

Novelties in *Psiadia* Jacq. ex Willd. (Compositae) from Madagascar and Comoros

Joel CALVO & Martin W. CALLMANDER



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Novelties in *Psiadia* Jacq. ex Willd. (Compositae) from Madagascar and Comoros

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ABSTRACT

Madagascar and the other islands of the western Indian Ocean are the foremost center of species diversity of the genus *Psiadia* Jacq. ex Willd. (Compositae, Astereae). Revising the material housed in the historical herbaria P-JU and P-LA, we realized that the name *P. madagascariensis* (Lam.) DC., based on Lamarck's name *Conyza madagascariensis* Lam., was misinterpreted and should be the priority name for the widely used *Psiadia altissima* (DC.) Benth. & Hook.f. ex B.D. Jacks. To avoid further misinterpretation, the types of the names *Conyza glutinosa* Lam. [accepted as *Psiadia glutinosa* (Lam.) Willd.] and *Glyphia lucida* Cass. [accepted as *Psiadia lucida* (Cass.) Drake] are discussed and clarified. In this frame, lectotypes are designated for six names. Moreover, the species *P. lucida* is recorded for the first time in the Comoros (Grande Comore). Finally, a new disciform species of *Psiadia* from Madagascar, i.e., *Psiadia salicifolia* J. Calvo & Callm., sp. nov., is described and illustrated.

KEY WORDS

Asteraceae,
Astereae,
Comoros,
Madagascar,
new synonym,
lectotypifications,
new species.

RÉSUMÉ

Nouveautés dans le genre Psiadia Jacq. ex Willd. (Compositae) de Madagascar et des Comores.

Madagascar et les autres îles de l'océan Indien occidental sont le principal centre de diversité d'espèces du genre *Psiadia* Jacq. ex Willd (Compositae, Astereae). En révisant le matériel conservé dans les herbiers historiques P-JU et P-LA, nous avons réalisé que le nom *P. madagascariensis* (Lam.) DC, basé sur le nom de Lamarck *Conyza madagascariensis* Lam., a été mal interprété et doit être le nom prioritaire pour *Psiadia altissima* (DC.) Benth. & Hook.f. ex B.D. Jacks, qui est largement utilisé. Pour éviter d'autres erreurs d'interprétation, les types des noms *Conyza glutinosa* Lam. [accepté comme *Psiadia glutinosa* (Lam.) Willd.] et *Glyphia lucida* Cass. [accepté comme *Psiadia lucida* (Cass.) Drake] sont discutés et clarifiés. Dans ce cadre, des lectotypes sont désignés pour six noms. De plus, l'espèce *P. lucida* est signalée pour la première fois aux Comores (Grande Comore). Enfin, une nouvelle espèce disciforme de *Psiadia* de Madagascar, *Psiadia salicifolia* J. Calvo & Callm., sp. nov., est décrite et illustrée.

MOTS CLÉS

Asteraceae,
Astereae,
Comores,
Madagascar,
synonyme nouveau,
lectotypifications,
espèce nouvelle.

INTRODUCTION

The genus *Psiadia* Jacq. ex Willd. (Compositae, Astereae) comprises c. 60 species distributed in Southern and East Africa, Madagascar, the Mascarene Archipelago, and Arabia, plus one species, *P. ceylanica* (Arn.) Grierson, in India and Sri Lanka (Humbert 1960; Scott 1991, 1993; Beentje 2002; POWO 2025). The genus is represented by 30 species in Madagascar (28 endemic; Humbert 1960; Nesom 2020) and at least 30 species on the surrounding islands (27 endemic to the Mascarene Archipelago; Strijk *et al.* 2012), which makes this region the foremost center of species diversity of *Psiadia*.

The species of *Psiadia* are shrubs or erect suffrutescent plants (rarely scandent) characterized by having the leaves alternate, often viscid; synflorescences corymbiform; capitula radiate or disciform; involucre 3-4-seriate with imbricate bracts; receptacle naked or somewhat fimbriate; ray florets (when present) pistillate with small limbs and disc florets functionally staminate, 5-lobed, corollas white or yellow; anther bases obtuse to shortly auriculate; style branches of the disc florets short, papillose; achenes subprismatic, 5-10 ribbed; and pappus composed of barbellate, uniseriate bristles.

