

A KEY TO THE SPECIES OF
CRYPTOCORYNE FISCH. EX WYDL. (ARAC.)

H. C. D. DE WIT

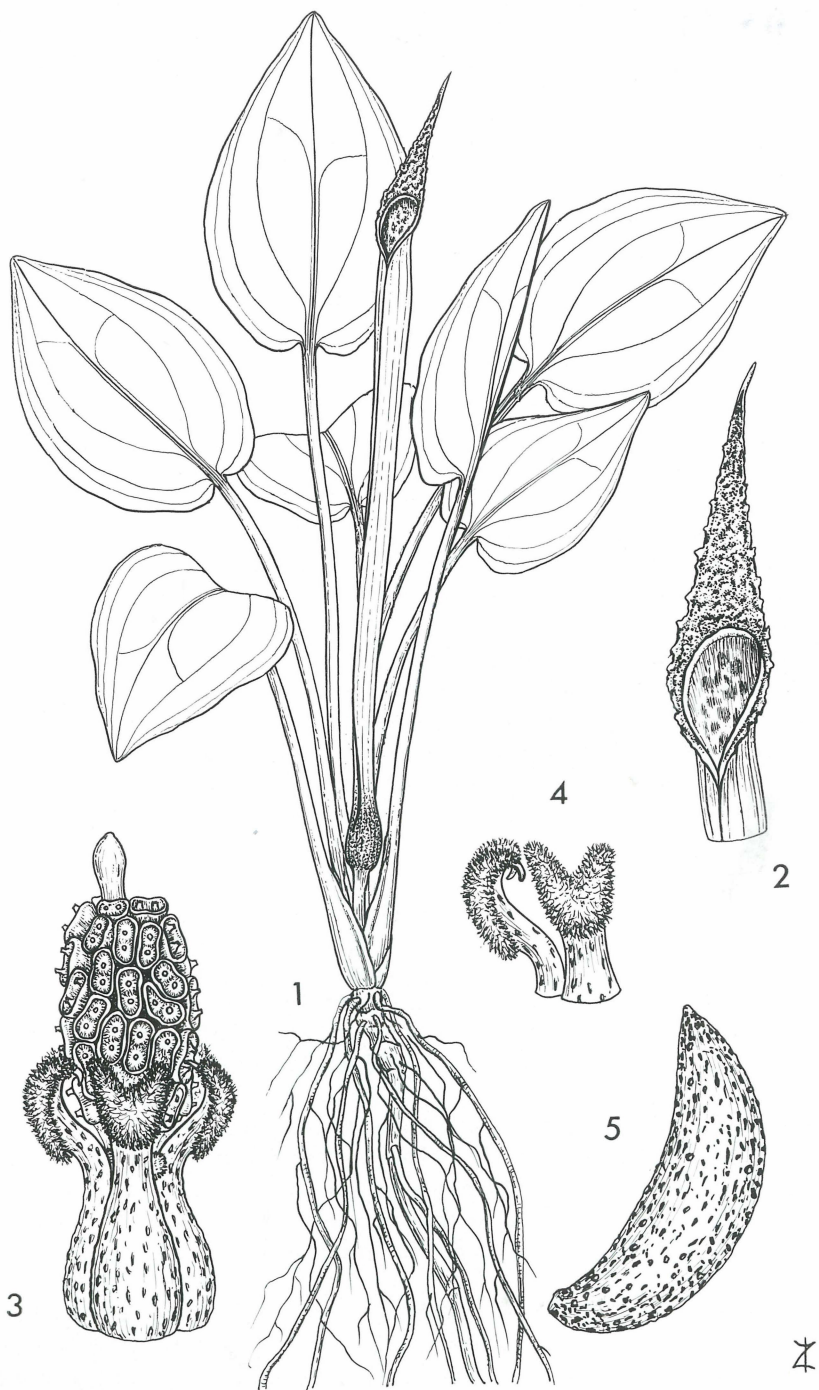
INTRODUCTION

The species of *Cryptocoryne* FISCH. ex WYDL. are among the most popular aquarium plants. They were and are shipped to Europe and the United States from tropical Southeast Asia (the natural area of the genus) by the thousands, or as a few incidentally added specimens to shipments of aquariumfishes. There is a steady demand for plants by aquarium keepers, partly because most amateurs are not very successful in growing *C.* and partly because 'novelties' are always wanted. Professional aquarium plant growers produce *C.* species in large quantities. For these reasons identifications of imported or cultivated specimens are needed and requested. There being no adequate key to the species available, the here presented key may prove to be useful. The key is one of the results of fifteen years of cultivating and observing specimens in the tropical glasshouse at the Wageningen Laboratory of Plant Taxonomy and -Geography. During those years professor VENEMA was the Director of the Laboratory and the present paper is dedicated to him in recognition of so many years of cordial co-operation under the same roof.

To the observations on the living plants (indispensable to understand their morphology and taxonomy) were added the data and conclusions derived from the study of herbarium specimens and literature. In particular I wish to acknowledge my great indebtedness to the directors or keepers of the herbaria at Bogor, Bombay, British Museum, Brussels, Calcutta, Copenhagen, Florence, Genève, Paris, Kew, Leyden, and Singapore; of great assistance was the set of drawings prepared under supervision of SCHOTT at Vienna.

The key, of course, contains only the names of species adopted by me; a full synonymy will be given in the german edition of my book on aquarium plants now in the press. The species will then be more fully described, and the majority are to be pictured at that occasion. Now, the key (in english!) may already contribute to the identification of *C.* species, while a number of photographs illustrates some of them.

