

# *Cryptocoryne nurii* var. *raubensis*

a new calcicolous variety from Pahang, Peninsular Malaysia



Partly open and shaded habitat near Jerantut (Photo J.S. 26.05.2013).

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*A new variety, Cryptocoryne nurii* var. *raubensis*, has recently been described. It differs from var. *nurii* in the always short spathe tube, a relative long kettle and a peduncle that adjusts its length to the water depth. That the spathe acts as a floating buoy so that the opening is always above the water surface with an open entrance and exit for pollinating insects. The distribution and its calcicolous (thrives in soil rich in lime) ecology are discussed.

## Introduction

A somewhat odd-looking *Cryptocoryne* from the vicinity of Raub, Pahang, Peninsular Malaysia has attracted attention for more than 10 years. It was only after the col-

lections from 2002 and 2007 (with red-black spathe limbs) came into cultivation that the pattern became more clear. After the recent collections from 2011, it became evident that we were dealing with a special long peduncled aquatic limestone plant which was recently described as a new variety of *Cryptocoryne nurii* Furtado viz. var. *raubensis* Ganapathy & Siow.

## History

The first known (then unidentified) collection of *C. nurii* var. *raubensis* was made in the Taman Negara National Park in the Sungai Kalau at Kuala Negaran in 1970 (Sungai: Malay word for river).



*Cryptocoryne nurii* var. *raubensis*. Type locality after cutting of the oil palm plantation in 2009. Note the rain forest in the background.

In 1985 it was found in Sungai Yong and Ulu Sungai Nereus both near Bukit Guling Gendang, Taman Negara N. P. Over the years Over the years this plant had had the working name: “yellow *nurii*” due to its distinctly yellow limb of the spathe. Besides the yellow limb of the spathe the plant had rather distinct dark green leaves that were broadly ovate with pallid “dotted” veins.

In 2002 Herman Bernard Ganapathy collected var. *raubensis* in an area north of Raub, and sent pictures to Jan Bastmeijer for identification. The pictures of the limb of the spathe were difficult to interpret, as the structures of the limb were not clear: the limb was almost all black, and it was difficult to ascertain the structures of the limb. We guessed/suggested *Cryptocoryne nurii* due to

the recurved limb of the spathe, the distinct protuberances and the narrow collar opening.

In May 2007 Ganapathy and Joshua Siow (Siow, 2015 [blog date August 5, 2008]) visited the site again and provided some very good pictures of the locality and the plants found there, even though the structure of the limb of the spathe was still somewhat puzzling: these pictures were the first good ones showing the exact structure of the spathe. From this trip, collected plants came into cultivation, and upon flowering they confirmed the information provided by Siow: something related to *C. nurii*.

In 2008 Ganapathy found another locality near Jerantut where the stream was 2 – 3m wide with a sandy to rocky bottom. Most of the var. *raubensis* were found carpeting



*C. nurii* var. *raubensis*. Type locality after cutting of the oil palm plantation.

the stream flowing through a village and rubber estates. This dense growth could be due to the nutrient-rich run-offs from the rubber estates and the lack of canopy cover, which permits almost direct sunlight during some periods during the day. This was also observed near Raub in a “primary” forest where there was

very little light and nutrient runoffs, and here the stands were rather scattered and small. Whereas the moment the same stream came out from the forest and into the oil palm plantation, the population became more dense and luxuriant.

During a field trip to the region north of Raub in 2011, we had the opportunity to see the plants in their natural habitat at two localities, and could again confirm Ganapathy’s and Siow’s information.

In 2011, we also visited the Sungai Yong in the Taman Negara and saw populations in two places in the river. The first place was a 6–8m broad river where var. *raubensis* was found with immature spathes, which upon a mechanical opening revealed that the limb in one



Type locality after cutting of the oil palm plantation with plants actually forming the rapids.



Flowering *C. nurii* var. *raubensis* at the type locality – reddish spathe.

case was yellowish and in another case reddish. It was not possible to ascertain the exact colour of the limbs, but it was assumed that upon a natural opening the yellowish one could become pretty close to that found in 1985. Interesting enough var. *raubensis* was found growing together with *C. affinis* Hook.f. (with bullate, green to brownish leaves), partly in separate stands, but the two were also growing intermingled. The leaves of var. *raubensis* were in different shades of mottled brown and green. At the second site several hundred meters away in Sungai Yong we only saw var. *raubensis*, and here the leaves were in different shades of marbled green.



Stand of plants with green leaves at the type locality in 2007 (before the oil palm plantation was cut in 2009).



Flowering plant at the type locality – dark purple spathe.

### *Cryptocoryne nurii* Furtado var. *raubensis* Ganapathy & Siow

In Jacobsen & al. (2015). A new calcicolous variety of *Cryptocoryne nurii* Furtado (Araceae) from Pahang, Peninsular Malaysia. Malayan Nature Journal 65(4), 230 – 239.

