

A PRELIMINARY REVISION OF GASTROCHILUS (ORCHIDACEAE)*

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Summary In this revision of *Gastrochilus* forty-six species including 8 (*G. carnosus*, *G. garhwalensis*, *G. linearifolius*, *G. guangtungensis*, *G. subpapillosus*, *G. nanchuanensis*, *G. saccatus* and *G. gongshanensis*) described as new to science and one new combination are treated here. An account of general morphology and natural history notes are provided. The species are divided in 3 sections based on the vegetative morphology, of which one section is named as new for the first time. A key and brief descriptions containing distribution for the species, as well as an index provided to the excluded species are given.

Key words Orchidaceae; *Gastrochilus*; revision

Introduction

The genus *Gastrochilus* D. Don has been poorly understood and a taxonomic revision is in urgent need. It consists of small epiphytic, strictly Asiatic, monopodial orchids distinguished by the lip firmly attached to the short and stout column without a foot, 2 globose pollinia porate on the back, slender stipe with bifid viscidium at the base. Taxonomically, the genus is a natural group in the subtribe *Sarcanthinae*.

This article is part of a research started in the Institute of Botany, Academia Sinica, Beijing, based mainly on herbarium materials with pickled flowers and my field observation made in China. A major portion of the work was completed in my visits to Harvard University Herbaria, the Herbarium of New York Botanical Garden and the National Museum of Natural History, Smithsonian Institution Washington, D. C, (December 1988–April 1990).

Historica Account

The genus *Gastrochilus* D. Don was established in 1825, on the basis of *Aerides calceolaris* J. E. Smith. The holotype was collected by Buchanan–Hamilton between 1802 and 1803 from Nepal.

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Wallich (1829) used the same generic name for a taxon in *Zingiberaceae*. Evidently, *Gastrochilus* Wallich is a later homonym. However, at the time it was not considered illegitimate. Consequently, many botanists used *Gastrochilus* Wallich in *Zingiberaceae* as a valid name and completely forgot *Gastrochilus* D. Don until 1913. Further confusion was created by outstanding botanists like Lindley, Bentham and Hooker. Lindley (1833) referred *Gastrochilus* D. Don to *Saccolabium* Blume. Bentham and Hooker (1883) adopting Lindley's concept placed the species similar to type species of *Gastrochilus calceolaris* (Buch. -Ham. ex J. E. Smith) D. Don in the series *Latiballatae* of *Saccolabium* Blume and the remaining species of plants with limp stem and many distichous small leaves in the series *Microphyllae* of *Saccolabium* Blume. Hooker (1980) proposed two sections: sect. *Calceolaris* and sect. *Distichophyllae* for the species characteristic to *Gastrochilus* D. Don. Unfortunately, he placed them in *Saccolabium* Blume. Under the influence of Lindley, King et Pantling (1898) placed the species of genus *Gastrochilus* D. Don from Sikkim in *Saccolabium* Blume. Otto Kuntze (1981), not having any knowledge of Asiatic orchids, realized *Gastrochilus* D. Don having the priority of the publication and transferred all the known species in *Saccolabium* Blume, later analysis found belonging to 27 genera, to *Gastrochilus* D. Don. J. J. Smith (1908) treated *Gastrochilus* D. Don as a section of *Saccolabium* Blume. Later he also proposed several new genera by separating taxa from *Saccolabium* Blume. In 1913, he formally recognized the generic status of *Gastrochilus* D. Don in his *Die Orchideen von Java Figuren-Atlas*. R. Schlechter (1913) in his study on *Die Gattungen Gastrochilus Don und Gastrochilus Wall.* restored *Gastrochilus* D. Don and recognized 16 species which were misplaced in *Saccolabium* Blume. He transferred 23 species of *Gastrochilus* Wallich to *Boesenbergia* O. Kuntze in *Zingiberaceae*. Ames (1974) was the first person who placed a new species (*G. philippinensis*) under *Gastrochilus* D. Don after restoration of D. Don's generic name. R. Schlechter (1919) in the course of studying Eastern Asiatic orchids recorded 9 species in *Gastrochilus* D. Don formerly misplaced in *Saccolabium* Blume. In the list of *Nomina Generica Conservanda et Rejicienda* of the 1955 edition of the *International Code of Botanical Nomenclature*, *Gastrochilus* D. Don was rejected in favor of *Saccolabium* Blume. This was done on a lack of knowledge on the real nature of *Gastrochilus* D. Don. modern orchidologists working on Asiatic orchids all agree that *Gastrochilus* D. Don is very distinct from *Saccolabium* Blume. L. A. Garay (1972) redefined the characteristics of *Gastrochilus* D. Don. G. Seidenfaden (1987) published a revision of *Gastrochilus* D. Don from Thailand and recognized 12 species for that country. H. J. Su (1978) recorded 6 species of *Gastrochilus* D. Don from Taiwan. T. P. Lin (1987) made a significant combination for the species of *Gastrochilus* D. Don in Taiwan, recognizing 8 species, three of which are new to science. On the other hand, E. A. Christenson (1985) in his study of *Saccolabium* Blume separated 41 species formerly placed in *Saccolabium* Blume. Subsequently, he (1987) published an index of 38 species for *Gastrochilus* D. Don.

After working on *Gastrochilus* D. Don, I realized that China is the center of species diversity of the genus. Up to now, I do not have enough data for the preparation of a monograph for the genus. This revision can only be taken as the result of a preliminary survey. The limitations are, first, the type specimens of *G. flabelliformis* (Blat. et McCann) Saldanha, *G. sororius* Schltr., *G.*

sumatranus J. J. Smith, *G. matsudai* Hayata, *G. ciliaris* Maekawa, *G. matsuran* (Makino) Schltr., *G. raraensis* Fukuyama and *G. flavus* Lin have not been examined; secondly, some species such as *G. calceolaris* (Buch. –Ham. ex J. E. Smith) D. Don, *G. intermedius* (Griff. ex Lindl.) O. Kuntze, *G. obliquus* (Lindl.) O. Kuntze, *G. acutifolius* (Lindl.) O. Kuntze and *G. dasypogon* (J. E. Smith) O. Kuntze have no voucher specimens given in literatures. Such species can never be rechecked for assigning their correct position. In addition, the extremely shrunk or miserably preserved flowers in the type specimens of *G. obliquus* (Lindl.) O. Kuntze, *G. biggibus* (Rchb. f. ex Hook. f.) O. Kuntze and *G. intermedius* (Griff. ex Lindl.) O. Kuntze made it difficult for the proper understanding of features of their flowers. I agree with L. A. Garay and G. Seidenfaden that the genus *Gastrochilus* D. Don is very complicate. Further field work and cooperation of Orchidologists, East and West, wait for a more satisfactory treatment of the genus.

Morphological Characters and their Taxonomic Significance

It is absolutely necessary to observe the detailed morphological features and variations in the vegetative organs and flower structure of every species. The taxonomic value of these morphological characters are discussed here.

Habit: the species of *Gastrochilus* D. Don are perennial epiphytes attached to tree trunks and upper branches generally situated in partial sun light along the margin of forests. Taxonomically, the sizes and growing state of plant body are significant for delimiting infrageneric taxa in this genus. For example, the plants in the species of sect. *Caespitosi* Tsi are relatively small, dwarf and erect, whereas the species in sect. *Microphyllae* Bentham & Hook. f. are trailing or pendent.

Stem: differences in the features of the stem are very obvious in the genus. These characters can be used taxonomically for distinguishing infraspecific taxa. Actually the species of *Gastrochilus* D. Don are grouped into three sections by their stems. The stem of sect. *Caespitose* Tsi is always short, thin, erect and simple, for example *G. xuanenensis* Tsi, *G. rantabuensis* Chow ex Lin. In sect. *Microphyllae* Bentham & Hook. f. the stems are usually elongate, limp, repent or pendent and sometimes branched. Their good examples are *G. affinis* (King et Pantling) Schltr., *G. pseudodistichus* (King et Pantling) Schltr., *G. formosanus* (Hayata) Hayata and *G. saccatus* Tsi. The stems of all species in sect. *Gastrochilus* are relatively thick and varying in length. The stems of *G. acutifolius* (Lindl.) O. Kuntze and *G. yunnanensis* Schltr. are usually 20~30 cm long, whereas those of *G. obliquus* (Lindl.) O. Kuntze, *G. pechei* (Rchb. f.) Schltr. and *G. hainanensis* Tsi are always short, only about 1 cm long.

Leaves: the shapes and sizes of leaves are often useful taxonomic characters at the sectional and specific levels. The leaf-apices may vary from entire acuminate to unequally bilobate, but their shapes are constant within a species. The examples are *G. calceolaris* (Buch. –Ham. ex J. E. Smith) D. Don, *G. obliquus* (Lindl.) O. Kuntze, *G. acaulis* (Lindl.) O. Kuntze, *G. flabelliformis* (Blat. et McCann) Saldanha, *G. hainanensis* Tsi, *G. bellinus* (Rchb. f.) O. Kuntze and *G. pechei* (Rchb. f.) Schltr. all have unequally bilobate apices and those of *G. intermedius* (Griff. ex Lindl.) O. Kuntze, *G. linearifolius* Tsi et Garay, *G. yunnanensis* Schltr. and *G. formosanus* (Hayata)

Hayata are acute or acuminate. In some species the coloration of the leaves may be significant, especially in sect. *Microphyllae*, for example the upper or lower surface of leaves of *G. matsuran*, *G. toramanus* and *G. nanus* etc. are often red-purple dotted and flushed along the margins of young leaves. However these coloration seem to be hard to used for delimiting any taxy within the genus.

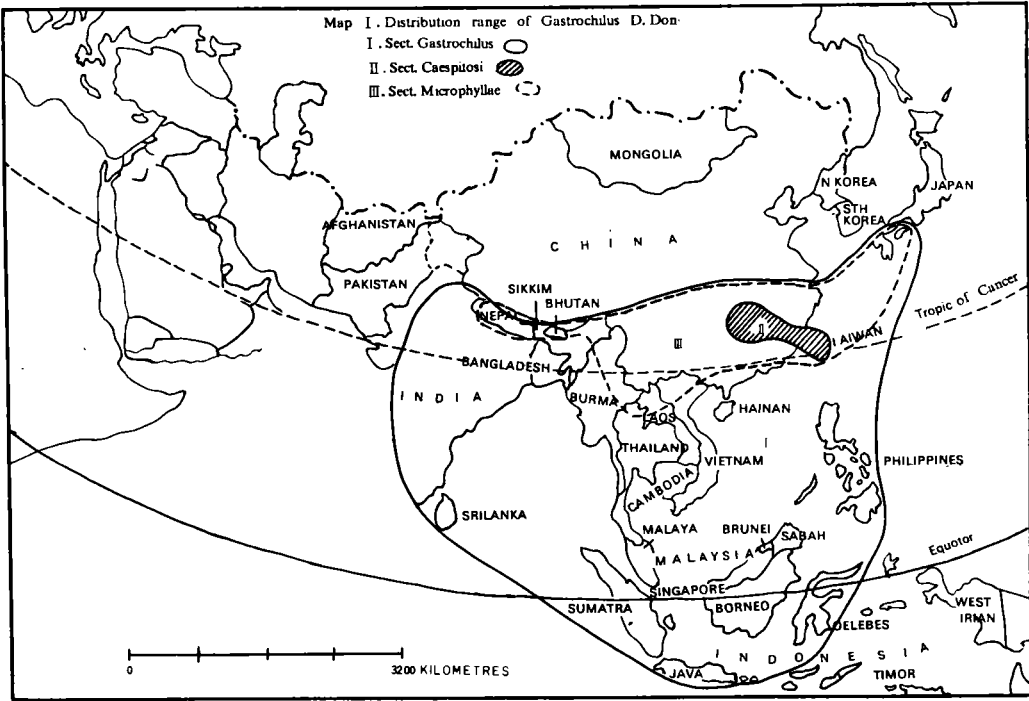
Inflorescence: the flowers of most species of *Gastrochilus* D. Don are usually in corymbs or subumbels, but *G. platycalcaratus* (Rolfe) Schltr. from Burma and South Yunnan of China as well as some species from the philippines and Indonesia are in distinct racemes.

