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REDISCOVERY OF CHEILOTHECA MALAYANA AND THE IDENTITY  
OF CHEILOTHECA, ANDRESIA AND MONOTROPASTRUM  
(ERICACEAE-MONOTROPOTDEAE)

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## ABSTRACT

*Andreeia*, *Monotropastrum* and *Wirtgenia* are reduced to the synonymy of *Cheilotheca*. Four species are accepted, keyed out and enumerated; a new combination, *Cheilotheca humilis* (D. Don) H. Keng, and a new species, *Cheilotheca sumatrana* H. Rene, are proposed.

## ABSTRAK

*Andreeia*, *Monotropastrum* dan *Wirtgenia* diperalihkan sebagai sinonim *Cheilotheca*. Dalam marga ini diterima adanya empat jenis yang dapat dibedakan berdasarkan suatu kunci determinasi. Satu kombinasi baru *Cheilotheca humilis* (D. Don) H. Keng dan satu jenis baru *Cheilotheca sumatrana* H. Keng telah diusulkan.

In late October 1972, my colleagues, Drs. C. J. Goh, K. H. Chow and I, together with the Honours students of the Botany Department, University of Singapore, went on a week-long field trip to Maxwell Hill, Taiping, Perak, W. Malaysia.

One day, on October 24th, we went along a small foot path off the 5<sup>th</sup> milestone of the main road. This led us into a thick wood in the belt of the upper dipterocarp forest. The altitude is around 2900 ft. or 870 m. On the dark, damp forest floor, among other things, we collected a small, creamy white-coloured plant whose black, fibrous roots were extensively growing on rotting leaf litter (Figs. A, B and C). We were somewhat puzzled by the showy, yellow, terminal, 3-merous flowers. Only after we returned to Singapore was it identified by Professor R. E. Holttum as *Cheilotheca malayana*, Scott. ex Hook. f.

The genus *Cheilotheca* was first established by J. D. Hooker in 1876 based on a species collected by himself from Khasi Hills of Eastern India. The Malayan species is the second species of the genus, it was discovered and described (in manuscript) by Father B. Scortechini (and later also collected by H. Kunstler) from Larut, Perak, in the 1880s. These collections are presently preserved at Kew. This plant has never been collected again since and was not even included in Burkill and Henderson's local flora of Taiping (*in Gard. Bull. Str. Settlement*, 3, 1925).

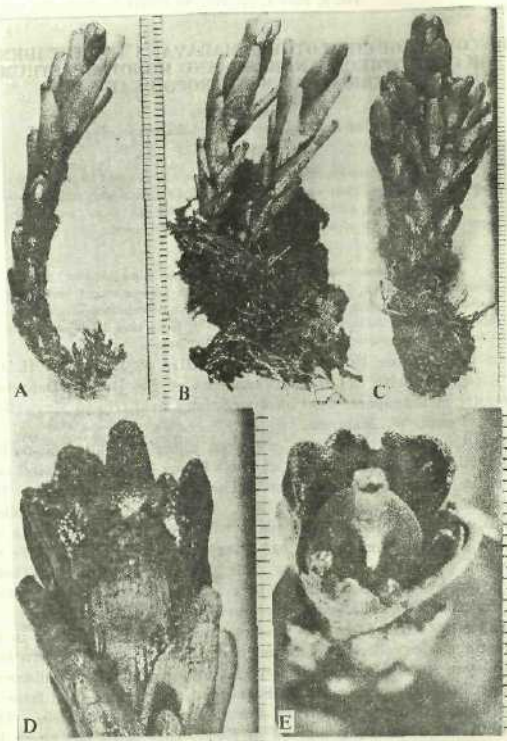


Plate 1. *Cheilotheca malayana* (Hook. f. (Divisions in 1 mm). A and B. unbranched plant. C. Fruiting plant. D. Fruit seen from above. E. Fruit seen from above.