It will be noticed that the characters used in the key are largely derived from flowering specimens and it might be observed that flowering occurs but rarely which reduces the employ of the key considerably. To this, it must be replied, that *C.* specimens without inflorescence are often not identifiable with certainty. To the trained eye it is sometimes possible to name *C.* plants even without inflorescence with some certainty or to reject suggested identi-



Cryptocoryne venemae DE WIT, sp. nov. - 1: flowering (nat. size); 2: spathe (2 x); 3: ovaries and stamen (16 x); 4: stigma's (16 x); 5: seed (8 x). Drawn from the type, G.D. HAVILAND 1879, Borneo (K).

fications, but even so, this applies to a limited number of species. The sometimes hardly conceivable changes plants show under changed environmental conditions render identification of the large majority of species uncertain if an inflorescence is lacking. To try and shape a key based entirely, or to a considerable extent, on vegetative characters would only lead to error and disappointment.

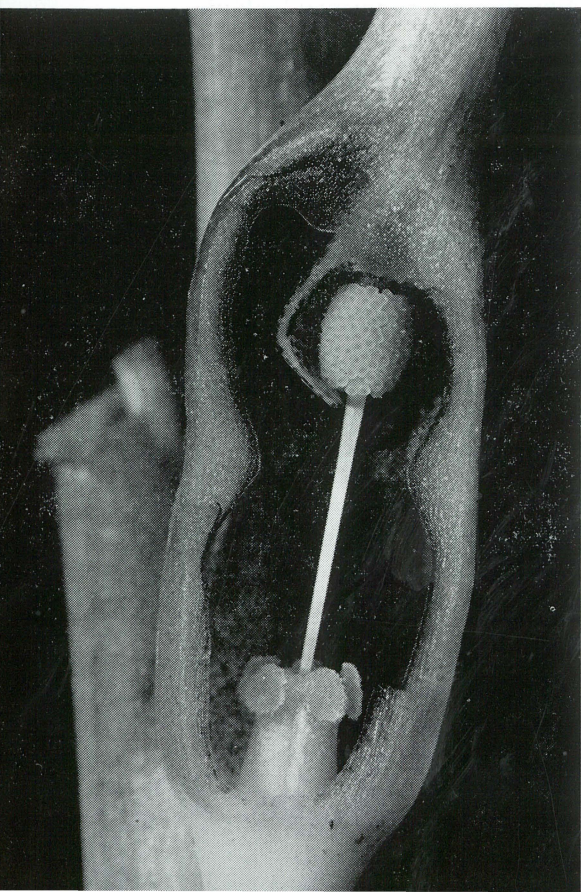
Into the present key 49 species are entered; some distinguishable infra-specific taxa are not mentioned, but the key is, I believe, so constructed, that if these latter taxa are at hand, they will smoothly join the specific epithet that includes them. No doubt more species wait discovery but all taxa which deserve specific rank and which are known or available at present were entered into the key.

It will be noted that some epithets are entered which refer to new *C.* species, not published till now. At the end of this paper a brief analysis is given of these species, which is sufficient for their nomenclatural status; a full account will be given in my book on aquarium plants referred to above.

By its morphology *Cryptocoryne* is easily segregated in the family *Araceae*. The spathe is connate along its margins, which results in a tube, opening at the top and, usually, inflated or widened at base. In the key, the inflated basal part (containing the spadix) is termed 'kettle', the tubular part as 'tube', the ending of the tube as 'throat', and the upper part of the spathe with free margins as 'limb'. The throat sometimes is bordered by a raised rim (at the base of the limb) termed 'collar'.

The kettle stands in direct communication with the tube but is, nevertheless, partly roofed by a hood-like tissue, a flabby membrane termed 'valvule'. The valvule partly envelops the top-part of the spadix, which carries the androecium. Above the androecium, the sterile apex of the spadix is at first attached to the kettle-wall (in the 'axil' of the valvule) but when the flowering phase proceeds it becomes detached. This top, often club-shaped, is naked, sterile, and short. Below this, the sessile anthers (representing the stamens) are grouped, crowded together, often in irregular spirals. The anther consists of 2 thecae. The pollen escapes from the theca by the dissolving top of a subulate 'spout' from the centre of the theca-roof and the pollen grains are floating in drops of liquid.

Below this androecium follows a naked, sterile, thread-like part of the spadix. At the base of the spadix, and on the bottom of the kettle, a single whorl of ovaries surrounds one or two whorls of 'olfactory bodies'. The olfactory bodies are contiguous to the spadix-base at one side, and to the ovaries at the other outer side, and obviously are reduced ovaries; they produce a carrion smell, that may become pleasant, suggesting roses, at some distance, when the smell is rarified. The ovaries are fused; a very short style carries a stigma. The ovules are inserted in the base of the ovarial cavity but, more often, also to high up the inner corner on the wall. Among the ovules, as a rule, a large quantity of hairs is observed (reduced ovules?).



Cryptocoryne albida R. N. PARKER
Upper: (left) habit, (right) limb and throat.
Lower: length section of kettle showing spadix
and girdling rim on inner kettle wall.

Laboratory of Plant Taxonomy, Wageningen,
April 1969. - Foto: De Wit.

