

No. 67. A Contribution to the knowledge of the
Indian Maydeae

BY

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§ 1. INTRODUCTION.

The grasses constitute a very well defined natural group of plants, but the division of this family into tribes and subtribes is a difficult problem. We know that ROBERT BROWN divided the family into the *Panicaceae* and the *Poaceae*. BENTHAM already indicated that in the former the tendency to imperfection lies in the lower flowers of the spikelets, whereas in the *Poaceae* the tendency is in the opposite direction, but he observes at the same time that this principle is too indefinite to serve as a practical character to recognize both groups. In combination with other characters, especially those taken from the fruits (the caryopsis, enclosed by the scales), these two groups become however more stabile.

KUNTH gave us no less than 13 tribes, many of them indeed very natural and accepted in recent works. The earlier agrostologists have given a considerable importance to the presence or absence of awns on the back or on the apex of the flowering glume (lemma). We know however at present that this character, although important to recognize species, is not very valuable for the different tribes and must be used with great reserve.

I follow the classification into *Panicoideae* and *Poeoideae* given by ASCHERSON and GRÄBNER in their Synopsis der Mitteleuropaischen Flora. This classification is in accordance with HACKEL's work on the gramineae in ENGLER's Nat. Pflanzenfamilien. American agrostologists usually accept the two subfamilies but their classification of what they call the *Panicatae* is restricted to a smaller group of but four tribes in stead of the six tribes accepted by HACKEL. Still more different is STAFF's division in the Flora of Tropical Africa. Although he accepts the two subfamilies *Panicoideae* and *Pooideae*, he places in the first subfamily only three tribes, the *Maydeae*, the *Andropogoneae* and the *Paniceae*. The tribe of the *Oryzeae* may however to my opinion better be placed under the *Panicoideae*. The group of grasses

forming the *Panicoideae* is very heterogeneous but all the genera belonging to this subfamily fall into distinct and well-marked tribes, one of these tribes, the *Maydeae*, I wish to deal with in the present paper. As we know the *Maydeae* are characterized by unisexual spikelets, the staminate and pistillate spikelets placed in separate portions of the same inflorescence, the staminate above, sometimes the spikelets are placed in totally separate inflorescences. Rarely and only in monstrous forms of *Zea*, staminate spikelets are mixed with the pistillate ones, or pistillate spikelets occur among staminate ones in the terminal panicle. The staminate spikelets are placed in pairs or threes, they are two-flowered with the lower floret imperfect; the pistillate spikelets are placed usually single, also two-flowered, the lower floret sterile. They are imbedded in hollows of a thickened articulated axis and fall together with the joints, sometimes they are inclosed in an osseous involucre. The genus *Zea* is anomalous, the pistillate spikelets crowded in rows on a much thickened axis. For the knowledge of the different genera the pistillate spikelets and the fruits are very important. Some genera of the tribe have a thickened lower glume of the female spikelet, the pistillate portion of the spike breaks up into several joints, each joint one-seeded. The greater part of the joint is formed by the first glume. On the other hand the joints of the American genus *Tripsacum* are for the greater part formed by the true rhachis. The genera *Coix*, *Euchlaena*, *Tripsacum* and *Zea* are well-known and for the moment excluded from this treatment of the *Maydeae*. The remaining genera, all Indian ones are *Polytoca*, *Sclerachne* and *Chionachne*. A fourth genus I shall describe as a new one. These four genera all have a so-called „false fruit”, nearly exclusively formed by a much enlarged osseous outer glume, which is completely closed over the remainder of the spikelet. This „stony case” or „false fruit” (in german fruchtgehäuse) is important to recognize the genus and the species. The three genera mentioned above are much related and different agrostologists have often united them. BENTHAM ¹⁾ in his Notes on Gramineae accepts the three genera and gives the differences, although the characters used by him to distinguish *Polytoca* and *Chionachne* (by the internodes of the rhachis, being enclosed by the outer glume or not) are by no means suitable HOOKER ²⁾ in his Flora of British India distinguishes only the genus *Polytoca*. According to HACKEL the three genera are well-characterized. The genus *Polytoca* has terminal inflorescences with male spikelets only, the lateral inflorescences (spikes) are mixed. The two other genera *Chionachne* and *Sclerachne* have spikes with mixed spikelets, the lower are female, the upper male. *Sclerachne* possesses but one male spikelet, terminating the inflorescence, the latter bearing mostly but one „false fruit”. *Chionachne* has 2-more male spikelets at the top of the inflorescence, *Sclerachne* has moreover a lower glume produced beyond the fruit into an open membranaceous appendage, wanting in the genus *Chionachne*. But even if we do

¹⁾ G. BENTHAM, Journ. Linn. Soc. XIX. [1881] p. 52!

²⁾ J. D. HOOKER, Fl. of British India, Vol. VII. [1897] p. 100!

not accept these characters as important enough, we cannot unite the three genera as did several authors and I will explain in this paper why the genera ought to be separated.

To have a better idea of the genera, the caryopsis was studied. Although the genera are not abundantly represented in herbaria I was fortunate enough to find the ripe grains of all the three genera. It is well-known that the fruits and especially the caryopses are very important for the discrimination of groups. By their characteristic form we are able to distinguish them easily. The caryopsis has at the base a small embryo, just opposite this embryo we find the hilum. The form of this hilum is also of great importance because the form is a constant character and whole tribes are recognizable by the form and position of the hilum. The tribe of the *Oryzaceae* has an elongated linear hilum, other tribes among the *Panicoidaeae* have a punctiform hilum. The *Maydeae* have, so far as they were known, also a punctiform hilum, but it is very curious that there is found one exception. Dr. STAPF has described and figured in HOOKER'S *Icones* under no. 2333 a *Polytoca Cookei*. In our herbarium there is a plant from Malabar Concan leg. STOCKS (Herb. Ind. Or. Hook. f. et Thomson) perfectly agreeing with the description and figure given by Dr. STAPF. Moreover this collection is cited by Dr. STAPF himself. The late Professor Dr. M. SCHENCK at Siegen has given the determination of this plant as *Polytoca Cookei* STAPF, the plant was placed in our herbarium with the incorrect name of *Chionachne barbata*. Prof. SCHENCK carefully studied this plant, he found a caryopsis having a linear hilum, because such a hilum was never observed in the group of the *Maydeae* he consequently based on this *Polytoca* a new genus he named *Trilobachne*. He never published his new genus but his notes and sketches I found years ago when I undertook the revision of the grasses in our herbarium. The short notes given by Prof. SCHENCK were the prime cause to study all the Indian *Maydeae* I could find in our collections. Moreover I could study the Indian *Maydeae* from the Berlin Herbarium kindly placed at my disposal by Prof. DIELS and Prof. PILGER. From Dr. STAPF I received fragments of the inflorescences with ripe grains from plants in the Kew Herbarium. Dr. STAPF says about his *P. Cookei*: „allied to *Polytoca bracteata*, Benn., but very distinct in the broad leaves, the „reduced number of the female spikelets, the different shape of their glume 1, „and the less advanced reduction of the neuter spikelets in the female spike. It „resembles more nearly *Polytoca barbata* (= *Chionachne barbata* Benn.) in habit, „particularly on account of the open spathe-like leaf-sheaths of the inflorescence, „but the female spike differs more than that of *P. bracteata*”. In his latin description STAPF says the following: „caryopsi a dorso leviter compressa late „oblonga antice leviter sulcata, hilo oblonga in sulco angusto a basi ad mediam „caryopsin ducto immerso”. Dr. STAPF has figured an immature caryopsis, in reality the hilum is not oblong but linear, probably STAPF has also seen the peculiar form of the hilum but has not given so much weight to this character.