**Leaves** more or less dark olive green, distinctly darker and lighter mottled brown to more green mottled to all green, the lower surface red to pale green; blade more or less smooth to grooved at the veins, more or less ovate to narrowly ovate with 2 – 3 pairs of prominent veins, sometimes lighter to reddish, 4 – 7 (-10) cm long, 2 – 4 cm broad with a more or less cordate base, margin



Sampled specimens to become part of the type collection: RR 11/32.



*Cryptocoryne nurii* var. *raubensis* with normal and whitish veined leaves.

sometimes crenulated; petiole 5–15 cm long, longest in deeply buried specimens.

**Spathe** 3–6 cm long, peduncle 2–15 (to more than 30) cm long, towards the upper part more brownish-purplish tinged on the outside; the unopened spathe with a characteristically half-round, re-curved limb abrupt narrowing into a tail-like appendage; kettle 2–3 cm long, tube less than 1 cm long; limb leathery like, 1.5–2 cm long, cordate, with a tail-like appendage, dark purple-black to deep red to brown to yellow irregularly transversely wrinkled with conspicuous, large, irregular protuberances along the margin; a rather narrow funnel-shaped, vertical opening into the tube; collar distinct.

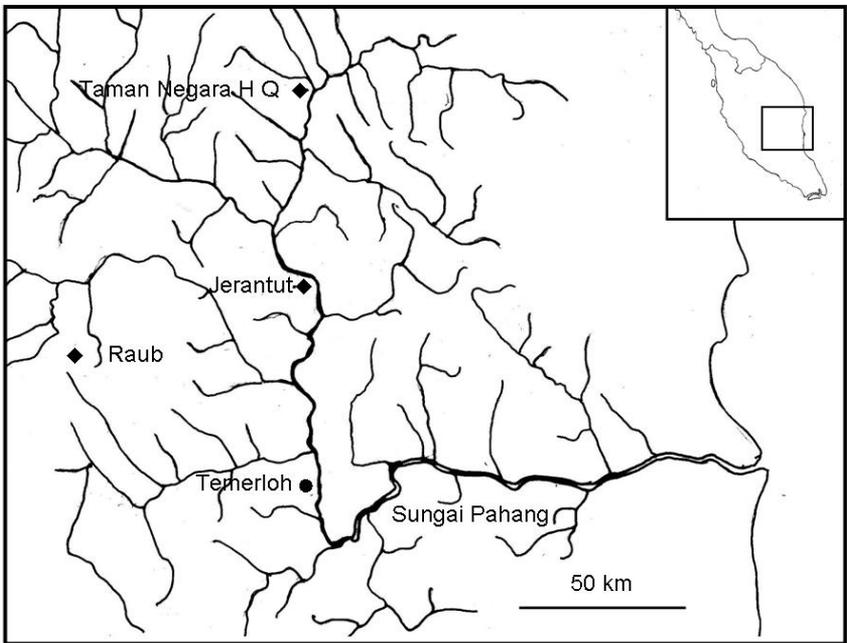
**Spadix** with 5–7 light greenish female flowers, with ovate stigmas;

olfactory bodies irregularly rounded, light yellow to greenish; male flowers 25–40, smooth.

**Infructescence** ovoid, with a rough surface; seeds brownish, smooth, 3–4 mm long; endosperm present, embryo cone-shaped, with an undifferentiated plumule. Chromosome number  $2n = 34$ .

**Distribution:** Peninsula Malaysia, Pahang, north of Raub and Jerantut, in tributaries to the Sungai Pahang. It may be assumed that it occurs in other places in the limestone region too.

**Habitat/ecology:** On clayey to sandy or gravel bottom in streams and rivers, in slowly to more quickly running water. Luxuriant stands may be found in places with very rapidly running water, where they seem to build up sand-gravel banks. In larger streams and rivers



This map shows most of the state of Pahang and the general catchment area of the Sungai Pahang running eastward into the South China Sea (other river basins are omitted). The emphasis is on the main Sungai Pahang and its larger river and stream tributaries, with the known distribution for *Cryptocoryne nurii* var. *raubensis* near Raub, Jerantut and the Taman Negara H. Q.



Photo J.S. 21.12.2008

Plants with mottled brown and green and more or less whitish veined leaves.



*Cryptocoryne nurii* var. *raubensis* cultivated for seven months in an aquarium at low water level.

the plants seem to be submerged most of the time, producing long peduncled spathes, while plants from places with low water may become emergent, with shorter peduncles. In all cases observed, the spathe itself has a total length of 3 – 6 cm with the characteristic long kettle, while it is the length of the peduncle that varies in length.

Under natural conditions var. *raubensis* would probably grow in more or less shaded places, but in places where the forest has been cut they can also thrive in full sunlight, provided they are submerged. If dried out, the deeply buried rhizomes will provide a basis for a renewed growth when the water rises again.

*C. nurii* var. *nurii* is a plant from the more acid rainforest found in the

south and south eastern part of Peninsular Malaysia (Othman & al. 2009), but is also found in Indonesia on the islands of Bintan, Lingga, Singkep and Sumatera (Bastmeijer, 2015).