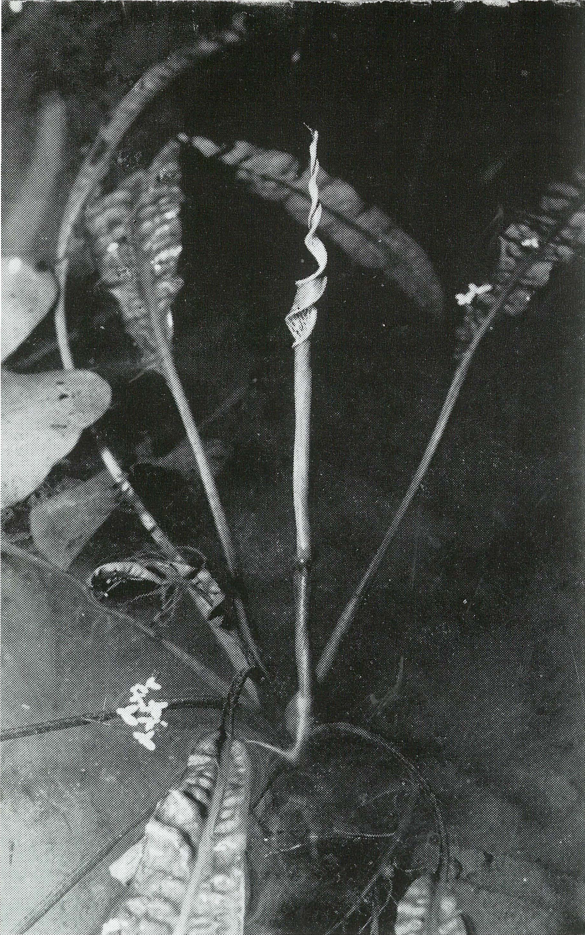
This brief survey of morphological data may suffice; the interesting biology and life-cycle of these marsh plants which have (?all) obligate cross-fertilization may receive attention at another occasion.

The genus *Cryptocoryne* is easily segregated from all other *Araceae* with the exception, perhaps, of *Lagenandra* DALZELL. However, the ovaries of *Lagenandra* are in several whorls (and so arranged in a half-sphere of superimposed, more or less spirally arranged carpels, at the base of the spadix. Another generic difference might be that in *Lagenandra* the pollen appears as grains together with a mass of extremely fine threads; further research must show whether this latter character holds for all species in either genus.

KEY TO THE SPECIES¹

- 1a. Above the kettle (valvule) a papillose-hirsute ovoid body on the wall inside the tube. Stigma horizontal **gomezii**
- 1b. Above the kettle the tubular part of the spathe (if present) smooth. Stigma more or less vertical (except *C. retrospiralis*) or turned downwards.
- 2a. Leaf-blade evenly bright green, without any purple.
- 3a. Large long-petioled leaves, blade elliptic-ovate, base usually truncate to subcordate, abruptly narrowing into the petiole. Edge of the limb of the spathe fringed **ciliata**
- 3b. Leaves narrow, short or long, the petiole gradually or abruptly widening to the blade. Edge of the limb of the spathe not fringed.
- 4a. Petiole (if distinguishable) gradually widening to the blade (which is several times as long as wide and gradually attenuate at base and top).
- 5a. A transverse wall (above the valvule) though pierced by a central hole separating the kettle from the upper part of the spathe. Limb once or twice loosely twisted, starting from the base, gradually narrowing to the top.
- 6a. Kettle long (like a wide tube) thin-walled. Stamens 120–140. Ovary containing ca. 15 ovules. Leaves over 50 cm long, blade 3–4 cm wide **huegelii**
- 6b. Kettle short, in the upper part thick-walled and inside, below the androecium, clearly constricted. Stamens 60–70. Ovary containing ca. 4 ovules. Leaves ca. 30 cm long, blade up to 2 cm wide **spiralis**
- 5b. Only a valvule (a membranous hood partly enclosing the androecium), forming the roof of the kettle.

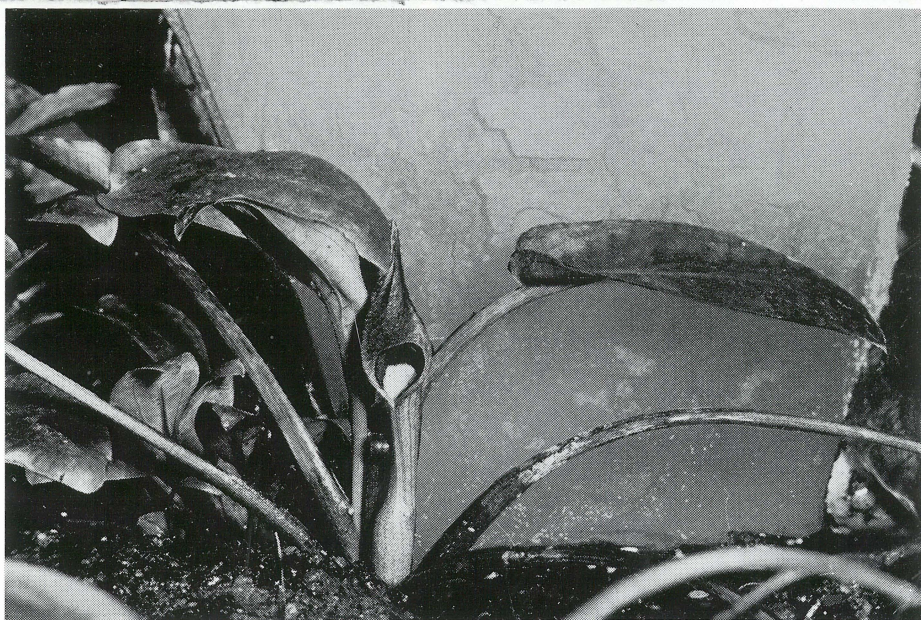
¹ Species illustrated by a photograph are marked by an asterisk.