Flowers: the most important taxonomic characters of the species in *Gastrochilus* D. Don lie in their flowers. The shapes of sepals and petals in most species are quite uniform and can be of little use at the species level. The sizes of flowers are extremely useful in delimiting infrageneric taxa. The largest flowers for the genus are found in *G. bellinus* (Rchb. f.) O. Kuntze belonging to sect. *Gastrochilus*. Its sepals 12~17 mm long. The species in sect. *Microphyllae* have small flowers with the sepals measuring only 2.2 mm long in *G. nanus* Tsi and *G. ciliaris* Maekawa. Flower colour is also useful for distinguishing species in sect. *Gastrochilus*. *G. hainanensis* Tsi and *G. patinatus* (Ridl.) Schltr. can be indentified by the lack of yellow pigment of the blade of the lip and *G. nanus* Tsi in sect. *Microphyllae* can be identified by its pure light green flowers with only olivaceous cushion on the blade of the lip. The epichile and hapochil of the lip show more distinctive specific characters. The features lie in the shape, size and marginal type of the epichile, the state of rim, indumentum and other processes on the upper surface of epichile and inside of the hypochil. The shapes of epichile of many species vary from subtriangular, semicircular to subreniform or transversely oblong. For example the epichile vary from subcircular in *G. philippinensis* Ames and *G. carnosus* Tsi in sect *Gastrochilus* to subreniform or transversely oblong in *G. matsuran* (Makino) Schltr. and *G. nanus* Tsi in sect. *Microphyllae*. The shape of hypochil is usually saccate hemispherical to short conic or cup-shaped. In few species, e. g. *G. toramanus* (Makino) Schltr. and *G. nanus* Tsi of sect. *Microphyllae*, the hypochils are elongate and prolonged into cylindrical spurs. The upper surfaces of the epichile vary from hairy (e. g. *G. calceolaris* (Buch. -Ham. ex J. E. Smith) D. Don, *G. bellinus* (Rchb. f.) O. Kuntze, *G. philippinensis* Ames, *G. sumatranus* J. J. Smith, *G. sororius* Schltr., *G. garhwalensis* Tsi, *G. carnosus* Tsi, *G. acutifolius* (Lindl.) O. Kuntze, *G. yunnanensis* Schltr., *G. platycalcaratus* (Rolfe) Schltr., *G. nanus* Tsi, *G. ciliaris* Maekawa, *G. matsudai* Hayata, *G. raraensis* Fukuyana, *G. hoi* Lin, *G. flavus* Lin, *G. sinensis* Tsi, *G. nanchuanensis* Tsi, *G. saccatus* Tsi, *G. gongshanensis* Tsi, *G. rantabunensis* Chow ex Lin and *G. formosanus* (Hayata) Hayata to smooth (e. g. *G. hainanensis* Tsi, *G. pechei* (Rchb. f.) Schltr., *G. patinatus* (Ridl.) Schltr., *G. intermedius* (Griff. ex Lindl.) O. Kuntze, *G. japonicus* (Makino) Schltr., *G. obliquus* (Lindl.) O. Kuntze, *G. xuanenensis* Tsi, *G. affinis* (King et Pantl.) Schltr., *G. fuscopunctatus* (Hayata) Hayata, *G. distichus* (Lindl.) O. Kuntze, *G. corymbosus* Das et Chanda, *G. fargesii* (Kranzl.) Schltr. and *G. toramanus* (Makino) Schltr. In *G. pechei* (Rchb. f.) Schltr. and *G. patinatus* (Ridl.) Schltr. of the sect. *Gastrochilus* and *G. fuscopunctatus* (Hayata) Hayata, *G. distichus* (Lindl.) O. Kuntze, *G. corymbosus* Das et Chanda and *G. formosanus* (Hayata) Hayata of the sect. *Microphyllae*, as well as in *G. xuanenensis* Tsi of the sect. *Caespitosi*, the margins of the

epichile are entire, but in other species the margins of the epichile are fringed nad toothed. In many species the upper surfaces of the epichile have not appendages of certain processes except pubescent or papillose, but *G. distichus* (Lindl.) O. Kuntze and *C. affine* (King et Pantl.) Schltr. have calluses or thick ridges on their upper surface of the blade. The inside of the hypochil of the most species within the genus are smooth, but the rudimentary septa are found at the bottom of hypochil in both *G. acaulis* (Lindl.) O. Kuntze and *G. acutifolius* (Lindl.) O. Kuntze. The state of the rim on the upper part of the hypochil is useful for distinguishing species. In the most species the rim raises above the blade of the epichile with more or less vertical front edges. The exceptions are that the rim of *G. obliquus* (Lindl.) O. Kuntze, *G. guangtungensis* Tsi and its allied species are nearly flush with upper surface of the blade.

Geographical Distribution

The generic range of *Gastrochilus* D. Don and the number of its section and species in various area are shown in Map. 1 and the Table 1. Evidently, *Gastrochilus* D. Don is a tropical and subtropical genus. The species are restricted to East Asia, Southeast Asia and South Asia. With the



generic range extends from Garhwal in western tropical Himalayan Range southwards across Deccan in India to Sri Lanka, thence eastwards to Southern China, the Philippines and northwards to southern Japan, with the Southern Honshu being the northern limit. As show in Table 1, there are 11 species in two sections of the genus in India, mainly in the northern portion of the country. Ten of the eleven Indian species, including 2 described as new here, occur in Northern India from Mishim Hills in Assam to western Garhwal in Uttar Pradesh, especially with the species

concentration in the northeastern section of the country. The other species, *G. flabelliformis* (Blat. et McCann) Saldanha and *G. acaulis* (Lindl.) O. Kuntze, occur in Southern India, with *G. acaulis* (Lindl.) O. Kuntze extending into Sri Lanka. Twenty-eight species belonging to 3 sections occur in Southern China, with 17 of them being endemics. In Thailand there are 7 species and one variety belonging to sect. *Gastrochilus* and sect. *Microphyllae*, with two species and one variety being endemics. Other regions within the generic range are species poor. To the south and the east-south periphery of the generic range numbers of species gradually decrease. There is only one species each in Sri Lanka and the Philippines, 2 species in Malaysia, 3 species in Indonesia. In the east and

Table 1, showing distribution of the number of section and species of *Gastrochilus* D. Don.

species group	India	Sri-Lank	Nepal	Sikkim	Bhutan	Bangladesh	Thailand	Burma	Laos	Vietnam	Malaysia	Indonesia	Philippines	Japan	China
Sect. <i>Gastrochilus</i>															
<i>G. bellinus</i>															
<i>G. acaulis</i>	■	■													
<i>G. flabelliformis</i>	■														
<i>G. hainanensis</i>															■
<i>G. pecheri</i>															■
<i>G. palmatus</i>															■
<i>G. calcicola</i>															■
<i>G. philippinensis</i>															■
<i>G. sumatranus</i>															■
<i>G. sororius</i>															■
<i>G. carnosus</i>															■
<i>G. garhwalensis</i>	■														■
<i>G. intermedius</i>															■
<i>G. linearifolius</i>															■
<i>G. guangtungensis</i>															■
<i>G. japonicus</i>															■
<i>G. obliquus</i>															■
<i>G. acutifolius</i>	○														■
<i>G. yunnanensis</i>															■
<i>G. rutians</i>															■
<i>G. acnaifolius</i>															■
<i>G. minor</i>															■
<i>G. davysonii</i>															■
<i>G. platycarpatus</i>															■
<i>G. subpilosus</i>															■
Sect. <i>Caespitosi</i>															■
<i>G. rantschensis</i>															■
<i>G. xuanenensis</i>															■
Sect. <i>Microphyllae</i>	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
<i>G. p. wuadistichus</i>	▨														▨
<i>G. fuscepunctatus</i>															▨
<i>G. allinis</i>															▨
<i>G. urticus</i>															▨
<i>G. eurymbosus</i>	■														▨
<i>G. maisuran</i>															▨
<i>G. largesii</i>															▨
<i>G. toramanus</i>															▨
<i>G. renus</i>															▨
<i>G. cilicis</i>															▨
<i>G. malsudii</i>															▨
<i>G. rafaeensis</i>															▨
<i>G. huii</i>															▨
<i>G. flavus</i>															▨
<i>G. sinensis</i>															▨
<i>G. nanchuanensis</i>															▨
<i>G. saecatus</i>															▨
<i>G. gonschaensis</i>															▨
<i>G. formosanus</i>															▨
species numer	11	1	5	7	3	2	8	6	2	4	2	3	1	4	28
section numer	2	1	2	2	2	1	2	2	1	2	1	1	1	2	3

■ distribution of species
 ▨ distribution of sect. *Microphyllae*
 ▩ distribution of sect. *Gastrochilus*
 ○○○ distribution of sect. *Caespitosi*

east-north areas of the generic range the species of sect. *Gastrochilus* tend to disappear with one exception, *G. japonicus* (Makino) Schltr. More species of sect. *Microphyllae* occur in East Asia, especially in Southern China and Japan. The sect. *Microphyllae* exhibits a high degree of endemism. In fourteen species of sect. *Microphyllae* 12 are endemic to China, 4 confined to Taiwan, and 8 occurring in southwest mainland China. There are 4 species in Japan, 3 of which belonging to sect. *Microphyllae*. Sect. *Caespitosi* has only 2 endemic species in China, actually this section is morphologically an intermediate between sect. *Gastrochilus* and sect. *Microphyllae*. The geograph-

ical range of this section is limited to Southern China. Table 1 also shows that *G. calceolaris* (Buch. –Ham, ex, J. E. Smith) D. Don of sect. *Gastrochilus* is a widely distributed species which occurs tropical Himalayans southeastward to Maiaysia.

In conclusion, it is evident that Southern China and Northeast India are not only the main center of distribution of the species in *Gastrochilus* D. Don, they are also a center of species diversity for the genus.

Taxonomic Treatment

Gastrochilus D. Don, Prodr. Fl. Nepal 32. 1825 (non *Gastrochilus* Wallich 1829) O. Kuntze, Rev. Gen. Pl. 2 : 66. 1891; J. J. Smith, Orch. Java Fig. Atlas 472. 1914; Schltr., Orchid. 573. 1927. — *Saccolabium* Blume ser. *Latibellatae* Bentham & Hook. f., Gen. Pl. 3 : 578. 1883. — *Saccolabium* Blume ser. *Microphyllae* Bentham & Hook. f. l. c. p. 579. — *Saccolabium* Blume sect. *Latibellatae* Bentham ex Pfitz. in Engler, Nst. Pflanzenfam. 6 : 213. 1889. — *Saccolabium* Blume Sect. *Galceolaria* Hook. f., Fl. Brit. Ind. 6 : 55. 1890. — *Saccolabium* Blume Sect. *Distichophyllae* Hook. f., l. c. — *Saccolabium* Blume Sect. *Gastrochilus* (D. Don) J. J. Smith, Fl. Buitenz. 6 : 632. 1905

Small or medium-sized epiphytes. Stems short or elongate, ascending, repent or pendent. Leaves few or many, close together or distichous, more or less fleshy, the base amplexicaul, articulate to the tubular sheath. Inflorescences short, simple usually in subumbellate corymbs. Flowers small or medium-sized, slight fleshy; sepals and petals similar, usually subspathulate; lip immobile, basally firmly adnate to the outsides of column; hypochil saccate, its upper part (rim) raised above the blade or flush with upper surface of the blade; epichile usually porrect, shape various, usually with a large or small cushion at the centre of the blade of lip; column short and stout, without foot; rostellum short, porrect or downward, bifid; pollinia 2, globose, with a small apical cavity or slightly split into two unequal halves (in *G. patinatus* (Ridl.) Schltr.); stipe narrow, longer than the diameter of the pollinia, with a large, thick and biforked viscidum at base.

Type: *Aerides calceolaris* Buch. –Ham. ex J. E. Smith = *G. calceolaris* (Buch. –Ham. ex J. E. Smith) D. Don.

Key to the species

1. Stem stout, 4 mm or more in diameter, ascending or pendent, but never repent; leaves (except *G. platycalcaratus*) 4.5 cm or more long, more than 1 cm wide (sect. *Gastrochilus*).
2. Blade of epichile with a cavity or sulcate at base of the cushion.
3. Rim of hypochil with truncate upper margin and a nearly vertical front edges.
 4. Dorsal sepal 12~17 mm long, 6~7 mm broad; blade of epichile nearly semiorbicular.....1. *G. bellinus*
 4. Dorsal sepal about 5~10 mm long, 3~5 mm broad; blade of epichile broadly triangular or crescently triangular.
 5. Epichile glabrous or rarely short-papillos pubescent on the upper surface.

6. Epichile with smaller cushion, along its margin lacerate-fringed.
7. Blade of epichile acute at apex, sometimes with short hairs on both sides of cushion; hypochil with a peglike projection at the bottom of the interior.....2. **G. acaulis**
7. Blade of epichile widely emarginate at apex, without hairs on upper surface, lacking projection at the bottom of the interior.....3. **G. flabelliformis**
6. Epichile occupied nearly by the large cushion, glabrous on upper surface.
8. Pollinai entire and with a small apical cavity.
9. Edges of epichile with irregular teeth at lateral wings.....4. **G. hainanensis**
9. Edges of epichile entire.....5. **G. pechei**
8. Pollinia split into two unequal halves; blade of epichile6. **G. patinatus**
5. Epichile densely papillos-hairs on the upper surface.
10. Inflorescences nearly corymbose.....7. **G. calceolaris**
10. Inflorescences distinctly racemose.
11. Leaves ligulate or oblong-elliptica, the blade of epichile orbicular.....8. **G. philippinensis**
11. Leaves oblong, epichile semiorbicular or broad-triangular.
12. Leaves 3~6 cm long, hypochil dorsi-ventrally compressed from middle to apex, truncate and retuse at apex.....9. **G. platycalcaratus**
12. Leaves 9~16 cm long, hypochil subobconic, rounded at apex.
13. Blade of epichile nearly semiorbicular.....10. **G. sumatranus**
13. Blade of epichile nearly triangular.....11. **G. sororius**
3. Rim of hypochil not forming vertical front edges.
14. The blade of lip suborbicular; the rim raising above the blade with oblique front edges.....12. **G. carnosus**
14. The blade of lip subovate; the rim flush with the blade, not forming distinct front edges.....13. **G. garhwalensis**
2. Blade of epichile without cavity or not sulcate at its base.
15. The upper surface of epichile smooth.
16. Rim of hypochil raising above blade of epichile, with a notch at the front and distinct vertical front edges.
17. Hypochil hemispherical, 3.2 mm long, about 3.2 mm in diameter; the blade of epichile semiorbicular, short lacerate-fringed along its edges.....14. **G. intermedius**
17. Hypochil cup-shaped, 3.5 mm long, about 2.5 mm in diameter; the blade of epichile semiorbicular with longer fringed on inside of apex except marginal fringed.....15. **G. linearifolius**
16. Rim of hypochil not raising above the blade of epichile, nearly flush with cushion or slightly raising at the front, but without distinct vertical front edges.
18. Stem 2~17 cm long; edges of epichile slightly erose.

19. Stem about 3 mm in diameter; leaves linear or falcately oblong, the acuminate tip with 2 setae.....16. *G. guangtungensis*

19. Stem about 5 mm in diameter; leaves oblong or falcate-oblong, with slightly curved acute tip or obtuse apex with slightly oblique two lobules.....
.....17. *G. japonicus*

18. Stem 1~1.5 cm long; leaves broadly oblong, unequally bilobulate, lobules obtuse; edges of epichile erose or lacerate.....18. *G. obliquus*

15. The upper surface of epichile with fringes of papillose hairs or a few papillae.

20. Stem 8 cm or more long.

21. Leaves acute at apex; the rim of hypochil with a notch at the front and nearly vertical front edges; the blade of epichile broadly triangular, the sides contracted near medium, with a large cushion on upper surface and broad thin margin covered by papillose hairs.....19. *G. acutifolius*

21. Leaves with 1~3 setae at apex.

22. Rim of hypochil raising high above the blade, with a notch at the front and nearly vertical front edges.

23. Surface of the epichile on both sides of the cushion covered by hair-like papillae; the blade of epichile lacerate-fringes along the edges.

