

**ILLUSTRATION OF TWO RARE BALANOPHORACEAE OF EQUATORIAL AFRICA  
BELONGING TO THE GENERA CHLAMYDOPHYTUM MILDBR. AND  
BALANOPHORA FORST.**

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**RÉSUMÉ:** Le *Chlamydoxylum aphyllum* Mildbr. retrouvé au Congo est analysé et figuré d'après du matériel vivant; notes sur la plante-hôte, *Tessmannia* (Légum. Césalp.). Notes et figures sur *Balanophora abbreviata* Bl. du Congo comparé à un matériel conspécifique des Nouvelles-Hébrides.

**ABSTRACT:** New living material from Congo of *Chlamydoxylum aphyllum* Mildbr. is analysed and pictured, with notes about its host *Tessmannia* (Legum. Caesalp.). Notes and drawing of *Balanophora abbreviata* Bl. from Congo, compared with conspecific material from New-Hebrides.

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**CHLAMYDOPHYTUM APHYLLUM Mildbr.**

In 1974, my colleague and friend A. BOUQUET of O.R.S.T.O.M.-Brazzaville communicated to me about excellent specimens of strange Balanophoraceae collected by Paul SITA, an excellent Congolese botanist, in the area of littoral sands close to the South of Gabon. A well flowered stipe was dispatched by plane which arrived alive in Paris on December 23. Initially presumed new, then with some difficulties and gropings due to gaps of the Index Kewensis, we recognized the species of MILDBRAED described from Cameroun and never found since: *Chlamydoxylum aphyllum*.

A part of the type material was pleasantly communicated to us by A. SCHILLING, Director of the Botanical Museum, Berlin-Dalhem. This material could be found thanks to the suggestions of R. LETOUZEY who could locate the collection of MILDBRAED in "March-April 1914", at the time of a short stay with Deng Deng, and gave a good approximation of the number which had not been cited. This type material, in spite of a juvenile state, agrees well with the new Congolese material, the original diagnosis had not made it possible to recognize the species because it contains an error and a small difference: "solitary male flowers on the various levels of the ramifications", and "anthers supernumerary 2-3", the good plate given by HARMS in ENGLER (edition 2, 1935), rectified the error concerning the male flowers. This plate, as EVRARD indicates, was not referred to in the Index Londinensis (supplement 1921-1935 published in 1941).

