

## Notes on *Schismatoglottidinae* of Borneo, II

By

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### 3. The genus *Schismatoglottis*

About 100 species of this genus are known from the region of Southeastern Asia, Malaysia and New Guinea, and the greater number of species are in Borneo. In 1912, ENGLER revised this genus in his monograph of Araceae (Das Pflanzenreich IV. 23 Da). He described many new species in there with the key. In his key, he used mainly leaf shape and the specimens of *Schismatoglottis* are mostly indeterminable by his key. Because the leaf shape is variable in some species. The descriptions of the species in ENGLER's work were also partially confused. This confusion was mentioned by ALDERWERELT van ROSENBURGH (Bull. Jard. Buit. 1922. vol. 4). Besides these difficulty of specific identification, he did not treat supra specific taxa. Therefore we can not safely determinate each species by the ENGLER's work.

ENGLER defined this large genus by the following characters; the deciduous lamina of spathe, the 2-4 parietal placentas, the pollen sac opening by pore, and the short or long winged vagina without free liguliform part. In our collection, some species are out of this definition; group of *Schismatoglottis homalomenoidea* and *S. monoplacenta* have a parietal placentation similar to the basal placentation; group of *S. homalomenoidea* has persistent lamina of the spathe similar to the genus *Homalomena*; *S. monoplacenta*, *S. rubiginosa* and other few species have liguliform free part at the base of petiole. The number of placenta varies usually from many to few, 4 to 1 in this genus. The persistent lamina of *S. homalomenoidea* is abnormal in the genus, but the male and female flowers of the group does not differs from that of other *Schismatoglottis*. *S. rubiginosa* and *S. barbata* are closely related to each other and the former has the free liguliform part of petiole, while the latter has't according to ENGLER's original description and figure. There is no reason to distinguish those species generically only by the one or few diagnostic characters. Those distinct species may be the representatives of supra specific taxon in the genus.

The genus, *Schismatoglottis* is closely related to *Piptospatha*, but differs from it by the characters as shown below:

<i>Schismatoglottis</i>	<i>Piptospatha</i>
Petiole base usually without free liguliform part	Petiole base with free liguliform part
Leaf lamina lanceolate to cordate ovata, somewhat thin	Leaf lamina narrower, usually lanceolate, more or less coriaceous
Spathe usually constricted at the middle part	Spathe not constricted at the middle part
Tube of spathe ellipsoidal at the fruiting time	Tube of spathe funnel shape at the fruiting time
Stigma semiglobose and not sessile or rarely discoid sessile, usually small	Stigma discoid sessile and large

Our collection contains about 30 species of *Schismatoglottis*. These species are found in various places, in altitude from near sea-level up to 1400m, in their habitat, on clay soil under forest, or on moist rock. But their favourite habitat is the humid tropical rain forest where they show very interesting distribution. In the field, present author did not found same species in different habitat nor in the distant locality. They seem to be isolated by ecological or geographical barriers each other. Generally the species of this genus have very limited ranges, i. e. many species are known only from their type localities, except cultivated species *S. calyptrata*.

In this paper, the present author describes some distinct species and mentions some infra generic groups.

#### ***Schismatoglottis* ZOLL. et MOR.**

*Schismatoglottis* ZOLL. et MOR. Syst. Verz. der in Java 1842-44 ges. Pfl. 83 (1854); SCHOTT, Syn. Ar. 120 (1856), Prodr. Syst. Aroid. 320 (1860); ENGL. in DC. Mon. Phan. 2: 349 (1879), Pflanzenr. 55: 82 (1912). — *Piptospatha* sensu ENGL. l. c. 124 (1912), pr. p.

#### Key to the species or group of species

- A. Lamina of spathe persistent. Petiolar base shortly and widely vaginate. Ovary with 1-2 placenta ..... Group of *S. homalomenoidea*
- AA. Lamina of spathe deciduous:
  - B. Ovary with one placenta; ovules few and gather in lower part of the parietal placentation. Petiolar vagina with long liguliform free part ..... *S. monoplacenta*
  - BB. Ovary with 2-3-4-parietal placentas; ovules many and evenly arranged:
  - C. Stigma dilated, usually as large as the diameter of ovary:
  - D. Plant glabrous, leaves few usually 1-2; petiolar base shortly vaginate ..... *S. platystigma*
  - DD. Plant with long and dense hairs, leaves many; petiolar base shortly vaginate or with triangular liguliform free part ..... Group of *S. barbata*

- CC. Stigma not dilated, smaller than the diameter of ovary :  
 E. Petiolar vagina with liguliform free part. Fertile male flowers cover the upper part of spadix..... Group of *S. acutifolia*  
 EE. Petiolar vagina without free liguliform part. Sterile male flowers usually cover the upper part of spadix..... Group of *S. calyptrata*

(A). Group of *Schismatoglottis homalomenoidea*

In our collection, there are 3 species. They have persistent lamina of the spathe, cylindrical sterile male part of spadix, and shortly vaginate petiolar base. They are very similar to the genus *Homalomena*, as for the external appearance, but are distinctly different from *Homalomena* by floral organs. Two of them have one placenta and new to science. The rest has two placentas and may be *S. beccariana* according to ENGLER's description.

(1) **Schismatoglottis homalomenoidea** M. Hotta, sp. nov. Fig. 1, A-J.

Caudiculus suberectus 2-3 cm longus, 5-7 mm crassus. Foliorum petiolus 12-20 cm longus, supra canaliculatus, basi breviter et late vaginatus, vagina 8-10 mm longa et lata, lamina subcoriacea, supra flavo-viridis, subtus pallidior, lanceolata vel oblongo-lanceolata, apice acuminata, apiculo ca. 2 mm longo cylindrico instructa, basi cuneata, 13-20 cm longa, 2.5-4 cm lata, nervis lateralibus I. utrinque 8-10, angulo 40-45° a costa arcuatim patentibus deinde in nervum collectivum marginalem confluentibus. Pedunculus 2.5-3 cm longus. Spathe 2.5-3 cm longa; tubus oblongus, viridis, crassior, ca. 1 cm longus, 5 mm latus; lamina persistens, ca. 2 cm longa, apice acuminata. Spadix sessilis; pars feminea cylindrica, basi organo neutris 8-10 obsessa, 6 mm longa, 2 mm crassa, masculae contigua; pars mascula decidua, cylindrica, 2.7 cm longa, inferne flosculis sterilibus paucis praedita, pars fertilis 1.1 cm longa, pars suprema sterilis 1.6 cm longa, apice rotundata vel subtruncata. Stamina vix 0.8 mm longa, thecis depresso-ovoideis quam filamentis paulum longioribus. Ovaria obovoidea, apice conica, unilocularia; placenta 1, parietalis; ovula 3-5. Staminodia superiora prismatico-cylindrica.

