A synopsis of woody Portulacaceae in Madagascar

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ABSTRACT
The relationships of the endemic woody Madagascan genera *Talinella* Baillon and *Dendroportulaca* (*gen. nov.*) are discussed. *Talinella* (5 species) is unique in the family for its juicy-mucilaginous berry-like fruits, while *Dendroportulaca* (monotypic) has unique spicate inflorescences but shares operculate fruits with the herbaceous genus *Portulaca*. *Talinella* and *Dendroportulaca*, which share similar smooth black and apparently primitive seeds, are probably primitive within the phylogeny of the family, and their relationships to the African woody genera *Ceraria* and *Calyptrotheca* (Portulacaceae) as well as to Basellaceae are discussed. The genus *Talinella* is monographically revised and a key to its 5 species is presented. *T. microphylla* and *T. pachypoda* are described as new. *Dendroportulaca* is monotypic with *D. mirabilis* also newly described. All taxa are illustrated.

KEY WORDS
Portulacaceae,
Talinella,
Dendroportulaca,
Madagascar.

RÉSUMÉ
Les affinités des genres malgaches, endémiques et ligneux, *Talinella* Baill. et *Dendroportulaca* (*gen. nov.*) sont discutées. Au sein des Portulacaceae *Talinella* (5 espèces) est unique par ses fruits bacciformes juteux-mucilagineux, et *Dendroportulaca* est unique par des inflorescences en épis tout en présentant des fruits operculés comme dans le genre herbacé *Portulaca*. *Talinella* et *Dendroportulaca*, qui possèdent en commun des graines noires, lisses et apparemment primitives, ont probablement une position primitive dans la phylogénie de la famille et leurs affinités avec les genres ligneux africains *Ceraria* et *Calyptrotheca* (Portulacaceae), de même qu'avec les Basellaceae, sont discutées. La révision de *Talinella* est présentée sous une forme monographique avec une clé de détermination des 5 espèces. Deux nouvelles espèces, *Talinella microphylla* et *T. pachypoda* sont décrites. *Dendroportulaca* est monotypique et l'espèce *D. mirabilis* est également décrite pour la première fois. Tous les taxons sont illustrés.

MOTS CLÉS
Portulacaceae,
Talinella,
Dendroportulaca,
Madagascar.

INTRODUCTION

The recent interest in caudiciform (term introduced by G.D. ROWLEY in 1948 for plants with succulent basal storage organ and ± mesophytic, often annual, aerial stems; ROWLEY 1987) plants among collectors of succulents and other xerophytes has brought to light many interesting taxa from Madagascar, predominantly of genera of Cucurbitaceae (e.g. *Trochomeriopsis*, *Xerosicyos*) and Passifloraceae (*Adenia*), but also occasionally from other systematic groups.

Such an introduction was also the starting point for the investigations which led to the present paper: Some years back, the author received an unidentified caudiciform from the extreme N of Madagascar. It was soon clear that this plant was a member of the genus *Talinella*, but attempts to identify it as to species were unsuccessful and showed that the genus was in need of revision.

HISTORICAL SUMMARY

Members of Portulacaceae are not conspicuous amongst the xerophytic and succulent vegetation of Madagascar (e.g. not mentioned in RAUH 1995). Casual examination of herbarium holdings shows that apart from *Talinella* (3 species described) there are a handful of species of *Portulaca* and the occasional specimen of *Talinum*, the latter no doubt representing neophytic weeds.

Talinella was described by BAILLON (1886a, 1886b) with the single species *T. boiviniana*, whose geographic origin within Madagascar was not mentioned. Its primary distinctive character according to BAILLON is the ovary, which is divided into two locules—a character which is unique in the family and which makes the systematic placement of the genus difficult (PAX & HOFFMANN 1934: 261; CAROLIN 1993). FRANZ (1908: 19) even went so far as to exclude the genus from the Portulacaceae, speculating about possible affinities to the Aizoaceae on account of the bilocular ovary.

A second species, *T. dauphinensis*, was described by SCOTT ELLIOT in 1891 from the vicinity of Fort Dauphin, and in 1915, DANGUY described *T. grevei* from near Morandava, comparing it with *T. dauphinensis*.

Half a century later, LEANDRI (1962) published the new monotypic genus *Sabouraea* which he associated, though with a question mark, with the Flacourtiaceae. Only three years later, LEANDRI (1965) recognized the synonymy of *Sabouraea* with *Talinella*, and reported that the parietal placentation indicated in the illustrations which accompanied the protologue of *Sabouraea* must be an error of observation. A careful examination of *Sabouraea sarmentosa* now reveals that it is conspecific with *Talinella grevei*. *Talinella* does not seem to have been the subject of further studies, with the exception of the superficial and uninformative study of NYANANYO (1986) who concluded on the basis of stomatal patterns that the genus properly belongs to the Portulacaceae. Since the species of *Talinella* are virtually unknown in cultivation (except some collections cultivated in the Heidelberg Botanic Garden for many years, and the more recently introduced material which was the reason to initiate this study), it is also absent from contemporary succulent plant literature (e.g. RAUH 1995)—a notable fact since its taxa appear to be quite widespread in the xerophytic vegetation of SW Madagascar. The synoptical revision that follows is mainly based on herbarium specimens at K, MO, P and Z, as well as on ample living material of *Talinella pachypoda*.

Checking the folders with undetermined Portulacaceae for material of *Talinella* revealed the presence of a second woody-shrubby genus of similar appearance in Madagascar. Despite the paucity of material available, it will subsequently be described as *Dendroportulaca*, to make the name available for a forthcoming treatment of the family for the Flore de Madagascar.

GENERIC RELATIONSHIPS

Relationships amongst the genera of Portulacaceae are still insufficiently known (HERSHKOVITZ 1993; HERSHKOVITZ in ms.) and this is equally true for the whole group of families, including Didiereaceae, Basellaceae and

Cactaceae (HERSHKOVITZ in litt.). Since no specific ancestral taxa (outgroups) can be recognized, character interpretation and cladistic studies are at present difficult to carry out. Both PAX & HOFFMANN (1934) and CAROLIN (1993) placed *Talinella* in the family Portulacaceae, but as a genus of very uncertain position. While its general habit—apart from its sarmentose growth—is rather suggestive of some taxa of *Talinum* (e.g. *T. portulacifolium* (Forssk.) Asch. ex Schweinf.) and is responsible for the generic name, several flower and fruit characters are notable: The septate ovary was already mentioned as an exceptional character by BAILLON (1886a), and its presence was recently confirmed by HERSHKOVITZ (pers. comm.). HERSHKOVITZ found that material probably representing *T. grevei* (specimen not recorded) had a bilocular ovary, each locule with a single ovule basally attached to the septum. In *T. boiviniana* (*Humbert 18878*, P), HERSHKOVITZ found an incompletely 4-locular ovary, i.e. a complete primary septum as in *T. grevei*, with 2 additional incompletely formed septae in the form of peg-like protrusions directed from the ovary wall towards the centre. This is in accordance with a notes made by BAILLON (1886a) on the basis of information supplied by the collector BOIVIN that the fruit was 4-locular with 1 seed per locule.