This curious Malayan plant, *Cheilotheca malayana*, was later segregated into a monotypic genus *Wirtgenia* by H. Andres (1914) which is unfortunately a later homonym of at least 3 entirely different genera, among them the earliest one appears to be *Wirtgenia* Sch. Bip. (1842), a genus now known as *Aapilia*, Thou. (Compositae). For this reason, H. Sletimer, in his treatment of Ericaceae for the Flora Malesiana (1967), renamed it as *Andresia*. Dr. Sleumer who was handicapped by lack of suitable preserved material, therefore tentatively accepted Andres' view and pointed out that the Malayan plant cannot be congeneric with *Gheilotlieca* on the grounds tabulated below.

*Cheilotheca* (Indian)

1. Sepaloid scales 3-4 only;
2. Petala flat;
3. Anthers of parallel cells with contractions or swellings at intervals; each cell opening by an irregular longitudinal slit;
4. Stigmas in the form of a pileus or reversed cup;
5. Placentas laterally expanded and bear few ovule? only.

*Andreda* (Malayan)

1. Sepaloid scales 5;
2. Petals concave;
3. Anthers linear, basifixod, hippocrepiforra; cells 2, smooth, confluent at apex, dehiscing by marginal pores which gradually extend into slits;
4. Stigmas obscurely 4-lobed or 8-lobed;
5. Placentas 6, parietal, only slightly prominent, with rather numerous ovules.\*

These five points of distinctions are briefly discussed as follows:

(1) The sepaloid scales are transitional between petals (or petaloid scales) and scale-leaves (Figs. F, H and I). From the Malayan material studied, their numbers are mostly 3, rarely 2 (Fig. 1), but never 5 as stated by Ridley (1923).

(2) The petals of the Malayan plant are clearly concave. No Khasian material is available for this study. But Hooker's original description stated (p. 607) that "petala ... non saccata, imbricata". As they are imbricate and their number being 3, it is thus rather unlikely that they are flat.

(3) This distinction more or less stands (for details, see key below).

(4) From the Malayan material studied, the stigma is hemispheric, but shallowly depressed in the centre, and very obscurely 6-lobed (Pis. G and H); in the fruiting stage, however, it becomes cup-shaped (Fig. E). This is generally in agreement with the description of the Khasian plant.

(5) Serial microtome sections of the ovary of the Malayan specimen show different configurations at different levels. In the sections around the middle portion, the placentas are less expanded and bear numerous ovules; whereas in the sections near the base, the placentas are strongly centripetally expanded and bear fewer ovules. Hooker in his original description of the Khasian plants stated that "ovula in loculis numerosissima".

Therefore the only remaining substantial difference between the Indian and Malayan plants is the external morphology of their anthers, as clearly pointed out by Hooker earlier (1887). It appears reasonable therefore to retain the Malayan plant within the genus *Cheilotheca*.

In reviewing the literature on this subject, my attention was drawn to another closely related genus, *Monotropastrum*, which was also created by H. Andres (1935). Originally there were three species described under this genus, namely, *M. macrocarpum* Andres (from S.W. China and B. India), *M. ampullacetus* Andres (S.W. China) and *M. arisanarum* Andres (Formosa). Of these three, I have only a faint recollection of the last species which I observed and collected many years ago. Professor H. Hara (1941, 1961, 1965) has made a series of studies of this genus. He examined both the fresh and herbarium materials of the Himalayan and the Japanese plants (the latter was excellently illustrated in T. Nakai, Icon. Pl. Asia. Orient. 4 (1): 324, 1941), and finally came to the conclusion (1965, 1972) that there is only one polymorphic species, namely, *Monotropastrum humile* (D. Don) Hara, in the genus. He also compared this genus with *Monotropa* (especially *M. niviflora* L.) and concluded that *Monotropastrum* differs from the latter in the following characters: (1) smooth unilocular ovary with 6-13 parietal placentas, (2) anther opening by an elliptic lid, (3) generally bluish stigmas, (4) indehiscent berry and (5) oval seeds without appendages.

