, dentibus 3 inferioribus triangulari-acutis, superioribus 2 connatis bi-denticulatis ; corolla poll, longa, vexillo obovato-oblongo, breviter unguiculato alis longitudine aequans, carina paullo longior ; legumina oblonga, 3-4 poll, longa, 5-G-sperma, brevissime stipitata, subvelutina et setis rigidis fulvis fragilibus deiduis obiecta, utrinque in alas .2 undulatas expansa, transverse et valde oblique simpliciter plicata, plicis magis minusve revolutis ; semina lato-elliptica, plana, £ circiter longa, nigra.—*Molluccos, Halmahaira*, in horto Bogoriensi culta.

21. PTEROCAEPUS MACEOCARPTIS, nov. sp.

Arbor, novellis fulvo-pubescentibus, folia impari-pinnata, -§-| pedes longa, rachi fulvo-puberula ; foliola ovata ad oblonga, 3-5-juga, alterna, petiolo 1-2 lin. longo ferrugineo-pubescente suffulta, breviter et obtusiuscule acuminata, mucronata, 1[^]-2J longa, integra, -coriacea, novella subtus fulvo-pubescentia, glabrescentia et secus nervos puberula ; *flores mediocres, flavi, pedicellis 3-4 lin. longis fulvo-pubescentibus ; in racemos simplices fulvo-pubescentes axillares digesti ; calyx dense ferrugineo-velutinus, c. 3 lin. longus, basi sub-oblique attenuatus ; corolla ultra 3 lin. longa, petalis undulato-crispatis ; stamina diadelpia ; ovarium villosum ; legumina canescentia v. fulvescenti-velutina, irregulari-orbicularia, alis subplicatis 1J-2 poll, in diametro, basi inaequali sinuato-rotundata, acumine styloso minuto supra sinu basali protrudente.—*Martaban ; Tenasserin.*

22. COMBEETTJM DASTSTACnTUM, nov. Sp.

Frutex scandens, habitu *G. Chinensis* sed paries omnes magis minusve pubescentes ; folia opposita v. scepius ternata, elliptico- ad obovato-oblonga, petiolo brevissimo erasso fulvo- v. ferrugineo-pubescente suffulta, acuminata, integra, 3-4 poll, longa, membranacea, supra sparse albo-puncticulata, subtus (secus nervos dense) pubescentia ; flores parvi, albidi, sessiles, spicas satis robustas strictas patentis v. decurvas dense ferrugineo-tomentosas axillares folio breviores efformantes ; calyx tubuloso-campanulatus ; limbus 4-lobatus, intus dense fulvo-liispidus j petala lato-oblonga, cuneato-unguiculata, calycis

lobis longiora ; ovarium mox glabrescens, obsolete 4-gonum ; fructus oblongi, *H* poll, fere longi, pollicem lati, glabri, 4-alati, alis chartaceis semi-oblongis nucis diametro multo latioribus.—*Pegu ; Martaban.*—*G. Ghinensi*, Eoxb. (*G. Griffithii*, Heurck and Muell-Arg. Obs. Bot. Plant: nov. 231) valde affine.

23. COMBEETUM PYEIFOLIUM, (*Pentaptera pyrifolia*, Wall., Cat., 3985 non Presl.).

Frutex scandens, habitu *G. ovalifolii*, novellis ferrugineo-puberulis; folia parva, ovalia ad lato-oblonga et suborbicularia, opposita v. alterna, petiolo 3-4 lin. longo gracili suffulta, obtusa v. subretusa et mucronata, integra, chartacea, 1² poll, longa, glabra, supra puncticulata; flores ... ; spicae puberulse, solitarise v. in paniculas graciles axillares v. breves terminales digestte ; fructus parviusculi, 1² poll, longi, glabri, 5-4-alati, alis chartaceis semi-ovalibus nucis diametro latioribus.—*Ava*.

24. COMBEETUM QUADRAANGULAE, nov. sp.

Frutex subscandens, argenteo-lepidotus et punctatus, ramulis acute 4-angularibus ; folia opposita v. raro alterna, parva, obovato-cuneata v. raro ovata, petiolo brevi gracili lepidoto suffulta, vulgo obtusa v. subretusa et mucronata, integra, 1²-3 poll, longa, chartacea, utrinque (subtus sub-dense) argenteo-lepidota et punctata ; flores parvi, albi ?, bractea, subulata, fugacissima substructi, spicas solitarias v. binas simplices dense lepidotas axillares folio breviores formantes; calyx infundibuliformis, vix lin. longus, dense lepidotus, limbo 4-dentato intus dense fulvo-villoso ; petala calycis dentibus 3-angularibus paullo longiora, obovata; stamina exserta ; fructus parvi, 1-2 poll. longi et lati, suborbiculares, dense argenteo-lepidoti, 4-alati, alis chartaceis, nucis diametro latioribus.—*Tenasserim ; Siam*.

N. B. *G. platyju/Uuni*, v. Heurck et Muell-Arg. Obs. Bot. Plant. Nov. 242 = *G. extensutn*, Koxb. ; *Anogeissus phillyrecefolia*, v. Heurck et Muell. Arg. 1. c. 2L9. = *A. acuminated* varietas.

25. LONICEEA LEIANTHA, nov. Sp.

Frutex glaber ; folia ovata ad ovato-oblonga, basi acuta decurrentia, petiolo 3-4 lin. longo suffulta, obtusiuscula, subcoriacea, 2-3 poll, longa, laevia, glabra, supra nitida ; flores magni, 2²-2 poll, longi, glaberrimi, sessiles, bini v. solitarii pedunculo crasso s trie to 3-4 lin. longo axillari suffulti; calycis tubus 3 lin. fere longus, levis, limbo ample-infundibuliformi lin. fere longo leviter 4-dentato.—*Avce montes.*—*L. longiflora*, DC. affinis.

26. EUBIA SIKKIMENSIS, nov. sp.

Herba perennis *R. cordifolice* arete affinis, aculeolato-scabra, caulibus anguste alato-angulatis ; folia sessilia v. subsessilia, 4na v. sursum 3na

verticillata, lanceolata ad elliptico-lanceolata, 3-5-nervia, acumiuata, basi obtusa, imprimis secus nervos et margines retrorse aculeolata, 2-4 poll, longa, chartacea ; flores minuti, pedicellis seminilineam longis suffulti, cymosuli, paniculas brachiatas axillares in paniculam majorem terminalem collectas formantes ; bacca didymse v. globosse, pisi minimi magnitudine, glabrse* suceulentse.—*Sikkim-Himalaya.*

N. B.—*JPsilobium capillare*, Kurz in Journ. As. Soc. Beng., 1872, 313
= *Morindopsis capillaris.*

27. ARNEBIA TIBETANA, nov. sp.

Herba perennis magis minusve ramosa usque ad semipedem alta, appresse hispida (pilis rigidis albidis et tuberculis albis orbatis) ; folia obovato-lineariter ad lineariter-oblonga et lineariter, radicalia in petiolum longiorem v. breviorum decurrentia, caulina sessilia, orbata v. orbatiuscula, crasse membranacea, appresse albo-hispida \-l\ poll, longa ; flores verosimiliter flavi, sessiles, in spicas longiores v. breviores circinnatas terminales et laterales congesti et saepius in paniculam spuriam albo-hirsutam collecti ; bractejB calyce breviores, albo-hispide ; lineares, obtuse ; calyx albo-setosus, usque ad basin fere 5-partitus, segmentis 2 lin. circiter longis v. longioribus anguste linearibus j corolla infundibuliformi-hypocraterimorpha, c. \ poll, longa, lobis brevibus rotundatis ; antheris fauci insertis ; nuceis grisese, 3-angulatis-ovatis, acutis, tuberculatis, lineam fere longas, dorso obtuse carinatis. *Xibetia occidentalis*, 12000-16000 p. s. m.



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Part II.—PHYSICAL SCIENCE, &c.

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ENUMERATION OF BURMESE PALMS.—By S. KURZ.

(Received Oct. 12, read Dec. 3, 1873.)

(With Plates XII—XXXI.)

In working up my Burmese palms, I find that a few of them are new. I now propose to describe these and to give at the same time an enumeration of all the species that have hitherto been found in Burma, adding also a conspectus so as to facilitate their identification. The rattans, however, are in such a state of confusion that little can be done until the material for description becomes more complete and the almost inextricable synonymy of the described species has been properly cleared up.

I have not paid special attention to palms in the field, but a few remarks on variation may not be out of place here.

The size of the palms is often enough variable and, amongst the many examples, I shall mention only *Phoenix paludosa*, the stem of which varies in height from only 2 or 3 ft. up to 15 to 25 ft. Sobolification is a character of little value in my eyes. I look upon it rather as an idiosyncrasy, and, therefore, not even as a sufficient character of which to establish a variety. No doubt in very many species this character has become general and constant, but atavisms are not unfrequent. We know, for example, cases in which the common betel-nut palm has made as many as 7 shoots, and similar examples are not wanting (especially in *Phoenix*, *Cocos*, *Aren(/a*, *Euterpe*). *Areca triandra* has simple and soboliferous trunks with all intermediate

states, and I have, therefore, unhesitatingly connected with it *A. laoca*, a species that differs in no structural points. *Garyota sob oilfera* is another example wherein simple-stemmed and soboliferous plants may occasionally be found in the Burmese jungles not a dozen yards from one another. Species based upon such distinctions, if not also accompanied by structural differences, are in my opinion untenable, and grouping palm-species after such a character is simply misleading.

Again, the armature in *Galamus* would appear to me to be also subject to variation within certain limits. It certainly is often very different according to the age of the rattan itself, or accordingly as the sheaths come from the lower or upper parts of the plant. On the other hand, the *Galami* (including *Dcemonorops*) offer so many valuable characters in their spathes and spathules, nature of seeds, lorise and flagellse, and, finally, in the scales and stamens, that we may confidently look forward to a sound and natural classification of the rattans so soon as the numerous book-species, often based upon incomplete pieces only, shall have been got rid of. The difference in the scales of the fruits of *Galamus* in different stages of growth is so far as possible illustrated in the present paper. The indument of the inflorescences and their spathes seems to afford valuable characters, especially to herbarium-botanists. The colour, however, of the same varies greatly in the same species, as for example in *A. gracilis*, in which some individuals have yellowish-white and bright scarlet *spadices*, while others have them greenish-purple.

Burmese palms are still very incompletely known, especially the rattans. While the distributional area of the leiocarpous palms is greater than one might have expected, that of the rattans is singularly restricted and limited. Thus I have been unable, in spite of all the pains I have taken, to identify several of my Burmese rattans with any of the 100 species or thereabouts already published. Only the more light-loving species, such as *G. Guruba*, *fasciculatus*, etc., have a wider distribution.

Burma and the Andamans contribute each a new type of *Galamus* in *C. tigrinus* and *G. Andamanicus*, which have the scales of their fruits furnished with fringed appendages as long as or longer than the scale itself.

I have, in the present paper, endeavoured to supplement my descriptions by the addition of figures, for it is irksome to recognise palms from descriptions only; a figure, moreover, allows considerably shortening of the description itself. Theism all size of the Society's Journal has, however, compelled me to introduce only the most important parts of these bulky plants.

SYNOPSIS OF THE GENEBA AND SPECIES OF BURMESE
PALMS.

SUBFAM. I. PALMiE GENUINiE.—Fruits not imbricate'scaly, but smooth or variously rough or tubercled. Seeds without arillus. Usually erect, very rarely armed palms.

TEIB. I. NIPINJE.—*Perianth of females reduced to a few scales. Ovaries 3, apocarpous. Male flowers in separate spadices surrounding the central female flower-head. Leaves pinnate.*

NIPA, *Humph.*—Spathes many, sheathing, persistent. Female flowers on a central globular torus, surrounded by the male spadices. Male perianth 6-parted, complete, valvate in bud. Stamens united by threes. Drupes woody, angular-turbinate, collected into a large dense head. Albumen equable, hollow in centre. Soboliferous almost stemless palms,
N. fruticans, Wurm. Only species.

TIIB. II. PmNATiE.—*Perianth complete in both sexes. Leaves pinnate twice pinnate or pinnatisect, rarely almost entire. Erect palms.*

* **Spathes 1 or 2, more or less boat- or spindle-shaped.**

§ *Cocoince.*—Spathes 1 or 2, spindle-shaped or clavate. Ovary syncarpous. Putamen at base 3-porous. Leaves simply pinnate. (Probably better reduced again to a section of *Arecinece.*)

Cocos, *L.*—Monoecious on the same spadix. Petals in females imbricate-convolute in bud. Ovary syncarpous, 3-celled, only one cell ovule-bearing. Drupe large, woody, containing a single one-seeded hard putamen. Albumen equable. Large simple-stemmed palms.

Cocos nucifera, *L.* Only species.

§ § *Arecinece.*—Spathes. 1 or 2, boat-shaped, caducous. Ovary syncarpous. Putamen not perforated. Pinnae neither fascicled nor erose-toothed.

AEECA, *L.*—Flowers monoecious, their bases immersed in the cavities of the nude spadix. Stamens 3, 6, or numerous. Petals valvate in bud.

Albumen ruminant. Simple-stemmed or soboliferous palms. Pinnse irregularly united into broader or narrower segments, rarely all connate in a 2-cleft blade.

Species.

Subg. 1. Areca, L.—Stamens 6 or 3. Stigmas 3. Female flowers lateral between the ramifications, rarely axillary. Spadix often twice ramified, the ultimate ramification; usually more or less filiform and covered by male flowers only.

X Stamens 6. Female flowers without bract.

Simple-stemmed, glabrous; drupes as large as a hen's egg,

...*A. Catechu, L.*

X X Stamens 3. Female flowers without bract.

Glabrous, simple-stemmed or soboliferous, *A. triandra, Roxb.*

Subg. 2. Pinanga, Bl.—Stamens numerous. Stigma 1. Female flowers in grooved series. Spadix simply ramified, or rarely undivided.

X Flowers distichous.

CsDspitose; spadix branched; sheaths, etc*, slightly scurvy, . . . *A. costata.*

X X Flowers tristichous.

Simple-stemmed; spadix slender, ramified or simple; sheaths, etc., scurvy,

...*As gracilis, Roxb.*

X X X Flowers 5—6-stichous.

Simple-stemmed; sheaths, etc., scurvy; spadix simple, fleshy, as thick as the finger, *A. hexasticha, Kurz.*

§ § § *Plioenicece.*—Spathes 1 or 2, boat-shaped, persistent. Ovary apocarpous, consisting of 3 distinct carpels. Pinnse often fascicled.

PHOENIX, *L.*—Dioecious. Corolla in males valvate, in females imbricate in bud. Drupes sappy, solitary. Albumen equable. Simple-stemmed or stoloniferous palms, sometimes stemless. The lower pinnae reduced to spines.

Species.

* Spathes smooth; flowers supported by a small subulate bract.

Stemless; petioles rather long and slender, spiny-armed,

...*P. acaulis, Roxb.*

* * Spathes covered with a brown scurf; flowers without a bract.

Simple-stemmed, robust; petioles very short and dilated, spiny-armed; drupes about an inch long, *P. sylvestris*^ *Roxb.*

Soboliferous, slender; petioles long and slender, spiny-armed; drupes about *i* an inch long, *P. paludosa, Roxb.*

* * **Spathes several, tubular or sheathing. Ovary syncarpous.**

§ § § § *Oaryotece*.—Spathes several, tubular or sheathing, persistent.
Pinnae of the leaves often fascicled, la[^]eed or e rosè-toothed.

AKEXGA, *Lah*.—Flowers monoecious in different spadices. Petals of both sexes valvate in bud. Stamens indefinite. Ovary 3-celled. Drupe depressed-3-angular, rather dry, 3-seedeH. Albumen equable. Simple-stemmed rarely soboliferous palms. Leaves simply pinnate, the pinnse linear, at base auricled at one or both sides.

Arenga saccharifera, Lab. Only species.

WALLICIIA, *Boxb*.—Flowers monoecious in different spadices, rarely dioecious. Petals in both sexes valvate in bud. Stamens often definite. Ovary 2-celled. Drupe sappy, usually 2-seeded. Albumen equable. Often stemless low palms. Leaves simply pinnate, the segments wedge-shaped.

Species,

Spadices smaller, the male spikes almost filiform ; maHflowers yellowish ; calyx tubular, about a line long, *W. caryotoides*, Koxt.

Spadices very ample, the male spikes thick and rigid; male flowers purplish or green ; calyx minute, cup-shaped, only about 3 lin. long,

..%*W. disticJia*, T. And.

As preceding, but the male calyx tubular, nearly a line long,

...*TV. densiflora*, Mart.

CABTOTA, X.—Flowers monoecious on the same spadix. Stamens iil-definite. Petals in males valvate, in females imbricate in bud. Ovary 1« or 2-celled. Drupe 1-or 2-seeded, sappy. Albumen ruminant. Simple-stemmed or soboliferous palms. Leaves bipinnate.

Species.

Simple-stemmed; male petals about \ inch long by 3 to 4 lin. broad, ...(*7. urensy* L.

Usually soboliferous ; male petals about 4 lin. long and only \ lin. broad 5 anthers mucronate or emarginate,, *C. soholifera*, Wall.

TEIB. III. FLABELLATJE.—*Leaves fan-shaped. Perianth complete in both sexes. Erect palms.*

§ *Borassince*.—Ovary syncarpous, 2—4-celled, with as many ovules. Drupes 2—4-celled, "with as many seeds.

BORASSTTS, *L.*—Spathes several, incomplete. Male spadix catkin-shaped. Corolla imbricate in bud. Drupe large, fleshy-fibrous, 3-seeded. Seeds pomaceous, with a pore at their apex. Lofty palms. Pinnae connate, and forming a blade.

Borassus jlauelliformis, *L.* Only species.

§ §. *Coryphince*.—Ovary apocarpous, consisting of 3 free or at apex united carpels (or only the styles united), usually only one of the carpels coming to perfection.

LTCTALA, *Humpli*.—Inflorescence axillary. Flowers hermaphrodite, solitary or by 2 or 3 together. Corolla 3-parted. Stamens perigynous, the filaments inserted at the throat of the corolla and united into a ring. Drupe sappy. Usually small simple-stemmed or tufted palms. Pinnae all free to the base, or by 2 or several united into broader or narrower flabellate segments.

*Species**

X Flowered large. Leaves peltately flabellate.

Calyx about 1 to 1 inch long. *L. peltata*, *Roxb.*

X X Flowers small. Calyx not above 2 lin. long. Leaves palmately flabellate.

Trunk 4 to 8 ft. long"; petioles aculeate, bordered along their whole length; calyx about a line long. *L. paludosa*, *Griff.*

Almost stemless; petioles unarmed at the upper third of their length; calyx 1/2 lin. long.? *L. longipes*, *Griff.*

CUAMJEROPS, *L.*—Inflorescence axillary. Flowers polygamous, several together. Corolla 3-parted. Stamens hypogynous. Drupe sappy. Albumen with a longitudinal furrow. Simple-stemmed or tufted palms. Pinnae all connate and forming a blade.

Chamcerops Khasyana, *Griff.* Only species.

LIVISTONA, *It. Br.*—Inflorescence axillary. Flowers hermaphrodite, clustered. Corolla 3-parted. Stamens perigynous. Drupe sappy. Albumen with a cavity filled up with the intruding integuments. Embryo dorsal. Erect palms perennially flowering. Pinnae connate and forming a blade.

Livistona speciosa, *Kurz.* Only species.

CORTPHA, *L.*—Inflorescence terminal. Secondary and tertiary spathes many. Flowers hermaphrodite, clustered. Corolla consisting of 3 free petals. Stamens hypogynous. Drupe corticate. Albumen hollow in centre or solid. Embryo apical. Lofty or rarely stemless palms, flowering once only and then dying off. Pinnae connate and forming a blade.

Species,

* Simple-stemmed often lofty palms. Petioles comparatively short. Trunk annular or almost even; drupes the size of a wood-apple,

...*C. unibraculifera*, L.

Trunk marked by the spiral scars of the fallen spirally arranged leaves ; drupes the size of a cherry, *C. Gebanga*, Bl.

Stemless.

Petioles 18 to 25 ft. long; drupes the size of a cherry, *O. toiacropoda*, Kz,

SUBFAM. II. *CAJJAMEM*,—Fruits covered by retrorsely imbricate scales. Seeds often spuriously arillate. Usually armed climbers, rarely erect or unarmed.

* TEIB. I. *FLABELLATJE*.—Leaves fan-shaped, Nearly all American.

TELB. II. *PINNATE*.—Leaves pinnate.

* Flowers spirally arranged, forming a more or less dense cylindrical catkin-like spike.

KOETHALSIA, *JBl.*—Spikes villous-bracteole or the bracteoles glabrous*, forming elongate panicles. Spathes tubular. Albumen ruminant. Scandent palms, sparingly armed.

Species,

Spines on the petioles almost straight, 3 to 4 lin. long ; drupes obovoid, \ inch long, *K. scaphigera*, Mart.

Spines on the petioles short, reflexed ; drupes turbinate (globular), the size of a small pea, *K. laciniosa*, Mart.

ZALACCA, *Humph.*—Spikes villous-bracteole, forming elongate panicles. Spathes elongate, cleft to the base. Seeds arillate. Albumen equable. Stemless or almost stemless erect palms, more or less armed.

Zalacca Wallicliiana^ Mart. Only species.

* * Flowers distichous (very rarely spuriously unilateral).

CALAMUS, *L.*—Flowers usually sessile, solitary in the spathe, or rarely in a short curved spikelet exerted from the spathe, forming elongate

more or less pendulous panicles. Spathes tubular or flattened out from a tubular base, persistent. Spathules cymbiform or tubular. Seeds arillate. Albumen equable, but often pitted or erose on the outside. Scandent, rarely erect rattan-palms, more or less fearfully armed.

Species.

* Drupes sessile, *i. e.*, the perianth more or less spreading and adhering to the base of the fruit. Spathules of the spikes mucli imbricated, the exerted part cymbiform, shorter than broad, more or less truncate.

O Scales of fruit without a conspicuous appendage.

A Pinnae equidistant. No leaf-tendrils.

Erect, tufted ; pinnae white beneath. No tendrils whatever,

...*G. arhorescens*, Griff.

Erect, tufted ; leaves uniformly green, without (but the sheaths and spadices with) tendrils, ...*G. erectus*, B-oxb.

A A Pinnae fascicled or interruptedly approximate.

Young stems, etc., whitish powdery; leaves without tendrils ; pinnae interruptedly fascicled ; drupes globular, straw-coloured,

...*C. fasciculatus*, Roxb.

Glabrous ; leaves tendril-bearing ; pinnae broad, alternately approximate ; drupes oblong, brown, ...*G. latifolius*, Koxb.

• O O Scales of fruits produced into a fringed appendage as long or longer than the crustaceous scale itself.

Leaves tendril-bearing; inflorescence without tendril; drupes $\frac{1}{2}$ inch long, uniformly brown,.....* •*G. Andamanicus*, Kurz.

Leaves without tendrils; inflorescence with tendrils ; drupes an inch long or somewhat longer, dark and pale brown variegated, *G. tigrinus*, Kurz.

Drupes seated on the erect indurated thick pedicel-like perianth. Spathules usually long-exserted and tubular, rarely cymbiform and imbricate, usually not truncate.

O Spathules imbricate, broader than long, truncate.

Leaves without tendrils ; pinnae equidistant; drupes globular, $\frac{1}{2}$ inch thick, straw-coloured,*G. tenuis*, Eoxb.

O O Spathules exerted and rather elongate.

X Spathes with a short acute limb only.

Leaves not tendril-bearing; pinnae interruptedly-approximate; drupes ellipsoid, straw-coloured, nearly an inch long,*G. gracilis*, Koxb.

Leaves not tendril-bearing ; pinnae equidistant, narrow ; spathes green, very thin, compressed-tubular, almost unarmed, *G. Illeferianus*, Kurz.

Leaves tendril-bearing ; pinnae distant, alternately approximate ; male flowers in recurved small spikelets or fascicles exerted from the spathules,

...*C. paradoxm*, Kurz.

X X Lower spathes expanded into a flat elongate limb, tubular at the short base only.

Leaves not tendril-bearing ; pinna? narrow, equidistant ; drupes globular, the size of a pea, the scales straw-coloured with blackish-brown borders,
...0. *Guruba*, Ham,

DIEMONOROPS, *Bl.*—Flowers usually pedicelled, naked or nearly so. Spathes cleft to the base, deciduous, the outer one boat-shaped. Spathules incomplete, reduced to bracteoles. Spadix erect, stiff, never tendril-bearing. Albumen usually ruminant. Seadent rattan-palms, more or less fearfully armed.

Species.

* Spathes unarmed or nearly so.

Leaves not tendril-bearing ; pinnae interruptedly-approximate, white beneath, *D. Jiypoleucus*, Kurz.

* # Spathes (at least the outermost one) much armed with thorns or spines.

Leaves uniformly green ; sheaths and spathes outside fearfully armed with flat glossy black spines ; drupes globular, the size of a cherry,
.. *D. grandis*, Griff.

PLECTOCOMIAJ *Bl.*—Flowers in small naked racemes or spikes, hidden by the imbricate distichous secondary spathes, the latter forming long tail-shaped one-sided paniced pendulous catkins. Spathes many, tubular. Drupes retrorsely hispid. Albumen equable. Seadent often lofty rattan-palms, more or less armed.

Plectocomia macrostachya, Kurz. Only species

ENUMERATION OF THE SPECIES.

NIPA, *Rumph.*

1. N. PHUTICANS, *Wurmb. in Verh. Bat. Genootsch., I, 349; Lab. in Mém. Mus., V, 297, t. 21-22; Roxh., Fl. Ind., Ill, 650; Mart, Palm., 305, t. 108, 171-172; Bl. Rumph. Ill, 76, t. 105, 164—165 ; Griff., Not. Monocot., 168, t 244-247; Miq., Fl Ind. Bat, III, 150.*

HAB. Common along the estuaries of the rivers, and in tidal forests all along the shores, from Chittagong down to Tenasserim and the Andamans.

Dane of the Burmese.

CocOSy L.

2. *C. tffTCTFERA*, L., *Fl. Zeyl.*, 391; 2to#&., *Gorom. PI, I*, 52, *. 37, ^ J7. J^., 117, 614 ; *Mart., Palm.*, 123, t. G2-G3 ^ tf. 88,/. 3-G; i!/^., J7. 7*iA JBa*, 777, 64.

HAB. Generally cultivated all over Burma, more especially within the influence of the sea, and also wild along the sandy beaches of the Cocos islands. Fl. C S., Fr. H. S.

Ting is the Burmese name of the cocos-palm.

ARECA, L.

3. *A. CATECHU*, L., *sp. pi.*, 1189; *Boxb., Corom. PI., I*, 54, t. 75 et *Fl Ind., Ill*, G15 ; *Hai/ñe*, *Arzney Gew.*, VII, t. 35 ; *Mart., Palm.*, 1G9 et 311, t. 182 et t. 149,/. 4, t. Z, X, / 11.; *Bl. Humph.*, II, 65, t. 102 A, ett.104*; *Miq., Fl. Ind. Bat., Ill*, 8; *Orif., Ind. Palm.*, 147, et in *Mad. Cole. Journ.*, V, 450; *Scheffi., Group, d. Arec*, 9.

HAB. Frequently cultivated by the Burmans and Karens, especially in Mavtaban and Tenasserim.

Kunti is the Burmese name.

4. *A. TRIA]STRA*, *Boxh., FL Ind., Ill*, 617 ; *Griff., Ind. Palm.*, 148, t. 230, A, et in *Mad. Calc. Journ.*, V, 451; *Mart., Palm.*, 171, t. 149,/. 1-3; *Scheff., Group, d. Arec*, 16. {*A. laxa*, *Ham. in Mem. Wern.Soc*, F', 309 ; *Griff., Ind. Palm.*, 149, et in *Macl. Calc. Journ.*, V, 452 ; *Schff., Group. Arec*, 17 ; *A. pumila*, *Bl. Humph.*, II, 71, t. 99 et 102, non *Mart*, nee *Griff., Sclicff. Group, d" Arec.*, 15).

HAB. Not infrequent in the evergreen tropical forests from Martaban down to Tenasserim and the Andamans ; also in Chittagong. * Fl. H. and K. S. ; Fr. the following year.

Tau Kunti (wild betel-palm) is the Burmese name of this as of all other wild species of *Areca*; the Andamanese call it *abaradah*.

5. *A. COSTATA*, {*Pinanga costata*, *Bl. Bumph.*, II, 80, t. 109 ; *Binanga KuJilii*, *BL Bumpli.*, II, 82, t. Ill, *ScJieff., Group, d. Arec.*, 34 ; *Sea/or" thia Kulilii*, *Mart., Palm.*, 185, t. 6, t. Z.f. 4 et 5).

HAB. In the evergreen tropical forests of the Andamans, around Mount Harriet, and probably elsewhere. Fr. June.