24. The blade of epichile broadly triangular; the rim of hypochil with about 1 mm high vertical front edges.....20. *G. yunnanensis*

24. The blade of epichile semicircular; the rim of hypochil with about 0.5 mm high front edges.....21. *G. rutilans*

23. Surface of the epichile on both sides of the cushion loosely covered by scattered papillae; mouth of hypochil circular; the blade of epichile transversely oblong, slightly erose along the edges.....22. *G. acinacifolius*

22. Rim of hypochil not raising high, nearly flush with the cushion of epichile; the front edges oblique, about 0.3 mm high; the blade of epichile semiorbicular-triangular.....23. *G. minor*

20. Stem 5 cm or less long.

25. Leaves ovate-oblong, acute with 3 unequal sharp teeth at apex; peduncle stout, half as long as the leaves; the blade of epichile reniform, densely covered by short hair-like fringes.....24. *G. dasypogon*

25. Leaves spatulate or suboblong, obtuse or acute, with very unequally bilobulate apex; peduncle more less than half of the leaf in the length; the blade of epichile subtriangular, covered by short papillose-hairs on both sides of the cushion.....
.....25. *G. subpapillosus*

1. Stem about 3 mm or less in diameter; leaves small, 1~2 (~4.5) cm long, less than 1 cm wide; flowers small, dorsal sepal usually 2.2~4.5 mm, rarely up to 7 mm long.

27. Stem erect, 5 mm or less long, simple; leaves tufted or closely distichous (Sect. *Caespitosi*).

28. Petals subcircular, along both sides of margin lanose; upper surface of the blade of epichile densely hairs.....26. *G. rantabunensis*
28. Petals oblong, entire; upper surface of epichile smooth.....27. *G. xuanenensis*
27. Stem limp, repent or pendent, sometimes branched, 1~37 cm long; leaves usually loosely distichous (Sect. *Microphyllae*).
29. Blade of epichile glabrous on upper surface.
30. Blade of epichile very flesh, less than transversal diameter of hypochil in breadth.
31. Stem 15 cm or more long; leaves with 1~3 setae at apex.....29. *G. pseudodistichus*
31. Stem 3~7 cm long; leaves without seta at apex.....28. *G. fuscopunctatus*
30. Blade of epichile more than transversal diameter of hypochil in breadth.
32. Hypochil obconic, bifid at apex; epichile with two thickening ridges on the upper surface, edges erose near the base.....30. *G. affinis*
32. Epichile without cilli and thickening ridges on the upper surface.
33. Epichile semiorbicular, with two blunt conical calli at the base.....31. *G. distichus*
33. Epichile without calli and thickening ridges on the upper surface.
34. Epichile rhomboid or subreniform, entire along the margin.
35. Blade of epichile rhomboid, obtuse at apex.....32. *G. corymbosus*
35. Blade of epichile subreniform, subtruncate and widely retuse of apex.....33. *G. matsuran*
34. Epichile broadly triangular, obtuse at apex, slightly erose along the margin.....
..... 34. *G. fargesii*
29. Blade of epichile pubescent on the upper surface.
36. Dorsal sepal 3 mm or less long.
37. Hypochil subcylindrical, longer than its transversal diameter; epichile transversally oblong or reniform.
38. Epichile transversally oblong, upper surface of cushion pubescent.....35. *G. toramanus*
38. Epichile reniform, upper surface densely pubescent throughout.....36. *G. nanus*
37. Hypochil hemispherical; epichile reniform, its upper surface papillose, margin ciliate.....
.....37. *G. ciliaris*
36. Dorsal sepal 3.5~7 mm long.
39. Hypochil obconic.
40. Apex of hypochil more or less curved forward.
41. Flowers brightly yellow, epichile white with yellow cushion.....38. *G. flavus*
41. Flowers yellowish.
42. Epichile reniform, hypochil slightly curved forward.....39. *G. sinensis*
42. Epichile semiorbicular or flabellate, hypochil distinctly curved forward.
43. Epichile with green cushion.....40. *G. raraensis*
43. Epichile with yellow cushion.....41. *G. matsudai*
40. Hypochil straight, suddenly attenuate near apex, apex lightly acute, epichile emarginate.....
.....42. *G. hoi*

39. Hypochil subcup-shaped, hemispherical or cucullate.
44. Epichile hairless except central cushion, apex truncate or rounded.....43. *G. formosanus*
44. Epichile densely hairy.
45. Epichile reniform or reniform-triangular, apex obtuse.....44. *G. saccatus*
45. Epichile apex 2-lobed or emarginate.
46. Epichile reniform, apex rounded and emarginate.....45. *G. gongshanensis*
46. Epichile reniform or semiorbicular, apex subtruncate and 2-lobed, the lobes overlapping
.....46. *G. nanchuanensis*

1. Sect. *Gastrochilus*

Stem ascending or pendent, stout, 4 mm or more in diameter. Leaves (1-) 5 cm or more long, usually more than 1 cm wide. Flowers middle size.

Type: *Gastrochilus calceolaris* (Buch. -Ham. ex J. E. Smith) D. Don.

1. *Gastrochilus bellinus* (Rchb. f.) O. Kuntze, Rev. Gen. Pl. 2: 661. 1891; Schltr. in Fedde Repert. Sp. Nov. 12: 314. 1913; Holttum in Orch. Rev. 70: 326. 1962; Seidenf. et Smitin., Orchid. Thailand 4(1): 633, fig. 475. 1963 et 828. 1965; Kerr in Nat. Hist. Bull. Siam. Soc. 23(1~2): 1969; Seidenf. in Bull. Mus. Hist. Nat. (Paris) I ll. ser. 71, 5: 129. 1973; et Cont. Rev. Orch. Camb., Laos and Vietn. 65. 1975; Kamemoto et Sagarik, Thailand Orchid. 48. 1975; Seidenf. in Opera Bot. 95: 287, fig. 1 86. 1988; Christenson in Am. Orch. Soc. Bull. 54(9): 1112. 1989—*Saccolabium bellinum* Rchb. f. in Gard. Chron. 1: 174. 1884; et 1. c. 1: 145. 1887; Hook. f. in Bot. Mag. 116: t. 7142. 1890; Fl. Brit. Ind. 6: 61. 1890; Grant Orch. Burma 274. 1895 (Repr. 1966); Hossens in Beih. Bot. Centralbl. 28(2): 382. 1911; R. E. Arnold in Gard. Chron ser. 3, 83: 314. 1928.

Sepals and petals yellow with alrge chocolate blotches, lip white with few purple dots, cushion yellow with red spots.

Burma: Boxall sine num., Herb. Reichenbach 42838 (W, type). **China:** Yunnan, Tsi 166, 118, 77 (PE); C. W. Wang 72753 (PE); Henry 13059 (PE). **Thailand:** Kerr 83(K); Smitinand 10288, Hansen et Smitinand 12631 (C). A. D. Kerr considered this species also distributed in Laos.

This species has the most beautiful flowers. It is distinguished from all other species by its the large and beautifully marked flowers.

2. *Gastrochilus acaulis* (Lindl.) O. Kuntze, Rev. Gen. Pl. 2: 661. 1891; Schltr. in Fedde Repert. Sp. Nov. 12: 314. 1919; Jayaweera, Rev. Handl. Fl. Ceylan 2: 243, fig. 107. 1981. Gopalan et Henry in Journ. Econ. Tax. Bot. 11(1): 230 et 232 (figs. 1~5). 1987—*Cleisostoma acaule* Lindl., Gen. Sp. Orch. Pl. 227. 1833. —*Vanda pulchella* Wight, Icon. Pl. Ind. Orient. 5: 9, t. 167. 1852. —*V. fimbriata* Gardne ex Thw. Pl. Zeyl. 305. 1861. —*Saccolabium acaule* (Lindl.) Hook. f., Fl. Brit. Ind. 6: 61. 1890; Trimen. Handb., Fl. Ceylon 4: 198. 1898. —*Gastrochilus nilagiricus* (Hook. f.) O. Kuntze, Rev. Gen. Pl. 2: 661. 1891; Rathakrishnan et Nair in Taxon 32: 638—639. 1983. —*Saccolabium nilagiricum* Hook. f., Fl. Brit. Ind. 6: 60. 1894. —*Gastrochilus pulchellus* (Wight) Schltr. in Fedde Repert. Sp. Nov. 12: 315. 1913; Saldanha, Fl. Hassan Dist. Karna. 8301.

1976. — *Saccolabium pulchellum* (Wight) Fischer, Fl. Press. Masras, Pt. 8: 1445. 1928. — *Gastrochilus dasypogon* auct. non (Rees) O. Kuntze; Sant. & Kap., Orch. Bombay 226. 1966. — *G. indicus* Garay in Bot. Mus. Leafl. Harv. Univ. 23(4): 180. 1972.

Sepals and petals pale green with red dots, lip white, the central cushion yellowish with red dots.

Sri Lanka: Jayaweera 32(7) (AMES), 2053 (PDA); Macrae 65 (K, type, Herb. Lindl.). **S. India:** Perumal 21681 (AMES); Saldanha 13256, 16712, 13327 (US); E. India Comp. 1063, Herb. Falconer (AMES, NY) may be also from S. India, its hypochil has a piglike projection at the bottom, but lip slightly covered by short papillous hairs on upper surface of the blade; D. H. Nicolson et al. 210 (US); Saldanha et al. 1647 (US)

3. *Gastrochilus flabelliformis* (Blat. & McCann) Saldanha in Fl. Hassan Distr. Karnataka India 830. 1976; Abraham et Vatsala, Introd. Orch. 468. 1981. — *Saccolabium flabelliforme* Blat. & McCann in Journ. Bombay Nat. Hist. Soc. 35: 722. t. 1. 1932. — *Gastrochilus dasypogon* auct. non (J. E. Smith) O. Kuntze; Santapan & Kapadia in Journ. Bomb. Nat. Hist. Soc. 59(3): 839. 1962.

Sepals and petals apple-green, sometimes with a rose-coloured dots, lip white, cushion yellow with red dots.

India: N. Kanera, Sedgwick 7078, Bell 5424, 5413, Sedgwick & Bell. 6957 (BLAT, type).

The specimens cited above have not been examined. I have only seen photos of those specimens.

4. *Gastrochilus hainanensis* Tsi in Bull. Bot. Res. 9(2), fig. 1. 1989. — *Saccolabium obliquum* auct. non Lindl.; Fl. Hainanica 4: 257, fig. 1130. 1977. — *Gastrochilus patinatus* auct. non (Ridl.) Schltr.; Seidenf. in Opera Bot. 95: 303, fig. 198. 1987; 1. c. 124: 66. 1995.

Sepals and petals yellow with red dots; epichile white with purple spots.

China: Hainan, S. K. Lau 26395 (AMES, SCBI, type); How? 70307 (PE, SCBT); Tsi 80—14, 82—30 (PE); C. Wang 36171 (NY). **Thailand:** GT 5522a, 4175, 4196 (C)

This species easily distinguished by nearly entire, smooth, complete fleshy blade of epichile except lateral wings.

5. *Gastrochilus pechei* (Rchb. f.) Schltr. in Fedde Repert. Sp. Nov. 12: 315. 1913; Holttum in Orch. Rev. 70: 326. 1962. — *Saccolabium pechei* Rchb. f. in Gard. Chron. 1: 447. 1887.

Burma: Reichenbach's Herbarium nr. 40811 (W, type); Hort. Kew May 1887 (K, isotype).

This species is closely related to *G. patinatus* (Ridl.) Schltr. It is distinguished mainly by its pollinia not split. The holotype of this species was collected from Moulmein by Peche. It is deposited in Kew. Additional holotype of fragmentary flowers which was from Peche's collection is kept in Reichenbach's herbarium. Reichenbach's type material is a sheet (Herb. Orchid no. 40811) consisting of 2 fragmentary flowers in a paper bag attached on the sheet with two specific diagrams by Reichenbach.

An examination of the flowers in the paper bag shows that the blade of the epichile is very flesh, recurved, transversally subtriangular, its margin entire, upper surface without hair, covered

only by minute papillae and with a cavity at base of the blade; hypochil nearly obconic, its rim raising above the blade of lip and with a notch at the front. Obviously, the features of those flowers are accordant with type material kept in Kew and also agrees with Rchichenbach's sketches below the sheet (no. 40811). The original description of *Saccolabium pechei* Rchb. f. is mixed, the characters of epichile is involed two different species, undoubtedly one of them (the blade of lip entire) indicated to be this species, another with lacinate blade of lip as represented by upper diagram on the sheet, shows the character of *Gastrochilus obliquus*.

6. *Gastrochilus patinatus* (Ridl.) Schltr. in Fedde Repert. Sp. Nov. 12: 314. 1913; J. J. Smith, l. C. 32: 382. 1933; Christenson in India Orchid Journ 2(1): 22. 1987; Seidenf. & J. Wood, Rev. Holttum; Orch. Penins. Malaya Singap. 690 (fig. f-g)—691. 1992.

Sepals and petals yellow with red spots; lip white with violet spots on upper surface of the blade.

Malaysia: Pahang, Ridley Sine num. type, fide Ridley's original description. R. E. Holttum listed this species for Indonesia (Sumatra) and Borneo, but I have not seen the specimens.

This species is very similar to *G. hainanensis* Tsi and *G. pechei* (Rchb. f.) Schltr., but it differs chiefly from them in its epichile with entire lateral wings and smaller cushion, as well as in having four unequal pollinia.

