On Some Species of the Moss Genus *Calyptothecium*

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Some twenty five years ago, the author¹⁾ made a taxonomic study of the genus *Calyptothecium* and revised Formosan species. As the material available at that time was insufficient, the taxonomic treatment of the species was unsatisfactory. Many of the names should be revised.

CALYPTOTHECIUM HOOKERI (MITT.) BROTH. (Figs. 1-3)—In 1859 Mitten²⁾ published *Meteorium hookeri*, the basionym of *Calyptothecium hookeri*, based on four specimens numbered 797, 809, 810 and 811 from Khasia and Sikkim. Having examined the original specimens preserved in the herbarium of the New York Botanical Garden, the author found that these specimens are not the same. The no. 797 is a sterile specimen, having regularly pinnate branches; the leaves are shortly acuminate and slightly falcate, but are hardly concave and with a short and faint costa. This specimen is distinct specifically from the other three. The specimen distributed by Levier as *Calyptothecium hookeri* and the plant described by the author as *C. pinnatum* in 1934 agree with this form.

On the other hand, the specimens numbered 809, 810 and 811 are identical. The last consists of two materials of different sources; one indicated as 811/1 came from Khasia regio trop. and the other 811/2 from Khasia regio temp. The former was not cited by Mitten. But the plants of the two collections are identical. As compared with no. 797, the plants in 809, 810 and 811 have concave and widely spreading but hardly squarrose leaves. Several names, *C. robustum* Broth., *C. sikkimense* Broth. and *C. cuspidatum* Nog. have been published for such a form. It seems that there is a problem of mixed materials. The no. 811/2 is a unique specimen that bears sporophytes among the specimens which Mitten cited (Fig. 1). It is clear that Mitten's description of the sporophyte was based on collection 811/2. Therefore, the author selected the specimen numbered 811/2 as the lectotype of *Meteorium hookeri* Mitt.

Brotherus³⁾ published the combination of *Floribundaria hookeri* (Mitt.) Broth., whose basionym is *Meteorium hookeri* Mitt., without any indication of the publication of basionym. As listed in "Index Muscorum"⁴⁾ this is a synonym of *Floribundaria sparsa* (Mitt.) Broth. The above discussion is summarized as follows:

***Calyptothecium hookeri* (Mitt.) Broth.** Nat. Pfl. 1(3): 839 (1909). Syn. *Meteorium hookeri* Mitt. J. Linn. Soc. suppl. 86 (1859) pro parte; *Meteoriella cuspidata* Okam. J. Coll. Sci. Imp. Univ. Tokyo, 38(4): 34 (1916), syn. nov.; *Calyptothecium sikkimense* Broth. in sched. Bryotheca E. Levier, syn. nov.

Representative specimens examined: Khasia, regio temp. 4-5000 ft. leg. J. D. Hooker e, T. Thomson, no. 811/2-lectotype, in NY; Khasia, regio trop. leg. Hooker et Thomson, no. 811/1, in NY. Sikkim, Chongtam, regio temp. 8000 ft. leg. Hooker, no. 810, in NY; Jonglo, alt. 10000 ft. leg. ? in NY; prope Kurseong, Sepoydura Forest, 5500 ft. leg. R. P. Decoly et Schaul, Nov. 2, 1899, Bryotheca E. Levier, as *C. sikkimense*; below Bakkim-Jongri, alt. 4000 m, leg. the Tokyo Univ. Bot. Exped. to E. India, 1960, May 19, 1960. Burma, without definite locality, leg. F. G. Dickason, no. 7446, p.p. as

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C. urvilleanum. Formosa, prov. Sinchiku, mt. Naroyama, leg. H. Sasaoka, Dec. 1912 —type of *Meteoriella cuspidata*. Japan, Kyushu, Kumamoto pref. Konose, leg. K. Mayebara, Apr. 1937.