Cryptocoryne balansae GAGNEPAIN
Upper: habit, spathe emerging; right: top of
spathe. Lower: spathe near the throat.

Laboratory of Plant Taxonomy, Wageningen,
March 1969. - Foto: De Wit.

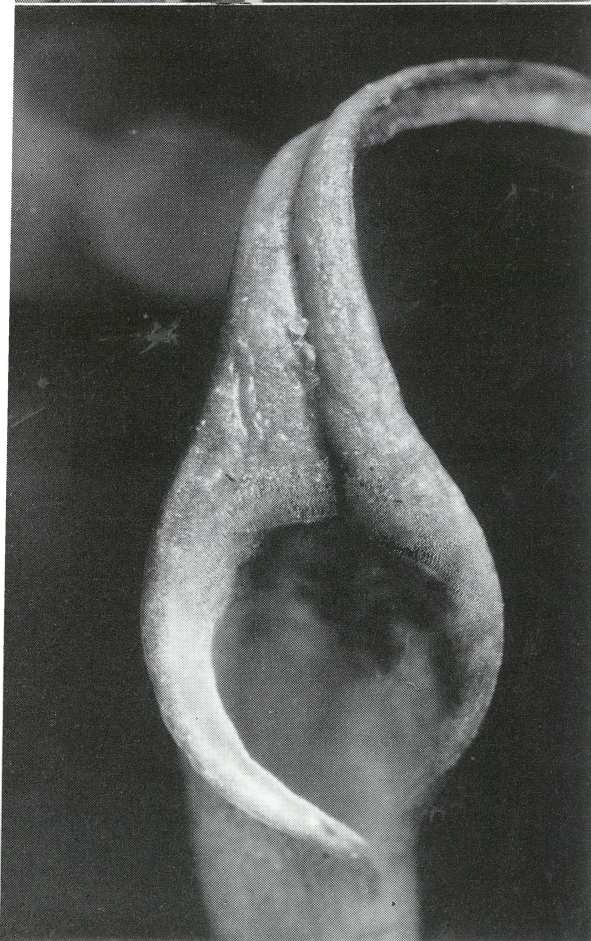
- 7a. Stamens 50–70. Limb of the spathe ovate, acute, not caudate. Throat collared.
- 8a. Leaves glossy green, 15–30 cm long. Throat (of spathe) dark purple, limb-surface dull, greyish bronze purple, upright **lucens**
- 8b. Leaves dull green, up to 15 cm long. Throat of spathe yellow, limb-surface bright purple, upright **nevillii**
- 8c. Leaves green, more or less glossy. Throat (of spathe) blackish downwards abruptly changing to almost white, almost closed by the obliquely horizontally directed, dark purple limb **parva***
- 7b. Stamens at least ca. 100, usually 120–150.
- 9a. Upper part of spathe repeatedly, corkscrew-wise twisted, the throat, if open at all, only by a narrow curving slit. Stigma more or less orbicular, directed horizontally or obliquely upwards. Wall of the tube strongly twisted **retrospiralis**
- 9b. Upper part of the spathe a distinct ‘limb’, near the throat flat and spreading, its top sometimes twisted. Stigma never horizontally directed.
- 10a. Limb long-tailed (10 cm or more). Kettle 4 cm long, longer than the tube, its wall thin, not constricted inside **cognata**
- 10b. Limb acute or short-tailed. Kettle very much shorter than the tube.
- 11a. Limb-surface whitish or creamy, mottled purple in the lower part, slightly wrinkled lengthwise. Kettle dark purple inside, the thick wall protruding and constricting the kettle inside at half its height (the upper, alveolar compartment containing the androecium . . . **albida***
- 11b. Limb-surface perhaps not mottled, probably dark evenly coloured, distinctly transversely rugose (and warty). Kettle wall thin, not constricting the kettle cavity **cruddasianum**
- 4b. Petiole clearly marked, abruptly widening to the usually truncate or cordate blade. Blade up to twice as long as wide.
- 12a. Kettle wide in the lower part (containing the ovaries), suddenly narrowed in the upper half (containing stamens and valvule) and there as wide as the tube. Leaf-blade shorter than the petiole, cordate **pontederiifolia**
- 12b. Kettle distinctly wider than the tube.
- 13a. Spathe if opening at all only by a narrow, curving slit, long tail-shaped (the kettle the widest lowermost part).
- 14a. Leaf-blade on lower surface roughly brown pubescent. Stigma elliptic, cushion-shaped (centre not sunken) **ferruginea**



Cryptocoryne beckettii
THW. ex TRIM.
Upper: habit. Lower: limb
and throat; note the once
twisted, dirty yellow limb,
the dark (chocolate) col-
lared throat.

Laboratory of Plant Taxonomy,
Wageningen,
March 1969. - Foto: De Wit.