Unfortunately, BOIVIN made no notes about the fruits of *T. boiviniana*, but remarks on several herbarium specimens of *T. grevei* and observations of living material of *T. pachypoda* show that the fruits exhibit another exceptional character for the family, as they ripen into juicy mucilaginous berries. In *T. pachypoda*, these berries are indehiscent and slowly change from bright green to brownish-red. It appears that the septae disappear upon ripening, and BOIVIN possibly analysed unripe fruits. Berry-like fruits are very suggestive of members of Basellaceae, but since the other characters (woody habit vs. twining lianas, stomatal patterns (NYANANYO 1986), inflorescence branching, and pollen) are in line with the variation found in Portulacaceae, the assignment of *Talinella* to the latter is not seriously questioned, though it certainly represents a very old member of this family, probably necessitating the creation of an additional tribe to accommodate it. Incidentally, NYANANYO (1990) placed *Talinella* in tribe Talineae, but the fruit characteristics are incongruent with his definition of the tribe.

The position of *Talinella* was also discussed by HERSHKOVITZ (1993). He places the genus in his "American/African group of the portulacaceous alliance", suggesting closest affinities with Didiereaceae and *Ceraria* and *Portulacaria.*

A further character of interest is the occurrence of unisexual flowers in *Talinella*, probably coupled with completely dioecious individuals at least in some cases. The available herbarium material does not allow firm conclusions, but it appears that completely unisexual inflorescences are rather the rule than the exception, and that apparently bisexual flowers could well be functionally unisexual, with either underdeveloped (or lacking) anthers or underdeveloped ovaries. All plants of *T. pachypoda* investigated are dioecious, and complete or partial dioecy is another rare character in the family, associated with woody habit in *Ceraria* and *Portulacaria.*

A comparison with other genera of Portulacaceae will have to include woody members with similar growth. These are *Ceraria* and *Calyptrotheca*, both from the African continent.

Calyptrotheca (2 species in E Africa): This genus is similar in its woody habit (though not sarmentose), semi-succulent deciduous leaves, inflorescence position and architecture (esp. the abbreviated contracted part-inflorescences with ± dichasial branching and the small bracts), basally hairy filaments, similar pollen (NYANANYO 1986: tab. 62; NYANANYO 1989), few-seeded fruits and smooth large black seeds. *Calyptrotheca* differs, however, in the following characters: Flowers much larger and apparently always hermaphrodite, style long exserted with capitate stigma (similar to species of Didiereaceae!), stamens more numerous, perianth forming a deciduous calyptra covering the fruit, fruit a dry capsule dehiscing from below with 6 irregular splits.

Ceraria (5 species in S & SW Africa): *Ceraria* resembles *Talinella* in its woody-shrubby habit (though not sarmentose), succulent deciduous leaves (often fascicled from short shoots), inflorescence position and architecture (often contracted fascicles), occurrence of unisexual flowers,

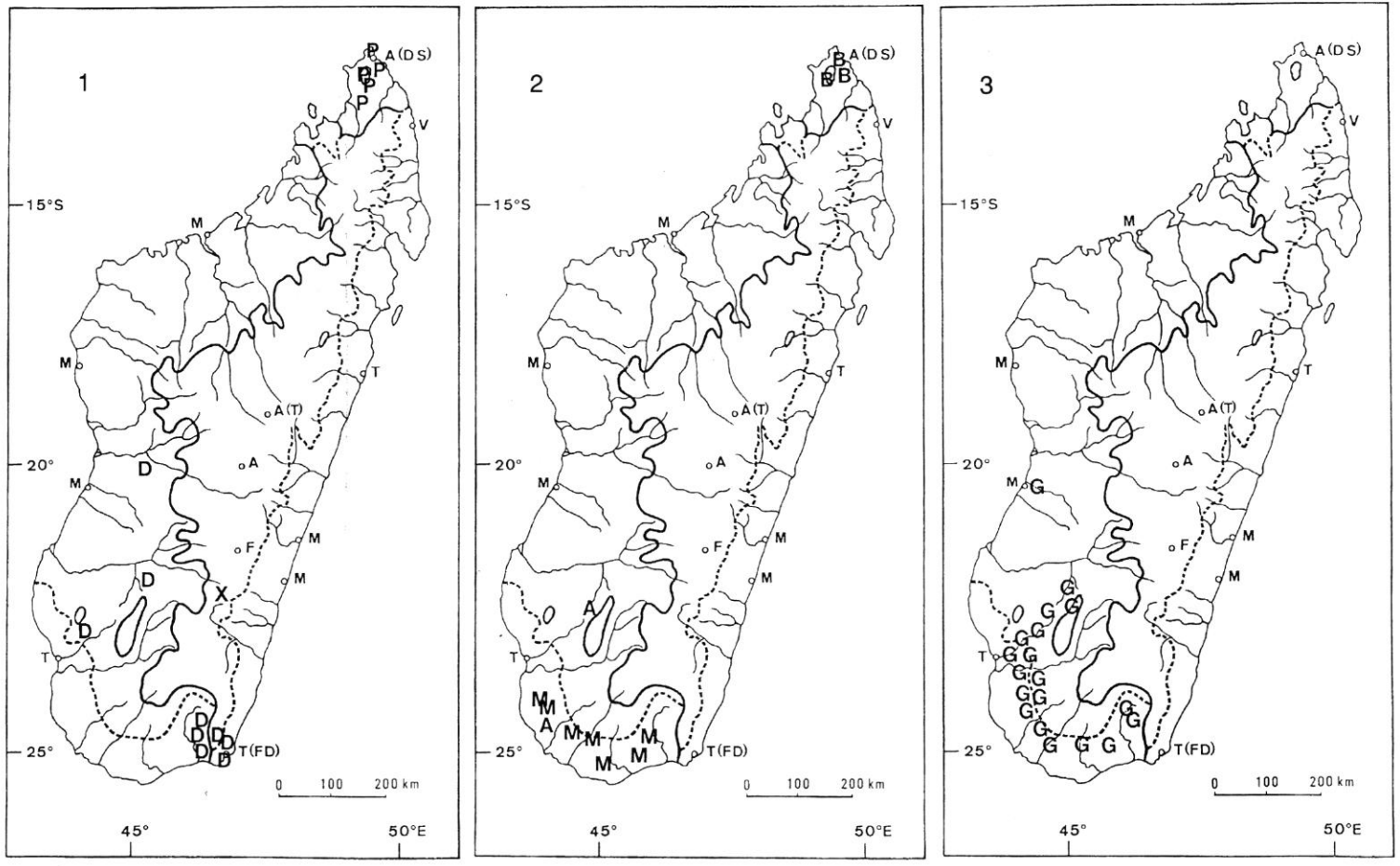

Fig. 1 (Maps 1-3).—The distribution of ***Dendroportulaca*** and ***Talinella***: Map 1 (left): D = *T. dauphinensis*, P = *T. pachypoda*, X = *Bosser 17406 + 17406bis* (see text for *T. dauphinensis*); Map 2 (center): A = *D. mirabilis*, B = *T. boiviniana*, M = *T. microphylla*; Map 3 (right): G = *T. grevei.*

ovaries with basal placentation, 2- to 3-fid style. It differs, however, in the perianth being persistent to fruiting stage and in the nut-like winged 1-seeded dry fruit.

