

Succulent Euphorbias of northern Madagascar

WERNER RAUH

Resum

RAUH, W. (1992). Eufòrbies suculentas del nord de Madagascar. Collect. Bot. (Barcelona) 21:197-210.

Es presenta una revisió de les espècies suculentas del gènere *Euphorbia* L. del nord de Madagascar. Es discuteixen els grups sistemàtics que no mostren afinitat amb les espècies indo-africanes d'*Euphorbia*. Es proposa una nova combinació: *Euphorbia aureo-iridiflora* (Rauh) Rauh

Mots claus: Euphorbiaceae, *Euphorbia*, Taxonomia, Madagascar.

Abstract

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A survey is given of the *Euphorbia* species occurring in northern Madagascar. The systematic groups which show no affinities with African-Indian *Euphorbia* species, are discussed. One new combination: *Euphorbia aureo-iridiflora* (Rauh) Rauh is proposed.

Keywords: Euphorbiaceae, *Euphorbia*, Taxonomy, Madagascar.

INTRODUCTION

Madagascar is very rich in Euphorbias. We know up today about 80 succulent and some 20 xerophytic species, all endemic to the island. It is remarkable that the Madagascan species have no affinities to the African-Indian species except for the geophytic species *E. primulifolia* Baker and *E. quartzitcola*, Léandri, which show a relationship to the African species as *E. silenifolia* (Haw.) Sweet, *E. crispa* (Haw.) Sweet, *E. rubella* Pax.

In Madagascar no high succulent tree *Euphorbia* as *E. candelabrum* Kotsehy or globular species (*E. obesa* Hook., *E. symmetrica* White, Dyer & Sloane) can be found. The present

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systematic classification of the Madagascan Euphorbias is not satisfying. Concerning the growth-forms we can distinguish in general the following two groups:

1. The "leaf- and spineless" coralliform Euphorbias (sect. *Tirucalli* Boiss).

These are mostly arborescent dioecious species with a big lignified stem and a crown of round, rarely flattened (*E. enterophora* Drake) or thorny (*E. stenoclada* H. Baill.) branches with small, soon deciduous leaves. The cyathia are unisexual and inconspicuous. From a distance the crown resembles a big coral stock; therefore the name "coralliform" Euphorbias. Their distribution areas are the dry areas of the north (*E. tirucalli* L.), the Inselberge of the High Plateau in Central Madagascar, but above all the dry, semi-desert regions of the southwest.

2. The thorny Euphorbias of the sect. *Diacanthium* Boiss. (mostly known as "*milii*-Euphorbias").

These are mostly shrubby plants with deciduous leaves, thrown off at the beginning of the rainy season. The stipules are transformed to pungent thorns. The bisexual cyathia are arranged in dichasial inflorescences and the often spreading cyathophylls are well developed and bright coloured. The main distribution areas of the *milii*-Euphorbias are the Inselberge and the Central Plateau as well as the deciduous-bush of the southwest and south.

Besides these both types of life-forms there are other Madagascan Euphorbias which must be put into separate systematic groups. The french botanist J. Léandri, who has carried through many studies of the Madagascan Euphorbias for many years, has erected the following groups (Léandri, 1952-1953): *E. lophogona*, *E. pedilanthoides*, *E. pachypodioides*, *E. ankarensis*, *E. bosseri*

But this is only a provisional classification. Intensive micromorphological and biochemical research is necessary, to erect a definitive system of the Madagascan Euphorbias.

Northern Madagascar, from the Cap d'Ambre up to the Sambirano-region (See map, Figure 1), is rich in remarkable Euphorbias, which are restricted in their distribution exclusively to the north.

Here, only one species of the *milii*-group is present, recently described by Rauh & Razafindratsira (RAUH, 1991a)

RESULTS

Euphorbia bulbispina Rauh

It grows only on the top of the Windsor Castle rock near Antsirana (Diego Suárez) and between limestone rocks in the valley northeast of the Castle rocks (see map 1), here in association with *Aloe suarezensis*, *Pachypodium baroni* var. *windsori*, *Euphorbia viguieri* and others. It forms big dwarf shrubs of a diameter of 1 m and more and a height of 80-100 cm. Juvenile stades are, contrary to the other *milii*-species, small trees with a prominent mainstem; the lateral branches are ascending and surpass the short mainstem; they are covered with a thick, dark-brown wax-layer. The deciduous leaves, mostly arranged to 5 in a terminal, spreading rosette, are short petiolated and have an ovate, dullgreen, red margined blade. The stipular thorns appear single; they are purple-red, when young, gray-brown with age and very bulbous at the base (Figure 2). The subterminal dichasial inflorescences have 2-4 cyathia with spreading, creme-yellow to pure white cyathophylls and green glands.

Plants of *E. bulbispina* are difficult to transplant; contrary to most of the species of the *milii*-group it is also difficult to propagate by cuttings.

All other Euphorbias of the extreme north can be put into the actual Euphorbia system only with difficulties.

We distinguish for the north the following groups:

1. Cyathophylls more or less spreading. Cyathia often nutant. Stipular thorns reduced: *Euphorbia ankarensis*-group with *E. ankarensis*, *E. alfredii*, *E. millotii*, *E. herman-schwartzii*.
2. Cyathophylls erect, enclosing and hiding the cyathia-involucrum.
 - a. Stipular thorns isolated and single: *E. pachypodioides*-group with *E. pachypodioides*.
 - b. Stipular thorns branched and united at the base to prominent wings (see Figures 8, 9): *E. neohumbertii*-group with *E. neohumbertii*, *E. aureo-viridiflora*, *E. viguieri*.

Euphorbia ankarensis P. Boit.

Known only from the Montagnes des Français and the Falaise de l'Ankarana near Antsiranana (Diégo Suarez, see map, Figure 1). It grows here on escarpments in deciduous forests in a black humus of eroded karstic limestone rocks, so-called Tsingys. Normally the plants have an unbranched stem of 40 to 80 cm tall, 3-5 cm in diameter, thinner at the base, covered with a mantle of silver-gray, splitted cork (Figure 2b). The deciduous leaves appear at the end of the flower period in a rosette of 5-9 (Figure 2b). The short petiolated blades are long-ovate, short acuminate, 5-7 cm long, 2-3 cm across and densely covered with silver-white hairs. The stipules are reduced to small, dissected protuberances, which disappear soon (Figure 2 b).

The inflorescences —dichasia— appear in the dry season in subterminal position and in such a great number that all the dichasia form a ball of nutant cyathia (Figure 2 c-d). The bell-shaped cyathophylls are relatively large, pale-rose to green coloured with a small red margin, broad-ovate and sharp acuminate, hairy beneath, especially at the midnerve and at the base; they cover completely the small involucrum with the yellow-green glands (Figure 2 c-d).