BRUNEI. Brunei: east of Brunei town, on wet rock under dense forest, alt. 10-40 m, Jan. 16, 1964, *M. Hotta* 13212 (holotype in KYO), *M. Hotta* 13211 (KYO).

(2). **Schismatoglottis parviflora** M. Hotta, sp. nov. Fig. 1, K-M.

Caudiculus suberectus 2-4 cm longus, 5 mm crassus. Foliorum petiolus basi breviter et late vaginatus, 10-15 cm longus, lamina oblongo-lanceolata 10-18 cm longa, 3.5-6 cm lata vel lanceolata 11-18 cm longa, 2.3-3.3 cm lata, supra obscure viridis vel secus costam albo-vittata, apice acuminata, apiculo cylindrico ca. 2 mm longo instructa, basi rotundata vel cuneata, nervis lateralibus I. utrinque 7-12, nervis lateralibus II. et III. quam I. tenuioribus. Pedunculus 2.5-3.5 cm longus. Spatha ca. 3 cm longa; tubus oblongus 8 mm longus, lamina persistens, 2.2 cm longa, apice acuminata. Spadix sessilis; pars feminea cylindrica, basi organo neutris 5-7 instructa, 5 mm longa, pars mascula femineae contigua, cylindrica, decidua, inferne fertilis, superne sterilis, apice rotundata. Stamina vix 0.6-0.7 mm longa, thecis ovoideis. Ovaria obovoidea apice conica, 0.8 mm longa;



Fig. 1. *Sohismatoglottis homalomenoidea* & *S. parviflora*

ovula 3-4, anatropa, placenta 1, parietalis.

BRUNEI. Seria: vicinity of Kpg. Mendaram, alt. 50-150 m, on wet rocky place under hill forest, Dec. 17, 1963, *M. Hotta 12582* (holotype in KYO), *12672* (KYO), *12585* (KYO).

These two species differ from each other by the leaf texture and shape. *Schismatoglottis homalomenoidea* has thicker and usually narrower lamina, and has larger spadix, ovary and male flower. *S. parviflora* is variable in the leaf shape and colour. The holotype (*Hotta 12582*) has oblong lanceolate leaf without white spots while other specimens (*12672, 12585*) have lanceolate leaf with white spots along the midrib.

(B). *Schismatoglottis monoplacenta* and *S. platystigma*

(3). ***Schismatoglottis monoplacenta*** M. Hotta, sp. nov. Fig. 2, A-H.

Caudex epigeus, 1.5 cm crassus. Foliorum petiolus laminam aequilongus vel quam lamina brevior, 20-30 cm longus, vagina in partem liberam lineari-lanceolatam 10-13 cm longam producta, lamina subcoriacea supra flavo-viridis, subtus pallidior, oblongolanceolata, basi obtusa et leviter cuneata, apice acuta et apiculo ca. 1.5 cm longo instructa, 28-35 cm longa, 12-25 cm lata, nervis lateralibus I. utrinque 25-30 adscendentibus, nervis lateralibus II. tenuissimis. Pedunculus 12-13.5 cm longus. Spatha cylindrico-ellipsoidea, infra medium leviter constricta, 9 cm longa (tubus 3 cm longus, lamina 6 cm longa), apice acuminata. Spadix cylindricus 6.9 cm longus, 6 mm crassus, pars feminea 2.5 cm longa, ad didymium usque spathae adnata, pars mascula sterilis inferna 3 mm longa, pars mascula fertilis 2 cm longa, pars mascula sterilis superna 2.1 cm longa, apice rotundata. Staminodia partis femineae clavata, apice subrotundata, staminodia partis masculae infernae clavata, dense roseo-punctata, staminodia partis supernae prismatico-cylindrica, basi confluentia, 3.5 mm longa. Ovaria obovoidea, stigmatis orbicularibus coronata; ovula 3-4, orthotropa, placenta 1, parietalis. Stamina filamenta cylindrica, roseo-punctata, quam antherae paullum longiora.

SARAWAK. Mardi: along S. Melinau, between S. Tutoh and Lubang Bungan, at the foot of G. Mulu, on moist limestone gravelly slope, March 14, 1964, *M. Hotta 14404* (holotype in KYO).

This new species differs from the other members of *Schismatoglottis* by the linear-lanceolate free part of the petiolar vagina and the one parietal placentation with few (3-4) ovules. This species may be a representative of a special supra specific taxa. The one placenta is also known in the group of *S. homalomenoidea*. But *S. monoplacenta* differs from the group by the large size of plant, lanceolate

↖ A-J. *S. homalomenoidea* A. whole plant (×1/2). B. stem, petioles, and spathe (1/2). C. spadix (×1.5). D. staminodes (×15). E. apical view of male flowers (×15). F. side view of male flowers (×15). G. ovary with staminode (×15). H. under side of staminode in female inflorescence (×15). I. vertical section of ovary (×20). J. seed (×15). K-M. *S. parviflora* K. spathe (×1.5). L. spadix (×1.5). M. vertical section of ovary (×15).