7. *Gastrochilus calceolaris* (Buch. —Ham. ex J. E. Smith) D. Don Prodr. Fl. Nepal. 32. 1825; Schltr. in Fedde Repert. Sp. Nov. 12: 314. 1913; Siedenf. et Smitin. Orchid. Thailand 4(1): 632, fig. 474. 1963; Tuyama in Hara, Fl. E. Himal. 1: 435. 1966; Jones in Kew Bull. 21: 153. 1967; Arora in Taxon 20: 785. 1971; Tuyama in Hara, l. c. 2: 189. 1971 (excl. spec. Sumatra, Java, philippines); Banerji et Thapa in Journ. Bomb. Nat. Hist. Soc. 70(1): 30. 1973; Rao et Balakrishnan in Rec. Bot. Surv. Ind. 20(2): 212. 1973; Herklots in Orch. Rev. 82: 354, fig. 194. 1974; Deb. et Dutta in Journ. Bomb. Nat. Hist. Soc. 71(2): 288. 1974; Seidenf., Cont. Rev. Orch. Camb., Laos and Vietn. 65. 1975; Lang et Tsi in Icon. Corn. Sin. 5: 771, fig. 8374. 1976; Seidenf. in Nord, Journ. Bot. 6(2): 178: 43. 1986; Hara et al., Enum. Fl. Pl. Nep. 1: 44. 1978; Mehra et Sehgal in Taxon 27: 389. 1978; Mehra et Kashyap in Taxon 28(4): 407. 1979; Prodhan, Ind. Orch. 2: 557. 1979; Hegde in Arun For. New. 3(3): 7. 1980 et in For. Dept. Arun. Prad. Itan. 74. 1984; Raizada et al. in Orch. Mus. 90. 1981; Seidenf. et Arora in Nord. Journ. Bot. 2: 17. 1982; Banerji et Pradhan in Orch. Nepal Himal. 494, t. 232. 1984; Christenson in Am. Orch. Soc. Bull. 54(9): 1113. 1985; Deva et Naithani in Orch. Fl. N. E. Himal. 399, fig. 231. 1986; Bennet, Fl. Pl. India et Adjac. Reg. 251. 1987, p. p.; Tsi in Fl. Xizan. 5: 787, fig. 426. 1987; Seidenf. in Opera Bot. 95: 289, fig. 187—188. 1988; Averyanov, Vasc. Pl. Syn. Vietnan. Fl. 1: 100. 1990; Seidenf. & J. wood, Kew. Holttum; Orch. Penins. Malays. Singap. 686, fig. 309. 1992. — *Aerides calceolaris* Buch. —Ham. ex J. E. Smith in Rees Cyclop. 39: Aerides 11. 1819. — *Epidendrum calceolare* Buch. —Ham. ex D. Don. l. c. 1825. — *Sarcochilus nepalensis* Spreng. Syst. Veg. 3: 721. 1826, nom. illegit. — *Saccolabium calceolare* (Buch. —Ham. ex J. E. Smith) Lindl. in Wall. Cat. no. 7302. 1832 p. p. non. nud; et Gen. Sp. Orch. Pl. 233. 1833; et in Bot. Mag. 24: 75 (Misc.) 139. 1838; Griffith. Itin Notes 2: 170. 1848; et Icon Pl. Asiat t. 334. 1851. p. p. (quoad flower); et in Journ. Linn. Soc. Bot. 3: 33. 1889. p. p.;

Rchb. f. in Walp Ann. Bot. Syst. 6: 883. 1846; Hooker f., Fl. Brit. Ind. 6: 60. 1890; Ridley in Trans. Linn. Soc. Bot. 2, ser. 3: 374. 1893; King et pantl. in Ann. Roy. Bot. Gard. Calcutta 8: 225, t. 300. 1898; Duthie in Ann. Roy. Bot. Gard. Calcutta 9(2): 147. 1906; et Fl. Up Gang. Pl. 3(2): 213. 1920; Guillaumin in Lecointe Fl. Gen. Indo-Chine 6: 503. 1933; Biswas in Ind. Forest. Rec. Bot. 3(1): 62. 1941; Merrill et Metcalf in Lingnan Sci. Journ. 21(1—4): 13. 1945; Gagnep. in Bot. Syst. (Paris) 14(2): 127. 1951; Guillaumin in Bull. Mus. Hist. Nat. (Paris) 2. ser. 26(6): 693. 1954; et l. c. 27(2): 142. 1955; R. S. Rao in Journ. Bomb. Nat. Hist. Soc. 61(2): 323. 1964; Mehra et Vij in Taxon 19: 110. 1970; Pham Hoang, Cay-Co Mien-Nam Viet-Nam 2, ed. 2: 1096, fig. 5256. 1972; Vij et al. in Taxon 30(2): 512. 1981; Raugada in Ind. Forester 85(11): 686. 1959; Tang et Chen in Fl. Hainanica 4: 257. 1977; Ban et Huyen in Fl. Taynguy. Enum. 204. 1984. — *Aerides leopardina* Wall. ex Lindl. in Sert. Orch. Frontesp. no. 6. 1838. — *A. leopardorum* Wall. ex Hook. f., Fl. Brit. Ind. 6: 60. 1890. — *Saccolabium bigibbum* auct. non Rchb. f. ex Hook. f.; Ridley in Journ. Linn. Soc. Bot. 32:362. 1896; et Mater in Fl. Malay Penin. 1: 164. 1907; et in Journ. Fed. Mal. St. Mus. 6: 182. 1915; et Fl. Malay Penin. 4: 165. 1924. — *Gastrochilus* sp. (Kerr 0215) Seidenf. et Smitin., Thailand 4(1): 626, fig. 471. 1963; P. F. Cumberlege et V. M. S. Cumberlege in Nat. Hist. Bull. Siam. Soc. 20(3): 172, fig. 9. 1963. — *G. intermedius* auct. non (Griff. ex Lindl.) O. Kuntze; Seidenf. et Smitin. in Orch. Tahiland 4(1): 629, fig. 472. 1963. — *G. obliquus* auct. non (Lindl.) O. Kuntze; Lindl. in Journ. Linn. Soc. Bot. 3: 33. 1859.

Sepals and petals greenish-yellow with brown or purplish blotchs, the epichile white, central cushion yellow with red dots; hypochile greenish-yellow with purple marking along the upper margin.

Nepal: Buchanan-Hamilton nine num. type(LINN); Hamilton' drawing (BM) may be a copying entity of the type specimen; Hara et al. 6307218 (TI); Wallich 7302 (K) in Herb. Lindl, and Wallich 7302a(K) in Herb. Wallich; Nicolson. 3044 (AMES, US). **Sikkim:** J.D. Hook. sine num. (AMES); Pantling 68 (AMES, CAL, K, US); Sawal & Party 124 (US). **NE. India:** Darjeeling, Griffith 5204 (K); Assam. Prain 183 (US); W. Micholity 21 / 11 / 03 (K); Parry 118 (K); Prain's collector 183 (AMES) ; Kingdon-Ward 18507 (NY); Griffith 5207 (CAL, K, NY), **China:** Yunnan, T. T. Yu 18039 (AMES, PE), 16389 (PE); H. T. Tsai 55704, 55684, 55632, 55751 (AMES, PE) 55757 (PE) ; C. W. Wang 66590, 72208 (AMES, PE), 72941, 72944, 66802, 76002 (PE); ForrestP 15906, 26700 (E, K), 8549 (E, K, PE) 26710 (NY, US); Tsi 169 (PE); Xizang, M. k. Li 1150, 2659, 5507, 1927 (PE); S. S. Li et S. Z. Cheng 2401 PE); Y. T. Chang 4451 (PE); Hainan, E. C. How 7037, 71145 (NY, PE); C. Wang 36801 (NY); S.K. Lau 5605 (AMES); E. A. McClure 1569, 1571 (AMES); W. T. Tsang 253 (AMES, NY, US), 284 (NY, PE). Some authors record this species for NW Himalaya, Bhutan, Burma, Thailand, Vietnam and Malaysia, but I have not seen the specimens.

8. *Gastrochilus philippinensis* Ames, Orchid. 5: 231. 1915. — *G. calceolaris* auct. non (J. E. Smith) D. Don; Ames et Quisumbing, Phil. Journ. Sci. 47: 200, 1932.

Philippines: Luzon, A. D. Eler 6517 (AMES, type).

This species is allied to *G. calceolaris*, but differs in having racemose inflorescences,

oblong-elliptical and ligulate leaves and suborbicular epichile.

9. *Gastrochilus platycalcaratus* (Rolfe) Schltr. in Fedde Repert. Sp. Nov. Beih. 4: 287. 1919; Holttum in Orch. Rev. 70: 326. 1962. — *Saccolabium platycalcaratum* Rolfe in Kew Bull. 368. 1909. — *Gastrochilus diannanensis* Tsi et Ma in Act. Bot. Yunnan. 7(1): 85. 1985, syn. nov. — *G. sukhakulii* Seidenf. in Opera Bot. 124: 68, fig. 88. 1995, syn. nov.

Sepals and petals yellowish with purple dots, the blade of lip whitish with greenish cushion, hypochil whitish with violet dots.

Upper Burma: Sander et Sans in Feb. 1909 (K, type). **Thailand:** Sukhakul GT9747(C.). **China:** Yunnan, Chen, Tsi et Ma 65 (PE).

10. *Gastrochilus sumatranus* J. J. Smith in Bull. Jard. Bot. Buitenz ser. 3, 4(1—2): 192. 1927; et Icon. Orchid Malay. 2: 138(LI). 1941.

Sepals and petals greenish yellow with purplish brown dots; epichile white with yellow and purple dotted cushion; hypochil white, with few purple dots outside, apex yellow, the rim with purple blotch.

Indonesia: West cost of Sumatra, E. Jacobson, Cult sub. nos. 1313, 1314, 1316, type materials; N. Borneo, J. et M. S. Clemens 29845, 30163, 30164 (AMES), C. E. Carr 27744 (AMES). I have not seen the type materials from Sumatra.

This species differs from *G. calceolaris* (Buch. —Ham, ex J. E. Smith) D. Don in having racemose inflorescence, semiorbicula epichile and rim with oblique front ridges.

ll. *Gastrochilus sororius* Schltr. in Fedde Repert. Sp. Nov. 12: 315. 1913; J. J. Smith, Orch. Java Fig. —Atlas, 472. 1914; et Bull. Jard. Bot. Buitent. ser. 3, 10(1—2): 20. 1928; C. A. Backer and al., Fl. Java 3: 444. 1968. — *Saccolabium calceolare* auct. non Lindl. : J. J. Smith in Fl. Buit. 6: 632. 1905. — *Gastrochilus calceolaris* auct. non Lindl. : Holttum in Orchids Malaya 1: 657. 1955. p. p.

Sepals and petals light green with brownish or purplish spots; the blade of epichile white, cushion yellow with red dots, hypochil white, apex yellow and reddish brown dots outside.

Indonesia: Java, J. J. Smith 496 (AMES); Loobb 257 (AMES); H. F. Sum 8347 (PE).

This species is allied to *G. calceolaris* (Buch. —Ham, ex J. E. Smith) D. Don and *G. sumatranus* J. J. Smith, differing from the former in having racemes not forming corymb or umbel and distinct projection at the middle of the notch, and from the latter in having acute leaves and broadly triangular epichile.

12. *Gastrochilus carnosus* Tsi, sp. nov. Fig. 1: g—h

Proximus *G. calceolari* (Buch. —Ham, ex J. E. Smith) D. Don differt floribus valde carnosus epichilo suborbicularito.

Stem 2 cm long. Leaves oblong, 7~14 cm long, 1~1.6 cm wide, acute, unequally 2-lobed at apex. Flowers very fleshy, up to 8 in a corymb; sepals and petals 3.5~10 mm long, 4~4.5 mm wide, petals slightly shorter and narrower, obtuse; epichile suborbicular 5 mm long, 8 mm wide, margin lacerate-fringed, covered with dense papillose above, especially at bases of the cushion, a cavity behind the cushion; hypochil cucullate, laterally compressed; rim raising forming a narrow

notch at the front, with obliquely front edges.

Indian: Assam, Prain 167 (AMES, type).

This species is closely related to *G. calceolaris* (Buch. Ham. ex J. E. Smith) D. Don distinguished by the shape of lip and the very fleshy texture of the flower.

13. *Gastrochilus garhwalensis* Tsi, sp. nov. Fig. 1: e–f

Habitu *G. calceolari* (Buch. –Ham. ex J. E. Smith) D. Don similis, sed sepalis petalisque ovate–lanceolatis, epichilio late ovato differt.

Stem 4~6 cm long, about 1 cm in diameter, internodes 5~7 mm long. Leaves strap-shaped or oblong, 22.5 cm long, 1.1~2.6 cm wide, unequally bilobulate at apex. Inflorescence 4–5-flowered; sepals and petals almost equal, ovate–lanceolate, 7.5 mm long, 3.8 mm wide, obtuse at apex; epichile broad–ovate, 5 mm long, 7 mm wide, margin more or less erose, with minutely papillose cushion and a cavity at the base; cushion surrounded by hairlike papillae especially at the base; hypochil subcupular, slightly laterally compressed; rim truncate and flush with epichile, shallowly notched at the front, without distinct front edges.

W. Himalaya: Garhwal, Inayat sine num. (AMES, type).

This species can be readily distinguished from all other species of *Gastrochilus* D. Don by its ovate–lanceolate sepals and petals and by its ovate epichile and subcupular hypochil.

14. *Gastrochilus intermedius* (Griff. ex Lindl.) O. Kuntze, Rev. Gen. Pl. 661. 1891; Schltr. in Fedde Repert. sp. Nov. 12: 314. 1913; Holttum in Orch. Rev. 70: 326. 1962; Seidenf. in Opera Bot. 95: 297. 1988. p. p. — *Saccolabium calceolare* auct. non (Buch. –Ham. ex J. E. Smith) D. Don: Paxt., Mag. Bot. 6: t. 97. 1839. — *S. intermedium* Griff. ex Lindl. in Journ. Linn. Soc. Bot. 3: 33. 1859; Rchb. f. in Otia Bot. Hamb. 42. 1878b; Hook. f., Fl. Brit. Ind. 6: 61. 1890 (excl. Griffith Notul. Pl. Asiat. 3: 356, et Icon. Pl. Asiat. t. 333. 1851). — *S. sp. Griffith*, Notul. Pl. Asiat. 3: 357 (no. 4). 1851.

NE. India: Khasia, Griffith 42 / 152 (K, type in herb. Lindl.). **Bangladesh:** sine coll. no. 5209 (K, in herb. Griffith, due to the miserable state of preservation of the flower, it can not be dissected, status questionabel. **China:** Sichuan, Z. Y. Liu 3731 (PE).

Z. Y. Liu 3731 from China comes close to the GT 5853 from Thailand (Seidenf. 1988: 95, fig. 193 b–e), these specimens may represent a new taxon. Further study of the relationship between this taxon and its allied species occurring in China and Thailand is needed. I agree with Seidenfaden that Vietnamese materials (Grillet 145 et Pham–Hoang's figure) regarded individually by A. Guillaumin (1956) and H. Pham–Hong (1972) as this species were incorrectly identified. Some specimens numbers cited by some authors in literatures have not been examined here.