When in full flower *E. ankarensis* is really a decorative and impressive succulent (Figure 2 c-d). After fruiting the cyathia fall off and a new leaf-rosette is formed at the beginning of the rainy season. *E. ankarensis* shows therefore as most of the madagascan Euphorbias a distinct between a vegetative and a fertile phase.

E. ankarensis is easy in cultivation, but it can be propagated only by seeds.

Very close to *E. ankarensis* is *Euphorbia alfredii* Rauh also native in the deciduous forests on limestone in the Montagnes des Français near Diégo Suarez. It differs from it by the thinner stems, the ovate, glabrous leafblades (Figure 3 a) and the spreading, \pm round, brownish to pale-rose cyathophyll blades and the mostly few-flowering inflorescences (Figure 3 b).

The plant was discovered by Alfred Razafindratsira, Antananarivo.

The culture and the propagation is the same as for *E. ankarensis*.

Euphorbia denisiana A. Guill.

This taxon of which neither the locality nor the origin is known, seems to be close to *E. alfredii*. Only one herbarium sheet is existing. The plant is not in cultivation. According to A. GUILLAUMIN (1929) *E. denisiana* is a shrub of 50 cm tall with a succulent stem, covered with 8 spiralized orthostiches of small tubercles. Leaves appearing after the flowering period; blades 5-7 cm long, 2.5-4 cm across, obtuse at the apex, pale-green above, whitish-green beneath. Inflorescences with numerous dichasia, forming a terminal globular head; cyathophylls hairy; color unknown.

Close to *E. ankarensis* and associated with it is *Euphorbia herman-schwartzii* Rauh an interesting plant of the *ankarensis*-group, because it is the only stoloniferous species. We discovered the plant in October 1990 in the western part of the Falaise de l'Ankarana, southwest of Diégo Suarez (Antsiranana). It grows here in cracks, filled up with humus of the eroded limestone plateau in association with *E. ankarensis*, *E. pachypodioides*, *Uncarina*

