Short communication

Taxonomic revision of Dendrobium moniliforme complex (Orchidaceae)

Jin Xiaohua*, Chen Singchi, Luo Yibo

Herbarium (PE), Institute of Botany, The Chinese Academy of Sciences, Nanxinchun 20, Xiangshan, Beijing 100093, China

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ABSTRACT

Taxonomic revision of Dendrobium moniliforme complex is presented. D. moniliforme complex is characterized by the even slim stems, bracts with brownish zone, semi-spherical anther cap and the hairy disc of lip. Dendrobium tosaense, Dendrobium officinale and Dendrobium guangxiense were excluded by having membranous bracts lacking brownish zone, anther cap conical and bifid. Two species are recognized in this complex, i.e., D. moniliforme and Dendrobium wilsonii. D. wilsonii differs from D. moniliforme by having elliptic leaves about 1.3–2 cm wide, dorsal sepal 3.0–4.0 cm long, 0.6–0.9 cm wide, petals elliptic to oblong, 3.0–4.0 cm long, 1.0–1.5 cm wide, lip elliptic to ovate–lanceolate, 2.6–3 cm long, 1.2–1.5 cm wide.

1. Introduction

The genus Dendrobium Sw., one of the largest genera in Orchidaceae about 800–1400 species, is widespread from China, India through Malaya, Indonesia to New Guinea, Australia, New Zealand and the Pacific Islands (Garay and Sweet, 1974; Pearce and Cribb, 2002; Seidenfaden, 1985; Tsi, 1999; Wood, 2006). Dendrobium occupies an important position in ornamental orchid cut flower industry (Limpanavech et al., 2008; Martin and Madassery, 2006). Most species in sect. Dendrobium are important raw materials for Chinese herb medicine, Shihu (Bao et al., 2001; Hu, 1971; Kimura, 1936). However, it is confused and inconsistent of the taxonomic treatments about sectional or generic delimitation and the taxonomy of species complex over large area of its distribution region.

Dendrobium moniliforme complex belong to sect. Dendrobium. There are two to ten entities in this complex, distributed in Eastern Asia and Himalaya regions, viz. from Japan through Korean, China to Nepal and India in the north limit of Dendrobium and the alpine regions (Garay and Sweet, 1974; Pearce and Cribb, 2002; Tsi, 1999; Wood, 2006). D. moniliforme was selected as the lectotype of the genus Dendrobium (Holttum et al., 1979). But the taxonomic treatment of this complex is quite confused and inconsistent. Garay and Sweet (1974) considered Dendrobium catenatum Lindl. as a synonym of D. moniliforme. Dendrobium tosaense Makino as separate species. Tsi (1999) treated Dendrobium flexicaule Z.H. Tsi, S.C. Sun & L.G. Xu, Dendrobium guangxiense S.J. Cheng & C.Z. Tang, Dendrobium huoshanense S.J. Cheng & C.Z. Tang, D. moniliforme, Dendrobium officinale Kimura & Migo, D. tosaense, and Dendrobium wilsonii Rolfe as distinct species, while D. catenatum as a synonym of D. moniliforme. Pearce and Cribb (2002) reduced D. officinale as a synonym of Dendrobium candidum Lindl. Ormerod (2002) was first to include D. tosaense Makino and Dendrobium stricklanianum Rchb. f. in the synonyms of D. catenatum, and treated D. flexicaule as synonym of Dendrobium scoriansum. Su (2000) stated that D. moniliforme distributed from Japan through Korean Peninsula and China to Northeast India. Wood (2006) suggested that D. wilsonii and D. candidum were conspecific with D. moniliforme, while D. officinale, D. guangxiense and D. huoshanense were synonyms of D. catenatum, and Dendrobium hennanense J.L. Lu & L.X. Gao were subgrouped with D. flexicaule. However, few authors supplied with evidence of their treatments.

There are several factors contributed to these confusions, such as D. moniliforme in itself is widespread and variable, the absence of specimens for comparison, few characters available for the taxonomy of Dendrobium, etc. So the primary aim of our research was to make the taxonomical revision of this complex based on field observation and specimen examination. In total, about 300 specimens of this complex were examined. Our fieldwork covered Anhui, Chongqing, Guangdong, Guangxi, Guizhou, Henan, Sichuan, Yunnan and Zhejiang Provinces in mainland China.
2. Results

It is not difficult to distinguish the members of *Dendrobium* complex from other members of sect. *Dendrobium*. All members of this complex have even slender stems, leaves with uneven bilobed tips, inflorescence mostly arising from the defoliate stems, membranous bracts with brownish and transverse zone, flowers usually whitish, lip disc usually with hairs. Anther cap semi-spherical. Some species, such as *D. catenatum*, *D. flexicaule*, *D. guangxiense* and *D. officinale* were excluded from this complex by having membranous bracts without brownish zone, flowers with different colour pattern, anther cap nearly conical and deeply bifid, lip disc with calli or hairs.

*D. candidum* is closely allied to *D. moniliforme* within the complex, such as the size and shape of leaves and flowers. *Wood* (2006) treated them as conspecific. *D. candidum* differs from the latter by having raceme with rachis ranging from 0.5 to 1.5 cm long. Our examination of specimens indicated that rachis usually were present in specimens from region west of Tanaka-Kaiyong Line, while it was absent in most specimens from regions east of Tanaka-Kaiyong Line. The Tanaka-Lang Line was considered as the representative specimens examined. BHUTAN: Trongsu, near Dorji Gompa, 2700 m, Y. Dorji, N. Pearce & P. Cribb (30!)