Other genera with similarities include *Talinum* (Africa & Americas; similar seeds, but with hermaphrodite flowers and many-seeded capsules dehiscent from the base), and the monotypic *Amphipetalum* (Paraguay; similar but even more contracted part-inflorescences, similar flowers, basally hairy filaments, few-seeded fruits, but different by the long exserted style, capitate stigma [as in *Calyptrotheca*], persistent calyptra formed from perianth remains, and capsules opening from below with 3 valves, as well as papillose seeds).

At present and on morphological grounds, nothing can be said about the generic affiliation of *Talinella* (and also of *Dendroportulaca*, for discussion see the protologue). Both genera show unique combinations of characters, most of which are also known from one or another of the remaining genera of the family, but both also showing unique traits (berry-like fruits in *Talinella*, spicate inflorescences in *Dendroportulaca*) for the family, but present in the closely related Basellaceae. They can thus serve as yet another indication of the very close relationships between Basellaceae and Portulacaceae, and the woody habit of both *Talinella* and *Dendroportulaca* is rather suggestive of their possible ancestral "primitive" status. Molecular investigations currently being carried out by M. HERSHKOVITZ, which also embrace the equally closely related families Didiereaceae and Cactaceae, will probably shed more light on the intricate relationships in this group of families within the Caryophyllales.

DENDROPORTULACA Eggli, **gen. nov.**

Generis Talinellae *aspecto generali similis, sed maxime differt inflorescentiis ut videtur spicatis, filamentis lateraliter connatis quasi aspectu umbraculo, fructibus circumscissilibus, operculatis ut in genere Portulaca.*

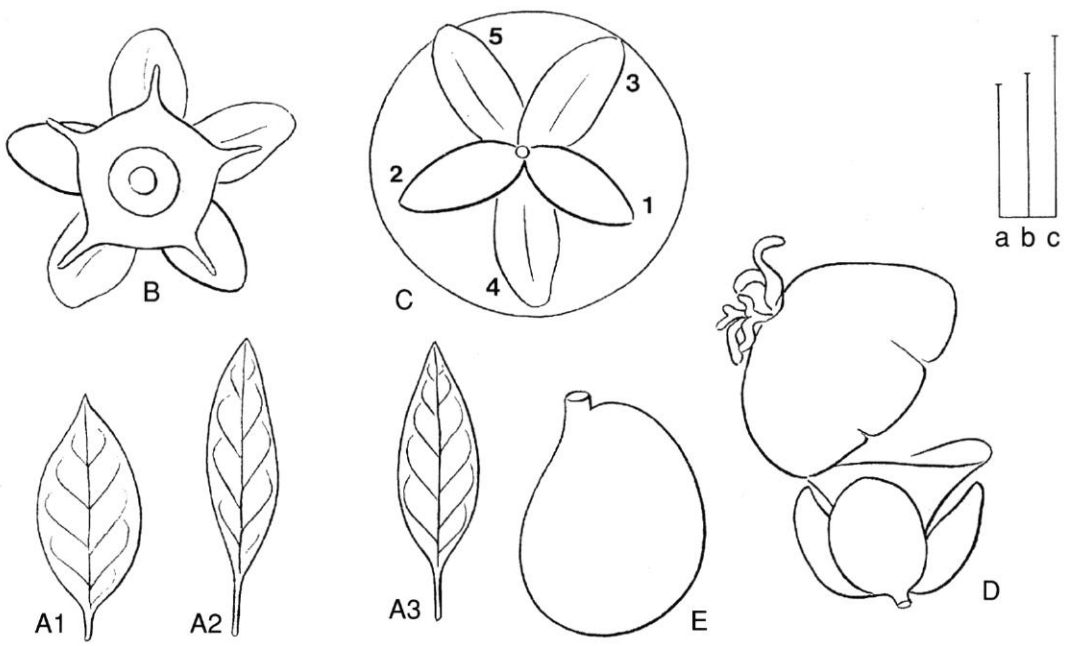

Fig. 2.—***Dendroportulaca mirabilis***: **A**, variation in shape and size of leaves; **B**, spent flower seen from above with scar of fallen ovary and umbrella formed by the united filaments; **C**, fruit seen from below (1-2 "sepals", 3-5 "petals"); **D**, opened fruit in sideview; **E**, seed. (A1, B, C, E: holotype; A2, A3, D: *Morat 2510*). (A = scale a = 23 mm; B, C, D = scale b = 2 mm; E = scale c = 1 mm).

A single species only:

Dendroportulaca mirabilis Eggli, **sp. nov.**

Diagnosis ut in genere Dendroportulaca, *supra.*

TYPE.—*Humbert 28786*, Madagascar: "Plateaux et vallées de l'Isalo à l'ouest de Ranohira, grès et sables siliceux, Hte. vallée de la Malio, restes de forêt tropophile, 800-1250 m", 29 Jan.-2 Feb. & 8-10 Apr. 1955 (holo-, P!).

Deciduous shrub, probably 2-3 m tall with slender twigs with smooth brown bark without lenticels; lateral short shoots spreading, internodes ± 1 cm; leaves alternate, petiole 0.6-1 cm, lamina to 4.7 × 2 cm, ± ovate-elliptic with clearly visible main and secondary venation, probably slightly succulent, basally cuneate (often slightly asymmetrical), apically pointed, completely glabrous. Inflorescences dense many-flowered spikes, terminal on the lateral short shoots, 4-7 cm long; flowers probably hermaphrodite, sessile, small, ca. 0.8 cm diam.; perianth of 2 outer slightly thickish ± shallowly cucullate sepaloid segments and 3 inner thin-textured petaloid segments; stamens 5, filaments basally broadened and united into a thin-textured umbrella-like structure; anthers not seen; ovary probably globose; stigma 3 sessile minutely papillate lobes ca. 0.8 mm long; ovary 1-locular, placentation central, ovules ± 15. Fruits circumscissile capsules as in *Portulaca*, 3-4 mm diam., dehiscent in lower half, basal part ± flatly saucer-shaped, operculum semiglobose with attached stigma remains; seeds ± 15, black, glossy, absolutely smooth and without visible cell pattern, ca. 0.8 × 0.6 mm, laterally somewhat compressed with a small stump where the funicle was attached.—Fig. 1 (Map 2: A), 2, 3.