I have changed the specific name according to a rule laid down in De Candolle's 'Laws of Botanical Nomenclature.' Dr. Scheffer and a very few others object to this rule, but to me it appears a sound one inasmuch as it rigorously compels an author to adopt a name which otherwise would be altered either out of pedantry or personal feelings, for illustrations of which Dutch literature especially furnishes examples enough. The rule is exact and therefore truly scientific, admitting of no excep-

tion but in cases of absolute absurdity[#]: it prescribes with almost mathematical precision the ultimate change. Why, for example, should we call *Guatteria pallida*, BL., at present *Marsypopetalwm ceratosanthes*, Scheff., and not *M. pallidum*? or why should the well-known *Flmbristylis diphylla*, with its pageful of synonyms, be rechristened *F. polymorpTia*, Boeck. ? The objection raised on account of increase of names *absqice necessitate* is a feeble one, and cannot counterbalance the advantages of a strict rule against arbitrary acts.

6. A. GRACILIS, *Boxb., Fl. Ind., Ill*, 619 ; *Griff., Ind. Palm.*, 154, t. 232, A—G, *et in Mad. Gale. Journ.*, V, 459.

HAB. Frequent in the evergreen tropical forests, especially in marshy places, from Chittagong, Pegu, and Martaban down to Tenasserim. Fl. H. and E. S.; Fr. the following year.

Dr. Scheffer identifies this species with Blume's *Pinanga patula*; *P. patula*, however, has distichous flowers, quite different fruits, and smooth sheaths and spadices. Again, *A. disticha*, Roxb. (of which *Ptychospenna simplicifrons*, Miq. is an exact synonym), which has a hispid spadix and scurvy sheaths and spathes, is also reduced to his *Pinanga patula*—a course in which I cannot follow him.

7. A. ILEXASTICHA, *n. sp.*, PL XII.

A slender simple-stummed gregarious palm, 20 to 30 feet high, the stem 3 to 4 in. in girth, the sheaths, etc. thinly scaly-rough, soon turning glabrous; leaves 3 to 5 feet long, pinnate with the end-pinnse confluent, on a short (3 to 4 in. long) scaly-rough petiole broadly sheathing at the base; pinniB linear, somewhat falcate, 1 to 1[^] feet long, alternate, 2- to 3-ribbe4 and many-nerved, the lower ones acuminate, the upper and terminal ones crenate-lobed and ending in as many bluntish and shortly 2-lobed lobes as there are ribs: flowers sessile, spirally arranged in 5, higher up in 6, grooved rows along the simple reflexed spike up to a foot long, the rachis as thick as the finger, fleshy; female perianth (in young fruit) very much like that of *A. gracilis*, the sepals and petals almost conform, broad-oval, blunt or bluntish, about a line long or a little longer; staminodes apparently

* If in such cases a rule were to be established to the effect that a species thus changed in name should be called after the author who first named and described it, the cases of doubt would be reduced to a minimum. Dr. Mueller Arg, has given some additional rules in his "Nomenclatoric fragments" defending his harpagean principles adopted in the 15th vol. of De Candolle's *Prodromus*, but I think that few, if any, right-minded men would refuse to adopt a MS. name, if they have knowledge of the same or if they have the plant, authentically named, at their disposal. On the other side, I fully a^gree that MS. names, the plants of which are inaccessible to an author, even if published but not characterized, are truly valueless "riomina chartacea," and as such reducible to species described at a later date. No one will ever persuade me to spend a few thousand rupees on a journey to T^vn-mp<. for th<> inn-pose of unenWlm><>; MS. names!

none ; unripe fruits fibrous-fleshy, smooth, spindle-shaped, and narrowed at apex.

HAB. In marshy places of the evergreen tropical forests of the southern parts of the Pegu Yomah, as for example between Kyauzoo and Kya Eng (Pazwoondoung-valley).

PHOENIX, L.

8. PH. ACATTLIS, *Boxb., Kort. Beng*, 73 et *FL Intl.*, 111,783; *Griff, in Mad. Cole. Journ.*, V, 345 et *Lid. Palm.*, 137, t. 128; *Mart., Palm.*, t. 136.

HAB. Frequent in the Eng-forests all over Pegu, Prome, and Martaban. Fl. March—Apr. ; Fr. May—June.

This species is called in Burma *Thenboug* like all others of the genus.

9. PH. SYLVESTBIS, *Boxb^Hort. Beng.*, 73 et *Fl. Lid.*, Ill, 787; *Griff, in Mad. Cole. Journ.*, V, 350 et *Lid. Palm.*, 141, t. 228 ; *A. Mart., Palm.*, t. 136.

HAB. Chittagong, cultivated only ; said to be also cultivated in Ava. Fl. begin of H. S. ; Fr. C. S.

As indeed Griffith remarks, *Ph. dactylifera*, L., differs hardly, and possibly solely by larger fruits. The fact that *Ph. dacUjlifera* will not succeed in the moister parts of India, may be an idiosyncrasy acquired by long cultivation in arid districts.

10. PH. PALUDOSA, *Boxb., Sort. Beng.*, 73 et *Fl. Lid.*, Ill, 7S9 ; *Griff, in Mad. Calc. Journ.*, V, 353 and *Lid. Palm.*, J44, t. 229, A—B. (*Ph. Siamensis*, *3liq., Palm. Archip. Ind.*, 14).

HAB. Common in the tidal forests all over Burma from Chittagong clown to Upper Tenasserim and the Andamans. Fl. March—Apr.; Fr. June—Decb.

AEEKGA, *Lahill.*

II. A. SACCHAEIFERA, *Lab., M'em. Z' lust.*, IV, 209.; *Mart., Palm.*, 191, t. 108 et t. 161, / 4, t. Z, IV, f. 11, XVII, f. 1; *Miq., Fl. Ind. Bat.*, Ill, 35 ; *Griff, in Mad. Calc. Journ.*, V, 472 and *Ind. Palm.*, 161, t. 233, j±r—(*Sagguerus Rumphii*, *Boxb., Fl. Ind.*, Ill, 626).

HAB. Frequent in the evergreen tropical forests of Martaban and Tenasserim, also occasionally in those of the eastern slopes of the Pegu Yomah. Fl. all the year ; Fr. the following year.

Toung-ong is the Burmese name. Griffith has been much blamed for having cut down the numerous areng-palms in the Calcutta Botanical Garden, and for having thus deprived the garden of one of its " ornaments." This censure must remain a matter of opinion, for I believe that few will be found who would detect any beauty in them, but many would

rather concur with Humphius, who compared the palm to a "ragged dirty drunken fellow."

Besides its well-known value for toddy, sugar, and fibre, this palm is especially adapted for the support of orchids, ferns, and other epiphytical plants, for which purpose it is highly reeommendable to horticulturists in tropical climates.

WALLICIIA, *Boxb.*

12. W. CARYOTOIDES, *Boxb., Oorom. Pl, Ill, 91, t. 295 ; Miq., Fl. Ind. Bat., Ill, 34- {Wrightia caryotoides, Boxb., Fl. 2nd., Ill, G21; Hari-na caryotoides, Ham. in Wern Soc, V, 317 ; Griff, in Mad. Cttlc. Journ., >, 485 and Ind. Palm., 174, t. 237 ; W. densiflora, Hook., Bot. Mag., t. 458-1, vix Mart, nee Griff.}*

HAB. In the evergreen tropical and damp hill-forests of Martaban and Tenasserim; also in the hills of eastern Ava and Chittagong, up to 4000 feet elevation. Fl. II, S. ; Fr. the following year.

Zanong is the Burmese name of this as also of the other species of the genus.

13. W. DENSIFLORA, *Mart., Palm., ed. I, 189 and suppl., 190. (W. oblongifolia, Griff, in Macl. Calc. Journ., V, 4SG, and Ind. Palm., 175, t. 237, A—G).*

HAB. Not frequent in the moister upper mixed and tropical evergreen forests of Arracan, apparently always on siliceous sandstone ; also Chittagong. Fl. Apr.

135. W. DISTICIIA, *T. And. in Journ. Linn. Soc. Lond., J&I, 6.*

HAB. Not unfrequent in the moister upper mixed forests of the eastern slopes of the Pegu Yomah, and on the spurs of the Kambala-toung. Fl. Apr.

The Burmese plant differs chiefly by much longer (1J-2 ft. long) pinna), and may possibly form a distinct species. It is also a much lower palm.

CARYOTA, *L.*

14. C. FIRENS, *L., Fl Zeyl, 187 ; Boxb., Fl. Ind., Ill, G25 ; Mart., Palm., 193, t. 107-108, 1G8 and t. V, f. 1-3 and 11; Miq., Fl. Ind. Bat., Ill, 41; Griff, in Macl. Calc. Journ., V, 478. and Ind. Palm., 169.*

HAB. Frequent in the upper mixed forests of the Pegu Yomah and Ava. Fl. Sept.

Burmese call this, as also the other species, *minbo*.

15. C. SOBOLIFERA, *Wall, in Mart. Palm., 194, t. 107, / . 2? Miq., Fl. Ind. Bat., Ill, 41 ? Griff, in Macl. Calc. Journ., V, 481 and Ind. Palm., 171, t. 236 (simple-stemmed) ? (C. Gunningii^ Lodd. ex Mart., Palm., Ill, 159? Bot. Mag., t. 5702 j C. Griffithii, Beccari in Giom. Ital).*

HAB. Frequent in the evergreen tropical forests from Arracan down to the Andamans, and from Martaban down to Tenasserim. FL Fr. C. and H. S.

I entertain little doubt but that the *Caryota* so' plentiful in the Burmese jungles is Loureiro's *C. mitis*, the more so as the same plant occurs also in Siam.

BORASSTJS, *L.*

16. B. FLABELLIFOTCMIS, *L.*, *Mus. Cliff.*, 13 ; *Roxb., Corom. Pl.*, I, 50, t. 71-72, and *FL IncL*, III, 790; *Hart., Palm.*, 219, t. 108, 121, 102 ; *Miq., Fl. Intl. Bat.*, Ill, 45. (*B. sp.*, *Griff., Not. Monoc.*, 107).

HAB. Frequently cultivated all over Burma, more especially, however, in Ava and Prome ; along the sandy sea coast sometimes growing like wild, but also in the dry Prome-district the palm is freely springing up in jungles. Fl. March—Apr. ; Fr. Close of rains.

Htan is the Burmese name of the palmyra.

LICUALA, *Rwnph.*

17. L. PELTATA, *Boxl., Fl. Ind.*, II, 179 ; *Mart., Palm.*, 284, t. 134 et 1G2 ; *Griff, Palms*, 120, t. 222 and in *Mad. Calc. Journ.*, V, 324.

HAB. Frequent in the evergreen tropical forests all over Burma from Chittagong, Pegu, and Martaban down to Tenasserim and the Andamans. Fl. begin of C. S. ; Fr. H. S.

Zaloon of the Burmese ; the Andamanese call it *gobol*.

18. L. PALXIDOSA, *Griff, in Mart. Palm.*, 318 ; *Mad. Calc. Journ.*, 323 and *Ind. Palm.*, 118, t. 221, A—C.

HAB. Frequent in the tidal forests and in marine swamps along the coast of the Andamans. Fr. Apr. May.

19. L. LONGIPES, *Griff, in Mart. Palm.*, 318 and in *Mad. Calc. Journ.*, V, 330 and *Ind. Palm.*, 125, t. 224, A—B.

HAB. Tenasserim, forests near Lainer, to the south of Mergui (*Griff.*). Fl. nearly the whole year.

CIAM^EROPS, *L.*

"20. Cil. KHASIANA, *Griff, in Mad. Calc. Journ.*, V, 341 and *Ind. Palm.*, 134, t. 227, A—B.

HAB. Not unfrequent in the drier lull and pine forests of Martaban, and probably also in the Ava hills, at 4000 to 6500 feet elevation.

It remains to be shewn how this species differs from *Ch. Martiana*, *Wall.*, which is said to have yellow lepidote fruits.

LIVISTONA, *B. Br.*

21. L. SPECIOSA, *n. sp.*, *Pis. XIII and XIV.*

A lofty simple-stemmed palm, 50 to 70 feet high, the trunk 40 to 60 feet

long by 3 to 5 feet girth, all parts glabrous ; leaves palmately flabellate, about 6 to 7 feet across, plaited, the petiole up to an inch broad at base, armed with strong sharp falcately curved flattish blackish spines, the lower spines up to half an inch long and longer by 3 to 4 lines broad at base ; the sheaths dividing into netted fibres; pinnae all (the lateral ones up to half of their length, the central ones higher up) connate in a blade, linear, sharply 2-cleft at apex, the ribs compressed, prominent, the veins rather visible and transverse; flowers small, solitary or by 2 on a nipple-shaped very short and thick pedicel, racemose-spicate, forming a much branched smooth panicle-shaped, 2 to 4 feet long spadix, furnished at the base and along the primary axes with large fuscous quite smooth spathes ; sepals and petals hardly a line long ; drupes elliptically obovoid, 1/2 to nearly an inch long, dark blue, smooth, 1-seeded, seated on the short thick indurated perianth jointed with the nipple- or disk-shaped very short peduncle.

HAB. Frequent in the evergreen tropical forests of the eastern and southern slopes of the Pegu Yomah ; Upper Tenasserim (Brandis). Fr. March—Apr.

Called *taitr-litan* by the Burmese. Very similar to *L. Jenhinsiana*, Griff., but loftier, and differing chiefly by the smooth (not scurvy) spathes and in shape of fruits. The armature seems more developed in my species.

COETIPHA, L

22. *C. UMBRACTILIFERA*, L., *Sort. Cliff.*, 4S2; *Hart., Palm.*, 232, t. 10S and 127, / 2. *Boxb.*, *FL Lid*, II, 177; *Miq., Fl. Lid. Bat.*, III, 49, *eel. syn.* (*C. Talliera*, *Boxb.*, *Corom. Pl.*, III, 51, t. 255-25G and *FL Ind.* II, 174. ; *Griff., Lid. Palm.*, 114, t. 220, U, and F and in *Macl. Calc. Journ.*, V, 317. ^

HAB. Frequently seen cultivated in villages all over Burma. Fl. H. S. ; Fr. the following year.

Pae is the Burmese name of this and all the other species of *Corypha*.

23. *C. GEBANGA* *Bl. Bumph.*, II, 59, t. 97-98 and 105. (*C. data*, *Boxb.*, *FL Lid.*, II, 17G; *Mart., Palm.*, 233; *Griff in Macl. Calc. Journ.*, V, 314 and *Lid. Palm.*, 112, t. 220, L>.).

HAB. Only occasionally seen in Burmese villages, as for example around Tounghoo. Fl. H. S. ; Fr. the following year.

24. *C. MACROPODA*, *Kurz in Andam. Bep.*, ed. 2, 50.—PL XV.

A gigantic stemless palm, 30 to 40 ft. high, all parts glabrous ; leaves very ample, palmately flabellate, from 12 to 20 ft. across, the petiole towards the base as thick as the arm, straight and slender, from 18 to 25 ft. long, along the polished margin armed with strong incurved compressed glossy black spines ; pinnae united to near the middle into a blade, 6 to 10 ft. long, linear, 2-lobed and bluntish at apex, the ribs 4-corned; inflorescence

and flowers unknown ; drupes the size of a cherry, globular, with one or two small abortive ovaries at their base, smooth, olive-brown, 1-seeded.

HAB. In the bamboo jungles of Termoklee island, western side of South Andaman, on chloritic rocks.

Called *dondah* by the Andamanese. I have not seen the palm in flower, but judge it to be stemless from having failed to detect any indication of a stem in the numerous full-grown specimens I met with accompanied by seedling-plants, which latter had their roots so deeply seated in the rocky ground that I did not reach them after digging to a depth of more than 2 feet.

KORTHALSTA, *JBl.*

25. K. SCAPHIGERA, *Mart. Palm.*, 211.—{*Calamosagus scaphiger*, *Griff., hid. Palm.*, 30, t. 184 A. *young plant*; *Calamosagus walliicJiicefolius*, *Griff, in Mad. Calc. Journ.*, V, 24 and *Ind. Palm.*, 29, t. 184 *sub nom. G. harincefolius.*)

Pis. XX, A, and XXI.

A large scandent rattan palm, the canes up to half an inch in diameter, the young leaves beneath fugaceously white-tomentose; leaves pinnate, 2 to 4 ft. long, the rachis sparingly armed with short simple sharp retrorse spines and terminating in a long recurved-thorny tendril, the petiole -| to 2 ft. long, irregularly beset with thin sharp rather straight spines 2 to 4 lin. long, the sheaths minutely brown-scurvy (in young plants sparingly prickly) dissolving along their margins into fibres embracing the stem ; pinna) at base contracted into a compressed petiolule, alternately somewhat approximated, plaited, broadly rhomboid-ovate, the upper ones cuneate-rhomboid, acuminate, from about the middle irregularly and sharply erose-toothed (the teeth formed by the more or less subulate-excurrent veinlets), many-nerved, 4 to 7 in. long, the terminal segment much broader; spadices long and pendulous, terminal, the tubular spathes (in fruit) smooth, brown; catkins very compact and terete, on a short sheathed peduncle, densely tawny tomentose, 3 to 4 in. long, about 4 lin. thick ; bracts very broad, rounded or almost acute, smooth, a little longer than the densely villous bracteoles ; female calyx rigid, more than £ lin. long, fibrous-ciliate ; corolla nearly 2 lin. long, very rigid-coriaceous, deeply 3-cleft, the tube very short; drupes obovoid, mucronate, $\frac{1}{8}$ inch long, retrorsely imbricate-scaled, 1-seeded; scales rigid, trapezoid-ovate, longitudinally impressed, greenish, towards the apex brownish, bordered by a pale brown broadly lacerate narrow bluntish me'mbrane.

HAB. Common all over the Andamans, especially in the evergreen tropical forests. Fr. H. S.

Called *bordah* by the aborigines. On the Andamans occurs another species of the habit of the preceding but with the sheaths densely

covered by sharp spines. Unfortunately, I neglected to collect specimens from the sterile plants, which alone I met with.

26. *K. LACINIOSA*, Mart., *Palm.*, 211. {*Galamosagus lacinosus*, Griff*, in *Mad. Calc. Journ.*, V, 23 c. tab. and *Ind. Palm.*, 27, t. 183 and t. 216, f. 2. (*K. Jtagellaris*, Miq., *Suppl. Fl. Sumat.*, 591).

HAB. Tenasserim, from the Salween down to Mergui. Fr. March.

I have no clear idea of this species, which would differ from the former by the shape of the drupes. The armature of the sheaths and nature of the dentation of the leaves are, as I find, somewhat variable. *C. ochriger*, Griff. {*Ind. Palm.*, t. 216, /! 1), of which authentic specimens exist in H. B. C, is *K* rigida*, Bl. exactly. Miquel reduces his *K. Jtagellaris* to *K. angusta*, Bl. I have not seen the latter species, but if his conclusion be correct, then *JL. laciniosa* and *K. angusta* must fall together.

ZALACCA, Humph.

27. *Z. WALLICHIAXA*, Mart., *Palm.*, 201, t. 118-119 and 136 ; *Miq.*, *Fl. Ind. Bat.*, Ill, 80, *quoad descr.* (*Z. edulis*, Wall., *Pl. As. rar.*, Ill, 14, t. 222-224 sub nom. *Z. Rumphii*; Griff, in *Macl. Calc. Journ.*, V, 7. p. p. and *Ind. Palm.*, 10, t. 175 ? *Calamus Zalacca*, Hoxb., *Hort. Beng.*, 72 and *Fl. Ind.*, Ill, 773).

HAB. Frequent in the evergreen tropical forests all over Pegu and Martaban down to Tenasserim. Fl. C. S. ; Fr. June, July.

Yeinga or *yengan Khyen* Burmese.

Wallfch and Griffith reduce this species to *Z. edulis*, Rwdfc. but it seems to differ by much smaller fruits, sessile catkins, and the leaves being green on both sides.

PLECTOCOMIA, Bl.

28. *P. MACHOSTACIYA*, n. sp., Pis. XVI and XVII.

A lofty climber, all parts glabrous ; leaves pinnate, the petiole and rachis spiny, the spines straight, up to \ inch long ; pinnae (median ones) somewhat approximate by pairs, linear-lanceolate, ^ to 2 ft. long, long-acuminate, white-powdery beneath, 3-ribbed (2 of the ribs marginal), coriaceous, but rather flaccid ; spadices not seen ; lateral spikes 4 to 5" ft. long, about 2 in. thick, somewhat compressed, pendulous ; spatheles distichous, rhomboid-obovoid, acute, 1£ to nearly 2 in. long, coriaceous, brown, blackish towards the upper borders, glabrous ; male spikelets as long as the spatheles, rusty-scurvy-strigillose, the rachis rather strong, shortly and distichously branched ; female flowers not seen ; male flowers : calyx wide, cup-shaped, about a line deep, shortly 3-toothed, the teeth acute, bordered especially in their sinuses by a dense brown woolly tomentum ; petals rigid, falcate, lanceolate, sharply acuminate, about -^ inch- long* or somewhat longer, sulcate outside ; stamens 6 ; drupes unknown.

HAB. Tenasserim, Bithoko range, at 3000 ft. elevation (Dr. Brandis). Allied to *P. elongata*, Bl., but easily distinguished by the doubly larger flowers and the larger and more densely imbricate spathules.

Dj^IONOIOPS, Bl.

29. *D. HYPOLETICUS*, *n. sp.*, Pis. "XVIII and XIX.

Apparently a slender scandent rattan palm, the sheathed stems as thick as the finger, the canes as thick as a common quill; leaves interruptedly pinnate, 2 to 3 ft. long, without tendril, the petioles short, often saccate at base, armed with shorter and longer conical thorns on the back and along the margins sparingly intermixed with somewhat recurved straight short spines, the reddish rachis similarly but more sparingly armed, upwards simply recurved spiny; the sheaths armed like the petiole but very densely so with unequally long straight sharp spines up to an inch long or longer towards the mouth, in front sending out a long prickly recurved-thorny whip-like tendril; pinnae 1 to 2 ft. long, alternately and interruptedly approximate by twos on each side, oblong-lanceolate, acuminate, bristly ciliate towards the apex, white beneath, many-nerved; female spadix small, only 1/2 ft. long, on a slender peduncle (about an inch long) thorny on both margins; spathes unarmed or occasionally with a minute prickle on the midrib, smooth-lanceolate-oblong, slit almost to the base; spathules shortly tubular with an acuminate limb, small and distant; female flowers minute, about a line long, distichous; calyx shortly 3-lobed, 1/2 lin. long; corolla twice as long with a short tube, the lobes linear-lanceolate, acute; male flowers and fruits unknown. (*Calamus hypoleucus*, Kz. olim).

HAB. Tenasserim, Thoungyeen (Dr. Brandis). Fl. March.

30. *D. GRANDIS*, Griff, in *Mart., Palm., A—C and t.* 216, 327, *t.* 175, *f. ix, t. Z. xii, f. 11; Miq., Fl. Ind. Bat., Ill,* 88. (*Calamus grandis*, Griff, in *Mad. Calc. Journ., V,* 84 and *Ind. Palms,* 91, *t.* 210, *A—C and t.* 216, *f. 3.*)

HAB. In the evergreen tropical forests of Rutland-island, Andamans. Fr. May

There grow two or three other species of *Demonorops* in Chittagong, Arracan, and the other provinces of Burma, but these I know from insufficient MS. figures only or from having merely seen them growing.

N. B. *D. Ilystrix*, Griff, is certainly identical with *D. ohlongus*, Bl.; the spines in the latter become quite as long as in the former.

CALAMUS, L.

31. *C. AHEOBESCENS*, Griff, in *Mad. Cole. Journ., V,* 33 and *Ind. Palms,* 4G, *t.* 188, *A—C; MUJ., Fl. Ind. Bat., III,* 113.—PI. XXII.

The insertion of the stamens would appear to vary somewhat. In my specimens they are inserted at the base of the corolla and free; filaments not infracted, shorter than the anthers. Drupes obovoid-oblong, J-f inch long, apiculate, supported by the coriaceous somewhat enlarged perianth, 1-seeded; scales uniformly brown, with a very narrow whitish minutely erose border, cordate-trapezoid, rounded at apex, almost biconvex from a longitudinal central furrow.

HAB. Frequent in marshy beds of choungs, in the moister and evergreen tropical forests of Pegu, on sandstone. Fr. C. S.

Called *thanoung* by the Burmans.

This is the only Burmese species which may truly be called arboreous, having no tendrils whatever. All others are furnished with such tendrils, either terminating their leaves (*Jlagellce*), in which case the inflorescences are axillary (actually they spring from near the base of the opposite leaf) and destitute of spadical tendrils (*lorce*); or the leaves are destitute of them, and the tendrils arise near the apex of the sheath of the opposite leaf, in which case the inflorescences are leaf-opposed and tendril-bearing (or rather the *lorce* grow out into inflorescences). In classification, these several relations have no great value, as an arrangement based upon such characters removes nearly allied species far from each other, as for example *G. Andamanicus* from *G. tig rimes*.

32. C. ERECTUS, *Roxb., Fl. Ind., Ill, 774*; *Griff, in Mad. Calc. Journ., F', 35.* (*G. longisetus, Griff, in Mad. Cale. Journ., V, 30 and Ind. Palms, 44, t. 189, A—B*; *Mi%, Fl. Ind. Bat., Ill, 114*; *G. macrocarpus, Griff., Ind. Palms, 40, t. ISO, A.f. 1-2*; *Mart, Palm., 333, t. 176,/. X*).

Pis. XXIII and XXIV.

A low erect tufted palm, looking like *Zalacca*, 12 to 15 feet high, all parts glabrous; leaves 18 to 12 feet long, pinnate, without tendril, the petiole as also the sheaths armed with seriate greenish or fuscous flat sharp spines up to an inch long, the rachis similarly armed, but the spines gradually becoming fewer in number towards the apex; pinna? by 5 or fewer alternately approximate, elongate-linear-lanceolate, glossy, green on both sides, many-nerved and transversely veined, acuminate, spinulose-ciliate, \ to 2 feet long by 1-1/2 to 2 inches broad, the midrib beneath armed with distant capillary bristles; spadices elongate, branched, terminating in a whip-like recurved-thorny tendril; spathes somewhat compressed, linear-tubular, acuminate, armed with half-whorfe of flat upwardly and downwardly directed spines up to \ inch long, the partial spathes unarmed, shaped and rupturing like those of *Zalacca*; spathules imbricate, cymbiform, almost truncate, glabrescent, fibrous-dissolving at their longer extremity; flowers distichous; calyx a little longer than the bract, shortly 3-toothed; corolla nearly 3 times longer, the tube narrow, nearly as long as the calyx, the lobes linear-oblong; sta-

mens in males free, the filaments broad, not infracted, shorter than the anther; drupes more than an inch long, ovoid-oblong, apiculate, glossy, brown, 1-seedsd; scales imbricate, cordate-trapezoid, fuscous, towards the base paler coloured, almost biconvex with a rather broad longitudinal central furrow, bluntish, the margins not bordered and almost entire; seed oblong, somewhat compressed, the albumen foraminate-erose, surrounded by a resinous crust.

HAB. Evergreen tropical forests of Chittagong and Pegu. Fr. C. S.

According to Roxburgh, the species is called in Chittagong *Sangotta*, but specimens collected there by Dr. Thomson bear the name *rong*—the name by which it goes in Sikkim also. The Burmese call it *tlieing*.

33. *C. FASCICULATUS*, *toxb.*, *Fl. Ind.*, *Ill.*, 779; *Griff.*, in *Mad. Calc. Journ.*, V, 52 and *Ind. Palms*, 62, t. 195, A—B (*eoocl. injl. in B*) and t. 190, A, f. 2; *Miq.*, *Fl. Ind. Bat.*, *Ill.*, 127; *Mart.*, *Palm.*, 210 and 238, t. 116, / IV and VI—PI. XXVII, B.

HAB. Frequent in the mixed deciduous forests, especially in the lower ones, all over Burma, from Ava and Chittagong down to Tenasserim and the Andamans. Fl. Sept. Octob.; Fr. Apr. May.

Called *Kane ga* in Burma.

It often happens that the fruits in this species become monstrous, as shewn in the plate.

34. *C. LATIFOLIUS*, *Roxb.*, *Fl. Ind.*; *Ill.*, 775; *Griff.*, in *Mad. Calc. Journ.*, V, 60 and *Ind. Palms*, 68, t. 198. (*O. palustris*, *Griff.*, in *Mad. Calc. Journ.*, V, 61 and *Ind. Palms*, 72, t. 199? *Miq.*, *Fl. Ind. Bat.*, *Ill.*, 131?).—PI. XXXI, A.