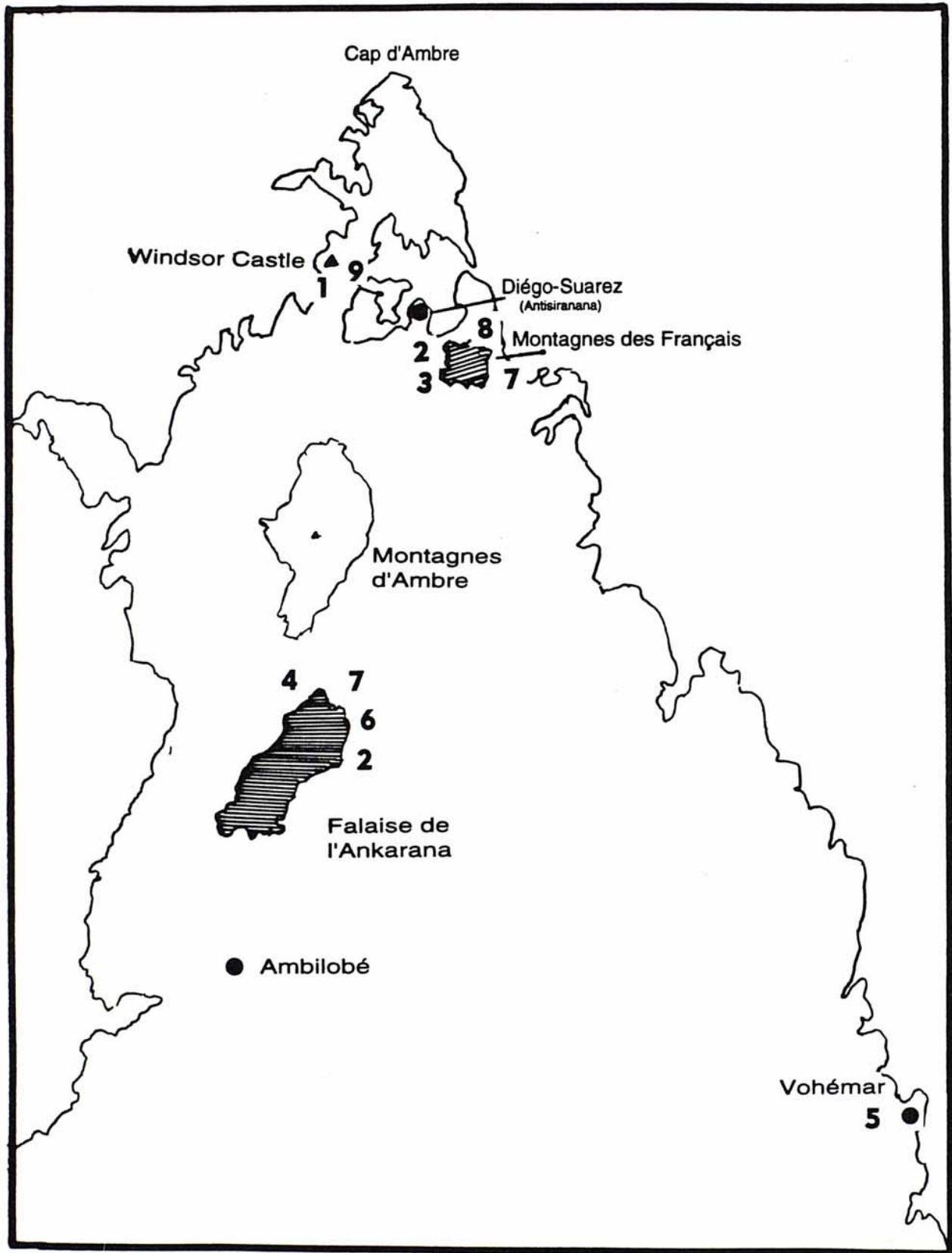


Fig. 1.—Distribution of the north Madagascan succulent *Euphorbias*: 1 *Euphorbia bulbispina*, 2 *E. ankarensis*, 3 *E. alfredii*, 4 *E. herman-schwartzii*, 5 *E. millotii*, 6 *E. pachynodioides*, 7 *E. neohumbertii*, 8 *E. auro-viridiflora*, 9 *E. viguieri*.
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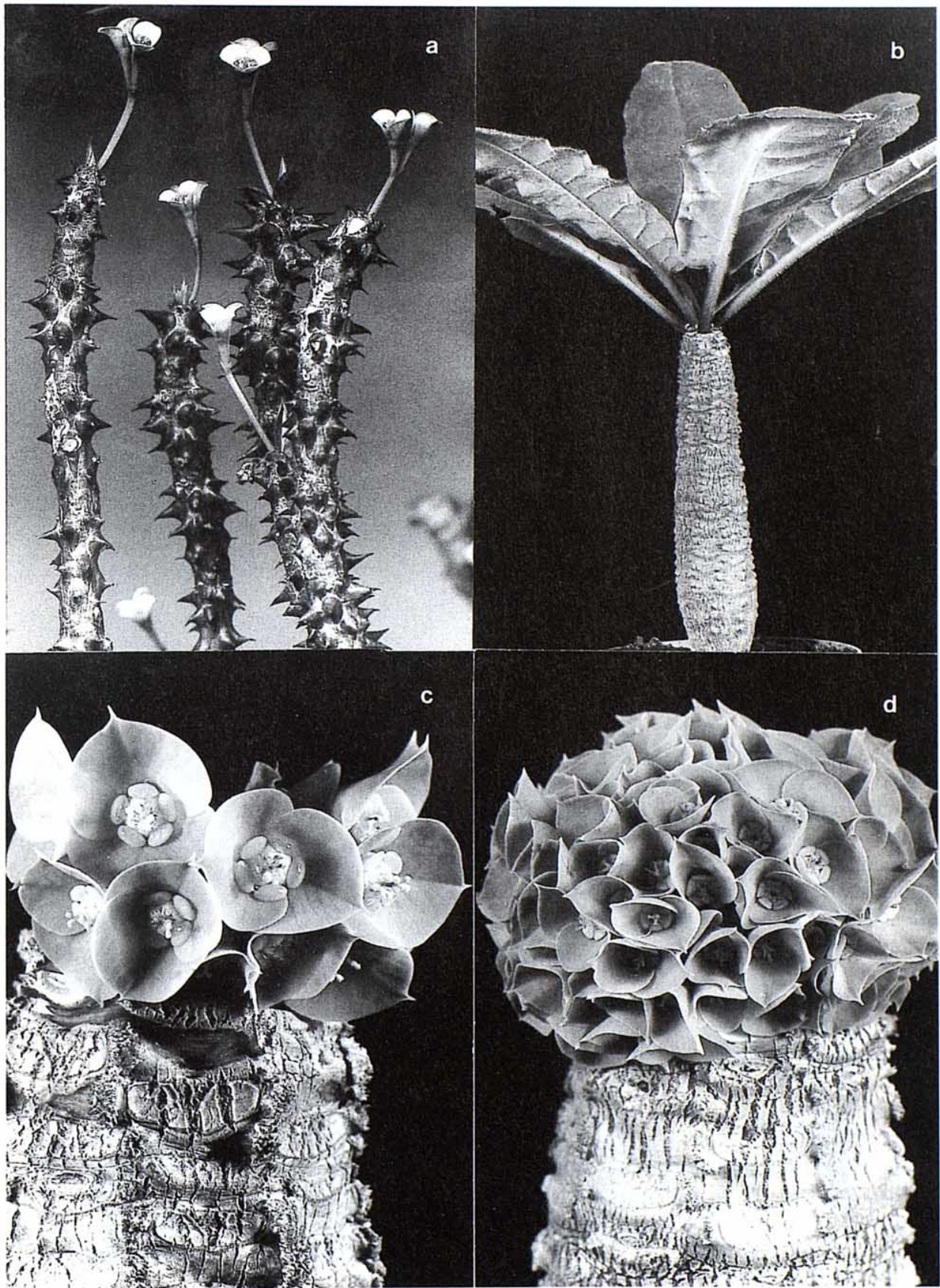


Fig. 2.— *Euphorbia bulbispina*: a) flowering plant; b) plant with the leaf rosette. *Euphorbia ankarensis*: c, d) flowering plants.

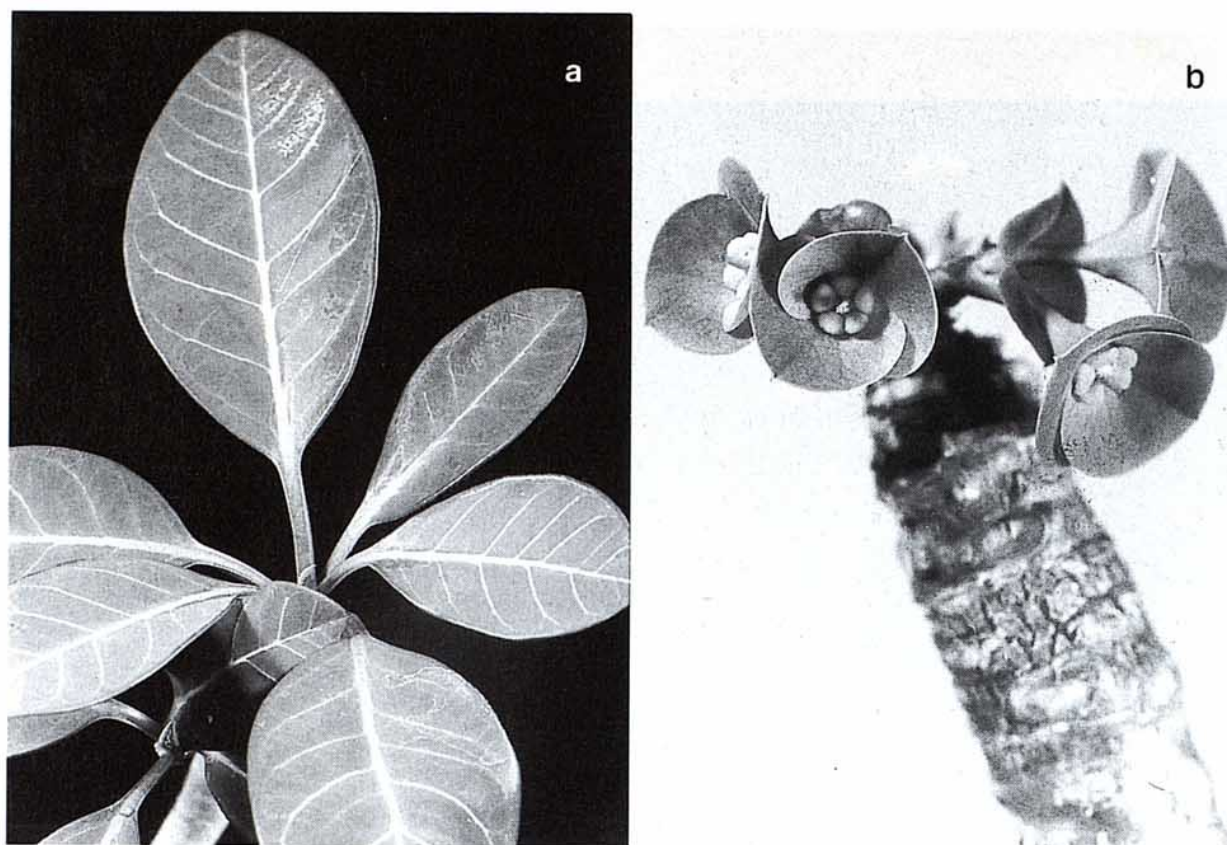


Fig. 3.— *Euphorbia alfredii*: a) leaf rosette; b) flowering shoot.