DISTRIBUTION.—SW Madagascar, seasonally dry forests, apparently rare.

NOTES.—Formal description and naming of this taxon was long deferred, and it is only known from two specimens in the Paris herbarium. It is not impossible that it has been more frequently collected, but specimens are probably filed with the indets in other families.

Dendroportulaca shows a unique combination of characters in the family, though all—with the exception of the umbrella-like structure formed by the laterally broadened filaments—are present in one or another genus. The smooth seeds are very reminiscent of those of other woody shrubby Portulacaceae, such as *Talinella* or *Calyptrotheca*, but no close relationship with any of these can be postulated on morphological grounds. Whether the circumscissile operculate capsules are homologous with those of the contracted capitulum-like inflorescence of the predominantly herbaceous genus *Portulaca* remains to be demonstrated. *Dendroportulaca mirabilis* is sufficiently distinct in all other characters to make a close relationship with *Portulaca* unlikely.

PARATYPE.—*Morat 2510* (P).

TALINELLA Baill.

Bull. Mens. Soc. Linn. Paris 1(72): 569 (1886).—Type: *Talinella boiviniana* Baill. (only element included in 1886).

Sabouraea Leandri, Adansonia, sér. nov., 2: 224-227 (1962), cf. LEANDRI 1965.—Type: *Sabouraea sarmentosa* Leandri = *Talinella grevei* Danguy.

Sarmentose deciduous shrubs, sometimes with arching branches or liana-like, or ± gnarled-contorted (*T. microphylla*) or with few ± strict laxly branched stems from a slightly swollen underground caudex (*T. pachypoda*); stems glabrous or papillose-hirsute, with compact peg-like to elongate short-shoots; leaves alternate, shortly petiolate, lamina slightly succulent to thickly fleshy, entire, lanceolate to (broadly) oblanceolate, underside normally with thickened midrib, secondary venation not visible, glabrous or papillate, sometimes (*T. grevei* p.p.) papillate-tomentose, esp. along margins and midvein on the underside.

Inflorescences various, large multi-flowered ± racemose panicles on branch tips (often involving upper short-shoots as well), or smallish few-

Fig. 3.—***Dendroportulaca mirabilis***: The holotype specimen (left × 0.28; right × 1.15).

flowered panicles terminal on short-shoots, often indistinctly dichasially branched but internodes often abbreviated; flowers variously irregularly fascicled or congested, sometimes unisexual, sometimes appearing hermaphrodite but at least in some species probably functionally unisexual, pedicellate, bracteate; perianth of 2 outer slightly fleshy glabrous or tomentose (rarely in *T. grevei*) sepaloid segments and 2-5 inner greenish to yellowish white or pink to dark red petaloid segments; stamens ± 20, ± whorled, filaments basally often hairy; anthers introrse; ovary ± globose, surrounded by a smallish nectary disc, bilocular (rarely incompletely 4-locular, e.g. *T. boiviniana*), each locule with a 1-few ovules basally attached to the septum; stigma lobes 2-3(-5), sessile or with a short style, thick and papillate or flattish and ± smooth.

Fruits indehiscent juicy-mucilaginous green to reddish purple round to slightly lemon-shaped glabrous berries; seeds few, (2-)4-10, black, smooth, ± glossy, ca. 1 mm long, laterally slightly compressed.

DISTRIBUTION.—Known only from Madagascar (excluding the moist forests of the E slopes).

NOTES.—The publication date is frequently cited as 1889 (which is the cover date of the periodical), but since the paper was presented in March 1886, it is reasonable to assume that publication was in the same year. Additional evidence comes from BAILLON (1886b) (erroneously cited as 1888 by NYANANYO 1986) where the Bulletin-publication is mentioned in a footnote.

Key to species

1. Inflorescence many-flowered (> 20 to > 100 flowers) long panicles to 30 cm and more 2
1'. Inflorescence few-flowered (5-20(-30) flowers), to 8 cm 3
2. Petals 5, whitish yellow to yellowish green; bracts inconspicuous; leaves large (4-6 cm), glabrous, broadest at middle ..... **T. boiviniana**
2'. Petals 2, reddish purple (rarely greenish white); bracts ± conspicuous, dark-tipped; leaves small (1-2(-3) cm), papillate to finely tomentose esp. at margin and dorsally on midrib (rarely glabrous), broadest at middle or above ..... **T. grevei**
3. Basal caudex present; young twigs glabrous with fibrous appearance or tomentose with white and dark brown hairs intermixed; basal stem parts forming a swollen caudex; petals 5, ± white to pale pink .. **T. pachypoda**
3'. Young twigs glabrous; basal caudex absent; petals 2 (rarely 3-5), white, yellowish, greenish white or pale pink 4
4. Thin-stemmed shrubs; leaves large (3-6 cm), thin-textured, broadest below middle; inflorescence to 8 cm, peduncles and pedicels long and very slender, to 2 cm ..... **T. dauphinensis**
4'. Compact ± contorted shrubs, stems and branches often knobbly-gnarled; leaves minute (0.5-0.8 cm), thick-textured, broadest above middle; inflorescence to 2.5 cm, peduncles and pedicels to 0.8 cm, slender ..... **T. microphylla**

Talinella boiviniana Baillon

Bull. Mens. Soc. Linn. Paris 1(72): 569 (1886).—Type: *Boivin s.n.* [*2576*], 1848 (holo-, P!; iso-, Z! [dated 1853, but probably date when received]).

Sarmentose shrubs to 3 m (sometimes described as "lianoïde"); stems glabrous, without lenticels, young twigs ± longitudinally striate when dry; leaves 4-6 cm long, only slightly fleshy, glabrous, described as brilliant green with waxy touch, lanceolate, acute, broadest ± at middle, midrib raised below.

