

New combinations and typifications in *Vitex* (Lamiaceae) from Madagascar

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Abstract

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The genus *Vitex* L. (Lamiaceae) is pantropical and comprises c. 250 species, of which 42 are currently accepted for Madagascar, all endemic to the country, but one. A number of the Malagasy species of *Vitex* have been treated as comprising infraspecific taxa, including *Vitex betsiliensis* Humbert and *Vitex cauliflora* Moldenke (two subspecies and three varieties respectively), which are the subject of this note. We have undertaken a thorough review all of the available specimens in the herbaria at G, MO and P to gain a better understanding of the morphological variations of both species, and we conclude that the five intraspecific taxa each represent distinct species. We therefore provide the necessary new combinations: *Vitex barorum* (Humbert) Callm. & Phillipson and *Vitex villosissima* (Moldenke) Callm. & Phillipson, and the new name: *Vitex humblotiana* Callm. & Phillipson. Each of the five species is provided with notes on their morphological affinities and with risk of extinction assessments following the IUCN Red List Categories and Criteria.

Résumé

CALLMANDER, M.W. & P.B. PHILLIPSON (2018). Nouvelles combinaisons et typifications dans le genre *Vitex* (Lamiaceae) à Madagascar. *Candollea* 73: 131-136. En anglais, résumés anglais et français. DOI: <http://dx.doi.org/10.15553/c2018v731a14>

Le genre pantropical *Vitex* L. (Lamiaceae) comprend env. 250 espèces, dont 42 sont actuellement reconnues à Madagascar, toutes endémiques sauf une. Certaines de ces espèces comprennent des taxons infraspécifiques, et parmi elles *Vitex betsiliensis* Humbert et *Vitex cauliflora* Moldenke (respectivement: deux sous-espèces et trois variétés). Celles-ci font l'objet de la présente note. Nous avons entrepris l'examen détaillé de tous les spécimens disponibles des herbiers G, MO et P pour apprécier la variation morphologique de ces taxons et nous sommes arrivés à la conclusion que chacun des cinq taxons infraspécifiques représente différentes espèces. En conséquence, nous proposons les combinaisons nécessaires: *Vitex barorum* (Humbert) Callm. & Phillipson et *Vitex villosissima* (Moldenke) Callm. & Phillipson, ainsi que le nom nouveau: *Vitex humblotiana* Callm. & Phillipson. Le traitement de chacune des cinq espèces est accompagné de notes sur leur affinités morphologiques ainsi que de l'évaluation de leur risque d'extinction selon les Catégories et Critères de l'UICN.

Keywords

LAMIACEAE – *Vitex* – Madagascar – Taxonomy – Typification

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Introduction

The genus *Vitex* L. (Lamiaceae) is pantropical and comprises c. 250 species (BRAMLEY et al., 2009). In Madagascar, the Flora treatment accepted 40 species (38 endemic and 2 indigenous non-endemic) (MOLDENKE, 1956). Three species were subsequently described from the island: *V. menabeensis* Capuron (CAPURON, 1972), *V. masoalensis* G.E. Schatz (SCHATZ, 1990: 207) and *V. lowryi* Callm. et al. (CALLMANDER et al., 2014). A new combination has been also established: *V. hispidissima* (Seem.) Callm. & Phillipson for *Colea hispidissima* Seem., an earlier name for *Vitex congesta* Oliv. (PHILLIPSON & CALLMANDER, 2013) which falls into synonymy, while *V. pulchra* Moldenke is considered to be a synonym of *V. coursii* Moldenke (see MADAGASCAR CATALOGUE, 2018). A total of 42 native species are currently accepted in the genus for Madagascar, all but one of which is endemic to the country (MADAGASCAR CATALOGUE, 2018).