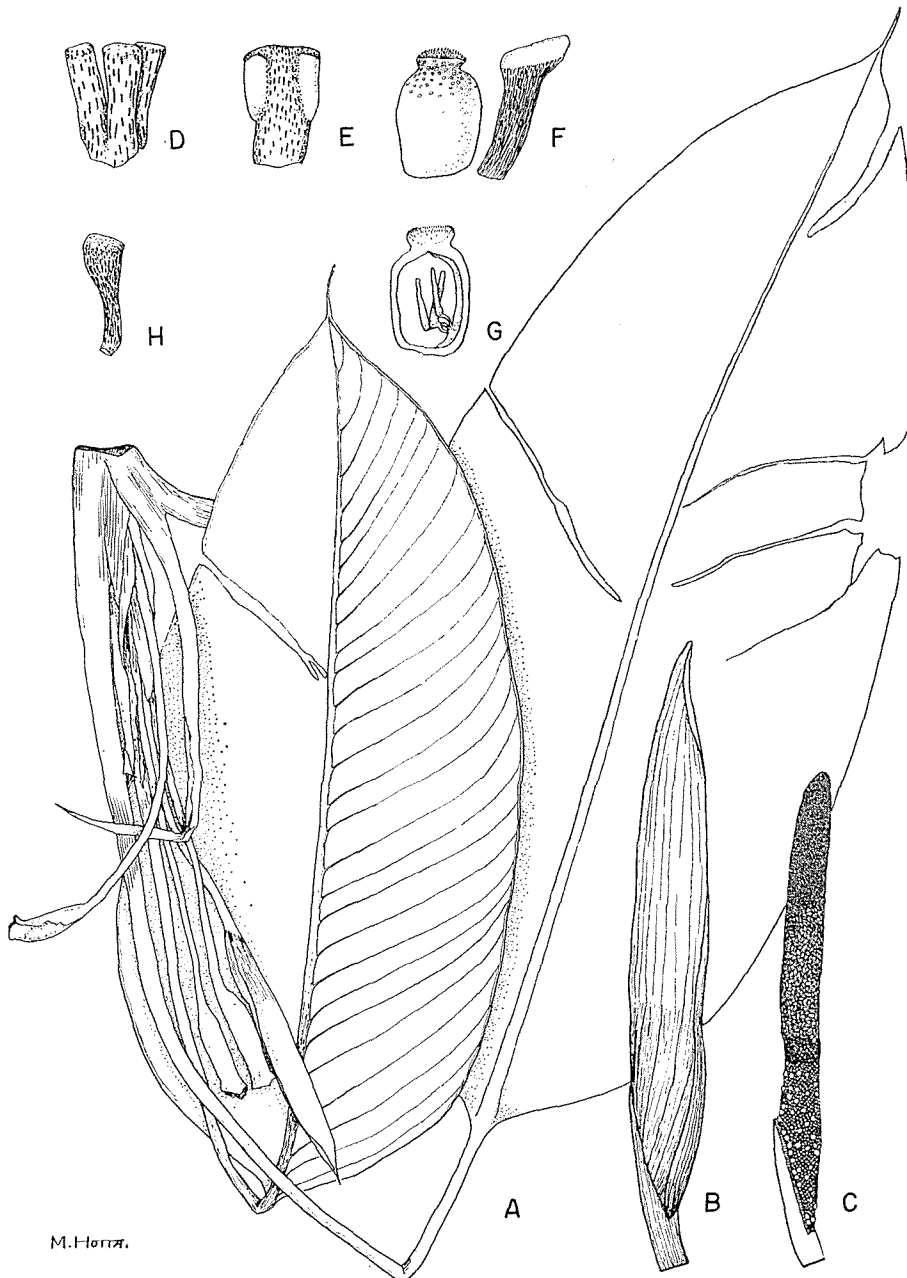


Fig. 2. *Schismatoglottis monoplocenta*

A. whole plant ( $\times 1/2$ ). B. spathe ( $\times 1$ ). C. spadix ( $\times 1$ ). D. staminodes of upper male part of spadix ( $\times 10$ ). E. male flower ( $\times 10$ ). F. ovary with staminode ( $\times 15$ ). G. vertical section of ovary ( $\times 15$ ). H. staminode of lower male part of spadix ( $\times 10$ ).

free part of the petiole, the deciduous lamina of spathe, and by many staminodes in the female part of spadix.

(4). ***Schismatoglottis platystigma*** M. Hotta, sp. nov. Fig. 3, A-H.

Caudex decumbens superne suberectus, 4-10 cm longus, ca. 1 cm crassus. Foliorum petiolus laminam aequans vel quam lamina longior 25-38 cm longus, supra canariculatus, basi breviter vaginatus, lamina viridis vel flavo-viridis, oblongo-lanceolata 25-33 cm longa, 7-11 cm lata, basi rotundata vel ovata 21 cm longa, 15 cm lata, basi cordata, apice acuminata, apiculo ca. 5 mm longo cylindrico instructa, nervis lateralibus I. utrinque 10-12, nervis lateralibus II. tenuibus 10-15 inter primarios. Pedunculus 3-5 cm longus. Spathae tubus ovoideus, 2.5 cm longus, viridis, lamina cylindrico-ellipsoidea, apice acuminata, ca. 4 cm longa, decidua, viridis. Spadix cylindricus, 5.1 cm longus, pars feminea 1 cm longa, ad dimidium usque spathae adnata, pars mascula sterilis inferna 0.5 cm longa, pars mascula fertilis 1.7 cm longa, pars mascula sterilis superna 1.9 cm longa, apice subrotundata. Ovaria depressoglobosa ca. 1 mm longa, 1.3-1.5 mm crassa, stigmatis magnis, sessilibus coronata; ovula ca. 20, placentae 3, parietales. Staminum filamenta tenuia et dilatata, antherae globosae. Staminodia tenuia, discoidea.

BRUNEI. Brunei Tembrong : eastern slope of Bt. Bangar, alt. 10-30 m, on rather dry rock under forest, Jan. 19, 1964, *M. Hotta 13132* (holotype in KYO); between Kpg. Biang and Bt. Biang, Jan. 20, 1964, *M. Hotta 13321* (KYO).

This species is characterized by the large discoid stigma usually as large as ovary, the thin and broad filament with 2-5 globose pollen sacs, and few (usually 1-2) leafed stem. The shape of the leaf varies from oblong lanceolate to ovate.

This new species distinctly differs from the others by the stigma and the male flower, and has no intimate ally.

(C). Group of *Schismatoglottis barbata*

ENGLER'S *Schismatoglottis barbata* is a very different in the genus by the delated stigma and the long ferruginous hairs of the leaf. In our collection, there are two species related to this peculiar species.

(5). ***Schismatoglottis cordifolia*** M. Hotta, sp. nov. Fig. 4, A-I.

Caudiculus breviter erectus. Folia numerosa densa; foliorum petiolus dense ferrugineo-pilosus, 4-5 cm longus, basi late vaginatus, vagina in partem liberam triangulatam 2 cm longam producta, lamina obscure viridis, ovata, apice rotundata, basi cordata, 5-10 cm longa, 5-9 cm lata, minute tuberculata, subtus ad costam ferrugineo-pilosa, nervis lateralibus I. utrinque 12-13, ascendentibus deinde marginalibus. Pedunculus brevissimus, glaber. Spathae tubus subglobosus 1 cm longus, lamina ovoidea 2.2 cm longa, 7 mm lata, viridis. Spadix subcylindricus; pars feminea spathae breviter adnata, 3 mm longa, pars mascula sterilis inferna 2 mm longa, pars mascula fertilis 3 mm longa, pars mascula sterilis superna obovoidea 1.7 cm longa, 5 mm crassa. Ovaria 1 mm longa, stigmatis sessilibus coronata, ovula ca. 20, placentae 3 parietales. Stamina 1.2 mm longa, bipartita pyriformia, filamentum valde dilatatum, basi thecis 2, parvis praeditum. Stami-

