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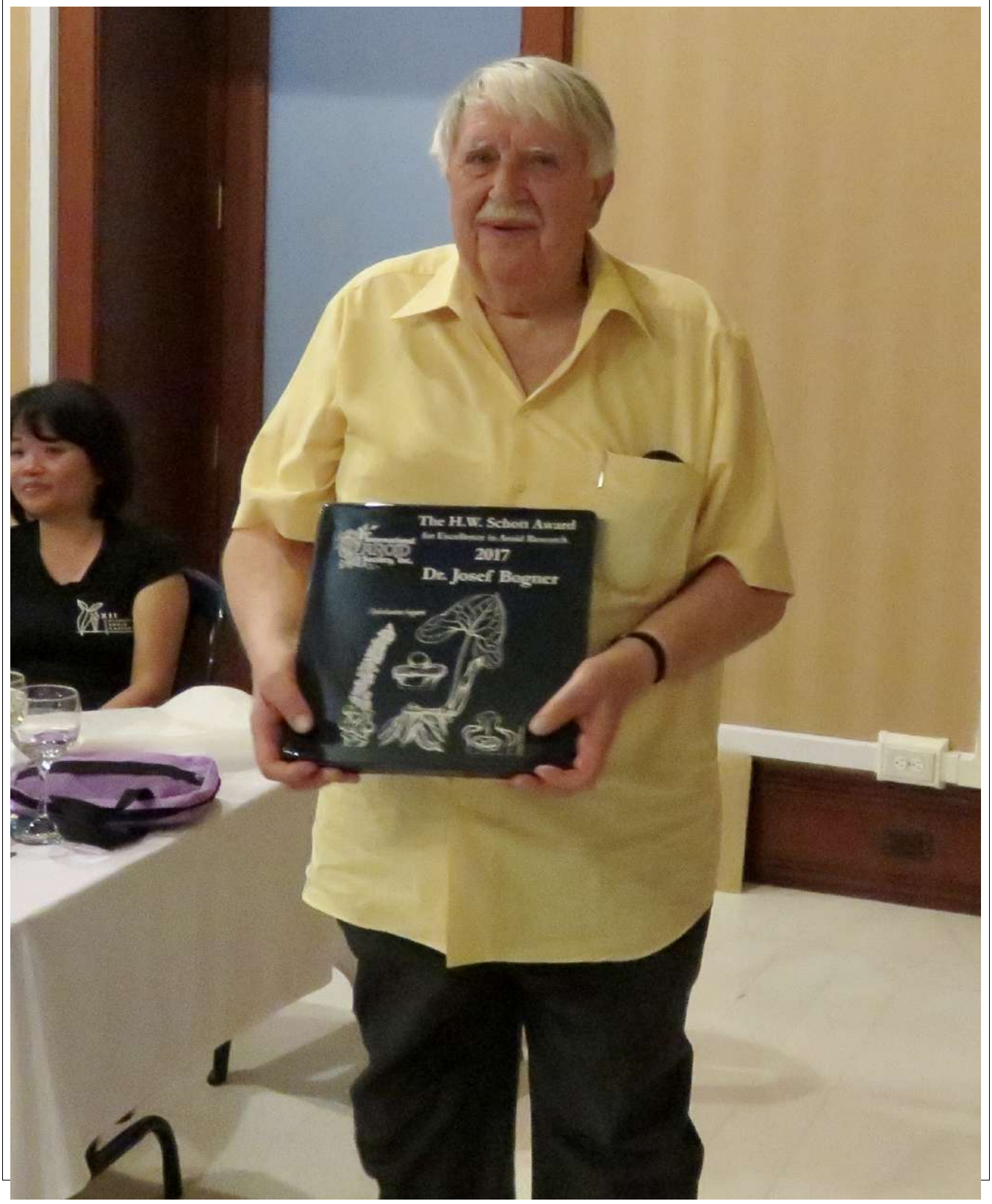

Josef Bogner — and the genus *Cryptocoryne*

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ABSTRACT

For more than 50 years, besides studying most of the genera in the Araceae, Josef Bogner also devoted much time to the genus *Cryptocoryne*, both field observations where he has seen more than 40 taxa in their natural habitats and in the cultivation of most of the species. He was an active member of informal groupings, and besides writing or co-authoring more than 40 papers on *Cryptocoryne*, he also promoted other people's work, and has been involved in all together more than 100 articles on *Cryptocoryne*.

KEY WORDS

Araceae, *Cryptocoryne*, South East Asia.

INTRODUCTION

When Josef's interest in the genus *Cryptocoryne* started, I do not know. One might expect that there may have been some correlation between his interest in Aroids and his employment at the Botanical Garden in München in 1968 and later becoming Garten Inspector, in charge of the greenhouses, where the aquatic and amphibious marsh plants were kept. However, there exist at least two letters from Josef to H.C.D. de Wit in Wageningen, in respect to questions about *Cryptocoryne*, one from 31st October 1965 regarding *Cryptocoryne gomezii* Schott (**Figure 1)**, later transferred to *Lagenandra gomezii* (Schott) Bogner & N.Jacobsen (Bogner & Jacobsen, 1987); the other letter dated 23rd August 1966 regarding *Cryptocoryne cognatoides* Blatter & McCann (**Figure 2)** later becoming *Cryptocoryne spiralis* (Retz.) Wydl. var. *cognatoides* (Blatter & McCann) Yadav, Patil & Bogner (Yadav et al., 1993). H.C.D. de Wit was professor of botany in Wageningen 1959–1980, and had an interest in aquatic plants, especially *Cryptocoryne*, perhaps originating from his stationing in Bogor in the years 1941–1946. Upon returning to the Netherlands and Wageningen he had begun a study of the genus *Cryptocoryne*, published in various articles (see Bogner & Bastmeijer, 2001), and had published books on aquarium plants in 1957 and 1966. So, Josef's interest in *Cryptocoryne* can be traced to before he obtained his degree in horticulture, either

during his stay at the University Botanic Garden, Cambridge (U.K.) or during his training as a horticultural engineer in Weinstephan with a degree in 1966 (Renner & Mayo, 2020).

Before 1960 it was only about a dozen species of *Cryptocoryne* species that were in cultivation in Europe. With the imports flowing in during the 1960s and 70s more than 30 species were in cultivation in Wageningen (de Wit, 1971). During the 80s and 90s, with new cultivation methods applied, that number rose to more than double (Jacobsen, 1992; Bastmeijer, 2021) and today we have had all more than 100 known taxa in cultivation.

FIELD TRIPS

Josef made a short trip to Thailand, Malaysia, and Singapore in March 1971. In Johor he collected *Cryptocoryne cordata* Griff., *C. ciliata* (Roxb.) Schott var. *ciliata*, *C. nurii* Furt. var. *nurii* (**Figure 3)** and *C. schulzei* De Wit (**Figure 4)**, the latter had just been found in 1970 and described in 1971 (Bogner, 1972). In Singapore he visited the nursery of Mr. Lim Chua Hoe, where he saw different species collected from various places (e.g., *Cryptocoryne bullosa* Engl. from Sarawak, from Henry Ong, and he also saw *C. albida* Parker, *C. blassii* De Wit *and C. siamensis* Gagnep.), but he did not collect any *Cryptocoryne* during his stay in Singapore and Thailand.

In 1973 Josef made a trip to India and Sri Lanka. He went to the Calcutta Botanical Garden (as it was then known; now the Acharya Jagadish Chandra Bose Indian Botanic Garden), where he visited the famous herbarium to study the historical material of Araceae and of course *Cryptocoryne* and *Lagenandra*. He continued to south-western India, where he collected *Lagenandra meeboldii* (Engl.) C.E.C.Fisch. and *L. ovata* (L.) Thw., *Cryptocoryne spiralis* (Retz.) Wydl., and *C. retrospiralis* (Roxb.) Kunth (**Figure 5** & **6**). In Sri Lanka he collected *Lagenandra ovata*, *L. lancifolia* (Schott) Thw., *L. thwaitesii* Engl. and *L. koenigii* (Schott) Thw. (*L. bogneri* De Wit was based on plants commercially imported from Sri Lanka and picked out by Josef in 1973). In the south-western part of the island, he found a new species of *Cryptocoryne* (**Figure 7** & **8**) which would be named *C. bogneri* Rataj (syn. *C. bogneri* De Wit, published a few months after Rataj's publication), and *C. beckettii* Trim. (syn. *C. petchii* Alston) (Bogner, 1974). After a series of 23 articles in the Dutch aquarium journal 'Het Aquarium' from 1958–1971, de Wit (1971) published a new version of his book *Aquarienpflanzen* dealing extensively with *Cryptocoryne* and *Lagenandra*, which also had new excellent line drawings of all species (drawn by I. Zewald), and a list of chromosome numbers of 19 *Cryptocoryne* species (provided by R.A.H. Legro, Wageningen).

So, from Josef's own experiences from SW India, Sri Lanka, Singapore, Peninsular Malaysia, and Thailand, and with de Wit's articles and book from 1971, Josef

had a pretty good idea of what was going on in *Cryptocoryne*, and with his keen eye, he was able to spot inconsistencies and deviating forms and colours.

With my first contact with Josef about *Cryptocoryne* in 1974 (letter of September 29, 1974; Jacobsen, 2020), and my own trip to Sri Lanka in March 1975, the basis was no doubt laid out for future contacts over all the years — letter exchanges [other parts of the story of Josef and *Cryptocoryne* was published in the IAS Newsletter (Jacobsen, 2020)]. A classical *Cryptocoryne* locality around Kandy is Halloluwa in the Mahaweli Ganga running along the Botanical Garden in Peradeniya. Here four species and a hybrid of *Cryptocoryne* were growing among each other (Jacobsen, 1976). Part of Josef's interest was no doubt that I was counting chromosomes and was able to make sense of the previous puzzling chromosome numbers in the genus (Marchant, 1972, 1973; de Wit, 1971). It was partly also due to a new understanding of the somewhat puzzling taxonomy within the $2n = 28$ chromosome group of the Sri Lankan *Cryptocoryne* species, complementary to de Wit's 1971 contribution (The $2n = 28$ group of Sri Lankan *Cryptocoryne* are among the best suited for aquarium use), and partly due to a new interpretation of what *C. nevillii* Hook.f. really was (Jacobsen, 1976). I am quite sure it tickled Josef that *Cryptocoryne nevillii* was a plant with a more than 20 cm long spathe with a black-purple spathe limb and collar with even darker spots in the tube opening (**Figure 9)**. And that the *C.* "*nevillii*" of the aquarium world, had a less than 10 cm long red purple spathe, and had a reduced pollen fertility, indicating that it was a hybrid, *C.* ×*willisii* Reitz (*C. beckettii* Trim./*C. walkeri* Schott × *C. parva* De Wit) (Jacobsen, 1977a, b). Dan Nicolson managed to collect live material from the Baticaloa region, in February 1979, proving beyond doubt that *Cryptocoryne nevillii* was completely different from what was previously known (Jacobsen, 1981). This species has a distinct resting period in nature during the dry season, not necessary in cultivation, but it helps to know that it does not grow vigorously during the whole year.