In Madagascar, *Psiadia* was comprehensively revised in the frame of the *Flore de Madagascar et des Comores* by Humbert (1960), who described most of the species included in the treatment. A narrow endemic from Mayotte was described afterwards (Labat & Beentje 2003). More recently, the species *Conyza ageratoides* DC. and *Psiadiella humilis* Humbert were transferred to *Psiadia* (Nesom 2020) based on the phylogenetic results previously presented by Strijk *et al.* (2012).

Thanks to the study of the specimens housed at the historical herbaria P-JU and P-LA, we realized that the name *Conyza madagascariensis* Lam. has been misinterpreted so far and that it has priority over the widely used *Psiadia altissima* (DC.) Benth. & Hook.f. ex B.D. Jacks.; the required nomenclatural adjustments are made below. Likewise, the types of the names *Conyza glutinosa* Lam. and *Glyphia lucida* Cass. are also discussed in order to avoid further misinterpretation. Including the synonyms, six names are here lectotypified. Lastly, the new species *Psiadia salicifolia* J. Calvo & Callm. is described from central-eastern Madagascar.

MATERIAL AND METHODS

This study is based on the revision of the available literature and the examination of herbarium specimens kept at G and P. Additionally, digital herbarium specimens from B, BM, GH, JE, K, M, MO, MPU, TAN, and W were revised. The preliminary conservation status of the new species was assessed following IUCN Red List Categories and Criteria (IUCN 2012). We calculated the extent of occurrence and the area of occupancy (with a 2 × 2 km grid) using the online “GeoCAT” software (<http://geocat.kew.org>; Bachman *et al.* 2011).

NOMENCLATURE AND TAXONOMY

Family COMPOSITAE Giseke
Genus *Psiadia* Jacq. ex Willd.

Species Plantarum, Ed. 4, 3: 2384 (Willdenow 1803).

TYPE SPECIES. — *Psiadia glutinosa* (Lam.) Willd.

1. *Psiadia glutinosa* (Lam.) Willd. (Fig. 1)

Species Plantarum, ed. 4, 3: 2384 (Willdenow 1803). — *Conyza glutinosa* Lam., *Encyclopédie méthodique. Botanique* 2(1): 89 (Lamarck 1786). — Typus: Madagascar • “de l’Isle de France”; s.d.; Anon. s.n.; lectotype (designated here): P-LA[P00356056]!; isolectotypes: MPU[MPU014968] image!, P-LA[P00356055]! (Fig. 1).

Solidago viscosa Schrad., *Sertum hannoveranum* 1 (fasc. 1): 12, t. 6 (Schrad. 1795), *nom. illeg., non* Lamarck (1779). — *Psiadia glutinosa* Jacq., *Plantarum rariorum horti caesarei schoenbrunnensis* 2: tab. 152 (Jacquin 1797), *nom. inval.* — Typus: Iconography; lectotype (designated here): Schrad. (1795: tab. VI, sub *Solidago viscosa*).

Psiadia altissima var. *latifolia* Humbert, *Mémoires de la Société linnéenne de Normandie* 25: 50, 175, 284 (Humbert 1923). — Typus: Madagascar • Anosy Region [Prov. Toliara], Fort-Dauphin; 1897; G. Paroisse 3; lectotype (designated here): P[P02488135] image!; isolectotypes: P[P02488129] image! • Atsimo-Andrefana [Prov. Toliara], Andrahomana; XI.1900; Ch. Alluaud 113; remaining syntype: P[P02488090] image!

ICONOGRAPHY. — Schrad. (1795: tab. VI, sub *Solidago viscosa*); Jacquin (1797: tab. 152); Humbert (1960: 305, fig. LXI: 25-31).

DISTRIBUTION. — Endemic to southeastern Madagascar.

NOTES

Some authors attributed to Nikolaus Joseph von Jacquin (1727-1817) the authority of *Psiadia glutinosa* (e.g. Humbert 1960), but this is an error because Jacquin’s name was not validly published under ICN Art. 38.5 (Turland *et al.* 2018). Since he cited the name *Solidago viscosa* Schrad. [1795] as a synonym, an illegitimate name under Art. 53.1 but validly published, both names become homotypic, and therefore, the requirement (b) for accepting the descriptio generico-specifica provided by Jacquin as validly published is not fulfilled.

