

# On *Cryptocoryne cordata* var. *siamensis*

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*Cryptocoryne cordata* var. *siamensis*. Habitat in shaded stream (near Chong Fah Waterfall, Khao Lak Lamru N.P., Phangnga, Thailand). NJT 04-61.



*C. cordata* var. *siamensis*. Habitat in sunny stream (road to Ton Prael Waterfall, north of Thai Muang, Phangnga, Thailand). NJT 03-1.

For many years the identity and understanding of the *Cryptocoryne cordata* complex has caused problems among botanists as well as aquarists. The first live introductions about 100 years ago were perhaps not so problematic as to the identification, but very problematic in cultivation. Since then plants have been imported every now and then under the name *Cryptocoryne cordata*, but very few plants survived and only a few flowering plants were documented.

Other names also floated around like *Cryptocoryne grandis* and *C. grabowskii*. In the middle of the last century, *Cryptocoryne kerrii*, *C. siamensis*, *C. blaussii*, *C. zonata*, *C. diderici* and later again *C. evae* var. *evae*, *C. evae* var. *recordata*, *C. siamensis* var. *ewansii* and *C. stonei* turned up.

Even if confusion may not have been total, there was quite some uncertainty as to exactly which plants were found growing in our aquaria, and which names were to be attached to them.

From the 1970s and onward much material and information has been accumulated, even though a more clear picture was not obtained until some time after the beginning of this millennium, where the amount of new documented collections exploded. Even now there are questions to be answered (e.g. the identity of the plants from the western Thai-Malaysia peninsula border region) but the overall picture seems clear as to the interpretation of *Cryptocoryne cordata* and its variation, distribution and ecological preferences.

As seen today, *Cryptocoryne cordata* is interpreted as being one variable species distributed from southern Peninsular Thailand, Peninsular Malaysia, Sumatera, Borneo (and the Natuna Islands).

Within *Cryptocoryne cordata* four varieties are recognized: var. *cordata*, var. *diderici*, var. *grabowskii* and var. *siamensis*.

Each of these four varieties has a different distribution, more or less different ecological niches, different chromosome numbers, and different morphological characteristics; the morphological characteristics to some extent being difficult to interpret and describe unambiguously, as the different varieties do vary morphologically and overlap in some traits (also caused by environmental conditions).

To make a long story short: almost all *Cryptocoryne cordata* plants in our aquaria today belong to var. *siamensis*. If you have it growing successfully in your aquarium there is a more than 90% chance that it is var. *siamensis*. And even if it is not growing well, there is probably still a more than a 90% chance that it is var. *siamensis*. If it were one of the other varieties of *Cryptocoryne cordata* it would most likely be dead by now. Of course, if you are one of the few people keeping aquaria with a pH of 4–5, you may have something else, but even then there is a good chance that you may have var. *siamensis*.

Var. *siamensis* can be recognized by its more or less ovate (to slightly cordate), smooth to sometimes somewhat bullate leaf blades which usually are purple tinged to bright red





*C. cordata* var. *siamensis*. Red-leaved plants from a slow running stream (near Chong Fah Waterfall, Khao Lak Lamru N.P., Phangnga, Thailand). NJT 04-61.



**Above:** *C. cordata* var. *siamensis*. Different spathe colours from one stream (road to Ton Prae Waterfall, N of Thai Muang, Phangnga, Thailand). NJT 03-1.

**Left:** *C. cordata* var. *siamensis*. Cultivated plant (classical locality by the 33 km stone N of Phuket, Thailand). NJT 02-6.

below and bronze to greenish above. If flowering—easy in emergent cultivation—the spathe is relatively short, 7–20 cm long, limb ovate with a shorter or longer point, more or less backward bent, yellow, often brownish tinged along the margin to covering larger parts of the limb, with a clear demarcation to the broad yellow zone around the throat.

Other varieties do enter our aquaria but usually do not survive for long as mentioned above. Var. *siamensis* comes from the southern part of Peninsula Thailand, which mainly consists of lime stone rock and soil, while the other varieties come from areas with very little or no limestone. Limestone or not, there is usually also some leaf litter or leaf peat present in the natural habitats or you have peaty water sieving out from the rainforest floor. The pH in water at the var. *siamensis* localities vary from say 5.9 to 6.3 and in the other varieties may vary from say 4.2 to 4.4 (As the pH scale is not linear but logarithmic, a pH of 4 is 100 times ( $10 \times 10$ ) more acid than a pH value of 6).

The landscape in var. *siamensis* country consists of north-south going mountain ranges, where the streams are usually relatively short running down from the rather narrow peninsula, and the catchments area is therefore also rather limited, and as far as we know only running westwards into the Andaman Sea. This means that after rains, the water runs off rather quickly, not filling up to extreme water carrying.