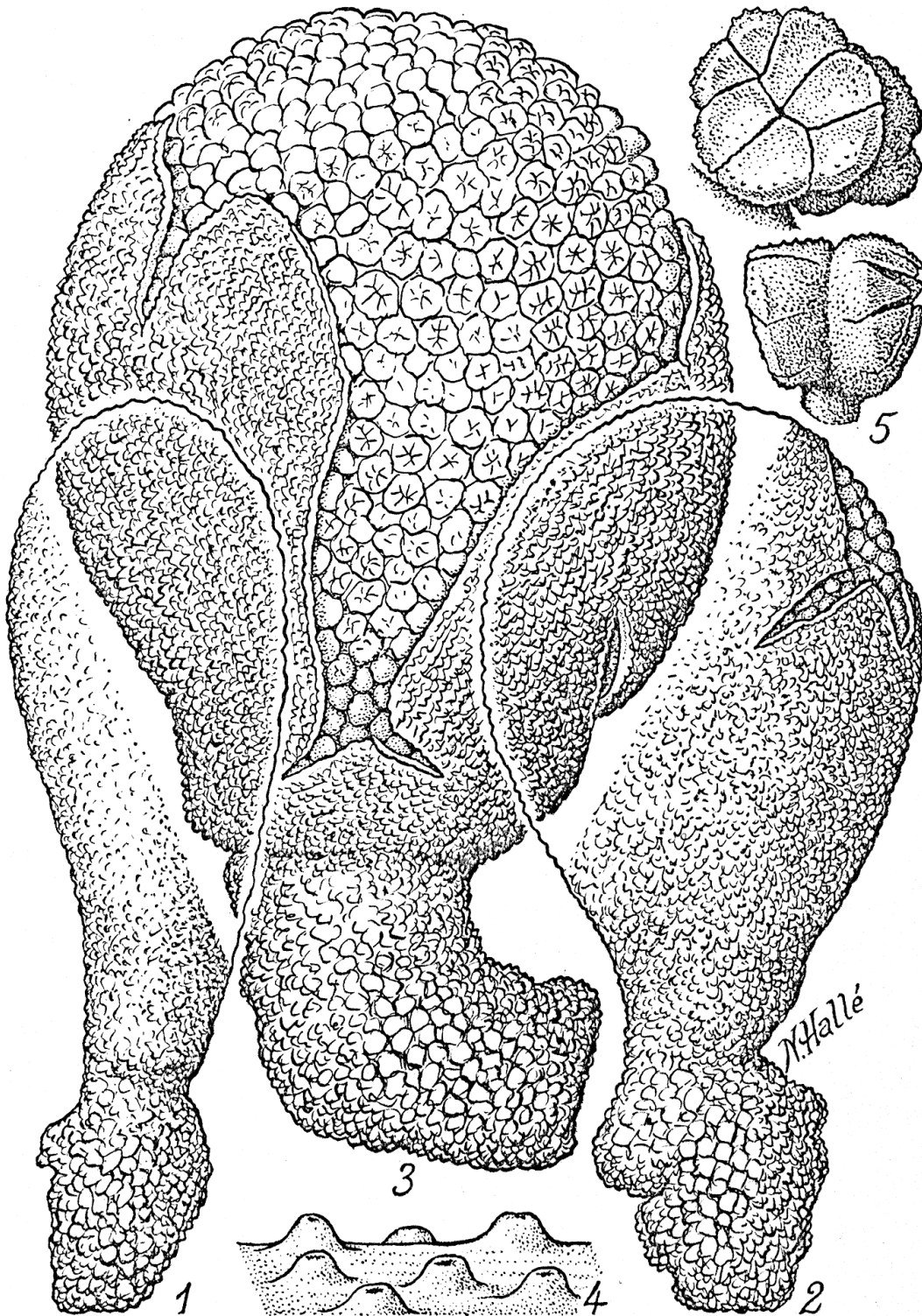


Plate 1. *Chlamydophytum aphyllum* Mildbr. : 1, 2, young male spike at the beginning of the opening of the spathe, 30 X 12.5 X 9 cm; 3, male stipe near to anthesis, 23 X 13 cm; 4, detail of the epidermis of the rachis of the male inflorescence, lenticels of 0.2 mm high; 5 paired male flowers close to anthesis, face and profile. (*Sita* 3819).

Very recently R.P. E JANS also found this species in Zaire which allowed C. EVRARD & H. BREYNE in 1975 to supplement the work of P. STANER (1948, Balanophoraceae of the Belgian Congo). This complement gives in four lines the description of pollen carried out in Stockholm by J. PRAGLOWSKY.

### NEW DESCRIPTION

Plants without chlorophyll, dioecious, completely glabrous, little or hardly stinking. Large fleshy, firm, irregularly oblong tuber or  $\pm$  bent, fixed on a large woody root of the tree *Tessmannnia* (Leguminosae-Caesalpinioideae). Warty epidermis with irregular polygonal warts. Juvenile plant upright, hidden in the sandy ground, entirely enclosed in a coriaceous obovoid gray-brown volva. Floriferous plant emergent with irregularly long volva 18-45 cm torn, diameter 8-12.5 cm before the rupture. Male inflorescence ovoid to 10-21 cm in diameter; large axis fleshy 4-5 cm in diameter towards the base, riddled with projecting microlenticels of 0.2-0.3 mm, and ramified into bunches; ascending tight branches 4-8 cm long, having flowers with a diameter of 2.5 cm; bracts tiny, acute, sometimes recalcrescent, sometimes absent. Male flowers paired, seldom in 3, 5-15 mm in diameter, fleshy, blood-colored, sessile (common pedicel of (0-)1-3 mm). Bud subprismatic, flattened at top; perianth simple valvate, of (5)6-8(9) deltoid fleshy segments, 3-6 X 1.5-4 mm, often unequal, sometimes with a truncated apex. Anthers globular, multilocular, sessile or sessile, 1-1.5 mm in diameter, inserted 6-8 into the base of the lobes around the receptacle which forms a flat cupule; there are sometimes 1-2 supernumerary anthers in the middle of the receptacle (2-3 in the material of MILDBRAED). Female inflorescence of a similar form, but of yellow-greenish color becoming brown; long ascending branches 5-9 cm, to 3 cm in diameter with the flowers; no trace of bracts; female flowers associated in globular, sessile connate capitula, 15-20 per branch with more than 100 simple flowers per capitulum. Stigmata, only apparent on the floral organs, showing in light relief 3-4 small lobes; the fleshy common receptacle, 1.5 cm in diameter, is hardly roughcast into small sinuous projections. Fruiting stage and seeds not seen.

STUDIED MATERIAL. CAMEROUN: Mildbraed 8680, Deng Deng (March-April 1914). fl. (type B). CONGO: *Sita* 3679 (7.2.1974, 2 male specimens) and 3819 (19.12.1974, 4 male and 1 female, buds and flowers), intersections of the roads to Ngongo-Tiétié and Ndindi (P.C.A. of Nzambi)-Madingo-Kayes, 11 °10' E, 3°47' S, forest with white Leguminosae and clearings on white sands.

CITED MATERIAL. ZAIRE: *Jans* 1131, Taketa, terr. Oshwe, 19°6' E, 3°15' S, along the R. Lukenie; another collection mentioned *in litt.* 1975.

REMARKS – MILDBRAED described extremely well the first juvenile stages which were missing to us. He compared the development of the spathe-like volva with that of the *Phallus impudicus*, and the adult stage with a dirty crimson cauliflower: in fact excellent comparisons apply well to collections of SITA and JANS.

