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A Monograph of the Genus *Microtoena* (Lamiaceae)

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DEDICATION

Dedicated to the ‘father’ of Microtoena and ex-director (1905–1922) of the Royal Botanic Gardens, Kew:
Dr. David Prain
The genus *Microtoena* is an enigmatic member of the mint family. Most species of this genus are rare and poorly collected in the field. Although this rare plant is not widely cultivated in most gardens, the lovely flowers of it are certainly attractive, both to the taxonomists and to the general public. Recent studies on chemical components of *Microtoena* reveal its huge potential in Medicine. Obviously, for a genus of such horticultural and medicinal importance, it is essential to have a scientifically sound taxonomy.

In the taxonomic history of *Microtoena*, more than thirty species and varieties have been described and reported. However, most of these taxa are poorly known, and the relationship between species was still unclear. The only taxonomic system of *Microtoena* was proposed about fifty years ago. Unfortunately, this taxonomic system with six series is not reliable, because it is mainly based on a few quantitative characters which are found to be unstable.

I have worked on this enigmatic genus for more than ten years and have carefully investigated nearly all the distribution areas of *Microtoena*. Based on extensive field observations, population sampling, critical examination of herbarium specimens, scanning electron microscopy (SEM) observations, and statistical analysis of all relevant characters, as well as molecular phylogenetic analysis, two sections with nineteen species are recognized here for *Microtoena*. In addition, twenty-two names of species and varieties are reduced to synonyms, and one species is excluded from *Microtoena*. Based on molecular phylogenetic analyses and reconstructions of ancestral states of diagnostic characters as well as distribution patterns, I traced evolutionary trends of a number of characters of taxonomic significance, and also inferred the biogeographical history of *Microtoena*.

It is to be hoped that the present monograph will stimulate the intensive study and conservation of these lovely plants. It is necessary for us to know such a rare, enigmatic, and important genus better, before we lose it.

Qiang WANG
Oct. 10, 2017
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CHAPTER I. TAXONOMIC HISTORY AND QUESTIONS TO BE ADDRESSED

TAXONOMIC HISTORY

Before the establishment of Microtoena, some taxa of this genus had attracted the attention of taxonomists. The first species described was by Henry Fletcher Hance (1884) from Guangdong Province (China), as *Gomphostemma insuave* Hance. This was transferred to *Microtoena* by John Isaac Briquet (1895).

Sir Joseph Dalton Hooker (1885) described *Plectranthus patchouli* C.B. Clarke ex Hook. f. from Assam (India). However, he was suspicious about the position of this new species. Charles Baron Clarke (1889) commented that *P. patchouli* might be a species of *Cymaria* or a close relative. David Prain (1889) renamed it as *Microtoena cymosa* Prain, but this name is illegitimate. Finally, this species was correctly transferred to *Microtoena* by Shwe Jye Hsuan (1965), as *M. patchoulii* (C.B. Clarke ex Hook. f.) C.Y. Wu & S.J. Hsuan.

Adrien René Franchet (1887) described *Clerodendrum moupinense* Franch. from Sichuan Province (China). This species was later transferred to *Microtoena* by D. Prain (1895), as *M. moupinensis* (Franch.) Prain.

The establishment of *Microtoena* was in 1889. Two years before 1889, David Prain, later director (1905-1922) of the Royal Botanic Gardens, Kew, visited India to investigate commercial plants. The ‘true Patchouli plant’ of Clarke attracted Prain’s attention, and he didn’t agree with Hooker and Clarke, and thought that it was unjustifiable to place this species in *Plectranthus* or *Cymaria*. In his opinion, this plant should belong to a new genus. In 1889, D. Prain founded his new genus *Microtoena*, and transferred *P. patchouli* to *Microtoena*. In accordance with the ‘Kew Rule’ about the priority of epithets being limited to their use only within a particular genus, which permitted changing an epithet when a species was transferred for the first time from one genus to another, D. Prain rejected the epithet ‘patchouli’ and renamed *P. patchouli* as *M. cymosa*, the first species name in *Microtoena*. The ‘Kew Rule’ has been rejected, and Prain’s renaming is now illegitimate. S.J. Hsuan (1965) transferred *P. patchouli* into *Microtoena* as *M. patchoulii*, and reduced the name *M. cymosa* to a synonym.

William Botting Hemsley (1890) described two new species of *Microtoena* from
Hubei Province (China), based on the collections of Augustine Henry: *M. robusta* Hemsl. with robust stems and *M. urticifolia* Hemsl. with *Urtica*-like leaves.