The fruit of the Khasian plant was at first unknown, but later Hooker (1887) was informed by C. B. Clarke that it was a subglobose berry. The material we recently collected from Maxwell Hill, Perak also included a leathery berry (Figs. D and E) with oval seeds devoid of appendages. The tangible difference between *Cheilotheca* and *Monotropastrum*, like the difference between *Cheilotheca* and *Andrexia*, lies solely on their androecial characters.

I therefore suggest to reinstate the Malayan species to *Cheilotheca* and to reduce *Monotropastrum* Andres to a synonym of *Cheilotheca*. Also based on the descriptions and illustration provided by Sleumer (1967) and on phytogeographical ground, I would like to consider the Sumatran

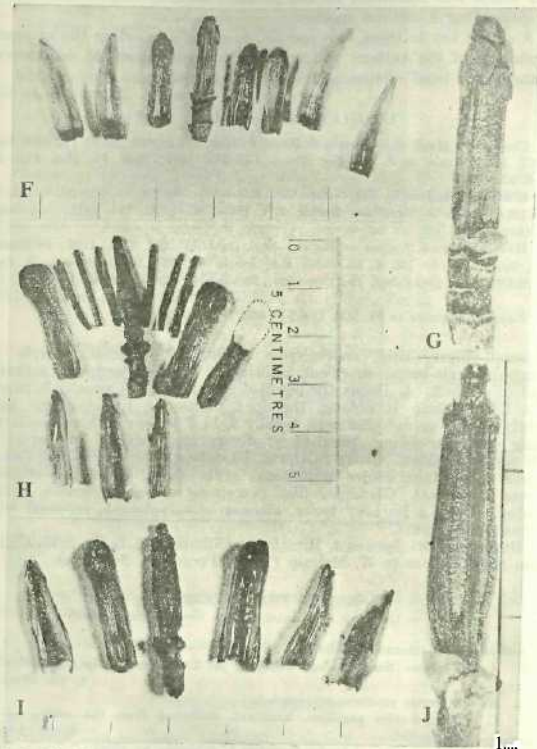


Plate 2. *Cheilotheca malayana* Scort. ex Hook f. (Divisions in 1 cm). P, dissection of a trimerous flower, showing (1) andro-gynoecium (centre), (2) 3 petaloid scales, (3) 3 sepaloid scales, and (4) an uppermost leafy scale. G, androgynuedun, of p. enlarged. H, dissection of a trimerous flower (different from F) with the 3 stamens spreading out. I, dissection of a bimerous flower, showing (1) andro-gynoecium, (2) 2 petaloid scales, (3) 2 sepaloid scales, and (4) an uppermost leafy scale, enlarged.

plant which was identified by Dr. Sleumer as *Monotropastrum kamile* as representing a distinct species.

A simple key to these four species, essentially based on the external morphology of the anthers and on their plausible mode of dehiscence, together with brief citations of literature follows.

### CHEILOTHECA Hook. f.

*Cheilotheca* Hook. f. in Benth. & Hook. f. (Jen. Pl. 2: 607. J<sup>o</sup>7-4; Fl. Brit. Ind. 3: 477. 1882; Prain in J. As. Soc. Bung. 73: 205. 1904; Eiiil. Fl. Mal. Pen. 2: 222. f. 93. 1923.

*Wirtgenia* Andres in Verh. Bot. Ver. Brandenb. 56: 58, 59, 61, 68, f. 1H. En tent. 1914. Domin in Sitz. Ber. Boehm. Ges. Wiss. M.-N. Kl. 104. 1915; non Sch., Bip. 1842.

*Monotropastrum* Andres in Notizbl. Berl.-Dahl. 12, 693, f. 8. 1935; in Harj. Bot. Symb. Sin. 7: 166, f. 23. 1936; Bot. Jahrb. 76: 103, 1953; Hara in J. Jap. Bot. 38: 78, f. 2. 1961; ibid. 40: 100. 1966; Sleumer in FL Mill. I, «&»: 870, f. 55. 1967.

*Adresia* Sleumer in Fl. Mai. I, 6(5): 66B, f. 54. 1967.