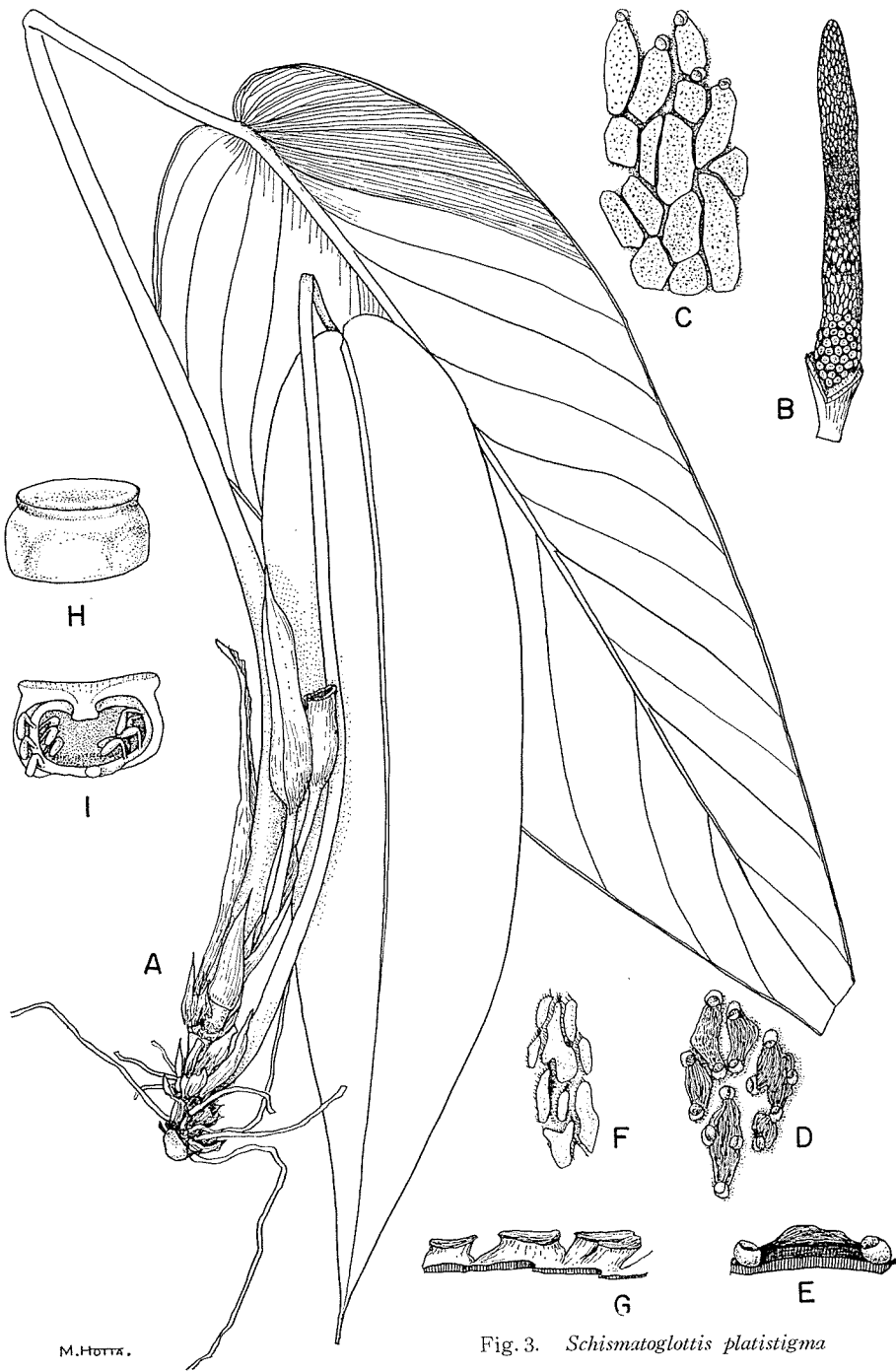


Fig. 3. *Schismatoglottis platistigma*



nodia partis spadicis supernae obovoidea, apice truncata, 1.5 mm longa.

BRUNEI. Seria: Bt. Teraja, alt. 300-400 m, on sand stone forming steep cliff under dense forest, Dec. 21, 1963, *M. Hotta 12886* (holotype in KYO).

(6). ***Schismatoglottis rubiginosa*** M. Hotta, sp. nov. Fig. 4, J-Q.

Caudiculus abbreviatus. Folia numerosa; petiolus laminam aequilongus vel quam lamina brevior, 8-12 cm longus, rubro-pilosus, basi breviter vaginatus, vagina in partem liberam triangulatam 1.5-3 cm longam glabrum producta, lamina roseo-viridis, oblanceolato-oblonga, basi obtusa, apice acuminata, 9-13.5 cm longa, 3-5 cm lata, subtus ad costam rubro-pilosa, supra sparse pilosa, nervis lateralibus I. utrinque 7-9, adscendentibus. Pedunculus brevissimus, glaber. Spatha cylindrico-convoluta, haud constricta, 3.5-4 cm longa, apice aristata. Spadix subcylindricus, pars feminea 9 mm longa, longitudine usque ad 8 mm spathae adnata, pars mascula oblongo-cylindrica, feminea contigua, 1.7 cm longa, 5 mm crassa; pars mascula fertilis in fronte ad medium spadicis, 5 mm longa, 5 mm lata. Ovaria 0.9 mm longa, unilocularia, stigmatis sessilibus discoideis coronata; placentae 2, parietales; ovula 6-10. Stamina 1.5 mm longa, subcylindrica, bipartita, filamentum thecis 2, praeditum. Organa neutra ovoidea, apice constricta. Staminodia obovoidea, apice truncata, 1.2 mm longa.

SARAWAK. Bintulu: along S. Bejangang, a branch of S. Anap, alt. 20-50 m, on moist clayey soil by the stream, Nov. 23, 1963, *M. Hotta 15581* (holotype in KYO), Nov. 18, 1963, *M. Hirano & M. Hotta 1203* (KYO).

These two species are well characterized by their long hairs of the leaves, the divided filaments conspicuously larger than the pollen sacs, the large delated stigma, and by their triangular free parts of vaginas.

*S. rubiginosa* is closely related to *S. barbata* but differs from the latter by the triangular free part of vagina, the divided filament, and by the fertile male part found only in front at the middle of the spadix.

*S. cordifolia* is recognized by the divided pyriform filament, wide discoid stigma, and by the dark green ovate leaf with small tubercles and long hairs. This species related to *S. rubiginosa* and *S. barbata* by the filament, and the hairiness of leaf. These three species form a natural group in the genus.

(D). Group of *Schismatoglottis acutifolia*

In 1912, ENGLER described *Piptospatha acutifolia* and *P. havilandii* with a good figure (Pflanzenr. 55: 128, fig. 76). These species are characterized by their small orbicular stigmata with basal constriction and by their liguliform free parts of the petioles. By this shape of stigma, these two species differ from the others of *Piptospatha*. In our collection, there is a new species which is related to *P. acutifolia* by its long liguliform free part of petiole and the fertile

↖ A. whole plant (×1/2). B. spadix (×1). C. apical view of lower part of male inflorescence (×10). D. apical view of fertile male flowers (×10). E. side view of male flower (×15). F. apical view of staminodes of upper part of spadix (×10). G. side view of staminodes (×15).