peltata (Pedaliaceae) and a non-flowering *Crinum*. Contrary to *E. ankarensis*, which has normally only single, unbranched stems (see Figure 2 b, d), *E. herman-schwartzii* is richly branched from the base (Figure 4 a) and the stems are differentiated in a geophilous, subterranean, rhizom-like part and an ascending to erect photophilous and inflorescences producing part (Figure 4 a). The aerial shoots are 1-2 cm thick, covered with a lustrous brown mantle of cork, the bulbous bases of the very short, deciduous stipular thorns and the big scars of the deciduous leaves (Figure 4 a). These appear in a rosette of 5-6, are 2-3 cm long, red petiolated and have long-ovate, acuminate, 6-8 cm long and 4 cm across, densely white hairy blades (Figure 4 b). Inflorescences several, subterminal (Figure 4 c), 1,5-2 cm long with 2-4(-8) erect cyathia (Figure 4 d). Cyathophylls first erect, later spreading (Figure 4 d), short connate at the base, 5 × 6 mm, sharp acute, nearly glabrous and somewhat fleshy, yellow-green to reddish, hiding the small, green, 2-lipped glands, pubescent at the base. Fruits and seeds unknown.

To the *ankarensis*-group belongs also

Euphorbia millotii Ursch & Léandri

Known only from the region of the Lac Bleu near Vohemar (Iherana), northeastern Madagascar, where it grows in sandy soil (see map, 1). It has nutant cyathia like *E. ankarensis*, but contrary to it, *E. millotii* forms shrubs up to 50 cm tall, richly branched from the base (Figure 5 a). The stems are reddish-green when young, but covered with a silvergray splitted cork-mantle with age and the half-moon-shaped scars of the deciduous leaves (Figure 5 b). These have a 8-10 mm long red petiole and a lanceolate-ovate, acuminate, green to purple-red (beneath) blade, up to 12 cm long and 3 cm across. The stipules are reduced to small, scarcely visible protuberances. The inflorescences appear in the leafless stades in subterminal position

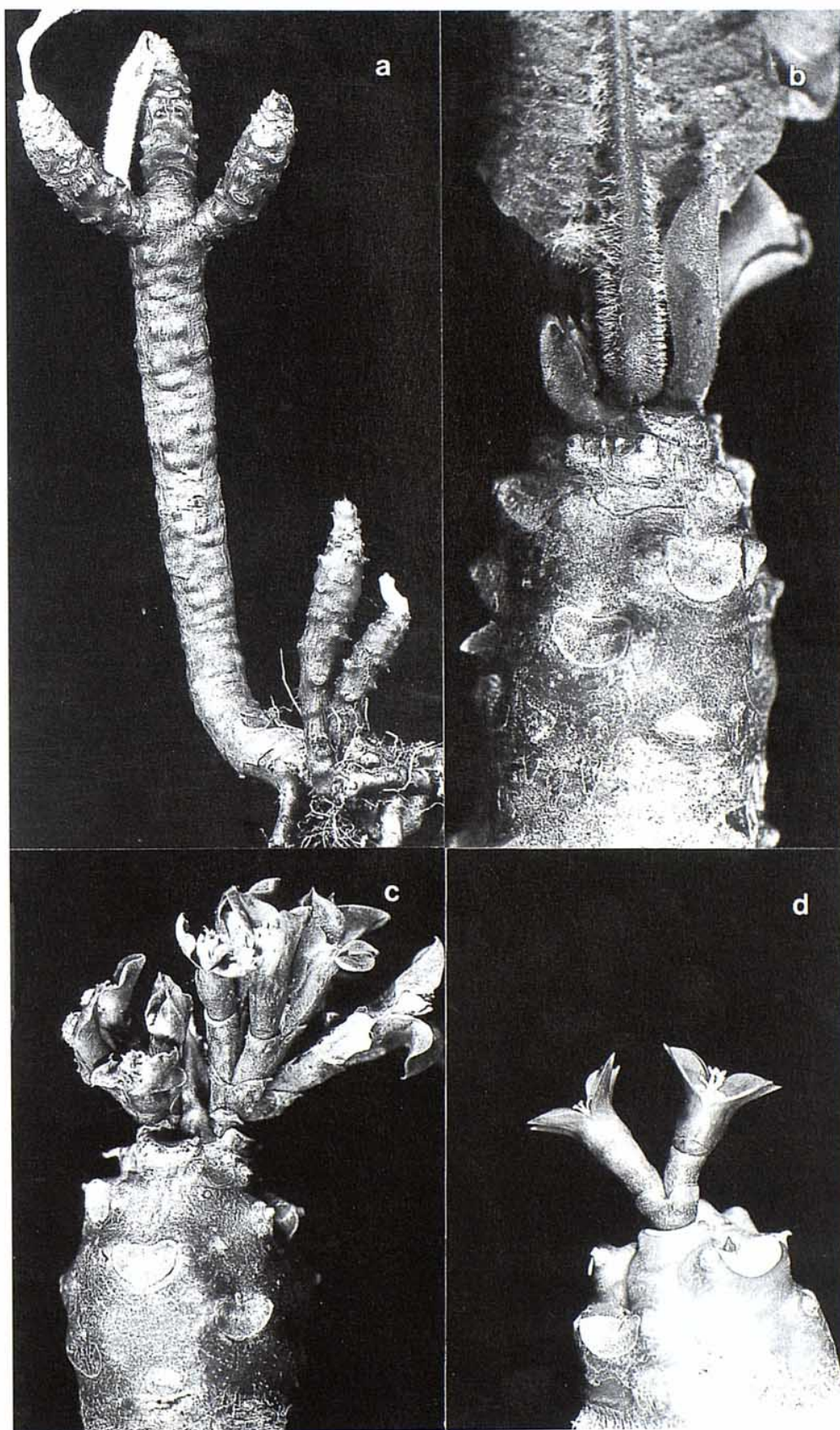


Fig. 4.— *Euphorbia herman-schwartzii*: **a)** part of a shoot-system; **b)** top of an aerial shoot; **c)** flowering shoot; **d)** single dichasium with 2 cyathia.

and are dichasias with mostly 2 nutant, short petiolated cyathia (Figure 5 b). The pale-red to green cyathophylls are 8×10 mm, short acuminate and hide completely the small involucre with the yellowish-green glands.