Inflorescences large lateral or terminal branched thyrsoid panicles, glabrous, sometimes with several hundred flowers, main branches sometimes subtended by leafy bracts, part inflorescences contracted; bracts inconspicuous; pedicels 2-3 mm; flowers apparently ± hermaphrodite but

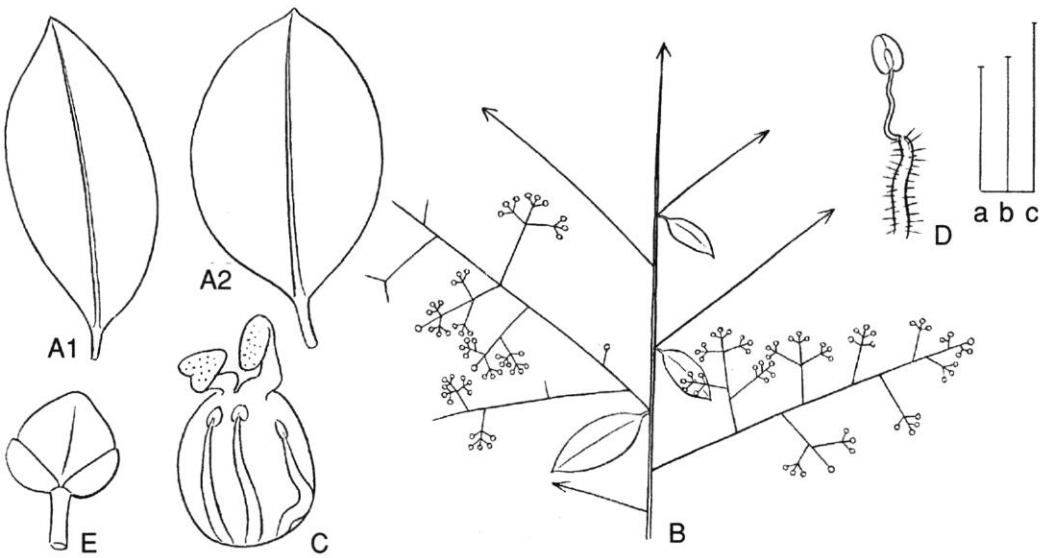

Fig. 4.—***Talinella boiviniana***: **A**, variation in leaf shape; **B**, schematic architecture of flowering branch; **C**, gynoecium with staminodes; **D**, inner stamen; **E**, developing fruit. (A, B, C, E: holotype; D: *Humbert 18940*). (A = scale a = 23 mm; E = scale a = 5 mm; B, C = scale b = 2 mm).

probably functionally unisexual; sepals 2, slightly thickish; petals 5, whitish yellow to yellowish green; outer filaments glabrous, inner filaments basally hairy, from a reddish-violet nectary disc; style short or absent, stigma lobes 2, ± sessile, thickish, papillose. Fruits and seeds not observed.—Fig. 1 (Map 2: B), 4.

DISTRIBUTION.—Extreme N Madagascar (region of Antsiranana [Diégo Suarez]), seasonally dry forests on limestone outcrops, 10-300 m.

VERNACULAR NAME.—"Vahilóko" (*Humbert 18878*).

NOTES.—This species appears to be rather local and is probably rare, judging from the limited number of available collections. The huge inflorescences (described as "une vaste grappe" in the protologue) are characteristic. *T. boiviniana* is closely related with *T. pachypoda*, which has much smaller inflorescences, however, and differs in several other characters as well.

MATERIAL EXAMINED.—*Boivin 2576* (type, P, Z); *Cours 5428* (P); *Humbert 18878* (P), *18940* (P); *Humbert & Cours 32237* (P).

Talinella dauphinensis Scott Elliot

J. Linn. Soc. Bot. 29: 4 (1891).—Type: Based on 4 syntypes: *Scott Elliot 2551, 2679, 2716, 2972a.* The selection of a lectotype is deferred for the moment until all SCOTT ELLIOT collections at K can be examined. The only specimen seen is *Scott Elliot 2717*, and this has been received as type, but is not in the list of syntypes given in the protologue (the number *2716*, however, is in the list, and a printing error is likely).

Sarmentose shrub or subshrub 0.5-1.5 m tall; stems palish ochre grey-brown, with scattered lenticels, glabrous or minutely papillate, young twigs glabrescent, longitudinally striate when dry; leaves hardly fleshy, 4-7 cm long, narrowly to broadly lanceolate, usually broadest below middle, pointed, glabrous, midrib prominent below, colour not described.

Inflorescences ± few-flowered (5-10(-20) flowers), to 8 cm long from short-shoots or terminal on long shoots, peduncle and pedicels very slender filiform, pedicels to 2 cm; bracts inconspicuous; flowers hermaphrodite; sepals 2, slightly thickish; petals 2 (rarely up to 5), whitish, yellowish or greenish white; filaments basally hairy, white or rose to reddish; ovary pale pink (or green ?); style very short or absent; stigma lobes 2(-3), sessile, thick, terete, spreading, papillose. Fruits and seeds not observed.—Fig. 1 (Map 1: D), 5.

DISTRIBUTION.—Common in the SE of Madagascar around Tolanaro (Fort Dauphin), with scattered collections in SW and W Madagascar, thickets or xerophytic scrub to deciduous forests on sandy soils or granite- and gneiss-derived ground, to 1000 m (occasionally to 1400 m).

NOTES.—Most collections of *T. dauphinensis* have been made in the region of Fort Dauphin, where the type was collected. Its relatively few-flowered inflorescences with thin filiform peduncles and pedicels are very characteristic, and it shows no close affinities with any of the other taxa of the genus. The scattered collections from SW and W Madagascar are notable. It is unknown whether they are last isolated remnants of a once wider distribution, or whether the taxon is simply under-collected. Since *T. grevei* is present throughout the region and is well-collected, the former hypothesis might be more reasonable.

Special problems are posed by a pair of collections by Bosser, i.e. *Bosser 17406* and *17406bis*, from the region of Ihosy ("Route de Ranotsara"), marked with X on Map 1. *Bosser 17406bis* without doubt represents typical *T. dauphinensis*, while *Bosser 17406* clearly is a specimen of *T. pachypoda*, which is not otherwise known outside the extreme N tip of Madagascar. Since a numbering error can be excluded (J. BOSSER, pers. comm.), it is highly desirable to ascertain the occurrence of *T. pachypoda* so far south by further collections.

MATERIAL EXAMINED.—Anonymous in *Service Forestier 23* (P); *Bosser 17406bis* (P); *Capuron 11755-SF* (P), *22397-SF* (P); *Croat 31953* (K, MO, P); *Gereau et al. 3209* (K, MO, P); *Humbert 12448* (P), *12804* (P), *13115* (P), *13269* (P), *13403* (P), *13737*