**Cultivation:** *Cryptocoryne cordata* var. *siamensis* is the easiest of the *C. cordata* varieties to cultivate under standard aquarium conditions. It tolerates water hardness up to 25

DH without any problem. The plants easily reach a height of 20–30 cm or more. Even though var. *siamensis* comes from limestone situations it will also grow under more acid conditions like the other varieties of *C. cordata*.

The other varieties of *C. cordata* generally mostly require rather acid conditions to grow to the extent to which they multiply and flower. Saying: “generally mostly require” means that e.g. what is called var. *grabowskii* is not a homogenous group of plants, and as you can imagine of plants found all over most of the island of Borneo, some diversification has taken place over time, and plants from different localities and niches have different growth requirements and will react differently in the same aquarium conditions.

Imitating the rainforest streams with leaf peat soil, we use the leaves of *Fagus sylvatica*, European Beech, in Europe, but leaves from a number of other tree species will no doubt also work, provided they are sufficiently broken down.

Generally the light requirements for *C. cordata* varieties are rather low (rainforest streams). And with too high a light intensity, you can actually see the petioles bending downward especially if they are growing emerged—submerging them will usually solve the problem; under aquarium conditions leaves bending toward the bottom usually is a sign of inadequate substrate and/or water conditions—often associated with too high a pH.

For those readers who are interested in a more detailed description of the four *C. cordata* varieties, characteristics of each are given below: the

descriptions below of the different varieties of *C. cordata* are made from specimens as they occur in nature. Some aquarium grown plants will differ from these descriptions, especially toward being smaller. You will just have to see which variety your plant fits the best overall.

***Cryptocoryne cordata* Griffith var. *siamensis* (Gagnepain) N. Jacobsen & D. Sookchaloem**

Synonyms: *C. siamensis*, *C. blaussii*, *C. evae* var. *evae*, *C. evae* var. *recordata*, *C. siamensis* var. *ewansii*

**Leaves** smooth to somewhat bullate, upper surface dark green with markings to purplish or purple, lower with reddish veins or shades to dark red; blade narrowly ovate (sometimes with a cordate base), 5–15 cm long, 3–7 cm broad; petiole 5–30 cm long, longest in continuously submerged specimens from slow-running water. **Spathe** 7–20 cm long, white on the outside, brownish/greenish towards the apex; kettle inside white, sometimes reddish in the lower half 1.5–3 cm long; tube 4–15 cm long, inside white; limb more or less flat, 2–4 cm long, more or less backward twisted, ovate with a shorter or longer point, surface more or less smooth, yellow to red-brownish shaded, if shaded then more intensively so toward the margins and the apex; collar zone broad, yellow, gradually merging into the white tube. Kettle inside white, some plants suffused purple in the lower part. Chromosome number:  $2n = 102$ .

**Distribution:** Peninsular Thailand: From the Takua Pa region in the north to around Phuket, Krabi and Trang in the south.

**Habitat:** Small or larger streams

with slow or more quick running water in lowland areas in limestone regions where it usually occurs submersed. In its original habitat there has probably been a mixture of dead leaves with clay and sand, but with most of the region being influenced by cultivation, the streams contain a large portion of sand and gravel. It may grow in rubber plantations and they will survive if the habitat is not too disturbed and there is some gallery forest to protect them against an all day direct sunlight.

**Notes:** As indicated from the synonymy, this variety has been the source of different opinions over a number of years, the main reason that it is easy to cultivate under standard aquarium conditions, i.e. soil and water with a high pH, thereby providing ample flowering material for study when cultivated (semi-) emergent.

Today we know more than 15 existing localities for var. *siamensis* from southern Thailand (and assumingly more exist). They are from relatively small streams, which are 3–6 m wide, and they generally have a small catchments area within the limestone regions.

A comparison of the morphology of plants from the presently known existing localities, which have been cultivated under uniform conditions, has shown that there are no characters or sets of characters that can separate these collections from each other. There is some variation in the size, shape and colours of the leaves, but they are only what can be characterized as very minor differences: populations from different streams look a little different!

**Characteristics:** *C. cordata* var. *siamensis* is characterized by the



a. *C. cordata* var. *siamensis*. Brown limb of spathe (road to Ton Prae Waterfall, north of Thai Muang, Phangnga, Thailand). NJT 03-1.  
 b. *C. cordata* var. *siamensis*. Just opened spathe in the morning (Cultivated plant from north of Sra Kaew Cave, Krabi, Thailand). NJT 02-17.  
 c. *C. cordata* var. *siamensis*. Opened kettle from cultivated plant (east of Thung Ma-phrao, Phangnga, Thailand). NJT 02-57.  
 d. *C. cordata* var. *siamensis*. Opened kettle from cultivated specimen (road to Ton Prae Waterfall, north of Thai Muang, Phangnga, Thailand). NJT 03-1.  
 e. *C. cordata* var. *siamensis*. Limb of the spathe of the cultivar 'Rosanervig'. NJ 3417.

narrowly ovate to ovate, smooth to bullate leaves, with a green to dark green to green-brownish to purplish or purple upper surface with markings, lower surface purple tinged to deep, dull purple, base more or less cordate. Spathe 10–20 cm long, kettle inside white but sometimes purple suffused over large portions; limb ovate with a shorter or longer point, more or less backward bent, yellow, often brownish tinged along the margin to covering larger parts of the distal parts of the limb, more or

less smooth with a clear demarcation to the broad yellow zone around the tube opening.