In the years after 1975, Josef and I continued to correspond on *Cryptocoryne* (and *Lagenandra*) and met on several occasions for aquarium society meetings in The Netherlands and Germany. In the summer of 1977, I was touring the major herbaria of Europe to study the grass genus *Hordeum* (barley), passing through Firenze to see Beccari's Borneo collections, Wien to see Schott's drawings, and München to see Josef. There we had some good days talking all about *Cryptocoryne* and my latest trip to Thailand in February 1977 and the implications of the collected material, and opening possibilities of making a joint trip to Malaysia (Jacobsen 2020).

The trip to Peninsular Malaysia and Sarawak materialized in the first four weeks in September 1978. We jumped on the same plane from Frankfurt to Singapore, and after landing in Singapore Mr. Lim Kim Kiat, of South Island Aquarium, managed

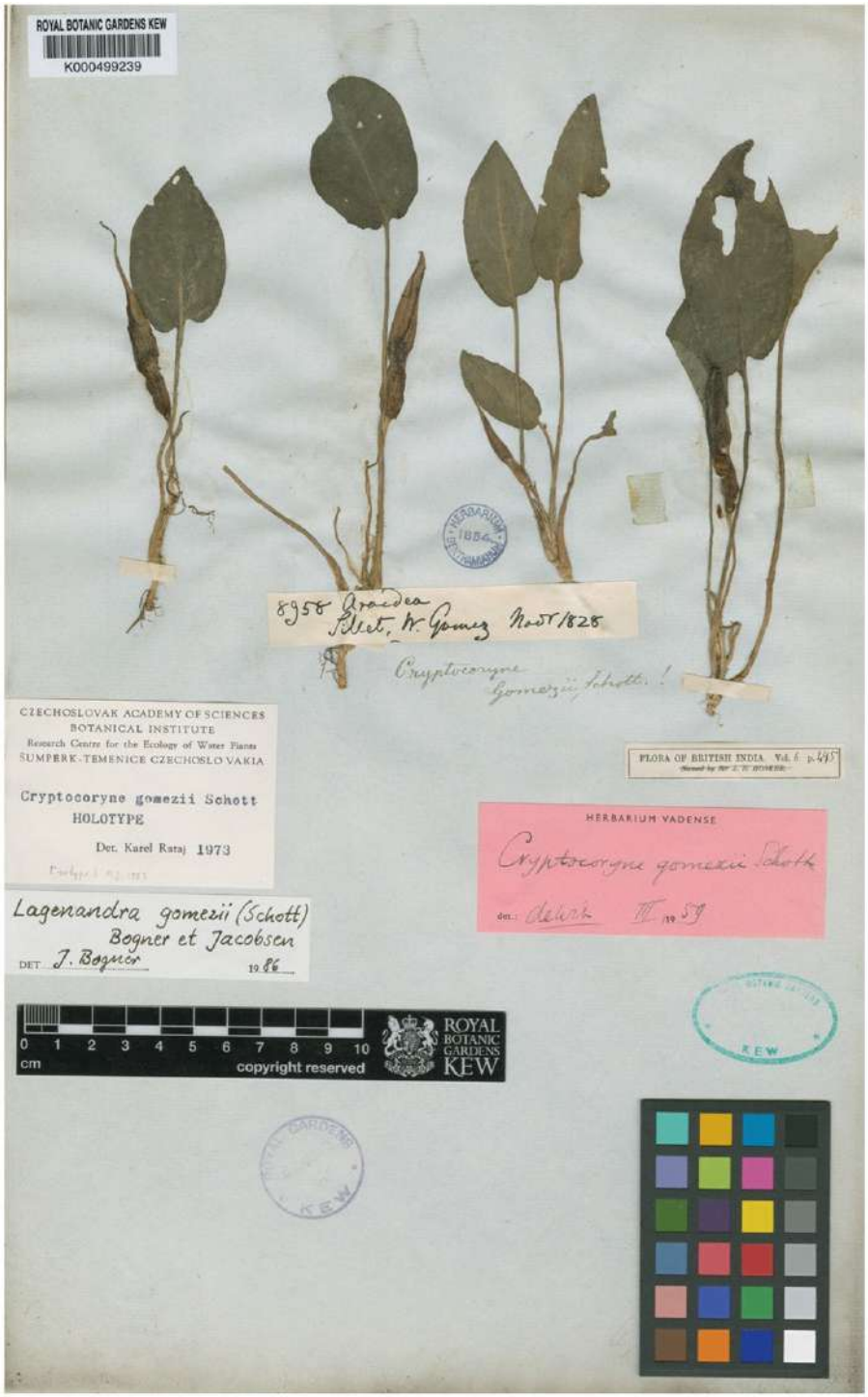

Figure 1. *Cryptocoryne gomezii* Schott — now *Lagenandra gomezii* (Schott) Bogner & N. Jacobsen (1987), has not been seen since its discovery in Sylhet in 1828. This species was the subject one Josef's letter to H.C.D. de Wit in 1965. A renewed study of the type specimens revealed that the single whorl of female flowers was free of each other and the leaf margins were involute, both characteristics of *Lagenandra*. Photo: The Herbarium Catalogue, Royal Botanic Gardens, Kew. Published on the Internet http://www.kew.org/herbcat [accessed on 15 04 2021]

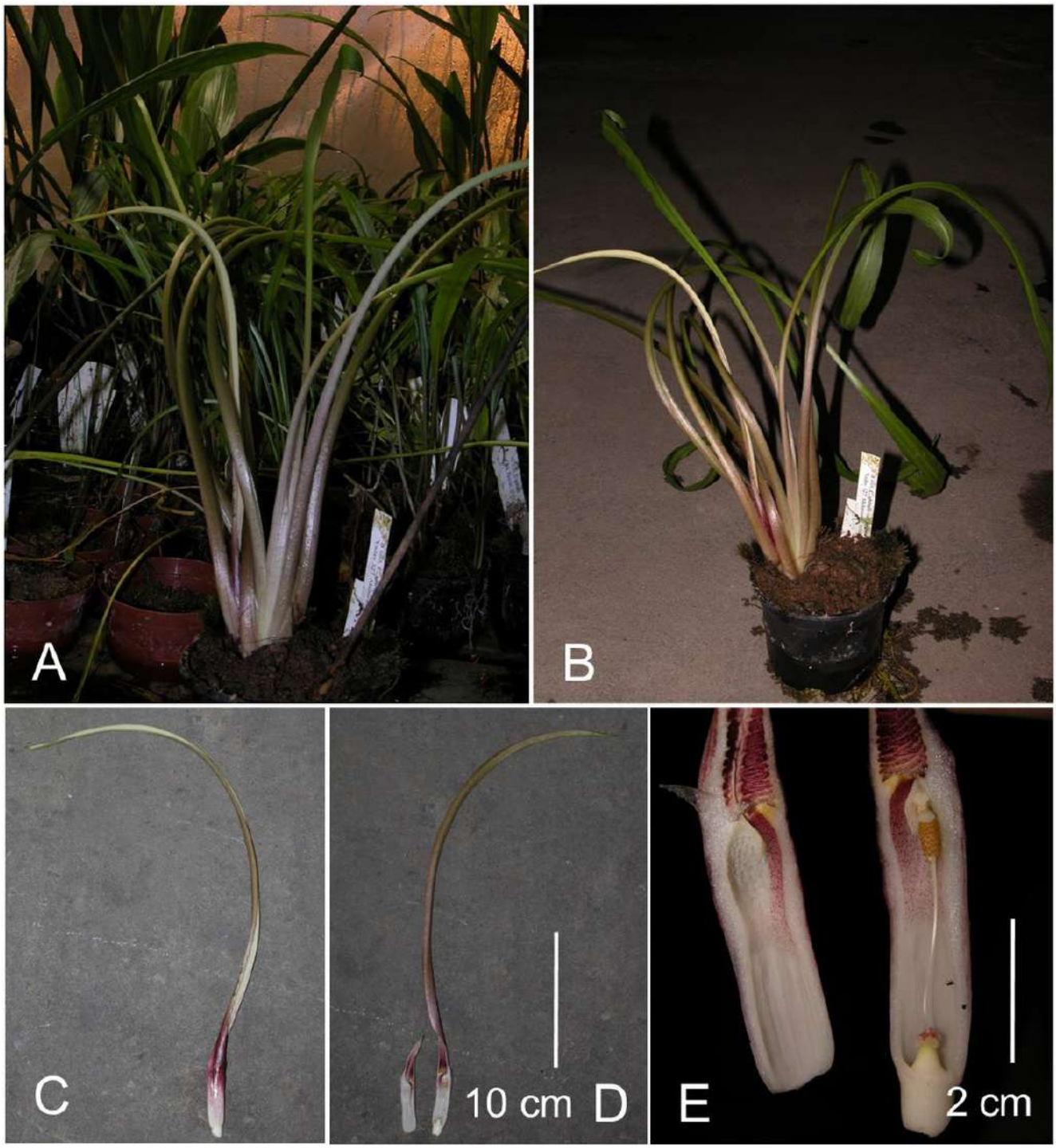

Figure 2. *Cryptocoryne spiralis* (Retz.) Wydl. var. *cognatoides* (Blatt. & McCann) Yadav, Patil & Bogner (1993); *Yadav 327* (= *B 669*), Amboli, Maharashtra. October 1990. This variety was the subject of Josef's letter to H.C.D. de Wit in 1966. **A.** Cultivated plant in situ in the greenhouse; **B.** The potted plant with the long yellow spathe limb; **C.** Cut off spathe showing the long yellow spathe limb; **D.** As C but the kettle cut open; **E.** Close up of kettle showing female flowers, reddish olfactory bodies, the long naked axis, male flowers, appendix, and flap. Photos by N. Jacobsen.