Two specimens of *Conyza glutinosa* Lam. are kept at P-LA. One of them (P00356056), which is selected here to serve as lectotype, bears a label handwritten by André Thouin (1747-1824), the Chief Gardener of the Jardin du Roi in Paris at that time, with the following information: “C. glutinosa L. / nouvelle en 1770 / de l’Isle de France”. The second specimen at P-LA (P00356055) bears a short description in Lamarck’s handwriting but is clearly part of the same gathering and considered here as an isolectotype. Another duplicate of this collection is extant in Thouin’s herbarium now at MPU (MPU014968) (see Callmender *et al.* 2019).



Fig. 1. — Lectotype of *Conyza glutinosa* Lam. (*Psiadia glutinosa* (Lam.) Willd.), P-LA[P00356056].

Psiadia glutinosa is unknown on l'Île de France, now Mauritius (Scott 1993). Indeed, it is considered as endemic to Madagascar (Humbert 1960), which suggests that the provenance of the seeds planted in the Jardin du Roi was mistakenly annotated. Confusion between Madagascar, Réunion, and Mauritius was not rare at that time. Those islands were often visited during the same voyage, leading to errors in the origin of the plants cultivated in France. Another case exemplifying this is the specimen of *Psiadia glutinosa* kept at B-W (B-W 16745 -01 0), where the label on its blue cover indicates “Habitat in insula Bourbon [Bourbon]”, now Réunion, where the species is unknown. This uncertainty probably also explains the fact that this species was omitted by Humbert in his first treatment of the Malagasy Compositae (Humbert 1923). Later, he treated *P. glutinosa* as an accepted species (Humbert 1960) and placed his *P. altissima* var. *latifolia* Humbert in synonymy.

Two syntypes were cited in the protologue of *Psiadia altissima* var. *latifolia*: Alluaud 113 and Paroisse 3. The second consists of two specimens kept at P, P02488135 being the most complete and informative. This is therefore selected as lectotype.

Psiadia glutinosa belongs to a taxonomically complex assembly of taxa centered around *P. altissima* (synonym of *P. madagascariensis*, see below) along with *P. coarctata* (Humbert) Humbert, *P. serrata* (Humbert) Humbert, and *P. angustifolia* (Humbert) Humbert. These taxa are currently treated as five distinct species (Humbert 1960; POWO 2025), but Humbert (1923) initially treated them as infraspecific taxa of *P. altissima*, except for *P. glutinosa* that was omitted as already explained above.

2. *Psiadia lucida* (Cass.) Drake (Fig. 2)

Histoire physique, naturelle et politique de Madagascar 36: t. 488. (Drake del Castillo 1903). — *Glyphia lucida* Cass., *Bulletin des sciences, par la Société philomatique de Paris* 1818: 141 (Cassini 1818). — *Glycyderas lucida* (Cass.) Cass., *Dictionnaire des sciences naturelles* 59: 63, 74 (Cassini 1829). — Typus: Madagascar • s.l.; s.d.; *P. Commerson s.n.*; holotype: P-JU[P00667271]!; isotypes: G[G00618076]!, P[P02475737]!; probable isotype: P[P02475738] image! (Fig. 2).

Microglossa sessilifolia DC., *Prodromus systematis naturalis regni vegetabilis* 5: 320 (Candolle 1836). — Typus: Madagascar • s.l.; 1835; W. Bojer 6; lectotype (designated here): G-DC[G00455785]!; isoelectotype: K[K000273809] image! • s.l.; s.d.; *J. Forbes s.n.*; remaining syntypes: BM[BM000903879] image!, G-DC[G00455808]!

Conyza flexilis DC., *Prodromus systematis naturalis regni vegetabilis* 5: 385 (Candolle 1836). — Typus: Madagascar • Alaotra-Mangoro Region [Prov. Toamasina], “province Bé tani-mena, forêts de Bé-fouroun”; 1835; W. Bojer 3; holotype: G-DC[G00453951]!