With c. 1400 collections of *Vitex* from Madagascar now available – a 7-fold increase in the specimen-base available now as compared to that which existed when Moldenke published the Flora (see CALLMANDER et al., 2014), a much better understanding of the diversity and distribution of the genus in Madagascar can be obtained. In the light of this, we have undertaken a much-needed review of the genus for Madagascar, identifying previously unidentified and wrongly identified material, and reassessing species limits and distributions. We have reached the conclusion that several taxa previously recognized at the infra-specific level merit recognition at species level. These include the two subspecies of *V. betsiliensis* Humbert and the three varieties of *V. cauliflora* Moldenke, (HUMBERT, 1939; MOLDENKE, 1951). We therefore propose the necessary two new combinations for: *V. betsiliensis* subsp. *barorum* Humbert and *V. cauliflora* var. *villosissima* Moldenke and a new name for *V. cauliflora* var. *longifolia* Moldenke, since the name combination *V. longifolia* Merr. already exists for a species from the Philippines.

These taxa all possess leaves reduced to a single leaflet, rather than possessing multifoliate leaves as it more common in the genus, and were therefore placed in *Vitex* sect. *Simplicifoliae* sensu MOLDENKE (1956). However, *V. cauliflora* is unique in this group by being cauliflorous, a characteristic found in numerous multifoliate species placed in sect. *Digitatae* sensu MOLDENKE (1956), e.g. *V. lowryi* and its relatives (CALLMANDER et al., 2014). We note that *V. cauliflora* var. *villosissima* was only known to Moldenke from the type collection, a specimen completely lacking any leaf material, nevertheless he correctly placed it in sect. *Simplicifoliae*, rather than sect. *Digitatae* due to the similarity of its floral morphology to *V. cauliflora*. We have been able to associate six additional collections (5 recently collected) that have leaf material with the type, confirming Moldenke's placement of this taxon in the simple-leaved group.

Each of the resulting five species is provided with notes on their morphological affinities and with risk of extinction assessments following the IUCN Red List Categories and Criteria (IUCN, 2012). Calculations of extent of occurrence (EOO) and area of occupancy (AOO) have been conducted with Geocat (BACHMANN & MOAT, 2012). Lectotypes are also designated for two of the species. Distribution maps for each species are available in the MADAGASCAR CATALOGUE (2018)

Taxonomy and nomenclature

Vitex barorum (Humbert) Callm. & Phillipson, **comb. et stat. nov.**

= *Vitex betsiliensis* subsp. *barorum* Humbert in Notul. Syst. (Paris) 8: 23. 1939.

Lectotypus (designated here): **MADAGASCAR. Prov. Fianarantsoa:** vallée d'Ihosa, 850 m, 29.VII.1928, *Humbert & Swingle 4908* (P [P00573440]!, isolecto-: B [B100030550] image seen, BR [BR0000005162642] image seen, G [G00096014]!, K, MO-2160579!, NY [NY00138422] image seen, P [P00440339, P00440340]!, PRE, TAN, WAG [WAG0251822] image seen). **Syntypi:** **MADAGASCAR. Prov. Fianarantsoa:** env. d'Ihosa, [22°23'S 46°07'E], VI.1933, *Perrier de la Bathie 19267* (P [P04398730, P04398731, P00440341, P00573443]!). **Prov. Toliara:** vallée moyenne du Mandrare, près d'Anadabolava, Mont Vohirotsy, [24°16'S 46°43'E], 850 m, XII.1933, *Humbert 12649* (G [G00341742]!, P [P00440342]!).

Notes. – HUMBERT (1939: 24) considered this taxon to be a subspecies of *V. betsiliensis*, distinct from the typical plant, stating: "... adaptée à un climat plus chaud de moindre altitude [adapted to a hotter climate and lower altitude]". *Vitex barorum* can be easily distinguished from *V. betsiliensis* by its smaller flowers - calyx 5-6 mm long (incl. 1 mm lobe) and corolla c. 10 mm long vs. calyx 8-12 mm incl. a 2 mm lobe and corolla 12-22 mm long; its white finely canescent indument on its lower leaf surface between the secondary veins and on the calyx between the nerves, and has a predominately salmon-pink papillate indument on the lower leaf midrib and secondary veins, petiole, inflorescence and young stem, while *V. betsiliensis* has a uniform, very dense, white, lanate indument covering the lower leaf surface, petiole, inflorescence and young stem. *Vitex barorum* is found on rocky slopes and inselbergs in the south and south-east of Madagascar while *V. betsiliensis* is endemic to the marble of Ibity and Itremo massifs.