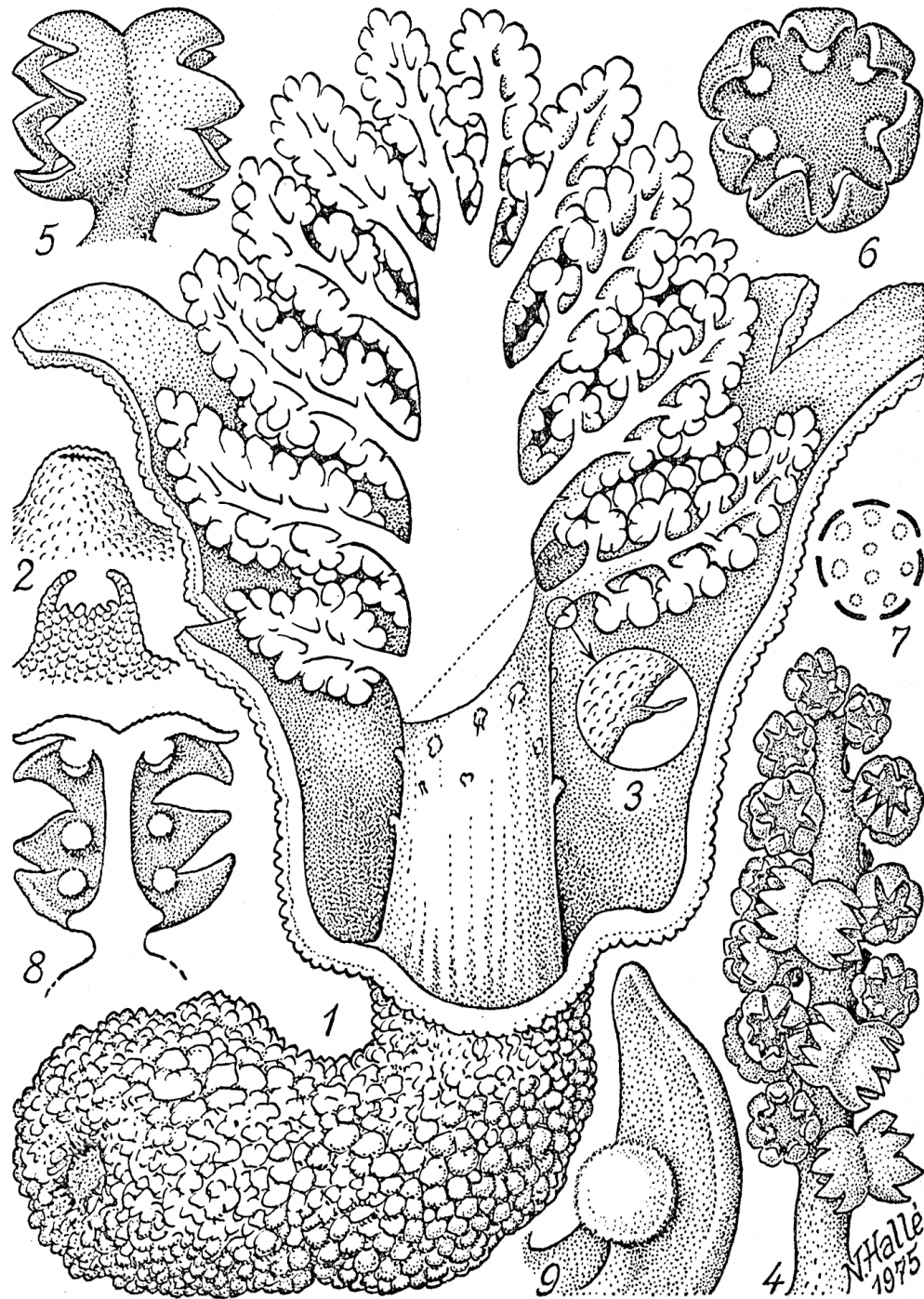


Plate 2. *Chlamydoxylum apyllum* Mildbr. : 1, opened up male spike, inflorescence 15 cm broad; 2, details of lenticel of inflorescence axis; 3, detail of bract; 4, detail of floriferous branch; 5, 6, opened up male flowers, profile and face, diam. 15 mm; 7, diagram of male flower having 2 supernumerary stamens; 8, longitudinal section of 2 flowers, 12 X 12 mm; 9, detail of the insertion of the anther at the base of a lobe. (*Sita* 3819).