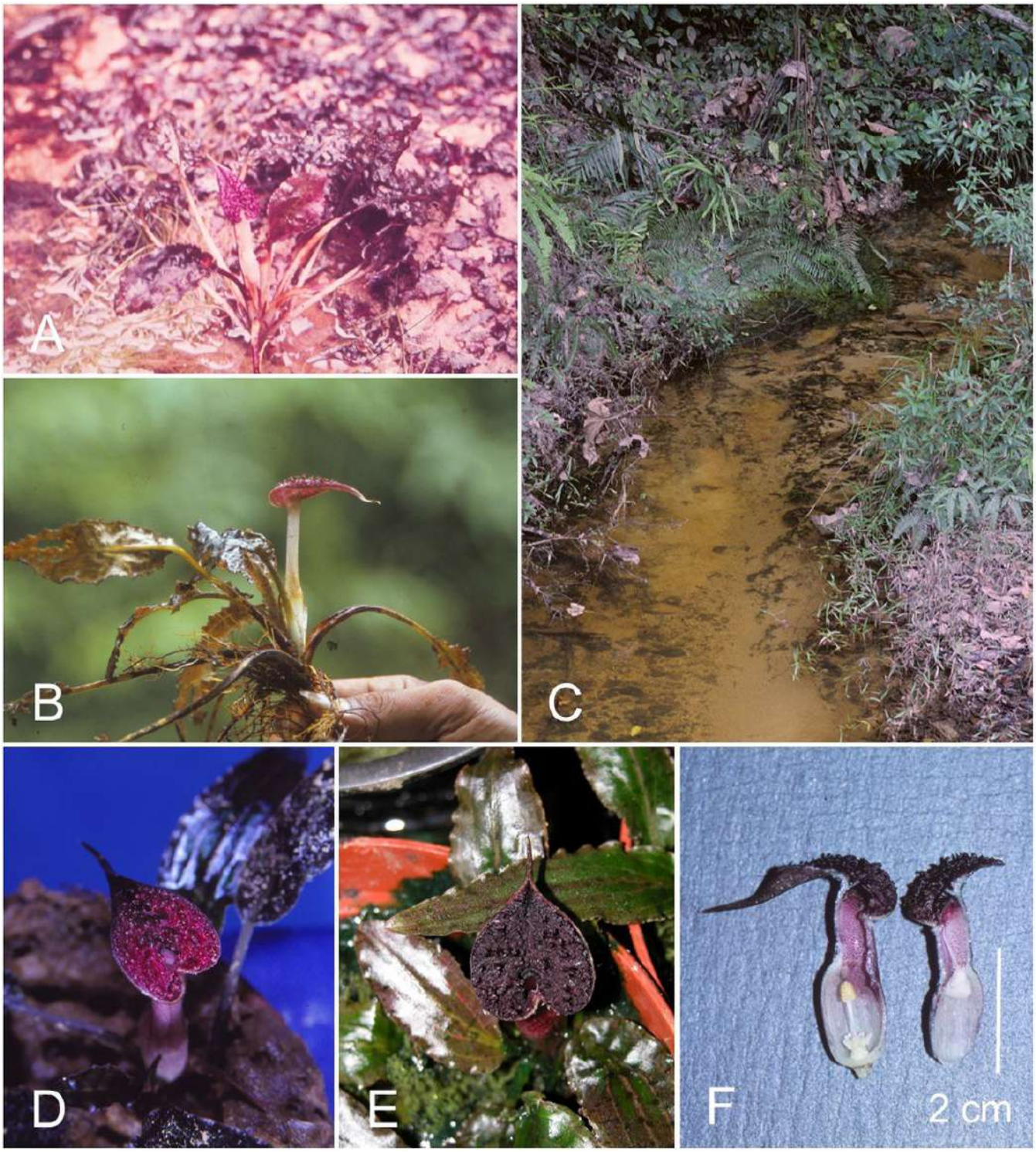

Figure 3. *Cryptocoryne nurii* Furt. var. *nurii*, near 32 km stone Mersing to Kluang, Johor. **A.** *Bogner 362*. 10 March 1971; **B.** *NJ 78–59*. 25 September 1978; **C.** Habitat. 14 February 2001; **D.** *NJ 78–59*, cultivated specimen; **E-F.** *NJM 01–09*, cultivated specimens. 14 February 2001; **E.** Spathe surface with irregular branched protuberances; **F.** Longitudinal section of spathe showing female flowers, the naked axis, male flowers, appendix, and flap. Photos A-B by J. Bogner, C-F by N. Jacobsen.

Figure 4. *Cryptocoryne schulzei* De Wit. **A & B.** Josef's original photographs from south of Mersing, Johor, *Bogner 364*. 10 March 1971; **C.** Submerged stand of plants in the recreational park at Hutan Lipur Panti, N of Kota Tinggi, Johor, *NJM 04–22*. 4 December 2004; **D & E.** Emergent cultivated plants of *NJM 22–04*; the three white labels indicate hybridization attempts. Photos A-B by J. Bogner, C-E by N. Jacobsen.

Figure 5. *Cryptocoryne spiralis* (Retz.) Wydl. var. *spiralis*, *Bogner 1829*, India, Kerala, near Ramanathukara, rice field after harvest. 25 November 1986. **A.** Habitat showing plant with open spathe; **B.** Dug up plants showing habitus with spathes; **C.** Different spathe shapes from one population. Photos by J. Bogner.

Figure 6. *Cryptocoryne retrospiralis* (Roxb.) Kunth. **A-B.** *Bogner 517*, India, Karnataka, Hassan Distr., Nethravathi River, cultivated specimen. 24 February 1973. **A.** Spathe limb with the characteristic red spots; **B.** Cut open kettle with the basal female flowers, the red spotted olfactory bodies, naked axis, yellow male flowers and the red spotted flap; inner kettle wall more densely red spotted upwards; **C.** *Bogner 1852*, Kerala, Maluppuram distr., Parakkabavu River Habitat with halfway submerged plants. 27 November 1986; **D.** *SW 2003*, Karnataka, Kodagu Distr., below dam at Harangi Reservoir, Kaveri River.17 January 2020. Habitat along riverbanks in disturbed situation. Photos A-B by N. Jacobsen, C by J. Bogner and D by S. Wongso.

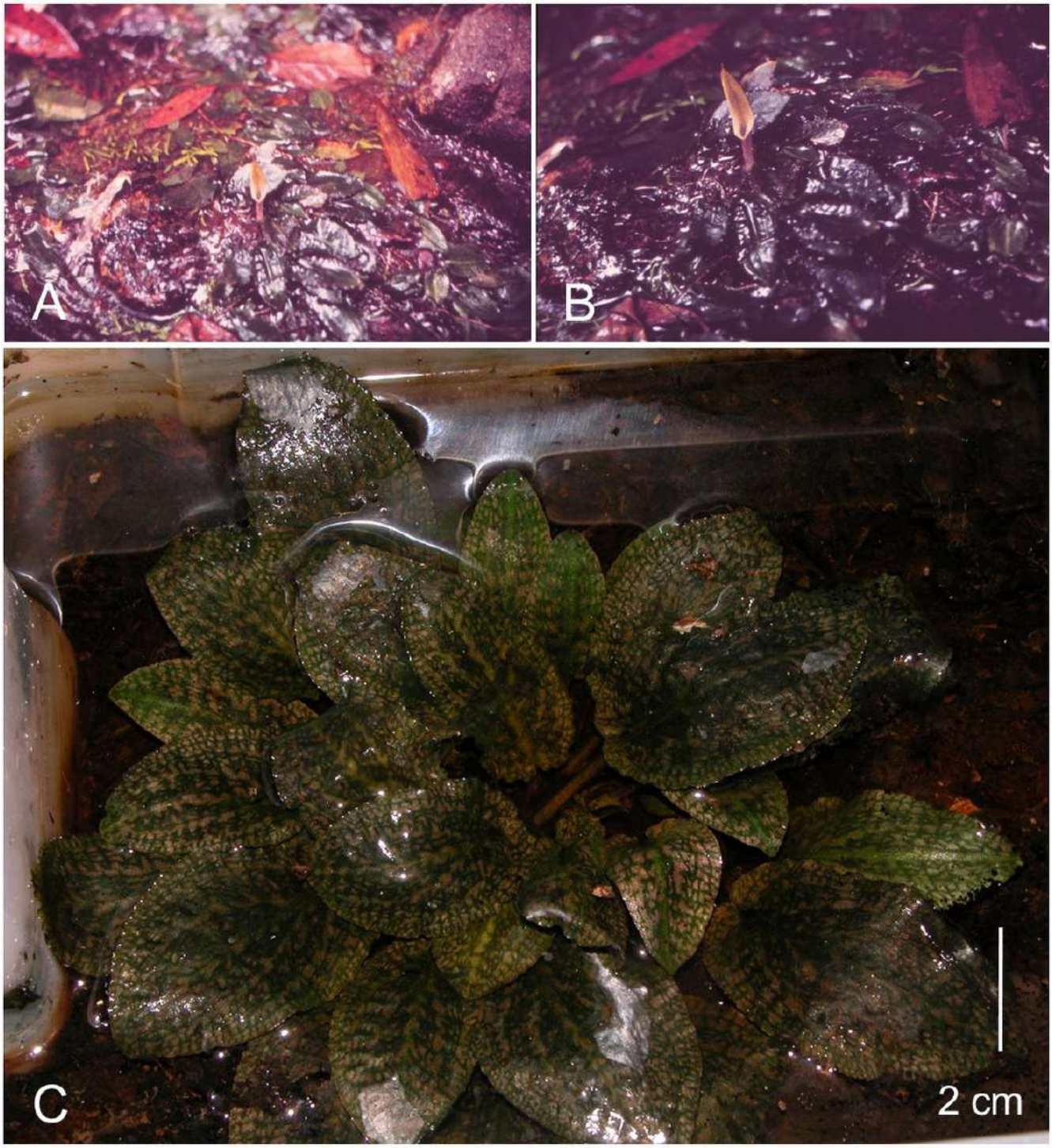

Figure 7. *Cryptocoryne bogneri* Rataj. **A-B.** *Bogner 484* (type specimen), Sri Lanka, Atweltota. 15 February 1973; **C.** *NJ 3100*, 1979, commercial import, cultivated specimen in 5 l tank. Photos A-B by J. Bogner C by N. Jacobsen.