All three available syntype collections are well representative of the species, however we select a sheet of *Humbert & Swingle 4908* in Paris as the lectotype, since it has more duplicates distributed to different herbaria.

Conservation status. – *Vitex barorum* is known from 12 locations of which only one, the newly established Vohidava-Betsimalaho Reserve, is encompassed by the protected area network. Here the species has been collected just once, in 2007 (*Randriatsivory* 270). All of the other collections date back to the sixties or the seventies and come from fragmented mid-elevation forest patches on rock outcrops in southern highlands, that are now highly threatened by over-grazing, wild fires and over-exploitation. With an EOO of c. 15,000 km² and an AOO of 56 km², *V. barorum* is therefore assigned a preliminary IUCN conservation status of “Vulnerable” [VU B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)].

Specimens examined. – **MADAGASCAR. Prov. Fianarantsoa:** premier étage de la Briche ou “Fandrana”, PK 545 à 64 km d'Ihoso à Ambalavao, [22°01'S 46°22'E], 1200 m, 17.V.1971, *Cremers* 1545 (P); Mont Vohipolaka au N de Betroka, versant NW, [23°08'S 46°05'E], XI.1933, *Humbert* 11632 (G, MO, P [2 sheets], TEF); Haute Matsiatra, Ingaro [21°36'S 46°22'E], VI.1969, *Morat* 3321 (MO, P, TAN); La Briche: rocher entre Ihoso et Ambalavao, [22°01'45"S 46°22'10"E], 1200 m, VI.1969, *Morat* 3353 (MO, P); Massif Ingaro, Ambalavao, [21°36'S 46°22'E], 900 m, 12.II.1955, *Service Forestier* 13743 (P, TEF); Ambandroja, Ambandrozana, [21°59'30"S 46°36'30"E], 900–1360 m, 22.VII.1954, *Service Forestier* 14490 (G, MO, P, TEF); massif de l'Irandana, entre Ankaramena et Ihoso, [22°01'00"S 46°22'30"E], 1300–1400 m, 7.X.1964, *Service Forestier* 23506 (P, TEF). **Prov. Toliara:** vallée moyenne du Mandrare, près d'Anadabolava, Mont Vohirotsy (sommets), [24°38'S 46°26'E], 800 m, XII.1933, *Humbert* 12648 (P); Amboasary Sud, Mahaly, Anadabolava, 24°14'36"S 46°17'01"E, 813 m, 27.X.2007, *Randriatsivory* 270 (MO, P, TEF); Anadabolava (Moyen Mandrare), [24°12'S 46°19'E], IX.1953, *Service Forestier* 8538 (P [2 sheets], TEF); Vohidava, près Anadabolava (Moyen Mandrare), [24°09'S 46°15'E], 700–900 m, 6.II.1963, *Service Forestier* 22598 (MO, P, TEF); Lalanandro, [22°19'S 46°07'E], 6.XI.1967, *Service Forestier* 27873 (G, MO, P, TEF).

Vitex betsiliensis Humbert in Notul. Syst. (Paris) 8: 22. 1939.

Lectotypus (designated here): **MADAGASCAR. Prov. Antananarivo:** Centre: S du Mt. Ibity, [20°07'S 47°01'E], 1200 m, III.1928, *Perrier de la Bâthie* 18480 (P [P00573442]); isolecto-: G [G00096013]!, K, MO, P [P00573441]!, TEF). **Syntypi:** **MADAGASCAR. Prov. Fianarantsoa:** env. d'Ambatofinandrahana, [20°33'S 46°48'E], 1600–1800 m, 18.II.1938, *Decary* 13057 (P [P04398732]); env. d'Antsirabe, col des Tapia (Haute Sahatsio), [20°15'S 47°09'E], c. 1600 m, 24.XII.1928, *Humbert* 7116 (P [P00573438, P00573439]); env. d'Ambositra à Faliarivo, [20°39'S 47°07'E], c. 1600 m, III.1934, *Humbert* 14519 (G [G00341333]!, K [K000192810] image seen, P [P00730633]); env. d'Ambatofinandrano, [20°33'S 46°48'E], 1400 m, VI.1913, *Perrier de la Bâthie* 10185 (NY [NY00138421] image seen, P [P00084312, P00100751]); bois des pentes occidentales (Tapia), au S d'Ambatofinandrano, [20°33'S 46°48'E], c. 1400 m, V.1920, *Perrier de la Bâthie* 13126 (G [G00096017]!, P [P00730635, P00730637]).