In var. *nurii* the leaf shape varies from nearly lanceolate to cordate, and often with short red lines spread over the leaf surface (especially in Peninsular Malaysia). The main characteristic for var. *nurii* is that the surface of the limb is more or less covered with irregularly branched protuberances. Their density and shape may vary, as well as the basic colour of the surface of the limb may vary from yellow to light red to dark red and almost black. Generally the whole surface of the spathe is covered with protuberances, but in e.g. plants from Bintan they are rather few and small. The



Flowering cultivated specimen showing the variation in leaf colours.

shape of the limb varies from broadly cordate to narrowly ovate-lanceolate, recurved to flat open. However, none of them have the prominent transversally wrinkled surface of the limb with the marginal protuberances as in var. *raubensis*.

**Notes:** Plants with different leaf colours may grow separate or they may grow mixed together: to some extent, the different leaf colours are genetically constant, i.e. they are maintained in cultivation under uniform cultivation circumstances.

At the type locality north of Raub, it was remarkable to see that even though the plants were deeply rooted in the sandbanks the spathes on long peduncles protruded above the leaves and were bent sideways by the running water. The long flexible peduncle with an air-filled young spathe seemed to provide

a versatile vehicle—a buoy—to cope with quickly running water and varying water depths and being able to keep the spathe limb at the water surface. Only *C. noritii* Wongso (Wongso & Bastmeijer, 2005) from the limestone springs in eastern Kalimantan, which also has a short spathe tube, has a comparable length of the peduncle: spathe 3–4 cm long, peduncle 1–5–10 cm, but no information is available as to a maximum length of its peduncle. In other cases within the genus *Cryptocoryne*, long spathe tubes rather than long peduncles are found (e.g. *C. cordata* Griff. var. *cordata*, and *C. crispitula* Engl. var. *balansae* [Gagnep.] N. Jacobsen [see e.g. Bastmeijer, 2015]). This may be advantageous where they grow in the lowland rainforest, but at little higher altitudes in the limestone



Long peduncled spathe from an aquarium with deep water; scale 10 cm.

region the velocity of the water current may be so that the chance of successful flowering may be better with the spathe anchored to the bottom with a floating device, rather than having a long maybe more vulnerable tube emerging up through the water. Some other species of *Cryptocoryne* may also have long peduncles (*C. usteriana* Engl. (*C. Kettner*, pers. com.) but they then have long spathe tubes. Again other species of *Cryptocoryne* may also have short spathe tubes, but then other factors come into consideration, such as never really high water (e.g. *C. thwaitesii* Schott, Sri Lanka; Jacobsen, 1987), or that they live in inner mangrove areas (e.g. *C. ferruginea* Engl., Borneo; Jacobsen, 1980).

Siow (Siow, 2015; blog entry of December 22, 2008) reported some



Flowering specimen showing spathe with a yellow limb.

different-looking leaves found in var. *raubensis* at the type locality, i.e. with conspicuous whitish veined leaves and sometimes most of the leaf blade was whitish. The cause of this phenomenon is not clear. It could be a genotype of var. *raubensis*, which under certain environmental conditions develop these whitish or whitish veined leaves, resembling that found in *C. cordata* Griff. 'Rosanervig'. Perhaps it could be the influence of fertilizers or a combination of several factors. The pictures of carpets of var. *raubensis* show a mixture of plants with different leaf colours suggesting that there may be different genotypes in a given population, and that they react differently under the same environmental conditions.

**Cultivation:** As var. *raubensis* is a plant from limestone areas, it is



Spathe of cultivated specimen showing the branched protuberances along the limb margin.

generally easy to grow in an aquarium and under not too acid conditions in mineral soil. It will also grow in mineral soil with some leaf peat added, and even in only leaf peat. It flowers easily in cultivation, and in aquaria under differences in water depth, it clearly exhibits its characteristic feature, as peduncles of a length of more than 30 cm have been observed, with the limb protruding above the water.

Different leaf-forms are known in cultivation, viz. green, light brownish and darker brownish with lighter lines and markings. These colours may change in aquarium cultivation as brown-leaved leaf colours have been known to become all green and afterward back again to brown, depending on the nutritional conditions in the water (nutrient deficiencies).

**Characteristics:** *C. nuri* var. *raubensis* is characterized by the more rounded leaves with a more or less cordate base, often variously mottled, and without the short, red lines characteristic for many var. *nuri*; spathe leathery with a

characteristically recurved limb varying in colour from yellow to light brown to deep red to dark black purple with conspicuously, large, irregular protuberances along the margin, collar of the same colour as the limb.

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# *Cryptocoryne nurii* var. *raubensis*, flowering specimens

Photo N.J., 07.10.2010



Spathe with a yellow limb.

Photo J.D.B., 2014



Spathe with a light brown-reddish limb.

Photo J.D.B., 2014



Spathe with a reddish limb.

Photo J.D.B., 2014



Spathe with a reddish limb.

Photo J.D.B. 2011



Spathe with a reddish limb.

Photo J.D.B. 2010



Spathe with a dark purplish black limb.

Photo J.D.B. 2010



Spathe showing the short tube and the relatively long kettle.

Photo J.D.B. 2011



Spathe with a kettle cut open kettle showing the female flowers (bottom) and male flowers covered by the flap (top).