The new genus I describe as follows:

TRILOBACHNE SCHENCK.

nov. gen. in Herb. Lugd. Bat.

Differt a *Polytoca* fructu et involucro fructus. Dorsum fructus deorsum productum trans basim embryonis et ibi medio profunde fissum.

Hilum anguste fasciiforme, curvatim currens in profunditate fissurae ab imo praeter dorsum scutelli ad latus dorsale et ibi immersum in sulcum et visibile per circa mm. 1.

Gluma exterior apice triloba incisionibus duabus profundis, lobo medio latiore, apice leviter emarginato, lobis lateralibus brevioribus, anguste acutis.

Trilobachne, e verbis $\tau\rho\iota$, $\lambda\omicron\beta\omicron\delta$ et $\alpha\chi\eta$, ob paleam exteriorem apice trilobam.

Species unica: *Trilobachne Cookei* (STAPF) SCHENCK.

= *Polytoca Cookei* STAPF in Hook. Icones. l. c. no. 2333.

The other three genera have a punctiform hilum, but as to the place of the hilum important differences are found and to my opinion it is necessary to keep them apart.

The genus *Polytoca* was established by ROB. BROWN in BENNETT'S *Plantae javanicae rariores* ¹⁾. The only species mentioned is *Polytoca bracteata* R. BR. This well-known species was already described as *Coix heteroclita* by ROXBURGH ²⁾, we find the plant under the name of *Polytoca heteroclita* KOORDERS nov. comb. ³⁾ and the same combination was given by MERRILL ⁴⁾. As a manuscript name this combination was however already used by COLL. MUNRO (in the herb. mus. Paris.) and published by BALANSA ⁵⁾ in the year 1890.

In the *Supplementum plantarum*, edited in 1781 by LINNÉ'S son, there is published an *Apluda digitata* on pag. 434. The meagre description reads: „*Apluda spicis digitatis secundis. Habitat in India. Thunberg. Gramen inter altiora.*”

In HACKEL'S *Monograph of the Andropogoneae* we find in the Index on p. 700: *Apluda digitata* L. f. est *Polytoca bracteata* Benn.

In JUEL'S *Plantae Thunbergianae* (Arb. Ekm. Univ. fonds, Uppsala no. 21, 1918), *Apluda digitata* is mentioned on p. 89. There is no specimen in THUNBERG'S herbarium at Upsala and JUEL cites THUNBERG'S *Spec. Or. Ind. nov.* from 1824 p. 31. *Polytoca bracteata* R. BR. is given by JUEL as a synonym.

¹⁾ J. J. BENNETT, *Plantae javanicae rariores*, [1838] p. 20 tab. 5!

²⁾ W. ROXBURGH, *Flora Indica* (Serampore edition), Vol. III. [1832] p. 572!

³⁾ S. H. KOORDERS, *Exkursionsflora von Java*, Bd. I. [1911] p. 99!

⁴⁾ E. D. MERRILL, *Philippine Journ. of Science*, Vol. X. [1915] p. 288!

⁵⁾ B. BALANSA in *Journ. de Botanique par Morot*, Tom. IV. [1890] p. 78!

I therefore propose to take up the name *Polytoca digitata* for the species described by ROXBURGH as *Coix heteroclita*.

This species has a very curious caryopsis. The base of the grain is concave, and the cavity is formed by the margins of the grain. In this cavity lies the relatively large ovaliform hilum. If we open the fruit-case at the front side we see but a trace of the hilum and we can only observe the whole hilum by taking the caryopsis from the scales. If we observe the grain from below, we find the hilum at the bottom of the cavity. It is very interesting to find this form of the caryopsis in other species of the *Maydeae*. BALANSA¹⁾ has extensively described a new species of *Chionachne*, named by him *Ch. Massii*. The type specimens of this very interesting species are preserved in BALANSA'S private grass-herbarium, now in the Rijks Herbarium. Dr. STAPF²⁾ has identified *Chionachne Massii* with *Sclerachne punctata* by error, probably according to the believed equal form of the lower glume, and therefore he called the species *Polytoca punctata*, but the structure of the fruit-case and the caryopsis is so different from *Sclerachne* that it is impossible to unite the two plants. BALANSA'S *Chionachne* is a true *Polytoca*, although the fruit is thicker and broader than the fruit of *Polytoca heteroclita* (*bracteata*), the grain has quite the structure as described above, the fruit-case is according to the thick grain much blown up and thus different in outline from the fruit-case of *Polytoca heteroclita*, but for the rest and especially in the upper free part of the lower glume, it is in accordance with *Polytoca*. In BALANSA'S species, the cavity is so deep and the lower margins of the grain are so sharp and entirely enclosing the cavity, that in an opened fruit-case no trace of a hilum can be found, the hilum is totally hidden by the margins. The name of BALANSA'S species is therefore *Polytoca Massii*.

After having characterized the genus *Polytoca* as given above, there remain two genera, *Sclerachne* and *Chionachne*. If we open the fruit-case of *Chionachne barbata* R. BR., or *Chionachne biaurita* HACK. at the front side, we see immediately the whole punctiform hilum. The same disposition is found in the Javanese *Sclerachne punctata* R. BR. The two genera *Sclerachne* and *Chionachne* although much related, differ as we have already remarked in the number of the male spikelets at the summit of the spike, (but one in *Sclerachne*, more than one in *Chionachne*), moreover they also differ in the fruit-cases. If we have a fruit-case of the genus *Sclerachne*, the true axis of the spike is not visible because the margins of the lower glume are overlapping, only the slightly excurrent top of the axis may be seen. *Chionachne* however possesses a totally free axis, the margins of the lower glume are clasping or they meet another, but the true rhachis is seen lying apparently in a groove of the fruit-case.

¹⁾ B. BALANSA, loc. cit. p. 78!

²⁾ J. D. HOOKER, Fl. of British India, Vol. VII. [1897] p. 102.

§ 2. KEY TO THE GENERA OF THE MAYDEAE.

- A. Female spikelets in the axils of bracts with large papery scales.
- a.* female spikes free, articulated, the fruiting spikelets falling off separately with the internodes to which they are attached. **Euchlaena.**
- b.* female spikes united together, female spikelets densely packed in several vertical rows upon a central spongy axis **Zea.**
- B. Female spikelets totally enclosed at the base by an ovoid or globose osseous part of the bract. **Coix.**
- C. Female spikelets with a hardened lower glume.
- aa.* the hardened fruit-case is partly formed by the outer glume and chiefly by the broad thickened internode of the rhachis. American species. **Tripsacum.**
- bb.* the fruit-case is chiefly formed by the lower glume. Indian species.
- aaa.* hilum narrowly linear, lower glume deeply 3-lobulate at the tip with a larger middle lobe. **Trilobachne.**
- bbb.* hilum ovaliform or punctiform, lower glume not cleft, or only shortly 2-3-dentate at the apex.
- α.* lower margins of the grain enclosing a cavity at the bottom of which is found the hilum. Hilum only visible from below or at the front side a small part of the hilum can only be seen. Ultimate panicles male, lateral panicles mixed. **Polytoca.**
- β.* no cavity at the base of the grain, hilum never hidden by the margins of the caryopsis, placed at the back of the grain.
- αα.* margins of the lower glume overlapping, enclosing the rhachis, one male spikelet at the end of an inflorescence, outer glume of female spikelet with an open membranous appendage. **Sclerachne.**
- ββ.* margins free, not overlapping, the rhachis visible over the whole length, or partly obtected only at the middle, always visible at the base and at the top. Several male spikelets, outer glumes of female spikelets without membranous appendages. **Chionachne.**

§ 3. SYNOPSIS OF THE GENERA.