Notes. – All three syntypes are well representative of the species, but *Perrier de la Bâthie* 18480 is selected as the lectotype simply because it has more duplicate specimens distributed in different herbaria.

This species seems to have been cultivated at Analamazaotra on the eastern escarpment of Madagascar by the staff of the Antananarivo botanical Garden (now Jardin Botanique et Zoologique de Tsimbazaza) in the 50's (*Herb. Jard. Bot. Tananarive* 27–2 (145), P [P04398722]). A second collection mentioned on the label that it was brought into cultivation, presumably in Antananarivo, and originally brought back from “Col des Tapias” (*Herb. Jard. Bot. Tananarive* 4845, P [P04398739]). It is not known if these introductions persist in cultivation.

Conservation status. – *Vitex betsiliensis* is known from 22 locations where two are encompassed in the protected area network in the Ibity and Itremo massif. All the collections are from the threatened and fragmented central highlands mid-elevation forests. With an EOO of c. 9,165 km² and an AOO of 96 km², *V. betsiliensis* is assigned a preliminary IUCN conservation status of “Vulnerable” [VU B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)].

Specimens examined. – **Prov. Antananarivo:** Antsirabe, Ibity, Beapombo, sur la crête du Mt Kiboy, 20°05'40"S 46°59'01"E, 7.II.2003, *Andriamihajarivo et al.* 115 (MO, P, TAN); Arivonimamo, PK 40, [19°01'S 47°11'E], IV.1962, *Bosser* 15481 (MO, TAN); Andranovelona, Lohavohitra, Ankazobe, Fihaonana, Andranovelona, 18°38'13"S 47°17'05"E, 1462 m, 16.III.2012, *Rabarijaona* 128 (MO, P, TAN); *ibid. loco*, 18°38'11"S 47°17'13"E, 1593 m, 6.VI.2012, *Rabarijaona* 175 (MO, TAN); *ibid. loco*, 18°38'11"S 47°17'08"E, 1527 m, 10.VI.2012, *Rabarijaona* 222 (MO, TAN); massif Ambohitrambo, Arivonimamo, [18°55'30"S 47°10'30"E], 1500 m, V.1957, *Service Forestier* 11987 (K, P [2 sheets], TEF). **Prov. Fianarantsoa:** Marovoalavo, Fir. Ambatofinandrahana, Fir. Itremo, 100 m à l'E du Mt Ambatoandrano, 20°33'36"S 46°41'42"E, 1110–1125 m, 2.II.2001, *Andriamihajarivo* 15 (MO, TAN, TEF); Itremo, Ambatofinandrahana, à l'W d'Ambatoandrano, 20°39'32"S 47°06'39"E, 1445 m, 9.XI.2001, *Andriamihajarivo* 57 (TAN, TEF); Ivato, PK 10, rte Ivato–Ambatofinandrahana, [20°37'S 46°12'E], IX.1956, *Bosser* 9798 (TAN); PK 12, entre Ivato et Ambatofinandrahana, [20°37'S 46°12'E], IX.1956, *Bosser* 9827 (P [2 sheets], TAN); Faliarivo (Ambositra), [20°39'S 47°07'E], 27.V.1939, *Decary* 14020 (P); env. d'Ambatofinandrahana, 10 km rte de Fenoarivo, [20°52'S 46°52'E], IV.1958, *Descoings* 3245 (MO, TAN); Itremo, Ambatofinandrahana, Ianasana, 20°34'40"S 46°35'11"E, 1558 m, 25.VI. 2005, *Hong-Wa* 364 (MO, P, TAN); env. d'Ambatofinandrahana (Betsileo), [20°37'S 47°12'E], 1400–1500 m, 16.I.1955, *Humbert & Capuron* 28107 (P); montagnes à l'W d'Itremo, 1500–1700 m, 17–22.I.1955 & 18–22. IV.1955, *Humbert* 29953 (MO, P [3 sheets]); Ambohimanjaka, c. 205 km along the road from Antananarivo to Ambositra, 20°11'06"S 47°05'24"E, 1380 m, 16.V.1993, *Jongkind & Rapanarivo* 931 (MO, P, TAN); Ambatofitorahana, Ambatofitorahana, [20°49'S 47°11'E], 1500 m, III.1960, *Keraudren* 220 (MO, P); entre Ivato et Ambatofinandrahana, [20°37'S 47°12'E], 1.XII.1970, *Keraudren-Aymonin & Aymonin* 25728 (G, P, TAN, TEF); Anavoza, Soanatao à 2 km S du village d'Ambatofinandrahana, sur la route vers Fenoarivo, 20°35'4"S 46°48'35"E, 1378 m, 18.III.2004, *Lebaviana et al.* 23 (MO, P, TAN); Itremo massif, W of Ambatofinandrahana, along road to Col d'Itremo, just below bridge over Ambalarangolana riv., 20°34'40"S 46°35'11"E, 1540 m, 9.XI.2002, *Lowry et al.* 5837 (MO, P, TAN); Col des Tapias, c. 15 km NNW