Microglossa mikanioides Baker, *Journal of the Linnean Society. Botany* 20: 182 (Baker 1883). — Typus: Madagascar • Central Madagascar; s.l.; s.d.; *R. Baron 1496*; lectotype (designated here): K[K000273806] image!

Psiadia tortuosa Klatt, *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 12 (Beibl. 27): 23 (Klatt 1890). — Typus: Madagascar • Vakinankaratra Region [Prov. Antananarivo], “Nord-Betsiléo, Sirabé”; VIII.1880; *J.M. Hildebrandt 3537*; holotype: GH[GH00303964] image!; isotypes: BM[BM000903880] image!, G[G00018143, G00018144]!, JE[JE00019268, JE00019269] images!, M[M0147048] image!, P[P00435708, P00435709] images!, W[W1889-0074243] image!

ICONOGRAPHY. — Drake del Castillo (1903: pl. 488); Humbert (1960: 299, fig. LIX: 13-25).

DISTRIBUTION. — Madagascar (widespread except for the West) and Comoros (Grande Comore). The species is here recorded for the first time in Comoros based on the specimen *Bojer s.n.* (G01094005) and confirmed by recent field observations (Y. Ibrahim, pers. comm.). This represents the third species of the genus for the country.

NOTES

Humbert (1960) treated *Microglossa sessilifolia* as a heterotypic synonym of *Psiadia lucida*. The type of the former name, kept at G-DC, has small capitula, with external bracts shorter than inner ones. In contrast, the type of *Psiadia lucida* shows remarkably larger capitula with external involucre bracts almost as long as the inner ones. The French botanist considered the latter as an atypical form with large capitula and suggested that it might be the result of a teratology (see isotype P02475737). He also pointed out the existence of intermediate forms such as *Scott Elliot 2621* (P02475730) and *Baron 4362* (P02475713: “forme à gros capitules, faisant passage vers la forme à capitules encore plus gros et à bractées élargies appelée *Glycyderas lucida* par Cass. [form with large capitula, leading to the form with even larger capitula and enlarged involucre bracts called *Glycyderas lucida* by Cass.]”). *Scott Elliot 2621* originating from Fort-Dauphin has involucre slightly smaller than those of the type of *P. lucida* but very similar in their overall shape, whereas the capitula of *Baron 4362* from Central Madagascar perfectly match the typical form with smaller capitula. Humbert (1923) also indicated that both the typical form and that with large capitula might be found in the same individual as in *Viguiér & Humbert 973* (P02475681, P04308799). These specimens show the typical small capitula and one or two abnormal capitula that are actually galls, rather than a plant developing two types of capitula. One specimen that really possesses large capitula was identified by Humbert himself as “*Psiadia madagascariensis* forma macrocephala” (P02475635) but the name was never published. All the specimens with large capitula come from the vicinity of Fort-Dauphin in southeastern Madagascar, whereas the typical form is distributed through the eastern part of the Island from North to South, including a few localities nearby Fort-Dauphin. Since the two forms lack a differentiated geographic distribution and intermediate forms exist, we follow Humbert's treatment and do not recognize them as distinct. Future phylogenetic data may shed more light on this taxonomic decision.



FIG. 2. — Holotype of *Glyphia lucida* Cass. (*Psiadia lucida* (Cass.) Drake), P-JU[P00667271].

3. *Psiadia madagascariensis* (Lam.) DC. (Fig. 3)

Prodromus systematis naturalis regni vegetabilis 5: 320 (Candolle 1836). — *Conyza madagascariensis* Lam., *Encyclopédie méthodique. Botanique* 2: 85 (Lamarck 1786). — *Baccharis madagascariensis* (Lam.) Pers., *Synopsis plantarum* 2: 423 (Persoon 1807). — Typus: Madagascar • s.l.; s.d.; *P. Commerson s.n.*; holotype: P-JU[P06986451]! (Fig. 3).