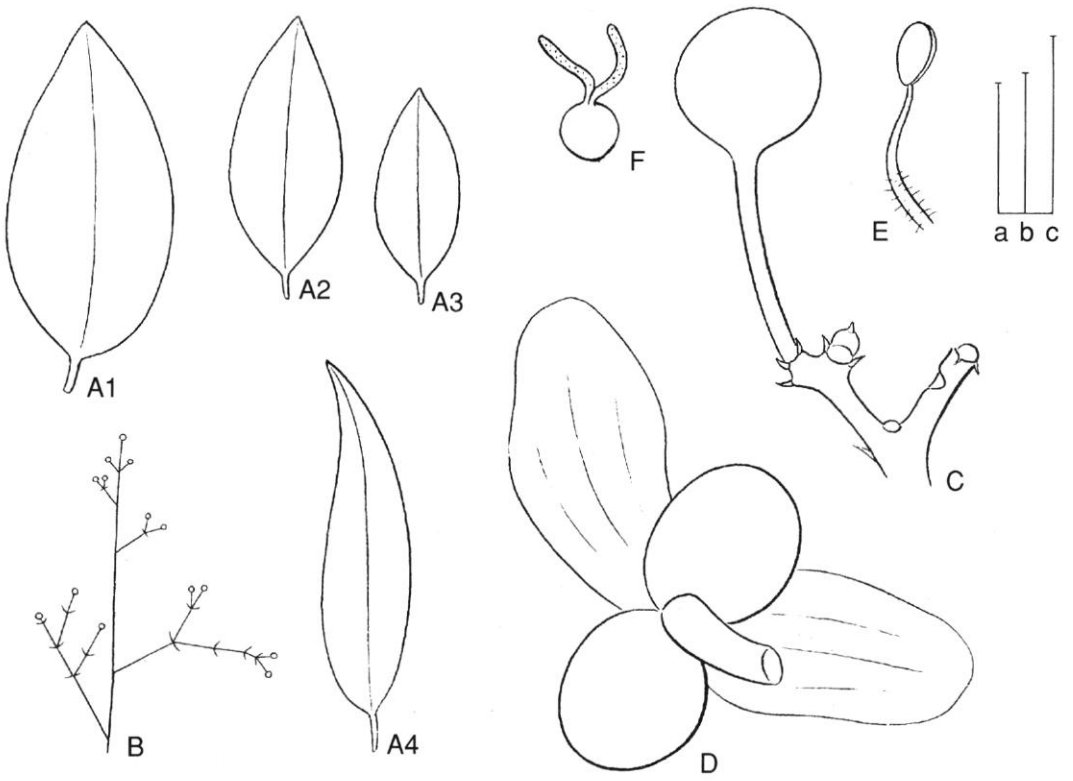

Fig. 5.—***Talinella dauphinensis***: **A**, variation in leaf shape and size; **B**, schematic architecture of inflorescence; **C**, branching of part-inflorescence with bracts and scars of fallen flowers; **D**, flower seen from below; **E**, stamen; **F**, gynoecium. (A1, A2, A3, B: *Scott-Elliott 2717*; A4: *Bosser 17406bis*). (A = scale a = 23 mm; C, D, E, F = scale b = 2 mm).

(P), *13847* (P), *14200* (P), *20758* (P), *20785* (P); *Humbert & Capuron 29017* (P), *29150* (P); *Perrier 1385* (P), *12533* (P); *Phillipson & Milijaona 3522* (MO); *Rakotoson 10784-RN* (P); *Scott Elliot 2717* (K, P; see discussion of typification above).

Talinella grevei Danguy

Not. Syst. (Paris) 3: 159 (1915, dated 1914).—Type: *Grevé 262*, Madagascar, SW of Be-Kapake, near Morandava (holo-, P!).

Sabouraea sarmentosa Leandri, Adansonia, sér. nov., 2: 226 (p. 225), *syn. nov.*—Type: *Leandri & Ratoto Jean de Dieu 3558* (holo-, P!).

Sarmentose shrubs 2-4 m, sometimes described as "lianoïde" with side branches arching over; stems finely papillate to bristly tomentose at least when young (papillae/bristles all white), rarely glabrous; leaves smallish to medium in size, 1-2.5(-3) cm long, roundish spatulate, broadest ± at middle or above, lamina glabrous or papillate, margins papillate to finely tomentose, midrib prominent below, papillate to tomentose.

Inflorescences numerous, terminal on short shoots (rarely also terminal on long shoots), many-flowered (20-80 flowers), paniculate to racemose, axis papillose-tomentose (papillae/hairs all white), rarely glabrous; bracts conspicuously dark-tipped; pedicels 1-2 mm; flowers apparently hermaphrodite or female; sepals 2, thickish, sometimes papillate-tomentose; petals 2, red-purple to maroon (pale greenish white in *Phillipson et al. 2700*); filaments basally sometimes irregularly united, basally hairy; style ± 1 mm with 2 (3 or 5?) tortuous spreading stigma lobes, these flattened and only slightly papillate.

Fruits described as a "bunch of grape", probably ± globose, green; seeds laterally compressed, reniform, black, smooth, glossy.— Fig. 1 (Map 3: G), 6.

DISTRIBUTION.—Widespread in S and SW Madagascar, often in *Didierea* xerophytic scrub on sandy soils, 100-400 m.

VERNACULAR NAMES.—"Dango Porotsy" (*Phillipson 1653*); "Pikala" (*Richard 0140*); "Sarondra" (*Humbert 12873*).

NOTES.—This is the most wide-spread taxon of the genus, presenting considerable variation in several characters. The numerous contemporaneous inflorescences terminal on lateral short shoots and the normally reddish flowers are characteristic, and the normally conspicuous papillose to bristly-tomentose indumentum of leaf margins and inflorescences is a further key character. In contrast to *T. pachypoda* with a similar indumentum, the papillae are uniformly white in *T. grevei* (white and dark brown mixed in *T. pachypoda*).

T. grevei is closely allied to *T. microphylla*, which occurs around the S & SW limits of the range of *T. grevei*.

MATERIAL EXAMINED.—*Basse s.n.* (P); *Bosser 10462* (P), *14226* (P), *14390* (P, TAN [not seen]), *15673* (P), *15722* (P); *Capuron 11880-SF* (P); *Chauvet 288*