Fig. 1. - Field photographs of *Vitex* L. **A-B.** *Vitex humblotiana* Callm. & Phillipson; **C.** *Vitex cauliflora* Moldenke; **D.** *Vitex betsiliensis* Humbert. [Photos: **A-B:** P. Antilahimena; **C:** G.E. Schatz; **D:** P.P. Lowry]

of crest of pass, 20°13'57"S 47°05'45"E, 1425 m, 25.XI.2009, *Lowry et al.* 7070 (MO); Ivato, 12 km à l'W d'Ivato, piste d'Ambatofinandrahana, [20°37'S 47°12'E], 25.VI.1969, *Morat 3317* (P, TAN); Fkt. Ranomafana, à 4 km au NW d'Ambatofinandrahana, 20°30'58"S 46°46'02"E, 1475 m, 19.VIII.1999, *E.S. Rakotoarisoa 21* (TAN); Ambatofinandrahana, Ianasana, 20°34'40"S 46°35'05"E, 28.IX.2012, *Rakotonasolo 2016* (K, TAN); Ambohimanjaka. Ank-eniheny, Ambohimanjaka, 20°14'02"S 47°05'35"E, 5.VI.2015, *Rakotonirina et al.* 1157 (MO, P, TAN); route vers Itremo à 19 km d'Ambatofinandrahana, 20°33'S 46°48'E, 12.VI.1994, *Ranaivojaona 6* (MO, P, TAN); Itremo, Fiv. Ambatofinandrahana, Itremo, 40 km à l'W d'Ambatofinandrahana, le long d'une vallée dirigée vers l'W du pont à Ianasana, 20°34'S 46°34'E, 1630-1770 m, 6.IV.1998, *Randrianaivo et al.* 161 (MO, P, TAN); massif d'Itremo, E margin, c. 19 km W of Ambatofinandrahana, 20°34'30"S 46°37'30"E, 1580-1700 m, 10.III.2000, *Schatz et al.* 3970 (MO, P, TAN); Distr. Ambatofinandrahana, forêt d'Antanimena, [20°49'S 47°11'E], 5.IX.1951, *Service Forestier 4723* (P); Faliarivo, Faliarivo, SW d'Ambositra, [20°38'S 47°07'E], 1.1955, *Service Forestier 11541* (TEF); Distr. d'Ambositra. Ankijana, Ambohimahazo, [20°40'S 47°06'E], 5.II.1955, *Service Forestier 13468* (P); *ibid loco*, 15.IX.1954, *Service Forestier 14756* (P, TEF); Anasana, massif de l'Itremo, [20°32'S 46°33'E], 3.VIII.1959, *Service Forestier 19504* (P, TEF); *ibid loco*, 20°37'S 46°35'E, 1500 m, 27.X.1994, *van der Werff & McPherson 13590* (MO, P, TAN). **Sine loco:** s.d., *Anon. s.n.* (P); 1400 m, 9.VII.1940, *Cours 1519* (P); Riv. Menaloha [?], 2.XII.1928, *Homolle 1825* (P).