***Cryptocoryne cordata* Griffith var. *siamensis* (Gagnepain) N. Jacobsen & D. Sookchaloem 'Rosanervig'**

Synonyms: *C. "rosanervis"*, *C. siamensis* var. *scheideri*

**Leaves** 20–40 cm long, blade narrowly ovate, 10–15 cm long,





*C. cordata* var. *cordata*. Habitat in a stream east of Muadzam Shah, Pahang, Malaysia. NJM 11-50.



*C. cordata* var. *cordata*. Limb of spathe. East of Kahang, Johor, Malaysia. NJM 02-7.



*C. cordata* var. *cordata*. Opened kettle from cultivated specimen, Toa Deng, Naratiwat, Thailand. NJT 02-26.



*C. cordata* var. *cordata*. Whole plant (scale 30 cm). Gunong Arong Recreational Forest, Johor, Malaysia. NJM 11-41.

3–6 cm broad and more or less red-brown, and main veins whitish rose to rose coloured, lower surface lighter. **Spathe** more than 10 cm long, limb yellow with a more or less pronounced brownish tinge, collar zone yellow.

**Distribution:** This cultivar was originally found as a deviating specimen in an import from Bangkok from the southern part of the distribution area.

**Characteristics:** The cultivar 'Rosanervig' is characterized by the narrowly ovate leaves with their whitish rose to rose coloured veins. The degree of rose-colouring depends on the cultivation conditions, and it seems that a higher pH and nutrient rich water will generate these different coloured veins. Under some aquarium conditions these veins may not be developed.

### *Cryptocoryne cordata* Griffith var. *cordata*

Synonyms: *C. kerrii*, *C. siamensis* var. *kerrii*, *C. stonei*

**Leaves** smooth to somewhat bullate, upper surface green to dark green with markings to purplish or purple, lower surface paler with reddish veins or shades to dark red; blade narrowly cordate to cordate, 5–14 (-20) cm long, 2–12 cm broad; petiole 10–50 cm long, longest in continuously submerged specimens from slow-running water. **Spathe** 15–35 (-50) cm long, white on the outside, sometimes brownish/greenish toward the apex; limb more or less flat, 3–5 cm long, more or less backward twisted, ovate with a shorter or longer point, surface more or less smooth, yellow; collar zone broad, yellow, gradually merging into the white tube. Kettle inside



*C. cordata* var. *diderici*. Cultivated specimen from Jambi province, Sumatera. B 1296.

white. Chromosome number:  $2n = 34$ .

**Distribution:** Peninsular Malaysia and south-eastern most Peninsular Thailand.

**Habitat:** Small or larger streams with slow- or more quick-running water in lowland forests where it usually occurs submersed. The original habitats seem to be more slow-running streams in forest habitats with acid water and a thick layer of leaf peat, while some of the more disturbed habitats are with more quick-running water with a sandy bottom.

**Characteristics:** *C. cordata* var. *cordata* is characterized by the mostly smooth leaves with a green to green-brownish to brownish upper surface with markings; blade cordate. Spathe 15–35 (-50) cm long, kettle inside white, limb more or less flat, more or less backwards twisted, ovate with a shorter or longer point, surface more or less smooth, yellow, throat rather broad, with a distinct demarcation

to the outer part, gradually merging into the white tube.

***Cryptocoryne cordata* Griffith var. *diderici* (De Wit) N.**

**Jacobsen**

Synonym: *C. diderici*

**Leaves** dark green to olive brown on the upper surface, lower surface red, ovate, 5–9 cm long, and 3–5 cm broad, base more or less cordate, apex more or less rounded; petiole 10–15 cm long. **Spathe** 8–15 cm long, the upper part brownish on the outside; limb 2–3 cm long, ovate, acuminate, irregularly rough on the brownish to brown surface, with a clear yellow demarcation zone toward the white throat. Chromosome number  $2n = \pm 102$ .

**Distribution:** Sumatera.

**Habitat:** Slowly running forest streams.

**Note:** Var. *diderici* differs from the other varieties of *C. cordata* by having a more rough limb of the spathe that varies in colour from brownish to almost reddish. The inside wall of the kettle is white to purple (may have some fine red dots) and the top of the spadix is purple.