Microglossa altissima DC., *Prodromus systematis naturalis regni vegetabilis* 5: 320 (Candolle 1836). — *Nidorella altissima* (DC.) Benth. & Hook.f. ex Klatt, *Annalen des Kaiserlich-Königlichen Naturhistorischen Hofmuseums* 7: 296 (Klatt 1892). — *Psiadia altissima* (DC.) Benth. & Hook.f. ex B.D. Jacks., *Index Kewensis* 2: 640 (Jackson 1894), **syn. nov.** — Typus: Madagascar • “Province d’Emirne”; 1835; *W. Bojer* 5; holotype: G-DC[G00455755]!

Psiadia stenophylla Baker, *Journal of the Linnean Society, Botany* 22: 490 (Baker 1887). — Typus: Madagascar • Central Madagascar; s.l.; s.d.; *R. Baron* 3549; lectotype (designated here): K[K000273973] image!; isoelectotypes: BM[BM000903966] image!, P[P00435635, P00435636] images!

Psiadia decurrens Klatt, *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 12 (Beibl. 27): 23 (Klatt 1890). — Typus: Madagascar • Vakinankaratra Region [Prov. Antananarivo], “Nord-Betsiléo, Sirabé”; VIII.1880; *J.M. Hildebrandt* 3541; holotype: GH[G02290259] image!; isotypes: BM[BM000903967] image!, G[G00002313, G00393789]!, JE[JE00006214] image!, P[P00435616, P00435617] images!

ICONOGRAPHY. — Drake del Castillo (1903: pl. 483 sub. *Psiadia altissima*; pl. 484 sub. *P. decurrens*); Humbert (1960: 305, fig. LXI: 1–24, sub. *P. altissima*).

DISTRIBUTION. — Madagascar (widespread) and îles Éparses (Europa and Juan de Nova).

NOTES

The type of *Conyza madagascariensis*, kept at P-JU, shows a flowering branch of an erect shrub that perfectly matches the concept hitherto known under the name *P. altissima*. The specimen bears a modern determination label by unknown hand with the identification “*Psiadia altissima*”.

The name *Psiadia madagascariensis* has priority over the widely used *P. altissima* (Humbert 1960; Strijk *et al.* 2012; POWO 2025). Humbert (1960) misinterpreted Candolle’s name *P. madagascariensis* as being heterotypic to Lamarck’s *Conyza madagascariensis*, which is its basionym. In turn, it seems that Candolle misinterpreted the concept of *P. madagascariensis* since the single specimen in G-DC labelled as such (G00455808) corresponds to *P. sessilifolia* (see below) and the taxonomic entity named *Conyza madagascariensis* by Lamarck was described by himself as *Microglossa altissima* DC.

The intended combinations by Bentham & Hooker f. (1873) of *Microglossa altissima* in both *Psiadia* and *Nidorella* are to be treated as not validly published (see ICN Art. 35.2 Ex. 6.).

4. *Psiadia salicifolia* J. Calvo & Callm., sp. nov. (Figs 4; 5)

DIAGNOSIS. — Among the disciform species of the genus, *Psiadia salicifolia* is unique for its linear leaves whitish-lanate on the abaxial surface.

TYPUS. — Madagascar • Alaotra-Mangoro Region [Prov. Toamasina], Ambatondrazaka, Réserve de Zahamena, lit de la riv. Manambato; 17°30’49”S, 48°45’13”E; 950 m alt.; 23.VII.1997; *S. Wohlhauser*, *M. O. Laivao* & *M. W. Callmender s.n.*; holotype: G[G00618075]!; isotypes: MO!, P!

PHENOLOGY. — Collected in flower in June and July.

DISTRIBUTION AND ECOLOGY. — Endemic to Madagascar, known from the central-eastern medium altitude moist evergreen forests (sensu Gautier *et al.* 2018). This species grows on rocky riverbeds.

ETYMOLOGY. — The epithet *salicifolia* has been chosen because of the resemblance of the leaves of the new species to some species of the genus *Salix* L., e.g., *S. eleagnos* Scop.

