



## Four new species of *Begonia* (Begoniaceae) from Vietnam: *B. abbreviata*, *B. calciphila*, *B. sphenantheroides* and *B. tamdaoensis*

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### Abstract

Four new species of *Begonia*, namely *B. abbreviata* C.-I Peng, *B. calciphila* C.-I Peng, *B. sphenantheroides* C.-I Peng and *B. tamdaoensis* C.-I Peng are documented from northern Vietnam. Detailed descriptions, line drawings, color plates, chromosome data, foliar SEM observations and comparisons with phenetically similar species are provided to aid in identification.

**Key words:** *Begonia*, new species, sect. *Coelocentrum*, sect. *Petermannia*, sect. *Platycentrum*

### Introduction

In the checklist of Southeast Asian *Begonia* Linnaeus (1753: 1056), Hughes (2008) documented 36 species from Vietnam. More recently, 18 new species were reported, bringing the total number to 54 (1 sp.: Nguyen *et al.* 2010; 10 spp.: Averyanov & Nguyen 2012; 1 sp.: Peng *et al.* 2014; 6 spp.: Peng *et al.* 2015). In continuation of our research on Asian *Begonia*, we report four additional new species, i.e. *B. abbreviata*, *B. calciphila*, *B. sphenantheroides* and *B. tamdaoensis* from northern Vietnam which belong to different sections, including sect. *Coelocentrum* Irmscher (1939: 553), *Petermannia* (Klotzsch 1854: 124) de Candolle (1859: 128) and *Platycentrum* (Klotzsch 1854: 243) de Candolle (1859: 134).

### Material and methods

#### Chromosome preparations

Somatic chromosomes of the four new species: *Begonia abbreviata* (Peng 22355), *B. calciphila* (Peng *et al.* 20226), *B. sphenantheroides* (Peng *et al.* 20216) and *B. tamdaoensis* (Peng *et al.* 16634, 16638) were examined using root tips. The methods of pretreatment, fixation and staining for chromosome observations followed Peng *et al.* (2014b). Classification of the chromosome complements based on centromere position at mitotic metaphase follows Levan *et al.* (1964). Voucher specimens of all species have been deposited in Herbarium, Biodiversity Research Center, Academia Sinica, Taipei (HAST).

#### Cryo-scanning electron microscopy

Fresh leaves of *B. abbreviata*, *B. calciphila*, *B. sphenantheroides* and *B. tamdaoensis* were dissected and attached to a stub. The samples were frozen with liquid nitrogen slush, then transferred to a sample preparation chamber at  $-160^{\circ}\text{C}$  and etched for 15 min at  $-85^{\circ}\text{C}$ . After etching, the temperature reached  $-130^{\circ}\text{C}$  for sample fracturing and coating. After coating, the samples were transferred to the SEM chamber and observed at  $-190^{\circ}\text{C}$  with a cryo-scanning electron microscope (FEI Quanta 200 SEM/Quorum Cryo System PP2000TR FEI).