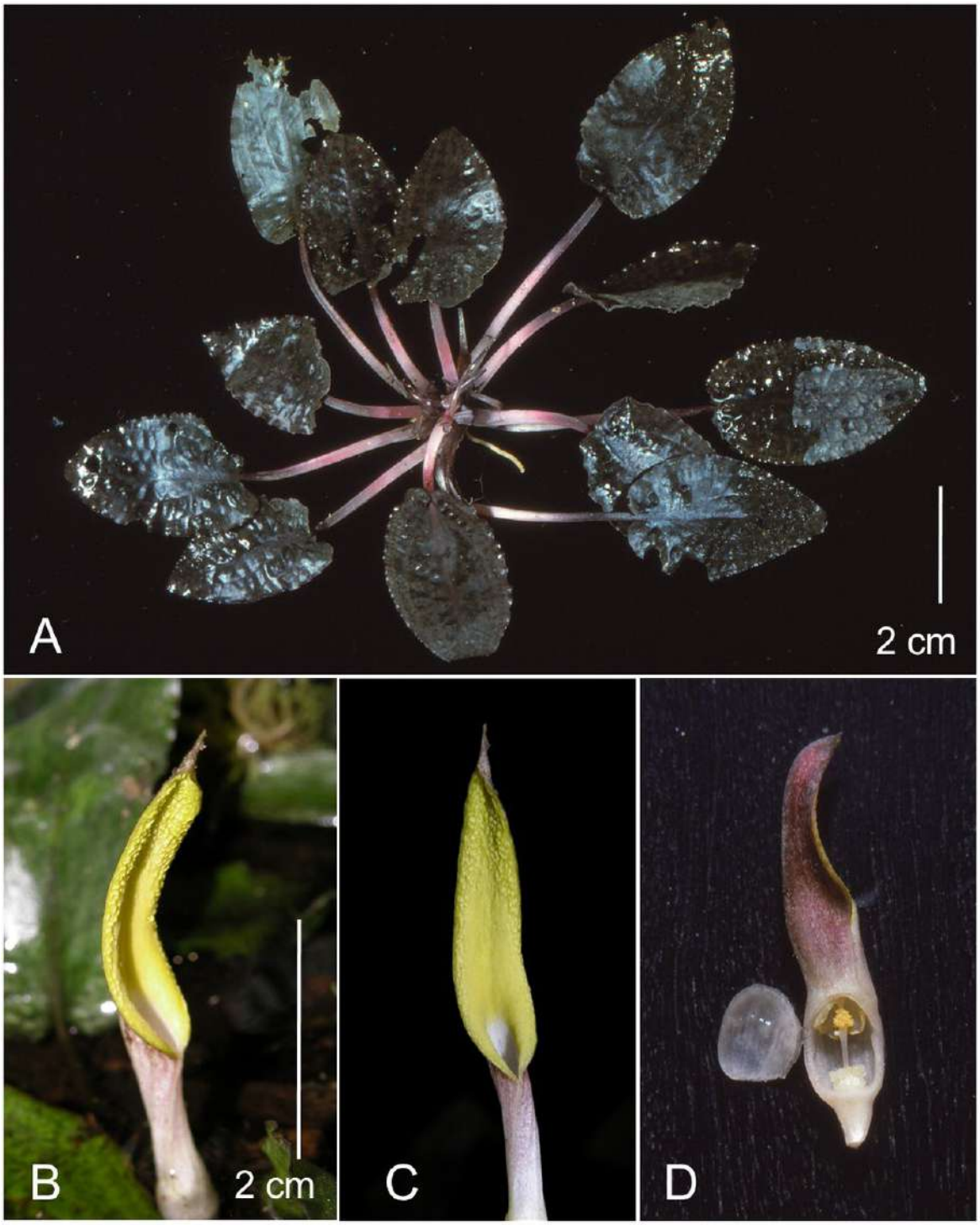

Figure 8. *Cryptocoryne bogneri* Rataj. **A.** *NJ 2934*, commercial import, cultivated specimen in 5 l tank. 12 July 1975; **B-C.** *NJ 3100*, commercial import, forward bent spathe limb with a slightly rough surface apically and towards the margins. 1979; *NJ 2917*, commercial import, spathe in lateral view with cut open kettle showing female flowers, naked axis, male flowers, and flap. 20 November 1974. Photos by N. Jacobsen.

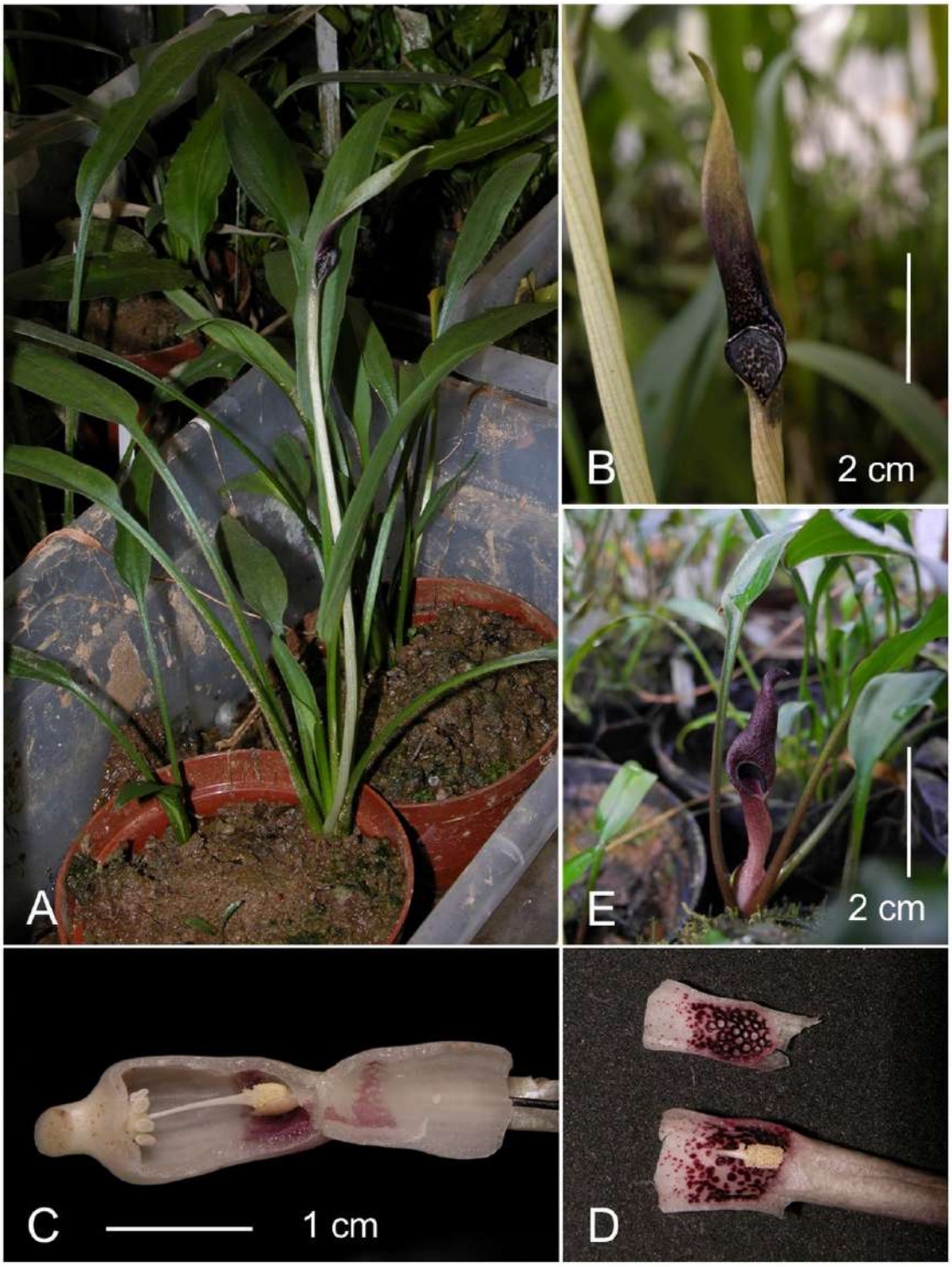

Figure 9. *Cryptocoryne nevillii* Hook.f., **A-D.** *NJ 3234*, Manresa Mission, 'Tropica' cultivated. 21 August 1981. **A.** Flowering plant with a c. 20 cm long spathe; **B.** Spathe limb with the characteristic long limb, raised collar and black purple spotted opening; **C.** Kettle cut open showing female flowers, naked axis, male flowers partly hidden behind flap and the purplish upper part around the male flowers; **D.** Cut open kettle showing upper part purple spotted and the alveolae in the wall clearly visible; **E.** *Cryptocoryne* ×*willisii* Reitz, NJ 23–18, Halloluwa, Kandy. 23 March 1975. Previously presumed to be *C. nevillii*. Photos by N. Jacobsen.