15. *Gastrochilus linearifolius* Tsi et L. A. Garay, sp. nov. Fig. 1: a–b — *Saccolabium intermedium* auct. non (Griff. ex Lindl.) O. Kuntze: King et Pantling in Ann. Roy. Bot. Garden. Calcutta 8: 226, t. 301. 1898. p. p. (quoad desct. et plantam depictam); Tsi in Fl. Xizan. 5: 784, fig. 424. 1987. — *Saccolabium* sp., Griff. Itin. Notes 2: 46 (no. 713). 1848; et Icon. Pl. Asiat. t. 333. 1851. — *Gastrochilus intermedium* auct. non (Griffith ex Lindl.) O. Kuntze: Ind. Orch. 2: 558. 1979.

Haec species *G. intermedio* similis sed epichilii margine et apice interiore fimbriis longis densis instructo, hypochilio minore.

Stem pendulous, elongate, slender, 26 cm long, 5 mm in diameter; internodes 1.5~2 cm long. Leaves linear or narrowly falcate, 8~13.5 cm long, 5~10 mm wide, acuminate at apex, with 3 unequal setae. peduncle 1 cm long bearing 3~4 flowers in an umbel; flowers very fleshy; sepals 4.5~5 mm long, 2~2.5 mm wide; petals similar to sepals, but smaller; epichile semiorbicular, 2.2 mm long, 4 mm wide with a large minutely papillae cushion, densely irregular-fringed along the margin and villose inside the apical portion; hypochil subcupular 3.5 mm long, 2.5 mm across, rounded at apex with a exterior ridge; rim raising above the cushion, notched at the front and forming nearly vertical front edges.

Sikkim: Khasia, Pantling 356 (AMES, type, CAL, K). **China:** Xizang, Qinghai Xizang 74-5099 (PE).

This species is closely related to *G. intermedius* (Griffith ex Lindl.) O. Kuntze also occurring in NE. India (Khasia). It is distinguished from the latter chiefly by dense fringes along margin of epichile and by villi inside the apical portion as well as its small subcupular hypochil.

16. *Gastrochilus guangtungensis* Tsi, sp. nov. Fig. 1: c-d

Species nova *G. linearifolio* et *G. intermedio* eaffinis, ab utroque epichilio subovato-triangulari, margine paullo eroso, hypochilio subcucullato diversa.

Stem pendulous, slender, 6~17 cm long, 3 mm in diameter, internodes 1 cm long. Leaves falcately oblong, 4.5~9.5 cm long, 6~11 mm wide, acuminate with 2 setae. Peduncle 8~14 mm long, bearing 2~3 flowers in corymb; flowers yellow; sepals obovate, 5~6 mm long, 2.2~2.7 mm wide, petals smaller and narrower; epichile subovate-triangular, 2.5 mm long, 3 mm wide, recurved at the medium, smooth above, margin slightly erose, with a large central cushion extending to front wall of the sack; hypochil subcucullate, 3.5 mm long, 4.5 mm wide, the rim nearly truncate, flush with the epichile.

China: Guangdong, S. K. Lau 2531 (AMES, holotype, NY, isotype), 935 (AMES, NY); Yunnan, C. W. Wang 66587 (PE, without flower, questionable).

This Chinese endemic species is allied to *G. linearifolius* Tsi et Garay and *G. intermedius* (Griffith ex Lindl.) O. Kuntze, differing chiefly by its recurved subovate-triangular epichile and subcucullate hypochil, as well as its rim flush with the epichile.

17. *Gastrochilus japonicus* (Makino) Schltr. in Fedde Repert. Sp. Nov. Seih. 12: 315. 1913; l. c. 4: 288. 1919; Koyoshoin, Color Ill. fl. Nipp. 8: 279. 1969; Maekawa, Wild Orch. Jap. Col. 442, t. 184. 1971; Garay et Sweet Orch. South. Ryukyu Isl. 153. 1974; Walker, Fl. Okinawa and South. Ryukyu Isl. 375. 1976; T. S. Liu et H. J. Su in Fl. Taiwan 5: 999. 1978; T. P. Lin, Nat. Orch. Taiwan 3: 106-107(t.). 1987—*Saccolabium* sp. Makino, Ill. Fl. Jap. 1(3): t. 16. 1889. — *S. japonicum* Makino, Ill. Fl. Jap. 1(7): 3, t. 13. 1891; et Phaner. Pter. Jap. Ico. Ill. 1(8): t. 44. 1900; Matsumura, Ind. Jap. 2: 262. 1905; Makino et Nemoto, Fl. Jap. ed 2: 1674 1931. ; S. S. Ying, Coloured Ill. Ind. Orch. Taiwan 1: 305 et 496. 1977; Ohwi, Fl. Jap. 357. 1965 et 456. 1978. — *S. somai* Hayata, Ion. Pl. Formos. 493. 1914. — *Gastrochilus somai* (Hayata) Hayata, Gen. Ind. Fl.

Formos. 79. 1917; Schltr. l. c. 4: 289. 1919; Hayata, Icon. Pl. Formos. 10: 35. 1921; Hsieh A-tsai in Quart. Journ. Taiwan Mus. 8: 246. 1955. — *Gastrochilus holttumianus* S. Y. Hu et Barretto in Chuing. Chin. Journ. 13(2): 32. 1976, Syn. nov. — *Saccolabium taiwanianum* Ying, Coll. Ill. India. Orch. Taiwan 1: 311. 1977.

Sepals and petals yellowish with red-purple dots, epichile white with yellow patch and tiny spots; hypochil white with yellow apex.

Japan: A. Hashimoto Jb (PE); Togashi, Apr. 10. 1939 (TI); Yamazaki et al. Mar. 19. 1968 (TI); T. Soma, March 1913 (TI); Sonohara et al. 6298 (US); Walker et al. 6971 (US); Werner & Asato 7116 (US); Fosberg 38088 (US). **China:** Hong Kong, S. Y. Hu 12349a (A), 12349b (K); Taiwan, H. J. Su & Chen T. Y. 8083, 8021, 7632 (NTUF). Tab. 16 (in Ill. Fl. Jap. 1889: 1(3).) should be considered as type.

18. *Gastrochilus obliquus* (Lindl.) O. Kuntze, Rev. Gen. 2: 661. 1891; Schltr. in Fedde Repert. Sp. Nov. 12: 315. 1913; Balakrishnan in Andaman et Nicobe Information II. 1976; Seidenf. in Opera Bot. 95: 298, fig. 195 (a-c) et 196. 1988; Averyanov, Vasc. Pl. Syn. Vietnam. Fl. 1: 100. 1990. — *Saccolabium obliquum* Lindl. in Wall. Cay. no. 7304. 1832, nom. nud.; et Gen. Sp. Orchi. Pl. 223. 1833; et Journ. Linn. Soc. Bot. 3: 33. 1859; Rchb. f. in Otia Bot. Hamb. 42. 1878; Hook. f., Fl. Brit. Ind. 6: 61. 1890; Deb. et al. in Bull. Soc. Bot. Bengal 22: 215. 1968. — *S. dasypogon* auct. non. (J. E. Smith) O. Kuntze; King et Pantl. in Ann. Roy. Bot. Gard. Calcutta 8: 225, t. 299. 1898; Bruhl, Guide, Orchid Sikkim 133. 1926; Gagnep. in Bot. Syst. (Paris) 14(2): 127. 1951; Guillaumin in Bull. Mus. Hist. Nat. (Paris) ser. 2, 34(5): 409. 1962; et ser. 3, 36(5): 198. 1965; Panigrahi et Joseph in Bull. Bot. Surv. Ind. 8(2): 157. 1966; Deb et al. l. c. 22: 213. 1968; Bose & Bhattacharjee, Orch. India 474. 1980. — *Gastrochilus dasypogon* auct. non (J. E. Smith) O. Kuntze; Seidenf. et Smitin., Orchid Thailand 629, fig. 473. 1963; l. c. 828. 1965; Kerr in Nat. Hist. Bull. Siam Soc. 23(1-2): 208. 1969; Seidenf. in Bull. Mus. Hist. Nat. (Paris) ser. 3, 71, 5: 128. 1973; et Cont. Rev. Orch. Camb., Laos and Vietn. 65. 1975; Pradhan in Am. Orch. Soc. Bull. 46: 244. 1977; Hegde in Arunachal Forest News 3(3): 7. 1980; et Forrest Dept. Arunachal Pradesh, Itanagar 75, fig. 102. 1984; Christenson in Am. Orch. Soc. Bull. 54(9): 1113. 1985.

Flowers fragrant; sepals and petals yellowish or yellow, rarely with a few red-brown dots; lip white, with red-purple dots along upper edges of the rim and yellow at apex of sack.

India: sine loc., OIC 2403 (SEL); J. T. Atwood 7846 (SEL); Assam, C. H. Dodson, sine num. (SEL); Parry 1018 (K). **Sikkim:** Pantling 248 (AMES, CAL, K). **Burma:** Wallich 7304 (K, type in herb. Lindley); McMillen 144 (US). **Laos:** Kerr 2320, 1597 (C). **Thailand:** Kerr 01 (K); put 2088 (K). **China:** Yunnan, C. W. Wang 81039, 79823 (AMES, PE). Tsi 53, 82-17, 84-16, 80-7 (PE); Henry 12730 (AMES, K, NY), 12970 (K, NY); Guangxi, Z. Y. Li 22 (PE); Sichuan, Mili Exped. Team 947 (PE, without flower, questionable). Some authors record this species also occurring in Bhutan and Vietnam, but I have not seen specimens.

A careful examination of the flowers and comparative study of both this species and *G. bigibbus* don't enable us to point out important characters for revealing their position. Further material may tend to the decision that *G. bigibbus* should be treated as a synonym, not a separate

species.

18a. *Gastrochilus obliquus* (Lindl.) O. Kuntze var. *suavis* (Seidenf.) Tsi, stat. nov. — *G. suavis* Seidenf. in *Opera Bot.* **95**: 298, fig. 194. 1988.

This variety is distinguished from *G. obliquus* (Lindl.) O. Kuntze by having deep yellow sepals and petals, densely spotted with tiny red dots.

Thailand: GT 7162 (C, type), 2332b, 874b, 8765 (C).

19. *Gastrochilus acutifolius* (Lindl.) O. Kuntze, *Rev. Gen. Pl.* **2**: 661. 1891; Holttum, in *Orch. Rev.* **70**: 326. 1962; Herklots in *Orch. Rev.* **82**: 356 et 358, fig. 196. 1974; Pradham in *Amer. Orch. Soc. Bull.* **42**: 694–695. 1973; et *Ind. Orch.* **2**: 558. 1979; Benerii et Prodl., *Orch. Nepal. Himal.* **493**, t. 231. 1984; H. Koontze in *Am. Orch. Soc. Bull.* Sept. 1985 (photo of back cover). — *Aerides umbellatum* Wallich *Icon.* 1137 nom. nud. — *Saccolabium acutifolium* Lindl., *Gen. Sp. Orch. Pl.* 223. 1833; et *Sert. Orch. Frontisp.* fig. 2. 1840; et *Journ. Lind. Soc. Bot.* **3**: 33. 1859; Hook. f., *Fl. Brit. Ind.* **6**: 61. 1894; King et Pantl. in *Ann. Roy. Bot. Gard. Calcutta* **8**: 226, t. 302. 1898. — *Saccolabium denticulatum* Paxtan in *Mag. Bot.* **7**: 145. 1840 et **80**: t. 4772. 1854. — *S. dentatum* Rchb. f. in *Wal. Ann. Bot. Sphalm.* **6**: 883. 1864. — *S. dentatus* (Paxt.) O. Kuntze, *Rev. Gen. Pl.* (may be error for *S. dentatum* Rchb. f.)

Flowers lightly fragrant, colour variable, sepals and petals usually greenish–brown or dull pale green, flushed and mottled with dull brown, rarely dull throughout; lip white with red dots on yellow cushion.

EN. India: J. T. Atwood 7845, J. L. Henderson sine num., OIC 1072 (SEL). **Sikkim**: Pantling 3 (AMES); Cathcart (K, type); J. D. Hooker sine num. (AMES). **Nepal**: Huttleston 2017 from Creech et Devos 621534 (AMES).

According to shape of leaves (broadly oblong about 10 cm long, 3.3 cm wide, with 2 sharp-teeth at apex) and stout peduncle bearing many flowers as well as the shape of lip, it seems to be very close to *Gastrochilus dasypogon* (J. E. Smith) O. Kuntze

20. *Gastrochilus yunnanensis* Schltr. in *Fedde Repert. Sp. Nov. Beih.* **4**: 76. 1919. — *Saccolabium sp.*, Griffith, *Itin. Notes* **2**: 46. 1948. — *S. sutepense* Rolfe ex Downie in *Kew Bull.* **95**: 390. 1925, syn. nov.; Guillaumin in *Leconte, Fl. Indochine* **6**: 504. 1933. — *S. monticola* Rolfe ex Downie, l. c. **95**: 388. 1925, syn. nov.; Guillaumin, l. c. — *Gastrochilus monticola* (Rolfe ex Downie) Seidenf. et Smitin. *Orchid. Thailand* **4**(1): 624, fig. 469. 1963; Seidenf., *Cont. Rev. Orch. Camb. Laos and Vietn.* **65**. 1975; et in *Opera Bot.* **95**: 293, fig. 189. 1988. — *G. sutepense* (Rolfe ex Downie) Seidenf. et Smitin., *Orchid. Thailand* **4**(1): 626, fig. 470. 1963; Seidenf. in *Opera Bot.* **95**: t. 191; l. c. **124**: 67. 1995. 1988. — *Saccolabium yunnanense* (Schltr.) S. Y. Hu in *Quart. Journ. Taiwan Mus.* **28**(1, 2): 153. 1975.

Sepals and petals yellowish with tiny light brown to pinkish dots; epichile white, central cushion yellow with small purple dots; hypochil white with a few purple spots both inside and outside the sack, the front edges of the firm purple spots.

Thailand: Kerr 206, 267A (K). **China**: Yunnan, Henry 12958 (K, type, NY).