E. millotii is easy to propagate by cuttings in contrary to *E. ankarensis*

Euphorbia pachypodioides P. Boit. (syn. *E. antanakara* LÉANDRI)

This plant is put by LÉANDRI (1953) into an own group, represented only by one species, just *E. pachypodioides*; it is a highly succulent dwarf *Euphorbia* of cactoid habitus (Figure 5 c, d). Because of its columnar unbranched stems it looks very similar to the juvenile stades of the arborescent *Pachypodiums* as *P. geayi* or *P. lamerei*. The unbranched stems become up to 50-70 cm tall and 5 cm thick (Figure 5 c) and consist mostly of water-storing pith. They are covered with a mantle of grey-brown cork and the prominent tuberculate leaf-scars, arranged in spiral rows and flanked by stout stipular, red-brown to black-violet thorns (Figure 5 d). The deciduous leaves, arranged in a terminal rosette, appear at the beginning of the rainy season; the short petiolated blades are 10-12 cm long, acuminate, 3-5 cm across, bright-green to blue-green on the upper side and often red-violet beneath.

The long pedunculated subterminal inflorescences appear to several at the end of the dry season (Figure 5 d). Each inflorescence is a richly branched dichsial cyme with 20-40 short petiolated, erect cyathia (Figure 5 d). The erect cyathophylls are dark-purple, pale-green at the base, 4-5 mm long, apiculate, hiding completely the involucre with the small glands. Only the purple styles and on the male flowers the yellow pollensacs are exerted (Figure 5 d).

E. pachypodioides is not only a very attractive but also a rare species. It grows only on cliffs of the eroded limestone Schrattealk (Tsingys) in the Falaise de l'Ankarana (Figure 5 a) southeast of Diégo Suarez.

It is not easy in cultivation, but grows well, when grafted on other *Euphorbias*, f.e. the African *E. candelabrum*.

The *Euphorbia neohumbertii*-group is characterized by the dense inflorescences with numerous, slender, bottle-shaped erect cyathia. Cyathophylls erect, completely covering the involucre. Stem erect, angled by the stipular thorns.

Euphorbia neohumbertii P. Boit.

It is, when flowering, one of the most decorative Madagascan *Euphorbias* (Figure 6 a).

This plant forms mostly unbranched, sharp 5-angled erect stems (Figure 6 a) up to 1 m tall and 5 cm in diameter, becoming thinner to the base. Epidermis bright-green, interrupted by the big transverse elliptic, grey-corky scars of the deciduous leaves. These are arranged in a terminal rosette (Figure 7 b); the petiolated blades are ovate, short acute, up to 10 cm long and 3,5 cm across bluish-green above, sometimes bright-red beneath (forma *rubrifolia*). Stipular thorns transformed into numerous simple or branched bristles, of which someones can reach a length of 1,8 cm. All these bristles are united at the base, densely covering the angles of the stem (Figure 6).

The cyathia appear in a great number (up to 100), forming a bright-red "head" (Figure 6 a). The single cyathia are erect and bottle-shaped; the cyathophylls are erect, up to 15 mm long, bright-red in the upper half, green at the base, tomentose on the outer (upper) side and cover completely the small involucre with the glands. Only the pollensacs and the green style, with the bifid stigmas are exerted (Figure 6 a).

E. neohumbertii is not rare in northern Madagascar, particularly in the Montagnes des Français and in the Falaise de l'Ankarana, growing here in dry forests on limestone. As *E. ankarensis* it can be propagated in cultivation only by seeds.

Into the relationship of *E. neohumbertii* belongs also *E. aureo-viridiflora*, distributed in the Montagnes des Français. It has been discovered in 1969 by rauh, growing in steep rockwalls and described as var. *aureo-viridiflora* of *E. neohumbertii*. But new studies in the type-locality

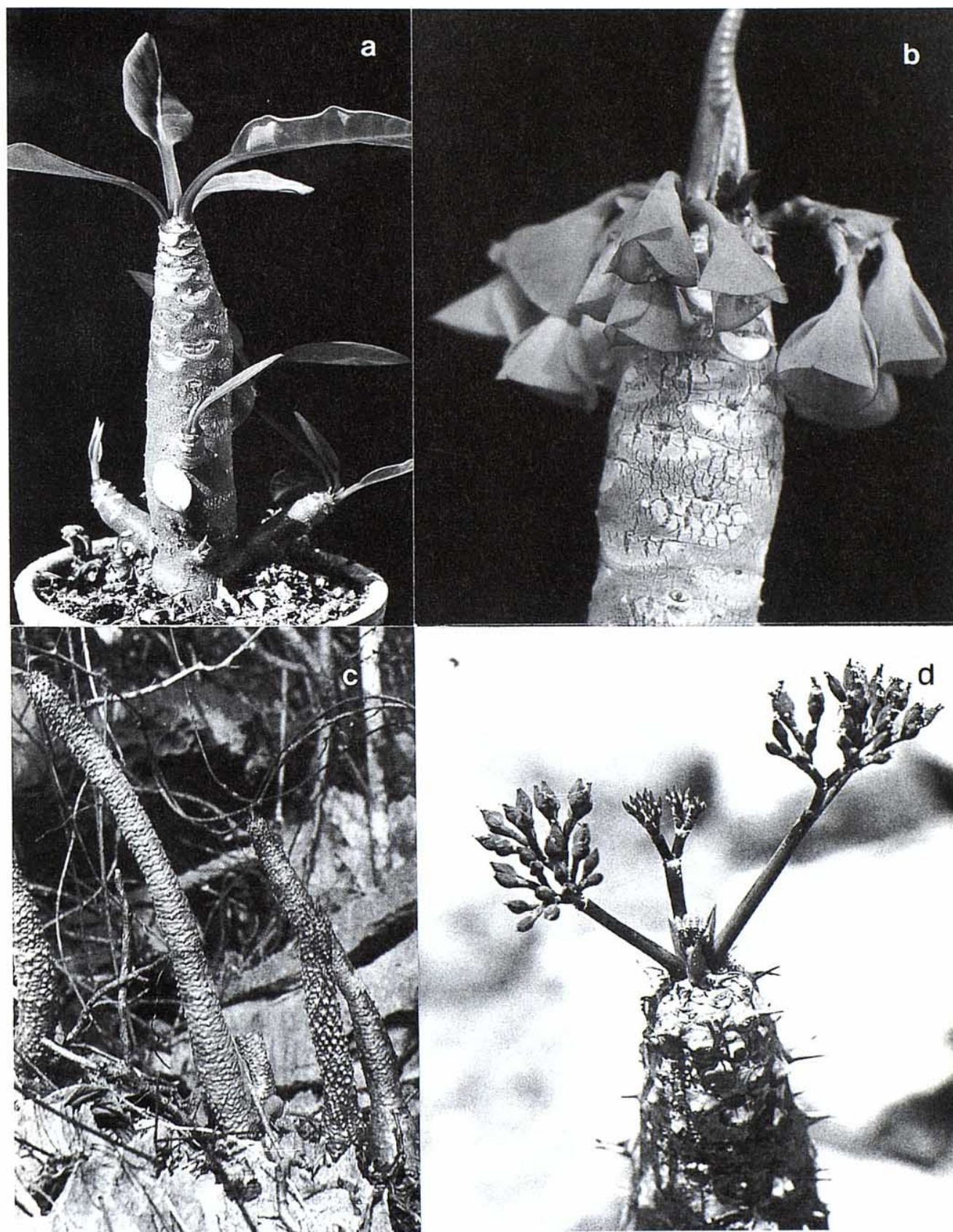


Fig. 5.— *Euphorbia millottii*: a) young plant, branching from the base; b) flowering shoot. *Euphorbia pachypodioides*: c) plants growing in the “Schrattenkalke” of the Falaise de l’Ankarana. Such a photo, taken in 1969, belongs to the past. Today *E. pachypodioides* has become very rare, because most of the plants are collected away; d) flowering plant.