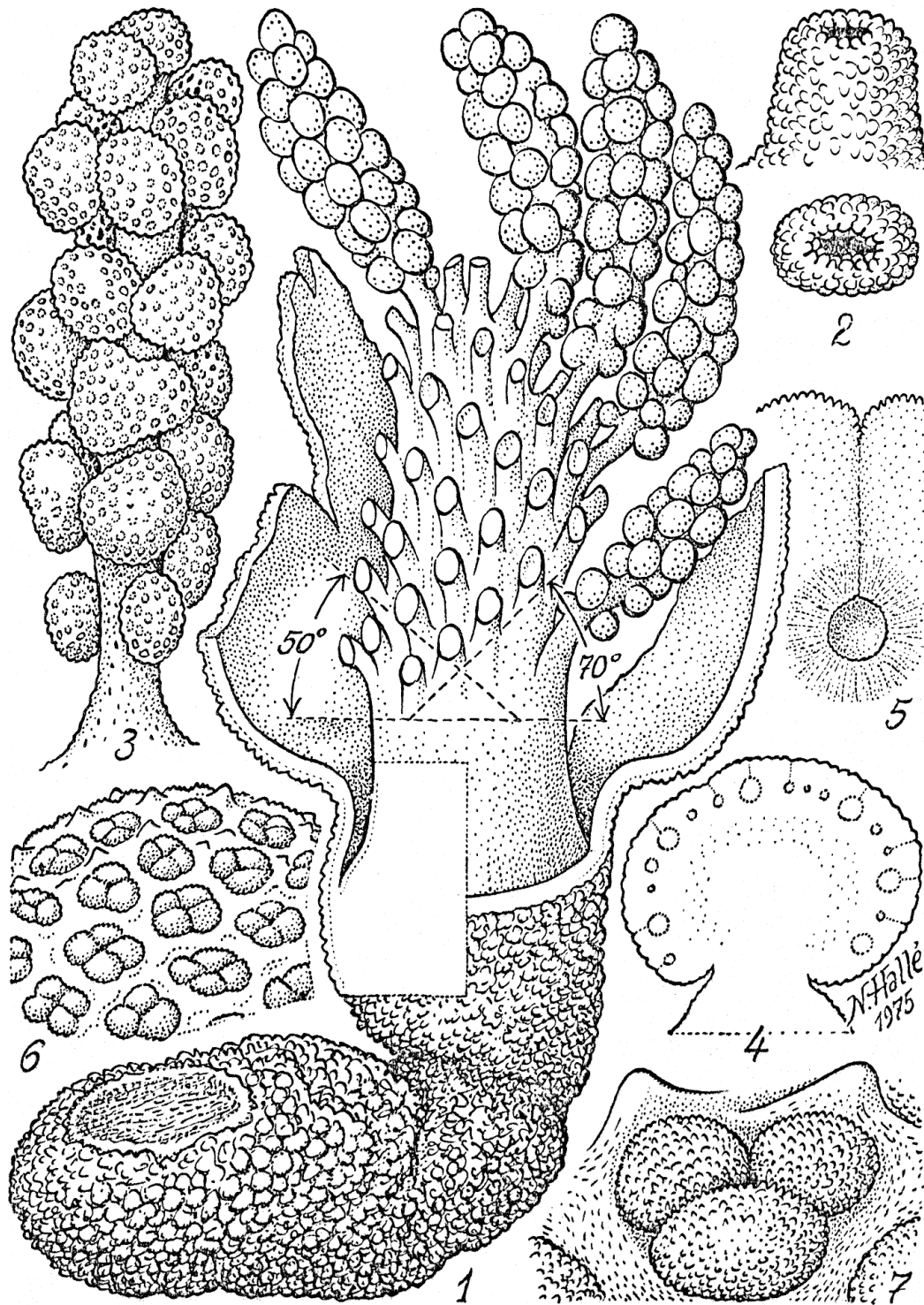


Plate 3. *Chlamydomyrtum aphyllum* Mildbr. : 1, opened up female inflorescence, total width 17 cm with all the ramifications; 2, lenticel of the rachis 0.3 mm high; 3, branch of inflorescence; 4, cut of multiflowered female capitulum, diam. 12 mm; 5, stylar channel and ovule in longitudinal section; 6, stigma; 7, detail of a trilobed stigma, diam. 1.3 mm. (*Sita* 3819).

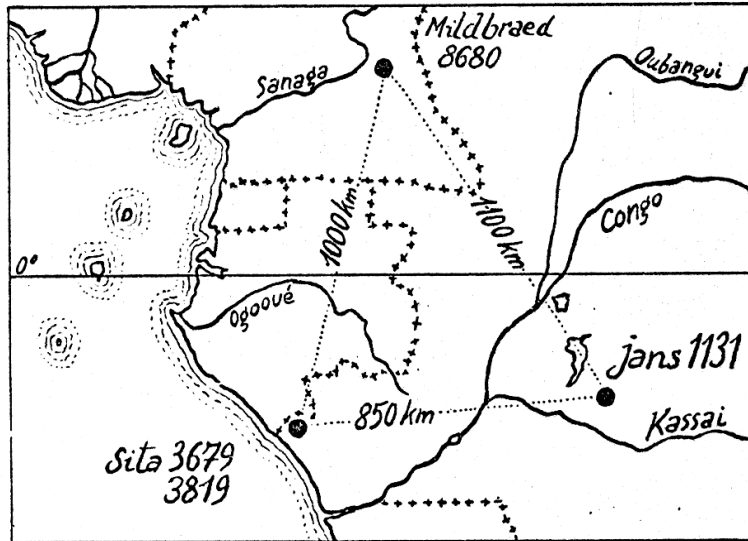


Fig. 4. – Distribution of *Chlamydomyllum aphyllum* Mildbraed.

Contrary to the diagnosis of MILDBRAED, the male flowers are not solitary; however, that [condition] exists in the close genus *Sarcophyte* Sparm. from Eastern Africa: for *S. piriei* Hutch. the male flowers are solitary, while they are generally paired in *S. sanguinea* Sparm.

PALYNOLOGICAL ANALYSIS<sup>1</sup>. - Pollen simple (eumonads), slightly brevifacial, equatorial diameter 22-24  $\mu\text{m}$ ; polar axis 20-21  $\mu\text{m}$ ; P/E = 0,87; grains subsopolar triporate with the subequatorial apertures; apertures surrounded by a smooth margin or the tectum rests on short columellate ones; ectoaperture of a subcircular contour; apertural membrane finely warted of irregular contour; endoaperture subcircular surrounded of a light diffuse thickening of the nexine. Exine intercolpium 1.6  $\mu\text{m}$  in thickness; tectum fine, perforated, very finely warted, resting on a columellar layer. Columelles located under the warts, from 0.8 to 1  $\mu\text{m}$  diameter on average and 0.7  $\mu\text{m}$  high. Nexine 0.8  $\mu\text{m}$  in thickness in the medium of a intercolpium, thickening gradually towards the apertures.

The studied samples, *Sita 3679* and *3819*, differ little from that described by PRAGLOWSKY.

