11. CALLMANDER, Martin W., Sven BUERKI & Peter B. PHILLIPSON: Nomenclatural changes in the Malagasy endemic genus Tina Schult. (Sapindaceae)

Introduction

A molecular phylogenetic study of the *Sapindaceae* have demonstrated the close relationship of the Malagasy endemic genera *Neotina* Capuron, *Tina* Schult. and *Tinopsis* Radlk., which, together with the regional endemic *Molinaea* Juss. (present in Madagascar and the Mascarene Islands), form a well-supported clade within the widespread "Cupania Group" (BUERKI & al., 2009). In a more focussed study, we have resolved the relationships between these four genera (BUERKI & al., 2011), showing that there is strong phylogenetic support for *Molinaea* forming a clade sister to a clade comprising *Neotina*, *Tina* and *Tinopsis*. Furthermore *Molinaea* can be easily distinguished morphologically from the other three genera by having three rather than two carpels, with the bicarpellate condition interpreted as a synapomorphy. However, relationships between the bicarpellate genera are more elusive, and indeed, historically, the delimitation of these genera has been problematic and controversial (e.g. CAPURON, 1969).

The genus *Tinopsis* Radlk. was described by RADLKOFER (1888) for *Tina apiculata* Radlk., a species whose flowers each possess five stamens rather the eight typically found in the other species of the genus *Tina* then known. CHOUX (1925) later transferred *T. isoneura* Radlk., whose flowers were unknown to Radlkofer, to *Tinopsis* which he found to be also five-staminate. Working together, CHOUX (1927) and RADLKOFER (1933) later changed their minds and sink *Tinopsis* into *Tina* due to the absence of other discriminating morphological characters. CAPURON (1968) made a detailed study of the group for his monograph of the Malagasy *Sapindaceae*. He resurrected *Tinopsis*, adding eight new species and two new combinations, including *T. dissitiflora* (Baker) Capuron which had been referred to the monospecific genus *Bemarivea* Choux (CHOUX, 1925). Furthermore, he described the new genus *Neotina* to accommodate the newly discovered *Neotina coursii* Capuron and *Tina isoneura* Radlk., limiting *Tina* to just six species. In addition to differences in stamen number referred to by the earlier authors, CAPURON (1969) found a number of other characters of the leaves, flowers and fruits that, in combination, could be used to distinguish the three genera. However, he stressed the close relationship between them, especially between *Neotina* and *Tinopsis*, stating: "… il est pratiquement impossible de séparer des échantilllons fleuris de ces deux genres" (CAPURON, 1969: 175). Conveniently, CAPURON (1969: 175) provided a summary of the differential characters, which we have discussed in detail elsewhere (BUERKI & al., 2011). However the characteristics of these three genera show considerable overlap and have proved impossible to apply consistently. We have shown that *Tinopsis* is paraphyletic with respect to *Neotina*, and that while a narrowly defined *Tina* may form a monophyletic clade, the support for this is rather weak (BUERKI & al., 2011). We proposed that an expanded circumscription of *Tina* should be adopted to encompass all three bicarpellate genera (*Neotina*, *Tinopsis* and *Tina*). Our revised circumscription of *Tina* returns to the generic alignment adopted some 80 years ago by CHOUX (1927) and RADLKOFER (1933) based solely on morphological evidence.

The primary aim of this note is to formally publish the nomenclature changes required with the adoption of the new circumscription of *Tina* (as shown in BUERKI & al., 2011). We have evaluated all the species described in the genus *Tina* s.l., after a careful examination of all collections deposited in Antananarivo (TAN), Geneva (G), Kew (K), Paris (P) and St. Louis (MO), and taking into account our own field observations. In addition to making the nine necessary new

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combinations in *Tina*, we propose some minor changes to the classification presented by CAPURON (1969), which have become apparent in the light of new material available. Specifically, we raise *Tinopsis dissitiflora* subsp. *suarezensis* Capuron to species level and assess its conservation status using the current IUCN Red List Categories and Criteria (2001). We also resurrect *Tina multifoveolata* Choux, which was treated as a synonym of *T. isaloensis* Drake by CAPURON (1969). Finally we no longer uphold Capuron's two varieties within *T. apiculata* Radlk. Three widespread and variable species, *T. striata* Radlk., *T. conjugata* Radlk. and *T. isoneura* represent taxonomically problematic species complexes that require further study, and in this context, we refrain from making a new combination for *Tinopsis tampolensis* Capuron because, as CAPURON (1969) himself pointed out, it is closely related to *Tina conjugata* (≡ *Tinopsis conjugata* (Radlk.) Capuron).