Sclerachne R. Br.

in BENNETT, *Plantae javanicae rariores* [1838] p. 15. tab. 4!; MIQUEL, *Fl. Ned. Ind. III.* [1855] p. 475! c. Tab. XLIA (a copy of Bennett's plate); KOORDERS, *Exkursionsflora v. Java I.* [1911]. p. 99!

Only species: *Sclerachne punctata* R. Br.

Distribution: Java, Madoera and Timor.

Specimens seen:

Timor: Coepang, april 1903 leg. ROB. BROWN ex herb. Musei Britannici, Herb. Lugd. Bat. no. 902.23—464 (Herb. Berol!)

Java: Djapara, anno 1899, leg. S. H. KOORDERS no 35291 β (Herb. L. B.).
Kepoeh, anno 1917, leg. J. JESWIET no. 632 (nom. vern. Pengkenan)
H. L. B. no. 920.291—81.

Soerabaja, Koepang, anno 1917 leg. BREMEKAMP, H. L. B. no. 920.285—49.
Kepoeh near Pasoeroean, anno 1917 leg. BACKER no. 20957, H. L. B.
no. 924.18—486.

idem, anno 1918 leg. BACKER no. 24198, H. L. B. no. 924.18—421.

Goenoeng Semongkrong near Pasoeroean, anno 1918, leg. BACKER
no. 24244, H. L. B. no. 924.18—432.

Soerabaja, Dradah south of Babad, anno 1919, leg. BACKER no. 30071,
H. L. B. no. 924.18—433.

Madoera: Insula Kangean, Tambalangan, anno 1919, leg. BACKER no. 27633,
H. L. B. no. 924.18—448.

Trilobachne M. Schenck.

Only species: *Trilobachne Cookei* (STAPF) SCHENCK.

= *Polytoca Cookei* STAPF in HOOK. *Icones XXIV.* [1895]. pl. 2333!; HOOK. *F. Fl. British India VII.* [1897] p. 101!; COOKE, *Flora of Bombay. II.* [1908] p. 998!

Distribution: British India.

Specimen seen: Malabar, Concan leg STOCKS, Law Co. Herb. Ind. Or. Hook. f. et Thomson, (H. L. B. no. 902.23—130).

Polytoca R. Br.

in BENNETT, *Plantae javanicae rariores* [1838] p. 20. tab. 5!; MIQUEL, *Fl. Ned. Ind. III.* [1855] p. 475!;

Key to the species of the genus Polytoca.

I. Female spikes short, about 2—3 cm. long, fruit-cases few (1—3), ovate, blowed up, constricted at the middle, glabrous, shining. Lower glume with

auriculate margins just below the middle, (the rhachis partly obtected), produced beyond the fruit into broad wings, truncate or slightly emarginate at the summit. Grain broader than high, the hilum very large, totally hidden by the lower margins of the caryopsis.

1. *P. Massii* (Bal.) Schenck

II. Female spikes long, mostly more than 5 cm. long, fruit-cases many, linear-oblong or cylindric, never constricted at the middle, glabrous and shining or hirsute. Lower glume never with auriculate margins, the rhachis free or only very slightly touched by the margins, lower glume always produced into acute or subacute wings, bifid at their summit. Grain longer than broad, the hilum not so large and only hidden by the lateral and opposite lower margins of the caryopsis, the hilum just visible at the base of the front side.

A. Fruit-cases short and broad, hairy or pubescent, not over 1 cm. long, scarcely 3 times as long as broad, mostly less (about $2\frac{1}{2}$ time). Rhachis free. Indian species.

a. fruit-case \pm 7 mm. long, about $2\frac{1}{2}$ mm. broad, very hairy on the back, rhachis very hairy with two lateral tufts of hairs just below the top. Male spikelets 5—6 mm. long, acute or acuminate, glabrous, the lower glume not winged, ending in a long deciduous flexuous awn having two hyaline appendages near the base.

2. *P. Wallichiana* (Nees) Benth.

b. fruit-case \pm 1 cm. long, 3 mm. broad, slightly hairy or pubescent on the back or only above the middle, rhachis hairy or ciliate, without lateral tufts of hairs. Male spikelets 9—10 mm. long acutish, unawned, pubescent, the lower glume of the male spikelet winged at the top, no hyaline appendages.

3. *P. digitata* (L. f.) Henr.

B. Fruit-cases long and narrow, glabrous, more than 1 cm. long, more than 3 times as long as broad. Margins of the rhachis partly obtected by the margins of the lower glume. Australian or Polynesian species.

aa. Lower glume of female spikelets with broad expanding lateral wings, the summit blunt but emarginate or bifid.

4. *P. cyathopoda* (F. v. M.) Bailey

bb. Lower glume of female spikelets without lateral wings, the summit acute. In the same inflorescence there occur fruit-cases with one or two lateral teeth not reaching the summit.

5. *P. macrophylla* Bentham

1. *Polytoca Massii* (Balansa) Schenck nov. comb.

= *Chionachne Massii* BALANSA in Journal de Botanique par MOROT, Tom. IV. [1890] p. 78!

Distribution: Tonkin.

A very characteristic species, easy to recognize.

Type in BALANSA's Herbarium (Hb. Lugd. Bat.)

Specimens seen: .

Sontay, près de la pagode militaire, dans les rizières en jachère, Nov. 1886, leg. MASSIE (Type in Herb. BALANSA, H. L. B. no. 908.94—550); Bords du Song-kau à Dap-cau, Nov. 1885, no. 312 (Hb. BALANSA, H. L. B. no. 908.86—12); Talus des sentiers près du village du Papier près de Hanoi, 13 juillet 1890, leg. BALANSA no. 4535 (Herb. Berol.); Hanoi, lieux vagues, Octob. 1890, leg. BALANSA no. 4556 (Hb. Berol.).

2. *Polytoca Wallichiana* (Nees) Bentham.

in Journ. Linn. Soc. XIX. [1881]. p. 52!

= *Cyathorhachis Wallichiana* NEES ex STEUDEL Syn. Gram. [1854] p. 403! — Gen. Nov. WALLICH Cat. n. 8629.

Distribution: Sikkim, Assam, Pegu.

The type is WALLICH 8629 B in the NEES Herbarium (Mus. Berol.).

Specimens seen:

Sikkim: Regio trop. leg. J. D. HOOKER (Hb. Hook. f. et Thoms., *Polytoca* no. 2), H. L. B. no. 902.23—461; (Hb. Berol.).

Assam: leg. COLONEL JENKINS (Calc. Herb.), H. L. B. no. 902.23—460.

Pegu: leg. SCOTT (Calc. Herb.), H. L. B. no. 902.23—462 and 463; leg. S. KURZ no. 1136 (Calc. Herb.), H. L. B. no. 908.168—809 (agrees perfectly with WALLICH 8629 B in Herb. NEES); (id. in Herb. Berol.).