ECOLOGICAL NOTES, LOCATION AND HOST. - the location of the collection is a sandy lagunal zone of the frontier area of Gabon located between the Mbanio lagoon and low Kouilou. Paul SITA noted that the parasite appears at 4-5 m from the trunk of the arborescent host in a perimeter where 4 scapes of them were counted. Only emergent tops of the inflorescences surrounded by the remainders of the volva [were seen]; these parts are often eaten by insects or vertebrates (probably Athérures). The plant is not rare around the parasitized trees.

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1. The palynologic study was carried out by D. LOBREAU-CALLEN.

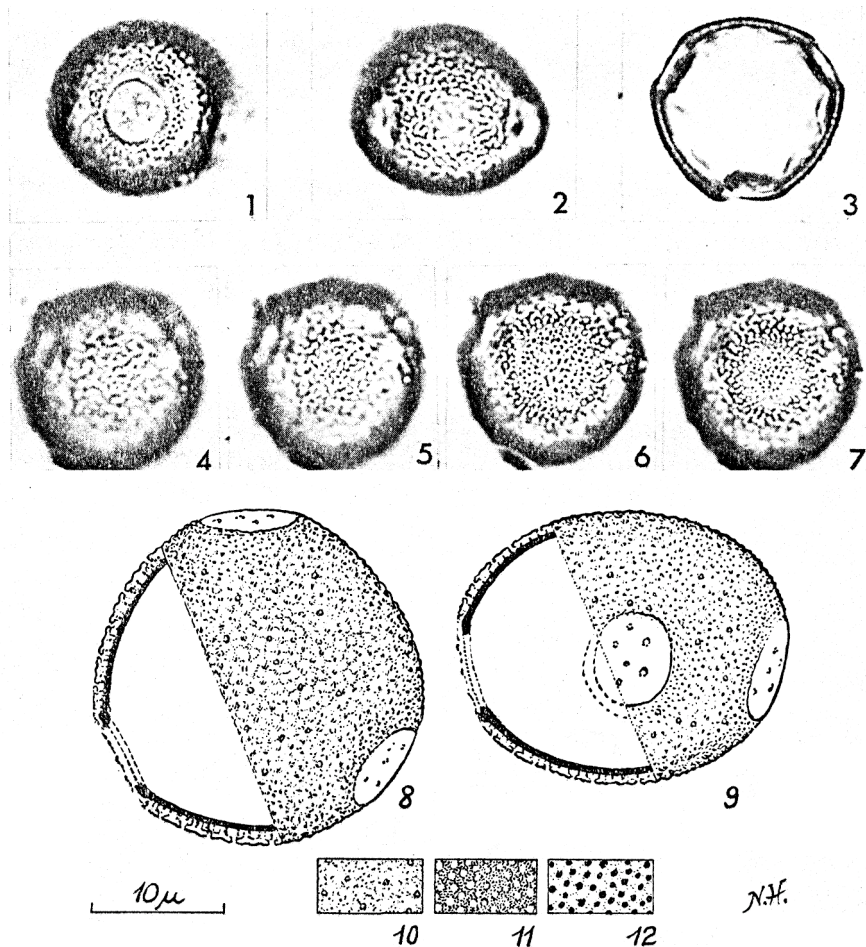


Plate 5. - *Chlamydoxylum aphyllum* Mildbr.: Pollen: 1, aperture of face; 2, Intercolpium; 3, equatorial optical section; 4 to 7, L.O. analyses of exines in polar view, tectum perforated and warty (4) resting on a columellate layer; 8, polar view; 9, side view; 10, detail of the exine at high magnification; 11, 12, details of the exine in major view. (1-7, *Sita* 3679, pollen X 1000, photographs D. Lobreau-Callen; 8-12, *Sita* 3819).

The host tree is a Leguminosae-Caesalpinioideae. Contrary to the provisional determination under which the sample was communicated to me, there is some question that it is *Crudia klainei* Pierre ex De Wildeman. In this species the foliar limb does not present the many translucent points as our sample, and the stipules, adaxial fused between them and very lanceolate, are neither sufficiently equitant nor rather asymmetrical at the base to agree with the host to make a determination. On the other hand, the sample of SITA has all the characters of *Tessmannia dewildemaniana* Harms: it is sterile material with five alternate leaflets 3-7 cm broad, a little asymmetrical at the base, acuminate with the apex emarginate, bicolored russet-red when dry, to 8-11 pairs of secondary veins closed in arches to 2 mm of the margins; rather coarsely reticulate and in relief on the two faces of the limb which is riddled with remarkable translucent points. The stipules correspond exactly to the terms of the description of J. LÉONARD (1950, p. 49). It is a species of wet grounds, still poorly known by from some very dispersed collections from Zaire. The type, *Cabra* 26, BR! (whose locality "Mayumbe?" is quoted as doubtful), is perfectly in conformity with our Congolese sterile specimens (it is through R. LETOUZEY who earns the merit of this determination).

CHARACTERS OF THE HOST WOOD. – The wood was analyzed by A. MARIAUX, head of the Division of Wood Anatomy of the C.T.F.T. (Nogent-sur-Marne), in March 1975:

Sample *Sita 3819*, host root diam. 17 mm: nothing is in opposition to it being *Tessmannia*.

Sample *Mildbraed 8680*, host root diam. 30 mm: is even more surely *Tessmannia*, with a more or less braided circumvascular aliform parenchyma, a final line, rays in 2 to 4 series, adorned with intervacular punctuations of 8 µm diameter. It is in any case certainly Caesalpinoideae.