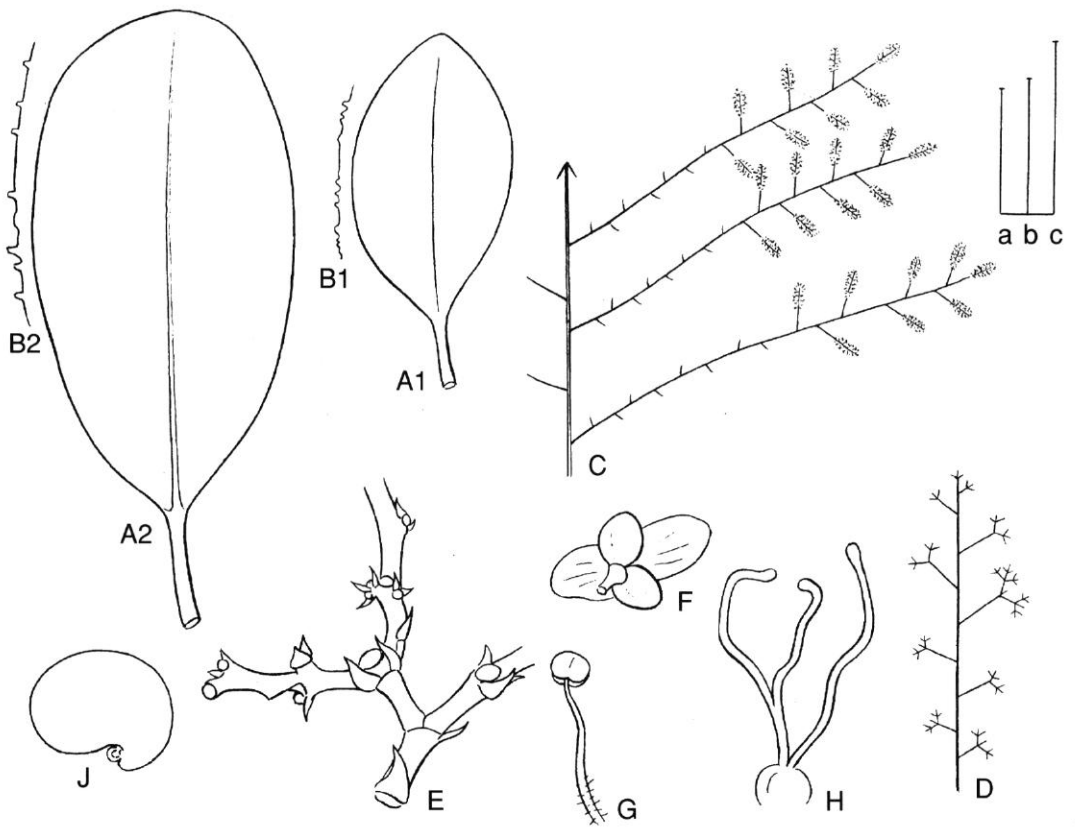

Fig. 6.—***Talinella grevei***: **A**, variation in leaf shape and size; **B**, papillae of leaf margin and surface; **C**, schematic architecture of flowering branch; **D**, schematic architecture of part-inflorescence; **E**, branching of part-inflorescence with bracts and scars of fallen flowers; **F**, flower seen from below; **G**, stamen; **H**, gynocium; **J**, seed. (A1, B1: holotype; A2, B2, F, G, H: *Phillipson & Rabesihanaka 3130*; C, E: *Phillipson 1665*; *D: Phillipson 2779*; *J: Phillipson 1653*). (A, E, F = scale a = 5 mm; G, H = scale b = 2 mm; B, J = scale c = 1 mm).

(P); *Decary 18694* (P); *Dorr et al. 3966* (K, MO, P), *4097* (K, MO, P); *Geay 3321* (P), *3356* (P), *5292* (P); *Grevé 20* (P), *262* (type, P); *Homolle 1568* (P); *Humbert 2804* (P), *12461* (P), *12753* (P), *12873* (P), *13402* (P), *19616* (P), *20300* (P), *29404* (P); *Humbert & Capuron 29420* (P), *29461* (P); *Keraudren 684* (P), *907* (P), *1306* (P), *1430* (P), *1475* (P); *Leandri & Rakoto Jean de Dieu 3558* (type of *Sabouraea sarmentosa*, P), *3720* (P); *Liede et al. 2735* (MO); *Morat 720* (P, TAN [not seen]), *2541* (P, TAN [not seen]); *Perrier 19026* (P), *19043* (P); *Petit s.n.* (P); *Phillipson 1653* (MO, P), *1665* (MO, P), *2700* (K, MO, P), *2779* (K, MO, P); *Phillipson & Rabesihanaka 3130* (K, MO, P); *Poisson 350* (P), *711* (P); *Richard 0140* (K); *Service des Eaux et Forêts 415-SF* (P), *4113-SF* (P).

Talinella microphylla Eggli, **sp. nov.**

A Talinella grevei *differt foliis glabris, multo minoribus crassioribusque, caulibus glabris lenticellis absentibus, caulibus veteribus plus minusve contortis, inflorescentia minore bracteis inconspicuis.*

TYPE.—*Humbert 20221*, Madagascar, "environs du lac Tsimanampetsotsa (Côte SW), bush xérophile des coteaux et plateaux calcaires rocailleux, 2-200 m", 14 Feb. 1947 (holo-, P!).

Contorted shrubs or small trees 0.5-1(-2) m with pale grey ± smooth bark, often ± knobbly, without lenticels; young twigs glabrous (very rarely with scattered bristly papillae), smooth, not conspicuously longitudinally striate when dry; leaves glabrous, minute, 0.3-0.8 cm long, spatulate to almost round, thickly fleshy, broadest above middle, tips minutely apiculate, round or emarginate, midvein prominent below or not visible.

Inflorescences terminal on short shoots, to 2.5 cm overall, few-flowered (1-5 flowers); bracts inconspicuous; pedicels 5-8 mm, thin; flowers hermaphrodite or unisexual and plants dioecious, female flowers without staminodes (always ?); sepals 2, slightly thickened; petals 2 (rarely 3), pink (rarely greenish ?); filaments basally minutely papillate or glabrous; style 1-2 mm with 3 tortuous spreading apically flattened ± glabrous stigma lobes; fruits and seeds not observed.—Fig. 1 (Map 2: M), 7.

DISTRIBUTION.—S Madagascar, xerophytic scrub on limestone plateaus and plains, or on sandy soils, 2-200 m.

VERNACULAR NAMES.—"Draky Draky" (*Humbert 20229,* Mahafaly idome).

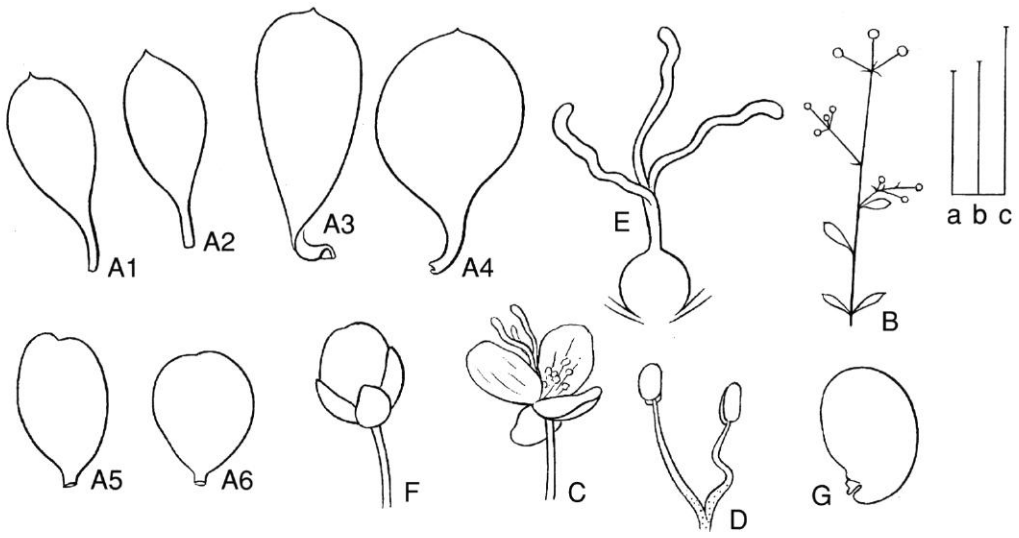

Fig. 7.—***Talinella microphylla***: **A**, variation in leaf shape and size; **B**, schematic inflorescence architecture; **C**, flower; **D**, stamina; **E**, gynoecium; **F**, developing fruit; **G**, seed. (A1-A4, B, C, D, E: holotype; A5-A6, F, G: *Capuron 28983-SF*). (A, C, F = scale a = 5 mm; D, E, G = scale b = 2 mm).