An extensive scandent rattan palm, all parts glabrous, the sheathed stems 2 to 3 in. diameter, the canes up to an inch thick; leaves 8 to 12 feet long, pinnate, terminating in a long whip-like retrorse-thorned tendril, the short petiole armed with a double or single row of short more or less sharp spines hollowed-out at inner base, saccate at base (the sac unarmed or sparingly and shortly prickly), the sheaths quite green, beset with a few excavate thorn-like protuberances or seriate large excavate flat sharp spines or occasionally quite or nearly quite unarmed (on the same plant), sometimes the spines short flat and black; the rachis armed with fascicled or simple upwardly recurved strong thorns; pinna) alternate, broad-lanceolate, the median ones alternately approximate by twos, 1 to 2 ft. long by 3 to 5 in. broad, towards the shortly acuminate apex bristly ciliate, many-nerved and transversely veined, uniformly green; spadix bifariously decompound, axillary, elongate, drooping; spathes tubular, with an obliquely truncate acuminate limb, glabrous, sparingly recurved-thorny, the partial spathes conform, but not so small and less armed; spathules cymbiform, the outer margin acuminate-produced, glabrous; male flowers greenish-yellow; ovary-rudiment small, 3-lobed; drupes ellipsoid-oblong, rather glossy, apiculate,

about 1 inch long, supported by the persistent rigid perianth; scales trapezoid, bluntish, slightly biconvex, with a faint longitudinal furrow, pale brown, with a narrow blackish brown margin; seeds almost semi-convex, grooved and irregularly wrinkled.

HAB. In the evergreen tropical forests all over Burma from Chittagong, Pegu, and Martaban down to Tenasserim and the Andaman islands. Fr. Apr. May.

This is the *yamata* of the Burmans. According to Roxburgh, its name in Chittagong is *Kora bet*.

35. C. ANDAMAKIOUS, *n. sp.*, Fte. XXVII, A and XXVIII.

A lofty scandent rattan palm, the sheathed stems as thick as the arm, the canes up to an inch in diameter, all parts almost glabrous; leaves pinnate, terminating in a whip-like recurved-thorny tendril, 6 to 8 ft. long, the petioles saccate at base, armed with short blackish thin thorns arising from tubercle-like swellings and intermixed with a few long black spines; the reddish brown sheaths covered with numerous obliquely placed seriate whorls of capillary black spines, which soon break off and leave only their bases, towards the fugaceously greyish-tomentose base furnished with reflexed broader flat black spines up to nearly an inch long and forming stronger combs; the rachis more or less depressed 5-gonous, armed beneath with reflexed paired or ternary thorns, towards the petiole also distantly short thorned along the margins; pinnae solitary, alternate, equidistant, 2 to 2½ ft. long and up to an inch broad, linear, subulate-acuminate, along the margins and on the three principal nerves beneath distantly capillary-spiny, transversely veined, uniformly green; spadix axillary, ample, decomposed, nodding; spathes somewhat compressed-tubular, armed with strong short reflexed solitary to ternary black thorns, otherwise apparently glabrous; the partial ones unarmed, tubular and slit on one side, rather abruptly acuminate, glabrous; spathules tubular-cymbiform, closely imbricated, truncate, glabrous; flowers...; drupes distichous, numerous, supported by the somewhat enlarged perianth, elliptically-ovoid, acuminate, uniformly brown, about ½ inch long; scales rhomboid, crustaceous, glossy, chestnut-brown-bordered, otherwise greenish, rather flat and without furrow, at apex prolonged into a lanceolate pale brown opaque acute ciliolate membranous appendage longer than the scale itself; seed semi-convex, grooved; albumen equable.

HAB. Common in the forests all over the Andamans.

Chowdah of the Andamanese.

36. C. TIGITINUS, *ft. sp.*, Pis. XXV and XXVI.

A large scandent rattan, all parts glabrous, the canes up to an inch in thickness; leaves pinnate, 4—8 ft. long, without tendril; the sheaths fearfully armed with whorls and half-whorls of broad flat sharp glossy fuscous or black spines (an inch long) variously intermixed with shorter or thinner

ones, sending out from their front a long similarly armed whip-like tendril the thorns of which are connate and those further up recurved; the petiole and lower parts of rachis similarly but less densely armed not only on the back but also along its margins; pinnae linear, the lower ones by 2 or 3 approximate, alternate or nearly so, 1½ to 2 ft. long, many-nerved and transversely veined, acuminate, spinulose-ciliate, green on both sides, the midrib above and usually also the lateral nerves beneath distantly capillary-spinous; the 2 terminal pinnae more or less connate, deeply 2-cleft; spadix ample, decomposed, nodding, tendril-bearing; spathes compressed linear-tubular, densely black-spinous; the partial spathes unarmed, tubular and much lacerating at apex; spathelets tubular-cymbiform, densely imbricate, truncate, minutely brown scurfy, the one side more produced and often lacerating; flowers...; drupes ovoid-oblong, acuminate, about an inch long, black and brown variegated, 1-seeded, supported by the scarcely enlarged perianth; scales much imbricated, trapezoid, not furrowed on the crustaceous glossy pale brown rather flat back, rather broadly black-bordered and produced into a large pale-brown minutely lacerate membranous rather acute appendage; seed oblong, broadly and longitudinally ribbed.

HAB. Common in the evergreen tropical forests from the eastern slopes of the Pegu Yomah and Martaban down to Tenasserim and the Andamans. Fr. H. S.

Called *lémé* in Burma. The Andamanese name is *umdali*.

37. C. TENUIS, *Boxb., Fl. Ind., Ill*, 780; *Griff, in Mad. Calc. Journ.*, V, 45 and *Lid. Balms*, 57, t. 193, A—C; *Mart, Balm.*, 335, t. 176, l. II, U Z, XVIII, f. XXIV and XXV; *Miq., Fl. Ind. Bat*, III, 118.

PI. XXXI, B.

The drupes of this species are almost ellipsoid-globular, seated on the pedicel-shaped indurated perianth, apiculate, nearly ½ inch long, straw-coloured; scales rhomboid, uniformly straw-coloured with a narrow whitish border, acute, almost flat, with a distinct longitudinal furrow.

HAB. Chittagong (Roxb., etc.); also Pegu (according to Martius). Fl. R. S; Fr. Apr.

According to Roxburgh, it is called *bandliari bet* in Chittagong; specimens from there in H. B. C. are marked with the native name *golob bet*.

38. C. GEACILIS, *Boxb., Fl. Ind., Ill*, 781; *Grif. in Mad. Calc. Journ.*, V, 54 and *Ind. Balms*, 64, t. 196—PI. XXXI, C.

Drupes ½ inch long, elliptical to elliptically globular, apiculate, supported by the indurated stalk-like perianth, straw-coloured; scales trapezoid, bluntish, straw-coloured with a very narrow brownish margin, slightly biconvex with a very deep longitudinal furrow; seed irregularly wrinkled.

HAB. Forests of Chittagong (Roxb.). Fr. March.

According to Roxburgh, called *Mapoori bet* in Chittagong.

30. C. HELFEEIASTTTS, *n. sp.*

Evidently a slender scandent rattan somewhat of the habit of *C. viminalis*, all parts glabrous; leaves pinnate, without tendril, the rachis thin, 3-gonous, along the convex back sparingly armed with small recurved solitary thorns; pinnae narrow-linear, alternately approximated by 2 to 4, long, acuminate, 6 to 8 in. long, towards the apex bristly ciliate, along the 2 lateral nerves above bristly and slightly so also along the midrib beneath; spadix elongate, very slender, glabrous; spathes elongate-linear-tubular, compressed, green, sparingly recurved thorny along the edges, the upper ones unarmed, the limb linear-acuminate, erect; the partial spathes shorter and truncate; spathules minute, cymbiform, remote; male flowers distichous, about 1-1/2 lin. long; calyx cupular, shortly 3-toothed; corolla more than twice as long as the calyx, 3-cleft almost to the base, the lobes oblong, acute; stamens inserted at the base of the corolla; female flowers, etc. unknown,

HAB. Tenasserim (or Andamans?) (Heifer G389).

It is apparently very nearly allied to *C. viminalis*, Bl., but the incompleteness of the material before me excludes the possibility of identifying it. It requires also comparison with *C. exilis*, Griff. (*Ind. Palms.*, 51), a species which I have not seen.

40. C. PAEADOXUS, *n. sp.*, Pis. XXIX and XXX.

An extensive scandent rattan palm, all parts glabrous, the sheathed stems 1 to 2 in. in diameter; leaves pinnate, 5—7 ft. long, terminating in a whip-like hooked-thorny tendril, the petiole short, along with the lower part of the rachis indistinctly puberous and armed underneath and near both margins with more or less straight sharp thorns; the sheaths armed with yellowish sharp flat spines arranged in combs; pinnae 1 to 1 1/2 ft. long, up to an inch broad, of a thin texture, alternating by pairs and remote, marginate, shortly acuminate and inconspicuously remotely appressed-ciliolate; male spadix bifariously decomposed, ample; drooping; spathes all smooth, tubular, with a truncate shortly acuminate limb; spathules similarly shaped, but much smaller, embracing the base of the very short (1 to 3 lin. long) distichously imbricate-bracted male spikelets; bracts spreading, ovate, acute, about a line long, brown, glabrous; male flowers: calyx about a line long, deeply 3-cleft, striate; petals rigid, at base only connate, nearly 2 line long, oblong, acute; stamens 6, filaments rigid, the lower part linear-oblong, longer and broader than the anthers, terminating in an inflexed thread, from which the anther is versatily suspended; ovary-rudiment hardly any; female flowers and fruits unknown.

HAB. Martaban, in the evergreen tropical forests of Palawa zeik (Toukyeghat), east of Tounghoo. Fl. Apr.

I heard this species called *Yamatha Khyeing* by the Burmans.

41. C. GUEUBA, *Hart., Palm., eel I, 211 et ed. II, 20G and 330, t.*

175, / I, t. Z, XVIII, f. XX and XXI_x (≠. *Master-sianus*, Griff, in *Mad. Gale. Journ.*, V, 76 and *Lid, Palms.*, 84, t. 206 and 195, B, excl.fol. sub nom. *C.fasciculati*),

HAB. Frequent in leaf-shedding, especially the mixed*, ^forests all over Burma from Chittagong and Ava down to Tenasserim. Fl. C. S.; Fr. Apr, May.

Called *Kyeing ni* in Burma.

Doubtful Species.

1. *C. PLATYSPATHUS*, *Mart., Palm., ed. I*, 210 (*Dcemonoropsplatyspathus*, *Mart., Palms.*, 206)

Stem thin,* the sheaths sparingly armed with subulate thorns and spreading bristles, in front below the membranous deciduous limb with bristle-like thorns; the rachis and petiole with straight and recurved thorns; pinnae all equidistant, linear-lanceolate, acute, several-nerved, plaited, along with the rachis beneath sparingly and minutely rusty-villous, \ to 1 ft. long, about an inch broad; male spadix \ \ ft. long, supradecomposed, the peduncle \ \ inch long, compressed-terete, thorny and bristly, the rachis lax, sparingly and minutely rusty-floccose, terminating in a recurved-thorny tendril; spathes membranous, flat, persistent, linear, 2—3 in. long, sparingly aculeate or almost unarmed; male flowers about a line long; calyx campanulate; corolla twice as long, the petals lanceolate, acute (*Mart. I. c.*)

HAB. Tenasserim, Tavoy (Wall. Cat. 8610).

I have not seen this species, which (owing to the tendril-bearing spadix) is evidently a *Calamus*, and, had it not been for the unequally distant pinnules, might have been compared with *C. Guruba*.

2. *C. CONCINNUS*, *Mart., Palm.*, 332, t. 116, f. X; *Walp. Ann. Ill.*, 483.—Pl. XX, C.

Erect or almost stemless? the rachis of the leaves (and of the spadix) rusty-tomentose, sparingly beset below with half-conical subulate straight reversed pale thorns; pinnae 15 to 20 in. long, 1—li inch broad, almost equidistant, linear-lanceolate, subulate-acuminate, many-nerved, glossy above, with numerous transverse veins, the margins and keel above setulose; female spadix decomposed; spathes coriaceous, rupturing, with small rather straight recurved thorns; secondary spathes lax membranous; spathules ring-shaped, short; calyx-lobes ovate, twice as broad as the lanceolate almost equally long corolla-lobes; drupe globular, acute, as large as a pea; scales yellowish, the lower margin broader brownish (*Mart. I. c.*)

HAB. Tenasserim, Tavoy (Wall. Cat. 8607.)

This species also is unknown to me, and the figured drupes appear to be very unripe.

3. *C. NJTIDUS*, *Mart., Palms.*, 334; *Walp. Ann.*, Ill, 484.

Stem ? leaves rather rigid, the rachis armed with copious solitary and combined recurved thorns intermixed with smaller ones ; pinnae \ ft. longer, 1 inch broad, approximate, equidistant, linear-lanceolate, glossy, marginate along the 3 nerves above and almost bristly along the border ; female spadix about 2—3 ft. long, terminating in a tendril, decomposed ; spathes produced into a membranous limb 2 in. long, at base beset with small retrorse black thorns rather thick at apex ; flowers by pairs (a male and a fertile one) ; calyx tubular, 3-toothed ; corolla lobes ovate, acute ; drupes (unripe) globular, acute ; scales chestnut-brown on the middle, with a broad pale-coloured fringed margin {*Mart. I. c.*).

HAB. Tenasserim, Tavoy (Wall Cat 8609).

Again a species which I cannot identify from the description only. It seems to belong in the affinity of *G. tigrinus*, etc. with fringed-appendaged scales, but has elongate spathules.

4. *C. MELANACANTHUS*, *Mart., Palm., 333, t. 116, f. XIII, t. Z, XXII, f. X; Walp., Ann., Ill, 484.—PL XX, B.*

Scandent, the thorns all antrorse, glossy black (those of the sheaths almost whorled straight ?) those on the rachis almost solitary, scattered and short (1-3 lin. long), recurved ; pinnae equidistant, linear, about 12—13 in. the upper ones 1/2 ft. long by 5—6 lin. broad, long acuminate, along the borders, on the midrib beneath and above and along the two lateral nerves beneath black-bristled ; female spadix decomposed, terminating in slender retrorsely aculeate tendrils ; spathes rather terete, shortly truncate, the lower ones with scattered retrorse thorns, the upper ones almost unarmed ; drupes ellipsoid, acute, 10 lin. long by 5 lin. thick ; pale yellowish, sometimes with a brown-coloured thin margin {*Mart, I. c.*).

HAB. Tenasserim, Chappang (Wall. Cat. 8608).

A species unknown to me.

5. *C. UUMILIS*, *Roxb., Fl. Incl, III, 773.*

Shrubby ; not scandent nor flagelliferous. Leaves lanceolar, smooth, many-nerved. Spines few, but long and strong (*Roxb. I. c.*).

HAB. Chittagong (Roxb.).

6. *C. POLYGAMUS*, *Roxb., Fl. Lid., Ill, 780; Or, if. in Mad Qalc. Journ., Y, 48, in adnot.*

A most extensive scandent* Rambler, canes the thickness of a common walking-stick ; spines almost whorled ; sheaths flagelliferous ; lower pinnae in remote fascicles of 3 or 4, the upper ones single and alternate or opposite, all linear with a few bristles on the margins and nerves underneath ; male and hermaphrodite flowers on the same supra-decomposed spadix {*Roxb., I. c.*).

HAB. Chittagong (Roxb.).

Hoodoo bet of the natives, according to Roxburgh,

EXPLANATION OF THE PLATES.

(All figures are of the natural size, except where the contrary is stated.)

PL. XII. ARECA HEXASTICHA, *Kurz.* Fig. 1. plant, reduced in size ; fig. 2. spadix in young fruit; fig. 3. transverse section of spadix, shewing the 6 series of flowers ; fig. 4. a very young fruit with perianth ; fig. 5. the same, longitudinal section, somewhat magnified.

PL. XIII. LIVISTONA SPECIOSA, *Kurz.* Fig. 1. plant, reduced; fig. 2. a piece of the ultimate branching of the fruiting spadix; fig. 3. seed, from below; fig. 4. section of the same; fig. 5. upper part of petiole and base of leaf. (The trunk in fig. 1 is drawn too thick by nearly half a line).

PL. XIV. LIVISTONA SPECIOSA, *Kurz.* Fig. 1. lower; fig. 2. upper part of petiole.

PL. XV. CORYPHA MACROPODA, *Kurz.* Fig. 1. plant, reduced; fig. 2. seedling-plant, also reduced; fig. 3. fruit; fig. 4. terminal pinna?, reduced; fig. 5. portion of petiole, reduced.

PL. XVI. - PLECTOCOMIA MACROSTACHYA, *Kurz.* Fig. 1. tail-like spike, lowest and uppermost part of it; fig. 2. a spathe with the inflorescence; fig. 3. flower; fig. 4. flower of *Plectocomia clongata*, for comparison's sake; fig. 5. flower, opened out, magnified ; fig. 6. petal, from outside, magnified.

PL. XVII. PLECTOCOMIA MACROSTACHYA, *Kurz.* Fig. 1. a portion of the leaf; fig. 2. the same, shewing spine on the under side.

PL. XVIII. DJEMONOROPS HYPOLEUCUS, *Kurz.* Fig. 1. flowering branch, § ; fig. 2. an ultimate branching of inflorescence, magnified; fig. 3. calyx, magnified; fig. 4. corolla, laid open, magnified.

PL. XIX. DJEMONOROPS HYPOLEUCUS, *Kurz.* Fig. 1. portion of branch and lower part of leaf; fig. 2. terminal portion of leaf.

PL. XX. A. KORTHALSIA SCAPHIGERA, *Mart.*, from the Andamans. Fig. 1. part of fruiting spadix ; fig. 2. a flowering catkin, ? ; fig. 3. drupe; fig. 4. scales of drupe, magnified; fig. 5. seed; fig. 6. the same, longitudinal section. B. CALAMUS MELANACANTHUS, *Mart.* Fig. 1. drupe, copied from Martius's work. C. CALAMUS CONCINNUS, *Mart.*, copied from Martius's work. Fig. 1. fruiting branchlet; fig. 2. drupe, magnified.

PL. XXI. KORTHALSIA SCAPHIGERA, *Mart.*, from the Andamans. Fig. 1. sheath and lower part of petiole; fig. 2. young plant.

PL. XXII. CALAMUS ARBORESCENS, *Griff.*, from Pegu. Fig. 1. part of fruiting spadix; fig. 2. drupe; fig. 3. scales; fig. 4. seed, immature; fig. 5. terminal portion of the male spadix ; fig. 6. male flower, somewhat magnified ; fig. 7. calyx, slit open, magnified ; fig. 8. corolla, with stamens, laid open, magnified ; fig. 9. stamens from different views, magnified.

PL. XXIII. CALAMUS ERECTUS *Roxb.*, from Chittagong. Fig. 1. lower part of female spadix ; fig. 2. portion of fruiting spadix ; fig. 3. seed, with the resinous cover ; fig. 4. seed, longitudinal section ; fig. 5. scales.

PL. XXIV. CALAMUS ERECTUS, *Roxb.*, from Chittagong. Fig. 1. portion of male spadix ; fig. 2. male flower; fig. 3. corolla with stamens, laid open, somewhat magnified ; fig. 4. stamens from different views, magnified.

PL. XXV. CALAMUS TIGRINUS, *Kurz.*, from the Andamans. Fig. 1. fruiting branch of the spadix with portion of tendril; fig. 2. lower part of the basal spadix ; fig. 3. drupe ;

fig. 4. scales of the same, magnified ; fig. 5. seed from above ; fig. 6. the same, side-view ; fig. 7. the same in longitudinal section, shewing the embryo at *e.* ; fig. 8. young fruits, from Pegu ; fig. 9. scale of the same, magnified.

PL XXVI. CALAMUS TIGRINUS, *Kurz*, from the Andamans. Fig. 1. leaf with tendril, reduced ; fig. 2. portion of petiole and sheath with tendril ; fig. 3. pinnule.

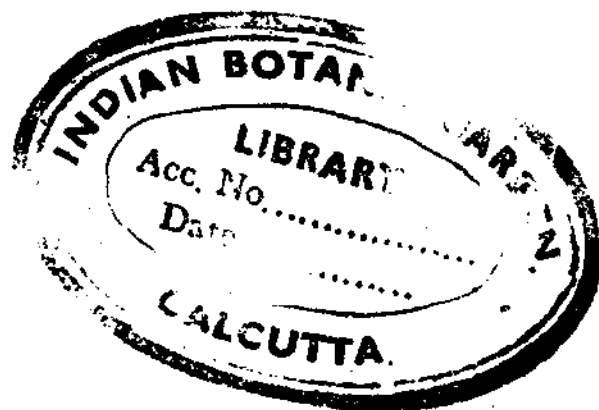
PI. XXVII. A. CALAMUS ANDAMANICUS, *Kurz*, from the Andamans. Fig. 1. portion of the fruiting spadix ; fig. 2. drupe ; fig. 3. scales of the same, magnified ; fig. 4. the same, still more magnified ; fig. 5. seed ; fig. 6. the same, longitudinal section. B. CALAMUS FASCICULATUS, *Roxb.*, from Burma. Fig. 7. a portion of the spadix with unripe and monstrous fruits ; fig. 8. a monstrous fruit, magnified.

PL XXVIII. CALAMUS ANDAMANICUS, *Kurz*, from the Andamans. Fig. 1. a portion of the stem with leaf and lower part of inflorescence, much reduced ; fig. 2. the same, with the lower part of the petiole ; fig. 3. a pinnule.

PL XXIX. CALAMUS PARADOXUS, *Kurz*, from the Martaban. Fig. 1. portion of flowering male spadix ; fig. 2. terminal spikelet of the same, magnified ; fig. 3. a male flower, magnified ; fig. 4. the same laid open, magnified ; figs. 5 and 6. anthers seen from the side and front, magnified ; fig. 7. leaf, reduced.

PL XXX. CALAMUS PARADOXUS, *Kurz*, from Martaban, $\$>$. Fig. 1. lower portion of leaf and sheath ; fig. 2. upper portion of ditto, with part of tendril.

PL XXXI. A. CALAMUS LATIFOLIUS, *Roxb.*, from the Andamans. Fig. 1. portion of the fruiting spadix ; fig. 2. drupe ; fig. 3. scales of the same, magnified ; figs. 4 and 5, seed seen from below and above ; fig. 6. the same in longitudinal section ; fig. 7. unripe fruits from Pegu ; fig. 8. the same, somewhat magnified ; fig. 9. scales of the same, magnified. B. CALAMUS TENUIS, *lioxb.*, from Chittagong. Fig. 1. piece of fruiting spadix ; fig. 2. drupe ; fig. 3. scales of the same, magnified ; fig. 4. seed, from above ; fig. 5. the same, in longitudinal section ; fig. 6. unfinished pencil sketch of drupe, copied from Roxburgh's drawings. C. CALAMUS GRACILIS, *Roxb.*, from Assam. Fig. 1. lower part of spadix with leaf-sheath ; fig. 2. drupe ; fig. 3. seed from below ; fig. 4. the same, in longitudinal section ; fig. 5. scales, magnified ; fig. 6. transverse section of the same.



ON THE GENERAL THEORY OF DUPLEX TELEGRAPHY.

By Louis SCHWENDLER.

(Continued from page 21.)

The first part of this investigation concluded by giving the best relations between the resistances of the different branches of the Bridge Arrangement, under the limiting supposition, however, that the line used for duplex working was perfect in insulation, or more generally that the real conduction resistance of the line could be neglected against the resistance of the resultant fault.*

It now remains, therefore, to investigate if the simple relations given are generally true ; or, if not, what they become in case the line has an appreciable leakage. In fact this is clearly the case of practical importance, since all overland lines, especially long ones, even if constructed on the best known principles, will always have a very considerable leakage, *i. e.*, the resistance of the resultant fault (*i*) will generally be by no means *wery* large in proportion to the real conduction resistance (*Z*) of the line.

In order to obtain the best general solution of the problem, we must conduct the investigation with great caution, that is, we must be careful not to introduce beforehand any relation between the different variables, however convenient, that is not necessarily a consequence of the paramount condition to be fulfilled for Duplex Telegraphy, *i. e.* ^e *Regularity of Signals*.

Thus it will be seen that the present general investigation must be conducted somewhat differently from the special one given in the First Part.

It must, however, be understood from the beginning that whatever the best relations may be, which should exist between the different resistances of the Bridge Method, when used on an imperfect line, these relations must revert to the special ones given before if we put $i = \infty$, and this fact affords a certain check upon the correctness of the new relations to be found.

General solution of the first problem for the Bridge Method.

The diagram (Fig. 1) given in the First Part represents the general case, and to it therefore I shall refer in the present paper.

The general mathematical question which is to be solved for Duplex Telegraphy has been stated as follows :—

REGULARITY OF SIGNALS. *D and S are two functions which must be rigidly equal to zero when no variation in the system occurs; and which for*

* For a definition of the terms, "resultant fault," "real conduction," "measured conduction," "real insulation," "measured insulation," &c, which will be of frequent occurrence in this paper, see my *Testing Instructions*, Part II, Section I.

any given variation in the system must be as small as possible, and approximate rapidly towards zero as the variation in the system becomes smaller and smaller.

Further these two functions *I* and *S* were expressed, say for Station (1), as follows:

$$I = \frac{E' \frac{1}{S} \frac{A'}{U}}{R' + \frac{1}{S} \frac{A'}{U}}$$

and

$$S' = \frac{E' \frac{1}{S} \frac{A'}{U}}{R' + \frac{1}{S} \frac{A'}{U}} \quad \text{(IV)}$$

These two expressions are quite general, *i. e.*, they do not as yet contain any restrictive conditions (beyond those involved by the mode of arrangement of the system of conductors) between the different variables ; and the signification of the abbreviated terms can be found from the First Part.[#]

Now—the first relation that we shall introduce is

$$w + P = f \quad \text{f}$$

for both stations, which may be called most appropriately "the key equation"

The introduction of this relation at the outset is quite justified, for say that $S' = I' = 0$ is rigidly fulfilled in Station (I), when Station (I) is sending and the key in Station (II) is at rest, and suppose the electromotive force in Station (II) equals o (the E. M. F. of all elements annulled and only their resistance f left), then, moving the key in Station (II) from its rest contact to its working contact, the regularity condition $S' = D' = 0$ would be (*i. e.* balance in Station I) at once disturbed if $w - f \neq f$ during the motion of the key, even if no variation in the line took place. Thus it is paramount to have $w + P = f$ each station during the movement of the key.

* For convenience of reference I shall give here all the terms of which, use will be made hereafter.

$$\begin{aligned} n &= h(a + d + ff + l) + (a + g)(f + d.) \\ TM &= b(\frac{1}{S} + d) + d(a + g.) \\ k &= b(a + f) + a(f + d.) \\ \psi &= \frac{k}{n} \\ \rho &= \frac{a}{n} \\ \ll &= *(ff + d)(a + f) + ag(d + l) + fd(a + g.) \end{aligned}$$

* These expressions have been obtained by the application of Kirchoff's rules to the Bridge Arrangement as represented in Fig. 1, and they are quite general, as no other relations beyond those represented by the diagram have been introduced as yet.

f To fulfil the key equation most exactly during the movement of the key, I have constructed a key (constant resistance key) based on the following principle : During

But if for instance in Station (I)

$$* + P = f$$

it follows that

Hence, substituting its value, for a' and reducing, we get more simply,

$$S' = \frac{E' m'}{n'} - \frac{E' b'}{n'} \dots \dots \dots \text{(IV')}$$

but as

$$\frac{m'}{n'} = \frac{V}{A' n'}$$

and

$$\psi' = \frac{k'}{n'}$$

we have

$$S' = \frac{E' b'}{n'} \left\{ \frac{1}{1 - \frac{\Delta'}{m' \psi'}} - 1 \right\} \dots \dots \text{(IV)}$$

Therefore S' approximates most rapidly towards zero if $\frac{A'}{in' \psi'}$ does, or

we have

$$\frac{\Delta'}{m' \psi'}$$

should be as small as the circumstances will allow of.

the first movement of the key (up or down stroke) a force is stored up in a spring before the contacts are changed, which force finally causes the change in these contacts; for this reason the two principal contacts of the key co-exist only for an almost infinitesimal time, the length of which is moreover independent of the signalling speed.

Thus for this key $u \cdot \rightarrow / = j\delta$ is fulfilled in all positions except one, when it is $\frac{w + \beta}{\dots}$, but for such a short time that the error cannot have any disturbing influence whatever.

* xj is the proportion of the total current arriving at point 1 Fig. 1, which passes off through the instrument g' when the key of Station (I) is at rest. Then if' , being a function of $\langle', \&', d', g'$, is also a function of $/'$. $0'$ is the proportion of the total current arriving at point 1 Fig. 1, which passes through the instrument g^o when the key of Station (I) is sending, thus, besides being a function of \langle', b', d^* and g' , it is a function of $w' + \&$ instead of $/'$, and as $\langle p^*$ and ψ' are otherwise quite similar functions they become identical if we make

$$/ > = i o > + f f$$

$E'V$

$t - \wedge p$ can never become zero, but should on the contrary be as large as possible, and, therefore, S' can only approximate towards zero by $\frac{\Delta'}{in' \psi'}$ as small as possible.

Now that D' approximates also rapidly towards zero [by making

$$f \sim \frac{\Delta'}{m \psi'}$$

as small as possible can be proved as follows :—

By definition we have

$$D' = \frac{P'}{P}$$

Further, as $\langle j \rangle' = i //$ (on account of the key equation), we have

$$p' = \delta' \text{ invariably}$$

$$\therefore D' = \frac{S'}{P'}$$

Thus D' for any given P' approximates towards zero at the same rate as S' does, *i. e.*, the smaller δ' becomes.