Vitex cauliflora Moldenke in *Phytologia* 3: 432. 1951.

Holotypus: MADAGASCAR. **Prov. Toamasina:** env. de la Baie d'Antongil, X.1912, fl., *Perrier de la Bâthie 10311* (P [P00100756]!; iso-: P [P00084315]!).

Notes. – With the exclusion of the two varieties that we treat as distinct species, we limit *V. cauliflora* to plants that correspond to the typical variety. *Vitex cauliflora* can be recognized by its sub-coriaceous, medium-size unifoliate leaves (8-17 × 3-5 cm) and its beige-brown villous inflorescences including the corolla (Table 1). This species is confined to low to mid-elevations evergreen forests in northeastern Madagascar.

Conservation status. – *Vitex cauliflora* is known from 15 locations, 9 of which are encompassed in the protected area network (within Anjanaharibe-Sud, Mananara-Nord, Makira, Marojejy and Masoala). With an EOO of c. 13,670 km² and an AOO of 60 km², *V. cauliflora* is therefore assigned a preliminary IUCN conservation status of "Least Concern" [LC].

Specimen examined. – MADAGASCAR. **Prov. Antsiranana:** Masoala PN, à 21 km du village de Sahamalaza sur la route de Vakoana. Vinanivao, Antalaha, 15°48'S 50°18'E, 15-16.II.1996, *Aridy & Moise 147* (MO, P, TEF); Marojejy AP, versant NW du Marojejy, 14°25'S 49°36'E, 1000 m, 17.X.2001, *Gautier et al.* 3856 (G, TEF); massif de l'Anjanaharibe (pentes et sommet N), à l'W d'Andapa (Haute Andramont, bassin de la Lokoho, NE), [14°36'S 049°23'E], 10.XII.1950, *Humbert et al.* 24540 (G, K, MO, P [2 sheets], TEF); Marojejy AP, along the trail to the summit of Marojejy Est, NW of Mandena, 14°26'S 49°46'E, 7.X.1989, *Miller et al.* 3436 (MO, P); *ibid loco*, W slopes of Mt. Beondroka, 14°27'S 49°47'E, 23-24.X.1989, *Miller & Randrianasolo 4404* (MO, P, TAN); *ibid loco*, W part of Marojejy, 14°29'09"S S 49°34'05"E, 30.I.2013, *Rajaovelona et al.* 562 (K, MO, P, TAN); Doany, Anjialavahely, forêt