- 14b. Leaf-blade on lower surface glabrous or sparsely, minutely puberulous. Stigma elliptic to orbicular (centre sunken), upper edge often emarginate.
- 15a. Spathe outside straw-brown, fuscous. Stigma almost orbicular . . . **fusca**
- 15b. Spathe outside pink, with a greyish hue. Stigma elliptic, with sunken centre bordered by a rim **tortilis**
- 13b. Spathe with an ovate, gaping throat, the top of the limb sometimes caudate.
- 16a. Throat collared, pallid. Limb long caudate, rugose. Leaf cordate **longicauda**
- 16b. Throat not collared. If limb caudate, then leaf-blade not cordate.
- 17a. Throat purple-dotted. Limb long caudate. Leaf-base short attenuate, cuneate. **lingua***
- 17b. Throat yellow. Limb small, narrow, the purple, erose-verrucose upper edge of the throat. Leaf-base truncate to subcordate . . . **versteegii***
- 17c. Throat blackish purple. Limb attenuate, not caudate, smooth. Leaf-base cordate **elliptica**
- 2b. Leaf-blade entirely purple or purple-veined on the lower surface, or variegated purple (on both surfaces) or dull, dark green.
- 18a. Leaf-blade lorate, strap-shaped, more than 4 times as long as wide. Upper surface of the limb (of the spathe) pallid, yellowish or brownish.
- 19a. Limb (of the spathe) spirally twisted, lengthwise purple-dotted and striped, smooth (also on edge). Collar absent. Upper part of kettle (above girdling rim on interior kettle-wall) containing ca. 150 anthers **balansae***
- 19b. Limb (of the spathe) flat, smooth or verrucose. No inner girdling rim in the kettle.
- 20a. Limb with scattered, coarse, dark purple warts, also on edge. Collar present. Stamens ca. 150 **consobrina**
- 20b. Limb smooth, not spotted or striped, perhaps subverrucose on edge. Collar absent. Stamens less than 100 **usteriana**
- 18b. Leaf-blade elliptic, ovate, suborbicular, sometimes ovate-oblong.
- 21a. Midrib of leaf-blade on the upper surface obviously lighter coloured than the laminar tissue, and appearing whitish or pallid.
- 22a. Limb (of the spathe) long and narrow, spirally twisted; upper surface smooth, velvety-black. Spathe at most opening by a curved slit. Leaf-blade oblong-ovate, widest in the lower half **affinis**



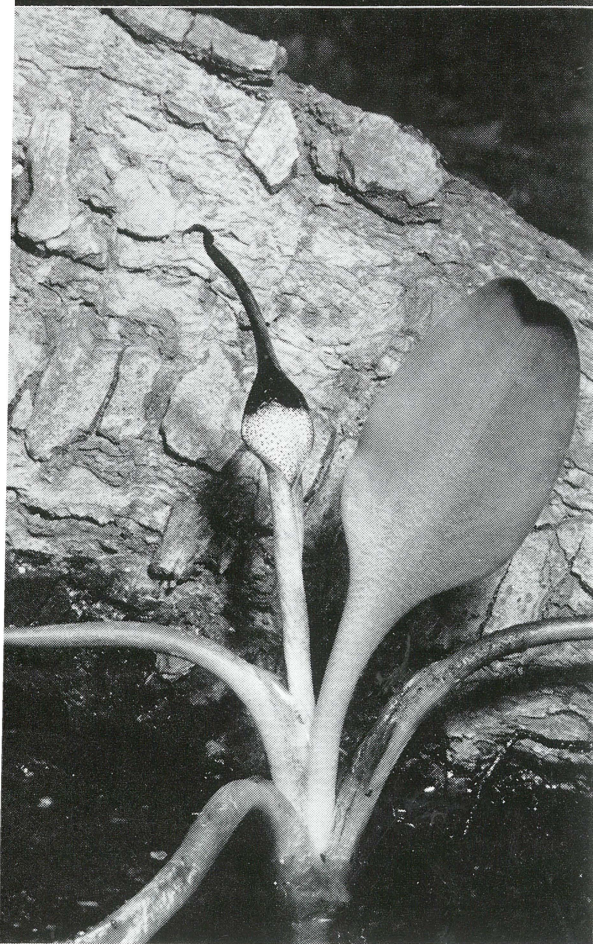
Cryptocoryne gracilis DE WIT

Upper: throat and limb; note the length-groove and dark (purplish) dots in the throat.
Lower: habit; note the variegated leaf-blade and emerging limb.

Laboratory of Plant Taxonomy, Wageningen,
April 1969. - Foto: De Wit.