As you can see from the chromosome number it appears to be the same as that found in var. *siamensis*. Further investigations are needed to illuminate their relationships.

**Characteristics:** *C. cordata* var. *diderici* is characterized by the dark green to olive brown ovate leaves, base more or less cordate, apex more or less rounded. Spathe 8–15 cm long, kettle inside whitish, limb ovate, acuminate, irregularly rough on the brownish to red brown surface, with a clear yellow demarcation zone toward the white tube opening. Spadix



*C. cordata* var. *diderici*. Limb of spathe from cultivated specimen from Jambi province, Sumatera. B 1296.

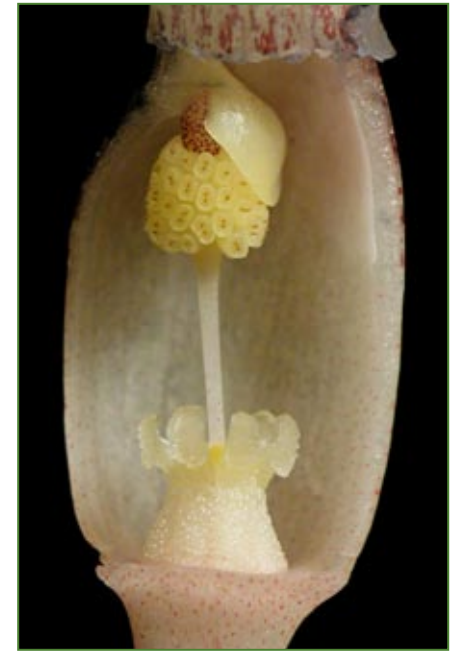
appendix purple spotted to almost purple.

***Cryptocoryne cordata* Griffith var. *grabowskii* (Engler) N.**

**Jacobsen**

Synonyms: *C. grabowskii*, *C. grandis*, *C. striolata* var. *cordifolia*, *C. cordata* ssp. *grandis*, *C. zonata*, *C. cordata* var. *zonata*, *C. "lastii"*

**Leaves** usually green to purple; blade ovate to cordate, lower surface pale green or more or less purple tinged to purple, 5–15 cm long, 4–10 cm broad, smooth to strongly bullate, margin entire, and with a more or less cordate base; petiole 5–25 cm long. **Spathe** 15–40 cm long; kettle 1–2 cm long, kettle inside white and purple spotted or with purple zone in the upper part or all



*C. cordata* var. *diderici*. Opened kettle from cultivated specimen, Jambi province, Sumatera. B 1296.

purple; tube 10–35 cm long, whitish; limb ovate, 3–5 cm long, surface yellow to brownish tinged, smooth to rough, with a distinct yellow demarcation zone or with a bulge at the demarcation. Chromosome number  $2n = 68$ .

**Distribution:** Borneo and Natuna Islands.

**Habitat:** In slow running forest streams and small rivers in deep mud or on sand banks, sometimes in small forest pools in dead arms of the stream. The water is often black and the plants may be situated deep in the plant debris.

**Characteristics:** *C. cordata* var. *grabowskii* is characterized by the usually green to purple ovate to cordate leaf-blades with a usually or more or less purple tinged to purple lower





- a. *C. cordata* var. *grabowskii*. Limb of spathe. Near Bati-Bati, Kalimantan. B 1025.
- b. *C. cordata* var. *grabowskii*. Limb of spathe. Near Banjarmasin, Kalimantan. B 1020.
- c. *C. cordata* var. *grabowskii*. Limb of spathe. Near Banjarmasin, Kalimantan. B 1003.
- d. *C. cordata* var. *grabowskii*. Limb of spathe. Sungai Siong (type locality), Kalimantan. B 1065.
- e. *C. cordata* var. *grabowskii*. Opened kettle from cultivated specimen. Sampit River Basin, Kalimantan. B 995.
- f. *C. cordata* var. *grabowskii*. Opened kettle from cultivated specimen. Natuna Island. B 1581.
- g. *C. cordata* var. *grabowskii*. Opened kettle from cultivated specimen. Sg. Meong, west of Kuching, Sarawak. NJS 04-2.



*C. cordata* var. *grabowskii*. Emergent cultivated specimen. Near Banjarmasin, Kalimantan. B 1020.



*C. cordata* var. *grabowskii*. Submerged cultivated specimen. Near Banjarmasin, Kalimantan. B 1003.

surface, smooth to strongly bullate. The **spathe** is up to 40 cm long, kettle inside white and purple spotted or with purple zone in the upper part or all purple; limb ovate, 3–5 cm long, surface yellow to brownish tinged, rough to verrucose; with a distinct yellow demarcation zone or with a bulge at the demarcation; spadix appendix purple spotted to almost purple.

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