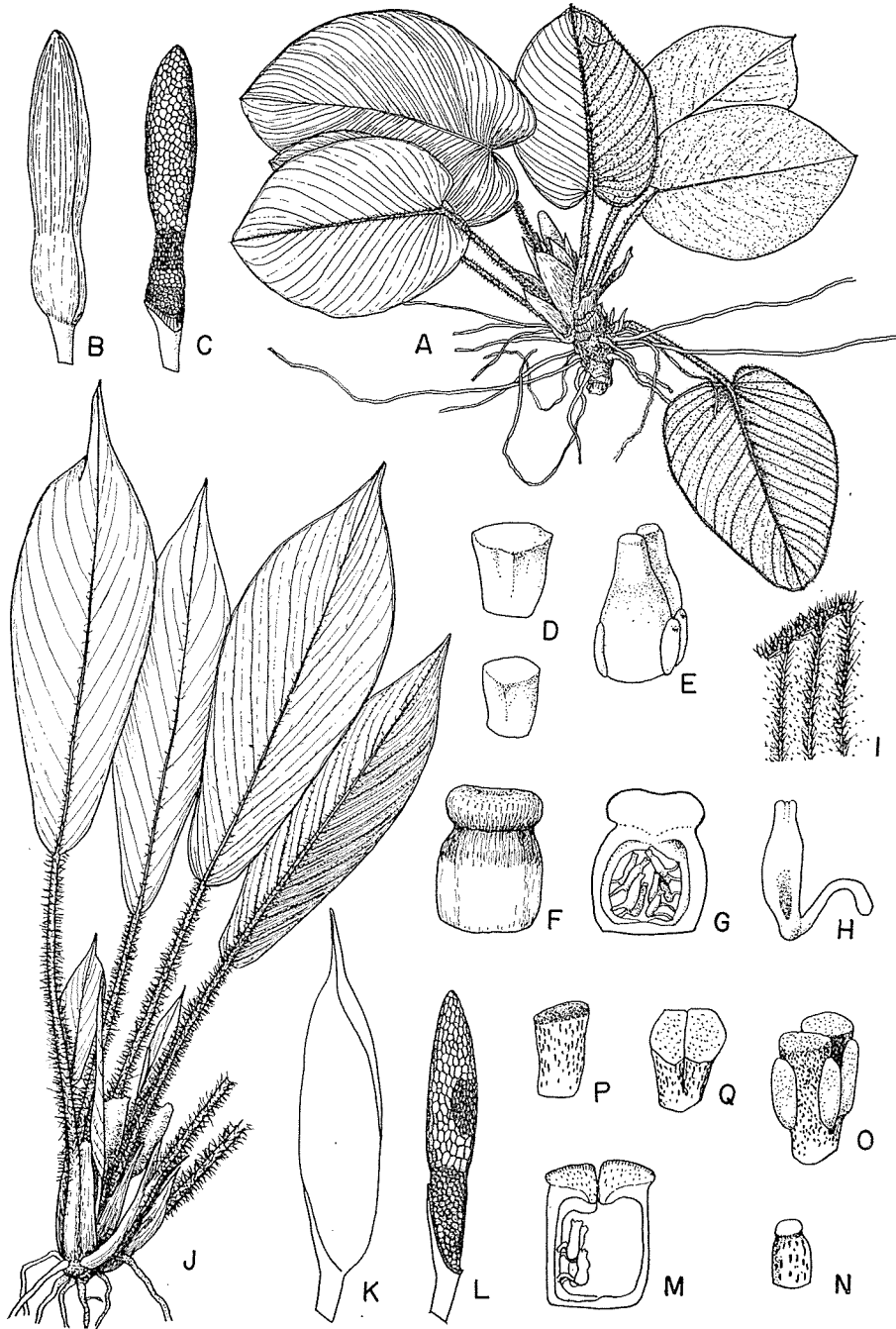
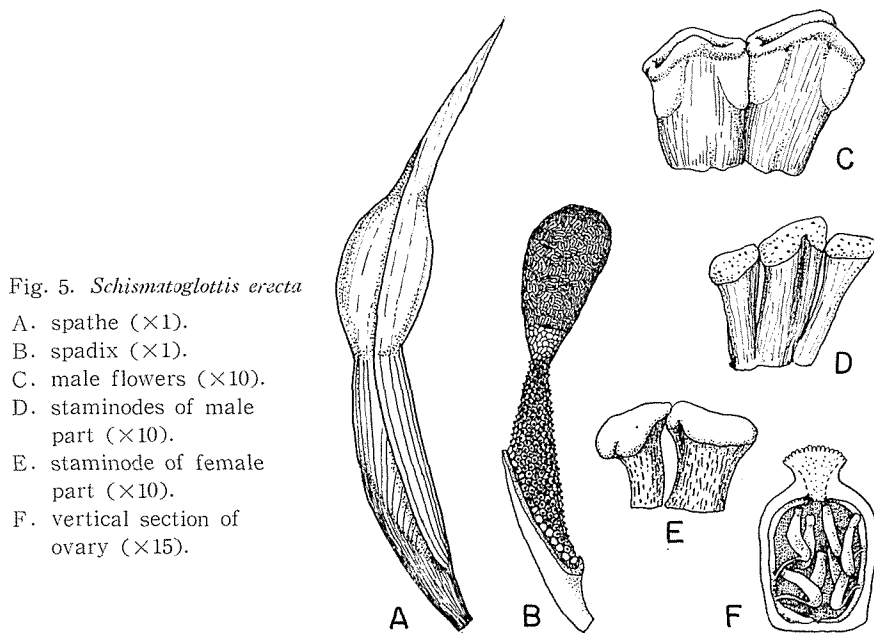


Fig. 4. *Schismatoglottis cordifolia* & *S. rubiginosa*

Fig. 5. *Schismatoglottis erecta*

- A. spathe ( $\times 1$ ).  
 B. spadix ( $\times 1$ ).  
 C. male flowers ( $\times 10$ ).  
 D. stamines of male part ( $\times 10$ ).  
 E. staminate of female part ( $\times 10$ ).  
 F. vertical section of ovary ( $\times 15$ ).

male part being on the top of the spadix. From the spathe with middle constriction and the small stigma, these three species are here included in the genus *Schismatoglottis*, because the liguliform free part of the petiole is not so important.

(7). ***Schismatoglottis acutifolia*** (ENGL.) M. HOTTA, comb. nov.

— *Piptospatha acutifolia* ENGL. in ENGL. Pflanzenr. **55**; 128, fig. 76 (1912).

(8). ***Schismatoglottis havilandii*** (ENGL.) M. HOTTA, comb. nov.

— *Piptospatha havilandii* ENGL., 1. c. 128 — *Rhynchopyle?* *havilandii* ENGL. in ENGL. Bot. Jahrb. **32**; 125 (1905).