Rangoon (no locality) anno 1857 no. 218 (Calc. Herb.), Hb. Berol.; Burma; District Minlen, village Mahoo, Clini Hill, Dec. 1902, coll. SHAIK MOKIM no. 895 (from Calc. Herb.) Herb. Berol.; Herb. GRIFFITH no. 6777, coll. Assam, leg. MASTERS, Hb. Berol.; Burma, Moalmyne, Jan. anno 1827, WALLICH no. 8629 B = *Cyathorhachis Wallichiana* N. AB ES. (type) Hb. NEES in Hb. BEROL.; Darjeeling Terai, July 1875, C. B. CLARKE, 26800 A, id. June 1870, Clarke, 12018 A, 12018 C. Herb. Berol.

Polytoca Wallichiana, according to the female spikelets, much resembles *Polytoca heteroclita*, but the plant has a totally different aspect and is

not so stout, moreover the male spikelets are smaller, narrower, and very acute, ending in an awn, this awn is rather long but easily breaks off, hence in some herbarium specimens (even the type in the NEES Herbarium) the awns are wanting or they are partly broken off.

3. *Polytoca digitata* (L. f.) **Henr. nov. comb.**

Apluda digitata L. F. Suppl. [1781] p. 434!

= *Polytoca heteroclita* (ROXB.) MUNRO ap. BALANSA in Journ. de Botanique par MOROT. Tom. IV. [1890] p. 78!

= *Coix heteroclita* ROXBURGH Fl. Ind. III. [1832] p. 572!; WALLICH Cat. no. 8627.

= *Polytoca bracteata* R. BR. l. cit. p. 20!

Distribution: British India, Tonkin, Philippines, Java and Madoera.

Specimens seen:

Tonkin: Col de Déo-Couan, dans les lieux humides, 13. janv. 1886, BALANSA no. 509, H. L. B. no. 908.94 - 551 et 555; Prairies situées à la base du Mont Bavi, juillet 1887, BALANSA no. 1785, H. L. B. no. 908.94 - 552 et 554, Hb. Berol.; Vallée de Couainak, près de Quang-yen, sur les collines incultes, 2 août 1885, BALANSA sine no. H. L. B. no. 908.94 - 553.

Siam: anno 1910, leg. A. F. G. KERR no. 1437; Chiengmai, anno 1911 leg. A. F. G. KERR no. 2219 (Herb. Berol.).

British India: Mont. Khasia, Reg. trop. coll. HOOKER F. et THOMS., H. L. B. 902.23 - 458, Herb. Berol. Sookna Darjeeling Terai, Dec. 1876 leg. C. B. Clarke no. 31737 A (Mus. Berol.).

Philippines: Mindanao, Davao Coll. Sibulan, Juli 1888 leg. WARBURG no. 14565 (Hb. Berol.); Mindanao, Mount Apo, Todaya, District of Davao, June 1909, leg. A. D. E. ELMER no. 11026 sub nom. *Rottboellia exaltata* L.! H. L. B. no. 911.170 - 493; Tangoulan and vicinity, Bukidnon, subprovince Mindanao June-July 1920 leg. M. RAMOS et G. E. DANO, Bur. of Science no. 39226, H. L. B. no. 924.18 - 273.

Java: Gampang merak unterhalb Pessawahan, von Walaran 1000 f. bis Radjab 300 f. herab, leg. JUNGHUHN, H. L. B. no. 902.23 - 453 till - 457; Preanger, Djampang Koelon leg. BACKER no. 903, anno 1914, H. L. B. no. 924.17 - 475; Sripit, anno 1914 leg. BACKER no. 11761, H. L. B. no. 924.18 - 56; Bojolati leg. BEGUIN, anno 1918, H. L. B. no. 924.17 - 505.

Madoera: Bangkalan, anno 1915 leg. BACKER, no. 19082 H. L. B. no. 924.18 - 71; S. W. of Ketapang daja, anno 1915 leg. BACKER, no. 19906 H. L. B. no. 924.17 - 490.

4. *Polytoca cyathopoda* (F. v. M.) Bailey.

F. M. BAILEY, Queensland Flora VI. [1902] 1849; Queensl. Agric. Journal XXVII. [1911] p. 69; Compreh. Catal. [1913] p. 616.

= *Sclerachne cyathopoda* F. VON MUELLER, Fragmenta Phytographiae australiae Vol. VIII. no. LXIII [1873] p. 116!

= *Chionachne cyathopoda* F. v. M. ex BENTHAM, Fl. Austral. VII [1878] p. 561!; BAILEY Syn. Queensland Flora [1883] p. 633; DOMIN, Bibl. Botanic. Heft 85 (I) [1915] p. 256!

Distribution: North-Australia and Queensland.

Only specimen seen: North-Australia; Sandy Island, Victoria River coll. F. VON MUELLER (Hb. Kew!).

Unfortunately the caryopsis of this species could not be studied in a perfectly developed state, it is not quite certain that this species is a *Polytoca* although the place of the hilum is near the base of the caryopsis, which agrees in other respects with the caryopsis of other *Polytoca* species. It is very probable that we have here a true *Polytoca* and no *Chionachne* as BENTHAM thought. I have therefore taken up BAILEY'S name. As to the rudimentary pedicelled spikelets this species agrees perfectly with *Polytoca macrophylla* BENTH, but the latter is easy to distinguish by the different form of the fruit-case. The first description of *Sclerachne cyathopoda* given by MUELLER is too short to recognize the species, moreover no type was indicated by him, although many localities are mentioned. MUELLER'S plants were a mixtum of three different species; BENTHAM, writing his Flora australiensis, assisted by baron F. VON MUELLER recognized one of MUELLER'S plants as *Chionachne barbata* R. BR. This plant collected by BOWMAN, Burdekin River is described in BENTHAM'S Flora and according to the exact description and the key given by him proves to be the *Chionachne barbata*. BENTHAM mentioned the spreading bracts under the spike, the latter one inch or rather longer, the several peduncles in the upper leaf-sheaths and the solitary, ovoid-oblong, nearly 4 lines long female spikelet. MUELLER compared his species with the Javanese *Sclerachne punctata*: „haec „planta omnibus notis bene accurrit *S. punctata* R. BR, excepto numero spicularum „utriusque sexus aucto, amplitudine pedunculorum secundariorum sive pedicellorum „et gluma spicularum feminarum exteriori non apicem versus herbacea. Transitum „ad *Polytocam* offert, cui fere adscribenda.” After BENTHAM'S discovery of the *Chionachne barbata* among MUELLER'S plants, we can better understand this explanation and also his note: „gradus variationis graminis Javanici adhuc ignotus”. The plant collected by BOWMAN cannot be accepted as a type specimen because MUELLER'S description does not apply to that plant.

MUELLER gives the following description: „Erecta, spiculis femineis 2—7 perfectis „cum spiculis masculis numerosis in spica unitis, bractea spiculae cujusvis feminae

„exteriore omnino crasso-cartilaginea, interiore tenui-cartilaginea breviter acuminata, „pedicello spicula femina amplexo apice in cyathulum oblique truncatum ampliato.”

The other plants mentioned by MUELLER are found under *Chionachne cyathopoda* MUELL. ex BENTHAM l. c. p. 515.