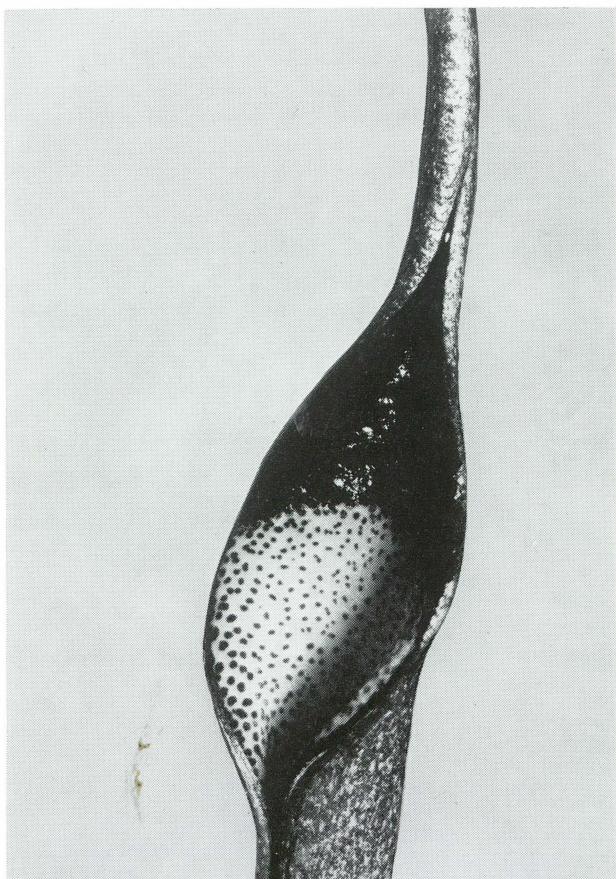


- 22b. Limb (of the spathe) flat, ovate, short-caudate; upper surface coarsely transversely verrucose. Leaf-blade broad-ovate, cordate
. **pallidinervia**
- 21b. Midrib of leaf-blade not (distinctly) lighter coloured than the laminar tissue, often darker.
- 23a. Limb of the spathe yellow, green or brownish.
- 24a. Collar present.
- 25a. Limb brownish, with contrasting purple warts. Small plants. Throat dark **minima***
- 25b. Limb yellow to green, without differently coloured warts, or smooth. Throat dark or light.
- 26a. Throat dark, much darker than the limb.
- 27a. Limb flat, not twisted, widest at the throat and from there narrowing into the acute top, one edge (almost) entirely denticulate, dirty yellow. Inner kettle-wall entirely alveolate **petchii***
- 27b. Limb flat, once twisted, ovate, one edge in the lower third finely denticulate, bright yellow or suffused with a brown hue. Inner kettle-wall alveolate in the upper part **beckettii***
- 26b. Throat coloured like the limb, or lighter.
- 28a. Limb with a twist. Throat bordered by a thin, white line, upwards followed by a dark brown rim (collar). Stigma sunken in the centre. Nerves of the leaf-blade as a rule purple, contrasting with the green laminar tissue. Submerged plants developing stilt-roots . . . **willisii**
- 28b. Limb flat, not twisted. Throat without white line or a differently coloured collar. Stigma often not sunken in the centre.
- 29a. Collar present. Rhizome thick, stunted, with crowded, very short, internodes, Leaf-blade glossy, bronze-purple. Limb (of the spathe) green or yellowish green, dull, rugulose-verruculose **legroi**
- 29b. Collar absent or vaguely indicated. Rhizome vigorous and with comparatively long internodes. Leaves dullish.
- 30a. Limb yellow. Stigma cushion-shaped, not sunken in the centre. Kettle-wall (interior) alveolate **lutea***
- 30b. Limb green, discolouring to ochre. Stigma sunken in the centre. Kettle-wall (interior) only in the upper part alveolate **walkeri**
- 24b. Collar absent.



Cryptocoryne lingua BECC. et ENGLER
Upper: habit. Lower: throat (yellow, dotted
purple), and lower part of (purple) limb.

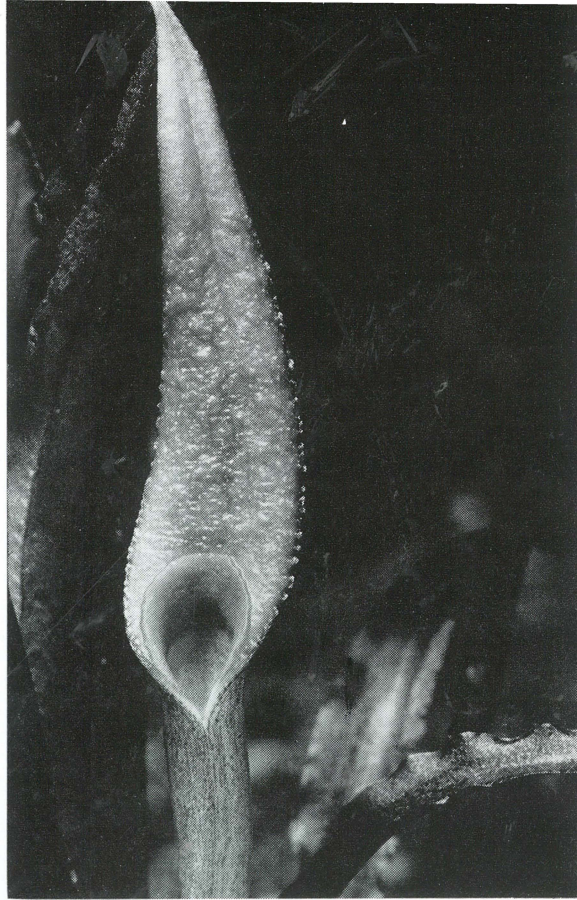
Laboratory of Plant Taxonomy, Wageningen
February 1969. - Foto: De Wit.