CONSERVATION STATUS. — *Psiadia salicifolia* sp. nov., is known from two locations encompassed within the Corridor Ankeniheny-Zahamena and Zahamena protected areas. The new species has an extent of occurrence (EOO) and an area of occupancy (AOO) of 8 km². Deforestation due to fires for slash-and-burn agriculture is considerable in the extreme south of the Corridor Ankeniheny Zahamena where one of the two known locations occurs (Goodman *et al.* 2018). Due to these plausible threats, *P. salicifolia*, sp. nov., is assigned to a preliminary risk of extinction status of “Endangered” [EN B1ab(ii, iii, iv, v) + 2ab(ii, iii, iv, v)] using the IUCN Red List Categories and Criteria (IUCN 2012).

ADDITIONAL SPECIMENS EXAMINED. — Madagascar • Atsinanana Region [Prov. Toamasina], Vatomaniry, Ambalabe, Sahanioka, forêt de Vohibe, au bord de la riv. Talaviana, de Tsitondroina vers l’ouest; 19°10’44”S, 48°32’29”E; 728 m alt.; 1.VI.2010; *A. Razanatsima* 848; MO[MO-3028060] image!, P[P00982567]!, TAN image!

DESCRIPTION

Subshrubs 0.3 m high, stems leafy on upper part, lower parts naked with conspicuous leaf-scars. Leaves alternate, simple, sessile, densely arranged; laminas 35–55 × 2–3.6 mm, linear to slightly broadened in distal third, base attenuate, apex rather acute, margins entire except for distal third somewhat crenulate, glabrescent on adaxial surface, whitish-lanate on abaxial surface, venation pinnate with secondary veins conspicuous, not covered by indumentum. Synflorescences terminal, corymbiform, composed of usually 10–15 capitula; bracts linear to subulate, decreasing in size from base to capitula, basal ones similar to upper leaves but smaller. Capitula on pedicels 7–32 mm long, with remnants of arachnoid trichomes; receptacle flat to slightly convex, epaleate, fimbriate. Involucres 4–5 × 5–7 mm (in dried specimens), hemispherical, glabrous, straw-colored; involucre bracts 31–33, 3–4-seriate, imbricate, subequal, outer ones linear-subulate, 2.9–3.1 × 0.5–0.6 mm, acute, entire, middle ones linear-oblong, 3.8–4.1 × 0.9–1 mm, acuminate, scarious marginally, inner ones as middle ones but narrower. Peripheral florets c. 23, 1-seriate, pistillate, tubulose; corolla 2.4–2.8 mm long, with trichomes in middle part, irregularly 3–5-lobed (lobes somewhat atrophied), whitish to pale yellow; style c. 3.6 mm long, branches c. 1 mm long, not broadened apically, rather smooth, pale yellow. Disc florets c. 19, functionally staminate, tubulose; corolla 2.9–3.2 mm long, with trichomes in middle part,