According to R. LETOUZEY, there are very strong chances so that I material Cameronian can be associated with [brought back to] *Tessmannia anomala* (Micheli) Harms rather than with the two other Cameronian species *T. africana* Harms and *T. lescrauwaetii* (De Wild.) Harms.

VERNACULAR NAME OF THE HOST. - In Zaire: *yaka* or *yatsa* according to EVRARD (*in litt.* 1975).

TOXIC SUBSTANCES. - A. BOUQUET obtained the following results of analyses carried out in Brazzaville on *Chlamydoxylum*:

Test 578 on 23.12.1974 :

Alkaloids.....	0	Flavones .....	+++
Tannins .....	++	Quinones.....	0
Terpenes.....	0	Anthocyanins .....	+++
Saponosides .....	±	HCN.....	0

The examination of the extracts by thin layer chromatography did not make it possible to determine the number of flavones; the chemical study will be continued [should continue] but it would be necessary to have more abundant material.



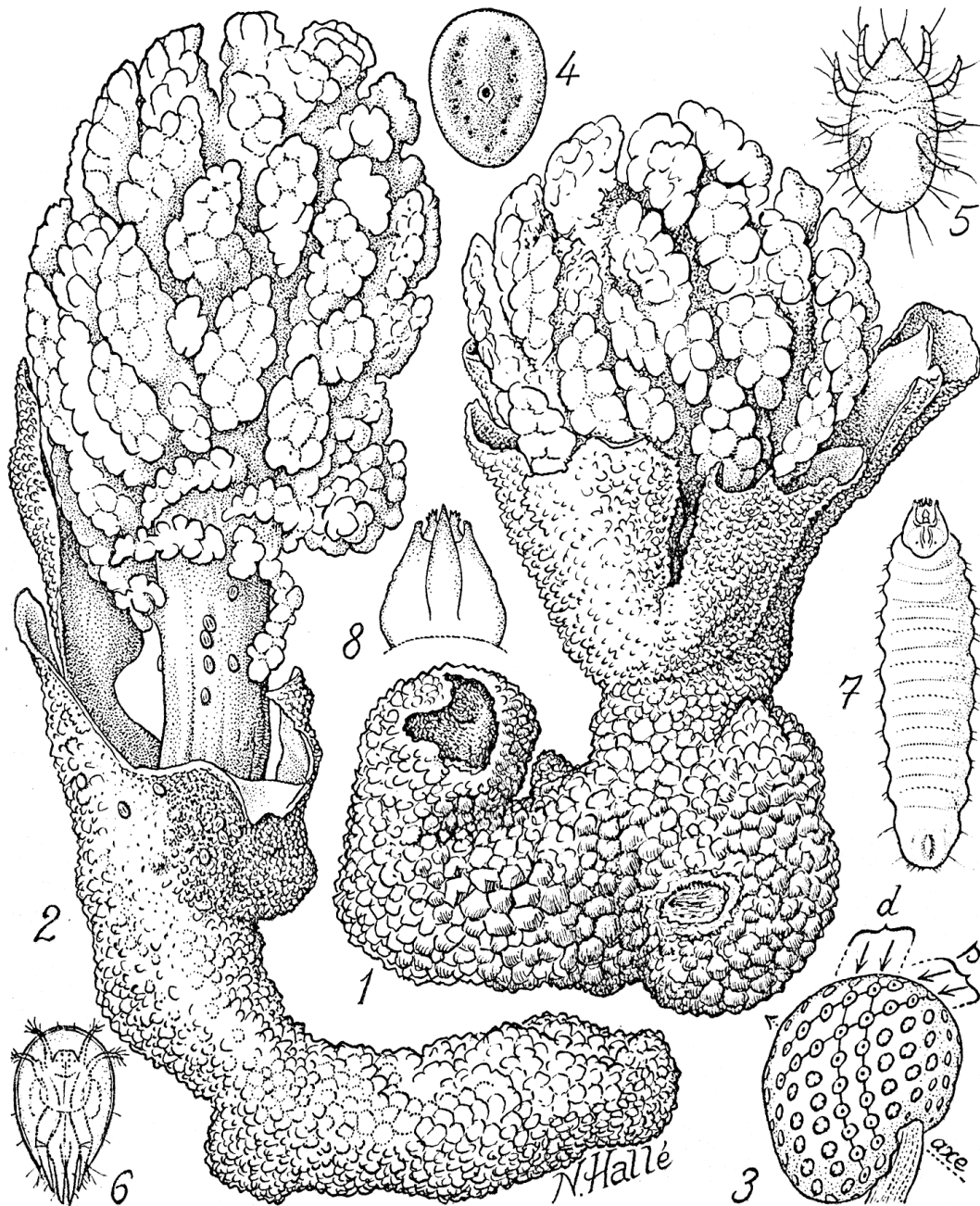


Plate 6. - *Chlamydophytum aphyllum* Mildbr. : 1, 2, old desiccated and parasitized male spike, height 20-30 cm (*Sita* 3679); 3, provision of female flowers on a capitulum, d = dextral parastichies, s = sinistral parastichies (*Sita* 3819); 4, Cochineal *Stictococcus*, env. 3.5 X 3 mm; 5, Acarien Thiroglyphe 0.6 mm; 6, Acarien Oribate (a mite), 0.2 mm; 7, dipteran larva *Orthorrhaphe*, 7 mm; 8, id., above the brain of 0.9 mm in length.