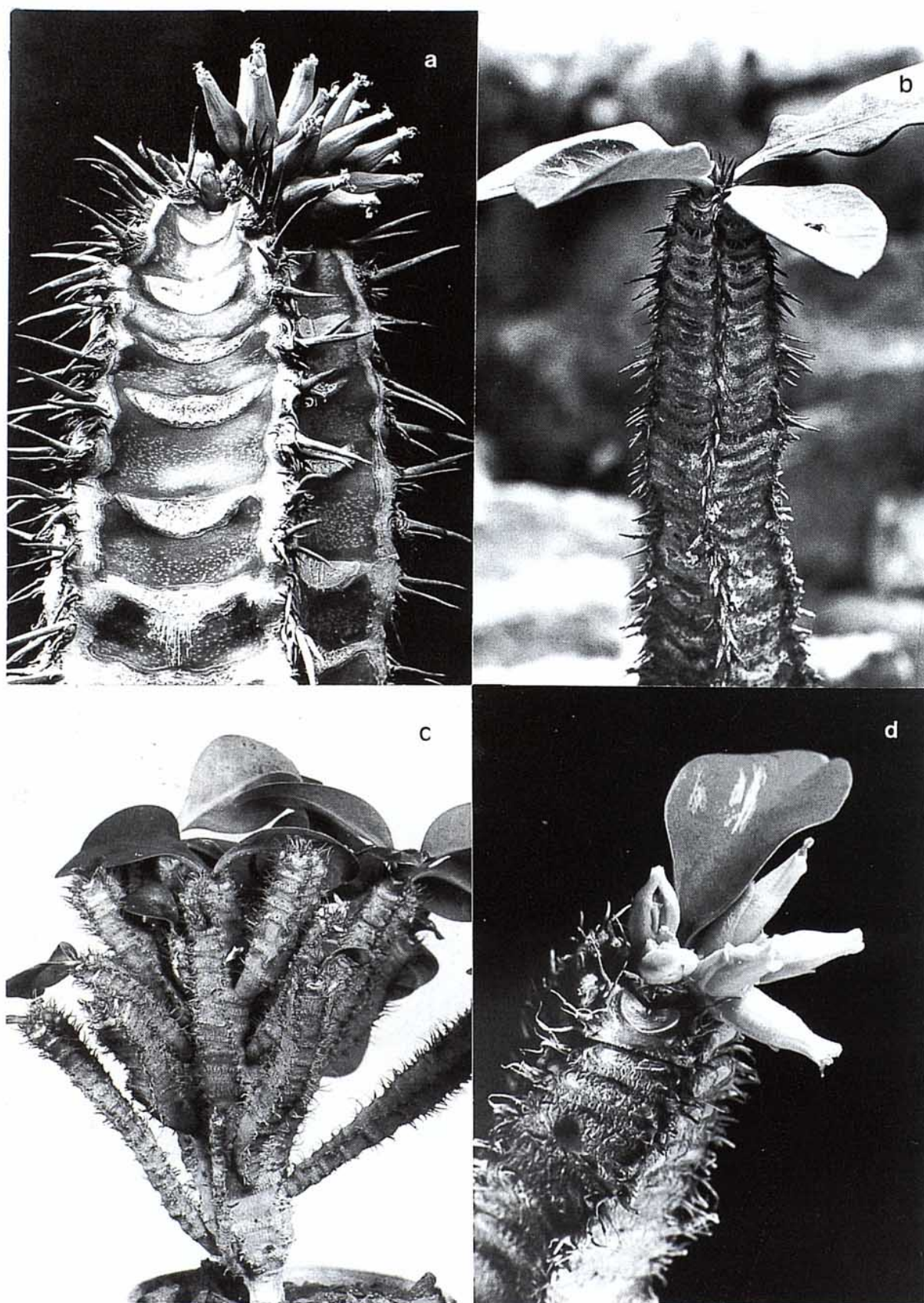


Fig. 6.— *Euphorbia neohumbertii* a) plant with the leaf-rosette; b) flowering shoot. *Euphorbia aureo-viridiflora*: c) young plant; d) flowering shoot.

in 1990 convinced the author to put this variety into the status of an own species as the following taxon.

***Euphorbia aureo-viridiflora* (Rauh) Rauh comb. & stat. nov.** (Basionym: *E. neohumbertii* P. Boit. var. *aureo-viridiflora* Rauh 1970, Cact. Succ. J. (U.S.) 13: 204-208).

It differs from *E. neohumbertii* in the following points: Plant richly branched and forming hemisphaerical dwarf shrubs (Figure 6 c), up to 50 cm tall. The 1-2 cm thick stems often twisted and covered soon with a grey-brown cork layer. Leaves much smaller than in *E. neohumbertii*: the ovate, short acuminate blades are only 1,3-3 cm long and 2,5 across, bright deep-green above; the stipules are dissolved into numerous bristles, first being reddish-brown, becoming soon pale and disappearing. Inflorescences few-flowering. Cyathia much smaller than in *E. neohumbertii* (Figure 6 d), yellow to yellow-green, tomentose on the outer surface. Involucrum very small, only 3 mm high; glands small, bright-green. Contrary to *E. neohumbertii*, *E. aureo-viridiflora* can be easily propagated by cuttings.

An attractive and in cultivation wide-spread species, which we put also into the *E. neohumbertii* group is the very variable.