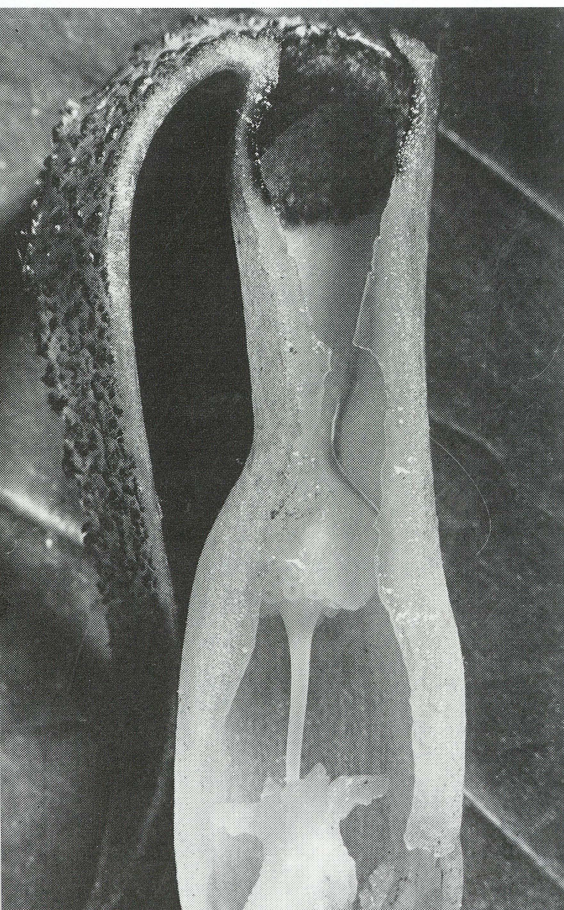


Cryptocoryne lutea ALSTON

Upper: throat (light) and collar, limb flat, one edge denticulate; throat, collar, and limb yellow. Lower: habit.

Laboratory of Plant Taxonomy, Wageningen,
February 1969. - Foto: De Wit.





Cryptocoryne minima RIDLEY

Upper: habit. Lower: spathe in length section.
Note length of limb, dark (collared) throat,
nodding stigma's.

Laboratory of Plant Taxonomy, Wageningen,
February 1969. - Foto: De Wit.

Cryptocoryne parva DE WIT
Upper: habit. Lower: spathe. Note the dark purple upper half, the blackish oblique throat, and obliquely twisting limb.

Laboratory of Plant Taxonomy, Wageningen,
March 1969. - Foto: De Wit.



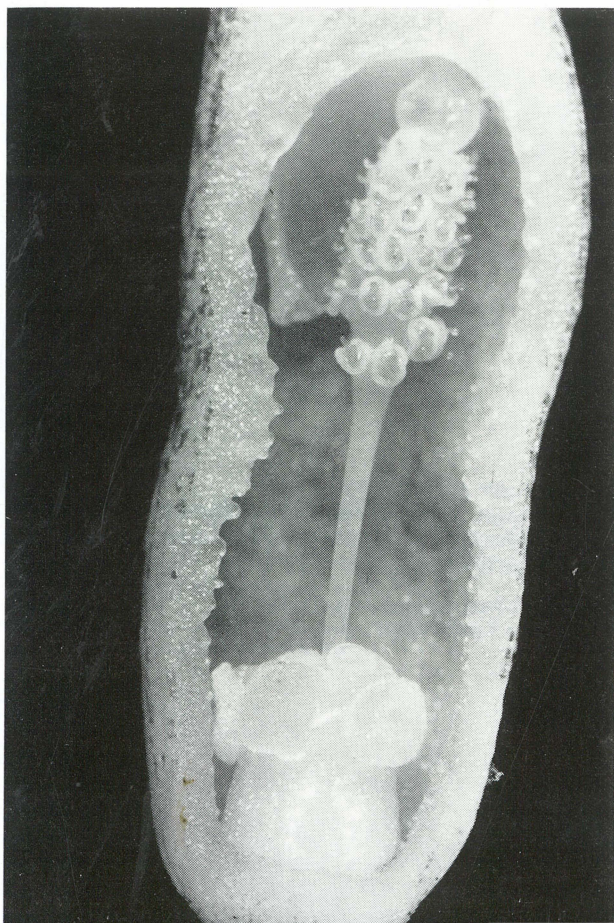
- 31a. A purple zone (the deep purple girdling zone on the interior wall of the kettle) transparent and visible on the exterior of the kettle. Limb often with small, scattered, purple wartlets **zonata**
- 31b. Kettle white or purplish tinged or sprinkled with purple all over.
- 32a. Limb bright yellow.
- 33a. Stigma linear, very narrow **grabowskii**
- 33b. Stigma not linear, elliptic, ovate to orbicular.
- 34a. Limb of (the spathe) almost smooth, top long caudate. Throat white or yellow, bordered by a deep yellow, glossy zone, the laterally somewhat compressed, narrowly elliptic opening of the tube. Stigma ovate, upper edge entire or slightly emarginate. Stamens 45–50 . . . **siamensis***
- 34b. Limb (of the spathe) wrinkled, top short caudate. Throat yellow, the orbicular or widely ovate opening of the cylindrical (short) tube. Stigma orbicular, upper edge widely emarginate. Stamens 30–35 . . **blaussii**
- 32b. Limb not bright yellow.
- 35a. Stamens ca. 25. Throat lighter coloured than the limb, not mottled. Limb brown, ovate, not grooved lengthwise **diderici**
- 35b. Stamens ca. 40. Throat mottled purple. Limb brownish to yellowish or purplish, grooved lengthwise **gracilis***
- 23b. Limb of spathe purple (sometimes limb almost absent), rarely light purplish (and with dark purple dots).
- 36a. Collar conspicuous, yellow, coarsely contrasting with the red-purple limb. Tube narrowed just below the throat, and curved. Ovules 2–4, in the base of the ovary **scurrilis**
- 36b. Collar, if present, not distinctly different in colour from the limb. Tube, as a rule, somewhat widening towards the throat, not curved, nor constricted. Ovules numerous.
- 37a. Limb (of the spathe) longer than tube and kettle together, or about equally long.
- 38a. Limb (of the spathe) long caudate.
- 39a. Spathe very long and slenderly caudate, as far as is known remaining closed. Theca with a central papilla, instead of the usual subula. Stigma almost linear. Leaf-blade strongly bullate, cordate; edge erose
. **caudata**
- 39b. Spathe opening at the throat. Theca provided with a subula to release pollen. Stigma narrowly oblong to broadly ovate. Leaf-blade usually flat.