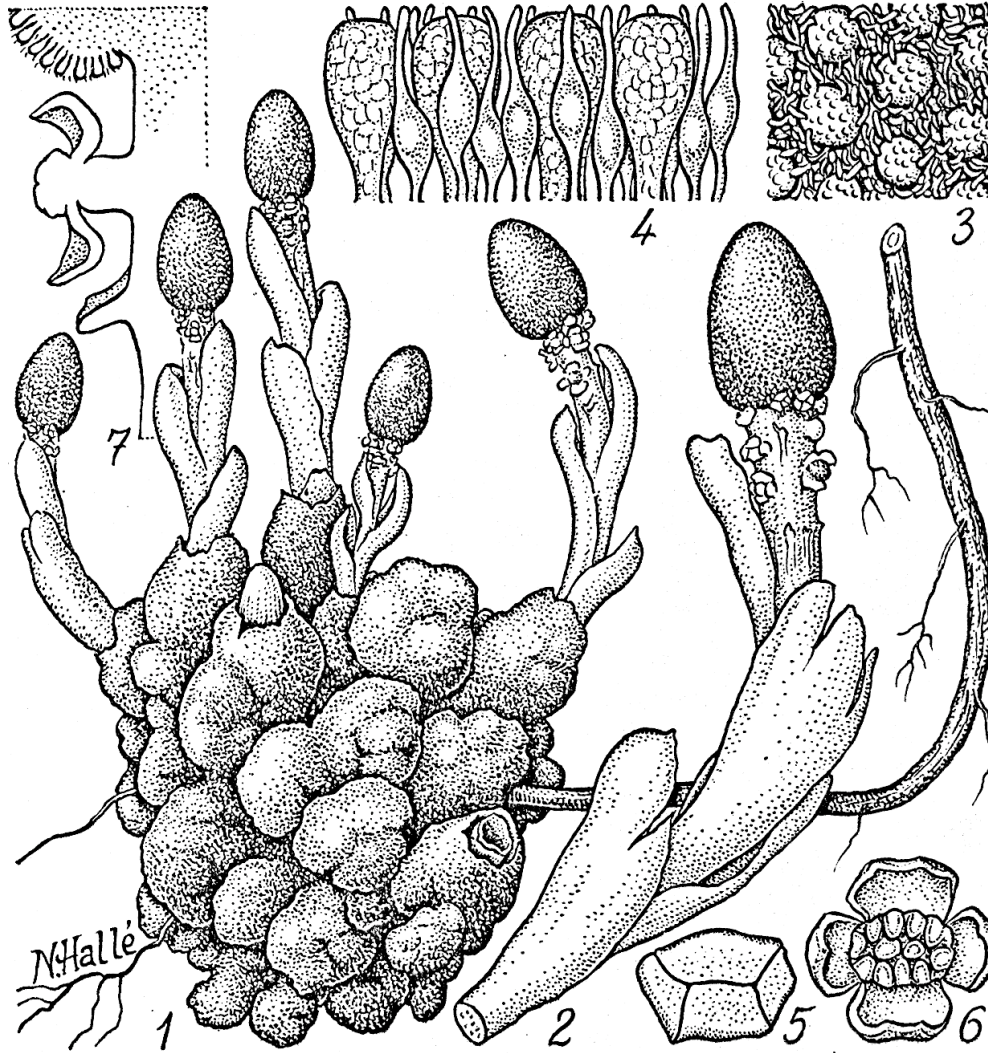


Plate 7. - *Balanophora abbreviata* Bl., of Congo: 1, composed floriferous scape, total diam 5 cm; 2, floriferous branch with diclinous female capitulum of 11 mm diam; 3, 4, detail of profile and top view of naked flowers and some 0.7 mm high spadicules; 5, 6, male flower in face, in bud and opened up, diam. 2-3 mm; 7, male flower in longitudinal section. (Farron 4047).

ASSOCIATED FAUNA. - the first samples received (February 1974) were organic remains and fine sand loads which were collected by brushing: it was there that one finds a very great number of living Acarina; among them most abundant were albescent or translucent Thiroglyphes in all stages of development; others still were many wood mites, smaller and brown. There were still abundant Hemiptera Anthocoridae in various stages. An adult male could be obtained by breeding and was determined by J. CARAYON, *Xylocoris afer* (Reuter). Finally a few tens of Cochineals *Stictococcus* sp. (det. C. RICHARD) parasitized the external face of the volva and the inflorescence stalk of the two specimens.