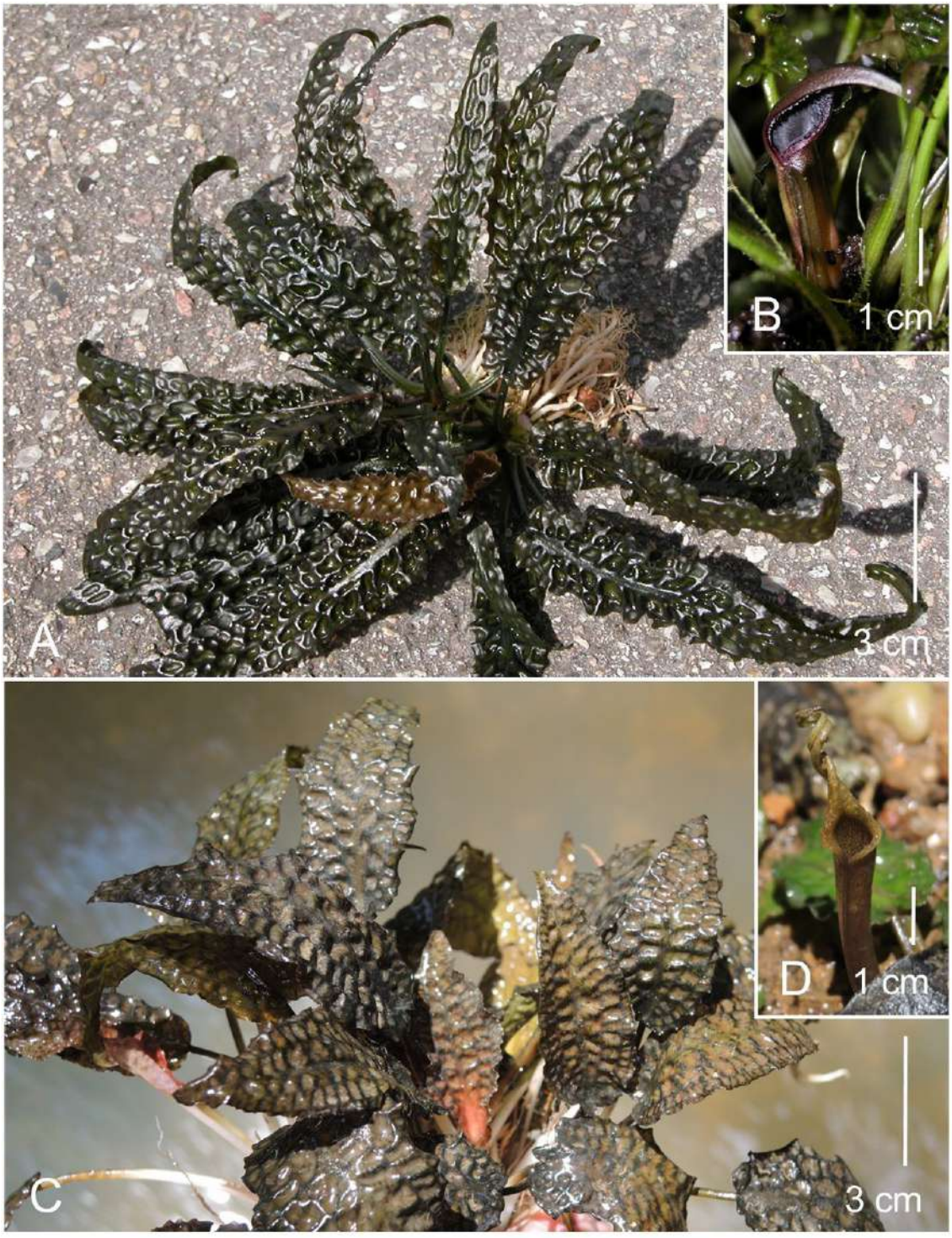

Figure 10. *Cryptocoryne bullosa* Engl., Sarawak, NJ 3422, Sarawak, cult. **A.** Plant with the narrow bullate leaves, 2*n* = 34; **B.** Spathe with the characteristic forward bent, black purple limb; **C.** *C. keei* N. Jacobsen, Sarawak, *NJ 14–31,* Sarawak, Sungai Sedian, Kpg. Sago. Plant with ovate-lanceolate, bullate leaves, 2*n* = 20. 20 August 2014; **D.** Spathe with the characteristic narrow, recurved, coiled limb. Photos by N. Jacobsen.

to send us off to Mr. Henry Ong Kee Chua, Kuching, who with great hospitality took us through the main *Cryptocoryne* localities in Sarawak (Jacobsen, 1985; a paper in which we described *C. hudoroi* Bogner & N.Jacobsen, from SE Kalimantan). We spent three weeks in Sarawak where we managed to see eight species of *Cryptocoryne* and other Araceous genera and whatever was on our way. A ninth species, which was later to become *Cryptocoryne keei* N.Jacobsen, was sent to us in Singapore after we departed Sarawak but before we left for Europe. We did go to see the locality, but heavy rains did not permit us to go into the river, a main river just outside Bau; at the time we thought the plant was *Cryptocoryne bullosa* ($2n = 34$), but it proved to have a hitherto unknown chromosome number of $2n = 20$ which showed us the light (**Figure 10)**. One species which we apparently could not find during our stay in Sarawak, even though the type specimen was from Kuching, was *Cryptocorne ferruginea* Engl. (**Figure 11)**, characterized by trichomes on the lower leaf surface, until we discovered that it did not always have the trichomes, and this varied even within the leaves on one plant. The Kuching localities were of course gone when we visited Sarawak, but we did find it in Henry Ong's tanks, from W of Kuching near Batu Kitang but also at the Stapok Forest Reserve (and since then several other places). This led us to elaborate on the *Cryptocoryne* inhabiting the tidal zones (Jacobsen, 1980).

Upon our return to Singapore Mr. Lim Kim Kiat took us through the traditional two-day trip around Johor where we saw five species of *Cryptocoryne*, among them *C. schulzei* which Josef had already seen during his trip in 1971, and visited Josef's old locality for *C. ciliata* (var. *ciliata*), a species which followed Josef for many years to come (**Figure 12)**. In Singapore we visited Mr. Lim Kim Kiat's farm, obtained additional *Cryptocoryne* samples, and we also visited Mr. Y.W. Ong, a well-known aquarium plant and fish exporter, and obtained additional *Cryptocoryne* samples.

On our 1978 trip one purpose was to collect root tips for chromosome counting in *Cryptocoryne*. I brought along my own self-constructed field kit box, measuring some 6 × 12 × 18 cm, made from a solid cardboard herbarium shelf bottoms, and taped together with a cloth-like tape, and inside were three plastic bottles with alcohol, acetic acid, and a diluted solution of colchicine. The root tips were pre-treated in colchicine, fixed in a mixture of alcohol and acetic acid, and stored in small 2 ml. plastic tubes until we returned home. Josef was a bit intrigued with me sitting in the mud, with forceps, and washing muddy root tips — and he naturally told me when he thought that I should take some more.

After our 1978 trip there were some years where we both had to work with various things, among them *Cryptocoryne*. In 1985 we managed, with the support of the Carlsberg Foundation, to take a month-long trip to Peninsular Malaysia and Sumatera. We toured the peninsula from north to south and from west to east, finding

altogether four species which we had not seen during our 1978 peninsula trip. We were quite excited when we relocated *Cryptocoryne elliptica* Hook.f. in the northern part of the Gunong Bongsu region, a species not seen since 1940 and before that not since 1862 and 1888. It proved to have a peculiar mode of vegetative propagation by a bud dislocated on to the petiole which may break off with the bud and form a new plant (**Figure 13** & **17**; Jacobsen et al., 1989). We continued to Sumatera where Erizal Mukhtar from the University of Padang guided us through a week around central Sumatera, and we found five species of which only *C. longicauda* had been encountered in Sarawak in 1978. Some uncertainty had surrounded *Cryptocoryne pontederiifolia* Schott, described in 1863, as the exact size and shape of the spathe was not known. After the discovery and the examination of a hidden spathe on the type specimen, and the recollection of a matching specimen at Tapakis, North of Padang, the identity was clear (**Figure 14)**.

Besides our joint trips, Josef went to the Philippines in 1983 where he wanted to investigate the problem of *Cryptocoryne usteriana* Engl. versus *C. aponogetifolia* Merr., and he visited the small island of Guimaras, which is the type locality for *C. usteriana*. He came back a bit disappointed because he only found a small *Cryptocoryne* of a little more than 5 cm long and thought he "only" found *C. pygmaea* Merr. However, it turned out, after Josef's Guimaras plant had been cultivated for some time that he had found some diminutive, starving plants of *C. usteriana* which when cultivated under proper conditions, grew to a leaf length of more than 60 cm and had a spathe with a yellow limb quite different from *C. aponogetifolia* (**Figure 15;** Bogner, 1984). On the same trip he also found *Cryptocoryne aponogetifolia* on a classical locality by Mt. Bulusan on the southern tip of Luzon.

Josef went to India again in 1986, and met with and travelled together with M. Sivadasan to see more *Cryptocoryne* and *Lagenandra* and found two species which he had not seen before, *C. spiralis* (several different types, one which was to become var. *caudigera* Bogner (Bogner, 2013) and what was later to become *C. sivadasanii* Bogner (Bogner, 2004) (**Figures 16** & **17**) which proved to have an unusual vegetative propagation from a dislocated bud situated at the proximal end of the root.

In a trip to Sarawak in 1994 Josef collected a broad-leaved form of *Cryptocorne ciliata* with long stolons at Saratok. The narrow-leaved *C. ciliata* var. *ciliata* with long stolons is diploid with $2n = 22$, and the broad-leaved *C. ciliata* var. *latifolia* Rataj with short stolons is triploid with $2n = 33$ (**Figure 18)**. After more than 20 years watching his broad-leaved plant with long stolons in cultivation in München (**Figure 19)**, he turned it over to us for checking, and it turned out to be tetraploid with $2n = 44$ and subsequently named *C. ciliata* var. *bogneri* N.Jacobsen (Jacobsen et al., 2018).