We currently recognize 20 species in our new circumscription of *Tina*, including the 10 species for which nomenclatural changes are provided in this article, and 10 others for which names in the genus *Tina* already exist, namely: *T. apiculata*, *T. chapelieriana* (Cambess.) Kalk., *T. conjugata*, *T. dasycarpa* Radlk., *T. fulvinervis* Radlk., *T. isaloensis*, *T. isoneura*, *T. multifoveolata, T. striata,* and *T. thouarsiana* (Cambess.) Capuron. Further details for each of these species are presented in the MADAGASCAR CATALOGUE (2011).

Nomenclature

Tina Schult. in Roemer & Schult., Syst. Veg. 5: 32, 414, 1819.

Type species: *T. thouarsiana* (Cambess.) Capuron, type cons. (≡ *Cupania thouarsiana* Cambess.).

= *Tinopsis* Radlk. in Durand, Ind. Gen.: 78. 1888. **Type species:** *Tinopsis apiculata* Radlk. (≡ *Tina apiculata* (Radlk.) Choux).

= *Bemarivea* Choux in Compt. Rend. Hebd. Séances Acad. Sci. 181: 72. 1925. **Type species:** *Bemarivea dissitiflora* (Baker) Choux (≡ *Cupania dissitiflora* Baker. ≡ *Tina dissitiflora* (Baker) Callm. & Buerki).

= *Neotina* Capuron in Mém. Mus. Nat. Hist. Nat., Sér. B, 19: 174. 1969. **Type species:** *Neotina isoneura* (Radlk.) Capuron (≡ *Tina isoneura* Radlk.).

Tina antongiliensis (Capuron) Callm. & Buerki, **comb. nova**

≡ *Tinopsis* antongiliensis Capuron in Mém. Mus. Nat. Hist. Nat., sér. B, 19: 138. 1969.

Typus: MADAGASCAR. Prov. Toamasina: massif du Beanjada, N de Masoala, 1100 m, XII.1953, y. fr., *Service Forestier 8517* (holo-: P[P00363225]!; iso-: P [P00363 224]!, TEF [TEF000419]!).

Tina chrysophylla (Capuron) Callm. & Buerki, **comb. nova**

≡ *Tinopsis chrysophylla* Capuron in Mém. Mus. Nat. Hist. Nat., sér. B, 19: 137. 1969.

Typus: MADAGASCAR. Prov. Tolianaro: Forêt d'Ilandy, Mahatalaky, 13.X.1955, fl., *Service* Forestier *14858* (holo-: P [P00363216]!, iso-: G [G00303494]!, P [P00363215]!, TEF [TEF000420]!).

Tina coursii (Capuron) Callm. & Buerki, **comb. nova**

≡ *Neotina coursii* Capuron in Mém. Mus. Nat. Hist. Nat., sér. B, 19: 176. 1969.

Typus: MADAGASCAR. Prov. Toamasina: S de Moramanga, entre Sandrangato et Anosibe, 800-1100 m, 3-7.XI.1952, *Leandri & Capuron 1638* (P [P00364187]!; iso-: G [G00 303491]!, K!, MO!, P [P00364185, P00364 186]!).

Tina dissitiflora (Baker) Callm. & Buerki, **comb. nova**

≡ *Cupania dissitiflora* Baker in J. Linn. Soc., Bot. 25: 308. 1888. ≡ *Tinopsis dissitiflora* (Baker) Capuron in Mém. Mus. Nat. Hist. Nat., sér. B, 19: 148. 1969. ≡ *Bemarivea dissitiflora* (Baker) Choux in Compt. Rend. Hebd. Séances Acad. Sci. 181: 72. 1925.

Typus: MADAGASCAR. Prov. Toamasina: Prov. Befandriana, fl. *Baron 5694* (holo-: K [K000426439]!, iso-: K [K000426438]!, P [P00363217, P00363218]!).