Therefore the whole problem is actually most generally solved by making

$$\theta = \frac{\Delta}{m \psi}$$

as small as possible for both stations.

Now for Station (I), if balance in the g' branch for the **outgoing** current be established, we have

$$a' d' - V c' = 0$$

where c' is the "*measured circuit*" from Station (I), and supposing that all variations in the system are chiefly due to variations in the line resistance,* we have at once:

$$- V \delta c' = K$$

$\delta c'$ the total variation of the line resistance may be either positive or negative, and supposing that $\delta c'$ contains its sign we have :

$$\delta \sim \frac{K}{m' i f'}$$

IT

to be made as small as possible.

Now in case of the line being perfect ($i = \infty$) $\delta c' = SL$ (a constant with respect to the different resistances of each arrangement, and which was the case in the first solution). At present however $\delta c'$ is a function

* The variations in $\langle f \rangle$ may be due to variations in the line, or to variations in the duplex arrangements. In the latter case they may be due either to an alteration of temperature in the station and then the effect can be only small, or to an accident (wire or connection breaking) and then the influence will become so great that nothing short of actual repairs could help. Thus practically the problem has only to be solved for variations in the line.

of the resistances of the two arrangements, which function must be first determined before we can decide what general condition makes δ as small as possible.

We have

$$\frac{+ \rho''}{n}$$

p'' being the complex resistance of Station (II).

Put $V = x$
and $V + I'' = L$

$$\frac{dV}{dx} = -\frac{dI''}{dx} = -\frac{dL}{dx}$$

Now c' may vary from three essentially different causes, namely :—

1. x varies, or the position of the resultant fault alters ;
2. i varies, or the resistance of the resultant fault alters ;
3. L varies or the real conduction of the line alters, as may happen by an increase or decrease of the temperature along the whole length of the line, or by the occurrence of a partial discontinuity (imperfect joints, loose shackles, &c).

These three causes may act separately or conjointly, and their total effect we can approximately get by taking the *total* differential of c' with respect to x , i , and L .

$$\therefore dc' = \frac{M}{dx} dx + \frac{M}{di} di + \frac{dG}{dL} dL$$

or $dc' = \frac{M}{dx} dx + \frac{M}{di} di + \frac{dG}{dL} dL$ approximately,

which expression is perfectly true, however, for small variations dx , di , and dL .

Now*

$$\frac{m' \psi'}{b} = \frac{N'}{n} + oc = P + c T^{00}$$

$$\frac{m'}{N'} = \frac{b'}{A' \sim A' \frac{\wedge}{m}}$$

$$\therefore n' \sim b' \sim \sim b'' mf$$

or $\frac{K'}{I'} = \frac{IS'}{m'} + \frac{A'}{b'} \cdot \frac{n'}{m'}$

Int $A' = // S'$

$$\therefore I' \sim 7/ + \frac{A'}{b'} \cdot \frac{n'}{m'}$$

$$\therefore \tilde{V} = \frac{\frac{dc}{dx} \delta x + \frac{dc'}{di} \delta i + \frac{dc'}{dL} \delta L}{p' + c' + \delta c'}$$

But as δx , δi and δL are very small, and, as neither $\frac{dc'}{dx} \rightarrow \frac{dc'}{di}$ nor $\frac{dc'}{dL}$ can become infinite, it follows that $\delta c'$ must be always very small in proportion to c' itself, and more so as compared with $p' + c'$

Thus we have at last

$$\mathcal{E} = \frac{d\mathcal{E}}{dx} \delta x + \frac{d\mathcal{E}}{di} \delta i + \frac{d\mathcal{E}}{dL} \delta L$$

and therefore to make \mathcal{E} , for independent variations δx , δi , and δL , as small as possible, each term should be made as small as possible. Now, taking p' and p'' as independent variables, it will be seen that the total differential of each term is negative. Thus \mathcal{E} becomes smaller the larger p' and p'' are selected, and the same of course is the case for \mathcal{O} (Station II).

Now the complex resistance of any one station can be expressed as follows:—

$$\rho^* = \frac{(a+f)(g+d)}{a+g+d+f} \frac{(ad-gf)^2}{(a-d+g+f) \{ b(a+d+g+f) + (a+g)(f+d) \}}$$

Thus for any given sum of resistances, i. e., $a + d + g = \text{const.}$, ρ will be largest if

$$ad - gf = 0 \dots \dots \dots \text{(VI)}$$

which is the "immediate balance condition"

Now

$$\frac{m' \psi'}{b'}$$

Substituting for $\frac{m' \psi'}{b'}$ its value we get

$$\begin{aligned} \text{but } N' &= if n' + a' \\ \therefore \frac{m' \psi'}{b'} &= \frac{N'}{n'}, \text{ but } \frac{a'}{n'} = \rho' \\ \therefore \frac{N'}{n'} &= c' + \rho' \\ \text{or } \frac{m' \psi'}{b'} &= c' + \rho' + \delta c' \end{aligned}$$

* This expression is nothing else but the resistance of a Wheatstone's bridge between the two battery electrodes. It is most easily obtained by the application of Kirchhoff's rules.

The fulfilment of the immediate balance condition is therefore no longer an assumption made to afford convenient and quick means of adjustment when balance is disturbed, but, as has been proved, is necessary in order to reduce the effect of any disturbance whatever to a minimum.

Supposing now the fulfilment of the immediate balance, we have

$$\frac{P}{P} = \frac{(ff + \ll^*) (a + f)}{a + d + f + g}$$

which again has a relative maximum for

$$g + d = a + f$$

whence it follows, in consequence of equation (VI), that

$$\ll = \frac{tf}{y} \dots \dots \dots \text{(VIII)}$$

represents the general solution of the problem.

This result might of course have been anticipated from the special solution, since equation (VIII) gives only a relation between the branches, quite independently of *i*. It remains now to determine the magnitude of one of the branches, and to this end we have to consider the magnetic moments of the receiving instruments.

MAXIMA MAGNETIC MOMENTS. By definition we have

$$S = P - Q$$

for both stations, and as it has been proved before quite generally that $S = 0$ if $A = 0$, *i. e.*, if rigid balance in the station for the out-going current be established, we know at once that at or near balance the currents which in one and the same station produce single and duplex signals must be identical, and need therefore express the magnetic moment in each station for *one* current only, by presupposing balance in both the stations.

The currents which at or near balance produce the signals are

$$* \quad \& = \frac{E''}{4} \dots \dots \dots \text{in Station (I),}$$

ami
ana

$$* \quad G'' = \frac{E''}{4} \cdot \frac{\mu''}{g' + c'} \dots \dots \text{,, ,, (II).}$$

* For "balance in Station (II) the current passing through Station (I) is

$$A''$$

$$i'' = \dots$$

$$\dots \dots \dots \frac{l''}{2l'' \psi''} \mu'' \psi''$$

but $y = \frac{1}{2} y$ on account of $a = d = g = l$ in each Station

$$\therefore G'' = E'' \frac{l''}{2l'' \mu''}$$

but $l'' = 4 \frac{c''}{l'' - j - i''}$

and dividing by b'' we get

These expressions follow from the general formula) by fulfilling the regularity equation (VIII) for both stations, and in addition the balance conditions.

Multiplying now G' by $\sqrt{g'}$ and G'' by $\sqrt{g''}$, we get

$$P' = \frac{E'}{4} \cdot \frac{\sqrt{g'}}{g' + c'} a'$$

$$P'' = \frac{E''}{4} \cdot \frac{\sqrt{g''}}{g'' + c''} \mu''$$

the magnetic moments of the two instruments in Nos. (I) and (II) Stations respectively; and, considering that*

$$\frac{ixf}{g' + c'} \sim \frac{p''}{g'' + c''} \sim \frac{i}{Q}$$

where $Q = (g' + V) (l + I'') + iW + g'' + V + I'$, we may write the two above expressions as :—

$$P'' = \frac{E''}{4} \frac{i}{Q} \sqrt{g''}$$

The first expression has clearly an absolute maximum with respect to g' , and the second with respect to g'' , but these two maxima cannot be simultaneously fulfilled, and do not therefore represent a solution in this particular case. But if we consider that during a *duplex* signal both the instruments g' and g'' are in circuit, while during a *single* signal, though not both the instruments yet certainly their equivalent in resistances are in circuit, it will be clear why simultaneous maxima of the two single expressions are *not* possible. It represents simply the more general case to which the question belongs of making the magnetic moments of two instruments, connected up in the same single circuit, maxima. In this case it is well known we can do nothing more than make the sum of the magnetic moments a maximum, and here therefore we must do the very same.

Adding then we get

$$P = P' + P'' = \frac{i}{4} \frac{E'' \sqrt{g'} + E' \sqrt{g''}}{Q}$$

$$G' = \frac{E'}{4} \cdot \frac{\mu'}{g'}$$

but $g'^2 = h'' r''$ on account of balance in Station (II)

∴ $4 \sqrt{g'} = \sqrt{h'' r''}$

* This can *ho* easily shewn by substituting for u' , h'' , c' and c'' their actual values.

which expression has a maximum with respect to both g' and g'' considered as independent variables, and such indeed according to the nature of the problem they really are.

Thus, differentiating P with respect to g' and g'' , we get

$$\frac{dP'}{dg'} = Q - 2\sqrt{g'} \left\{ \sqrt{g'} + \frac{E'}{E''} \sqrt{g''} \right\} \frac{dQ}{dg'} = 0$$

and

$$\frac{dP}{dg''} = Q - 2\sqrt{g''} \left\{ \sqrt{g''} + \frac{E''}{E'} \sqrt{g'} \right\} \frac{dQ}{dg''} = 0$$

But as the same kind of instruments are employed in both the stations, we require evidently also the same force in both to produce the signals, no matter what the state of the line may be.

Thus we must put*

$$P' = P''$$

or

$$\therefore \frac{E''}{E'} = \frac{\sqrt{g''}}{\sqrt{g'}}$$

Substituting this value for the proportion of the E. M. F., we get

$$Q - 4g' \frac{dQ}{dg'} = 0$$

and

$$Q - 4g'' \frac{dQ}{dg''} = 0$$

but

$$\frac{dQ}{dg'} = g'' + l'' + i$$

and

$$\frac{dQ}{dg''} = g' + l' + i$$

Substituting these values in the above equations and reducing; and, further, dividing the first equation by $V + i$ and the second by $I'' - i$, we get at last

$$i l' \left(1 + \frac{g''}{l'' + i} \right) = 0$$

and

$$i l \left(1 + \frac{g'}{l' + i} \right) = 0$$

* This supposition in the case of a perfect line is fulfilled by itself, since when the two instruments are not only of the same kind, but absolutely identical.

Put $I^\circ + \frac{iV}{i + \frac{1}{y}} = L''$ measured conduction from Station (II),

and $V + \frac{iI''}{i + \frac{1}{y}} = -Z'$ measured conduction from Station (I).

Thus, the two equations which determine the absolute magnitude of g' and y respectively, are

$$L' + g' - 3g' \left(1 + \frac{g'}{i + g'}\right) = 0$$

and

$$L'' + g'' - 3g'' \left(1 + \frac{g''}{i + g''}\right) = 0$$

from which g' and y'' can be expressed, namely,

$$g' = -i + \sqrt{2' + i^2 / (3L' + q)} \dots \dots \dots (X')$$

and

$$y = -i + \sqrt{2'' + i^2 / (3L'' + q'')} \dots \dots \dots (X'')$$

where

$$q' = \frac{1}{y} + l'$$

and

$$2'' = i + L''$$

Supposing now $i = \infty$, or the insulation perfect, we have $L' = L'' = L_y$ and

$$g' = g'' = g = \frac{L}{2}$$

the former *special* solution.

But so long as i is not infinite, U and X' may be different from each other j and, therefore, also g' different from g'' and, further,

$$g' = \frac{L'}{2}$$

and

$$y = \frac{L''}{2}$$

will be somewhat too large. These values will, however, represent a very close approximation in the case of any line in tolerably good electrical condition; and, as a line worked *duplicè* represents two lines, it can be always afforded to select the best sections, when the above values for g' and g'' will be sufficiently correct for all practical purposes, especially if it be remembered that when once g' and g'' have been fixed, they cannot be easily altered, and that, therefore, U and X'' must be invariably certain averages, either for the whole year or for certain seasons. This, however, belongs more to the practical application than to the theory of Duplex Telegraphy.

The resistance of the b branch in each station can now be easily calculated from the balance equations and the values given for y' and y'' .

The value of the b branch must be calculated to enable us to ascertain that *maximum* part of b which will have to be made variable in increments for the purpose of adjusting balance, and to this interesting question we shall revert further on.

The general solution of the problem might now be considered complete, if it were not for the currents which produce the signals, of which we do not know as yet with certainty that we have the maxima in the solution given above. It must, however, be understood that this solution represents the *only true one* from our physical point of view, and that, if it should not be identical with that giving the maxima currents, when considered generally by themselves from the beginning, the solution would not be thereby invalidated; but only the duplex method in question would prove to be not quite so perfect as could be desired. The sequel, however, will shew that the relation $a = d = g = f$ represents also the maxima currents that are possible under the circumstances. As this investigation is of great importance in forming a correct opinion of the value of the method, it will be fully gone into.

MAXIMA CURRENTS. When considering the question of currents, for any telegraphic circuit, the two conditions which invariably should be fulfilled are :

Firstly.—Greatest possible constancy of current.

Secondly.—Maximum current.

How far these two conditions can be fulfilled simultaneously, depends clearly on the special circuit and the special arrangements adopted; but so much is certain, that from a practical point of view, the first condition (constancy of current) will always be of far greater importance than the second, inasmuch as the required strength of currents can be obtained by employing cells, efficient in kind, sufficient in number, and properly arranged to suit requirements.

Thus in our case, when we consider the currents which produce the signals in Duplex Telegraphy, before going to the condition of maximum current, we must ascertain first the condition of *greatest possible constancy* of current.

Now it has been proved before that *immediate balance* in each station is requisite in order to make the effect of any disturbance on the receiving instrument as small as the circumstances will allow of. But as these disturbances were considered with respect to *one* and the *same* instrument, *i. e.*, independently of the magnetic moment, these disturbances are then simply due to the disturbances in the signalling current; from which it follows at once that the fulfilment of the *immediate balance* condition is required also

in order to have the *greatest possible constancy* in the signalling current. Thus when investigating the question of maxima currents we are justified in presupposing the rigid fulfilment of the immediate balance for both stations, *i. e.*,

$$ad - gf = 0$$

Further, as it has been shewn before that the fulfilment of the regularity condition

$$a = d \wedge g = f$$

for both stations does make the effect of the disturbances still *smaller*, we have only to investigate the current at balance, and to show that the condition of maximum current becomes identical with the regularity condition, whence it would follow that the duplex method under consideration is perfect in every conceivable respect.

The question to be solved stands, therefore, as follows :—

Two signalling currents, the expressions of which are known, have to be made simultaneous maxima, while the different variables are linked together by four condition equations.

Thus
$$G' = E'' \sqrt{r, f' f}$$

the current which produces single and duplex signals in Station (I).

b'
 k'

the current which produces single and duplex signals in Station (II).

1.	$a' d' - b' c' = 0$	}	Condition equations.
balance in (y') Station (I).			
2.	$a'' d'' - b'' c'' = 0$		
balance in g'' Station (II).			
3.	$otdt - g > f = 0 \setminus$		
4.	$a'' d'' - g'' f'' = 0)$		
immediate balance in both stations.			

Now c' is a function of p'' , but on account of equation (4>) p'' is independent of b'' , thus c' is also independent of b'' ; in the same way it follows that c'' is independent of b' j thus b' and W can be explicitly expressed at once, and from the four condition equations we have

$$b' = \frac{a' d'}{c'}$$

$$b'' = \frac{a'' d''}{c''}$$

$$f' = \frac{a' d'}{g'}$$

$$f'' = \frac{a'' d''}{g''}$$

and, substituting these values in the expressions for G' and G'' we get

$$G'^* = \frac{a^* g''}{\{c'' k a'' + g''\} + \ll'' (g'' + d'')} \quad \text{and} \quad G''^* = \frac{E' \cdot \frac{g'}{g''}}{\{C \{a' + g'\} + a' (l + d')\} \{q' \{a'' + g''\} + a'' (l + d'')\}}$$

where

$$q' = i + V$$

$$q'' = i + I''$$

Put

$$\frac{g'}{g''} = h$$

and substitute in the first expression

$$g'' = k g'$$

in the second

$$g' = \frac{g''}{k}$$

when we get

$$G' = E'' i k \cdot \frac{a' g'}{\{c'' (a'' + g' k) + a'' (d'' + g' k)\} \{2' (\ll' + y') + \ll' (g' + d')\}}$$

$$G'' = \frac{E' \cdot a'' g''}{\{e' (g'' + a' k) + a' (l + d' k)\} \{g'' (a'' + g'') + \ll'' (d'' + g'')\}}$$

Now it will be seen that G' has clearly a maximum with respect to g' , while G'' has a maximum with respect to g'' ; thus, if we take g' as the only variable in G' (h constant) and differentiate with respect to g' we get

$$\frac{d G'}{d g'} = 0$$

and, if we take g'' as the only variable in G'' and differentiate, we get

$$\frac{d G''}{d g''} = 0$$

* If in these two expressions we put

$$i = \infty$$

and remember that then

$$a' = a'' = a$$

$$j' = j'' = j$$

$$y' = y'' = y$$

$$C^* = c'' = L \ll^* p$$

and

while

$$p = \frac{1}{a + g}$$

we get

$$G' = G'' = G = E r \frac{1}{(Z (a + \ll j) + 2 a (y + l))} \cdot (l + l)$$

the expression of the current which produces the signals (single and duplex) Oirough ?i perfect line, as was given in the first part of this investigation (p. 19).

These two equations must be fulfilled simultaneously in order to have the simultaneous maxima of the two currents in question.

Executing the differentiation, and re-substituting for h its value $\frac{a''}{g}$, we get after reduction.

$$\begin{aligned} & \ll' a'' 0'' + cl'' (q' + (V) - g'f(a' + q') (a'' + c'')) \\ & - g' (\ll'' + u'') j 0 / (\ll' + y') + \gg' (l + *) \} \frac{dc''}{g} = \ll' \\ \text{and} \quad & a' a'' (c' + d') \{ \ll' + d'' \} - l \ll' f(a'' + q'') (\ll' + c') \\ & - g'' (a' + g') + a \frac{dc'}{dy''} = 0 \end{aligned}$$

while

$$\begin{aligned} \frac{dc''}{da'} &= \frac{i^2}{((l + p')^2)} \cdot \frac{a' (a' - d')}{(a' + r^1)^2} \\ \frac{dc'}{dy''} &= \frac{i^2}{(\ll' + P''Y')} \cdot \frac{a'' (a'' - d'')}{(\ll'' + l T)} \end{aligned}$$

Now the terms in the two equations which have $\frac{dc''}{dg}$ and $\frac{dc'}{dg'}$ for factors become independently zero, the first for $a' = d'$ and the second for $a'' = d''$ and, substituting these values for d' and d'' in the other two terms, both become zero for

$$a' a'' - g' g'' = 0$$

whence it follows that

$$\begin{aligned} a' - d' &= 0 \\ a'' - d'' &= 0 \\ a' a'' - g' g'' &= 0 \end{aligned}$$

is one of the simultaneous solutions of the two equations.*

Thus, substituting for d' its value a' and for d'' its value a'' , we get

$$\begin{aligned} \& \gg' \mathbf{JB} \ll' < \frac{a' / l}{(c' + a') (a' + y') (a' + g') (u^2 + q')} \\ G'' &= E' i \frac{a'' g'}{(a' + a) (a' + l) (\ll'' + y'') (a'' + r'')} \end{aligned}$$

The first equation has clearly a maximum with respect to a' and the second with respect to a'' , namely

$$\frac{\partial G''}{\partial a'} = U, \text{ which gives } a' = y,$$

and $\frac{\partial G''}{\partial a''} = 0$, which gives $a'' = y''$.

* The other solutions which are possible from a mathematical point of view are however impossible with respect to the physical problem, for the quantities being all electrical resistances must be taken with the same sign, say positive.

Thus it follows generally that $a = d = g$ represents a maximum of the currents, and this, in consequence of the immediate balance, gives at last

$$a = d = g = f$$

the known regularity condition, which thus has also to hold good in order to make the two currents G' and G'' simultaneous maxima.

The first problem for the Bridge Method has therefore now been generally solved, and the results are expressed by the following formulæ :

$$a = d = f = g = w + \beta$$

$$g = H \left(\sqrt{1 + \frac{L}{H}} - 1 \right)$$

where
$$H = 3 = \frac{I + i}{3}$$

When the insulation is perfect ($\infty = \infty$) the results revert to those originally obtained in the special solution, viz. :—

$$a = d = f = g = w + \beta$$

$$g = 2$$

$$b = \frac{L}{6}$$

It will be clear that the given solution fulfils the following conditions which are necessary and sufficient to place Duplex Telegraphy on a par with Single Telegraphy.

i. Any variation in the resistance of the line has the least possible disturbing effect on the receiving instrument.

ii. Any disturbance can be eliminated by a single adjustment in the branch without disturbing balance in the distant station.

iii. Minimum magnetic moment of the receiving instrument.

iv. Maximum current.

There seems to me to be no other method that can fulfil all these conditions simultaneously, and the "double balance" method must, therefore be pronounced perfect in every conceivable respect. I am convinced that if the general problem of duplex working were investigated by means of the Variation Calculus, the double balance method would come out as the final and only solution.

* I have called this method the "double balance" method, since there are two balances to be fulfilled in each station, namely, balance in the b branch for the incoming current and balance in the a branch for the outgoing current.

The double balance method was introduced on one of the important Bombay-Calcutta main lines in June last. Since then this duplex method has been working so satisfactorily and with such regularity and speed, even during the worst time of the

ADDENDUM.

HISTORICAL.

When reading this paper before the Asiatic Society on the 4th February 1874, and, further, when editing the First Part for publication in the Journal of the Society, I was unacquainted with the fact that a most complete history of Duplex Telegraphy had been published by Dr. Karl Eduard Zetzsche* (Leipzig 1865). According to Professor Zetzsche,† the Bridge Method of Duplex Telegraphy was already invented in 1863 by Maron, a Prussian Telegraph Inspector; and Dr. Zetzsche very truly remarks that the Bridge Method would seem to be that least affected by variations in the resistance of the line. To this, from an historical point of view, most valuable book, I refer the reader.—It is to be hoped that an English translation of it may soon be published.

year (South-West monsoon)—when necessarily the insulation as well as the inductive capacity of lines are so enormously variable, that about its thorough practicability no doubt can be entertained, and Col. Robinson, Director General of Telegraphs in India, has consequently decided to introduce this duplex method also on the other long main lines of India.

At present the apparatus for the Bombay-Madras line (worked direct 800 miles) is almost finished, and the apparatus for Calcutta-Rangoon is under manufacture.

The Calcutta-Bombay main line is worked duplicate with Jabalpur only in translation; distance between Calcutta and Jabalpur 850 miles: distance between Jabalpur and Bombay 640 miles. The wire is almost throughout No. 5 B. W. Gr. (diam. = 5J m. m.)

This experiment, made on such a large scale and under the most unfavorable meteorological conditions, has proved most conclusively the practicability of the *double balance* method, which certainly will invariably succeed on any line where single telegraphy is possible.

* Die Copiertelgraphen, die Typendrucktelegraphen, und die Doppel Telegraphie, ein Beitrag zur Geschichte der electrischen Telegraphie, von Dr. Karl Eduard Zetzsche, Leipzig 1865.

† Page 125 in the work quoted.

(To be continued.)

LIST OF CHIROPTERA INHABITING THE KHASIA HILLS, WITH DESCRIPTION
OF A NEW SPECIES.—By Gt. E. DOBSON, B. A., M. B., F. L. S.

To Major H. II. Godwin-Austen we chiefly owe our knowledge of the fauna of these little known hill tracts, and the following list has been almost altogether made out from his collections presented to the Indian Museum. Most of the species were new, or Himalayan forms, while one is a well known European bat.

FAM. *BKINOLOPKIBM.*

1. *KHINOLOPIUS LUCTUS*, Temm.

This species has never, so far as I know, been found in the plains. Indeed all the species of this genus appear to be fond of elevated lands far from human habitations. The genus *Rhinolophs* is the only genus of this large family represented in the colder latitudes, and both species of leaf-nosed bats found in England* belong to it. The fur of all the species is remarkably long and dense, evidently in relation to the temperature they live in. In this respect they contrast remarkably with the species of the allied genus, *Phyllorhina*, which are almost confined to the plains and low hill ranges of the tropical and sub-tropical parts of the Eastern Hemisphere.

2. *KH. YUNANENSIS.*

lth. Ytwanensis, Dobson, J. A. S. B., 1872, p. 33G.

? *lth. lan-atus*, Milne-Edwards (non Horsfield), Mammif. du Tibet, 1872, p. 248.

Milne-Edwards' species is most probably identical with this, which will probably be found generally distributed throughout the Himalayas and adjoining mountain ranges. A dried specimen in the Indian Museum from Tupai Mukh, collected during the Lushai expedition, belongs to this species.

3. *PHYLLORHINA ARMIOERA*, Hodgson.

This fine species, first discovered by Mr. Hodgson in Nipal, is almost the only hill-dweller among numerous and widely distributed species of the genus. It is alone surpassed in size by the African *Ph. Conimersouii* (*Macronycteris gigas*, Gray), and is the largest Asiatic leaf-nosed bat yet discovered. It extends along the Himalaya into China, and has been found by Mr. Swinhoe at Amoy.

The Khasia Hills are a new locality for this species.

4. *PH. LEPTOPHYLLA*, n. sp.

Ears rather large, broad and triangular with subacute tips, the outer margin slightly concave beneath the tip. The upper transverse nose-leaf

small, upper edge simple, narrower than the horse-shoe portion, thin, the three vertical folds in. front faintly discernible at jbase only : the horse-shoe with a small incision in **the** centre of its front free edge : frontal pore small, placed at some distance **behind** the transverse nose-leaf.

Wing-membranes from the tibia a short distance above the **ankle** ; **interfemoral** membrane triangular, the extremity of the tail projecting, **For** and in teguments dark throughout.

This species belongs to the same section* **of the genus** as *Ph. ar miff era* **from which** it is **distinguished** by its considerably .similler size ; by the upper transverse nose-leaf being simple, not lobed above as in that species, and by the incised front edge of the **horse-shoe** winch **in** *Ph. armigera* is invariably **plain**.

The specimen from which the above description is taken is an adult **male** preserved in . alcohol, obtained in the Khasia Hills by Major **H. H Gfodwin-Austen** and sent by **him** to the Indian Museum.

5. PH. LABVATA, Horsfield.

Tim **Indian Museum** possesses specimens of this species from the Khasia Hills collected by tin* late Lieut. Bourne. They **differ remarkably** in the colour of the fur from the Javanese and Burmese forms. Those from the **Khasia** Hills are usually very dark without the least reddish tinge; in one **specimen**, however, an **old** male with greatly enlarged glandular elevations between the eyes, the fur has a very distinct orange tinge throughout.

G. Pn. **FULTA**, Gray.

This appears to be the most widely distributed species of the genus.. It varies **remarkably** in **the** colour of the fur and **size** of the **ears**, and has **consequently** received nearly as many **names** as those of tlio **different countries** it inhabits,

PAM. VBSPMMTtlONIDJS.

7. YESPEBUS FACHYOTIS.

Fetpmu /'<"•/' iff is, Dobaon, P. A. S. B. 1871, p. 211.

This remarkable species, readily **distinguished** by its peculiar **fleshy** ears, has not been recorded from any other locality. The **original description** ua* taken from two adult specimens, a male and female, preserved **in** alcohol **in** the Indian Museum.

8. ' YESPEIIUO (PITISTBELLUS) IMBHICATUS, Hoi'S field.

This **h the commonest** bat in India **where** it takes **the** plac-i- of the **European Pipistrelle**. **Specimens** vary much in size according to age and locality ; the tuna **of** the teeth, **especially** of the incisors, is also very variu-

* *Gloionyeteris*, Gray.

23G G. E. Dobson—*On the Chiroptera inhabiting the Khasia mts.* [No. 1] ^
ble, and consequently the species has received a great number of different names.

9. VESPERTILIO (PIPISTRELLUS) AUSTENIANUS.

Pipistrellus Austenianus Dobson, P. A. S. B., 1871, p. 213.

Major Godwin-Austen has lately sent another specimen of this species which is readily known by its broad straight tragus, and intensely black integuments and fur. *P. ajjinis*, Dobson, from Yunan, is very close to this species, but there are nine vertebrae in the tail compared with seven in *P. Austenianus*, the tragus is narrower, and the colour of the fur light brown.

10. NYCTICEJUS ORNATUS, Elyth.

This peculiarly marked bat is the nearest representative of the American genus *Atalapha* (= *Lasiurus*). It is common in the warm valleys about Darjeling and Dr. J. Anderson found it in the Kakyan Hills, Yunan.