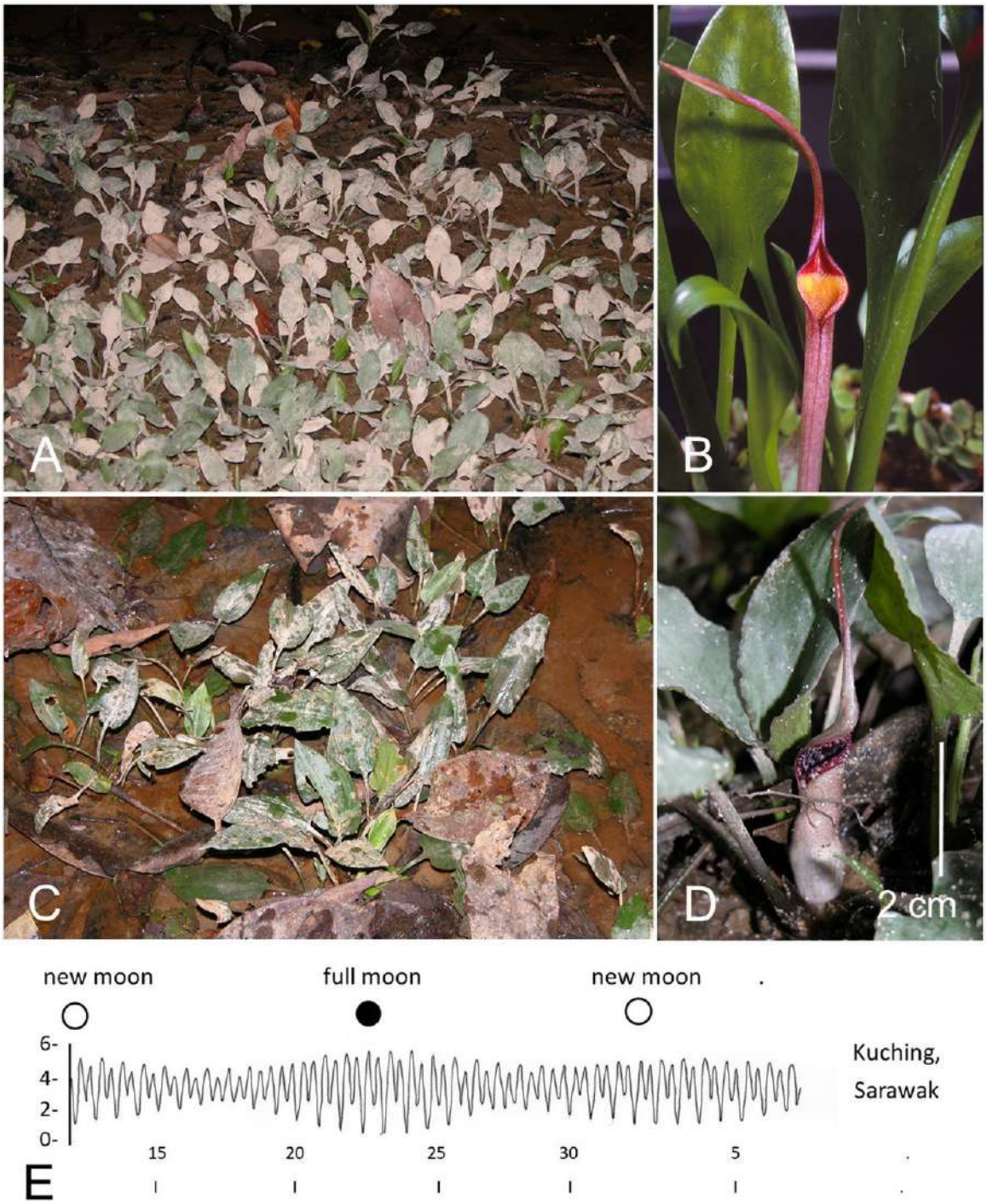

Figure 11. A-B. *Cryptocoryne lingua* Engl., *NJS 04–03*, Sarawak, NE Bau, small tributary to Sg. Sarawak Kanan, behind the nursery of 'Malesiana Tropicals'. 28 November 2004. **C-D.** *Cryptocoryne ferruginea* Engl. var. *ferruginea, NJS 04–04*, same locality as A-B, but grows upstream from *C. lingua* with *C. ciliata* downstream. **E.** The tidal oscillations from Kuching shown in the period 10 December 2018 to 8 January 2019, with minimum amplitudes between new moon and full moon and again between full moon and new moon. The diagram illustrates how it is possible for these small herbs to survive, flower and proliferate in the inner mangrove areas, and specific locations that become emergent midway between new and full moons. Photos by N. Jacobsen.

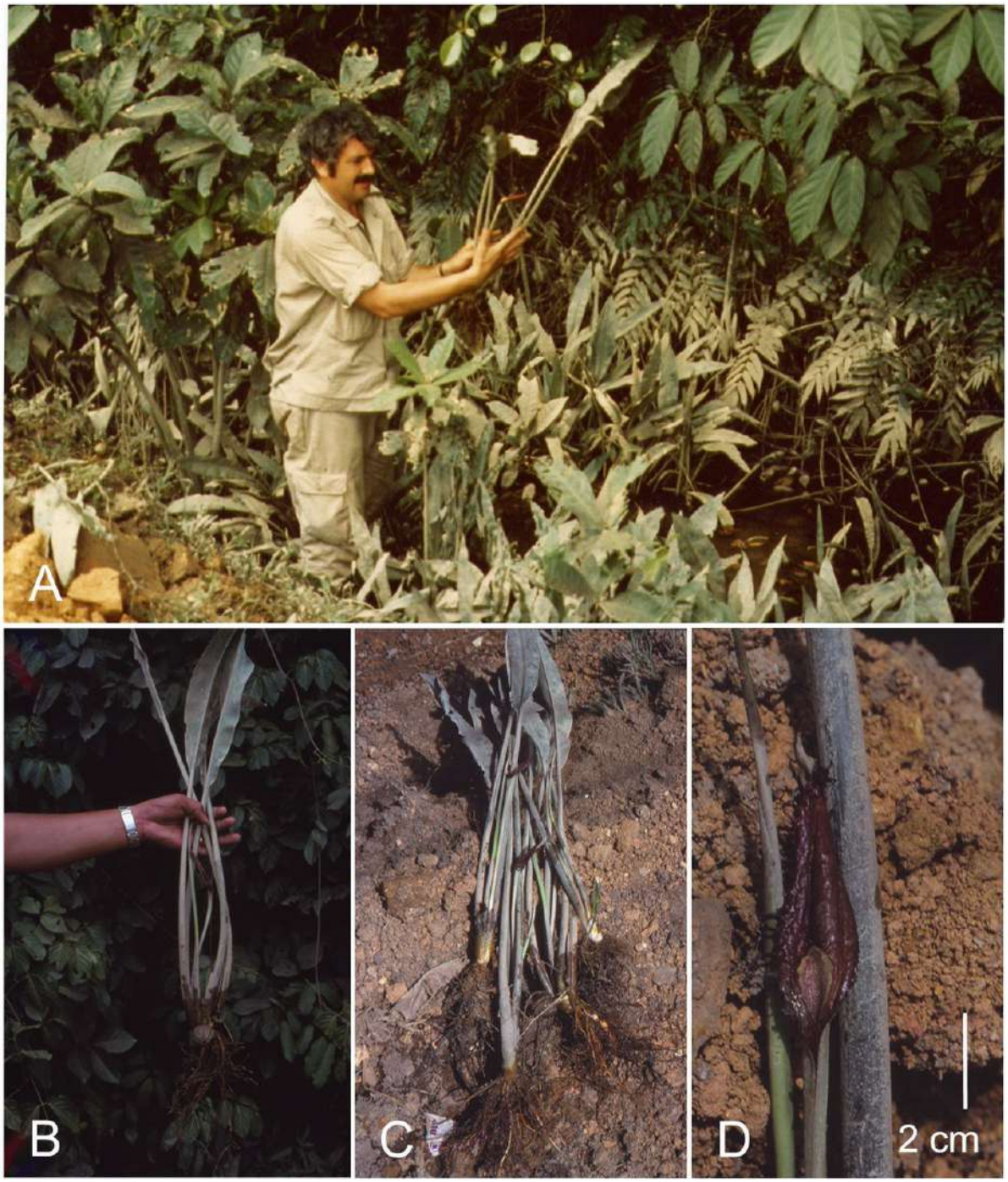

Figure 12. *Cryptocoryne ciliata* (Roxb.) Schott var. *ciliata*, N of Kota Tinggi, Johor, NJ 78–56. *23* September 1978. **A.** Ditch by roadside in mangrove zone; **B.** Flowering and fruiting specimen; **C.** For herbarium sample; **D.** Spathe limb. Photos by N. Jacobsen.

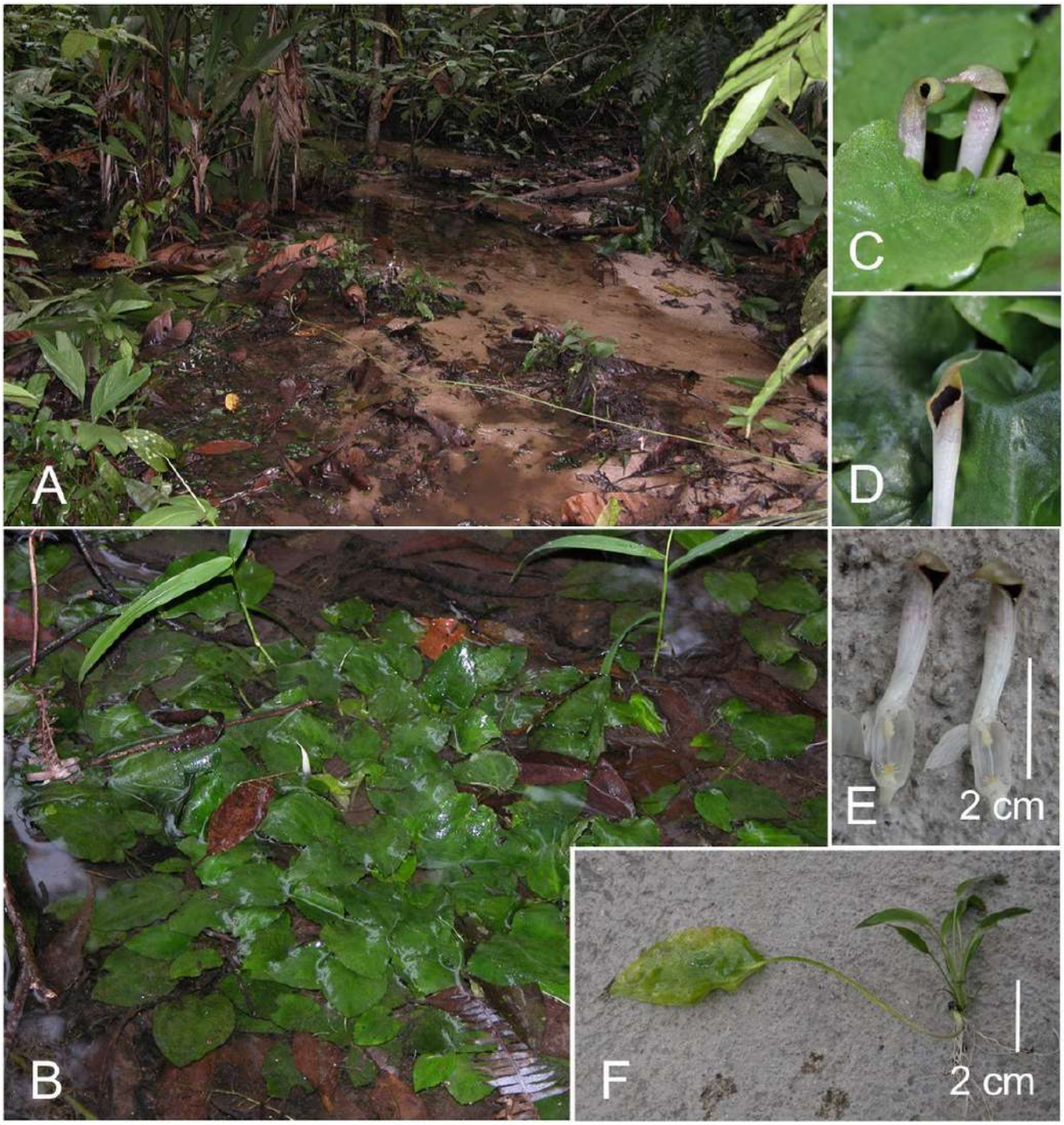

Figure 13. *Cryptocoryne elliptica* Hook.f. from the northern part of Gunong Bongsu region, Kedah, Peninsular Malaysia, *NJ 85–06*. 2 August 1985 **A.** Habitat at bottom of small valley with streamlets reticulating among the trees, spiny palms, and shrubs; **B.** Dense stand of plants among fallen leaves; **C.** Spathes with the characteristic forward twisted limb; **D.** The distal part of the limb is yellow, while the opening is black purple; **E.** Spathe with the kettle cut open showing the white inner surface, female flowers, yellow olfactory bodies, naked spadix, male flowers, appendix, and flap; **F.** Young plant developed from a bud at the base of the petiole. Photos by N. Jacobsen.