Tina macrocarpa (Capuron) Callm. & Buerki, **comb. nova**

≡ *Tinopsis* macrocarpa Capuron in Mém. Mus. Nat. Hist. Nat., sér. B, 19: 146. 1969.

Typus: MADAGASCAR. Prov. Antsiranana: col d'Ambatondradama, (piste Maroantsetra Antalaha), c. 500 m, 24.XII. 1953, fr., *Service Forestier 8781* (holo-: P [P00363223]!; iso-: G [G00303495]!, P [P00363222]!, TEF [TEF000422]!).

Tina phellocarpa (Capuron) Callm. & Buerki, **comb. nova**

≡ *Tinopsis phellocarpa* Capuron in Mém. Mus. Nat. Hist. Nat., sér. B, 19: 144. 1969.

Typus: MADAGASCAR. Prov. Toamasina: Tampolo, Fénérive, 1.VI.1954, fl., *Service Forestier 10570* (holo-: P [P0036 3290]!; iso-: G [G00303488]!, P [P00363291]!).

Tina suarezensis (Capuron) Callm. & Buerki, **comb. & stat. nova**

≡ *Tinopsis dissitiflora* subsp. *suarezensis* Capuron in Mém. Mus. Nat. Hist. Nat., sér. B, 19: 150. 1969.

Typus: MADAGASCAR. Prov. Antsiranana: Diégo-Suarez, bassin de la Saharaina, forêt de Sahafary, 23.X.1954, fl. & y. fr., *Service Forestier 11371* (holo-: P [P00363121]!, iso-: G [G00303490]!, MO!, P [P00363119, P00363120]!, TEF [TEF000421]!).

Observations. – Capuron (1969) recognised this taxon as a subspecies of *Tinopsis dissitiflora* (≡ *Tina dissitiflora). Tina suarezensis* differs from *T. dissitiflora* by its sub-coriaceous leaves (vs. chartaceous in *T. dissiflora*) with folioles elliptic (vs. oblong), 2-3 times longer than width (vs. 4-6 times) generally folded along the main vein (vs. flat) and the fruit long-stipitate (> 3 mm) (vs. generally short-stipitate, < 2 mm). Furthermore, *T. suarezensis* is know from the far North around Daraina and Sahafary while *T. dissitiflora* is known from the dry parts of Madagascar from the Mandrare basin in the south-east, through the valley of the Onilahy River and its tributaries and through the western areas up the Bemarivo Basin in the Boeny Region in the north-west.

Conservation status. – With three subpopulations one of which is situated within the protected area network (Loky-Manambato), an EOO of 1952 km^2 and an AOO of 45 km^2 (calculation following Callmander & al., 2007), *Tina suarezensis* is assigned a preliminary status of "Endangered" (EN B1ab[i, iii], B2ab[i, iii]) following the IUCN Red List Categories and Criteria (IUCN, 2001).

Tina tamatavensis (Capuron) Callm. & Buerki, **comb. nova**

≡ *Tinopsis tamatavensis* Capuron in Mém. Mus. Nat. Hist. Nat., sér. B, 19: 138. 1969.

Typus: Madagascar. Prov. Toamasina: Betampona, près d'Adiriana, 4.XI.1953, fl. & y. fr., *Service Forestier 8584* (holo-: P [P00363202]!; iso-: P [P00363201, P00363203]!).

Tina urschii (Capuron) Callm. & Buerki, **comb. nova**

≡ *Tinopsis urschii* Capuron in Mém. Mus. Nat. Hist. Nat., sér. B, 19: 142. 1969.

Typus: Madagascar. Prov. Toamasina: Perinet, Analamazaotra, XII.1954, fr., *Service Forestier 11539* (holo-: P[P00363209]!; iso-: G [G00303492]!, MO!, P [P00363207, P00363208]!, TEF [TEF000423]!).

Tina vadonii (Capuron) Callm. & Buerki, **comb. nova**

≡ *Tinopsis vadonii* Capuron in Mém. Mus. Nat. Hist. Nat., sér. B, 19: 140, 142. 1969.

Typus: Madagascar. Prov. Antsiranana: col d'Ambatondradama, (piste Maroantsetra-Antalaha), c. 500 m, 23.XII.1953, fr., *Service Forestier 8782* (holo-: P [P00363212]!; iso-: G [G00303489]!, P [P00363210, P00363211]!, TEF [TEF000424]!).

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