11. BARBASTELLUS COMBIUNIS, Gray.

I can discover no difference between the specimen sent by Major Godwin-Austen and specimens of the common European *Barbastelle*. It appears to be common in the Himalayas. Specimens have been sent from Másurí by Captain Hutton, and from Simla by Moulvie Ataor Iluhinan; those from Simla are preserved in the Indian Museum.

It may be confidently expected that the following species which are generally common in the surrounding countries will be found in the Khasia Hills, namely—*Pteropus ineilius*, Temm.; *Cynopterus inarginatus*, Geoff.; *Cynonycteris amplexicauda*, Geoff.; *Megaderma lyra*, Geoff.; *Rhinolophus affinis*, Horsf.; *Rh. Garoensis*, Dobson; *Phyllorhina diadema*, Geoff.; *Ph. speoris*, Schr.; *Taphozous saccolaimis*, Temm.; *T. melanopogon*, Temm.; *Vespertilio forpwsus*, Hodgson; *Kerivoula picta*? Pallas; *K. Hardwickii*, Gray; *Vesperugo annectens*, Dobson; *Vesperugo (Tylonycteris) pachypus*, Temm.; *V. dietrichi*, Horsf.; *V. Tickelli*, Blyth; *Marina harpia*, Pallas; and *M. cyclotis*, Dobson.

DESCRIPTIONS OF NEW SPECIES OF CHIROPTERA FROM INDIA AND
YUNAN.— *Bij* G. E. DOIBSON, B. A., M. B., F. L. S.

PHYLLORHINA BRACIOTOTA, 11. sp.

Ear comparatively small, as broad as long, inner margin very convex forwards, outer margin slightly concave beneath the tip; nose-leaf as in *JRh. Iqvata*, Horsf., front surface of upper transverse portion with three very distinct vertical ridges; frontal pore small, indistinct, not larger than that of the females of *Ph. larvata*.

Feet small: wing-membrane from the metatarsus near the base of the toes. Interfemoral membrane rather large, triangular behind; extreme tip of tail free.

Fur, above, light brown at base, the terminal third of the hairs very dark, the extreme tips paler; beneath similar but somewhat paler. The fur on the shoulders and along the spine darker. Ears and wing- and interfemoral-membranes very dark known. Specimens in colourless alcohol appear very dark brown throughout.

The second upper premolar is separated from the canine by a wider interval than usual in this genus; in the midst of this space, but rather to the outside, the small, scarcely distinguishable first premolar is placed.

Length, head and body 1"95 inches; tail 1"4; head 0"75; ear (anteriorly) 0"5; forearm 1"75; thumb 0".25; second finger 2"7; fourth finger 2"1; tibia 0"72; calcaneum 0"4; foot and claws 0"3.

The above description is taken from an adult male, preserved in alcohol, obtained by Staff Surgeon F. P. Staples in Central India, and presented by him to the Museum of the Army Medical Department at Netley.

VESPERTILIO MONTIYAOUS, II. sp.

Crown of head very slightly elevated; muzzle obtuse: ears narrow, tapering, with rounded tips; outer side flatly emarginate immediately beneath the tip for about quarter its length, then slightly convex, and lower down, opposite the base of the tragus with a small emargination, terminating beyond this in a small rounded lobe; inner margin convex for two-thirds its length, then forming a straight line to the tip; tragus long, narrow, and acutely pointed; inner margin straight, outer slightly convex upwards with a small rounded lobe at the base.

Feet very small, toes two-thirds the length of the whole foot. Tail wholly contained within the interfemoral membrane. Wings from the base of the toes.

Fur, above, dark-brown, the extreme tips paler and shining ; beneath much darker, almost black for three-fourths the length of the hairs, the remaining portion ashy. In front the face is everywhere densely covered, the long hairs concealing the eyes and leaving the tip of the nose alone naked : on each side of the muzzle two or three small glandular wart-like elevations may be seen through the hairs. The ears are quite naked anteriorly, posteriorly their bases only are covered. On the wing-membrane the fur of the back extends as far as a line drawn from the junction of the proximal and middle thirds of the humerus to the commencement of the distal third of the femur : on the interfemoral membrane it ceases abruptly at the end of the second caudal vertebra. Beneath the fur extends upon the wing-membrane as far as a line drawn from the elbow to the knee-joint; the interfemoral membrane is covered at the root of the tail, and three fourths of the remaining part is very thinly clothed with the short hairs arising from the transverse dotted lines.

Incisors, on each side, parallel and acutely pointed ; inner incisors longest, with a small acutely pointed talon near their extremities on the outer side. In the lower jaw the second premolar is small but distinctly visible, standing in the tooth-row ; in the upper jaw the space between the canine and third premolar is small, and the second premolar is very minute, placed interiorly, in the angle between the first and third premolar, and with difficulty distinguishable even with the aid of a lens.

Length, head and body 1.8 inches ; tail 1.6 ; head 0.65 ; ear 0.55 ; tragus 0.25 ; forearm 1.5 ; thumb 0.25 ; second linger 2.7 ; fourth linger 1.9 ; tibia 0.6 ; foot and claws 0.3.

Habitat.—Hotha, Yunan.

The above description is taken from adult male and female specimens preserved in alcohol, obtained by Dr. J. Anderson during the Yuuain Expedition, and deposited in the Indian Museum, Calcutta.

SOME ORNITHOLOGICAL NOTES AND CORRECTIONS.

By W. EDWIN BROOKS, O. E.

(Received August 25th, read Nov. 4th, 1874).

TINNUNCULUS PEKINENSIS, Swinhoe.

I obtained a mature male, a young male in changing plumage, and an adult female of this species, in April last, near Dinapore. They were, with many others, hovering over the cleared *paddy* land close to the line of railway.

T. cencliris, Naum., it will be "remembered, is distinct from the Indian and Chinese species.

ACCTPITER YJITGATUS, Temil).

J. A. S. B., 1872, p. 73.

Mr. Hume saw the specimen procured in Cashmere by Capt. Cock, and pronounced it to be an old male of *Ac. ni-ms*, Lin. ; in which I believe him to have been correct.

AQUITJA BFFASOIATA, Gray and A. ORIENTALIS, Cab.

With the addition of Mr. Anderson's specimens, I have now eight of the latter species. Four are marked as males, as indeed their small size indicates ; the average length of the wing in these is 20.09 inches. Of four males of *A. bifasciata* - the first four I met with—the average of the wing is 20.62 inches, or a trifle more than half an inch difference, which is quite a trilling one for so large a bird as an eagle. The sexing of one of the four females is certainly incorrect : this bird has a wing only 20.75 long: one of the males has the wing 20.50 : showing a difference of only 0.25 in. between male and female, which, in an eagle of this size, is far too small; there should have been a difference of 1.50 in. at least. Between the four males and four females of *A. bifasciata* there is an average difference of 2.63 inches ; If therefore, need only contrast the males of each as regards size, using for this purpose only this series of eight of each which I have before me.

One of the objections to my identification of *Aq. orientalis* with *A. bifasciata* was the alleged larger average size of the latter—a question which must be left open till a reliable series of the European bird can be obtained, *• £ , reliable as regards sex. The European birds were mostly obtained from the dealer Moeschler of Dresden, and there is much doubt about the specimens marked as females, for they approach the males too closely in size.

The other point of supposed difference was the darker tone of plumage of the European bird. With regard to this, I find that the Indian species is quite as dark. In fact, in the series now before me, the balance of darkness

of colour is decidedly on the side of the Indian birds. The European ones, which are spring and summer birds, are more faded. The question of colour may, therefore, be dismissed at once, for in this respect the two species correspond as closely as could be desired, but that of comparative size must stand over till a good series of the European bird is obtained, and for such a series to possess any value the sexes of the birds should have been determined by a naturalist, and not by a mere dealer.

For the present, then, I adhere to my conclusion that the two species are identical; each one having the peculiar buff patch at the back of the head, the strongly banded wings when immature, and a tail barred in precisely the same way—all very strong points in favour of absolute identity.

AQUILA HASTATA, Lesson.

This species is said by Mr. Dresser to differ from the species found in North Europe, in the plumage of the young bird. The adults are said to correspond.

I have two specimens in their first plumage, taken from the nest at Saharunpore, and the following is a description of them.

Irides dark brown; bill black, but lead-gray towards base; cere and gape bright yellow; feet a dull yellow; claws black. Above, dark hair-brown; this dark brown is shaded into quite a brownish-grey on the lower half of the back and upper tail-coverts, the feathers of this lighter portion being dark-shafted; upper tail-coverts barred with white on their outer webs; from top of head and down to nape of neck the feathers are tipped with small fulvous spots; scapulars, ridge and bend of wing, and most of the lesser wing-coverts tipped with fulvous spots of larger size; median wing-coverts similarly pale-tipped, with the lower row having the spots considerably larger (about $\frac{1}{2}$ in. in length): this row of large spots presents the appearance, at a little distance, of a first and slight wing-bar; greater coverts all broadly tipped with dull fulvous white, presenting the appearance of a second and strong bar on the wing; secondaries and tertials broadly edged with greyish-white shaded off into the darker portion of the feather, and these light ends form the third bar on the wing; the dark portion of the wing-coverts and scapulars is of the same dark hair-brown as the back; primaries uniform black and unbarred; secondaries brown, profusely barred with hoary-grey on both webs; the greyish-white ends to the tertials are *very* broad; cheeks and side of head brown of a paler shade than the top of the head and streaked very faintly with darker; tail-feathers dark brown, tipped broadly with greyish-white, and barred with greyish on both webs; these bars are nearly square to the shaft (Mr. Anderson's young example has not, however, any indication of bars on the tail, except on the two outer feathers, and these nearly obsolete bars are con-

finned to the inner webs) ; chin, throat, and breast are brown of a shade lighter than the head and upper back and gradually becoming paler lower down, till it passes into dingy fulvous on the lower abdomen and under tail-coverts ; from the top of the breast to lower abdomen the feathers have central and terminal stripes of fulvous, the stripes increasing in size towards the legs ; the feathers of the lower tail-coverts are slightly, but broadly, barred with pale brown, and the shaft portion forms also a longitudinal brown streak ; the appearance of the tail from below is brown, darkest towards the basal portion, and barred profusely with whitish grey ; tibial plumes lightish brown spotted with fulvous ; tarsus fulvous, indistinctly streaked with pale brown. The primaries, though apparently barless, are, especially the inner ones, when seen from below, obsoletely barred on the inner web. One specimen is much less spotted than the other on the upper portion of the wing, most of the lesser coverts being plain brown, and the small spots being almost confined to the vicinity of the bend of the wing and to its ridge.

Mr. Dresser has promised me an immature bird of the European form for comparison, the result of which will be communicated hereafter.

AQUILA FULVESCENS, Gray and Hardw.

For the last three years no additional examples of this rare eagle have been procured. The African species, *Aquila ncsvioides*, Cuv. with which our bird has been confounded, is, I find, subject to some variation as regards the tail. In my remarks on this species (P. A. S. B., 1873, pp. 173-175), I noted the strongly barred tail of the example then before me. Mr. Anderson has since lent me another South African example, a fine adult bird, which is in the moult; in it both *old and new* tail-feathers are hoary-greyish* brown, and the indications of bars so faint as to be only perceptible in certain lights. It would thus appear that only some individuals have the tail well-barred like the common Indian *Aquila Vindhiana*, and, consequently, that a barred tail may not always be one of the characteristics of the species. I may note that I have a single example of *Aquila Vindhiana* with an absolutely plain tail; but of the hundreds that I have seen, all, with this single exception, had well-barred tails.

The body plumage of this second example of *Aq. ncevioides* above referred to is of two colours : all the old feathers are light sandy-coloured, while the new ones are foxy-red : the lesser and median wing-coverts, and also the scapulars, are a mixture of purplish-brown of different shades and rufous; the rufous, in most of the feathers, occupying the centre as a broad stripe, but in some cases being confined to one side. The nostril is vertical and of the same oblong form as that of *Aq. Vindhiana*.

I cannot understand how our Indian *A. Tindhiana* came to be con-

founded with the well-marked African *A. ncevioides*; no two birds could be more distinct, the foxy-red plumage of the latter being most striking. As far as general tone of colour goes, the African species more resembles *Aquila fulvescens*, Gray in its immature or buff stage; but this last is readily distinguished by its very circular nostril, not to mention other well-marked differences.

AQUILA VINDHIANA, Franklin.

Having seen Kuppell's plate of *Aquila albicans* and read what Mr. Blanford* and Dr. Finsch† say of the North East African species, which they term *A. rapax*, Temm., I strongly suspect its identity with our Indian *A. Vindhiana*. From what I have seen of true *Aquila ncevioides* vel *rapax*, I cannot conceive of this bird ever being "pale cream coloured" or "blackish brown;" and a species distinct from *A. ncevioides* (and which has been confounded with it) is doubtless found in the North em portion of Africa. Küppell's plate of *A. albicans* is the most perfect representation of a pale "Wokhab" that could be desired. A series of North African and Punjab birds should be compared. Mr. J. II. Gurney once told me (*in litt.*) that the identity of the North African Eagle generally termed *A. ncevioides* with our Indian *A. Vindhiana* was very probable; and also that Lord Walden had Abyssinian examples of the latter species.

ARCHIBUTEO STROPHIATUS and A. CRYPTOGENYS Hodgs.

Are two entirely distinct species. I have copies of Hodgson's minute drawings of each, with all details of bills and feet. Although both are of similar size, the latter is "a much feebler bird and more of a Buzzard; it has a very much smaller foot, a more slender tarsus, and a much smaller bill, and while *A. strophiatius* has the nostril free, *A. cryptogenys* has it partially hidden by plumes. The plumage of the two birds is also entirely different. Neither, I should remark, bears the faintest resemblance to *Aquila pennata*, which is only two-thirds of the size of Hodgson's two species, so that if a specimen of the last-named in the British Museum, said to have been sent by Hodgson, is labelled ^4. *strophiatius*, it could not have been so labelled by Hodgson, who cannot be held responsible for what is probably due to Museum blunders, and who anyhow knew the Booted Eagle too well to apply the name of *strophiatius* to it.

MILVUS PALUSTRIS, And.

P. A. S. 1873, pp. 142—147.

Mr. Anderson authorizes me to withdraw this species. I have procured a considerable series of the common Indian village Kite (*Jf. affinis*, Gould),

* Zoology and Geology of Abyssinia, p. 295.

† Trans. Zool. Soc. Loud., 1870, p. 201.

and there appears to be but little doubt that *M. pains tr is* is this bird in either second or third plumage.

As before observed, *M. Gorinda*; Sykes is the larger Kite which comes to the plains of India in the cold weather. The large dimensions given by Sykes render it certain that he described the larger species, for no common village Kite reaches the length of 20 inches. It is also pretty clear that Sykes did not contemplate there being two affined Kites, both of them found in the country in which he worked.

Mr. Gurney has informed me that the two types are of different sizes ; but regardless of the types, neither of which in this instance may have been the very one from which Sykes described, I think we should hold to the original description, which describes a large 20-inch Kite. And in this case *Milvus major*, Hume and *Milvus melanotis*, Temm. and Schleg. become synonyms of *Milvus Govinda*, Sykes.

I possess a common Indian village Kite, returned to me by Mr. Gurney as being feather for feather identical with the Australian species, *M. affinis*, Gould. This identical bird is the commonest form of the resident species distributed so widely over India; and I think, therefore, that our common Kite should in future be known by its correct name of *M. aiflnis*.

At Mussoorie, both species are to be seen during the spring and summer, but more in the interior of the hills only the large species, *M. Govinda*, is met with. A few breed at JBarahaut on the lihaugaruttee.

PEHNIS CMSTATA, Cuv.

A young bird from the nest which I once kept in confinement, had the breast of a rather light earth-brown, each feather having a black central stripe. Even in this young bird the crest was well developed.

The dark-plumaged birds are the fully adult ones. I have one shot from the nest in this plumage, and all I saw at Saharunpore in July, where they had their nests in trees near the canal, were of this dark plumage. In speaking of the young bird, I should have mentioned that the upper plumage was a very dark clove-brown.

HIRUNDO DAUIUCA, Lin. and II. ERYTHROPYGIA, Sykes.

I only met with the latter species in cishimalayan Cashmere, as far up as Chungus on the Tawi river. At Mussoorie, Simla, and Almorah, and also at Binsur, north of Almorah, the strongly striated species with paler rump-band (*If. -Daurica*) prevails. It is also somewhat larger than *If. erythropygia*. I have procured both in the plains in the cold weather, but the hill bird is there very much scarcer. *If. erytlropygia* breeds near Chunar, and at most places in the North-West Provinces where there are old buildings or quarries suitable. The eggs are laid at the commencement of the rains. At Mussoorie, I saw a nest of *If. Daurica* on the ceiling of

a bath-room in Col. Macdougall's house. The birds went in and out through a broken pane of glass. Other nests were affixed to the underside of the roofs of servants' houses belonging to a house at the south end of Mussoorie. The doors being generally left open, the place just suited the swallows, which were only shut up with their nests at night. The young were hatched in the beginning of July, so that the eggs must have been laid towards the latter part of June. I have, however, seen eggs of this species at Almorah in the end of April.

HEMICHELIDON SIBIRICA, Gmel.

El. fuliginosa, Hodg.

I have referred to this species in J. A. S. B., 1872, p. 75. It is now known by its older term of *H. Sibirica*, Gmel. I compared my examples with one of Hodgson's in the Indian Museum, and found them identical. Hodgson's dimension (2f in.) for the wing refers to the minimum size; the range of variation in length of wing is greater than I supposed possible in such a small bird, viz. 2.75 to 3.05 in. What the small species referred to by me in J. A. S. B., 1872, p. 76 was, I have no means of ascertaining. I remember it well, and still have Mr. Hume's letter concerning it, written at the time, when he assured me that Hodgson's species was not the one commonly received as such.

ALSEONAX TERRICOLOR, Hodgs. and A. LATIROSTRIS, Raffles.

Mr. Hume considers these species identical, and in writing of the former always terms it *A. latirostris*, under which name he has figured it in *Lahore to Yarkand.' Mr. Swinhoe* identifies *Muscicapa cinereoalba*, Temm. and Schleg. with *Alseonax latirostris*, Raffles. Having examined the Chinese species *M. cinereoalba*, I find it distinct from *A. terricolor*, by its shorter tail and rather differently shaped and somewhat broader and shorter bill, which is also blacker towards the tip than in the other bird. *Alseonax latirostris* is without doubt one of these two closely allied birds; and the question is, Which of the two agrees with Raffles's type and description? Mr. Hume appears to think that because *A. terricolor*, Hodgs. has been procured in the country from which Raffles described his *A. latirostris*, it is therefore Raffles's species; but the other bird, which is a common species in China, may also occur in Sumatra in winter.

I do not know whether Mr. Swinhoe was correct in uniting *A. cinereoalba* and *J. latirostris*, and whether he compared his examples of the former with the type or not; and the subject requires thorough investigation, for Mr. Swinhoe speaks of the Chinese bird as being "identical with the Indian species."

I know for a certainty, from close comparison, that Mr. Swinhoe's examples of *M. cinereoalba* in the Indian Museum are not identical with the Indian species *A. terricolor*, and I have indicated the points of difference. This identification of his makes me very much doubt that of *A. cinereoalba* with *A. latirostris*. Apparently he has not noted the difference between *A. terricolor* and *A. cinereoalba*.

I fail to see any grounds whatever for Mr. Hume's identification in the fact that both he and Lord Walden have *A. terricolor* from the locality whence KarHes obtained his species; and the question, What bird is *Alseonax latirostris*? must be regarded as at present an unsettled one.

ERYTHROSTERNA PARVA.

J. A. S. B., 1872, p. 76.

The bird I observed in Cashmere should be *Erythrosterna hyperythra*, Cabanis, distinguished from *E. parva* by having a band of velvet-black down each side of the neck and edging the red of the throat and breast. This full breeding-plumage is assumed after the birds have left the plains. In the cold weather when they re-appear, they have lost the black band; but the old males retain the red breast. In this plumage it has been mistaken for *E. jparva*, which for the present should be expunged from the Indian list.

ERYTHROSTERNA ALBICILLA, Pallas.

Erroneously termed *E. leucura* by Blyth and Jerdon, this species having a western limit at about Buxar or Ghazepore and being replaced in the North-West by the aforementioned species. The black wings and tail of *E. albicilla* and its colder and greyer plumage readily distinguish it from the other when in immature or female plumage; it is not nearly so often procured with a red throat, and even then the red does not extend down the breast as in the other species, but is confined to the throat.

ACROCEPHAIUS STENTOREUS, H. and E.

Acrocephaius brunnescens, Jerdon, Ibis, 1874, p. 49.

Lord Walden* considers the Cashmere species to be distinct. I have seen many both in Cashmere and in the plains of India, and the birds are perfectly identical. The very peculiar and loud voice is alone sufficient to identify the bird by, whether in the plains or in Cashmere. It varies somewhat in size and in tone of colour; the latter depending upon the season of the year. Our plains' birds are only with us during the cold weather, leaving in the spring. Cashmere is the nearest breeding-place, but the great majority of the birds probably go farther north. I should also remark that in this species length of bill, wing, and tail is variable.

* Trans. Zool. Soc. Lond., 1872, p. 64.

ACROCEPHALUS DUMETORTTH, Blyth.

I saw a few of this species near Mussoorie on June 1st frequenting dense rose-thickets at about 7000 feet elevation. Whether they would have remained there to breed or gone further north, is a question to be solved. Capt. Hutton is said to have taken the eggs near Mussoorie. The males were not singing, as they usually do vigorously when the nest is built.

DUMETICOLA AFFRNTS, HodgS.

Is subject to variation as regards being spotted or not, just as is *D. major*, Brooks. I obtained one or two unspotted examples of the latter; they were breeding males, too, and in full song. Mr. Hodgson was aware of the variation, and hence figures *D. affinis*. & s unspotted, but describes it as spotted. The female of neither species has been recorded; that sex in both is probably unspotted. I never obtained a female of *D. major*.

DFMETICOLA BRThSTNEIPECTUS, Blyth.

Eferred to by Mr. Blanford in J. A. S. B., 1872, p. 1G4. I examined this bird, and found it to be *D. affinis* in the unspotted stage. I would suppress Blyth's *D. brunneipecius* altogether as a species, considering it but *D. affinis*, Hodgs.

TRIBURA LUTEOYEKTRIS, Hodgs.

I examined the specimen referred to by Mr. Blanford* and found it also to be *Dumeticola affinis*, Hodgs. in the unspotted plumage. *Tribura luteoventris* has a longer head, measured from the back of the skull to the tip of the bill, which latter is also of a different shape. The specimen in the Indian Museum is so old and faded that the original colour cannot be recognized; nor can the forms of wing and tail be ascertained.

NEOEXIS FLAYOLITACEA, Hodgs.

I have this species, and it is a greenish olive above. Hodgson's drawing, No. 900, does not represent it, as stated by Mr. Hume, f but is applicable to *Horornis assimilis*, Hodgs., as stated by Gray.

PHYLLOSCOPTJS PALT.IDIPES, Blanford, J. A. S. B., 1872, p. 1G2.

Is not a *Phylloscopus*, but a true *Iloreites*. I have examined the type: the second quill is equal to about the sixteenth; third equal to eighth; the first, second, third, and fourth are graduated, the distance from tip to tip of each feather diminishing till the fourth is reached. This is a very rounded wing, such as is not possessed by any *Phylloscopus*; in the wing of which genus there is always a long space

* Journ. As. Soc. Bengal, 1872, p. 164.

f Stray Feathers, 1873, p. 444.

between first and second quills, and the second is equal to from fifth or sixth to eighth or ninth, according to the species. The tail, too, of *Horeites pallidipes* is much rounded and *non-phyloscopine*. A further difference between *Phylloscopus* and *Horeites* lies in the fact that the former has twelve tail-feathers and the latter ten. I cannot see any generic distinction between *Horornis* and *Horeites*; *Neornis* also appears to be the same with a better developed tail.

PHYLLOSCOPUS MAGNITOSTRIS, Blyth.

Mr. Hume* tells us that this bird is identical with *P. borealis*, Blasius (*P. sylvicultrix*, Swinhoe). I examined the Chinese examples of the latter, in the Indian Museum, and found the following differences:

1. *P. borealis* has a minute first primary, as in *P. sibilatrix*, Bechst., while *P. onagnirostris* has a much larger one, as in *Hippolais Rama*, Sykes.

2. The wing of *P. borealis* is of a different shape from that of *magnirostris*, being more pointed, with the 2nd quill intermediate between the 5th and 6th; while *P. magnirostris* has a wing much more rounded in form* the 2nd quill being equal to about the 9th.

Such differences as these are fatal to identity.

CULICIPETA CANTATOR, Tickell.

I examined the specimen referred to by Mr. Blanford and found it to be *Reguloides viridipennis*, Blyth, and to agree perfectly with the types in the Indian Museum. *G. cantator* is a very different bird, and is correctly described by Jerdon.

REGULOIDES VIRIDIPENNIS, Blyth.

May be described as a small and brightly coloured *Hog. trochiloides*, Sundevall. Small examples of *Meg. trochiloides* are very difficult to separate from *Reg. viridipennis*.

REGULOIDES MACULIPENNIS, Blyth.

Mr. Hume identifies this species with *Reg. chloronotus*, Hodgs.; against which I do protest. I also have seen Hodgson's drawing referred to by Mr. Hume and could not come to such a conclusion. Hodgson's types of *chloronotus* have been identified by Blyth and others with *Reg. proregidus*, Pallas. The drawing referred to is one intended to represent the nest, which by the bye is that of an *JEthopyga*, and we have no evidence that Hodgson distinguished between his *Abrornis chloronotus* and *Reg. maculipennis*, or that he knew the latter species at all. Such an identification from this slightly coloured drawing cannot be admitted, Hodgson sometimes over**

* Stray Feathers, 1873, p. 494.

t Journ. As. Soc. Bengal, 1872, p. 163.

t Stray Feathers, 1873, p. 494.

coloured and sometimes under-coloured. Take his *Lophophanes dichrous* : the drawing is far too red, and it would be impossible to recognize the species intended from it. So also with his *Parus* (*Emodius* : it was this very faulty drawing, omitting the crest and the wing spots, that led me to describe *Lophophanes Humei* (J. A. S. B., 1873, p. 57), which must henceforward stand as *Lophophanes* (*Emodius*) Blyth made out that the type of *Parus* (*Emodius*) was not a *Parus* but a *Lophophanes*. Many of Hodgson's drawings are very good, especially those in which he had evidently superintended the work and given minute details, but others, such as that of the supposed *Meg. maculipennis*, are insufficient for the determination of such birds as the *JPhylloscopi*, which, as a rule, resemble each other so much in size and colour.

I also examined the specimen referred to by Mr. Blanford in J. A. S. B., 1872, p. 162, and found it to be *Beguloides maculipennis*; Blyth; as also was *Beguloides* sp. ? mentioned on the following page of the same Journal.

BUDYTES FLAVA, Lin.

B. CINEBEOCAPILLA, Savi.

B. MELAFOCEPIALA, Bonaparte.

Under the term *Budytes viridis*, Scop. Lord Walclen* makes great confusion. He says, "One example in winter plumage, olive green above, upper part of breast sulphur yellow, rest of under surface pure white; some of the ventral and under tail coverts dashed with sulphur yellow. Supercilium conspicuous, broad, and pure white. Agrees perfectly with examples from Continental India."

This bird is, of course, *Budytes flava*, the characteristic of which is the broad white supercilium. Again he says, " *Motacilla flavescens*, Stephens, Gen. Zool. Aves. X, p. 559, is enumerated in the 'Hand list' by Mr. G. R. Gray, as a distinct species, with the habitats of the Moluccas, Celebes, Timor and Java, assigned. Stephens gave this title to Buffon's Bergeronnette de l'île de Timor Hist. Nat. V. p. 275. Buffon's bird belongs to that phase of plumage of *B. viridis*, (Gris.) in which the superciliary stripe is yellow, the upper plumage ash coloured, and the under yellow." When the male of *B. flava* has newly moulted in the spring, the supercilium is sometimes strongly tinged with bright yellow, as are the margins to the white wing-coverts and tertials; this yellow rapidly fades away leaving the feather pure white: the yellow tinge on the white wing margins is a regular occurrence, but that on the supercilium is accidental or, I should

* Trans. Zool. Soc., 1872, p. 65.

f In a memoir 'On the Birds of Celebes,' Trans. Zool. Soc. Lond., Vol. VIII, part 2, 1872, p. 60.

rather say, occasional and not specific. Of the many hundreds of examples examined by me, only three had this yellow bloom on the supercilium. Lord Walden, however, speaks of the bird as being *ash-coloured* above ! The ash-coloured back in the field-wagtails pertains only to the young and, perhaps, to the female in winter plumage. When the supercilium is *yellow*, the back is *green* in *B. flava*. Stephens' bird was probably the female of *Budytes citreola*, Pallas or the male in autumnal plumage, for this species has a yellow supercilium and an ash-coloured back which *B. flava*, *B. cinereocapilla*, and *B. melanocephala* certainly have not.