Cryptocoryne petchii ALSTON

Upper: habit. Note dark throat, collar, and flat, not twisting limb. Lower: length section of kettle, showing sterile top of spadix, anthers releasing pollen-liquid, and sterile interval of spadix, and ovaries. Kettle wall alveolar.

Laboratory of Plant Taxonomy, Wageningen,
April 1969. - Foto: De Wit.



NEW SPECIES ENTERED INTO THE KEY

Cryptocoryne diderici De Wit sp. nov.

Cryptocoryne diderici species nova notabilis conspicuaque spatha laete colorata. Bene distincta tamen ex affinitate *C. blassii* et *C. siamensis*. Ab eis differt limbo spathae brunneo, verrucoso, margine dextra denticulata. Faux late hians (tubo parte superiori haud lateraliter compressa). Stilus distincte angustatus; stigma apicem versus angustior, apice rotundatum, haud emarginatum.

Typus: J. Liet (Amsterdam) misit, e Malacca boreali, Octobris 1960, in spiritu servatus (WAG).

Cryptocoryne fusca De Wit sp. nov.

Cryptocoryne fusca species nova borneensis ex affinitate *C. tortilis* et *C. ferruginea*. Differt a *C. tortili* spatha stramineo-fusca (haud plumbeo-rosea), valde brevior et minus torta, stigmatate latiore, ovulis duplo majoribus, staminibus minus numerosis. Facies inferior foliorum minute pallide- sive ferrugineo-puberula.

Typus: De Wit s.n., Decembris 1962, culta in calidario Vadensi, in spiritu servatus (WAG).

Cryptocoryne gracilis De Wit sp. nov.

Cryptocoryne gracilis species nova a Peninsula Malesiana. Planta parva, folia bullosa (an semper?), conspicue transversaliter purpureo striata, de reliquo lamina foliorum luteo-viridis. Spatha delicate tubulosa, fauce hians, limbo laevis tamen longitudinaliter sulcata, longe graciliter et tenuiter caudata, saepe purpurascens (et fauce irregulariter purpurea maculata). Corpora olfactoria depressa. Stigma ovatum, integer margine, velutinum, centro paucè depressum.

Typus: J. W. Purselove, P. 5361, Sungei Mayeng, Tau Range (SING).

Cryptocoryne legroi De Wit sp. nov.

Cryptocoryne legroi species nova probabiliter zeylanensis ex affinitate *C. luteae* et *C. walkeri*. Differt ab *C. lutea* foliorum laminis majoribus subtus purpureo-brunnescentibus, supra saepe fusco-viridis lucentioribus. Spatha pallido-viridis ex luteo, tamen numquam lutea vel coriaceo-fusca. Rhizoma *C. luteae* et *C. walkeri* stolones graciliter elongata prodiit, tamen rhizoma *C. legroi* stolones breves internodiis crassas contractas ferit.

Typus: R. A. H. Legro legit, in calidario Vadensi. In spiritu servatus (WAG).

Cryptocoryne parva De Wit sp. nov.

Cryptocoryne parva species nova zeylanica ex affinitate *C. lucentis* et *C. nevillii*, illas tres species sine inflorescentia in statu crescenti submersae similis, toto coelo tamen inter se differunt supra aquam crescentes spathasque gerentes. *C. parva* spatha brevi, purpurea, limbo oblique semitorta, fauce atropurpurea compressa inter aliiis satis distincta.

Typus: J. Schulze, 20-2-1967, in spiritu servatus (WAG).

Cryptocoryne tortilis De Wit nom. nov.; olim '*Cryptocoryne longicauda* Becc. ex Engl.' sensu De Wit (in Webbia 9, 1954, p. 455-457; cf. Aquariumplanten, 2nd ed., 1966, p. 164).

Cryptocoryne venemae De Wit sp. nov.

Cryptocoryne venemae species nova borneensis (e regione Sarawak dicitur), ex affinitate *C. striolatae*. Satis differt tamen a *C. striolata* (tametsi olim Ridley eam varietatem '*cordifolia*' existimavit) superficiei limbi valde verrucosa, fauce purpureo-maculata, parte tubi inferiore purpurea, stigmatate profunde emarginata. Praeterea pars sterilis spadicis deest.

Typus: G. D. Haviland, Oct. 1892, Rejang Sibiu, Kalong (K).

Cryptocoryne zonata De Wit sp. nov.

Cryptocoryne zonata species nova borneensis (e regione Sarawak dicitur), ex affinitate *C. blassii* et *C. siamensis*. Differt tamen a *C. blassii* superficiei limbi rugulosa saepe ex purpura flava, stigmati integris vel submarginatis, angustioribus; a *C. siamensi* fauce hiante (tube spathae haud lateraliter compressa), staminibus ca. 30 (*C. siamensis* 45–50). Paries internus tubi inferiore parte ad junctionem cum cavitate inflata inflorescentiam continente, zona purpurea ornatus, translucenter ab exteriori conspicua.

Typus: A. J. Key, s.n. 17/28-12-1961, Sungei Lamut and S. Niah, Seria, Brunei, Sarawak, N. Borneo (WAG).