(9). ***Schismatoglottis erecta*** M. Hotta, sp. nov. Fig. 5, A-F.

Caudix inferne decumbens, sursum erectus, 15 cm longus, 7 mm crassus, internodiis 2-3 cm longis. Foliorum petiolus quam lamina brevior, 8-11.5 cm longus, vagina supra basin in ligulam 2.5-5.5 cm longam longe triangulatam producta, lamina supra viridis subtus pallidior, oblongo-oblanccolata vel elliptico-oblanccolata, 10-13 cm longa, 2.2-3.5 cm lata, apice (1.5-2 cm) aristata, basi cuneata,

↖ A-I. *S. cordifolia* A. whole plant ( $\times 1/2$ ). B. spathe ( $\times 1.5$ ). C. spadix ( $\times 1.5$ ). D. staminodes ( $\times 10$ ). E. male flower ( $\times 18$ ). F. ovary ( $\times 18$ ). G. vertical section of ovary ( $\times 18$ ). H. ovule ( $\times 70$ ). I. under margin of leaf. J-Q. *S. rubiginosa* J. whole plant ( $\times 1/2$ ). K. spathe ( $\times 1.5$ ). L. spadix ( $\times 1.5$ ). M. vertical section of ovary ( $\times 22$ ). N. sterile ovary ( $\times 8$ ). O. male flower ( $\times 12$ ). P, Q. staminodes ( $\times 12$ ).

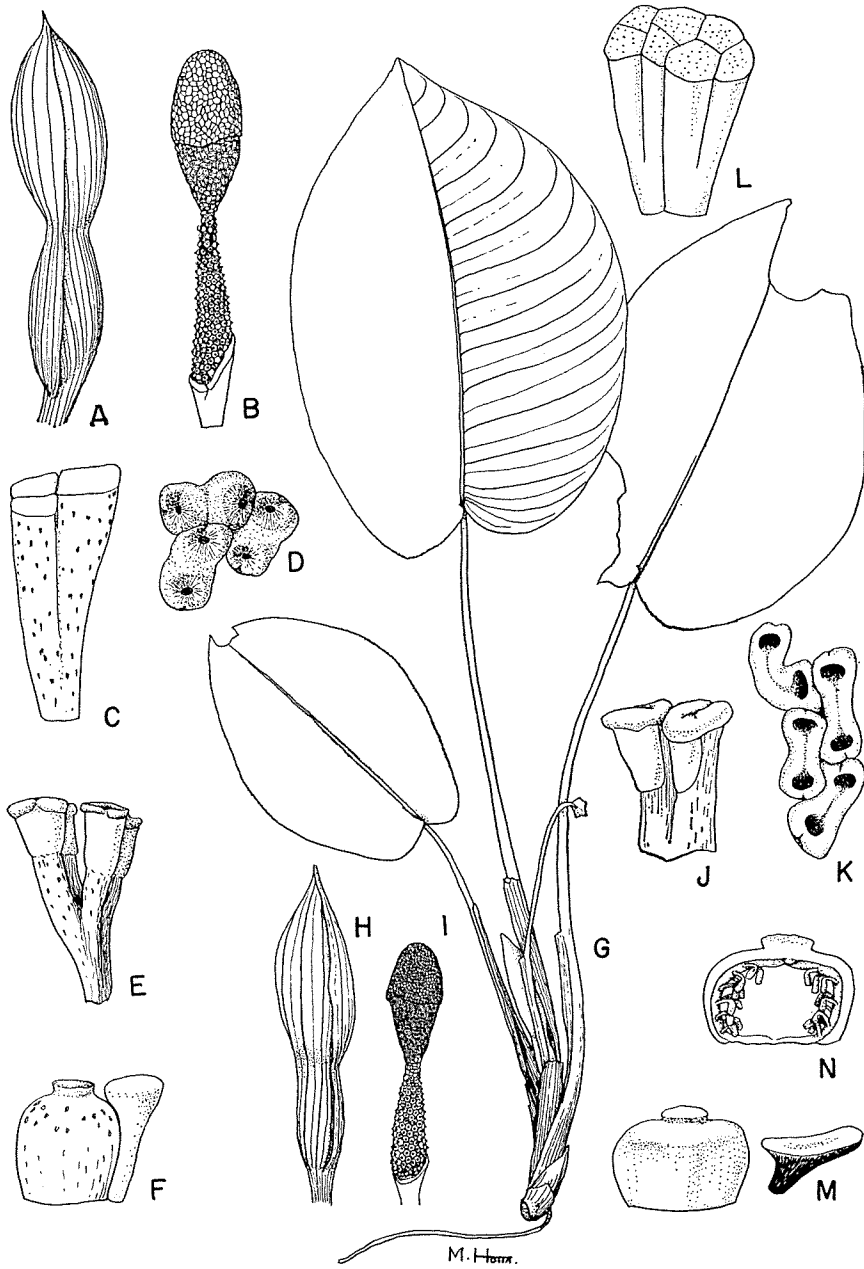


Fig. 6. *Schismatoglottis muluensis* & *S. multinervia*

nervis lateralibus I. utrinque ca. 15-18, leviter arcuatis, ad marginem adscendentibus. Pedunculus florifer 6 cm longus sursum curvatus. Spathae tubus cylindricus 2 cm longus, 6 mm latus, viridis, lamina ellipsoidea 1.3 cm longa, 7 mm diam., in acumen angustissimum 1.8 cm longum exiens. Spadicis pars feminea ad dimidium usque spathae adnata, conoidea, 1.5 cm longa, inferne staminodiis obsessa, pars mascula obovoidea, 1.4 cm longa, 7 mm crassa, inferne staminodiis paucis praedita. Ovaria obovoidea, stigmatibus orbiculari coronata, placentis 3, parietalibus; ovula ca. 12. Stamina compressa 2 mm longa.

SARAWAK. Bintulu: along a stream of the valley of S. Keyan, Ulu S. Kakus, alt. 50-100 m, on humus in dense forest, Nov. 9, 1963, *M. Hirano* & *M. Hotta* 479 (holotype in KYO).

This species differs from *Schismatoglottis acutifolia* by the tall stem with long internodes, thin and wider leaves, the conoid female part of spadix, and by the sterile male flowers at the base of male part.

(E). Group of *Schismatoglottis calyptrata*

The most species of the genus belong to this group. This group is characterized by the usually long vaginated petiole without liguliform free part, small and sessile stigma, 2-4 placentas of the ovary, and by the appendage of the spadix covered by sterile male flowers. In this group, the shapes of the leaf, anther, staminode and appendage of the spadix are variable. By the floral characters, the species of this group are classified into several subgroups, i. e. subgroup of *S. emarginata*, subgroup of *S. calyptrata*, subgroup of *S. ridleyana* etc.