There are four distinct yellow field *Budytes* with olive green backs, and I note them, with short distinguishing characters of the mature male.

- | | | |
|---------------------------|--|--|
| <i>B. flava.</i> | Grey head, broad white supercilium, grey and white cheeks. | Generally distributed over the old world and northern half of the new. |
| <i>B. cinereocapilla.</i> | Dark grey head, supercilium absent or else very narrow and white ; often only a half supercilium behind the eye ; cheeks a dark slate colour or almost black. This dark cheek is the well marked peculiarity of the species. | Eastern Europe, India, and China. |
| <i>B. melanocephala.</i> | Pure black head, with very rarely indeed a supercilium, and then very narrow, like a thin white thread. I have twice seen examples with this thread-like supercilium. The black head is a good distinction. | Eastern Europe, India, and China. |
| <i>B. Mayi.</i> | Top of head yellowish olive, supercilium bright yellow, and cheeks yellow. | Western Europe, North-West Africa, and Central Asia. ¹ |

It will thus be seen that the colour of the cheek in summer is alone a sufficient criterion.

It seems inexplicable to me how so many good ornithologists have confounded these four very distinct species, and lumped them together as *B. flava* with varieties, or as *B. viridis* with varieties.

There are but two yellow-headed marsh wagtails found in all India, and, I believe, in all the world besides, viz. *Budytes calcaratus*, Hodgs.—with black back and yellow head, sometimes a greyish patch remaining on the lower back; and *Budytes citreola*, Pallas—with grey back and yellow head, also generally a crescentic black band above the shoulders at the hind part

* Two examples of this species, as also of *Anthus pratensis*, were lately obtained by Dr. JStoliczka in Yarkand.

of the lower neck, but this is sometimes absent, even when the bird is in full plumage. *B. citreoloides*, Hodgs. is identical with this latter species, and not with the former, as Mr. Hume supposes in 'Lahore to Yarkand.' Hodgson's drawing represents a yellow-headed wagtail with a grey back. The back feathers are always more or less changed when the head in spring becomes pure yellow; Hodgson's drawing thus shewing a uniform grey back with the yellow head, is clearly a representation of a male *B. citreola*. When the other species, *B. calcaratus*, Hodgs., attains the yellow head, the back is either blotched largely with jet-black or is entirely black. It is therefore an utter impossibility for Hodgson's *B. citreoloides* to have been the black backed bird.* *B. citreoloides*, Hodgs. is a synonym of *B. citreola*, Pallas, and as such should sink into disuse. Hodgson's drawing of *B. calcaratus* is lifesized, and represents the bird in winter plumage with yellow supercilium, olive cap, and grey back. In this plumage it closely resembles *B. citreola* in its winter plumage. It is *by the long tarsus alone* that I connect *B. calcaratus* with the black-backed bird. The tarsus of *B. citreola* never reaches the size given by Hodgson for *B. calcaratus*; both in the drawing and in the table of dimensions, the length of the tarsus given is that of the largest black-backed birds I have procured. In 'Lahore to Yarkand' Mr. Hume appears to consider Hodgson's description as inapplicable to the black-backed species; but I cannot see in what respect it does not suit. It should be remembered that Hodgson measured the tarsus from the sole of the foot, and not from the junction of the toes, the latter being the usual mode of measurement.

The females of all the six species I have noted, have their characteristics, but it would add too much to the length of this paper to introduce them now, enough to say that they abundantly confirm my view of the distinctness of each.

These wagtails can only be properly worked out by the field observer, and the confusion into which cabinet naturalists have thrown them is thus easily accounted for.

MOTACILLA CASHMIMEJSTIS, Brooks.

Is only *M. Hodgsoni*, Gray in full summer plumage. Having had abundant opportunities of again observing this bird up the valley of the Bhagaruttee, I am forced to the above conclusion.

I formerly thought that *M. Hodgsoni*, Gray and *M. personata*, Gould were identical, the former being the latter in breeding plumage: but having lately had the advantage of Mr. Mandelli's fine series of *M. Hodg-*

* Gould in his 'Birds of Asia' has misapplied the term to the black backed yellow headed Wagtail.

soni, shewing that the adult male retains its black back during the autumn and winter months, it is impossible to avoid the conclusion that the two species, though closely affined, are thoroughly distinct.

-*M. Hodgsoni* may be described as a black-backed *M. personata*. Each species has the eye set in a diamond-shaped white patch, which even in young grey and white birds of the year is conspicuous; so that neither should ever be confounded with *31. luzoniensis* or *M. Diiklmnensis*.

Old females of *Hodgsoni* have black backs like the males; but younger birds, as I take them to be, often have the back grey, but of a more dusky shade than that of *personata*, which has the back of a pure light grey. Some females of *Hodgsoni* have the grey clouded with black to a slight extent, especially on the upper portion of the back.

A parallel case of specific distinctness existing only in the colour of the back is that of *Budytes calcaratus*, Hodgson and *Budytes ciireola*, Pallas; the former of which has a jet black back in the breeding season, while the latter has invariably a grey back, with generally a black half collar at the lower part of the hind neck during the breeding season. I refer to the males only, for the females are very similar to one-another.

MOTACILLA LUZONIENSIS, Scop.

The western limit of this species appears to lie between Dinapore and Buxar, in the districts in which I have been placed. The old males, to a great extent, retain the black back during autumn and winter, and even the old females are somewhat patched and clouded with black at these seasons. The chin and throat is always white, and *the white hand down the side of the neck*, as in *M. Dukhunensis*, is invariably present at all seasons. This white band communicates with the white surrounding the eye. In *IT. per sonata*, the eye, at all seasons, is set in a diamond-shaped patch of white, which is bounded below, as well as above, by black; this white eye-patch has thus no communication with the white of the lower parts, and is the characteristic by which this species may at any time be easily known, when obtained in the plains.

Mr. Hume has pointed out to me that Dr. Jerdon's description of *M. Dukhunensis* is only applicable to *M. per sonata*, Gould, and this, as is proved by his appendix, was Dr. Jerdon's own conclusion; but in his description, the statement that "the neck all round is black" does not agree with another that in its winter dress it is barely distinguishable from *IT. Luzoniensis*. *M. personata* is at all times conspicuously distinct from *M. Luzoniensis*. Dr. Jerdon's description of *M. Dukhunensis* is, however, not sufficiently definite to fix the species intended, neither is the original description by Sykes, except for the statement that "it very closely resem-

bles *M. alba* of Europe, but differs in being of a light slate or cinereus, and in the wing coverts and secondaries being edged with broader white" (P. Z. S., 1832, p. 91).

ANTIUS AGILIS, Sykes.

Was said by Blyth to be apparently *Aiithus trivialis*, Penn. (= *Anthus arboreus*, Bechst). In the original description, Sykes says, "found on open stony lands;" but I think it probable, as it is the only *Aiithus* noted by him, that his *agilis* was either *Agrodroma campestris*, Lin. or *Corydalla rufula*, Vieill. These pipits do affect stony and waste lands, as does *Corydalla striolata*, Blyth, but neither of the tree-pipits do, least of all *P. niaculatus*, ~*H. odg.j** to which Sykes's term *agilis* has most unaccountably been applied: the most arboreal of all pipits certainly is never found on "open stony lands." I think it would be almost safe to conclude that Sykes's bird was one of the three I have named, viz. either *Ag. campestris* juv. with spotted breast or *G. rufula* or *G. striolata*. I am most inclined to the last. I am weary of hearing ornithologists speak of the green Chinese tree-pipit as *P. agilis*, Sykes, the application of the name to it being absurd.

ALAUDA DEVA, Sykes.

Spizalauda Deva Blyth.

I do not see any grounds whatever for separating the genus *Spizalauda* from *Alauda*[^] and I think the term should be abandoned. *Spizalauda simillima*, Hume is as true an *Alauda* in every respect, in colour of plumage, in voice, and in habits, as could be desired. It is rather small and this is all that can be said.

Sykes says of his *Alauda Dem*, that it is smaller than *A. Gulgula*, but *Alauda Malabarica*, which Mr. Hume would identify with *Alauda Deva*, is not smaller than *A. Gulgula*, but fully the same size, or if anything a larger and fin or lark; Sykes's species is therefore the small one which Mr. Hume separated (J. A. S. B., 1870, p. 120) as *S. simillima*; and the last term becomes a synonym of *Alauda Deva*, Sykes. I have seen many of this last, including some brought by bird-catchers from localities well to the south and west, and there is but one species which is smaller than *gulgula*, and this is the true *Alauda Deva* of Sykes. The Khandalla large crested lark, *A. Malabarica* Scop., will stand as such till the contrary be shewn, and my *Alauda australis* of the Neilgherries (Stray Feathers, 1873, p. 4SG), which is a fine large non-crested rufous toned *Alauda*, will stand until an older name can be shewn as clearly pertaining to it.

* In J. A. & B., 1873, p. 83, line 24, for "never strictly arboreal, read "more strictly arboreal."

ALAUDA DTJLCIYOX, Hodg.

Of the unfair identification of this species with *A. arvensis* of Europe, I shall say nothing more, but will leave those that have good eyes for form and colour to decide for themselves, when they have an opportunity of comparing specimens of each : I repeat that they are most thoroughly distinct, and that *A. arvensis* is *non-alpine* or *non-monticolous*. The colour and form of bill is different, the colour of the legs and feet is different, to say nothing of the different body plumage and almost total absence of rufous on the greater wing-coverts. There is the utmost difference that can be expected in birds of such similar plumage as larks.

CORVUS CULMINATUS, Sykes and C. INTEE^IEDIUS, Adams.

These two crows, though very similar in general appearance, are nevertheless quite distinct. As a rule the latter has a decidedly *{by fully an inch}* longer tail and is a bird of duller plumage. The voice of the hill bird, too, is notably different, being a much deeper toned and more hollow sounded croak. This great difference in the note strikes most observers on first going to the hills. For a time, I was inclined to believe with Mr. Hume in the identity of the two species, but having examined a good number of each and having paid great attention to the voices and manners, I am entirely convinced of their specific distinctness.

SCOLOPAX BUSTICOLA.

It was a mistake to include this bird among those that breed in the Cashmere Valley (J. A. S. B., 1872, p. 86). It breeds among the pines on the mountain sides, high up near the snows.



OF THE OCCURRENCE OF A SUPERORBITAL CHAIN OF BOXES IN THE ARBORICOLA: (WOOD-PARTRIDGES).—By JAMES WOOD-MASON of Queen's College, Oxford.

(Received April 20th ; read March 4th, 1874.)

(With Plate II).

In his elaborate paper 'On the Osteology of the Gallinaceous Birds and Tinamous' read before the Linnean Society on November 25th, 1862, Professor W. Kitchen Parker announced the remarkable discovery, in *Tinamus robustus*, "of a whole row of super-orbital bones, the like of which must be sought for, not amongst birds, but in a group of creatures a long way down in the scale," viz., in the Skinks and Blind-worms. Further on in the same paper, the presence of a similar chain of superorbitals in *Psophia crepitans*, "only in an enfeebled form," is mentioned. The same author, in a memoir 'On the Structure and Development of the Skull in the Ostrich Tribe' read before the Royal Society on March 9th, 1865, records the occurrence of a double row of these bones extending all along the superorbital margin from the lacrymal to the post-frontal process in *Tinamus variegatus*.

I have now to announce the occurrence of a similar chain of ossicles in four out of the eight recognized species of *Arboricola*, a genus of Indian Partridges, viz., in *A. torqueola*, *atrogularis*, *rufogularis*, and *intermedia*; and I look forward with especial interest to the examination of skulls of the two of the remaining species which have been referred by some authors to the subgenus *J?eloperdix*, and which inhabit the Tenasserim provinces and the Malay peninsula.

Mr. Parker has pointed out how in the Lapwing (*Vanellus*) the frontal in the young bird sends out square denticles of bony substance under and beyond the nasal gland, which coalesce with one another, with the lachrymal in front, and with post-frontal process behind, so as to form beyond the gland a secondary frontal margin, which acts as a smooth eave to the eyeball; and that the superorbital chain of bones in the Tina^{nou} takes the place of this secondary frontal margin and the denticles in the Lapwing, the same end being attained by different means. But in the Arboricolas the arrangement is totally different: in them the margins of the combined frontals so far from being bevelled or scooped for the reception of the nasal gland are rather prominent and the internal edges of the ossicles composing the chain come into close relation of apposition with them.

I have examined a considerable number of species of Gallinaceous birds, small and great, including, by the kindness of my friend Major Godwin-Austen, a species of *Bambusicola*, but have hitherto failed to detect so much as a single grain of bone in the superorbital membrane of any one of them.

The *Arbovicolas*, I may add in conclusion, differ from all in not having the temporal fossa bridged by bone, the zygoruatic process of the squamosal being quite rudimental.



Explanation of Plate II.

- Fig. 1. Upper view of skull of *Arbor kola rufogularis*, nat. size.
Fig. 2. Side view of the same skull, nat. size.
Fig. 3. Upper view of skull of a young individual of the same species, nat. size.
Fig. 4. Side view of the same skull, nat. size.
Fig. 5. Upper view of skull of *Tinamus robustus*, magnified two diameters.

(After Parker).

Sro. Superorbital chain of ossicles; *l* lacrymal; *p. o.* postorbital process; *s. o. m.* unossified portion of superorbital membrane.



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ADDITIONS AND ERRATA.

Page 46, 17 lines from top of page, *after* words "D. *elongata*, Miq.," *add* words "Fl. Ind. Bat. I /2. 12 ;" and 21 lines from above, *for* " t. 9293," *read* " t. 92—93."

Page 57, 8 lines from top of page, *after* words " slopes of," *add* word " the ;" and *after* "Pegu" *add* "Yomah."

Page 61, 4 lines from top of page, *transfer* the passage " 2. C. LINNJEANUS, {*Menispermum hirsutum* L. sp. pi. 1469 Roxb. Fl. Ind. III. 814; *Menispermum myosotoides*, L. 1. c.; *Cocculus villosus*, DC. Syst. I. 52*; Hf. and Th. Ind. Fl. I. 101).

HAB. Frequent in hedges, shrubberies, etc., around villages all over Pegu and Prome ; also Ava. Fl. Jan. Febr.

3. C. INCANUS, Colebr. in Linn. Trans. XVII. 57; Scheff. Obs. Phyt. III. 76, t. 10. (*Pericampylus incanus*, Miers in Tayl. Ann. ser. 2. VII. 40 and Contr. Bot. III. 118 • Hf. and Th. Ind. Fl. I. 102 ; *Menispermum villosum* Eoxb. Fl. Ind. III. 812).

'HAB. Frequent in savannahs, mixed and other deciduous forests all over Burmah from Chittagong, Ava, Pegu, and Martaban down to Tenasserim, up to 3000 ft. elevation. Fl. March," *to* the bottom of the following page.

Paḍ-e63, 3 lines from the bottom of the page, *for* "edition," *read* "issue;" and 5 lines from the bottom, *after* «t. 940," *add* « Jenk. Pl. Ind. 20. t. 19."

Page 67, 18 lines from top of the page, *for* " Eoxb.," *read* "Echb."

Page 74, 17 lines from top of page, *erase* the marks % X and *substitute* *

Page 76*, 6 lines from bottom of page, *after* word " Seeds," *add* word " usually."

Page 85', 6 lines from top of page, *after* " 257," *add* " {C. *hiflorus*, Turcz. in Bull. Mox. 1863. 580)."

Page 103, 15 lines from top of page, *for* " S. *glutinosa*," *read* " S. *Mysurensis*."

Page 104, 4 lines from top of page, *restore* " S. *Mysurensis*, W. A.," and *reduce* «S. GLUTINOSA, Eoxb. (non'Cav.)" to a synonym; and 11 lines from top of page, *for* "ALBUTILON," *read* "ABUTILON."

Paḍ-e 105, 3 lines from top of page, *for* " Capsules," *read* "Carpels."

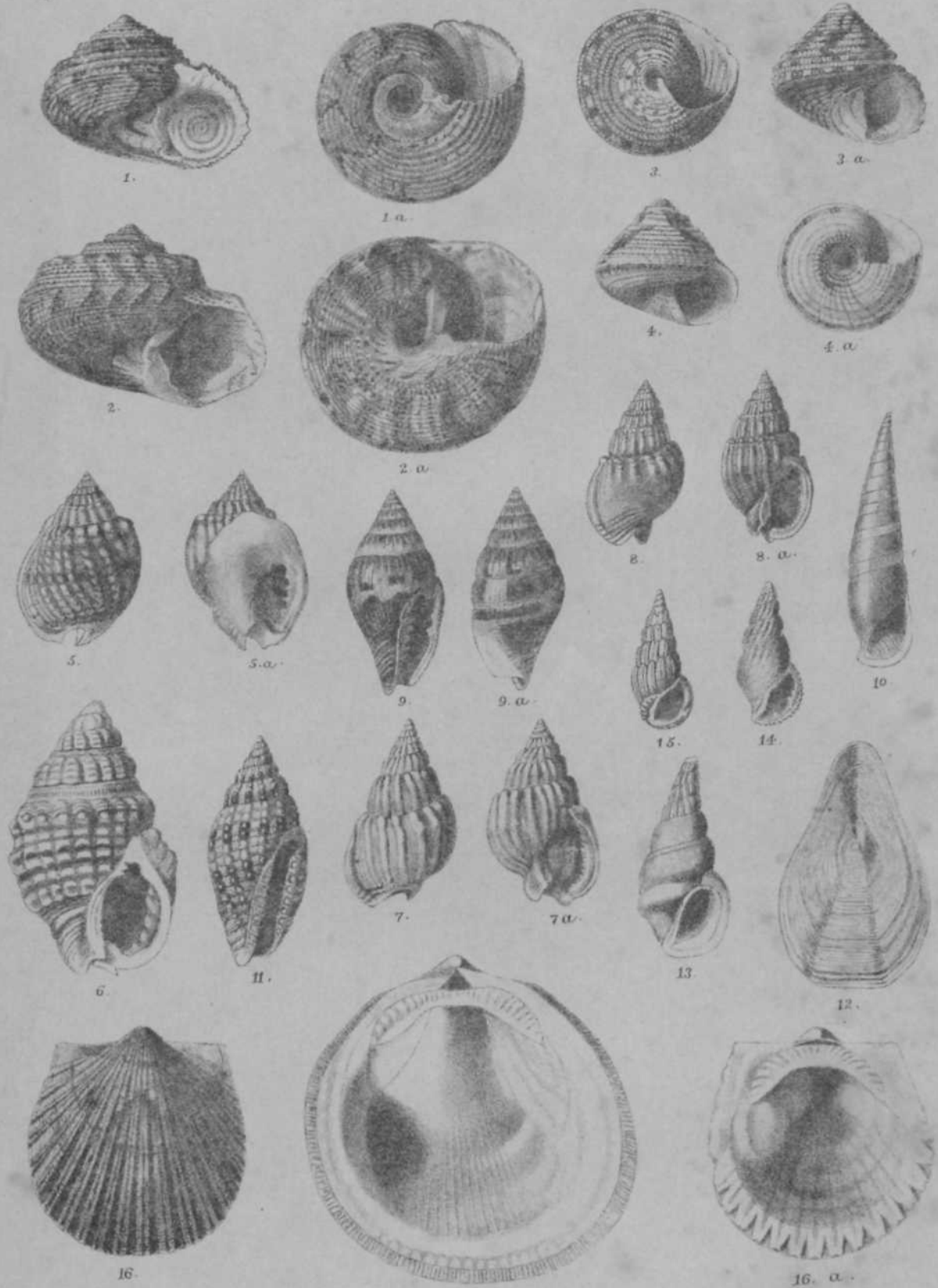
Page 121, 8 lines from bottom of page, *after* "374," *add* " W. *longiramea*, Turcz. in Bull. Mosc. 1863, 571."

Page 125, 4 lines from top of page, *for* "*, " *read* « % ; and 20 lines from the top, *for* "G. *scabrida*," *read* " G. *acuminata*."

Page 126, 16 lines from top of page, *substitute* " G. ACUMINATA, TUSS. in Ann. Mus. IV. 91! t. 48," and *reduce* " G. SCABKIDA, Wall" to a synonym; and 5 lines from the bottom, /or " IV," *read* " 1111."

Page 187, 17 lines from top of page, *after* " 1/2," *add* " poll."

Page 206, 10 lines from top of page, *add* the words " Mr. Homfray of Port Blah-has since informed me that this palm makes a trunk 8-12 ft. high, and that the leaves are there proportionally smaller. It is found also in the vicinity of Port Mouat."

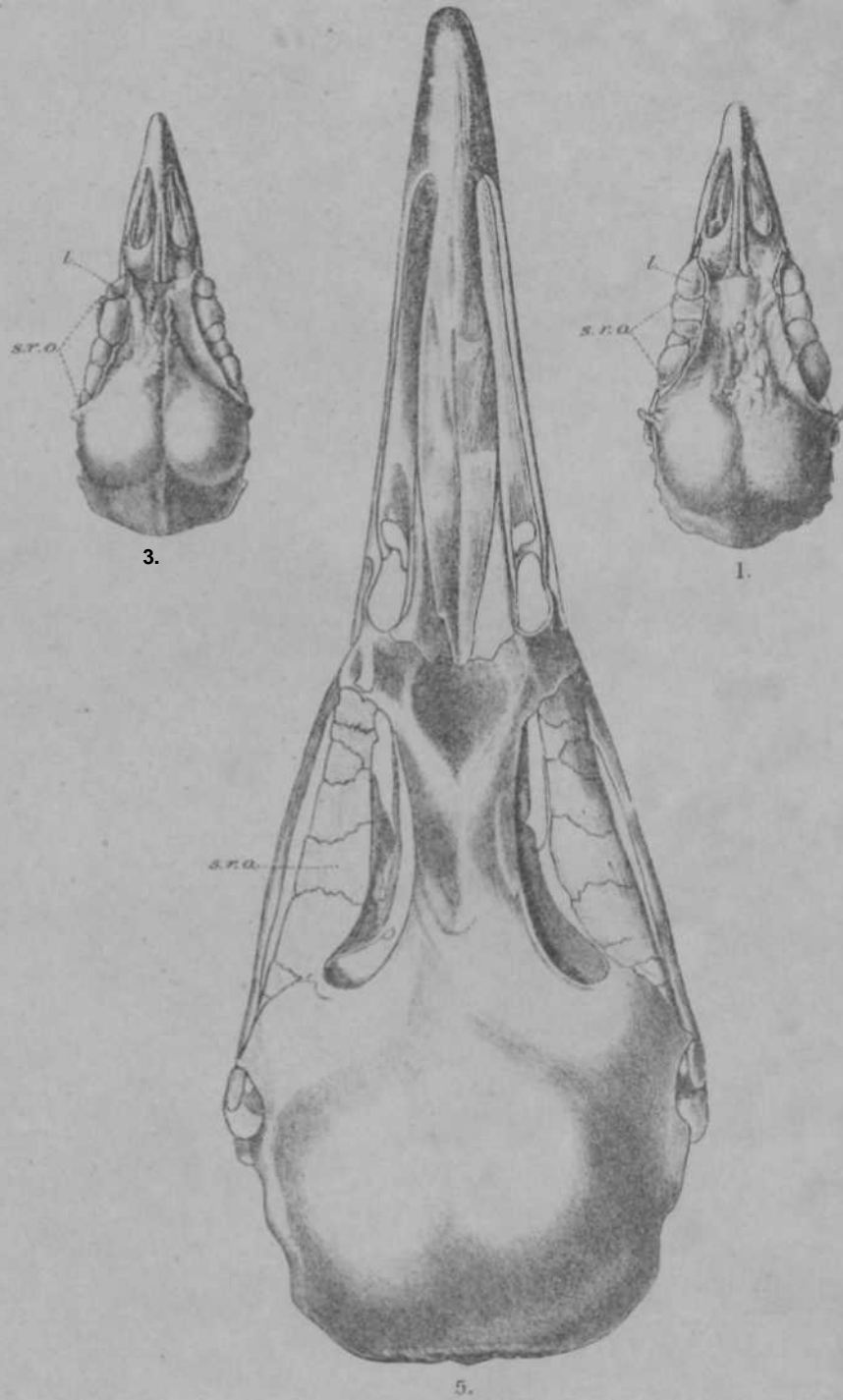


1. *Trochus Masoni*.
 2. *T. Warnfordi*.
 3. *T. Tonnerri*.
 4. *T. casta*

5. *Nassa callospira*.
 6. *N. sistroidea*.
 7. *N. sinusigera*.
 8. *N. Stoliochana*.

9. *Mitra Cornica*.
 10. *Eulima mirifica*.
 11. *Cithara amabilis*.
 12. *Scutus abnormis*.
 17. *Limopsis compressa*

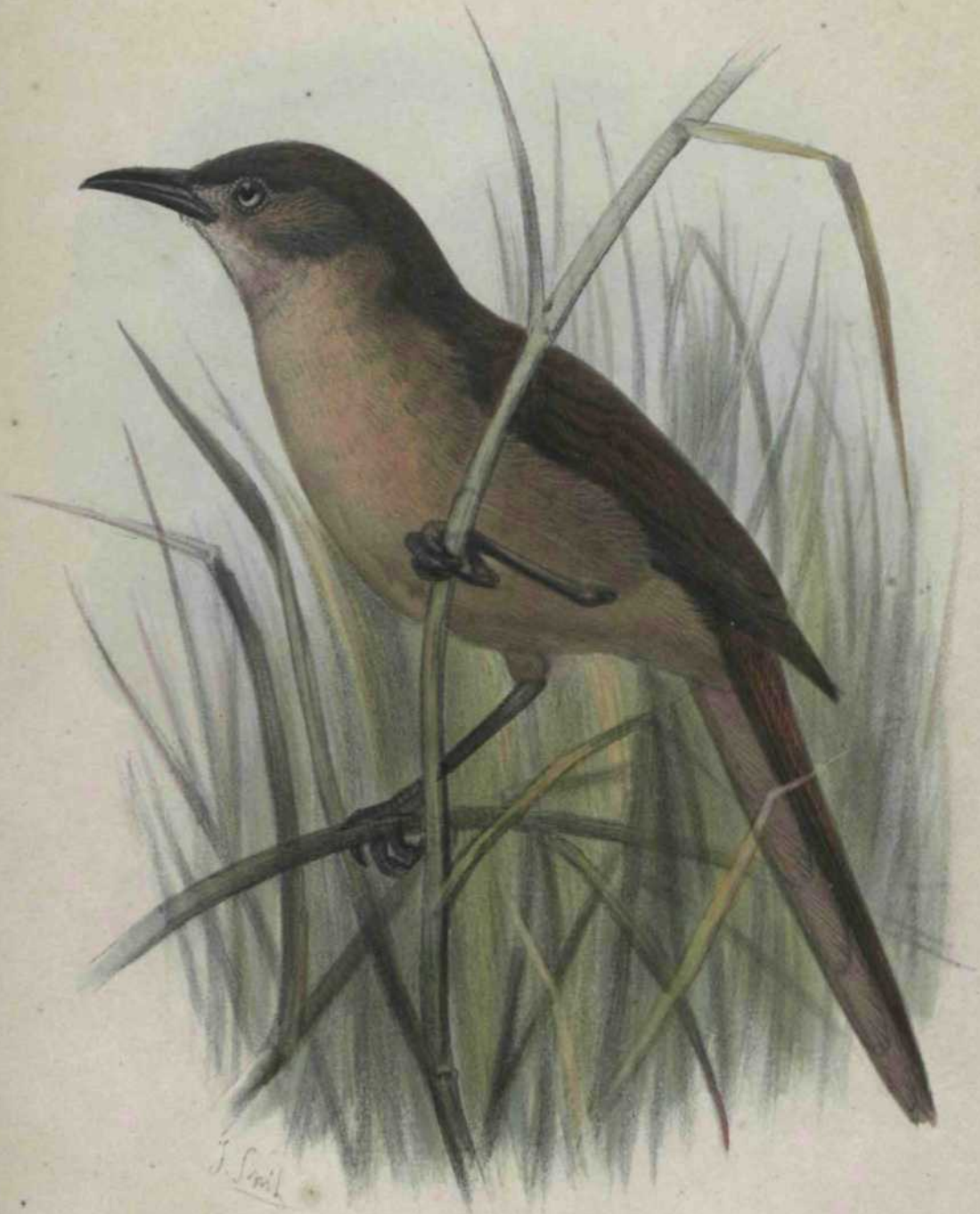
13. *Rissoina perversa*.
 14. *R. curvata*.
 15. *R. minuta*.
 16. *Pectunculus planatus*





AL: C£1, NAGA HILLS ANn AE>SAM.





J. Smith del.

M. N. Hanhart imp.

LAYARD1A R0BIG1N0SA



GARRULAX ALBOSUPERCILIARIS.

Godwin-Austen, del.

MacIure & Macdonald, imp.



SIBTA PtlLCHE LLA.



J. Smiel lith.

M & N. Hazhert. imp.

TURDINUS GAROENSIS.