Figs. 1-3. *Calyptothecium hookeri*, Hooker et Thomson, no. 811/2-lectotype, Figs. 4-6. *C. pinnatum*. 1, plants, $\times 1/6$; 2, 5, showing sporophytes, $\times 5$; 3, 6, peristomes, $\times 135$; 4, plants, Hooker and Thomson, no. 797, $\times 1/4$.

As Mitten's description is brief, additional details follow.

Plants pleurocarpous, sporophytes on secondary stem or branches. Perichaetial bracts erect and imbricate, the inner ones much larger than the outer ones, oblong and rather rapidly attenuated to a long linear awl, reaching 4.5 mm long, margins entire, costa faint, reaching the middle of bracts, paraphyses abundant, filiform. Seta about 1 mm long, capsules immersed, ovate, about 1.5 mm long by 1 mm thick, brown, the upper region darker than the lower, without stomata. Peristome teeth linear-lanceolate, attenuated, perforated along the median line, smooth on the surface, hyaline, reaching 0.25 mm long, praeperistome low, fragmentary, inner peristome without basal membrane, the segments linear, perforated along the keel line, hardly carinate, longer than the teeth, about 0.3 mm long. Spores ovate, 15–20 μ in diam.

Calyptothecium pinnatum Nog. (Figs. 4–6) Trans. Nat. Hist. Soc. Formosa, 24: 471 (1934). Syn. *Meteorium hookeri* Mitt. J. Linn. Soc. suppl. 86 (1859), pro parte.

Representative specimens examined: Formosa. prov. Taichu, Taikwan, alt. ca. 2200 m, leg. A. Noguchi, no. 6058-holotype, Aug. 1932, in Herb. Noguchi. Khasia,

regio subtrop. 4000 ft. leg. Hooker et Thomson, no. 797, in NY. Sikkim, prope Kurseong, Sepoydura Forest, 5500 ft. leg. Decoly et Schaul, Nov. 2, 1899, Bryotheca E. Levier, as *C. hookeri*; Yoksam, alt. 1700 m, leg. the Tokyo Univ. Bot. Exped. to E. India, 1960, May 17, 1960. Burma, without definite locality, leg. Dickason, no. 7446, pp. as *C. urvilleanum*.

Sporophytes on secondary stem or branches. Inner perichaetial bracts oblong, with a long linear acumen, reaching 4.5 mm long, margin toothed above, costa faint, extending upward half way, paraphyses numerous. Capsele immersed, subglobose, brown, about 1.5 mm long by 1.2 mm thick, without stomata. Peristome teeth linear-lanceolate finely attenuated, yellowish, pellucid, smooth, about 0.35 mm long, prae-peristome high, almost half length of exostome, frequently fragmentary above, yellowish, smooth on the surface, inner peristome without basal membrane, the segments linear, hardly carinate, longer than the teeth. Operculum with a high erect and attenuated beak, about 0.8 mm high. Spores globose, ovate, sometime triangulate, finely papillose, variable in size 25-45-50 μ .

CALYPTOTHECIUM WIGHTII (MITT.) FLEISCH. (Figs. 7, 8)—This species was established by Mitten in 1859, based on the specimen collected by Wallich in Nepal. The type specimen consists of three stems mounted on a small sheet (Fig. 7), two of which bear a stoloniferous apex. Such a modification seems to be found in well developed stems of this species. In the majority of specimens of this species in the Mitten herbarium at the New York Botanical Garden the stems are mostly simple and obtuse at the apex. *C. formosanum* is the name for this form. *C. nematosum* (C. Müll.) Dix. seems also to be identical with *C. wightii*. The synonymy does not end here. The author found that *Pterobryopsis subacuminata* Broth. et Par. is the same as *C. wightii*, though Brotherus and Paris did not refer to the correlation between the two species. The synonymy of this species is as follows:

Calypsothecium wightii (Mitt.) Fleisch. Hedwigia 45: 62 (1905). Syn. *Meteorium wightii* Mitt. l. c. 85 (1859); *Calypsothecium formosanum* Broth. Over. Finsk. Vet.-Soc. Förhandl. 62: 23 (1919-20), syn. nov.; *Pterobryopsis subacuminata* Broth. et Par. Rev. Bryol. 34: 45 (1907), syn. nov.