Small mycorrhizic, sa-prophytic herbs. Stems erect, simple or branched. Scale-leaves succulent, imbricate. Flowers terminal, solitary. Sepaloid scales 2—4. Petals (or petaloid perianth-lobes) usually 3, rarely 4—5, linear-oblong to oblong, the apex obtuse or rounded, the base slightly saccate or not. Stamens usually 6, in 2 series; anthers reniform, oblong or linear-oblong, parallel or divergent, basifixed or versatile, glabrous or papillose. Ovary fusiform, 1-loculate, with simple or 2-forked parietal placentas; ovules numerous; style short, cylindrical; stigmas globose or conical. Glandular disk prominent or inconspicuous, entire or lobed. Fruit a leathery berry, globose or sub-globose, crowned with s, cup-shaped stigma.

DISTRIBUTION: Species 4, Himalayas (Sikkim), E. India, S.W. China, Japan and Formosa to W. Malesia (Malay Peninsula, Sumatra).

#### KEY TO THE SPECIES

(based on the outer or abaxial surface view of the anthers)

- A. Anther-locules (thecae) parallel.  
 B. Anther-locules linear-oblong, dehiscing on the sides by longitudinal slits.  
     1. *Ch. khasiana*  
 B. Anther-locules reniform or rounded.  
 C. Anther-locules papillose, basifixed, dehiscing from the centre by an elliptic lid.  
     3. *Ch. humilis*  
 C. Anther-locules glabrous, versatile <7 dehiscing by slits).  
     4. *Ch. sleumeriana*  
 A. Anther-locules (thecae) divergent down to the base, the tip + united; opening by longitudinal slits.  
     2. *Ch. malayana*

### 1. CHEILOTHECA KHASIANA Hook. f.

*Cheilotheca khasiana* Hook. f. in Benth. & Hook. f. Gen. Pl. 2: CCS. 157S; Fl. Brit. Ind. 3: 477. 1882; Icon. Pl. t. 1564. 1887, in *adnot.*

Known only from Khasi Hills: Mushai, near River Oongkot, alt. 1050 m, Assam, E, India.

### 2. CHEILOTHECA MALAYAMA Scortechini ex Hook. f.

*Cheilotheca malayana* Scortechini ex Hook. f. Icon. Pl. t. 1E64. 1887; Prain in J. As. Soc. Beng. 73: 205. 1904; Ridl., Fl. Mai. Pen. 2: 222, f. 93. 1923. - *Wirtgenia malayana* (Scort.) Andres in Verh. Bot. Ver. Brandenb. 56: 58, B9, 61, 68, f. 1 H. in text. 1914. - *Andrew malayana* (Scort.) Sleumer in Fl. Mai. I, 6(5): 669, f. 54. 1967.

Collected from Larut District (no precise locality), alt. 1050 m, Perak, Malaya, and from Maxwell Hill, alt. 870 m, Perak.

### 3. Cheilotheca humilis (U. Don) H. Keng, *comb. nov.*

*Monotropa kinrtilis* D. Don, Prodr. Fl. Nepal. 151. 1825. — *Mmotropastrum kamite* (D. Don) Hara in J. Jap. Bot. 36: 78, f. 2. 1961; ibid. 40: 100. 1965; non Sleumer in Fl. Mai. I, 6(5) 670, f. 55. 1967.

From Himalayas (Sikkim), S.W. China, Formosa to Japan (for full citation of synonyms, see Hara 1961, 1965).

### 4. Cheilotheca sleumeriana H. Keng, *spec. nov.*

*Monotropastrum hitmile* sensu Sleumer in Fl. Mai. I, 6(5): 670, f. 55. 1967; non Hara 1961.

Affinis *Cheilotheca kamilis* a qua antherae glabrae 2-loculares, loculis parallelis, versatilis differt.

Once collected near Lae Pondora, alt. 1500 m, E. of Sidikalang, N. Sumatra.

A CK N OW LEI] GEM EN T5

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