Euphorbia viguieri M. Denis

The type var. *viguieri* forms unbranched or often branched 40-100 cm tall stems, thinner at the base, but becoming thicker to the apex, reaching a diameter of up to 6 cm and 4- to 5 angled (Figure 7). The prominent angles are formed by the thick tuberculate bases of the longitudinal flattened, simple or branched, brown stipular thorns (Figure 8 c). The deciduous leaves are arranged in orthostiches in a terminal rosette; they are short petiolated and have a long-ovate, 9-10 cm long, 3 cm across, green blade (Figure 7 a). The midrib is prominent

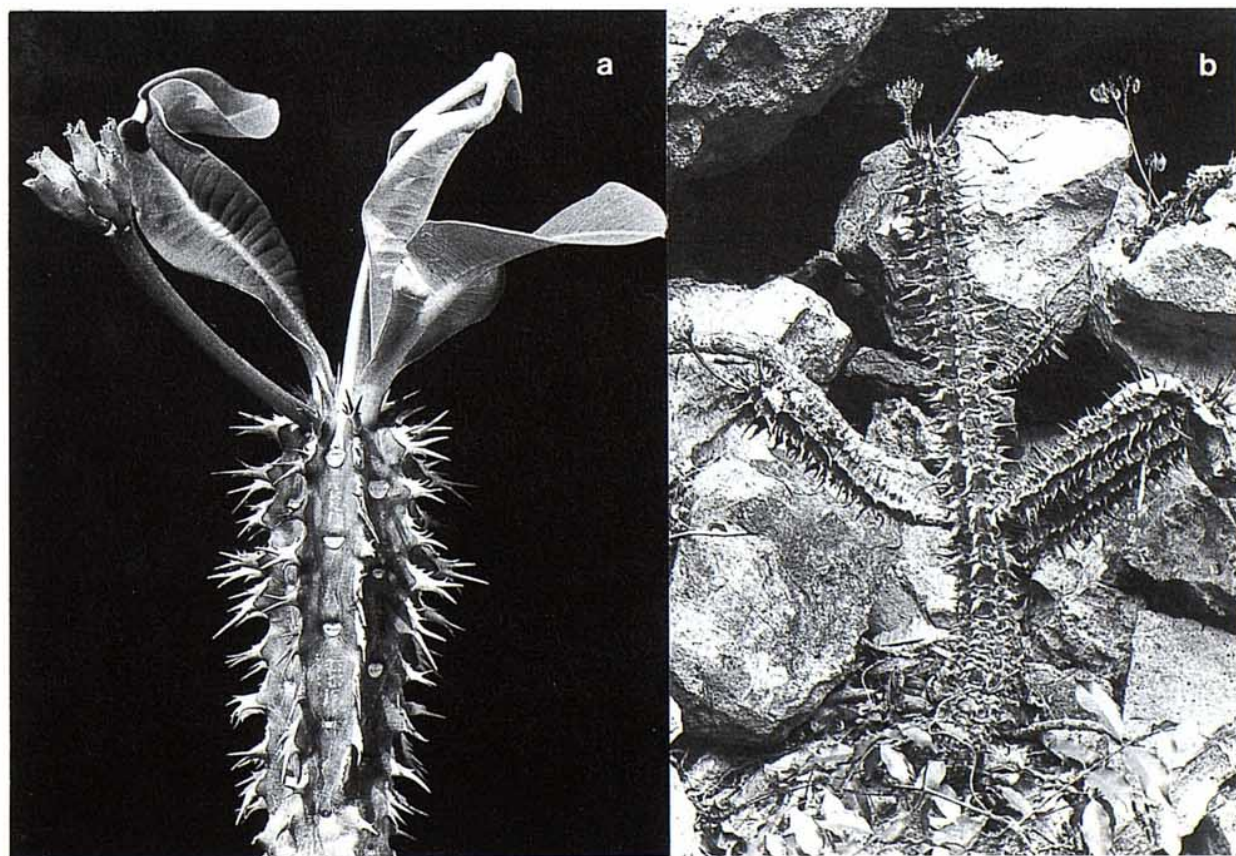


Fig. 7.— *E. viguieri* var. *viguieri*, (a, b), in cultivation, grown from seed.

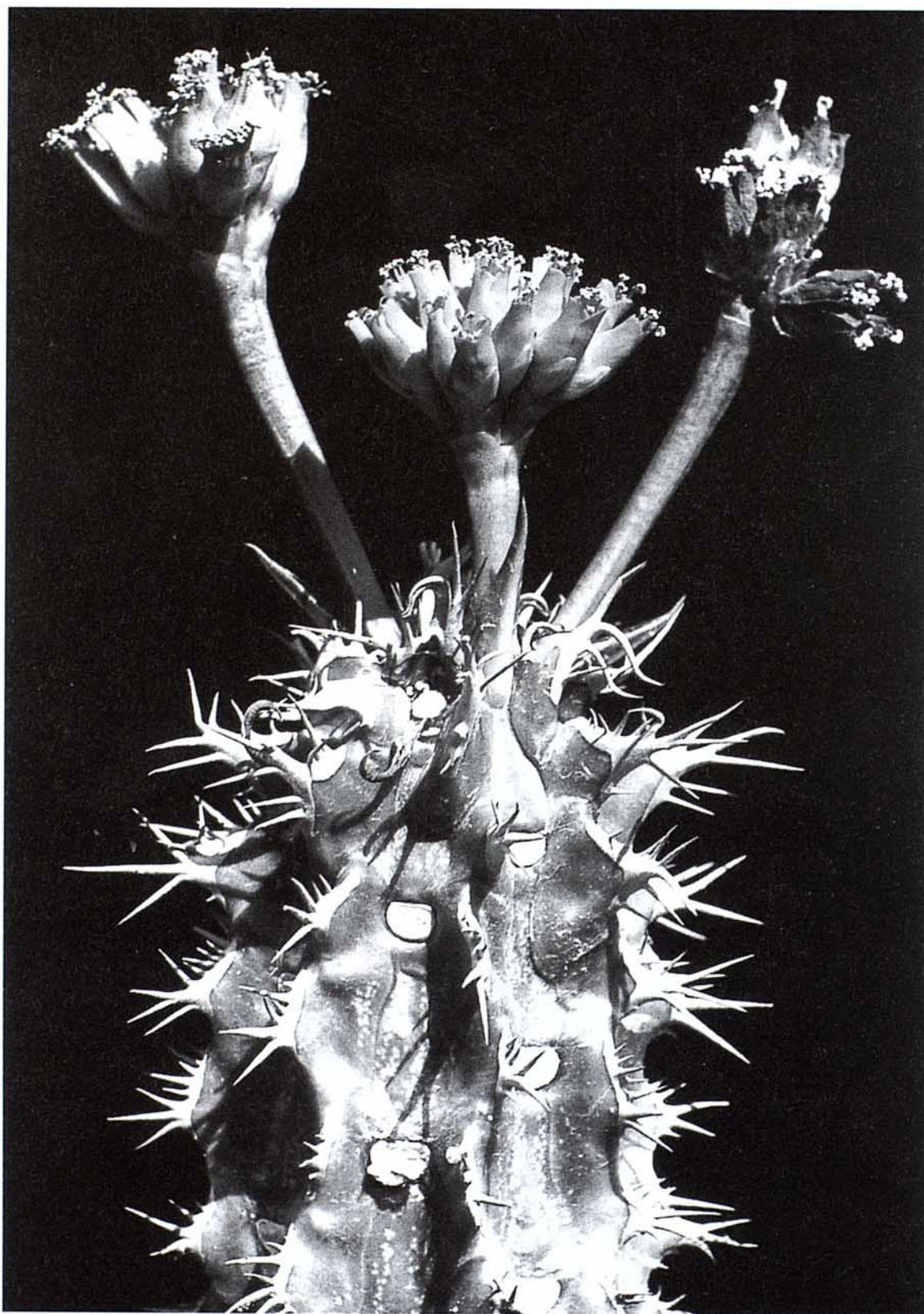


Fig. 8.— *Euphorbia viguieri* var. *ankarafantsiensis*, Réserve Nat. 9, south of Mahajanga.