Some authors considered this species also occurring in Bangladesh and Vietnam, but I have

no seen specimens.

This species readily distinguished by acuminate leavea with 2~3 setae at the apex and the rim with two small triangles at front upsides.

21. **Gastrochilus rutilans** Seidenf. in Opera Bot. **95**: 293, fig. 190. 1988.

Sepals and petals deep orange–yellow, nearly completely covered by deep red dots; epichile white, with many tiny red dots on the yellow cushion; hypochil white with scattered strong red spots outside and inside and a few deep–purple dots along upper margin of the rim.

Thailand:GT 8617 (C); Cumberlege 962 (C, type).

22. **Gastrochilus acinacifolius** Tsi in Bull. Bot. Res. **9**(2): 25, fig. 2(1–2). 1989.

Sepals and petals yellowish with red–purple dots, epichile white with yellowish and red–purple cushion.

China:Hainan, Z. H. Tsi et W. T. Ming 77–1, 029 (PE, holotype); F. C. How 72066, 65297 (PE); S. K. Lau 28347 (AMES); N. K. Chum et C. L. Tso 34987 (AMES, NY); H. Y. Linang 65293(NY).

23. **Gastrochilus minor** Seidenf. in Opera 1301. **95**: 296. 1988.

Sepals and petals pale–yellow with dark orange dots; epichile white with very small yellow spots at centre.

Thailand:GT 5109 (C. type).

This species is most closely related to *G. rutilans* Seidenf. , but differs chiefly in its rim being nearly flush with the epichile and with only about 0.3 mm high front edges.

24. **Gastrochilus dasypogon** (J. E. Smith) O. Kuntze, Rev. Gen. Pl. **2**: 661. 1861. — *Aerides dasypogon* J. E. Smith in Rees. Cyclop. 39: suppl. 1818.

Sepals and petals deep red on adaxil surface, deep green on abaxil surface; epichile white with bloodred dots on surface of the cushion; hypochil yellowish with red spots.

Nepal:Buchanan–Hamilton's coloured drawing (LINS, type).

The type material of this species is represented by drwing of a plant. It is kept in the Herbarium of the Linnean Society of London. If it is a entity, a series of record about this species considered by many authors may be wrong since 1894, because Buchanan–Hamilton's drawing and original description made by J. E. Smith are differs from all "*G. dasypogon*" recorded by later authors. So far, nobody yet found again such a entity completely identical with J. E. Smith's description and Buchanan's drawing except the record of A. S. Raon et Deori (in Journ. Ind. For 3 (3–4): 334. 1980). Obviously, it is necessary to further studying. So I consider that it dealed by Hooker f. as questionable species seems to be proper before getting true entity.

A specimen from **Guam** identified by R. Muniappan & Joss A. Crisostomo as this species, but examination of the specimen shows that it is *Trachoma quamense* (Ames) Garay.

25. **Gastrochilus subpapillosus** Tsi. sp. nov. Fig. 2: n

Species nova *G. obliquo* (Lindl.)O. Kuntze proxima, a quo imprimis differt epichilio papillosis brevibus laxis obtecto; hypochilii marginibus superibus andtice margines verticales formatis.

China: Yunnan, C. W. Wang 79176 (AMES, PE, holotype). Flowers yellowish white.

This species is closely related to *G. obliquus* (Lindl.) O. Kuntze, but it differs in the epichile covered by short papillose-hairs and rim with distinct vertical edges at the front.

II. Sect. **Gaespitosi** Tsi, sect. nov.

Planta pumila; caudex erectus obscurus; folia distiche aggregata, minus quam 3 cm longa.

Type: *G. rantabunensis* Chow ex Lin.

26. *Gastrochilus rantabunensis* Chow ex Lin, Nat. Orch. Taiwan 3: 109 et 110 (t.). 1987.

China: Taiwan, Lin 433 (TAIF, type); Hunan, C. S. Fan et Y. Y. Li 270 (AMES)

27. *Gastrochilus xuanenensis* Tsi in Act. Bot. Yunnan. 4 (3): 269, fig. 1(7–13). 1982.

China: Hubei, H. C. Li 2982(PE, type); Guizhou, Sino–America Guizhou Bot. Exped. 577 (AMES, PE).

III. Sect. **Microphyllae** (Bentham & Hook. f.) Seidenf. in Opera Bot. 95:285. 1988. —

Saccolabium Blume sect. *Microphyllae* Bentham & Hook. f., Gen Pl. 3: 579. 1883. — *Saccolabium*

Blume sect. *Distichophyllae* Hook. f., Fl. Ind. Brit. 6: 55. 1890.

Type: *G. distichus* (Lindl.) O. Kuntze

28. *Gastrochilus pseudodistichus* (King et Pantl.) Schltr. in Fedde Repert. Sp. Nov. 12:315, 1913; Fischer in Rec. Bot. Surv. Ind. 12(2): 142. 1938. — *Saccolabium distichum* auct. non Lindl.: Hook. f. in Ann. Roy. Bot. Gard. Calcutta. 5: 49, t. 73. 1895. p. p. — *S. pseudodistichum* King et Pantl. in Journ. As. Soc. Beng. 64(3): 341. 1895; et in Ann. Roy. Bot Gard. Calcutta. 8: 229. t. 305. 1898; Bruhl, Guide. Orch. Sikkim 130. 1926; Mehra et Vij. in Taxon 19: 110. 1970. — *S. distichum* var. *pseudodistichum* (King et Pantl.) Finet ex Guillaumin in Lecomete, Fl. Indochine. 6: 506. 1933. — *S. houopse* Rolfe ex Dowhne in Kew Bull. 387. 1925; Guillaumin in Lecomte Fl. Indochine 6: 505. 1933; Seidenf., Cont. Rev. Orch. Camb. Laos and Vietn. 65. 1975. — *Gastrochilus hoyopsis* (Rolfe ex Downie) Seidenf. et Smitin., Orchid. Thailand 4(1): 623, fig. 468. 1963; et 828. 1965.

Sepals and petals orange with purple dots; epichile yellow with purple spots on upper surface of cushion; hypochil yellowish with purple dots inside and outside. $2n = 38$.

Sikkim: Pantling 49 (AMES, K, type); King 3052(US). **NE. India:** Parry 127 (K). **China:** Yunnan, M. K. Li 2520 (PE); R. M. Feng 13023, 13493 (AMES, PE); Tsi 96, C. W. Wang 86174, 82587, 76833(PE); C. W. Wang 67560 (AMES, PE). **Thailand:** Kerr 231 (K). **Burma:** F. G. Dickason 9476 (AMES, without flower, questionable).

It is easy to confuse this species with *G. distichus* (Lindl.) O. Kuntze. The chief distinction between them lies in the shape and structure of their lips.

The specimens recorded by some authors for Vietnam and other regions have not been seen.

29. *Gastrochilus fuscopunctatus* (Hayata) Hayata, Gen Ind. Fl. Form. 78. 1917; T. S. Lu et H. T. Su in Fl. Taiwan 5: 999. 1978; T. P. Lin, Nat. Orch. Taiwan 3: 100. 1986. — *Saccolabium fuscopunctatus* Hayata, Icon. Pl. Formos. 2: 143. 1912; et 4: 89, fig. 45. 1914; Makino et Nemoto, Fl. Jap. ed 2: 1674. 1931; Hsieh A–tsai in Quart. Journ. Taiwan Mus. 8: 245. 1955; S. Y. Hu in Quart. Journ. Taiwan Mus. 1: 496. 1977; S. S. Ying, Coloured Ill. Ind. Orch. Taiwan 1: 303 et 496.

1977.——*Gastrochilus fuscopunctatus* (Hayata) Schltr. in Fedde Repert. Sp. Nov. Beih. 4: 288. 1919.

Sepals and petals yellowish-green with red-purple dots; epichile white with green cushion, red-purple spotted; hypochil white externally, red-purple dotted at apex, upper margin of its rim densely red-purple spotted.

China: Taiwan, B. Hayata et S. Sasaki, Jan. 1912 (TI, type); A. Hashimoto 81-a, 83-f (PE); T. H. Shyn et al. 8348 (NTU); Su et al. 7334 (NTUF)

In the original description this species was described to have hirsute epichile. This character has not been confirmed by subsequent observations.

30. *Gastrochilus affinis* (King et Pantl.) Schltr. in Fedde Repert. Sp. Nov. 12: 314. 1913; Tuyama in Hara, Fl. E. Himal. 434. 1966; l. c. 2: 187. 1917; Pantling, Ind. Orch. 2: 560. 1979; Banerji et Thapa in Journ. Bot. Nat. Hist. Soc. 70(1): 30. 1973; et in Orch. Nepal 116. 1982. —— *Saccolabium affine* King et Pantl. in Ann. Roy. Bot. Gard. Calcutta 8: 228, t. 304. 1898.

In the vegetative characters this species is very similar to *G. pseudodistichus* (King et Pantl.) Schltr. It differs chiefly from latter in having flowers with different shape and structure of lip. Its epichile is broadly triangular, subacute at apex, lateral margins irregularly dentate and with two thick longitudinal ridges on the upper surface. Its hypochil is obconical, dorsally compressed, and slightly bilobed at apex.

Sikkim: Pantling 444 (Kt, type). **E. Nepal:** Hara et al. 6307301 (TI).

31. *Gastrochilus distichus* (Lindl.) O. Kuntze, Rev. Gen. Pl. 2: 611. 1891; Tuyama in Hara, Fl. E. Himal. 435. 1966; l. c. 2: 187. 1971; Banerji & Thapa in Journ. Bot. Nat. Hist. Soc. 70(1): 30. 1973; Herklots in Orch. Rev. 82: 357, t. 195. 1974; H. Ohashi, Fl. E. Himalay. 144. 1975; Lang et Tsi in Icon. Corn. Sin. 5: 772, t. 8374. 1976; Hara et al., Enum. Fl. Pl. Nep. 1: 14. 1978; Pradham, Ind. Orch. 2: 559. 1979; Tsi in Fl. Xian. 5: 787, fig. 426. 1987. —— *Saccolabium distichum* Lindl. in Journ. Linn. Soc. 3: 36. 1859; Hook. f., Fl. Brit. Ind. 6: 64. 1890; et in Ann. Roy. Bot. Gard. Calcutta 5: 49, t. 73. 1895. p. p.; King et Pantl. in Ann. Roy. Bot. Gard. Calcutta 8: 227, t. 303. 1898; Schltr. in Notes Bot. Gard. Edinb. 5: 112. 1912; S. Y. Hu in Quart. Journ. Taiwan Mus. 28(1, 2): 150. 1975.

Sepals and petals greenish or yellowish with red-purple dots, lip white.

India: Khasia, J. D. Hooker 83(K). **Sikkim:** J. D. Hooker 206 (K, type); Pantling 132 (CAL, K); Clarke 25239 (K); S. Kurz sine num. (AMES). **Nepal:** Nicolson 3348 (US); Hara et al. 6307290 (TI). **Bhutan:** F. Ludlow et al. 20512 (AMES). **China:** Yunnan, T. N. Liou 23090, T. Tsiang 11565, R. C. Cheng 22782, H. C. Wang 4153, K. K. Tsong 2294, C. W. Wang 8273, 86292 (PE); C. W. Wang 63369, 63294, 72267 (AMES PE); H. T. Tsai 54564 (AMES, PE); Forrest 17667 (AMES, E, PE), 3101, 4722 (E); Xizang, Quing Zang Exped. 73-143 (PE).

32. *Gastrochilus corymbosus* A. P. Das et Chanda in Journ. Econ. Tax. Bot. 12(2): 401, fig. 1. 1988.

Sepals and petals with macular dark-brown blotches on the adaxil surface, epichile with small brown spots on the cushion.

India: Darjeeling, A. P. Das 823 (CAL, type).

In size and habit the plant is closely allied to *G. distichum* (Lindl.) O. Kuntze. It is readily distinguished by its larger flowers and epichile without calli on the base.

33. *Gastrochilus matsuran* (Makino) Schltr. in Fedde Repert. Sp. Nov. Beih. 4: 289. 1919; Garay et Sweet, Orch. South. Ryukyu Isl. 168. 1974. — *Saccolabium matsuran* Makino in Bot. Mag. Tokyo 6: 48, 1892; et 16: 12. 1902; Matsumura, Ind. Pl. Jap. 2: 262. 1905; Makino et Nemoto, Fl. Jap. ed 2: 1674. 1931; Ohwi, Fl. Jap. 257, 1965.

Flowers yellowish or yellowish-green, with purple blotch or some times only sepals with purple blotch externally.

Japan: A. Hashimoto nos. 74a, 74b (PE); M. Togashi, Apr. 9. 1939 (TI); M. Togashi Apr. 26. 1958 no. 1693 (AMES, NY, TI, US), Sep. 20, 1957, no. 1585 (AMES, NY, US); Masamune, Sept. 1926 (TI); T. Makino, Aug. 28, 1897 et K. Nemoto, June 1897 (type) I have not seen type specimen.

This Japanese endemic species is allied to both *G. fuscopunctatus* (Hayata) Hayata and *G. matsudai* Hayata of Taiwan. Their vegetative characters are very similar, but they can be distinguished by having different shape and structure of lips.

34. *Gastrochilus fargesii* (Kranz.) Schltr. in Fedde Repert. Sp. Nov. Beih. 4: 288. 1919; Lang et Tsi in Icon. Corn. Sin. 5: 772, t. 8373. 1976. — *Saccolabium fargesii* Kranz. in Journ. de Bot. 17: 423. 1903; S. Y. Hu in Quart. Journ. Taiwan Mus. 28(1, 2): 151. 1975.

China: Sichuan, Farges 1236 (P, holotype, AMES, NY, PE, isotype; Sichuan Economic Exped. 0276 (PE).

35. *Gastrochilus toramanus* (Makino) Schltr. in Fedde Repert. Sp. Nov. Beih. 4: 290. 1919; Koyu Shoin. Color Illustr. Fl. Nipp. 8: 281. 1969. — *Saccolabium toramanum* Makino in Bot. Mag. Tokyo 19: 141. 1905; Makino et Nemoto, Fl. Jap. ed. 2: 1675. 1931; Ohwi, Fl. Jap. 358. 1965.

Flowers yellowish-green with red-purple dots.