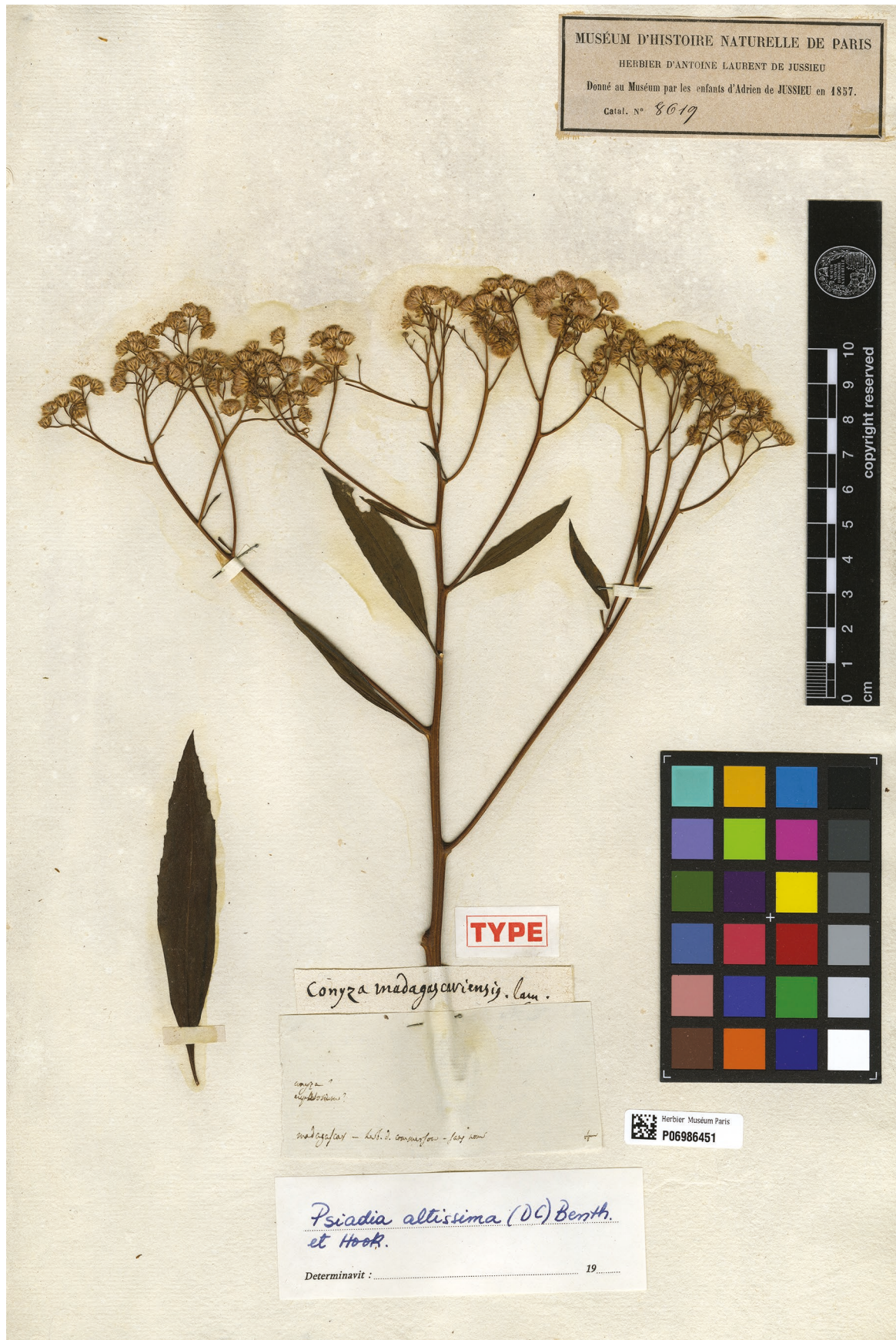


Fig. 3. — Holotype of *Conyza madagascariensis* Lam. (*Psiadia madagascariensis* (Lam.) DC.), P-JU[P06986451].



FIG. 4. — Field picture of *Psiadia salicifolia* J. Calvo & Callm., sp. nov.: detail of leaves and capitula. Photograph: Aina Razanatsima.

lobes *c.* 0.8×0.35 mm, whitish to pale yellow; stamens with filament collars cylindrical, anthers *c.* 1.13 mm long (including appendages), apical appendages *c.* 0.27×0.13 mm, oblong, anther bases obtuse to shortly auriculate; style *c.* 4.2 mm long, branches 0.8 mm long, broadened apically, papillose, pale yellow. Achenes of peripheral florets $2-2.1 \times 0.56-0.65$ mm, subprismatic, 5-ribbed, glabrous except for some papillae at apex; pappus 1-seriate, 2.6-3 mm long, barbellate, white; achenes of disc florets sterile; pappus as in peripheral florets.

NOTES

Psiadia salicifolia is related to the species group comprising erect shrubs or subshrubs with tubulose peripheral florets, glabrescent adaxial leaf surfaces, tomentose adaxial leaf surfaces, and non-attenuate leaf apices. This group includes *P. alticola* Humbert, *P. coursii* Humbert, *P. leucophylla* Humbert, *P. marojejyensis* (Humbert) Humbert, and *P. tsaratananensis*

Humbert. From these taxa the new species clearly differs by its linear leaves and, as far we know, it does not co-occur with any of them. Any confusion is therefore unlikely.