It is difficult to select the type of MUELLER'S species, because after having excluded the BOWMAN plant, the other ones are once more a mixtum. I have not seen the plants collected in Queensland and could only examine the plants from North-Australia. They are accepted by me as types, because they are first mentioned by MUELLER and were collected by himself. The two plants from MUELLER I saw, belong to two different species and to select the type specimen I have compared them with MUELLER'S second description in BENTHAM'S Flora (p. 516).

The following phrase in the description is noteworthy: „female spikelets closely „appressed, the hard shining outer glume 4 to 5 lines long and embracing the „rhachis as in *C. barbata*.”

The fruit-cases of the Victoria River plant are $5\frac{1}{4}$ lines long and the rhachis is free as in *C. barbata*. The Sturt's Creek plant has fruit-cases scarcely $3\frac{3}{4}$ lines long and the margins of the lower glume are overlapping, the rhachis hidden by them. Hence the Victoria River plant is taken up as the type. The Sturt's Creek plant is a genuine *Chionachne*, this specimen is scanty and I could examine but one ripe caryopsis. The specimen has, according to the overlapping margins of the lower glume some resemblance with the genus *Sclerachne* and I have identified the plant with BAILEY'S *Chionachne Sclerachne*.

5. *Polytoca macrophylla* Benth

in Journ. Linn. Soc. XIX. [1881] p. 52!; SCHUMANN und LAUTERBACH, Flora d. deutschen Schutzgeb. in der Südsee [1901] p. 164!

Distribution: Malay Archipelago (Ternate), New-Guinea (Kaiser Wilhelmsland), Bismarck Archipelago, Louisiade Archipelago.

This species was shortly described by BENTHAM as follows: „spicis longis (omnibus?) „androgynis simplicibus, glumis acuminatis exaristatis; folia adsunt 2-pedalia, „2 poll. lata, spicae 4–6-pollicares: from the Louisiade Archipelago (*Mac Gillivray*)”

The species is easy to recognize even not in flower, the plant has some resemblance with *Zea Mays*, but the blades are cordate and not so broad. The fruit-cases all have the same form but they are very variable as to the first glume, the latter is entire or toothed at the summit, or there are two lateral teeth, sometimes but one, the different forms are found on the same plant or in the same inflorescence. The resemblance of the long female part of the inflorescence with the inflorescence of the genus *Rottboellia* is very striking but a more accurate examination proves clearly the differences with that genus.

Specimens seen:

- Ternate:** (Akè bobotja) leg. BEGUIN no. 1383 anno 1921, H. L. B. no. 924.11—778.
- New Guinea;** (*Kaiser Wilhelms Land*): Ramu Expedition anno 1899, Bismarck Gebirge leg. RODATZ und KLINK no. 120. Hb. Berol.; Ramu (Jagei) fluss, cult. in Dörfern als Zierpflanze (fol. variegat.), 14 Aug. 1896 leg. LAUTERBACH no. 2650. Hb. Berol.; Finschhafen anno 1890 leg. LAUTERBACH no. 816, Hb. Berol.; idem bei Kelana im Grase, Juli 1888, leg. HELLWIG no. 45, Hb. Berol.; Erima, zwischen Alang-alang, auf altem Plantagenland häufig, Mai 1896 leg. LAUTERBACH no. 2162, Hb. Berol.; Finschhafen, busch bei Kolim, anno 1890, leg. KARL WEINLAND no. 356, Hb. Berol.; Gogolfluss (mittellauf) am Ufer gemein, Nov. 1890 leg. LAUTERBACH no. 990, Hb. Berol.; auf dem Wege von Ramu zur Küste, anno 1902, leg. SCHLECHTER no. 14137, Hb. Berol.; Sattelberg, leg. WARBURG no. 20967, Hb. Berol.; Batjan Ebene, leg. WARBURG no. 17967, no. 17972, Hb. Berol..
- Bismarck Archipelago:** Gazelle-Halbinsel, bei Ralum im Lowon, anno 1897 leg. DAHL; idem anno 1896 leg. DAHL no. 209, Hb. Berol.; bei Raluana, im Walde, anno 1890, leg. LAUTERBACH no. 340, Hb. Berol.; Neu-Mecklenburg, Namatanai, Alangfeld anno 1909 missionar PEEKEL, no. 267, Hb. Berol.; Neu-Hannover, anno 1875, leg. NAUMANN no. 13, Hb. Berol.; Nusa im Steffenskanal, anno 1881, leg. E. BETCHE no. 178, ex herb. N. S. Wales, Sydney in Herb. Berol..
- Cultivated in the Bot. Garden at Buitenzorg, no. 447 sub nom. *Coix Lacryma* L., H. L. B. no. 902.23—161.

Chionachne R. Br.

in BENNETT, Plant. javan. rariores [1838] p. 15!; BENTHAM et HOOKER, Gen. Plant. Vol. III. [1883] p. 1113!

The genus was published by BROWN in a note following the description of the genus *Sclerachne*: „Affinitate proxima *Coixi arundinaceae*, WILLD., quae genus proprium „(CHIONACHNE) efformat, a *Coice* diversum defectu veri involucri osseo-cartilaginei; „in hac plantâ enim involucrem auctorum gluma inferior locustae femineae est, „ut in *Sclerachne*, a quâ *Chionachne* distinguitur praesertim figurâ et texturâ uniformi „glumae inferioris locustae femineae, et insuper spicâ locustis masculis pluribus, „nec unicâ, etiam habitu”. BENNETT, on pag. 17 of the work cited above, explains very clearly the differences between *Chionachne* and *Sclerachne* and it is important to give here his explanation: „The curious remark, made by Mr. BROWN, that the „so-called involucrem of *Chionachne* has an origin totally different from that of „*Coix*, being in reality the outer valve of the glume of the female locusta, at once „establishes a striking difference between the two. Its surface is smooth, shining

„and of a cartilaginous texture, resembling the involucre of *Coix*, but its margins „are not united, and the pedicellus of the male spike passes between them without „being entirely hidden; there are no pedicels of abortive flowers on the same „joint with the female locusta; and each joint of the male rachis has also but a „single locusta, which, like the male locustae of *Coix*, is furnished with a 2-valved „glume, and contains two bivalvular triandrous male flowers. The true involucre, „in this genus as in *Sclerachne*, is foliaceous, open in its whole length, and attached „to the base of the pedicellus of the spike.

„As the name of *Coix arundinacea* applied by WILLDENOW to the species which „forms the type of this genus, is posterior by many years to the application by „LAMARCK (Encycl. Meth. IV. p. 422) of the same name to a grass, which appears „to be very nearly related to *Coix Lachryma*, it may perhaps be advisable to „substitute for it ROXBURGH'S specific name of *barbata*. The outer valve of the „female locusta of *Chionachne* is well described by the last-named botanist (Fl. Ind. „III. p. 569), but with the mistaken notion that it constituted a true involucre.”

ROXBURGH'S name of *barbata* given in his Hortus Bengalensis [1814] as well as in WALLICH Cat. no. 8626 is a nomen nudum. *Coix barbata* was published in the III^d volume of his Flora India in the year 1832, but SPRENGEL in the year 1825 already named the plant *Coix Koenigii*, based on *Coix arundinacea* KOENIG ex WILLDENOW. The combination *Chionache Koenigii* given by THWAITES is therefore taken up by me.

Key to the species of the genus Chionachne.