- CHINA: Anhui, Huo county, Wang Lizhi 03 (PE); Dahieshan Mts, Wang Lizhi 01 (PE); Fujian, Dehua, 1000 m, W2 (PE); Guandong, Nanxiong, Deng Liang 6301 (PE, KUN!); Lechang, S.P. Kwok 80687 (PE); Guangzi, Qianzhu, T.T. Tsong 82030 (AMES!); Longsheng, 900 m, Team of Guangfuin 90 (PE!); Chuanhsien, Z.S. Chien 81613 (KUN!); Guizhou, Kuiyang, E. Bodinier 2210 (E!); Kaili, Leigongping, 800 m, Qian-nan Team 3462 (PE, KUN!); Henan, Shangqiu, Longsheng, Herbarium of Hennan Institute of Biology, 006102 (s.n. 0031!); Sichuan, Leibo, in forest, Team of Institute of Botany 0297 (PE!); Omei, E.H. Wilson 11108 (AMES!); Tianshan, 2400 m, K.L. Chu 2559 (E!); Taiwain, Bunkiko 1500 m, Fairie 1809 (AMES!); Ming-Hsien Chen T.Y. Liu 174 (AMES!); 2257, J. Linsley Grissitt 1877 (AMES!); Yunnan, Forrest G. 19960 (KFW!); Fugong County, Gaoligongsan Mts, 2700 m, X.H. Jin 6913 (PE!); Gengma, Daizhu and Waizhu Autonumous county, 1700 m, C.W. Wang 72946 (PE, KUN!); Gongshan, Dunlingjiang, Expedition team of Dulong Jiang Team 4866 (KUN); Lushui, Liuku, 1500 m, Z.H. Tsi 94-47 (PE!); Jingdong, Ma Yuezhong 37 (PE!); J. Cavalerie 2817 (E!); Jingdong, Mashugui 4602 (KUN); Longsheng, Second district, Team of Guangfunin 86 (PE!); Pingbian, Daweishan, 2000 m, Sino-USSS Team 4506 (PE!); Ward F.K. 214 (E!); Wenshan, 1050 m, Z.H. Tsi 94-46 (PE!); Yangbi, middle part of Cangshan Mts., R.C. Ching 22598 (PE, KUN!); Tibet, Bomi County, Tangmai, 2000 m, T. Naito, K.Y. Lang, Y. Tateishi, T. Nemoto & B.S. Li 950 (PE!); Ding je County, 2500 m, Team of Qinghai-Tibetian Plateau 5674 (KUN!).

- INDIA: Yehri, Garhwal, Mackinnois 24155 (AMES!); Sikkim, Laling, Lachu Valley, 7000 ft, Pantling 367 (KFW!).

- JAPAN: Ohsumi, Kyushu, Island. Kaku-shima, Kami-yaku-choo, Kusukawa, Kusu river, 200 m, Miyoshi Furuse 10885 (PE!); Mino, Buyi, Michu Kumunada 9172 (AMES!); Mino, Kaigami, Kenzo Shiota 2201 (AMES!); Nagasaki, R. Oldham 831 (KFW!).

- KOREAN ARCHIPELAGO: R. Oldham 1050 (KFW!).

- MYANMAR: Between Tibet, Assam, and Myanmar. Chin Hills, Haka, 6500 ft, 1910, F.E.W. Venning 57 (KFW!).

- NEPAL: Near Lumsum, 7500 ft, Stanton, Sykes & Williams 2582 (PE); Kachin State, Seinghku Wang, 6000 ft, F.K. Ward 6725 (KFW!); Kumaon, 3000 ft, R. Stache & J.E. Winterbotton 8 (KFW!); Taquet 1692 (KFW!); Wallich s.n. (KFW!).

It seems that *Dendrobium okinawense* Hatusima & Ida is polyploidy and *D. moniliforme* is one of ancestors based on the
protologue and description of character presented by Chung and Lu (2007). However, there is no specimen available for examination.


*D. kwangtungense* C.L. Tso in Sunyatsenia 1:140. 1933. Type: China, Guangdong, Lokchong, C.L. Tso 22743 (Holotype IBSC!, isotype KUN!).

Representative specimens examined.

CHINA: Sichuan, Omei, S.S. Chien 5554 (E!), W.P. Fang 15137 (AMES!, KUN!), Farges R.P. P00386214 (PI!), Xing Gongxia, Lang Kaiyong 1141A (PE!), Xiong Jihua, Zhang Shoushi et Jiang Xinglin 32771 (PE!); Meishan County, Wanshengqu, Sichuan Economic expedition team 5260 (PE!); Mabian County, Dilan, 1130 m, T.H. Tu 5635 (PE!); Leibo, Zhongshanding 1300 m, Sichuan Economic Expedition Team 0472 (PE!); Hubei, Hanfeng County, Shaxi, 1300 m, Dai L.K. et Qian Chonghai 716 (PE!); Hunan, Xiangxi, 1350 m, Team of Shuanzhi Forest Institute 0510 (KUN!); Guizhou, Zhunyi, ShanpanQu, Qianbei Expedition team 0158 (PE!).

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