Representative specimens examined: Nepal, leg. Wallich, holotype, in NY; Mirgne, leg. Griffith, no. 34, in NY. Burma, Swayghyen, leg. Scott Kurz, no. 2694. Yünnan, in pluviisilva tropica infra vicum Yaotou inter Möngdu et Manhao, alt. 650 m, ad rupes, leg. Hand.-Mazz. Iter Sinense, no. 5973, March 1915, as *C. subacuminatum*. Formosa, prov. Takao, Raisha, leg. Y. Matsuda.

CALYPTOTHECIUM HAMATUM (MITT.) FLEISCH. (Figs. 9-12)—This species was reduced to a synonym of *C. wightii* by Fleischer⁵⁾. The author has examined the type specimen of *C. hamatum* in the Mitten herbarium and is not in agreement with Fleischer's conclusion. The leaves of *C. hamatum* are imbricated and do not appear divergent or squarrose as do these of *C. wightii*. The costa of *C. hamatum* is shorter than that of *C. wightii*. *C. hamatum* is regarded as distinct from *C. wightii*. In the Mitten herbarium occurs a fertile specimen of *C. hamatum* but labelled as *C. wightii* (from Ceylon, Thwaites no. 186). Based on this specimen, the description of sporophyte may be added.

Calypsothecium hamatum (Mitt.) Fleisch. Hedwigia 45: 62 (1905). Syn. *Pilotrichum hamatum* C. Müll. Linnea 26 (1869-70).

Two or three sporophytes lateral on secondary stems, extending in one direction. Perichaetial bracts erect and imbricate, the inner ones oblong and long subulated,

reaching 4 mm in length, costa faint but extending above mid-leaf, paraphyses few. Seta exceedingly short, about 0.5 mm long. Capsule immersed, subglobose, brown, about 1.5 mm long by 1.3 mm thick, without stomata. Peristome teeth linear-lanceolate, obtuse at the tips, widely split along the median line, colourless and pellucid, smooth on the surface, about 0.17 mm long, praeperistome covering lower half of teeth,

Figs. 7-8. *Calypso wightii*. Figs. 9-12. *C. hamatum*. 7, plants, holotype, $\times 1/3$; 8, 9, leaves from holotypes, $\times 20$; 10, 11, showing sporophytes, $\times 6$; 12, peristome, $\times 135$.

jointed, frequently fragmentary, endostome without basal membrane, longer than the teeth, segments linear, hardly carinate. Spores globose to ovate, finely papillose, $35-45 \mu$ in diam. Operculum convex with a curved beak, about 0.65 mm long. Calyptra small, mitriform, shortly rostrate, brown, about 0.8 mm long, covering the beak only, with dense and long hairs.

Representative specimens examined: Ceylon, reg. mont. leg. J. Nietner, type, in NY; Poondeloya, leg. Nietner, without definite locality, leg. Thwaites, no. 186, in NY.

CALYPTOTHECIUM URVILLEANUM (C. MÜLL.) BROTH.—After a careful study of *Calypsothecium urvilleanum* (C. Müll.) Broth., Dixon⁶ mentions that the name *Meteorium tumidum* Mitt., based on *Neckera tumida* Dicks., which appeared in *Bryologia Javanica* (Pl. 199)⁷

is not good and *Calypsothecium urvilleanum* (C. Müll.) Broth. becomes the correct name for the plant. At the same time he concluded that *Neckera tumida* Dicks. is distinct from *C. urvilleanum* and that it must be treated as a member of the genus *Pterobryopsis*. *Calypsothecium japonicum* Thér., which has been considered as an endemic species in Loo Choo and Formosa is also conspecific with *C. urvilleanum*.

Calypsothecium urvilleanum (C. Müll.) Broth. Nat. Pfl. 1(3): 839 (1906). Syn. *Neckera urvilleanum* C. Müll. Syn. 52 (1851); *Calypsothecium japonicum* Thér. Le Monde des Plantes 9: 22 (1907), syn. nov.; *C. densirameum* Broth. Rev. Bryol. 56: 9 (1929), syn. nov.