A. Fruit-case single, slightly contracted below, glabrous and shining throughout, ovoid in outline, rounded at the summit without membranous wings, rhachis narrow, cylindrical, free, visible over its whole length.

1. Ch. Koenigii (Sprengel) Thwaites.

B. Fruit-cases many, more or less suddenly contracted or truncate at the base, linear-oblong in outline with more or less developed membranous wings, rhachis broad, not cylindrical, more or less conical upwards, not visible over its whole length, or at least partly hidden by the margins of the lower glume.

a. Fruit-case very narrow, cuneiform, summit deeply cleft, with two truncate triangular membranous wings, margins of the lower glume suddenly contracted at the middle and partly enclosing there the somewhat conical rhachis.

2. Ch. biaurita Hackel.

b. Fruit-case not cuneiform, almost cylindrical or semiterete, summit entire or somewhat emarginate, not deeply cleft, margins of the lower glume

strongly overlapping, the rhachis only visible at the top and the base of the fruit-case.

aa. Fruit-case smooth and shining, narrowly cylindrical, semiterete, minutely contracted at the summit, the margins of the membranous wings erect, entire, slightly erosulate-denticulate or very minutely incised, margins of the lower glume ciliate at the middle.

3. Ch. semiteres (Bentham) Henrard.

bb. Fruit-case slightly rough, ovate-lanceolate, strongly contracted at the summit, margins of membranous wings somewhat spreading, distinctly cleft at the summit, with rounded lobes, slightly denticulate only near the top, margins of the lower glume glabrous.

4. Ch. Sclerachne Bailey.

1. Chionachne Koenigii (Sprengel) Thwaites.

Enumeratio Pl. Zeylanic. [1864] p. 357!

= *Coix Koenigii* SPRENGEL Syst. I. [1825] p. 239!

= *Coix arundinacea* KOENIG ex WILLD. Sp. Pl. IV. [1805]. p. 203! non *Coix arundinacea* LAMARCK.

= *Coix barbata* ROXBURGH, Hort. Benghalensis [1824] nomen nudum; id. WALLICH Cat. no. 8626 nom. nud.; ROXB. Fl. Indica (edit. Serampore) Vol. III. [1832] p. 569! (descriptio).

= *Chionachne barbata* (ROXB.) R. BR in BENNETT l. c. [1838] p. 18!; BENTHAM, Fl. Austral. VII. [1878] p. 515!

= *Coix crypsoides* C. MUELL. in Bot. Zeit. XIX. [1861] p. 334!

= *Polytoca barbata* (ROXB.) STAPF in HOOKER, Fl. British India, VII. [1897] p. 102!; COOKE, Fl. Presid. of Bombay, Vol. II. [1908] p. 999!

Distribution: British India, Tonkin, Ceylon, Celebes and Queensland.

Specimens seen:

British India: Panjab, Reg. trop. leg. THOMSON (Hb. Hook. f. et Thoms.) H. L. B. no. 902.23-131, Hb. Berol.; Mont. Khasia, Reg. trop. leg. HOOK. F. et THOMSON, H. L. B. no. 902.23-132, Hb. Berol.; on banks of wooded Dhamne Valley, Dec. 1879 collector?, H. L. B. no. 920.23-129; Southern Maratha Country and North Canara, Bombay Presidency, near Kusani, Nov. 1881, leg. A. P. YOUNG, H. L. B. no. 920.230-79; Bengalia leg. GRIFFITH, ex herb. K. MUELLER Halle sub nom. *Coix crypsoides* n. sp., type of MUELLER(!) Hb. Berol.; a specimen without locality ex Herb. Hort. Bot. Calcutta in Hb. Berol.; Chota Nagpore, Noada Nov. 1883 leg. C. B. CLARKE no. 34246 ex Herb. Kew. in Hb.

- Berol.; Bengal in graminosis circa Leebpore(?) raro, leg. S. KURZ (forma depauperata, foliis angustioribus) Hb. Berol.; Malabar, Concan, Reg. trop. leg. STOCKS, LAW (Hb. Hook. f. et Thomson) Hb. Berol.; Peninsula Ind. orient. Herb. WIGHT prop. no. 213, Hb. NEES in Hb. Berol..
- Tonkin:** Ki-Luon, prairies, Octob. 1891 leg. B. BALANSA no. 4919, Hb. Berol..
- Ceylon:** THWAITES C. P. no. 3137, Hb. Berol..
- Celebes:** Macassar anno 1861 leg. WICHURA no. 2058, Hb. Berol..
- Australia:** Queensland (sec. Benthams, Burdekin River, leg. BOWMAN; Cardwell District, BAILEY). Specimens not seen.

2. *Chionachne biaurita* Hackel

in Philipp. Journ. Sci. I. Supplem. [1906] p. 263! et 320!

Distribution: Philippines, endemic.

Specimens seen: Prov. of Benguet, Luzon, Bued River, anno 1905 leg. E. D. MERRILL no. 4282, H. L. B. no. 911.150—14, Hb. Berol..

3. *Chionachne semiteres* (Benthams) Henrard. nov. comb.

= *Tripsacus semiteres* WALLICH Cat. Herb. Ind. no. 8628; BENTHAM et HOOK. Gen. Plantarum III. p. 1113! nomen nudum.

= *Polytoca semiteres* BENTHAM l. c. p. 1113, nom. nud.; Hook. f. Fl. Br. India VII. [1897] p. 101! (descriptio).

= *Chionachne Wightii* MUNRO ap BENTHAM l. c. p. 1113, nomen nudum.

The different names given to this species are all nomina nuda, and a description of *Polytoca semiteres* was given in HOOKER'S Flora. *Chionachne Wightii* was a manuscript name given by MUNRO and was mentioned by BENTHAM and HOOKER together with *C. cyathopoda* F. v. M.. BENTHAM and HOOKER in the Genera Plantarum say: „In „*C. cyathopode*, F. MUELL., et in *C. Wightii*, MUNRO, articuli fructiferi plures fere „*Tripsaci*, sed rhachis immersa tenuis nec lapideo-incrassata glumae subaequilata.”

This cannot be considered as a publication, two different species are mentioned under the same phrase, and the characters given apply to both species. Unfortunately I could not study the caryopsis of WALLICH'S no. 8628, and I saw only WIGHT'S specimen (Kew Herb.). According to the characters of the grain this is a true *Chionachne*, as shown by the position of the hilum. The caryopsis is moreover characterized by a curious keel, running from the hilum to the top of the grain.

So far as I could study the *Maydrae*, no other species shows this character. I have taken up the published name *semiteres* for this species.

Distribution: Deccan Peninsula and Burma.

Only specimen seen: Palmacotta, anno 1835 leg. WIGHT no. 3315 (Herb. Kew).

4. *Chionachne Sclerachne* Bailey

in Dept. Agric. Bot. Bull. II. [1891]. p. 21.

= *Polytoca Sclerachne* BAILEY, Queensland Flora [1894] in Queensl. Dep. of Agric.

Under *Chionachne cyathopoda* I mentioned above that VON MUELLER united all the Australian plants of this group in one species, he compared with the Javanese *Sclerachne punctata*; finding his plants very variable (indeed a mixtum of three different species) he unfortunately overlooked the true *Chionachne barbata* among them. I explained the reasons why I selected as the type of MUELLER'S species the Victoria River plant. His Sturts Creek plant is a different species and belongs so far as I could find to the species afterwards described by BAILEY as a *Polytoca*. Because the Sturts Creek plant has a caryopsis with a hilum characteristic for the genus *Chionachne* I have used here the first name given by BAILEY.

