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Weeding the Nettles II: A delimitation of "*Urtica dioica* L." (Urticaceae) based on morphological and molecular data, including a rehabilitation of *Urtica gracilis* Ait.

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Abstract

The taxonomy of subcosmopolitan *Urtica dioica* L. s.l. is problematic. Recent floras recognize *Urtica dioica* as a subcosmopolitan species ranging throughout the entire holarctic region and also South Africa and New Zealand. Numerous infraspecific taxa have been proposed, especially in western Eurasia. There is only weak character differentiation, with floral and fruit morphology largely uniform, details of leaf morphology and indumentum are therefore primarily used for species delimitation, together with some characters of gender distribution and growth habit. The present study addresses the enigmatic relationships of the infraspecific taxa in *Urtica dioica* with a special emphasis on the monoecious, American representatives of *Urtica dioica* s.l. The study is based on extensive field and herbarium studies, molecular data and the experimental cultivation of all relevant forms. Infraspecific taxa currently assigned to *U. dioica* are retrieved mainly on two separate clades, one comprising the predominantly polygamous western Eurasian and African taxa (all subspecies and varieties sampled), the other comprising the monoecious American taxa. Monoecious American representatives of "*Urtica dioica*" and closely allied taxa (*U. aquatica, U. mollis*) are retrieved as a monophyletic group sister to a clade with East Asian and Australasian species, this clade is then retrieved as sister to the western and central Eurasian and African taxa of *U. dioica*. We therefore advocate the removal of the American representatives of this group from *Urtica dioica* and their placement as infraspecific taxa under *Urtica gracilis*. The following new names are consequently proposed: *Urtica gracilis* subsp. *gracilis* (for *Urtica dioica* subsp. *gracilis*), *Urtica gracilis* subsp. *holosericea, comb. nov.* (for *Urtica dioica* subsp. *holosericea*), *Urtica gracilis* subsp. *aquatica*, *comb.* & *stat. nov.* (for *Urtica aquatica*), *Urtica gracilis* subsp. *mollis*, *comb.* & *stat. nov.* (for *Urtica mollis*). Additionally, we describe a new subspecies from Peru under the name *Urtica gracilis* subsp. *incaica*. The literature report of *Urtica gracilis* (*dioica* subsp. *gracilis*) as an introduced weed in New Zealand is shown to be erroneous – the corresponding specimens belong to Australian *Urtica incisa*. Based on gross morphology close affinities have been proposed between a range of Australasian, Asian, North American and European infraspecific taxa, all of these can be shown to be erroneous.

Key words: *Urtica angustifolia,* monoecy, stinging nettle, phylogeny, chloroplast markers

Introduction

The "Greater Stinging Nettle" *Urtica dioica* Linnaeus (1753: 984) in a wider sense is currently considered as a species of nearly worldwide distribution (Friis 1993). The taxon is morphologically quite plastic and encompasses a large number of named forms on all continents (Geltman 1982, Edmondson 1992, Jiarui *et al.* 2003, Weigend 2005, 2006, Navas 1961, Soraru 1972, Woodland 1982, Juárez 1991, Boufford 1997). *Urtica dioica* is believed to be introduced in both South Africa (Friis & Immelmann 2001) and New Zealand (Webb *et al.* 1988).

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nodes at the top, whereas ssp. *mollis* has male flowers at the base, followed by female flowers, for further differences see under ssp. *holosericea*. An association of this taxon with Old World ssp. *pubescens* is also clearly refuted.

This taxon is relatively widely distributed in Chile and Argentina, and seems to tolerate relatively dry conditions, unlike all the other subspecies of *U. gracilis*.

Representative specimens:—CHILE. **III Región, Atacama:** Prov. Huasco, Vallenar, 4000 m, January 1924, *E. Werdermann 266* (BM, E, MO); **IV Región, Coquimbo:** Prov. Elqui, margin of Cerro Tapado, 3300 m, 30°12´S, 70°02´W, 07 January 1981, *M. Kalin Arroyo 81901* (CONC); Cerro Hipólito, Embalse La Laguna, 3300 m, 30°16´S, 70°03´W, 06 December 1979, *C. Villagrán et al. 1827* (CONC); Embalse La Laguna, 3350 m, 05 February 1963, *Ricardi et al. 720* (CONC); camino Internacional to San Juan, S side of Embalse La Laguna, entrance to Quebrada Calabozos, 3100 m, 06 January 1967, *Ricardi et al. 1758* (CONC); Prov. Limarí, Depto. Ovalle, 190 m, 30 37 S, *C. Jiles 7119* (M); Cordillera de Ovalle, El Chape, 2650 m, 30°43´S, 70°38´W, 16 January 1949, *C. Jiles 1206* (M); **V Región, Valparaíso:** Prov. San Felipe de Aconcagua, Catemu, 20 April 1989, *O. Zöllner 11869* (MO); **Región Metropolitana, Santiago:** Prov. Cordillera, between Disputada and Pérez Caldera, 3000 m, 28 November 1954, *B. Sparre 11045* (CONC); Pérez Caldera, 3000 m, 27 January 1954, *B. Sparre 10599* (CONC); Prov. Chacabuco, Cuesta de La Dormida, 1160 m, November 1956, *H.Gunckel 29.962* (CONC); Prov. Santiago, Los Cerillos, 550 m, 20 Dezember 1941, *H. Gunckel 18.737* (CONC); Cultivated in Berlin from seed collected in Chile, Región Metropolitana, Parque Mahuida in Santiago, Cerro la Cruz, 13 February 2010, *T. Kern s.n.*, specimens prepared 16 July 2010, *M. Weigend 9356* (B, M, F); without precise locality: *Cuming s.n.* (BM). ARGENTINA. **Prov. Catamarca:** Antofagasta de la Sierra, Cara, 3200 m, 10 February 1912, *F.M. Rodriguez 313* (M); Depto Ambato, El Rodeo, near Río Ambato, 15–16 December 1971, 1350 m, *L. Ariza 2638* (MO). Depto. Santa Maria, Los Trapiches, 25 April 1948, *A. Reales 1377* (MO); **Prov. Tucuman:** Dept. Tafi del Valle, 16 February 1958, *H.A. Fabris 1550* (M); **Prov. San Juan:** Quebrada de las Vizcachas, Feb. 1960, *H.A. Fabris & J.M. Marchionni 2348* (M); **Prov. Mendoza:** Dept. Tunuyán, Quebrada Capitán Lemes, 1 February 1950*, M.A. Palacios & A. R. Cruzo 4466* (M); Depto. Malargue, 05 January 1893, *F. Kurtz 7484* (MO); Depto. Malargue, 13 January 1885 *F. Kurtz 5790* (MO); Depto. Malargue, 11 February 1893, *F. Kurtz 7664* (MO).

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