Godwin-Austen, del.

1. *C. STICOLA MIJNIPUKENSIS* Hat Size
2. *PRINIA KUFULA*

Machre & Macdonald imp.

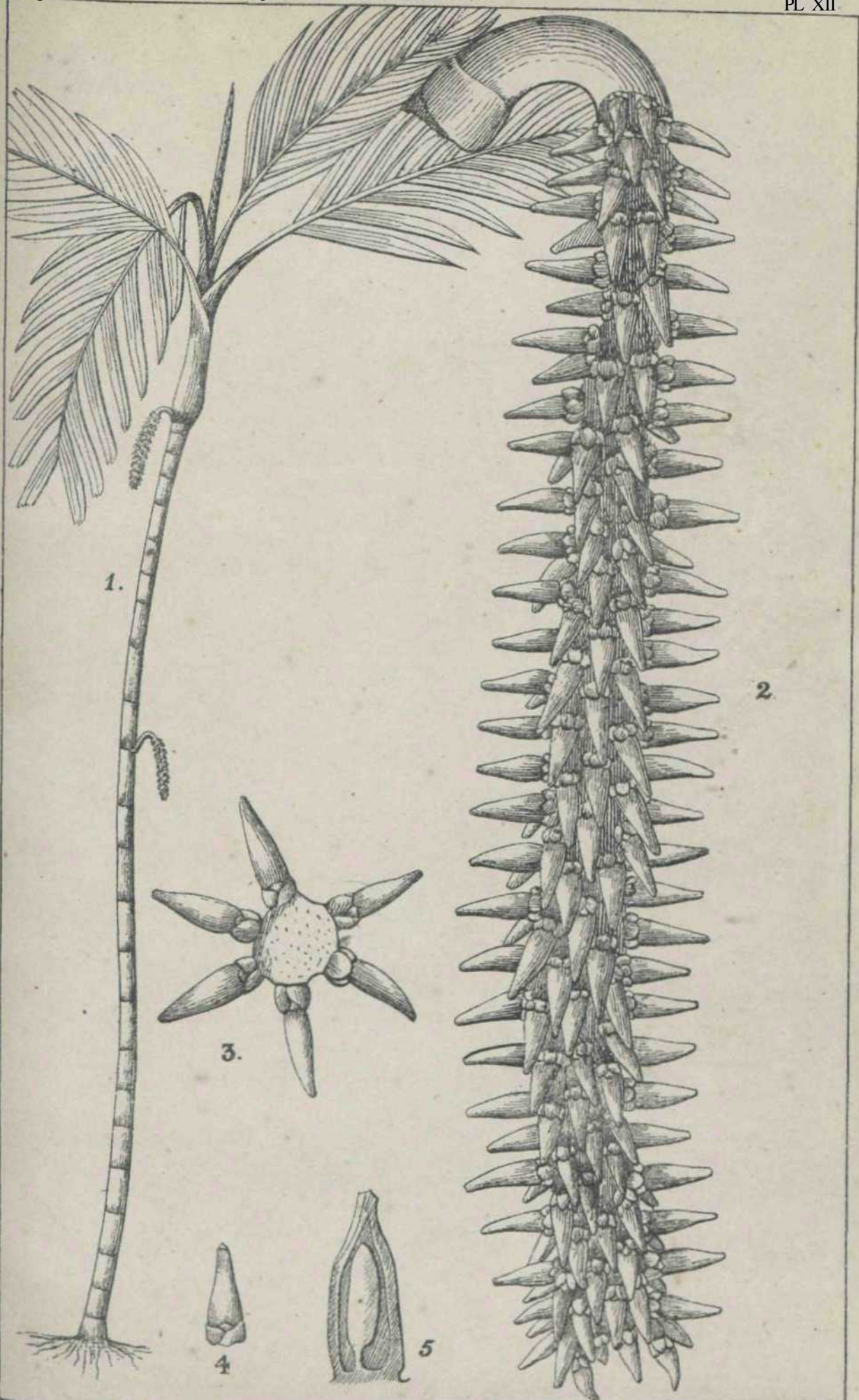


1874.

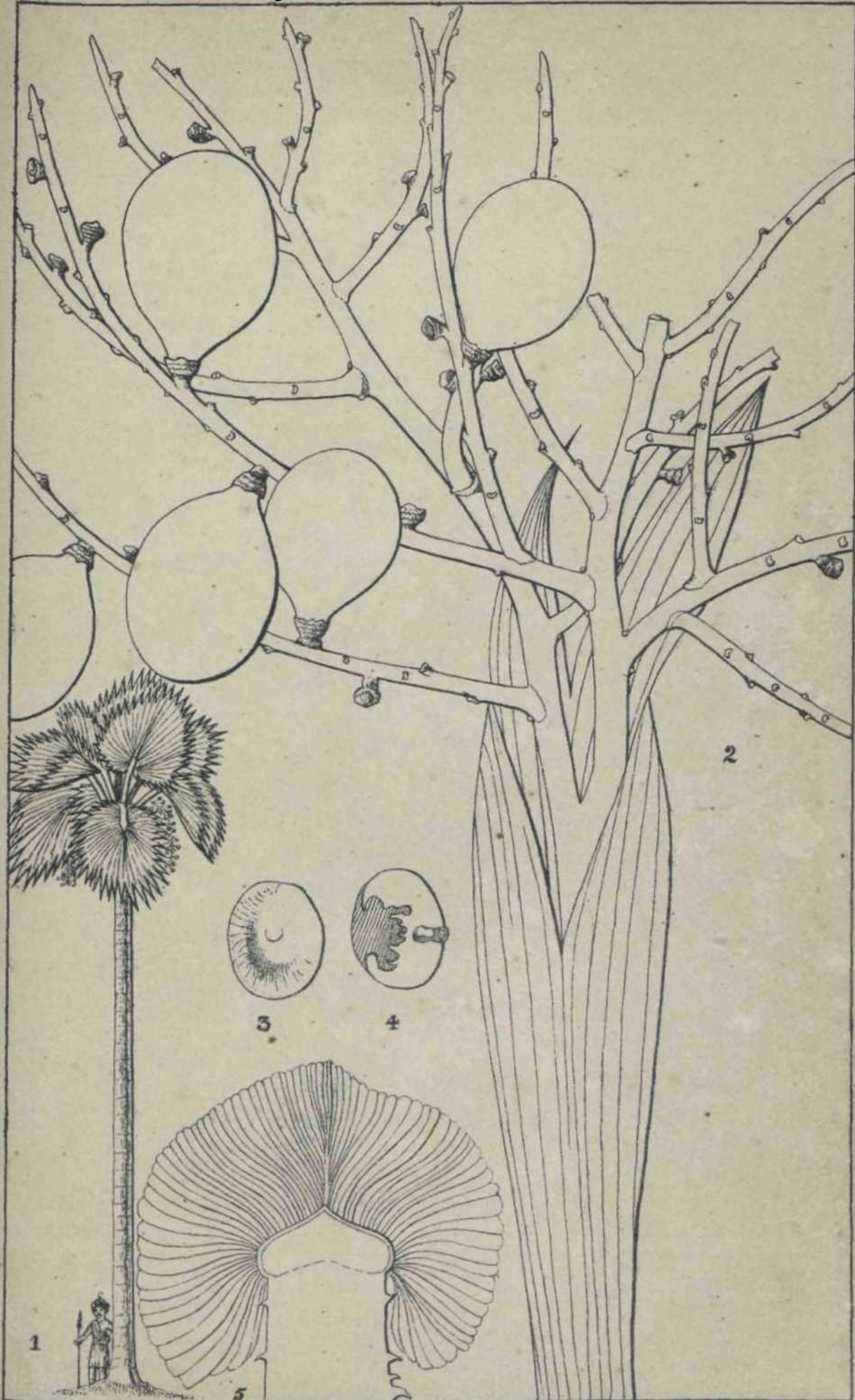
UinnAieUn.il.el.

1. C IS TIC OLA MEL; NOCHIPHALA. Nat Size.
2. " " SCHENIC'QLA.

Mackre & Mackre del.

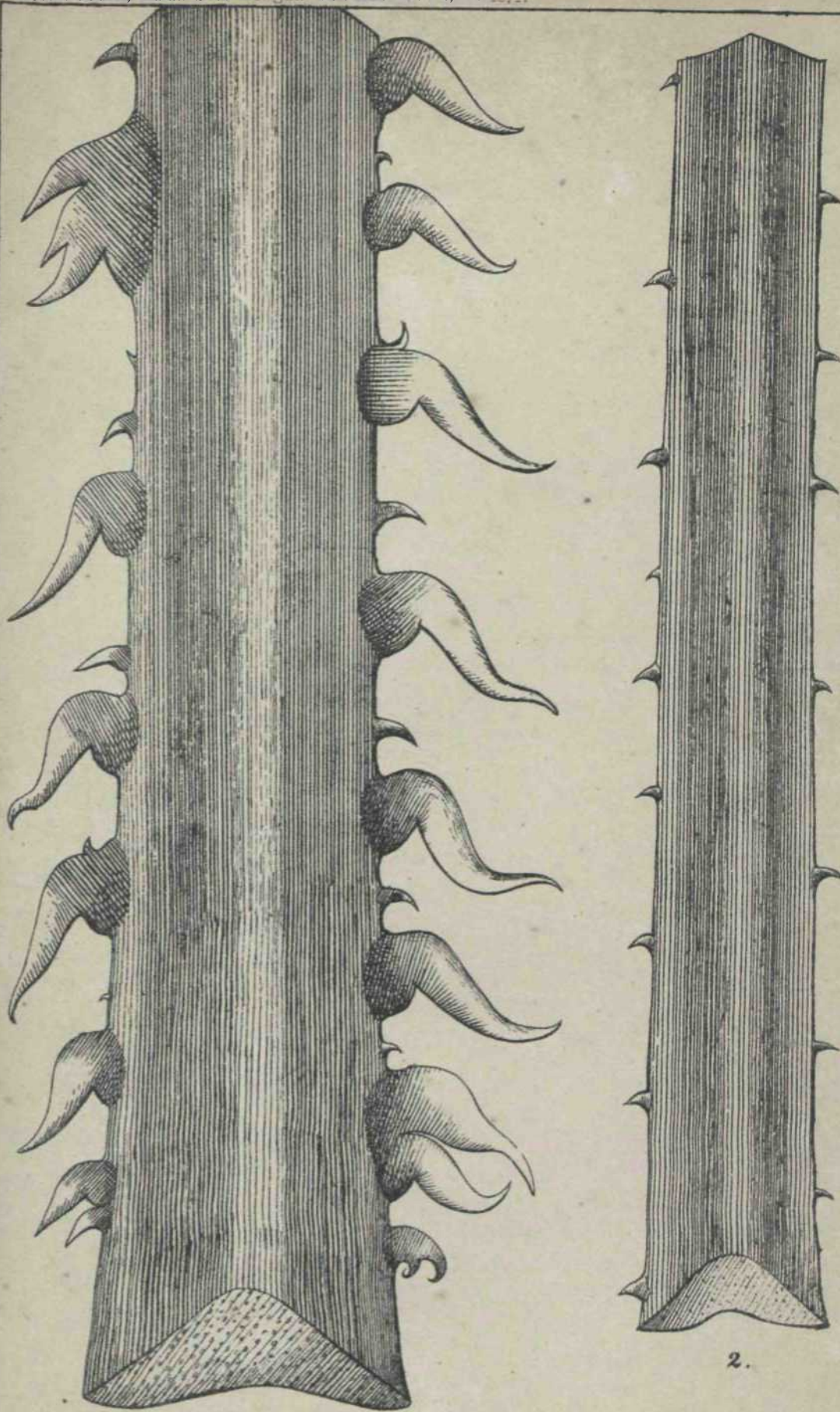


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LIVISTONA srECIOSA.

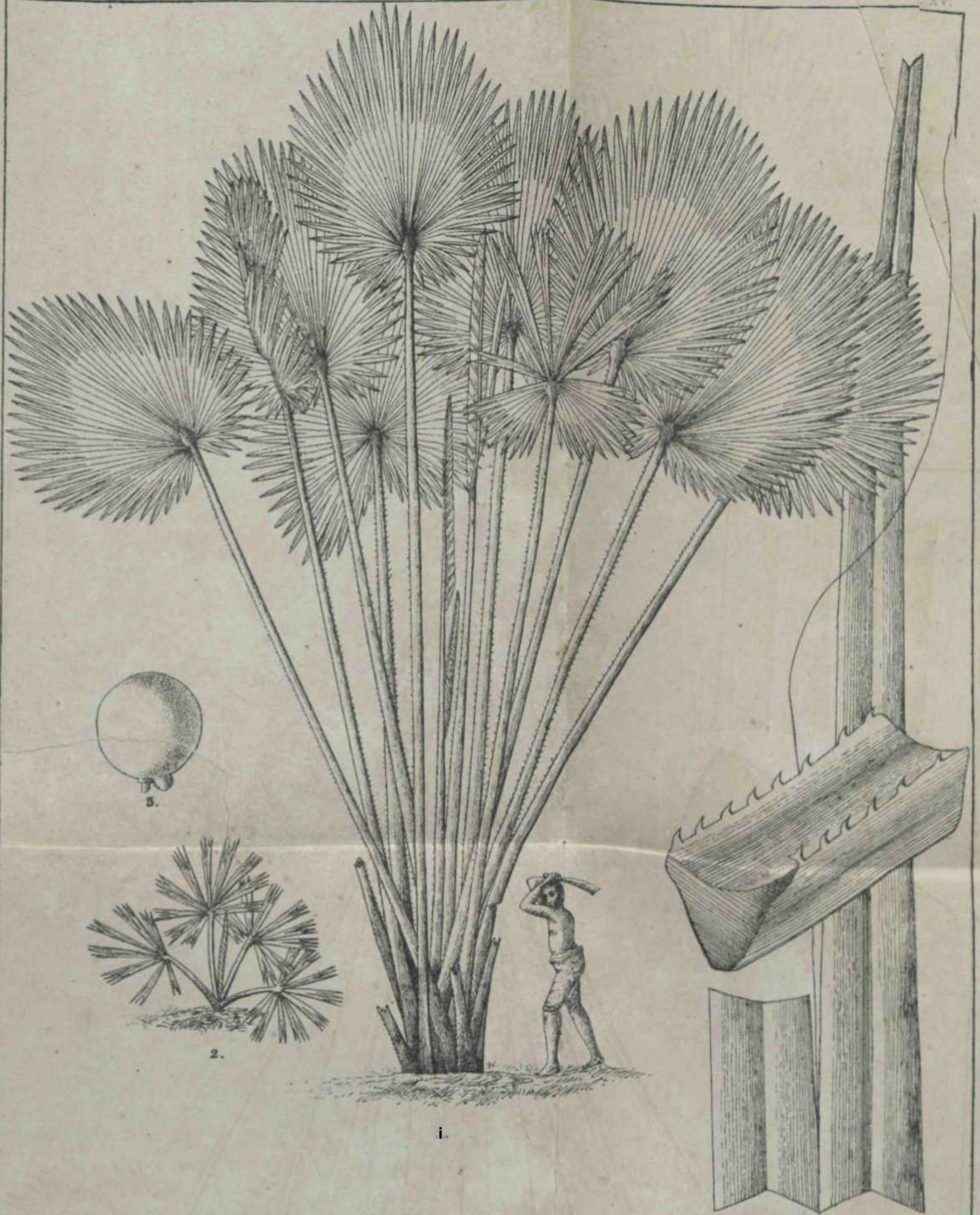


1.

2.

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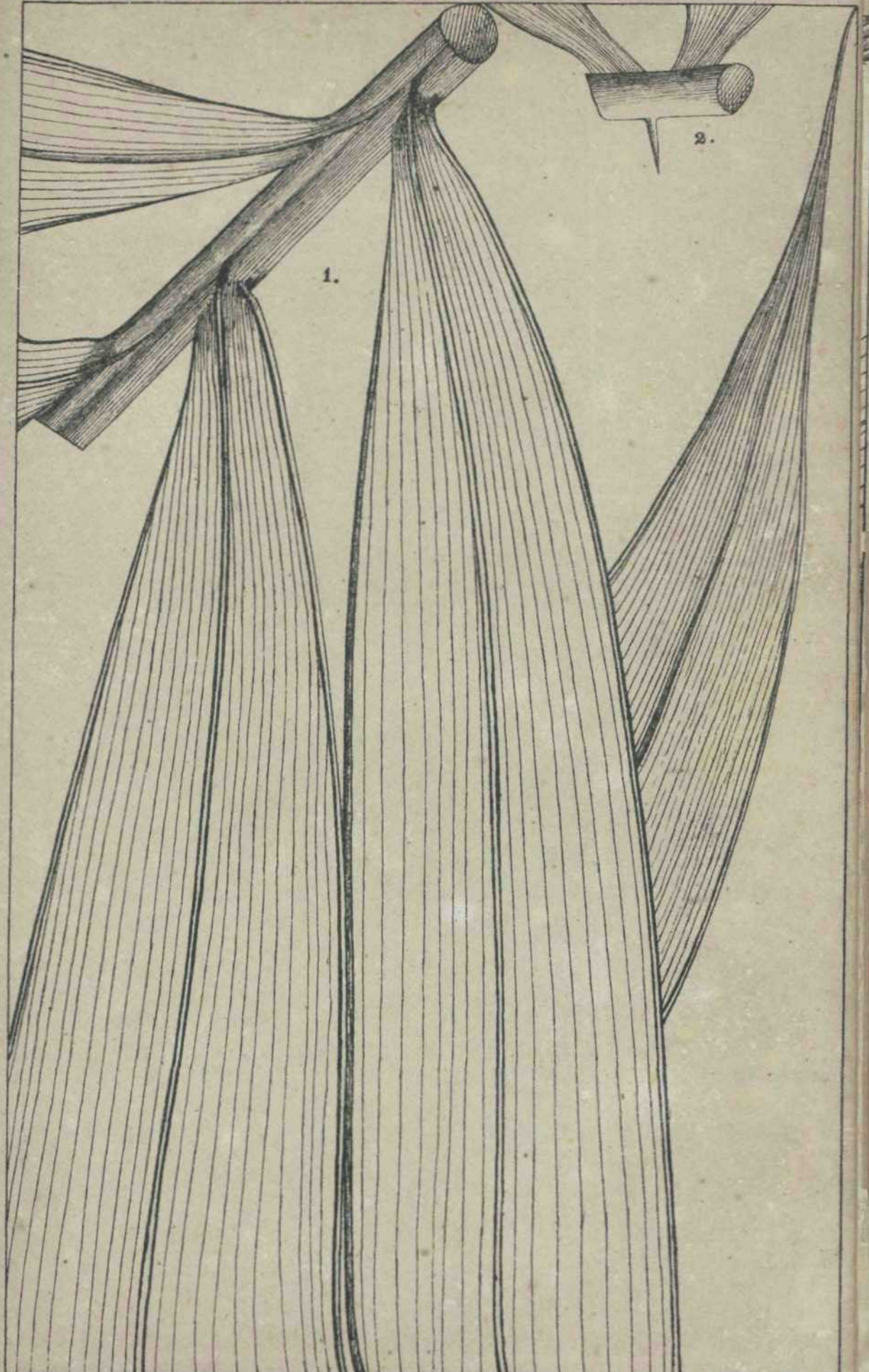
LIVISTONA SPECIOSA.



CORYPHA MACROPODA

Photostereographed at the Surveyor General's Office.





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PLECTOGONIA MACROSTACHYA



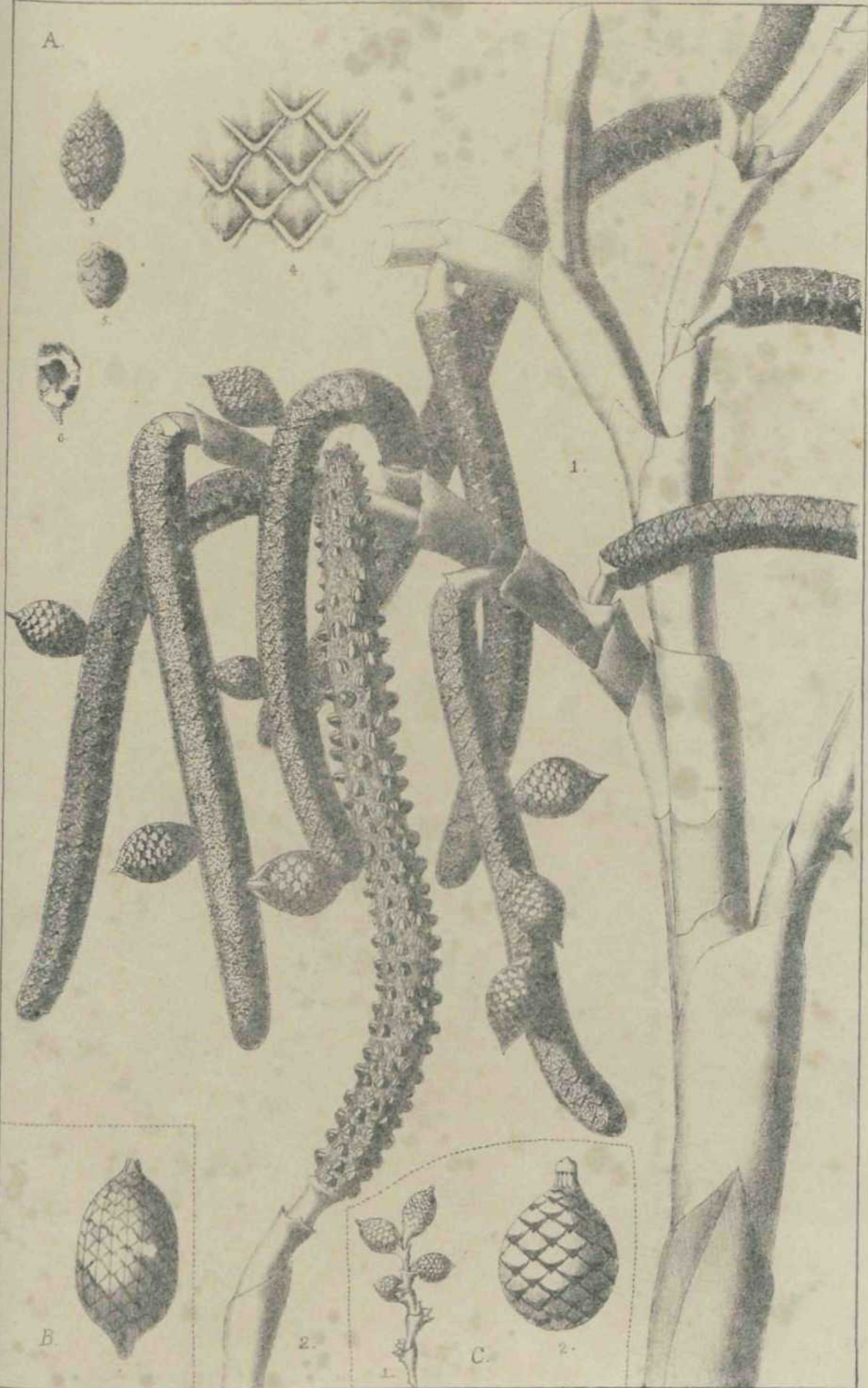
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DEMONROPS HYPOLEUCUS



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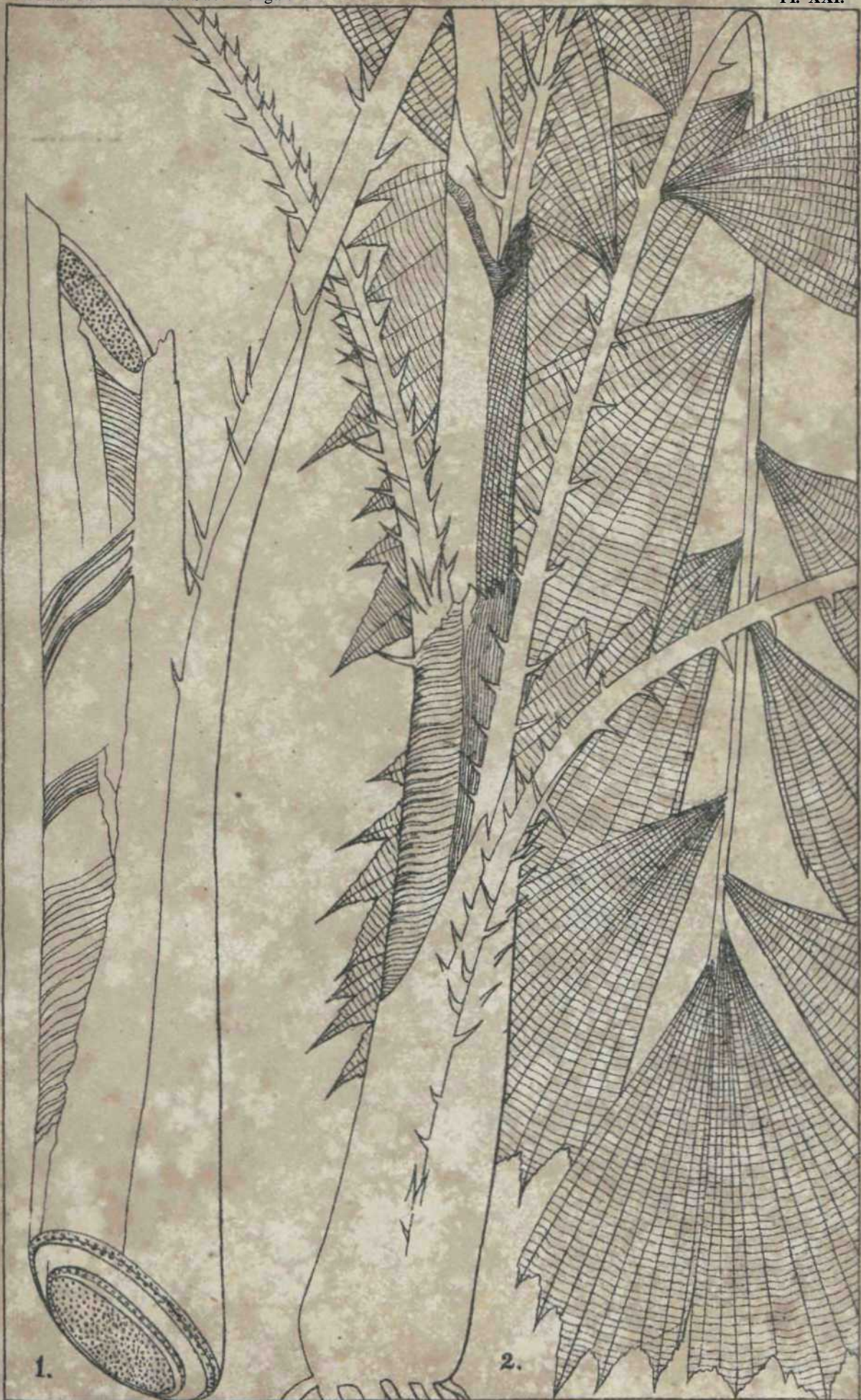
DÆMONOROPS HYPOLEUCUS



J. Schaumburg Lith.

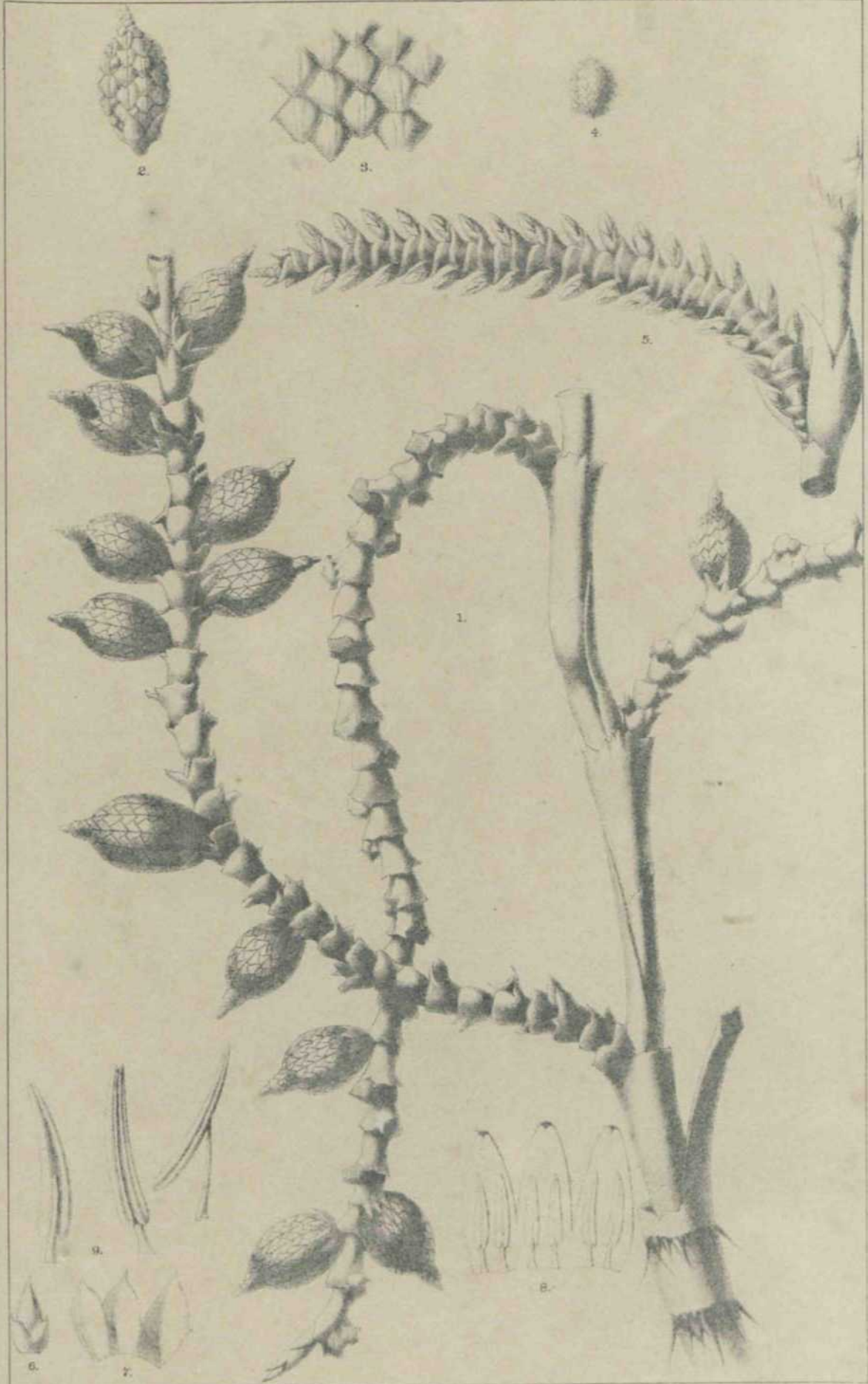
Calcutta.