Distribution: Queensland, endemic.

Specimen seen: Australia: Sturts Creek, leg. F. v. MUELLER (Herb. Kew).

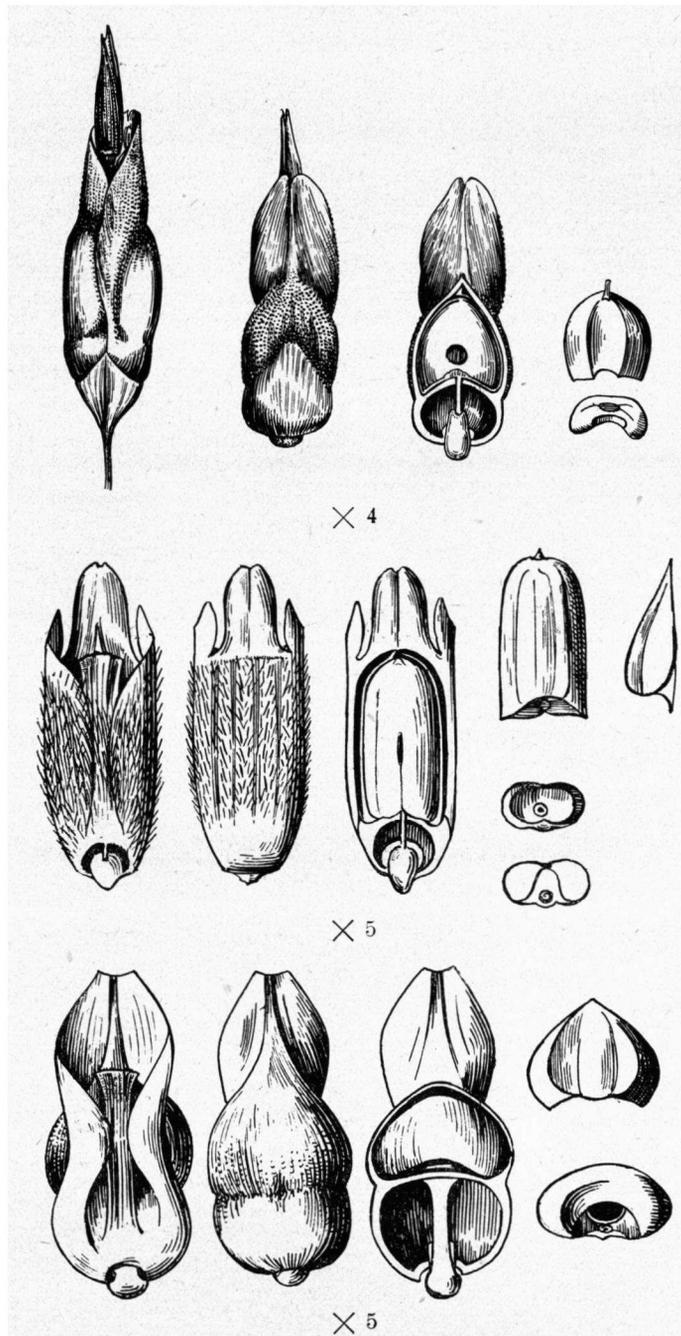


Fig. 1. *Sclerachne punctata* R. BR. from Timor, leg. R. Brown. Fruit-case with peduncle and male spikelet; fruit-case in front; id. opened, with caryopsis and hilum; grain from the back; id. seen from below.

Fig. 2. *Trilobachne Cookei* SCHENCK from Concan, leg. Stocks. Fruit-cases, the third one opened with the linear hilum; caryopsis from the back; the same seen from below, the hilum scarcely visible, in the centrum the place of the pedicel of the fruit; a cross-section of the grain with hilum and there below the coleoptile; right-hand fig. a sagittal section with linear hilum.

Fig. 3. *Polytoxa Massii* BALANSA from type specimen. Fruit-cases, the third one opened; caryopsis from the back; the same seen from below with hilum in the cavity.

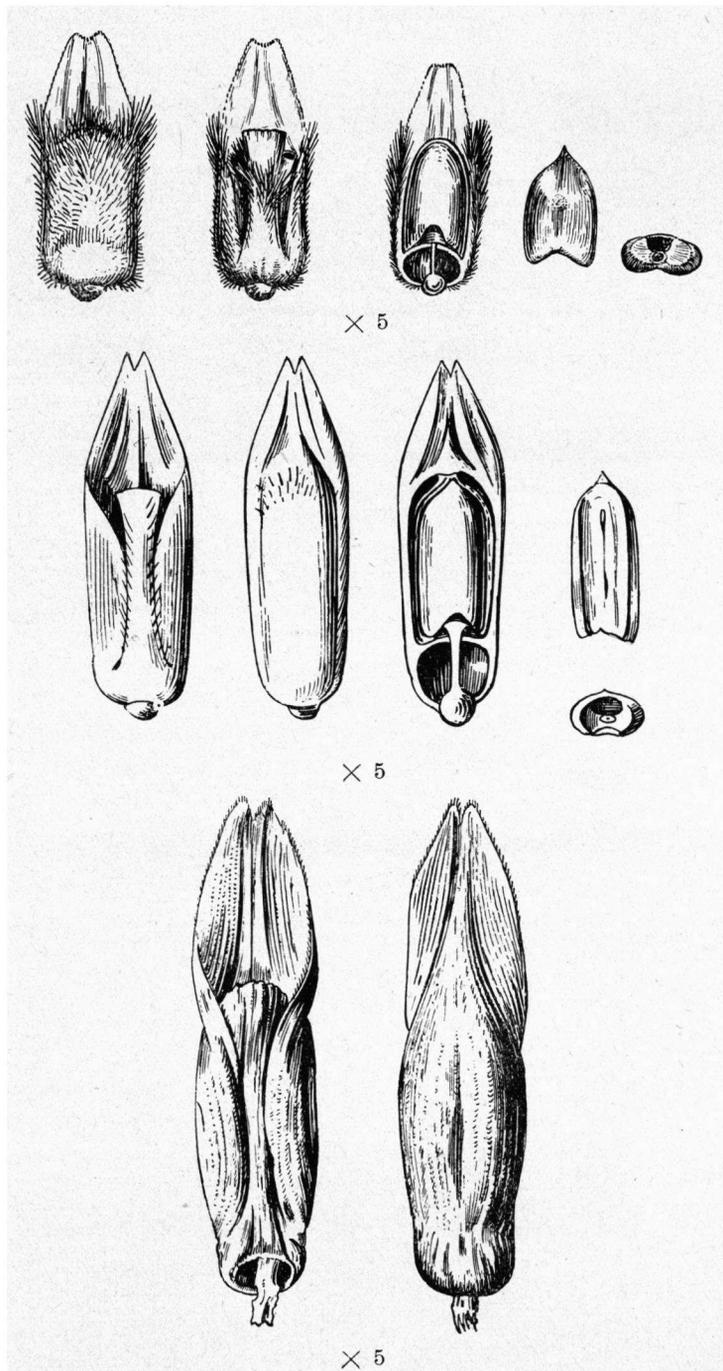


Fig. 1. *Polytopa Wallichiana* (NEES) BENTH. from type specimen of *Cyathorhachis Wallichiana* NEES. Fruit-cases, the third one opened; caryopsis taken out, from the back; caryopsis seen from below.
 Fig. 2. *Polytopa digitata* (L. F.) HENR. leg. Junghuhn, Java. Fruit-cases, the third one opened; grain taken out, from the back; the same seen from below with the hilum in the cavity.
 Fig. 3. *Polytopa cyathopoda* (F. v. MUELL.) BAILEY from Victoria River, leg. v. Mueller. Two fruit-cases.