Figure 14. *Cryptocoryne pontederiifolia* Schott, Sumatera, Tapakis, N of Padang, *NJ 85–29*. 20 August 1985. **A.** The sample was secured and being photographed by Josef just when school was finished for the day; **B.** The sample, with infructescences; **C.** Cultivated specimen, with unusual colouring in the tube opening; **D.** Spathe with yellow tube opening; **E.** Spathe limb with broad collar and slightly rough distal part of limb; **F.** Longitudinally cut open kettle showing female flowers, yellow olfactory bodies, naked axis, male flowers, and flap. Photos by N. Jacobsen.

Figure 15. ***Cryptocoryne usteriana*** Engl., *Bogner 1644*, Philippines, Guimaras Island, Bigo River. 27 June 1983. **A.** Emergent cultivated plant with spathe showing the shape and colour of the limb (München B. G.); **B.** Emergent, larger pot grown plant; **C.** Yellow spathe limb showing collar zone and distal surface yellow (in A the distal part is red-brownish); **D.** Kettle cut open female flowers, yellow olfactory bodies, naked axis, male flowers mostly hidden behind the flap; **E.** *Bogner 1644* from 27 June 1983 showing leaves less than 5 cm long; **F.** *Bogner 1644*, cultivated specimen sampled in 1988. Photos by N. Jacobsen.

Figure 16. *Cryptocoryne sivadasanii* Bogner, *Bogner 1846*, India, Kerala, Malappuram District, stream-bed in Vallamthodu, south of the Calicut University Campus. 25 November 1986. **A.** Submerged plants in streambed; **B.** M. Sivadasan presenting a sample; **C.** Sample showing how deep the plants were rooted in the stream bottom; **D.** Flowering plants during dry season, *SW 2014A*, N of Kumta, Karnataka. 19 January 2020. Photos A-C by J. Bogner, D by S. Wongso.

In a visit to Vietnam 1997, he managed to find *Crytocoryne vietnamensis* Hertel & Mühlberg — not *C. annamica* Serebryanyi — an identification problem which we pointed to in 1984 and dealt with again in 2014 (Bogner & Jacobsen 1984; Nguyen, Bui & Bogner 2014).

During a trip to Myanmar in 2003, he did not manage to find *Cryptocoryne cruddasiana* Prain in the north-eastern part, but Jin Murata found it a few years later in 2005, and Josef wrote an article about it (Bogner 2009).

One of Josef's less successful trips was to Sylhet in Bangladesh (2010) where he was trying to locate *Cryptocoryne*/*Lagenandra gomezii* and find out what a live specimen looked like (Bogner & Jacobsen 1987). It was rough country with a lot of agriculture, and he was not able to find it. The plant had not been seen since its original collection in 1828. Photographic rumours in the form of a photograph seemingly showing the long-lost *L. gomezii* indicate that it may have been located in 2020, which turned out to be a bad year for fieldwork to confirm the existence.

MEETINGS

Josef was also active at various international conferences over the years, including the XIVth International Botanical Congress, Berlin 1987, with Josef as the organizer of the simultaneous IIIrd International Aroid Conference. At the IXth International Aroid Symposium in Kuching, 2004, we went on a short field trip on which four *Cryptocoryne* species were found that we did not see during our 1978 trip. At the Monocots IV Conference in Copenhagen in 2008, a group of aroiders were gathered again, and Josef was of course present. One of the off-programme events was a field trip to the greenhouses at the Frederiksberg Campus, where the *Cryptocoryne* collection was maintained. During the XIth International Aroid Conference in Hanoi in 2013, we were able to visit some more *Cryptocoryne* sites with *C. crispatula* Engl. var. *balansae* (Gagnep.) N.Jacobsen and *C. crispatula* Engl. var. *tonkinensis* (Gagnep.) N.Jacobsen in which case we were able to finally find out what the plant was behind the name var. *tonkinensis* (Jacobsen & al., 2015).

Over the years we of course corresponded about various aspects of *Cryptocoryne*, and when Jan Bastmeijer launched his website on *Cryptocoryne* — '*the crypts pages*' around 1997 (Bastmeijer, 2021), discussions among enthusiasts became much easier when there was a common frame of reference which could be updated whenever new information was obtained. When the European *Cryptocoryne* Society (ECS) was started in 2000, we had yearly meetings in September–October in places around Europe. We would have from Friday evening till Sunday morning to talk about *Cryptocoryne* and have presentations from many people. Josef would always participate in the meetings. An aspect of the ECS meetings was no doubt also the scientific

social aspect: that there were people with whom he could talk about *Cryptocoryne* (and *Lagenandra*) and discuss new aspects, new plants, and new information. We had the living plants in front of us on the table and there were about 15 presentations at each meeting. In a way *Cryptocoryne* became a kind of 'pet' genus for Josef: every year for almost 20 years he attended the ECS meetings where he would hear the latest news — if he had not already heard through letters. We always knew that next year we would meet and exchange information.

Another place where Josef played a great role was in the German aquarium magazine *Aqua Planta*, that started in 1976. Josef was a member of the editorial committee from around 1985 and participated in the yearly meetings of the Arbeitskreis Wasserpflanzen. Josef himself authored or co-authored more than 40 articles on *Cryptocoryne* (Renner & Mayo, 2020), and he translated the numerous articles written by other non-German speaking authors, from English to German, for example, more than 40 with Bastmeijer, Jacobsen or a team as authors. So, besides his own articles, and the translations, and the ones written by German speaking authors, Josef has been involved in or promoted an estimated more than 100 *Cryptocoryne* articles over the years.

Josef himself had seen around 40 of the about 100 species, varieties, and hybrid taxa of *Cryptocoryne* in nature (of the 100 taxa about 25 have been described within the last 10 years from areas where Josef had not had the chance to visit).

Josef did not just look at the articles and at the *Cryptocoryne* plants he saw, he was always curious, what about this and what about that species/accession and the distribution. Always poking questions: and when he got an answer it was always followed by an "Oooh" — and then a new question from Josef. He was able to spot the weaknesses and consequences in the argumentation or the data set.

One of Josef's last contributions to *Cryptocoryne* was in the spring of 2019 when he reviewed Jan Bastmeijer and my book manuscript on the genus *Cryptocoryne* — more than 250 pages. He was the only one that could do it. It has yet to be published.

REFERENCES

Bastmeijer, J.D. (2021). the crypts pages. https://crypts.home.xs4all.nl/Cryptocoryne/ Accessed February 18, 2021.

Bogner J. (1972). Reiseeindrücke aus Südostasien. *Aquaterra* 9(10): 93–98.

Bogner J. (1974). Reisindrukken uit India en Ceylon. *Het Aquarium* 44(8): 210–213.

Bogner J. (1984). *Cryptocoryne usteriana* Engler und *Cryptocoryne aponogetifolia* Merrill. *Aqua-Planta* 9(4): 7–13.

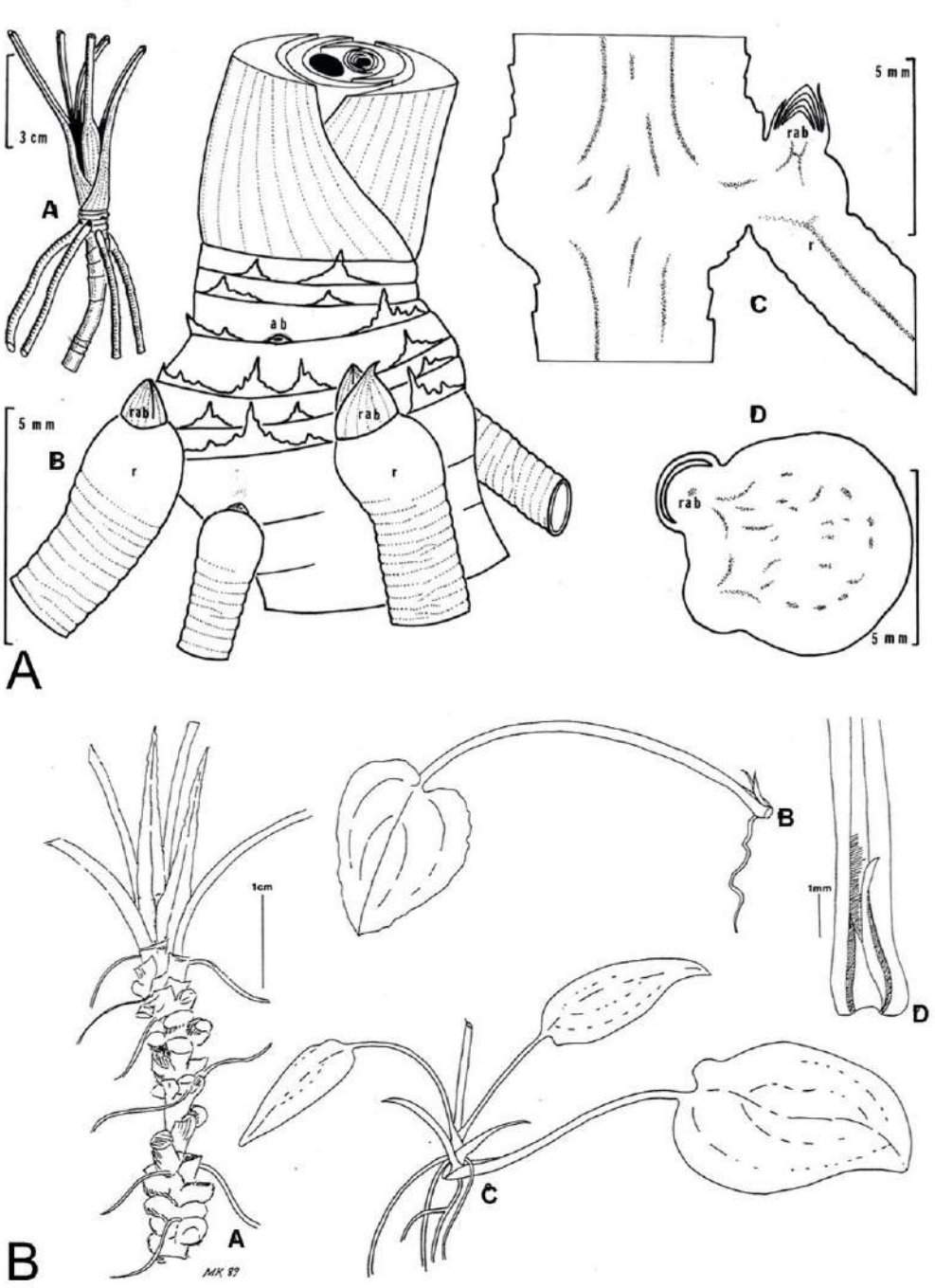

Figure 17. Unusual vegetative propagation in *Cryptocoryne*. **A.** *Cryptocoryne sivadasanii* Bogner, *Bogner 1846*; **AA.** Plant with thick fleshy roots; **AB.** Part of a rhizome with thick fleshy roots, with buds at the base as well as normal buds on the rhizome; **AC.** Longitudinal section of a part of the rhizome and a root with its basal bud; AD; Transection of a rhizome and the proximal part of the root with a bud [ab - accessory bud, r - root, rab - root accessory bud]. **B.** *Cryptocoryne elliptica* Hook.f., *NJ 85–06*; **BA.** Plant with notched rhizome; **BB.** Leaf with a bud (rooting) at the base of the petiole; **BC.** Young plant developed from a bud at the base of the petiole; **BD.** Enlarged leaf base with a bud on the upper surface. From Jacobsen et al. (1989). Drawings A by M. Sivadasan and B by M. Krøjgaard.