NOTES.—*T. microphylla*, so named for its exceedingly small leaves (the smallest in the genus), appears closely related to *T. grevei*, whose range is adjacent or probably just overlapping. The new species was first regarded as a depauperate form of *T. grevei* from more arid habitats. Consistent differences (glabrous thickly succulent leaves, ± contorted stems without lenticels, few-flowered inflorescences) have led to the decision to recognize it as a separate taxon. Its close relationship with *T. grevei* is apparent in the similar flowers and especially the similarly flattened and almost glabrous stigma lobes.

PARATYPES.—*Bosser 3752* (P), *4101* (P), *14436* (P), *15737* (P); *Capuron 28983-SF* (P); *Chauvet 414* (P); *Humbert 20229* (P); *Keraudren 1405* (P); *Morat 3951* (P); *Peltier 5871* (P); *Phillipson 2737* (K, MO, P).

Talinella pachypoda Eggli, **sp. nov.**

Differt a T. boiviniana *statura minore, caulibus caudiciformibus, basaliter inflatis et succulentis, inflorescentia minore.*

TYPE.—*Röösli & Rechberger s.n.*, Madagascar, Diégo Suarez, Montagne des Français, SE flank, 7-8 km from Diégo Suarez (ca. 12°19.5'S, 49°20'E), 1989 (holo-, ZSS).

Smallish divaricate to strict shrublets to 1 m (occasionally 2.5 m) with basal inflated succulent caudex; older stems with scattered lenticels, young twigs glabrous and longitudinally striate with fibrous appearance or laxly to densely bristly-tomentose (bristly papillae white and dark brown mixed), sometimes ± glabrescent; leaves large, 4-7 cm long, slightly succulent, lanceolate, pointed, glabrous, green, underside sometimes flushed purplish, broadest ± at middle, margins sometimes ± wavy, midrib prominent below.

Inflorescences mostly when plants are leafless, terminal on short shoots, branched but densely congested with ± fasciculate part-inflorescences, 20- to 30-flowered, glabrous; bracts inconspicuous; pedicels 1-2.5 mm; flowers unisexual and plants dioecious; sepals 2, slightly thickish, pale greenish; petals 5, ± white to pale pink, sometimes 1 petal intermediate to sepals; stamens ± 20, filaments basally hairy, pale pink; ovary

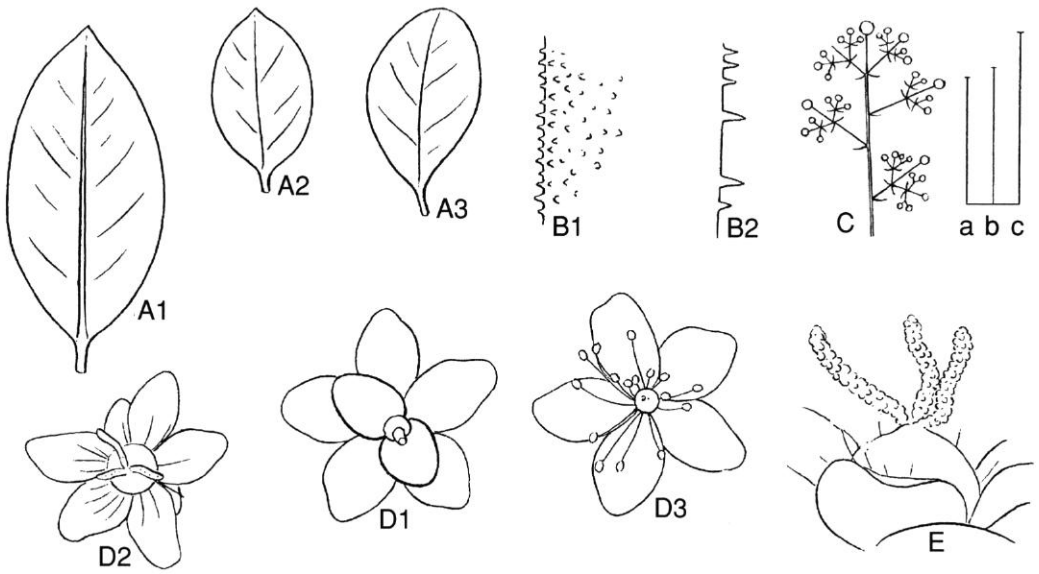

Fig. 8.—***Talinella pachypoda***: **A**, variation in leaf shape and size; **B**, indumentum of twigs; **C**, schematic inflorescence architecture; **D**, flowers (1 seen from below, 2 female seen from above, 3 male seen from above); **E**, detail of stigma. (All drawn from the holotype). (A = scale a = 23 mm; B1, E = scale b = 2 mm; B2 = scale c = 1 mm; D = scale a = 5 mm).

green, globose; style absent, stigma lobes 3, sessile, thickish, papillate.

Fruits ripening into grape-like greenish-brown to greenish-red berries, young fruits shortly beaked and lemon-shaped; seeds reniform, laterally compressed, black, smooth, glossy.—Fig. 1 (Map 1: P), 8.

DISTRIBUTION.—Extreme N tip of Madagascar in the Montagnes des Français, deciduous forests and forest margins on limestone, to 600 m. (See also comment under *T. dauphinensis*).

NOTES.—*T. pachypoda* is notable for the basal caudex (for which it was named) which is already apparent in small seedlings, and which is underground or aboveground in habitat. The aerial shoots are probably semi-deciduous under adverse conditions, but larger shrubs are also reported. The root systems of the other species of *Talinella* have not been described, but none of the numerous specimens examined mentions basal thickenings or swellings. It is therefore assumed that the basal caudex of *T. pachypoda* is diagnostic, even though its uniqueness cannot be established beyond doubt.

The flowers (5 petals, sessile thick papillate stigma lobes) show the close relationship to the sympatrically occurring *T. boiviniana*, but the large inflorescences of the latter and the completely glabrous nature of its stems at once distinguish it. *T. pachypoda* is similar to *T. grevei* in its indumentum, but unlike the latter, it shows a mixture of white and dark brown bristly papillae. *T. pachypoda* is the only taxon of the genus which is amply represented in cultivation, based on seed propapagtion from the holotype collection. As far as known, it is completely dioecious.

PARATYPES.—*Bosser 5928* (P), *17406* (P; see comment under *T. dauphinensis*); *Decary 14555* (P); *Gentry 11943* (P); *Perrier 16325* (P); *Phillipson 1993* (MO, P).

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