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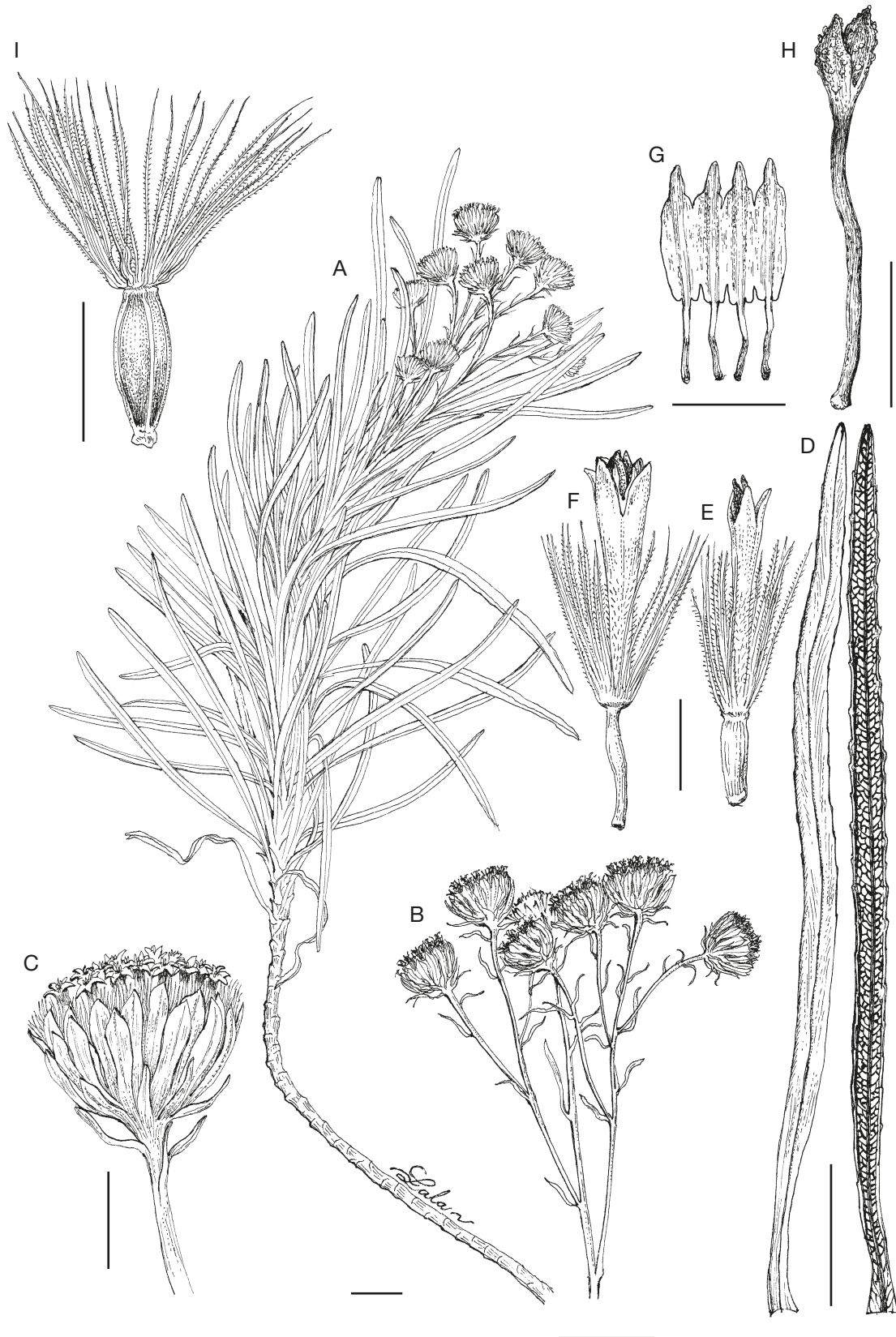


FIG. 5. — *Psiadia salicifolia* J. Calvo & Callm., sp. nov.: **A**, habit; **B**, synflorescence; **C**, capitulum; **D**, leaf (left, adaxial surface; right, abaxial surface); **E**, peripheral floret; **F**, disc floret; **G**, anthers; **H**, style and stigma; **I**, achene. **A-I**, *Razanatsima* 848. Drawing: Roger Lala Andriamiarisoa. Scale bars: A, B, D, 1 cm; C, 5 mm; E, F, G, H, 1 mm; I, 2 mm. Drawing: Roger Lala Andriamiarisoa.

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