d'Ankarongameloka, versant E, 14°15'32"S 49°26'23"E, 1235 m, 10.III.2006, *Rakotoavao et al.* 2939 (MO, P, TAN); Andapa, forêt Domaniale de Masia-posita, 14°39'20"S 49°42'20"E, 890 m, 10.XI.1995, *Ravelonarivo & Lowry 866* (P, MO, TAN); Andapa, Doany, Anjialavahely, 14°14'S 49°26'E, 9.III.2006, *Ravelonarivo et al.* 1824 (MO, P, TAN); Ambatomenavava, Bezavona, forêt d'Ampiranaomby, 14°23'18"S 49°52'26"E, 687 m, 25.X.2010, *Ravelonarivo & Raharivelo 3583* (MO, P, TAN); Cap Masoala, sources de l'Anaovanandrano (confins), 15°36"S 50°00"E, 750 m, *Wohlhauser et al.* 661 (G, P, TAN). **Prov. Toamasina:** Fiv. Maroantsetra, Abinanitelo, Fkt. Marovovonana, between Befotsila and Sahamengo, 15°17'30"S 49°27'57"E, 695 m, 10.IX.2004, *Antilabimena 2890* (K, MO, P, TAN); NW coast of Masoala Peninsula, trail E of village of Hiaraka, ESE of Maroantsetra on, 15°30'S 49°56'E, 550 m, 10.X.1986, *Lowry et al.* 4055 (MO, P); *ibid loco*, ridge running SE of village of Ambanizana, along ridge SE of Androka riv., 15°38'S 49°59'E, 400 m, 15.X.1986, *Lowry et al.* 4136 (MO, P); Mananara-Avaratra NP, Antanambe, above Mavokely riv., 16°27'S 49°47'E, 24.X.1994, *Prance & Andriantiana 30748* (K, MO, P, TAN); *ibid loco*, 26.X.1994, *Prance & Andriantiana 30817* (K, MO, P, TAN); entre Bedinta et Andranobe, 15°39'30"S 49°57'30"E, 350-500 m, 24.XI.2001, *Rabevohitra 4001* (MO, P, TAN); Mananara-Avaratra NP, 570 m, 18.X.1990, *Raharimalala 2397* (P).

Vitex humblotiana Callm. & Phillipson, **nom. et stat. nov.**

= *Vitex cauliflora* var. *longifolia* Moldenke in *Phytologia* 3: 433. 1951 [non *V. longifolia* Merr.].

Holotypus: MADAGASCAR. **Prov. Toamasina:** "Passimbé", 27.XII.1881, fl., *Humblot 90* (P [P00440350]!; iso-: P [P00440351]!).

Notes. – *Vitex humblotiana* can be easily recognized by its very large (25-43 × 4.5-8.5 cm), unifoliate, coriaceous leaves and its cauliflorous inflorescences with pubescent pedicels, bracts and calyx and yellow strigose corolla (see Table 1). This species is confined to low to mid-elevation evergreen forests in east-central Madagascar.

Conservation status. – *Vitex humblotiana* is known from 9 locations and five are encompassed in the protected area network (Analalava, Betampona and Zahamena). The species is threatened by habitat degradation due to forest exploitation, tavy and bush fires, especially in areas that are not formally protected. With an EOO of c. 14,760 km² and an AOO of 40 km², *V. humblotiana* is assigned a preliminary IUCN conservation status of "Vulnerable" [VU B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)].

Specimens examined. – MADAGASCAR. **Prov. Fianarantsoa:** c. 0.6 km of Ambodirafia, 21°20'26"S 47°42'14"E, 534 m, 14.XI.1998, *Almeda et al.* 8128 (CAS, P). **Prov. Toamasina:** Foulpointe, Ananalava, 17°42'S 49°26'E, 12.XI.2007, *Andriamiarinoro 85* (MO, P, TAN); Analalava Mahavelona Foulpointe, Fokontany Morarano, Piste Rabedona, 17°42'06"S 49°27'19"E, 38 m, 7.X.2011, *Andriamiarinoro & Amosa 249* (MO, P, TAN); Brickaville, Maroseranana, à 5 heures de marche d'Andeka, vers le N, Amparamanambola, lieu dit Sahatsara 18°26'23"S 48°49'40"E, 698 m, 28.X.2005, *Andriamihajarivo et al.* 615 (MO, P [P04398258], TAN); Analalava, W of Foulpointe, 17°42'S 49°29'E, 0-50 m, 13.XII.1984, *Barnett & Dorr 263* (MO, P); Didy a Brickaville, [18°29'S 48°48'E], *Cours 4905* (P [P04398292]); forêts d'Ambanivoules, Savaïndou, II.1837, *Goudot s.n.* (G); Analanjirifo, Analalava, 17°42'23"S

Table 1. – Comparison of morphological characters between *Vitex cauliflora* Moldenke, *V. humblotiana* Callm. & Phillipson and *V. villosissima* (Moldenke) Callm. & Phillipson.