Japan: A. Hashimoto no. Jc (PE); T. Kurokawa Oct. 8. 1933 (I); T. Yoshinaga Oct. 1904 (TI, type).

This species is closely related to *G. nanus* Tsi. It is distinguished by transversely oblong epichile and pubescent cushion above.

36. *Gastrochilus nanus* Tsi in Journ. Arn. Arbor. 70: 122, fig. 2. 1990.

Flowers greenish, cushion olivaceous.

China: Guizhou, Sino-America Guizhou Bot. Exped. 407 (PE, holotype, AMES, HGAS, isotypes).

This is one of the species with the smallest flower in this genus. It is easy to be confused with *G. toramanus* (Makino) Schltr. and *G. raraensis* Fukuyama by the vegetative. It differs from the former in having a reniform epichile and oblong petals and from the latter in having smaller greenish flowers with a cylindrical-subcylindrical, vertical hypochil and differently shaped petals.

37. *Gastrochilus ciliaris* Maekawa in Journ. Jap. Bot. 12: 92. 1936; Masamune in Sci. Rep. Kanazawa Univ. 9: 139. 1964; Ohwi, Fl. Jap. 357. 1965; Garay et Sweet, Orch. South. Ryukyu Isl.

168. 1974; Koyo Shoin, Color Illust. Fl. Nipp. 8: 34. 282. 1964. — *Saccolabium ciliare* (Maekawa) Ohwi in Sull. Nat. Sci. Mus. Tokyo n. s. 1: 1. 1954

Flowers pale yellowish-green, sepals and petals with red-purple dots externally.

Japan: Kyushu and Ryukyu Isl., A. Hashimoto 82-11 (PE); Y. Doi anno 1935 (Type).

This species, like *G. nanus* Tsi, has very small flowers. It is distinguished by its subreniform, retuse an dpapillose epichile, ciliate along the margin.

Type specimen of this species has not been seen.

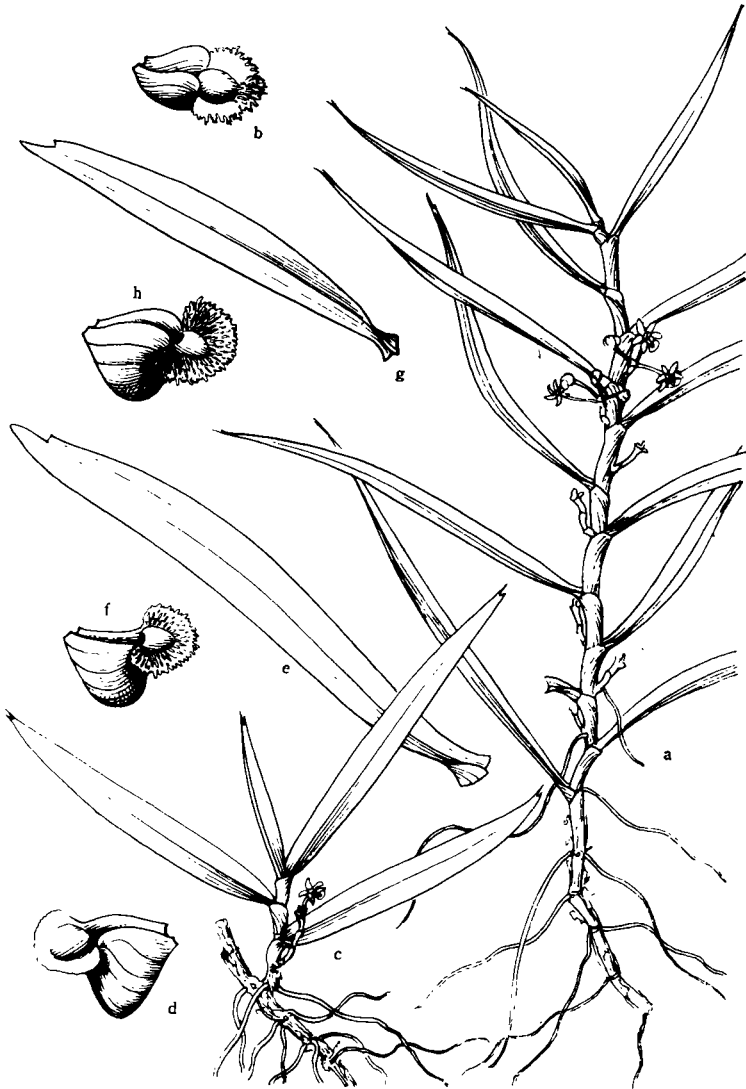


Fig. 1 *Gastrochilus linearifolius* Tsi et Garay: a. plant $\times 1 \times 6/10$, b. lip $\times 10 \times 6/10$. *G. guangtungensis* Tsi: c. plant $\times 1$, d. lip $\times 4$. *G. garhwatensis* Tsi: e. leaf $\times 1$, f. lip $\times 4$. *G. carnosus* Tsi: g. leaf $\times 1$, h. lip $\times 3$.

38. ***Gastrochilus flavus*** Lin, Nat. Orch. Taiwan 3: 95-96(t.). 1987.

Flowers yellow with brown dots; epichile whitish, with yellow cushion.

China: Taiwan, Young sine num. 1978, 5. 15. (TAIF. type). I have no seen type specimen.

39. *Gastrochilus sinensis* Tsi in Bull. Bot. Res. 9(2): 23. 1989.

Sepals and petals greenish-green with red-purple dots.

China: Guizhou (Jiangkon), C. P. Tsien et al. 32550 (PE. type); Hubei (Wufeng), Z. S. Fu 34 (EDC); Anhui (Hua Shan), D. Q. Wang 6610 (ACM).

40. *Gastrochilus raraensis* Fukuyama in Bot. Mag. Tokyo 48: 441. 1934; Lin, Nat. Orch. Taiwan 3: 119–120 (t.). 1987—*Saccolabium raraense* (Fukuyama) S. Y. Hu in Quart. Journ. Taiwan Mus. 28(1, 2): 152. 1975. —*G. roramanus* auct. non. (Makino) Schltr. : T.S. Liu et H. J. Su in Fl. Taiwan 5: 1001. 1978.

Sepals and petals yellowish-green with purple spots, epichile whitish with greenish cushion, hypochil whitish with brown dots.

China: Taiwan, Fukuyama 4138 (type); Su & Wang 6944 (NTUF); Su & Chen 7713 (NTUF)

The shape of the hypochil of this species shows a close similarity to that of *G. toramanus* (Makino) Schltr. It differs from the latter by difference in the maller flower with semiorbicular epichile and densely barbate above.

Type specimen has not been seen.

41. *Gastrochilus matsudai* Hayata, Icon. Pl. Formos. 9: 116, fig. 40. 1920; T. S. Liu et H. J. Su in Fl. Taiwan 5: 999. 1978; T. P. Lin, Nat. Orch. Taiwan 3: 107 et 108 (t.). 1987. —*Saccolabium matsudai* (Hayata) Makino et Nemoto, Fl. Jap. ed. 2: 1674. 1931; Hsieh A-Tsai in Quart. Journ. Taiwan Mus. 8: 268. 1955.

China: Taiwan, Lin 411 (TAIF); T. Matsuda Nov. 1918 (type), I have no seen the specimen of this species.

The vegetative characters of this species come close to *G. fuscopunctatus* (Hayata) Hayata. It is distinguished by its subsemiorbicular epichile, densely pubescent above.

42. *Gastrochilus hoi* Lin, Nat. Orch. Taiwan 3: 103–104 (t.). 1987.

Sepals and petals yellowish-green with brown dots; epichile pale green, with green cushion.

China: Taiwan, Lin 434 (TAIF, type). I have no seen type specimen.

This species resembles *G. matsudai* Hayata and *G. flavus* Linn. It is distinguished from the former in having straight hypochil and green cushion and from the latter in having different shape of lip.

43. *Gastrochilus formosanus* (Hayata) Hayata, Icon. Pl. Formos. Add. & Corr. 1915; et Gen. Indl. Fl. Formos. 78. 1917; et Icon. Pl. Formos. 10: 35. 1921; T. S. Liu et H. J. Su in Fl. Taiwan 5: 998. 1978; T. P. Lin, Nat. Orch. Taiwan 3: 97, 99 (t.). 1987. —*Saccolabium formosanum* Hayata in Journ. Coll. Sci. Univ. Tokyo 30: 336. 1911; et Icon. Pl. Formos. 4: 88, fig. 44. 1914; Makino et Nemoto, Fl. Jap. ed. 2: 1673. 1931; Hsieh A-tai in Quart. Journ. Taiwan Mus. 8: 245. 1955; S. Y. Hu, l. c. 28(1, 2): 151. 1975; Masamune in Journ. Geobot. 23(1): t. 2.3. 1975; S. S. Ying, Coloured Ill. Ind. Orch. Taiwan 1: 495. 1977. —*Gastrochilus formosanus* (Hayata) Schltr. in Fedde Repert. Sp. Nov. Beih. 4: 288. 1919. —*G. nebulosus* Fukuyama in Bot. Mag. Tokyo 49: 762. 1955, nom. nud; et 50: 16. 1936. —*G. rupestris* Fukuyama, l. c. 49: 763. 1935. —*Saccolabium nebulose* (Fukuyama) Hu in Quart. Journ. Taiwan Mus. 28(1, 2): 1975. —*S. rupestris* (Fukuyama) Hu, l.

c. 28(1, 2): 152. 1975. — *S. fuscopunctatum* auct. non Hayata; Masam. in Journ. Geobot. 23(3): t. 219. 1976. — *S. shaoyaoii* Ying, Coll. Ill. Ind. Orch. Taiwan 1: 310. 1977. — *Gastrochilus matsuran* auct. non (Makino) Schltr.; T. S. Liu et H. J. Su in Fl. Taiwan 5: 1001. 1978 (quoad descr. p. p.).

Flowers yellowish with minute spots.

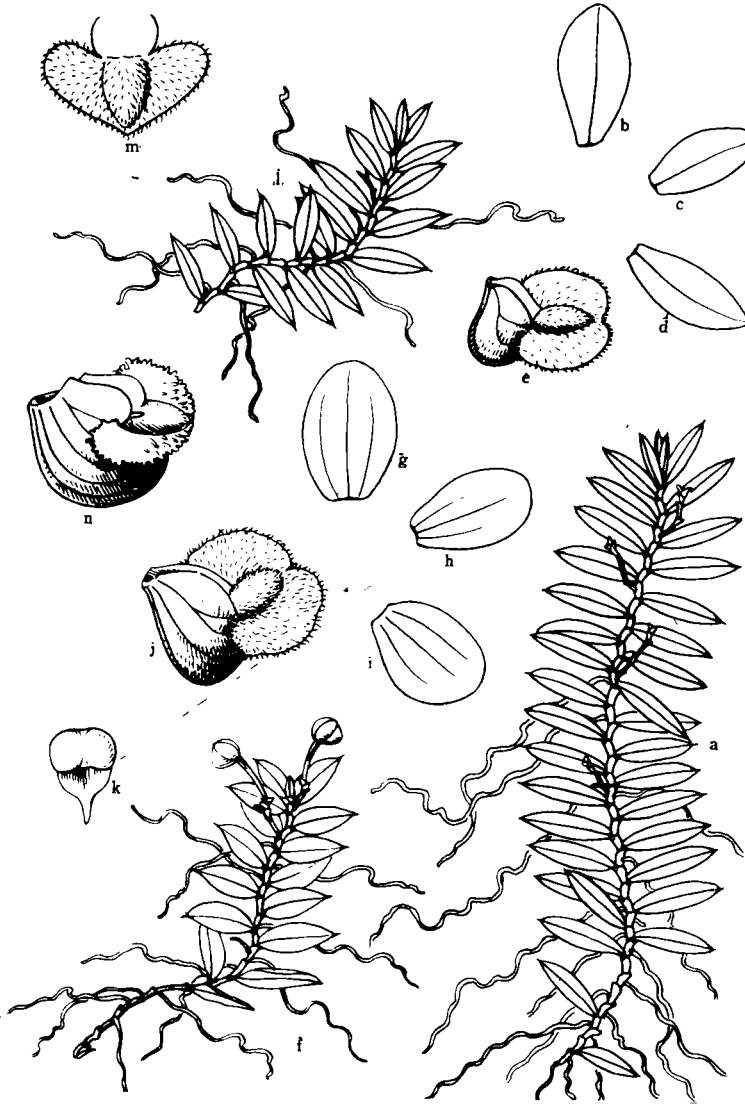


Fig. 2 *Gastrochilus gongshanensis* Tsi: a. plant $\times 1$, b. dorsal sepal $\times 6$, c. petal $\times 6$, d. lateral sepal $\times 6$, e. lip $\times 6$. *G. nanchuanensis* Tsi: f. plant $\times 1$, g. dorsal sepal $\times 6$, h. petal $\times 6$, i. lateral sepal $\times 6$, j. lip $\times 6$, k. operculum $\times 6$. *G. saccatus* Tsi: l. plant $\times 1$, m. lip $\times 6$. *G. subpapillosus* Tsi: n. lip $\times 6$.

China: Taiwan, J. W. Hsu 1785 (AMES); Su et al. 9003, 8546 (NTUE); Z. I. Chen et al. 8856 (NTUF); T. Yamazaki sine num. Sept. 1969 (TI); U. Fauff 994, 1914 (AMES); T. Kawakami et U. Mori 3164 (TI, type); U. Mori, March 1908 (K); A. Hashimoto 81-B (PE). Fujian, Wugong Mt. Exped. sine num. (PE); Shanxi, Ningshan, Medicinal Herbs Exped. 72 (MMI, questionabel, without flower); Hubei, Shen Nong-Jia Exped. 20851 (PE).

The specimens from Fujian (Mt. Wugong) and Hubei (Shen Nongjia) appear to belong to another taxon. Their leaves are smaller than those from Taiwan, more closely placed and with red-purple spots on both surface.

44. *Gastrochilus saccatus* Tsi, sp. nov. Fig. 2: l-m

Haec species affinis *G. flavo* Lin, ab eo epichilii limbo reniformi, hypochillo subcupiformi et verticali.