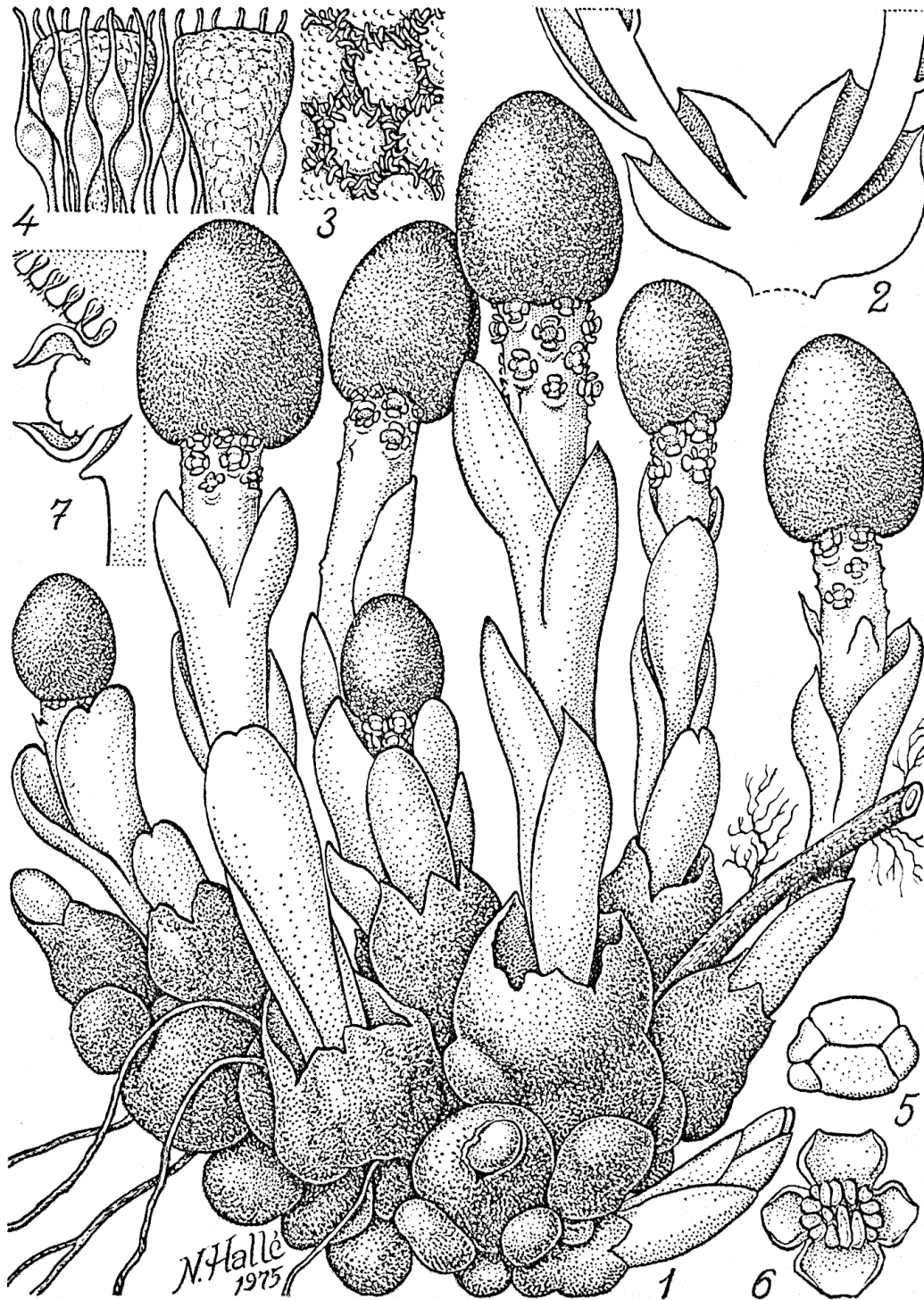


Plate 8. - *Balanophora abbreviata* Bl., of the News-Hebrides: 1, composed floriferous scape, total diam 10 cm; 2, detail of the insertion of the stems at the bottom of the fleshy volvas; 3,4, detail of profile and top view of naked flowers and high spadicules of 1 mm; 5, 6, male flowers in face, in bud and opened up, diam. 2,5-3,5 mm; 7, male flower in longitudinal section. (N. Hallé RSNH 6351).

The samples of the second sending (December 1974), much healthier as a whole, were collected at the best time of flowering. They provided only endoparasites from the rhizome: larvae of Diptera Brachyceres Orthorrhaphe, family Solvidae, P. TSACAS det.

## **BALANOPHORA ABBREVIATA Bl.**

The beautiful discovery by FARRON of *Balanophora* on the roots of *Ficus* from forests of Bangou, Congo, was the subject of two articles (1968 and 1969). However, neither one nor the other provided the morphological precision that one might expect which would have been useful to support the determination of this collection: *Farron 4047*, alcohol material deposits with Museum (P!).

In addition, in 1971, at the time of a prospection on the island of Mallicolo, with the expedition of Royal Society of London in New Hebrides, we were likely to meet important populations of *Balanophora abbreviata* Bl. In 1972, B. HANSEN published an important monographic revision of the genus *Balanophora*. The name used by FARRON, *B. hildebrandtii* Reichenb. f, falls in synonymy and the Congolese material takes for a correct name *B. abbreviata* Bl. As the species is has very broad tropical distribution and that its morphology is rather variable, we considered it useful to compare by drawing the conspecific materials that are at first sight rather dissimilar of Congo and of Mallicolo, regions situated near enough to the antipodes of each other.

MATERIAL STUDIED. - CONGO: *Farron 4047*, forests of Bangou, Center O.R.S.T.O.M. from Meya, 27.4.1965. - NOUVELLES-HEBRIDES: *N. Halle RSNH 6351*, Mallicolo, E of Tisbel (W coast), forest floor with *Ficus* on the slope, 450-550 m: selection of a large specimen forming a mass of the volume of a grapefruit. This locality usefully completes the distribution known by HANSEN (chart 15, p. 76, 1972).

PARASITES. - the Congolese materiel provided Cochineals *Stictococcus vayssierei* C. Richard (det. C. RICHARD, Laboratoire of Entomology of the Museum).

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