A. **Korthalsia** «i anliifera i'. t-alarus melanacantius. C. C concinnus



Herbarium prepared at the Surveyor General's Office Calcutta

KORTHALSIA SCAPHIGELLA.



CALAMUS ARBORESCENS.



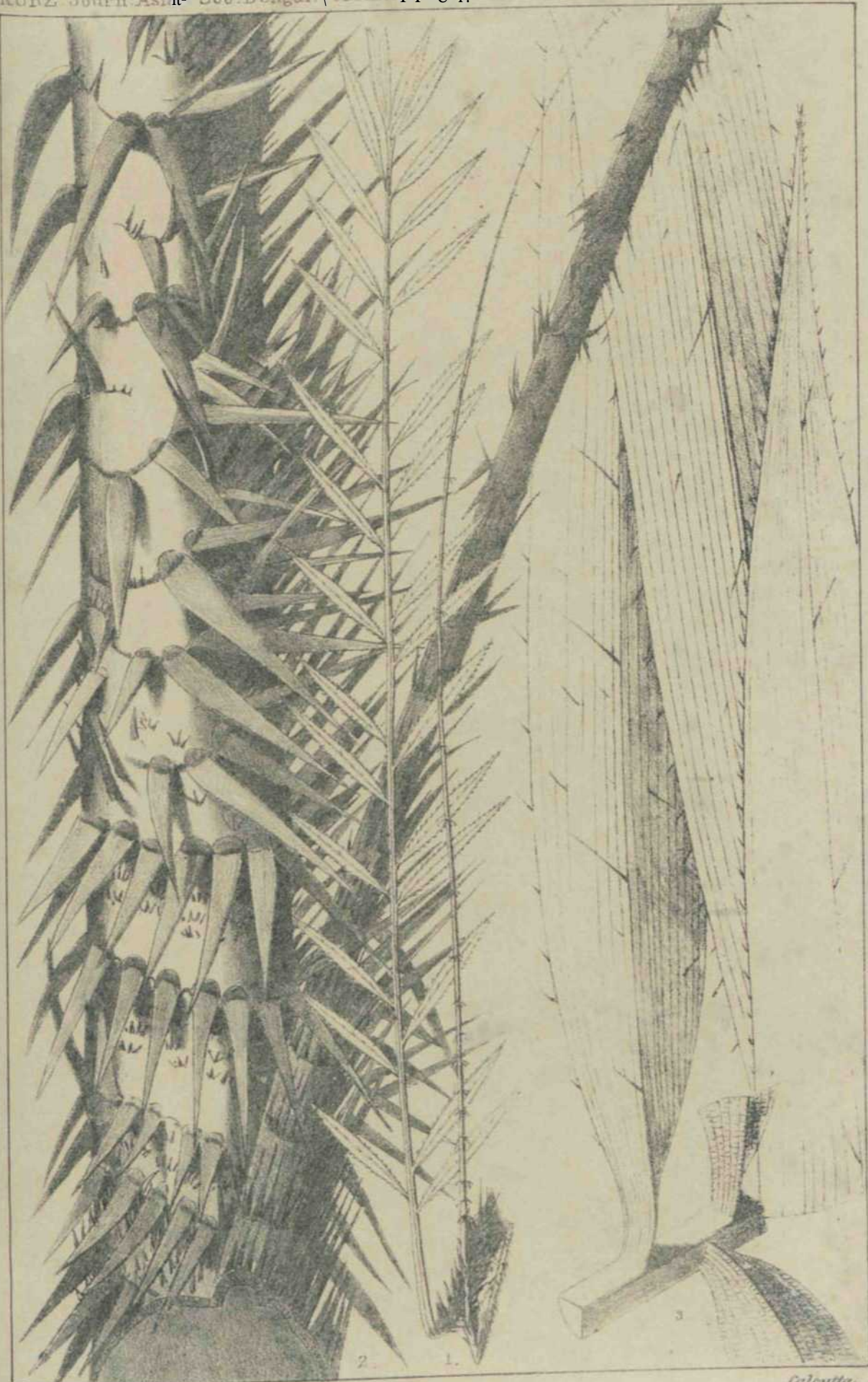


Photocopy of the original illustration by Sumfhar Onuni's Office, Calcutta.

CALAMUS ERECTUS.



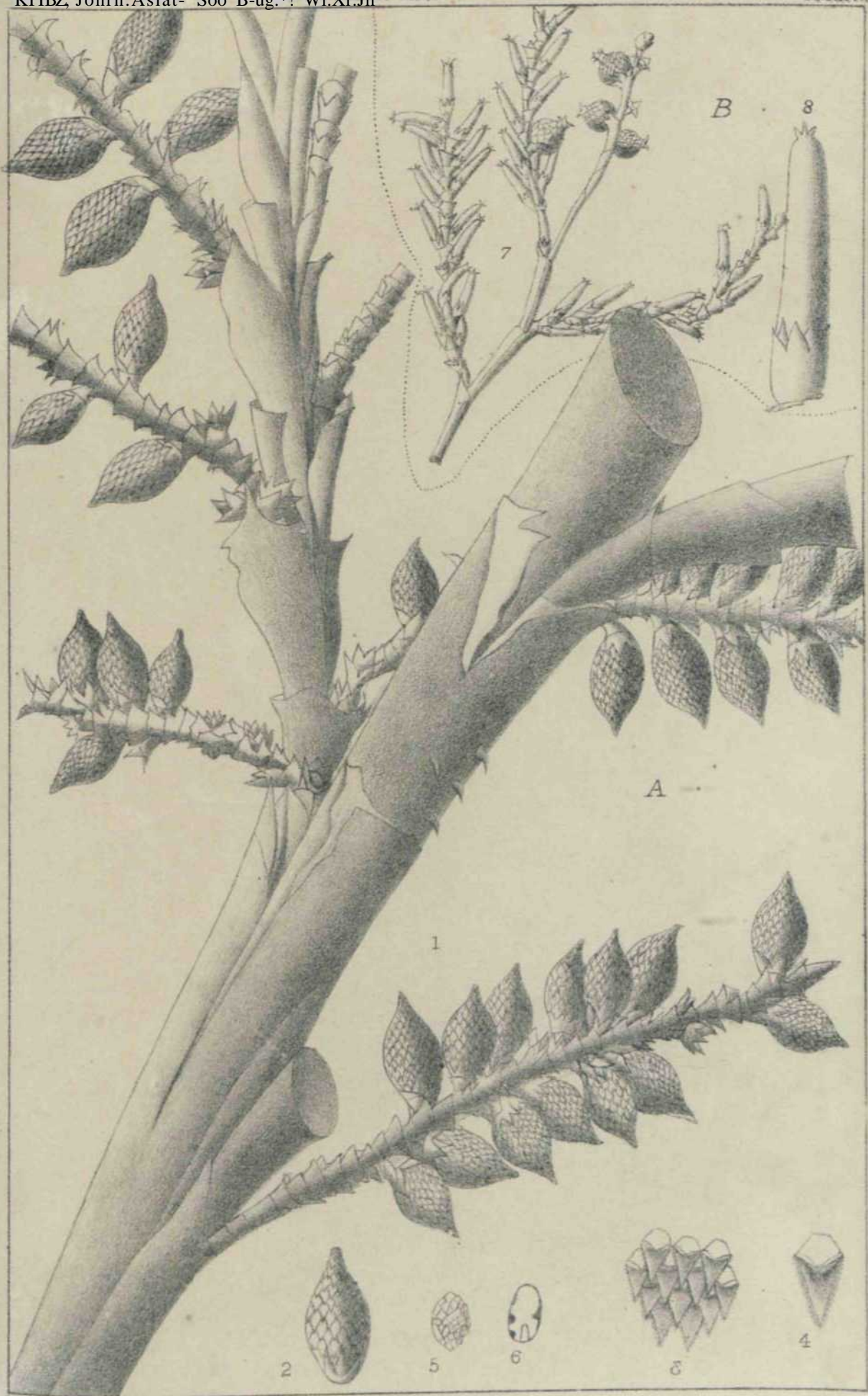
CALAMUS TIGRINUS.



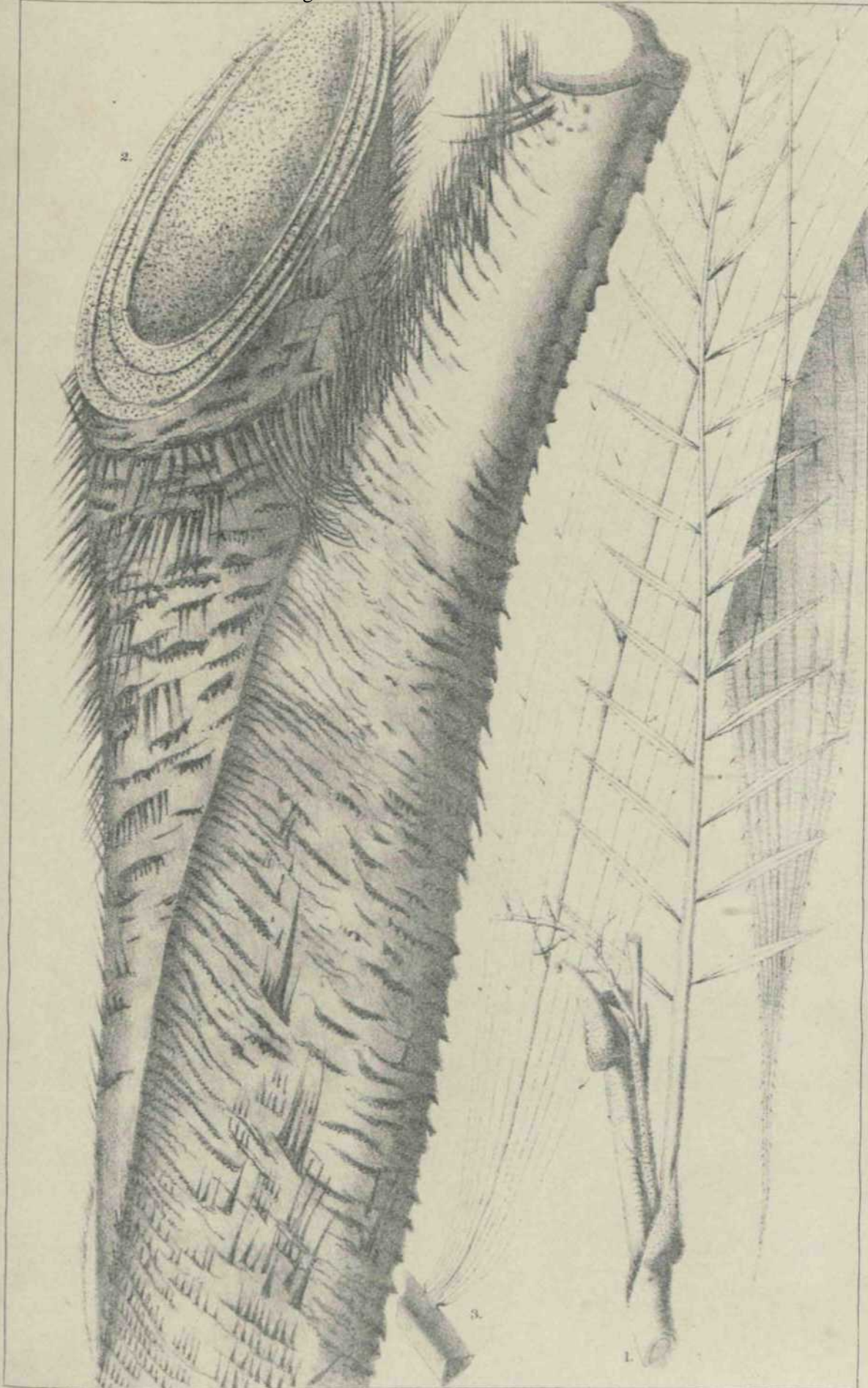
J. Scharumburg Lith.

CALAMITIS TIGRINUS.

Calcutta.

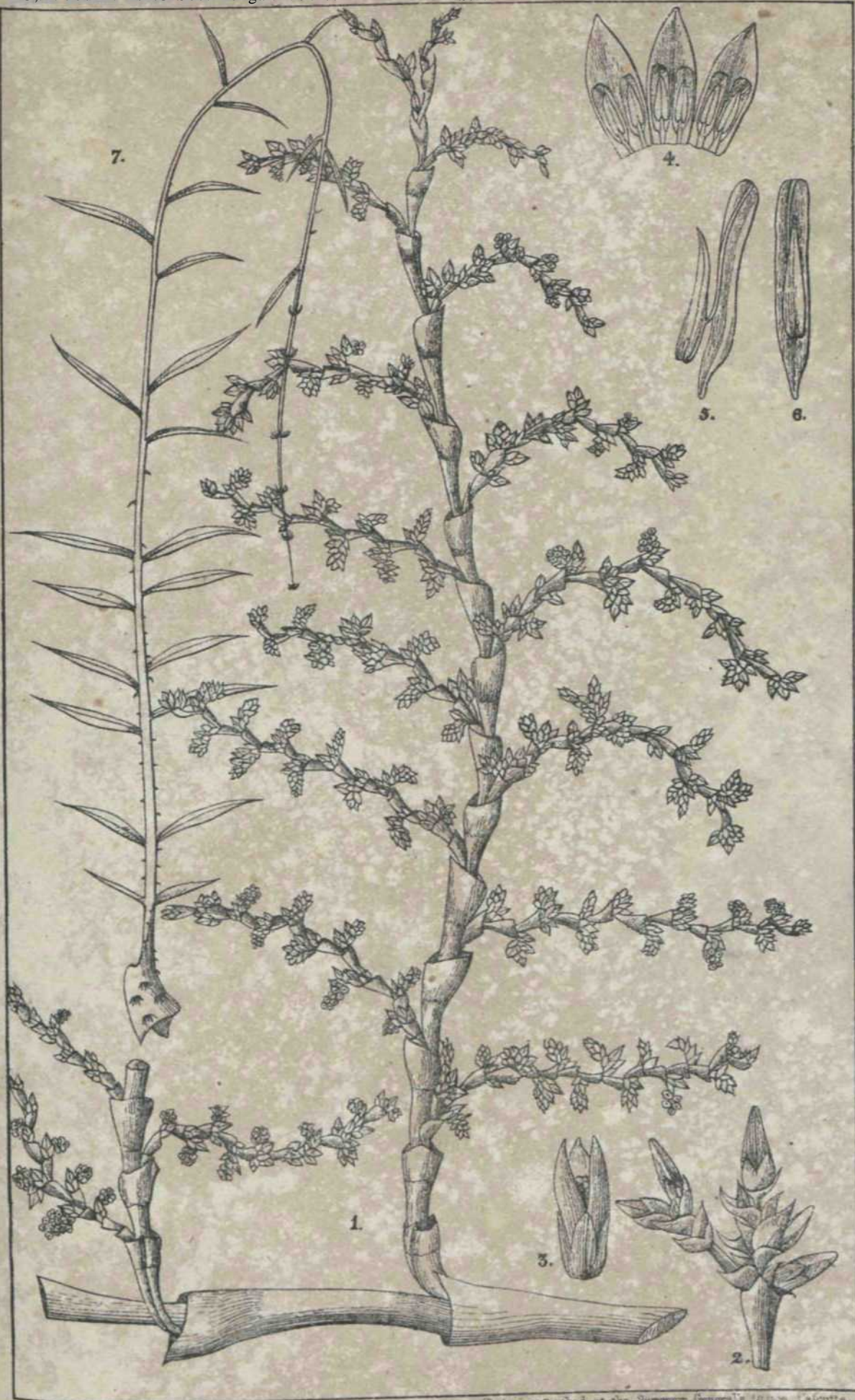


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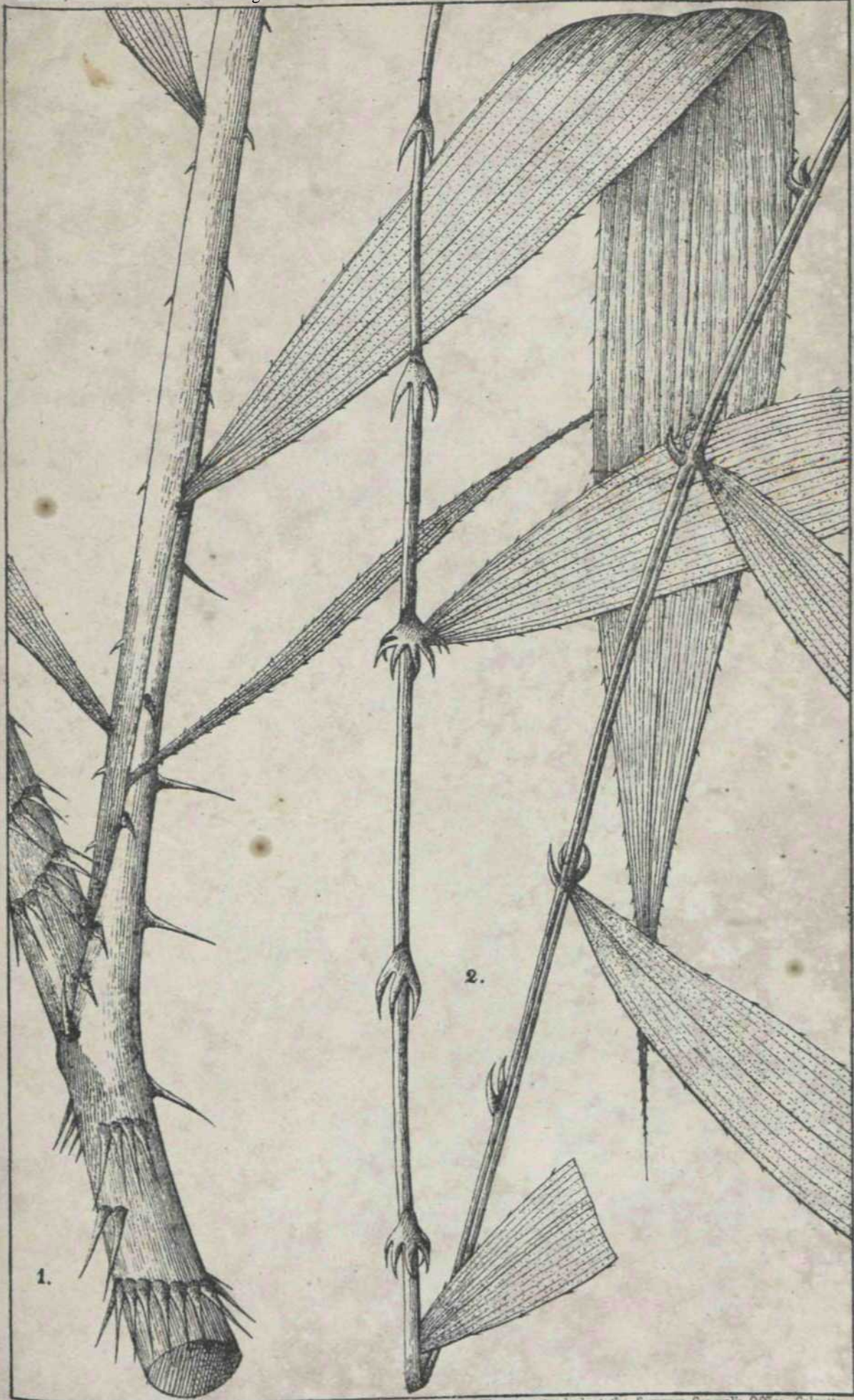
J. Schaubury-Litho

CALAMUS ANCAMAJSriCUS,?



Photoincographed at the Surveyor General's Office Calcutta.

CALAMUS PAKADOXUS.

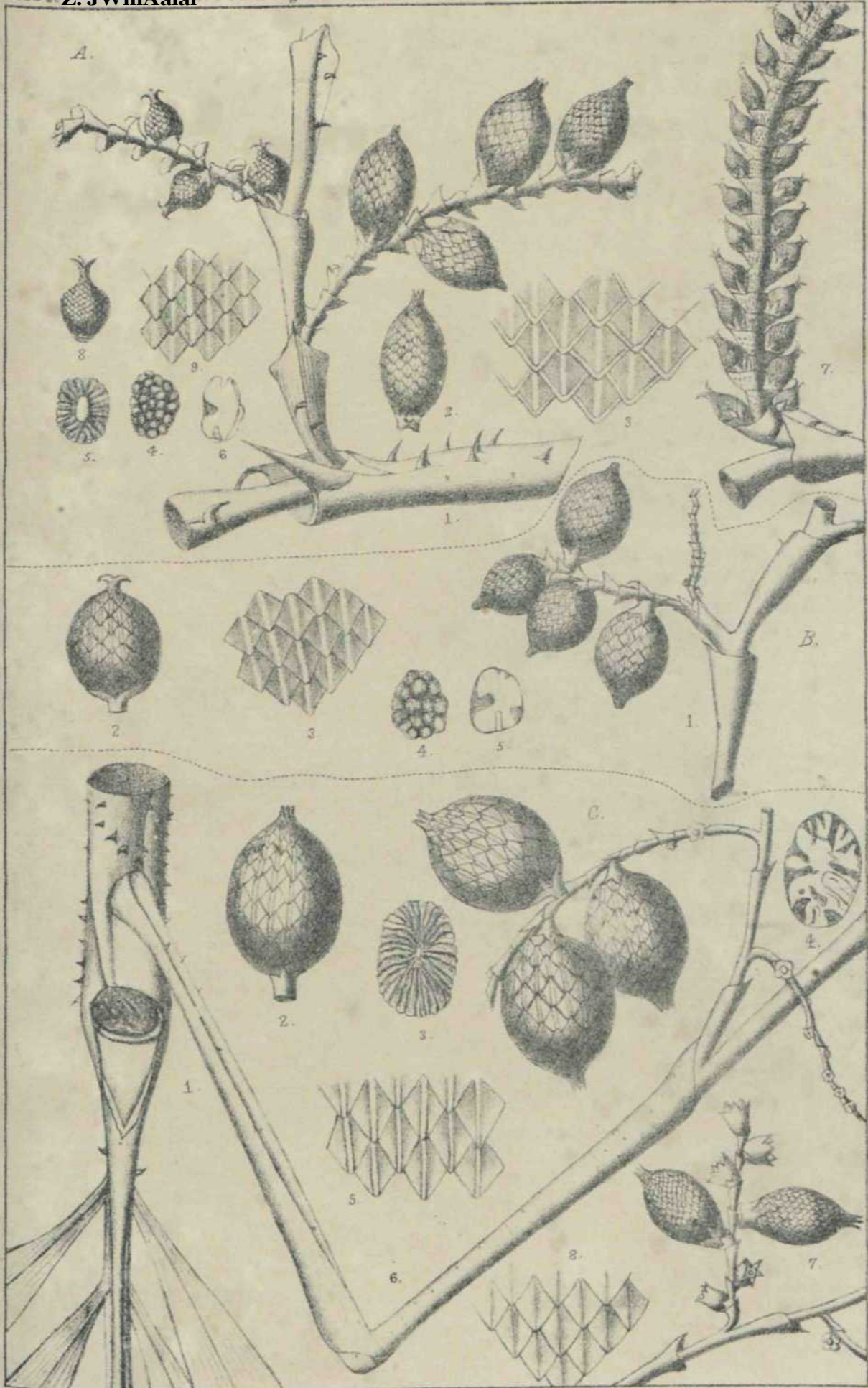


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Photographed at the Surveyor General's Office Calcutta.

CALAMUS PARADOXUS.



J. N. Das. Lith. \wedge C, H [. n n l] , s latifolius. i? . C. tenuis. C. C: gracilis.

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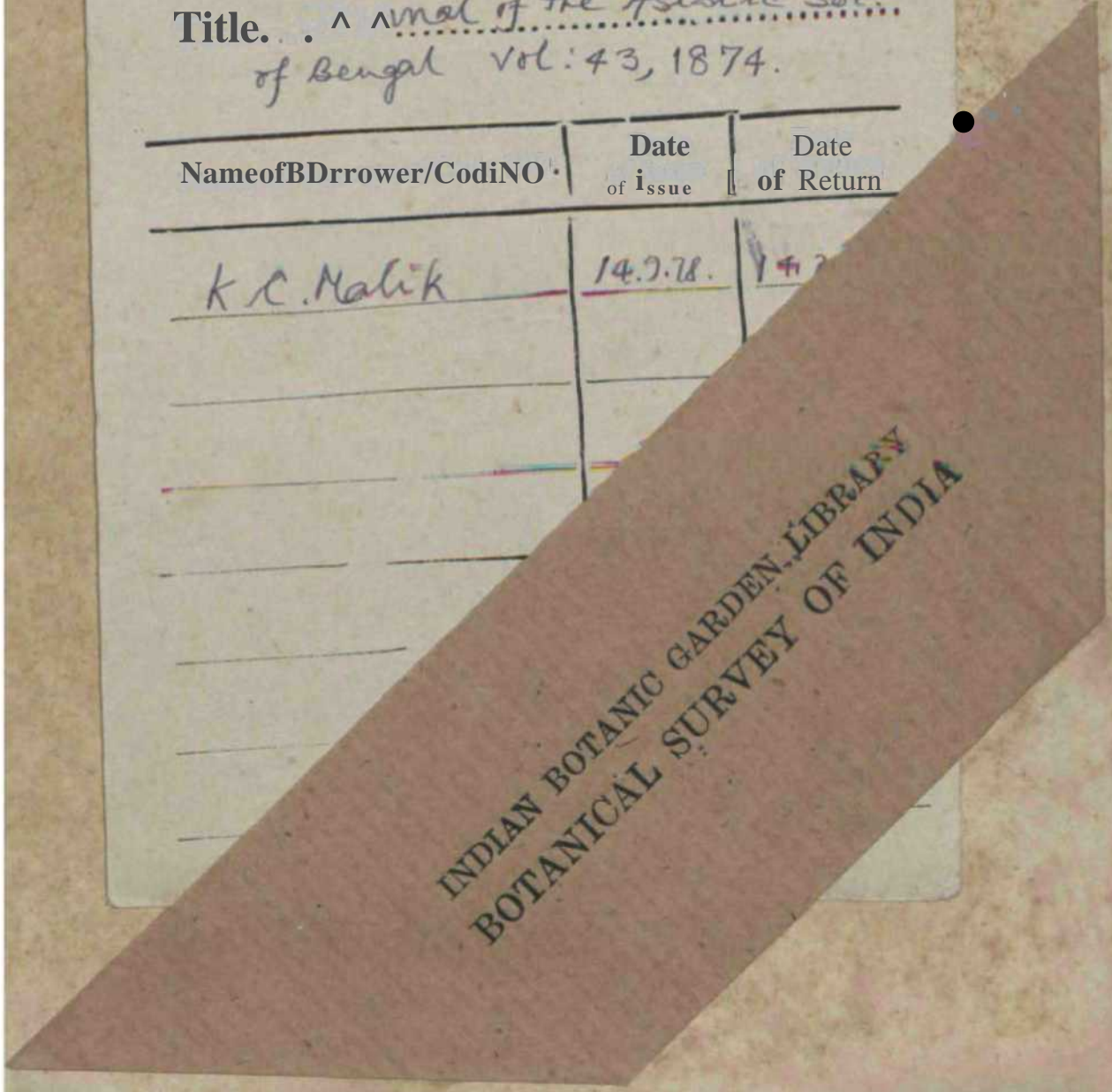
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