Plant prostrate. Stems 3~9 cm long, 2.3 mm in diameter, sometimes branched, internode 4~5 mm long. Leaves distichous, elliptical, 1~1.8 cm long, 4~7 mm wide, acute at apex, minutely 3-lobule, the middle one apiculate. Peduncle slender 7 mm long, 2~3-flowered; dorsal sepal elliptical, 4.8 mm long, 2.8 mm wide, obtuse at apex; lateral sepal slightly obliquely oblong, as large as the dorsal sepal; petals obovate, 4 mm long, 2.6 mm wide, rounded at apex; epichile subreniform, recurved, 2.7 mm long, 9 mm wide, nearly obtuse at apex, margin and upper surface densely covered by short hairs; cushion thick, extending into front wall of the sack; hypochil subcupular, erect, 4 mm long, 3~3.5 mm across, rounded at apex, with 4 parallel ribs externally, the rim nearly flush with epichile.

China: Yunnan, Dalavay 2, 23, 1938 sine num. (AMES, P, holotype)

This species resembles *G. flavus* Lin in its vegetative characters. It is distinguished by its reniform-triangular epichile and its subcupular hypochil with 4 ribs externally.

45. *Gastrochilus gongshanensis* Tsi, sp. nov. Fig. 2: a-e

Proxima *G. sinensi* Tsi, a quo sepalis et petalis l-nervio, hypochilio hemisphaerico diagnoscutur.

Stem creeping, 14 cm long, 3 mm in diameter, internode 4~5 mm long. Leaves distichous, oblong, 15~16 mm long, 6 mm wide, acute and minutely trilobulate at apex, the middle one larger, apiculate. Peduncle 1 cm long, usually bearing 2-flowers; dorsal sepal subelliptical, concave, 5 mm long, 3 mm wide, obtuse at apex, l-nerved; lateral sepals blong, 5 mm long, 2.3 mm wide, obtuse at apex, l-nerved; Petals subobovate, 4.5 mm long, 2.5 mm wide, rounded at apex, l-nerved; epichile reniform, 2.5 mm long, 4 mm wide, notched at apex, with a cushion at center, the margin and upper surface densely short barbate; hypochil hemispherical, 3 mm long, 2.5 mm across; the rim slightly raising and tapering downtowards the base of the epichile, with a wide notch at the front.

China: Yunnan, C. W. Wang 71803 (PE, type).

This species resembles *G. sinensis* Tsi, but differs chiefly in having l-nerved sepals and petals as well as semispherical hypochil.

46. *Gastrochilus nanchuanensis* Tsi, sp. nov. Fig. 2: f-k

Affinis *G. hoi* Lin, a qua epichilio apice bipartito, hypochilio brevior et latior, apice rotundato.

Plant creeping. Stem 4~7 cm long, 2 mm in diameter, internote 4~5 mm long. Leaves distichous, fleshy, with red-purple spots, ovate or elliptical, middle lobe longer, apiculate. Peduncle 5~7 mm long, bearing 2~3 flowers in corymb; sepals and petals overlapped, 1~

3-nerved; sepals elliptical, concave, 4.2 mm long, 3.5 mm wide, obtuse at apex; petals similar to sepals, slightly smaller; epichile semiorbicular or reniform, 3 mm long, 6 mm wide, truncate-rounded and bifid at apex, the lobes overlapping, margin slightly ciliate, densely covered by short hairy above, especially on the cushion, the cushion extending into the front wall of the sack; hypochil shortly obconic, dorso-ventrally compressed, 3.3 mm long, 4.2 mm across, rounded at apex, the rim slightly raising, with subtruncate upper margin forming a broad notch at the front, without distinct front edges.

Flowers in December, yellowish with red-purple spots.

Ghina: Sichuan (Nanchuan Xian, Z. Y. Liu 4765 (PE, holotype), D. Z. Fu 83196(PE)

Acknowledgements

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Excluded Taxa

Gastrochilus acuminatus (Lindl.) O. Kuntze = **Uncifera acuminata** Lindl.

G. ascendens (Gaud.) O. Kuntze = **Robiquetia ascendens** Gaudich.

G. ampullaceus (Lindl.) O. Kuntze = **Ascocentrum ampullaceum** (Lindl.) Schltr.

G. aphyllus (Thouars) O. Kuntze = **Solenangis aphylla** (Thouars) Summerh.

G. bifidus (Lindl.) O. Kuntze = **Megalotus bifidus** (Lindl.) Garay

G. biglandulosus (Bl.) O. Kuntze = **Ceratochilus biglandulosus** Bl.

G. bipunctatus (Par. & Rchb. f.) O. Kuntze = **Trichoglottis bipunctata** (Par. & Rchb. f.) Tang et Wang

Gastrochilus blumei (Lindl.) O. Kuntze = **Rhynchostylis retusa** (Linn.) Bl.

G. brevifolius (Lindl.) O. Kuntze = **Robiquetia brevifolia** (Lindl.) Garay

G. cephalotes (Lindl.) O. Kuntze = **Acampe cephalotes** Lindl.

G. chionanthus (Lindl.) O. Kuntze = **Schoenorchis micrantha** Bl.

G. clavatus (Koen.) O. Kuntze = **Thrixspermum clavatum** (Koen.) Garay.

G. compressus (Lindl.) O. Kuntze = **Rjobiquetia compressa** (Lindl.) Schltr.

G. congestus (Lindl.) O. Kuntze = **Acampe congesta** Lindl.

G. constrictus (Rchb. f.) O. Kuntze

= **Robiquetia constricta** (Rchb. f.) Garay

G. coriaceus (Sw.) O. Kuntze

= *Angraecum coriaceum* (Sw.) Schltr.

G. crassilabris (King & Pantl.) Garay

From morphological characters given in the original description of this species, it is obvious that it does not belong to the genus *Gastrochilus* D. Don. Perhaps it should be placed in the genus *Pomatocalpa*.

G. curvifolius (Lindl.) O. Kuntze

= **Ascocentrum curvifolium** (Lindl.) Schltr.

G. aalzelianus (Santapau) Santapau & Kapadia = **Smithsonia viridiflora** (Dalz.) Saldanha

G. densiflorus (Lindl.) O. Kuntze

= **Robiquetia spathulata** (Bl.) J. J. Sm.

G. dentatus (Paxt.) O. Kuntze =? *G.*

acutifolius (Lindl.) O. Kuntze Dr. E. A. Christenson's opinion is probably right, because this is no *Saccolabium dentatum* described by Paxton. It may be an error for *S. dentatum* Rchb. f. referred to *G. acutifolius* (Lindl.) O. Kuntze

G. fasciculatus (Lindl.) O. Kuntze

= **Micropera fasciculata** (Lindl.) Garay

G. filliformis (Wight) O. Kuntze

= **Schoenorchis chrysantha** (Alston) Garay

G. flavus (J. D. Hook.) O. Kuntze

= *Sarcoglyphis flava* (Hook. f.) Garay

G. flexuosus (Rchb. f.) O. Kuntze By the

morphological characters given in the original description, this taxon does not belong to genus *Gastrochilus* D. Don. Its taxonomic status awaits future studies.

G. fragrans (Par. & Rchb. f.) O. Kuntze

= **Schoenorchis frsagrans** (Par. & Rchb. f.) Seidenfaden & Smitinand

G. gemmatus (Lindl.) O. Kuntze

= **Schoenorchis gemmatum** (Lindl.) J. J. Smith

G. giganteus (Lindl.) O. Kuntze

= **Rhynchostylis gigantea** (Lindl.) Ridl.

G. gorwalicus (Lindl.) O. Kuntze

= **Rhynchostylis retusa** (L.) Bl.

G. gracilis Lindl.) O. Kuntze

= **Robiquetia gracilis** (Lindl.) Garay

G. griffithii (Par. & Rchb. f.) O. Kuntze

= **Microsaccus brevifolius** J. J. Sm.

G. helferi (Hook. f.) O. Kuntze

= **Smitinandia helferi** (Hook. f.) Garay

G. incospicua (Hook. f.) O. Kuntze

= **Luisia incospicua** (Hook. f.) Hook. f. ex King et Pantl.

By the shape of the pollinia and the length of the stipe which is longer than pollen mass, this species can be placed in the genus *Gastrochilus* D. Don. However, its more characters, such as terete leaves, raceme short and thick, the lateral sepals keeled, the lack of a bifid viscidium adhered to backside of a bifid rostellum and the shape of lip, all point to its taxonomic position to be in genus *Luisia*. It seems better to keep the species in genus *Luisia* rather than placing it to genus *Gastrochilus*.

G. jerdonianus (Wight) O. Kuntze

= **Schoenorchis jerdoniana** (Wight) Garay

G. lanatus (Lindl.) O. Kuntze

= **Cleisomeria lanatum** (Lindl.) Lindl.

G. laxiflorus O. Kuntze = **Aerides ringens** (Lindl.) C. E. C. Fischer

G. longiflorus (Lindl.) O. Kuntze

= **Acampe rigida** (Buch.-Ham. ex J. J. Sm.)

G. maculatus (Dalz.) O. Kuntze

= **Smithsonia maculata** (Dalz.) Saldanha

G. micranthus (Bl.) O. Kuntze = **Omoea micrantha** Bl.

G. miniatus (Lindl.) O. Kuntze

= **Ascocentrum miniatum** (Lindl.) Schltr.

C. minimiflora (Hook. f.) O. Kuntze

- = **Abdominea minimiflora** (Hook. f.) J. J. Sm.
G. niveus (Lindl.) O. Kuntze
- = **Schoenorchis nivea** (Lindl.) Schltr.
G. obtusifolius (Lindl.) O. Kuntze
- = **Uncifera obtusifolia** Lindl.
G. ochraceus (Lindl.) O. Kuntze
- = **Acampe ochracea** (Lindl.) Hochr.
G. odoratus (Kundo) J. J. Sm. = **Haraella retrocalla** (Hayata) Kudo
G. pachyglossus (Lindl.) O. Kuntze
- = **Schoenorchis pachyglossa** (Lindl.) Garay
G. paniculatus (Bl.) O. Kuntze
- = **Schoenorchis paniculata** Bl.
G. paniculatus (Wight) O. Kuntze
- = **Aerides ringens** (Lindl.) C. E. C. Fischer
G. papillosus (Lindl.) O. Kuntze
- = **Acampe papillosa** (Lindl.) Lindl.
G. parviflorus O. Kuntze = **Smitinandia micrantha** (Lindl.) Holttum
G. parvulus (Lindl.) O. Kuntze
- = **Robiquetia succisa** (Lindl.) Seidenf.
G. penangianus (Hook. f.) O. Kuntze
- = **Malleola penangiana** (Hook. f.) J. J. Sm. & Schltr.
G. perpusillus (Hook. f.) O. Kuntze
- = **Schoenorchis micrantha** Bl.
G. praemorsus (Roxb.) O. Kuntze = **Acampe praemorsa** (Roxb.) Blatter & McCann.
G. praemorsus, sensu Dur. & Jacks.
- = **Rhynchostylis retusa** (L.) Bl.
G. pumilio (Rchb. f.) O. Kuntze = Both **Saccolabiopsis pusilla** (Lindl.) Seidenf. & Garay and **Robiquetia discolor** (Rchb. f.) Seidenf. & Garay
G. pumilus (Hayata) Hayata = **Ascocentrum pumilum** (Hayata) Schltr.
G. pusillus (Bl.) O. Kuntze = **Saccolabium pusillum** Bl.
G. quasipinifolius Hayata = **Holcoglossum quasipinifolium** (Hayata) Schltr.
G. quinquifidus (Lindl.) O. Kuntze
- = **Cleisostoma quinquifidum** (Lindl.) Garay
G. racemiferus (Lindl.) O. Kuntze
- = **Cleisostoma racemiferum** (Lindl.) Garay
G. ramosus (Lindl.) O. Kuntze
- = **Pomatocalpa ramosum** (Lindl.) Summerh.
G. reflexus (Lindl.) O. Kuntze = **Renanthera elongata** (Bl.) Lindl.
G. retrocallus (Hayata) Hayata
- = **Haraella retrocall** (Hayata) Kudo
G. retusus (L.) O. Kuntze = **Rhynchostylis retusa** (L.) Bl.
G. rheedei (Wight) O. Kuntze
- = **Rhynchostylis retusa** (L.) Bl.
G. ringens (Lindl.) O. Kuntze = **Aerides ringens** (Lindl.) Fischer
G. roseus (Lindl.) O. Kuntze
- = **Robiquetia rosea** (Lindl.) Garay
G. rostellatus (Hook. f.) O. Kuntze
- = **Cleisostoma discolor** Lindl.
G. speciosus (Wight) O. Kuntze = **Aerides maculosa** Lindl.
G. spicatus (D. Don) O. Kuntze
- = **Rhynchostylis retusa** (L.) Bl.
G. strictus (Thou.) O. Kuntze
- = **Angraecum striatum** Thou.
G. tenuicaulis (Hook. f.) O. Kuntze
- = **Ventricularia tenuicaules** (Hook. f.) Garay
G. trichromus (Rchb. f.) O. Kuntze
- = **Cleisocentran trichromum** (Rchb. f.) Bruhl
G. undulatus (Lindl.) O. Kuntze
- = **Pomatocalpa undulatum** (Lindl.) J. J. Sm.
G. violaceus (Rchb. f.) O. Kuntze
- = **Rhynchostylis violacea** (Lindl.) Rchb. f.
G. viridiflorus (Lindl.) O. Kuntze
- = **Smithsonia viridiflora** (Dalz.) Saldanha
G. wightianus (Lindl.) O. Kuntze
- = **Aerides ringens** (Lindl.) Fischer

兰科盆距兰属(*Gastrochilus*)植物的修订

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摘要 本文对盆距兰属 (*Gastrochilus*) 植物作了修订, 共分 3 个组, 含 46 种和 1 变种, 其中 1 个组 (Sect. *Caespitosi*) 和 8 个种 (*G. carnsus*, *G. garhwalensis*, *G. linearifolius*, *G. guang-tungensis*, *G. subpappilosus*, *G. nanchuanensis*, *G. saccatus* and *G. gongshanensis*) 为新的, 首次在本文作了描述报导。本属属的形态特征, 研究历史和订正后属下的分类群检索表, 种的文献引证、简短的特征记要和地理分布以及在属中被排除的分类单位索引均提供在本文。

关键词 兰科; 盆距兰属; 修订

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