Figure 18. *Cryptocoryne ciliata* (Roxb.) Schott. **A-B.** var. *ciliata*, *NJM 11–56*, Malaysia, Perlis, Kangar. 3 March 2011; **A.** Stand at low tide showing long stolons; **B.** Spathe limb; **C-D.** var. *latifolia* Rataj, *NJS 14–26*, Sarawak, Matang. 20 August 2014; Stand at low tide showing short stolons; **D.** Spathe limb; **E.** Stolons of var. *ciliata*, 2*n* = 22; **F.** Stolons of var. *latifolia*, 2*n* = 33. Photos by N. Jacobsen.

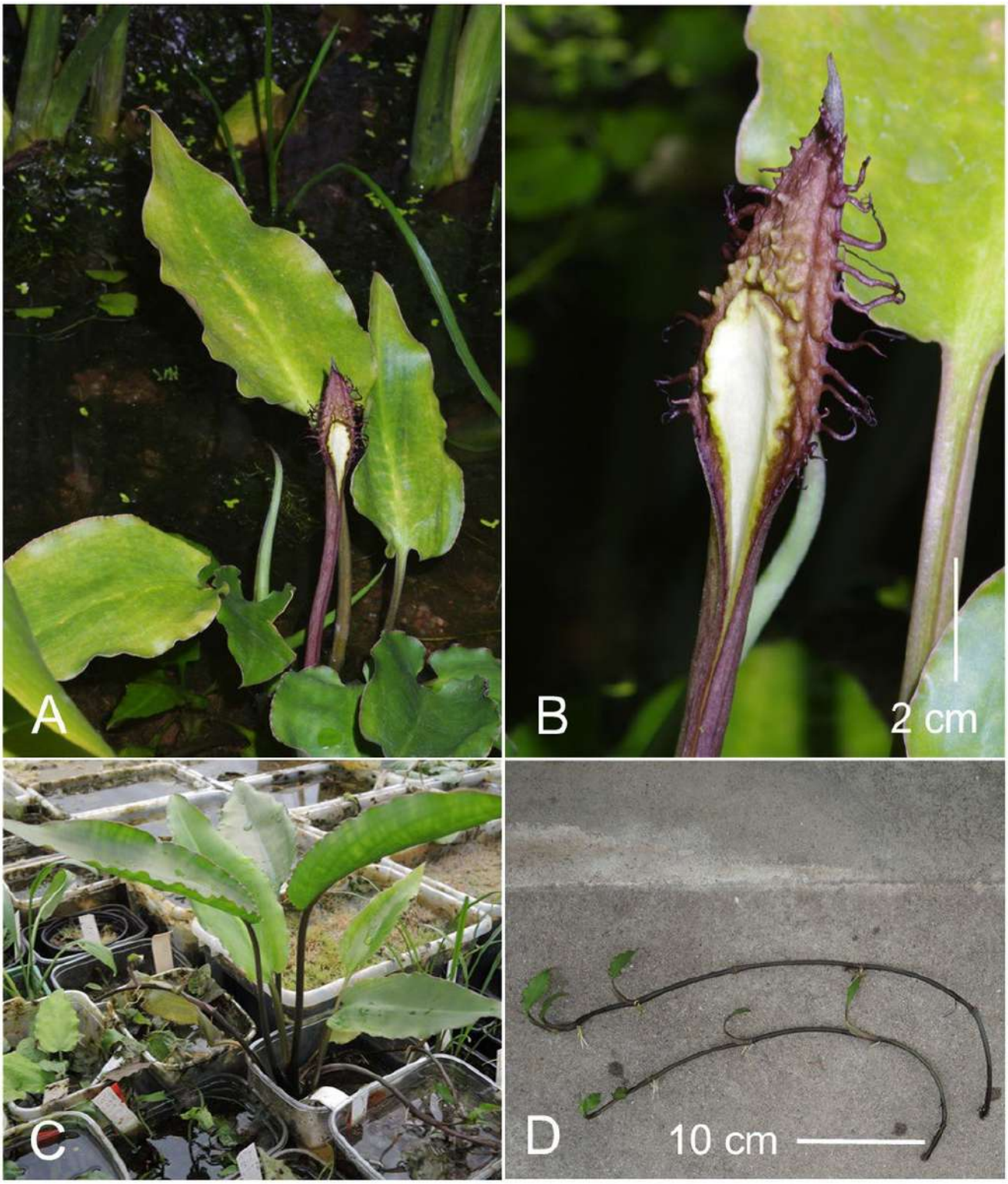

Figure 19. *Cryptocoryne ciliata* (Roxb.) Schott var*. bogneri* N. Jacobsen, 2*n* = 44, *J. Bogner 3025* from type collection, Sarawak, Betong Division, Seblak River, Saratok. March 2014; cultivated specimens. **A-B.** Flowering plant at München B. G.; **C.** Plant in Copenhagen with stolons; **D.** Stolons. Photos A-B by G. Gerlach, C-D by N. Jacobsen.

Bogner J. (2004). *Cryptocoryne sivadasanii* (Araceae), a new species from India. *Willdenowia* 34: 195–201.

Bogner J. (2009). *Cryptocoryne cruddasiana* Prain, eine endemische Art aus Myanmar (Burma). *Aqua Planta* 34(1): 4–13.

Bogner J. (2013). Eine neue Varietät der *Cryptocoryne spiralis* (Retz.) Fischer ex Wydler (Araceae) aus Indien. *Aqua Planta* 38(4): 141–148.

Bogner J. & J. Bastmeijer (2001). In Memoriam — H.C.D. de Wit (1909–1999). *Aroideana* 24: 3–5.

Bogner J. & N. Jacobsen (1984). Eine unbekannte *Cryptocoryne* aus Vietnam. *Aqua-Planta* 9(3): 19–20.

Bogner J. & N. Jacobsen (1987). Die systematische Stellung von *Lagenandra gomezii* (Schott) Bogner et Jacobsen, comb. nov. *Aqua-Planta* 12(2): 43–50.

Jacobsen N. (1976). Notes on *Cryptocoryne* of Sri Lanka (Ceylon). *Botaniska Notiser* 129: 179–190.

Jacobsen N. (1977a). Chromosome numbers and taxonomy in *Cryptocoryne* (Araceae). *Botaniska Notiser* 130: 71–87.

Jacobsen N. (1977b). Zytologie und Taxonomie der Cryptocorynen Sri Lankas (Ceylon). *Aqua-Planta* 2(4): 1, 3–8.

Jacobsen, N. (1980). Does *Cryptocoryne ferruginea* flower at full moon? *Aroideana* 3: 111–116.

Jacobsen, N. (1981). *Cryptocoryne undulata* Wendt und Bemerkungen zu anderen Arten. *Aqua-Planta* 6(2): 29, 31–38.

Jacobsen N. (1985). The *Cryptocoryne* of Borneo (Araceae). *Nordic Journal of Botany* 5: 31–50.

Jacobsen, N. (1992). Die Kultur einiges schwieriges *Cryptocoryne* Arten in Buchenlauberde. *Aqua-Planta* 17(1): 18–25.

Jacobsen N. (2020). In memory of Josef Bogner. *Newsletter of the International Aroid Society* 42(2): 5–6 & pictures 11–14.

Jacobsen, N., J.D. Bastmeijer, J. Bogner, Nguyen V.D., Hong Q.B. & M. Ørgaard (2015). The identity of *Cryptocoryne crispatula* var. *tonkinensis* (*Araceae*). *Willdenowia*, 45(2): 177–182. https://doi.org/10.3372/wi.45.45203

Jacobsen N., J.D. Bastmeijer, K.R. Jensen & M. Ørgaard (2018). A new tetraploid variety of *Cryptocoryne ciliata* (Araceae) from Sarawak. *Willdenowia* 48: 425–431. https://doi.org/10.3372/wi.48.48312

Jacobsen, N., M. Sivadasan & J. Bogner (1989). Ungewöhnliche vegetative Vermehrung bei der Gattung *Cryptocoryne* (Teil 1 & 2). *Aqua-Planta* 14(3): 83–88; 14(4): 127–132.

Marchant, C.J. (1972). Chromosome variation in the Araceae: IV. Areae. *Kew Bull.* 26: 395–404.

Marchant, C.J. (1973). Chromosome variation in Araceae: V. Acoreae to Lasieae. *Kew Bull.* 28: 199–210.

Nguyen V.D., Bui H.Q. & J. Bogner (2014). The status of *Cryptocoryne annamica* (Araceae: Aroideae: *Cryptocoryneae*) in Vietnam. *The Gardens' Bulletin Singapore* 66: 67–72.

Renner, S.S. & S.J. Mayo (2020). Josef Bogner (1939–2020). *Taxon* 69(3): 643–646. https://onlinelibrary.wiley.com./doi/full/10.1002/tax.12273

Yadav, S.R., K.S. Patil, & J. Bogner. 1993: Kritische Bemerkungen über die Identität von *Cryptocoryne cognatoides* Blatter et McCann (Araceae). *Aqua Planta* 18(2): 62–67.

Wit, H.C.D. de. 1971: *Aquarienpflanzen*. Ulmer, Stuttgart.