At the same year, D. Prain (1890) described *M. griffithii* Prain as new, based on two specimens collected from Assam (India). The lectotype of *M. griffithii* designated in the present study, *Griffith 4059* [preserved in K (K 000928194)], might be the oldest collection of a *Microtoena*. It was collected by William Griffith in April 1863, approximately twenty-six years before the establishment of *Microtoena*.

Five years later, D. Prain (1895) described another new species: *M. delavayi* Prain with two varieties, var. *vera* Prain and var. *grandiflora* Prain. The name *M. delavayi* var. *vera* is invalid (Art. 24. 3), and the autonym *M. delavayi* var. *delavayi* should be accepted. In addition, D. Prain transferred *Clerodendrum moupinense* to *Microtoena*, as *M. moupinensis* (Franch.) Prain.

In the same year, J.I. Briquet (1895) regarded *Gomphostemma insuave* Hance as conspecific with *M. cymosa*. Therefore, he made the new combination, *M. insuavis* (Hance) Prain ex Briq., and reduced *M. cymosa* to synonymy.

Friedrich Ludwig Emil Diels (1900) described a new species from China, *M. prainiana* Diels. This species was collected from Jinfo Mountain, Nanchuan county, Chongqing City (China). This distinct species has glomerate cymes in ovoid panicles. It has also been found in other provinces of SW China, such as Sichuan, Yunnan, and Guizhou.

Augustine Abel Hector Léveillé (1911) described three new species: *M. mollis* H. Lév., *M. esquirolii* H. Lév., and *M. coreana* H. Lév.. Both *M. mollis* and *M. esquirolii* were collected from Guizhou Province (China), but *M. coreana* from Seoul City (South Korea) was far from SW China and SE Asia, the main distribution area of *Microtoena*. A.A.H. Léveillé was suspicious about this remote species, and marked it as a doubtful member of the genus.

Unaware of the combination of J.I. Briquet (1895) for *Gomphostemma insuave*, Stephen Troyte Dunn (1913) transferred *G. insuave* to *Microtoena* again, and combined it as *M. insuavis* (Hance) Prain ex Dunn, which is certainly illegitimate. In addition, S.T. Dunn regarded *M. cymosa*, *M. mollis*, and *M. esquirolii* as conspecific with *M. insuavis*, and reduced these names to synonyms.

Heinrich Raphael Eduard von Handel-Mazzetti (1936) described a new species and a new variety from China: *M. maireana* Hand.-Mazz. narrowly distributed in Huize County of Yunnan Province and *M. urticifolia* var. *subedentata* Hand.-Mazz., a poorly known taxon endemic to Nu Jiang region of Yunnan Province.

Cheng Yi Wu (1959) made the first taxonomic revision of *Microtoena* in China. In his revision, nine species and two varieties were recognized. C.Y. Wu followed S.T. Dunn (1913) and reduced *M. cymosa*, *M. mollis*, and *M. esquirolii* to synonyms of *M. insuavis*, and the invalid name *M. delavayi* var. *vera* to a synonym of *M. delavayi*. In addition, C.Y. Wu described two new species of *Microtoena*, *M. tenuiflora* C.Y. Wu
with slim flowers and *M. megacalyx* C.Y. Wu with a conspicuously dilated calyx.


One year later, W.T. Stearn (1983) described three further new species of *Microtoena* from East Himalayan: *M. bhutanica* Stearn endemic to Bhutan, *M. siamica* Stearn endemic to Thailand, and *M. wardii* Stearn endemic to S Tibet.

In the *Flora of China* vol. 17, H.W. Li and Ian Charleston Hedge (1994) accepted 20 species and 5 varieties of *Microtoena* in China, mainly based on the revision of Hsuan (1965). In addition, they accepted the legitimate combination name *M. insuavis* (Hance) Prain ex Briq. for *G. insuave*. However, they improperly included its homonym *M. insuavis* (Hance) Prain ex Dunn as a synonym of *M. patchoulii*.

Based on specimen examination, extensive field observation, and careful analysis of a number of characters, De Yuan Hong and I (Wang & Hong, 2011) made a taxonomic revision on the most complicated group of *Microtoena*, the *M. insuavis* complex. In this revision, we confirmed the separation of *M. patchoulii* and *M. insuavis*, and restored *M. esquirolii* as independent species. In addition, we reduced *M. subspicata* and *M. subspicata* var. *intermedia* to synonyms of *M. esquirolii*, *M.