The specific identification is very difficult in this group. Our party collected many species of this group, but the present author describes only clear-cut new species in this paper.

(10). ***Schismatoglottis muluensis*** M. Hotta, sp. nov. Fig. 6, A-F.

Caudiculus brevissimus, 8 mm crassus. Foliorum petiolus quam lamina longior, 25-30 cm longus, superne canaliculatus, ad medium usque vaginatus, lamina tenuis, supra viridis, subtus lucens, oblongo-lanceolata, basi leviter cordata, apice acuminata vel acuta, 20-25 cm longa, 7-10 cm lata, nervis lateralibus I. utrinque 12-14 adscendentibus ad marginem confluentibus. Pedunculus quam petiolus brevior, 7-9 cm longus. Spatha viridis, medio constricta, tubus ellipsoideus 2.5 cm longus, lamina oblonga apice breviter acuminata, 2.5-3 cm longa, 1.2-1.3 cm lata. Spadicis pars feminea conoidea, ad trientem usque spathae adnata,

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∩ A-F. *S. muluensis* A. spathe (×1). B. spadix (×1). C. staminodes of male part (×10). D. apical view of male flowers (×10). E. side view of male flower (×10). F. ovary with staminode (×10). G-N. *S. multinervis* G. whole plant (×1/2). H. spathe (×1). I. spadix (×1). J. side view of male flower (×15). K. apical view of male flowers (×15). L. staminodes of male part (×15). M. ovary with staminode (×15). N. vertical section of ovary (×15).

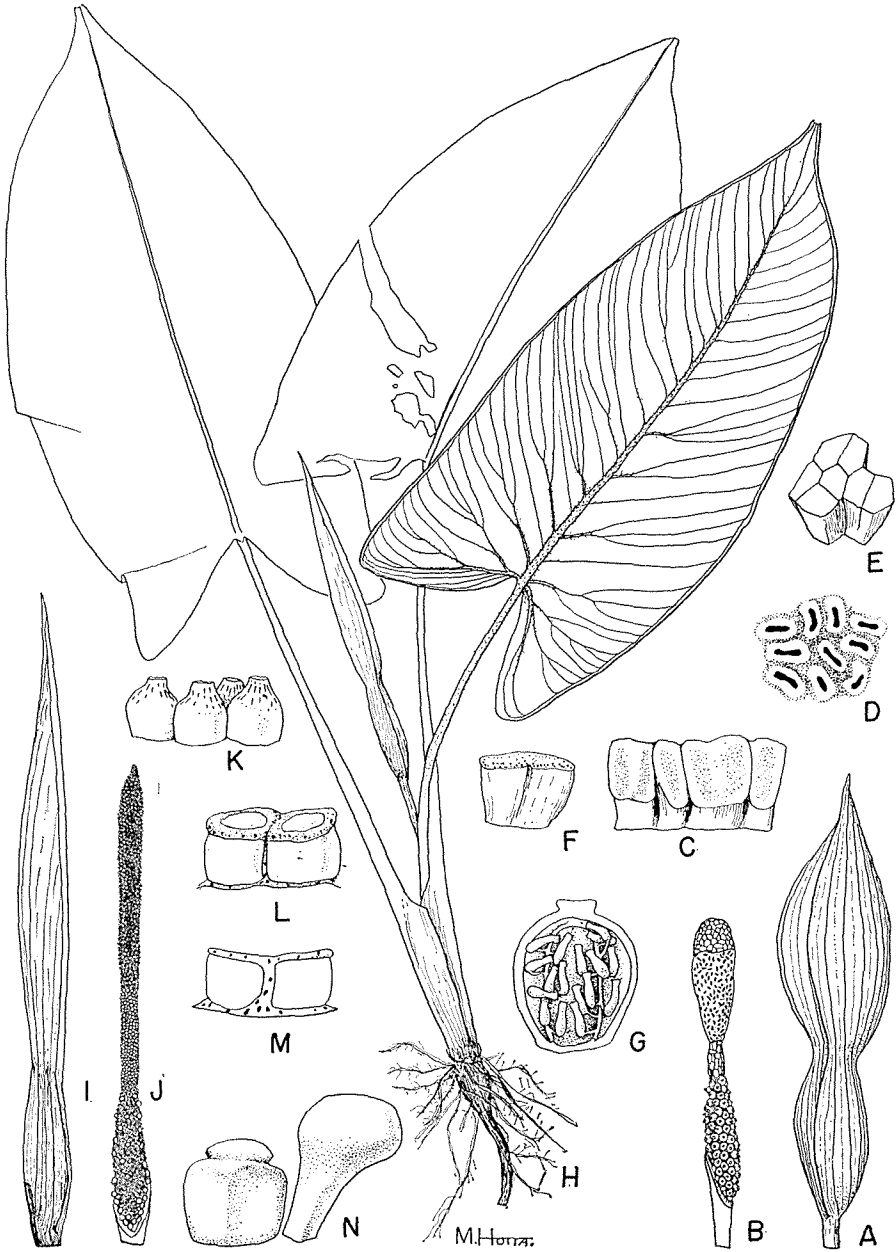


Fig. 7. *Schismatoglottis gamoandra* & *S. colocasioides*

A-G. *S. gamoandra* A. spathe ( $\times 1$ ). B. spadix ( $\times 1$ ). C. side view of male flowers ( $\times 10$ ). D. apical view of male flowers ( $\times 10$ ). E. staminodes of male part ( $\times 10$ ). F. staminode of female part ( $\times 10$ ). G. vertical section of ovary ( $\times 10$ ). H-N. *S. colocasioides* H. whole plant ( $\times 1/2$ ). I. spathe ( $\times 1$ ). J. spadix ( $\times 1$ ). K. staminodes ( $\times 10$ ). L. M. male flowers ( $\times 12$ ). N. ovary with staminode ( $\times 15$ ).

2.5 cm longa, inferne et superne staminodiis paucis praedita, pars mascula ellipsoidea 2.3 cm longa, 1 mm crassa, inferne fertilis ca. 1 cm longa, superne sterilis apice rotundata. Stamina ca. 2.7 mm longa, filamentum roseopunctatum, thecis obovoideis, apice truncatis ad marginem crassis. Staminodia superiora quam stamina paullum longiora, apice truncata, lactea et crebro roseo-punctata. Ovaria oblonga, albo-punctata, 1.7 mm longa, stigmatate brevi discoideo subsessili coronata, placentis 3, pluriovulatis. Staminodium partis femineae claviforme, albidum, quam ovarium paullum longior.

SARAWAK. Mardi: western ridge of G. Mulu, alt. 1200-1600 m, in mossy dense forest, March 17, 1964, *M. Hotta 14623* (holotype in KYO), alt. 1100-1200 m, along a stream, March 16, 1964, *M. Hotta 14507* (KYO).