Characters	<i>Vitex cauliflora</i>	<i>Vitex humblotiana</i>	<i>Vitex villosissima</i>
Leaf blades [cm]	8-17 × 3-5	25-43 × 4.5-8.5	6-9 × 1.3-2.6
Leaf venation [below]	secondary veins conspicuous	secondary veins conspicuous	secondary veins discrete
Leaf texture	sub-coriaceous	coriaceous	chartaceous
Corolla indument	beige-brown strigose	sparsely yellow pubescent	pale grey sericeous
Pedicels, bracts and calyx indument	strigose	strigillose	canescent

49°27'05"E, X.2008, *Nikolov et al.* 1765 (MO, TAN); Zahamena AP, partie SE, 17°43'30"S 48°59'25"E, 610 m, 20.X.1994, *Randrianjanaka* 222 (G, MO, P, TAN); Zahamena AP, Andranofantsona, 10 km au S de Manakambahiny I, au bord du rivièrè Ihofika, 17°39'17"S 48°49'10"E, 600 m, 23.X.2002, *Razafitsalama* 142 (CNARP, MO, P [P04398287], TEF); Ambodiriana, Betampona, [17°55'S 49°13'E], 29.X.1953, *Réserves Naturelles* 5872 (G, MO, P, TAN); Ambodiriana, [17°55'S 49°13'E], 13.VII.954, *Réserves Naturelles* 6458 (G, P [2 sheets]); Betampona, RN 1, au N d'Ambodiriana [17°56'S 49°15'E], 250-500 m, 20.VIII.1957, *Service Forestier* 18093 (P [2 sheets], TEF); Analalava à l'W de Foulpointe, [17°42'S 49°26'E], 30.X.1963, *Service Forestier* 22795 (MO, P, TEF).

Vitex villosissima (Moldenke) Callm. & Phillipson, **comb. et stat. nov.**

= *Vitex cauliflora* var. *villosissima* Moldenke in *Phytologia* 3: 433. 1951.

Holotypus: MADAGASCAR. **Prov. Toamasina:** Anony, forêt du N du pays Sihanaka, 3.IX.1937, *Herb. Jard. Bot. Tananarive* 2949 (P [P00440352]!; iso-: NY [NY00138431] image seen, P [P00440353]!, TAN).

Notes. – The species is characterized by its small, chartaceous, unifoliolate leaves (6-9 × 1.3-2.6 cm). Furthermore, this species has a different indument on both the corolla and other parts of the inflorescence (see Table 1). This species is known from mid-elevation evergreen forests around Lake Alaotra.

Conservation status. – *Vitex villosissima* is known only from 4 locations with only one encompassed in the protected area network (Zahamena). The other locations are from other eastern escarpment evergreen tropical forests that are threatened by habitat degradation due to tavy and forest over-exploitation. With an EOO of c. 240 km² and an AOO of 20 km², *V. villosissima* is therefore assigned a preliminary IUCN conservation status of "Endangered" [EN B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)].

Specimens examined. – Vohimena, [17°21'S 48°36'E], 1000 m, 8.IX.1946, *Cours* 2871 (G, MO, P); Zahamena PA, Ankosy, 17°28'45"S 48°44'10"E, 996-1250 m, 15.VII.2000, *Ratovoson et al.* 252 (CNARP, MO, P, TEF); *ibid. loco*, Ambarihely (2 km à l'E d'Ankosy), 17°28'43"S 48°44'17"E, 1000 m, 13.VII.2005, *Ratovoson* 1027 (MO, TEF); *ibid. loco*, 12.VII.2000, *Rakotonandrasana et al.* 405 (CNARP, MO, P); *ibid. loco*, au bord de la piste vers Antevibe, 17°33'34"S 48°54'34"E, 750 m, 26.X.2000, *Rakotonandrasana et al.* 457

(CNARP, MO, P, TAN); *ibid. loco*, Andranofantsona à 10 km au S de Manakambahiny, 17°39'20"S 48°56'46"E, 610 m 27.X.2002, *Razafitsalama* 157 (CNARP, MO, P, TEF).

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