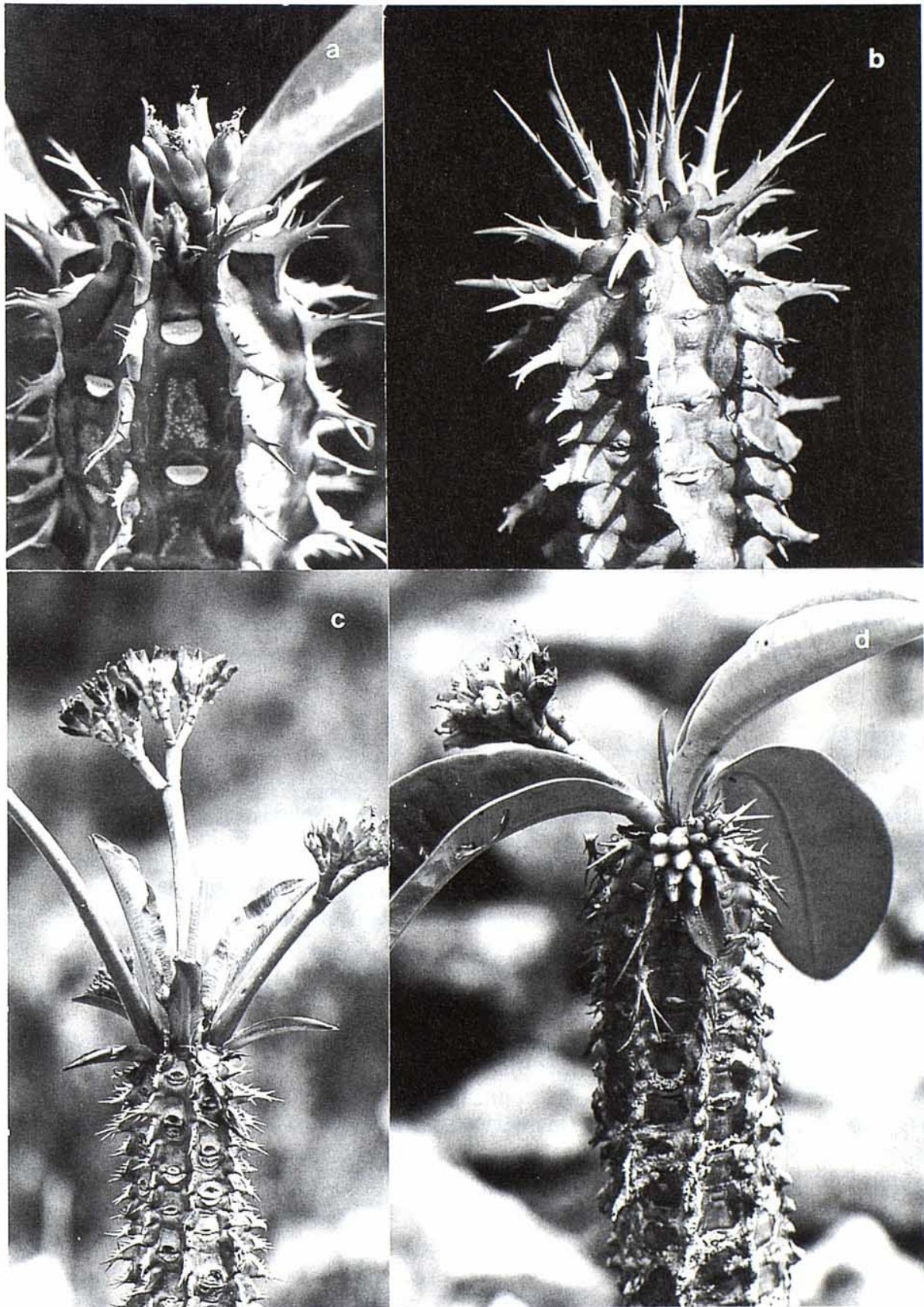


Fig. 9.— *Euphorbia viguieri* var. *capuroniana*: a, b) falaise de l'Ankarana. c) *Euphorbia viguieri* var. *tsimbazaza*: d) *Euphorbia viguieri* var. *vilandranensis*, near the village Vilanandro, Rés. Mat. de Namoroka.

beneath, white and red to the petiole. The subterminal inflorescences bear erect cyathia in a dichasial arrangement; the cyathophylls are brilliant red and enclose completely the involucre (Figure 8). According to DENIS (1921), who has described this species, the cyathia are unisexual. All the other varieties have bisexual cyathias. Concerning the shape and length of the stipular thorns, the length of the inflorescence-peduncles, several varieties have been described, but it is difficult to distinguish them after cultivated plants.

The distribution area of the *E. viguieri*-complex extends from the Montagnes des Français in the north up to Morondava in middle-west Madagascar. The different varieties are:

var. *viguieri*: Montagnes des Français, Falaise de l'Ankarana to Maevatena, south of Mahajunga (Figure 7)

var. *ankarafantsiensis* Ursch & Léandri: Reserve Naturelle Ankarafantsika, south of Mahajunga (Figure 8)

var. *capuroniana* Ursch & Léandri: Stipular thorns very long. Inflorescences subsessile to sessile (Figure 9 a, b): Falaise de l'Ankarana near Diégo Suarez

var. *tsimbazaza* Ursch & Léandri, described after a specimen in the Botanical Garden Tsimbazaza. Inflorescences long-stalked (Figure 9 c)

var. *vilandranensis* Ursch & Léandri: Reserve Naturelle de Namoroka, near the village Villandrano, northwest Madagascar, east of Mahajunga. Inflorescences short stalked. Cyathophylls green to pale-red (Figure 9 d).

These different varieties, described by URSCH & LÉANDRI (1954) are only geographical and ecological races of no taxonomic value.

All the previously described Euphorbias of northern Madagascar, except for *E. bulbispina* are endangered species. They therefore have been put into Appendix I of the W.A. and the export of wild-collected plants is strongly forbidden.

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