This species is closely related to both of *Schismatoglottis emarginata* and *S. bitaeniata*, and easily distinguished from those species by the larger size of plant, the longer female part of spadix, and by the leaf without white spots.

(11). ***Schismatoglottis multinervia*** M. HOTTA, sp. nov. Fig. 6, G-N.

Caudiculus brevis, 8 mm crassus. Foliorum petiolus quam lamina longior, (10) 14-22 cm longus, inferne 5-8 cm latiuscule et tenuiter vaginatus, lamina subcoriacea, late ovata, basi leviter cordata, apice obtusa et apiculo....., supra obscure viridis, subtus pallidior et glaucescens ad costam papiloso-pilosa, 9-14 cm longa, 5.5-9.5 cm lata, nervis lateralibus I. utrinque 15-18, arcuatim adscendentibus ad marginem confluentibus. Pedunculus brevis, ca. 2 cm longus. Spathae tubus 1.5 cm longus, 7 mm latus, cylindrico-ellipsoideus, lamina oblonga, viridis, 2.7 cm longa, 1.1 cm lata, apice acuta. Spadicis pars feminea conoidea, 1.5 cm longa, inferne dorso spathae adnata, basi apice-que organo neutris praedita, pars mascula fertilis obconica ca. 1 cm longa, pars mascula sterilis obtuse conoidea 8 mm longa, 8 mm in diam. Ovaria depresso-globosa, 1 mm longa, 1.3 mm in diam., stigmatate parvo sessili coronata, placentis 3, parietalibus, ovulis ca. 40. Staminodia partis femineae inferna oblique obconica. Stamina 1.4 mm longa, filamentum compressum, thecis obovoideis, apice truncatis ad marginem crassis. Staminodia partis masculae quam stamina longiora, apice truncata, flavo-lactea, 1.7 mm longa.

SARAWAK. Mardi: at the foot of G. Mulu, along S. Payau, alt. 50-100 m, on moist clay under the riparian forest, March 22, 1964, *M. Hotta 15297* (holotype in KYO), *15275* (KYO, SAR).

This species is characterized by the long and slender petiole, cordate lamina with papilose on the nerves beneath, the very short peduncle, and by the depressed globose ovary. This species is similar to *S. ovata* and *S. pulchra* by the leaf shape, but differs from the latter by numerous primary lateral veins usually 15-18 on each side. This species belongs to the subgroup of *S. emarginata* by the following characters; the rotundate apex of spadix, the long whitish staminodes of male part, and the long filaments usually united at the base.

(12). ***Schismatoglottis gamoandra*** M. HOTTA, sp. nov. Fig. 7, A-G.

Herba pusilla, rhizoma tenue, hypogaeum, 2-4 mm crassum. Foliorum petiolus quam lamina brevior, 3-7 cm longus, ad 1/2-1/3 longitudine late vaginatus, lamina

lanceolato oblonga, inaequilateralis, basi subhastata lobis posticis apice obtusis, lobis anticis apice acuta et apiculo breviter aristata, supra atro-viridis, subtus pallidior, 7-11 cm longa, 3-5 cm lata, nervis lateralibus I. utrinque 8-10, nervis lat. II. tenuibus, adscendentibus, subparallelis, ad marginem confluentibus, nervis lat. III. tenuissimis interjectis. Spathae tubus oblongus 2.5 cm longus, 1 cm latus, viridis, lamina ovoidea, alba, apice acuminata, 4 cm longa, 1.6 cm lata, decidua. Spadicis pars feminea elongato conoidea, inferne dorso spathae adnata, basi organis neutris paucis instructa, 2 cm longa, 4 mm crassa, pars mascula fertilis 1.3 cm longa, a feminea interstitio separata, interstitio 5 mm longo tenui, floribus paucis sterilibus obsesso, pars mascula sterilis 5 mm longa, subglobosa. Organa neutra obovoidea, apice subtruncata, 1 mm longa. Ovaria obovoidea, 2 mm longa, 1.5 mm crassa, stigmatibus sessilibus discoideo coronata, placentis 3, parietalibus, ovulis ca. 30. Stamina 1.3 mm longa, thecis ovoideis, filamentis longioribus, hyalino-albis, interse connatis. Staminodia partis masculae sterilis 1.3 mm longa.

SARAWAK. Bintulu : along S. Latai, a small branch of Ulu S. Kakus, on clayey soil of the basin of moist valley, Nov. 7, 1963, *M. Hirano & M. Hotta 817* (holotype in KYO).

This species is characterized by the connated pollen sacs and by the leaves subhastate lanceolate-oblong, dark green above and forming a rosette.

(13). ***Schismatoglottis colocasioidea*** M. Hotta, sp. nov. Fig. 7, H-N.

Caudiculus tenuis et brevis, hypogaeus, ca. 7 mm crassus. Foliorum petiolus laminam aequilongus, 14-17 cm longus, inferne 4-5 cm longitudinis late vaginatus, papilloso-pilosus, lamina tenuis, supra viridis, subtus pallidior, ad costam dense papilloso-pilosa, lanceolato-oblonga, leviter inaequilateralis, apice acuminata, apiculo ....., basi subhastata vel triangulari-cordata, 17-19 cm longa, 8-9 cm lata, nervis lateralibus I. utrinque 8-10, inferioribus ramosis, superioribus simplicibus, nervis lat. II. et ramis I. tenuioribus subparallelis, ad marginem confluentibus. Pedunculus 8 cm longus. Spathae tubus oblongus persistens, viridis, 2.4 cm longus, 6 mm latus, lamina lanceolata 6.7 cm longa, 7 mm lata, alba, decidua. Spadicis pars feminea 2.2 cm longa, conoidea, inferne dorso spathae adnata, pars mascula fertilis femineae contigua, cylindrica 1.5 cm longa, 2.5 mm crassa, pars mascula sterilis oblanceolato-oblonga, apice acuta, 3.2 cm longa, 3 mm crassa. Ovaria angulata obovoidea, stigmatibus discoideo instructa. Staminodium partis femineae claviforme, ca. 1 mm longum; staminodium partis masculae pyriforme, apice truncatum 0.7 mm longum. Stamina tenuia, 0.7 mm longa, thecis cylindricis, hyalino-albidis, filamentis abbreviatis.

SARAWAK. Mardi : at the foot of G. Mulu, along, S. Payau, on mud under riparian forest, March 22, 1964, *M. Hotta 15310* (holotype in KYO).

This species is characterized by the branched lateral veins similar to those of *Colocasia*, long cylindrical male part of the spadix, thin and degenerated filament, and by the bottle shaped staminodes of the upper part of spadix. This species is related to the subgroup of *Schismatoglottis calyptorata* but distinguished from the subgroup by above mentioned characters.