Representative specimens examined: Loo Choo, Isl. Amami-Oshima, Yuwandake, leg. J. B. Ferrie, Oct. 1899, type of *C. japonicum*. Formosa, prov. Taihoku, Urai, leg. Noguchi, Aug. 1932. Philippines, Luzon, Sorsogon, mt. Bulusan, leg. A. D. E. Elmer, Sept. 1916. Borneo, without definite locality, leg. Hose. Java, Bantjar Berg. leg. Schiffner, Dec. 1893. New Guinea, Madang Dist. alt. 2000 ft. leg. R. G. Robbins, Aug. 1958. Fiji, Viti Levu, Tavua vicinity, 3000 ft. leg. E. Whitehouse, Jan. 1955. New Caledonia, Koghi, northeast of Noumia, leg. Y. Shibata, Oct. 1958.

Correlation between *Calyptothecium* and *Pterobryopsis*

The author has examined the authentic specimen of *Pterobryopsis tumida* Dixon, which was sent from Dixon. The leaves are cordate ovate and lack auricles at base. This combination of characteristics is generally found in the species of *Pterobryopsis*. The capsules of *Pterobryopsis tumida* lack praeperistome, but with the segments of inner peristome. Brotherus⁹⁾ distinguishes *Calyptothecium* from *Pterobryopsis* by its absence of stomata on capsule, and presence of both praeperistome and segments of inner peristome. In this respect Dixon has not agreed with Brotherus, as Dixon describes the peristome of *P. tumida* as having segments but no praeperistome. On the contrary, *C. wightii* has praeperistome but no segments (according to Brotherus, fig. 569). The author found no stomata in the examination of a small number of capsules of *Pterobryopsis*. The author agrees with Dixon in emphasizing the presence of praeperistome as a distinguishing character for *Calyptothecium*. As compared with the well developed segments of the inner peristome of *Calyptothecium*, those of *Pterobryopsis* are weak or frequently absent. Although unimportant, this characteristic also distinguishes the two genera. In addition, *Calyptothecium* is characterized well by the leaf base with distinct auricles and by the calyptra bearing hairs.

As to the systematic position of *Calyptothecium*, Brotherus, Fleischer, Dixon and Bartram have placed the genus in Neckeraceae. The author, on the basis of characteristics discussed above, classifies the genus *Calyptothecium* in the family Pterobryaceae.

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摘 要

野口 彰: *Calyptothecium* 属(セン類)の数種について

Mitten が命名した *Calyptothecium hookeri* は、原標本についてみると、2種を含む混合種のように思われる。標本のうち、胞子体をつけたものは Hooker と Thomson の採集品である No. 811/2 のみであり、Mitten は胞子体の記載をも与えているので、筆者はこの番号のものを *C. hookeri* の lectotype に指定したい。そうすると、*C. sikkimense* や日本にも産する *C. cuspidatum* はそのシノニムになる。No. 797 のみは他と違った taxon のもので、これは *C. pinnatum* に当る。

台湾産の *C. formosanum* は *C. wightii* と同種であり、また、*C. wightii* と同種と考えられてきた *C. hamatum* は原標本を比較してみると、それぞれ別の種と考えられる。次に、*C. japonicum* は *C. urvilleanum* の名でよばれるのがよい。

Calyptothecium 属は *Pterobryopsis* 属によく似ていて、しばしばその区別は困難で、今まで論議のもとになっている。筆者は、*Calyptothecium* 属は *Pterobryopsis* 属からは、葉の基部両隅に耳状のくぼみのあること、前さく歯のあること、歯突起の発達のよいこと、帽に毛のあることなどを考慮して区別されるものと思う。なお、*Calyptothecium* 属は従来ヒラゴケ科に分類されていたが、むしろ、ヒムロゴケ科に入れるのがよいと思う。(熊本大学理学部生物学教室)。