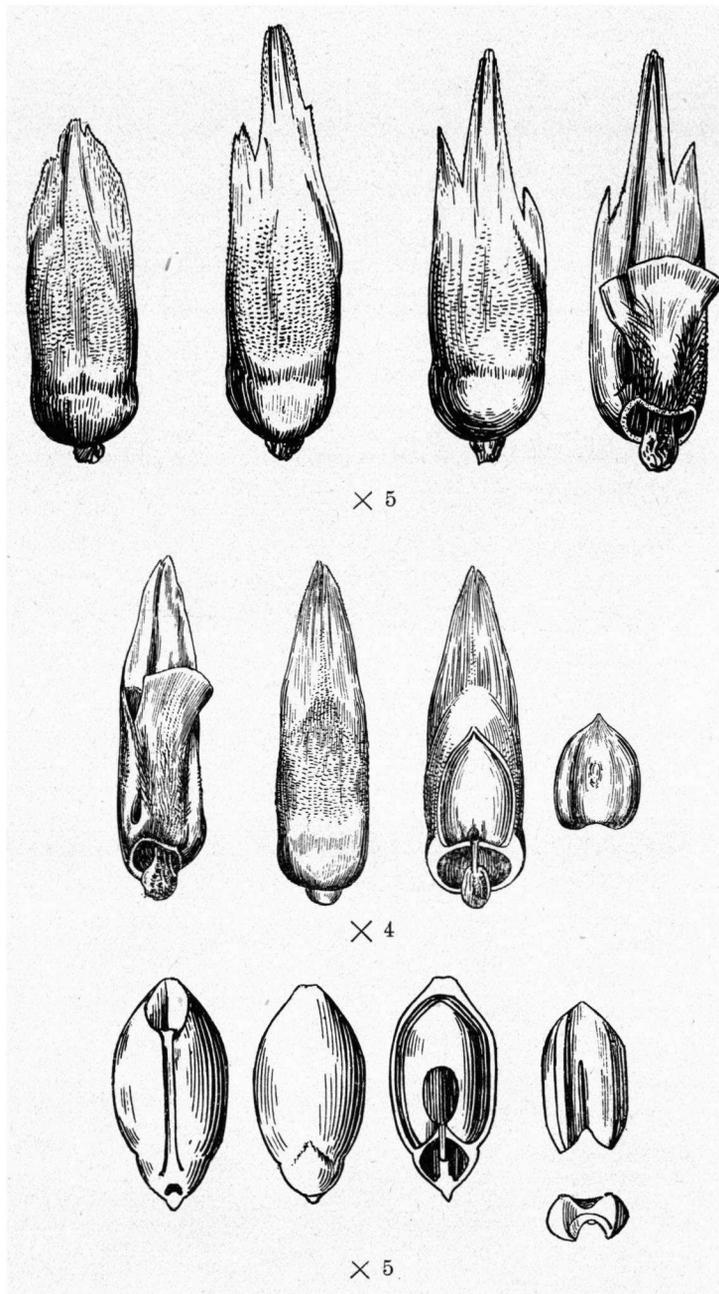


Fig. 1. *Polytoxa macrophylla* BENTH. from Lauterbach no. 340.
 Fig. 2. *Polytoxa macrophylla* BENTH. from Lauterbach no. 990. Fruit-cases, the third one opened; grain taken out, from the back.
 Fig. 3. *Chionachne Koenigii* (SPRENG.) THW. from Panjab (Herb. Hook. f. et Thoms.), fruit-cases the third one opened; caryopsis taken out, from the back; the same from below.

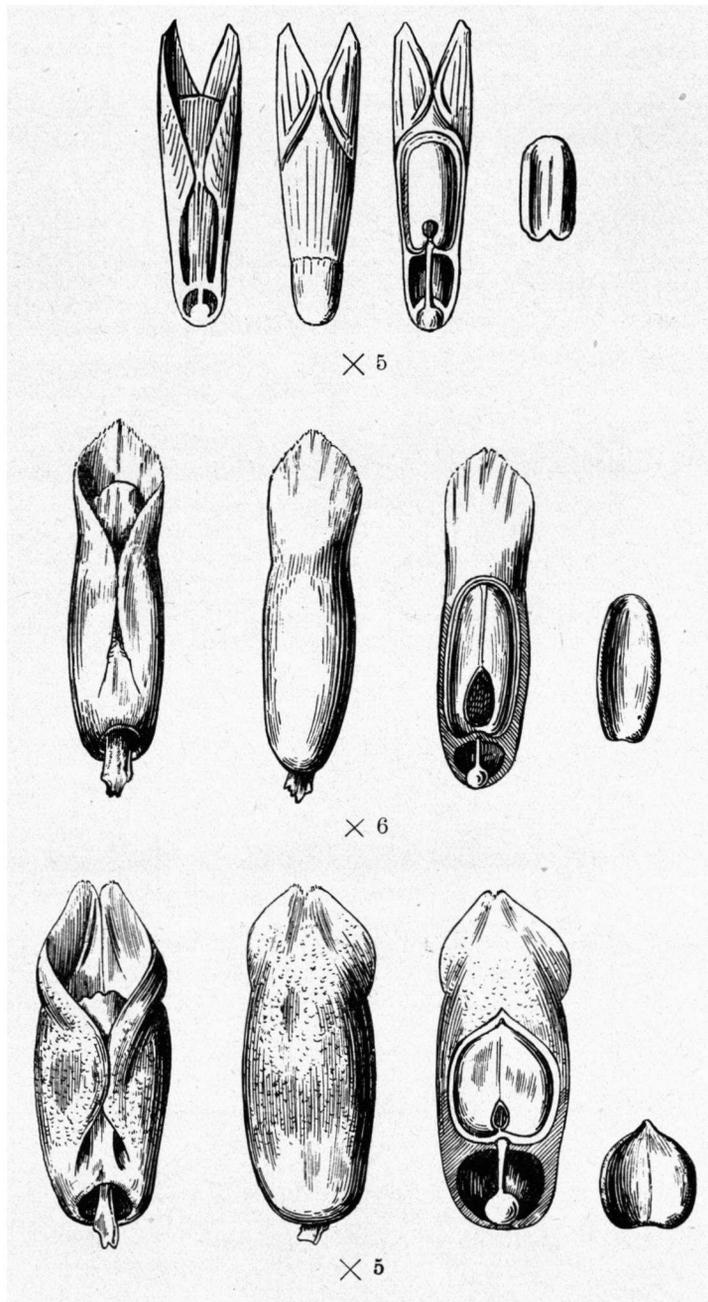


Fig. 1. *Chionachne biaurita* HACK. from duplicate type.

Fig. 2. *Chionachne semiteres* (BENTH.) HENR. from Wight no. 8315 Kew Herb.

Fig. 3. *Chionachne Sclerachne* from Sturts Creek leg. Mueller Kew Herb.

All these figures: three fruit-cases, the third one opened and the caryopsis taken out, seen from the back.