Taxonomic notes on *Metasasa* and *Indocalamus nanunicus* (Poaceae: Bambusoideae)

Yu-Xiao Zhang and De-Zhu Li

Y.-X. Zhang, D.-Z. Li (dzl@mail.kib.ac.cn), Key Laboratory of Biodiversity and Biogeography, Kunming Inst. of Botany, Chinese Academy of Sciences, CN–650204 Kunming, Yunnan, PR China; Plant Germplasm and Genomics Center, Germplasm Bank of Wild Species, CN–650204 Kunming, Yunnan, PR China. YXX also at: Graduate Univ. of Chinese Academy of Sciences, CN–100049 Beijing, PR China.

Based on comprehensive field observations and careful herbarium studies, we discuss the status of the type species *Metasasa* W. T. Lin (*M. carinata* W. T. Lin) and entities previously treated as synonyms of its name. Three species in two genera were involved. First, *M. carinata* and *M. albofarinosa* W. T. Lin were confirmed to be conspecific and a new combination *Acidosasa carinata* (Lin) D. Z. Li & Y. X. Zhang is proposed. Secondly, although *M. carinata* was previously treated as a synonym of *Acidosasa nanunica* (McClure) C. S. Chao & G. Y. Yang, close morphological study revealed that these two are not conspecific. *Pseudosasa nanunica* (McClure) Z. P. Wang & G. H. Ye is restored to accommodate this distinct species. Finally, another name previously treated as a synonym of *A. nanunica*, *Pseudosasa acutivagina* T. H. Wen & S. C. Chen should also be resumed. Synonyms are provided for each of these three species.

Because of the rarity of flowering, some species of bamboos have been described based on vegetative materials alone. However, the vegetative parts are variable among individuals in different phases of development and in different habitats. It is crucial to identify species with a comprehensive collection and careful observations in the field (Soderstrom and Young 1983, Li 1997a). However, incomplete collection of bamboo is often inevitable, which has made it very difficult to clarify the identity of some species.

In the course of a molecular phylogenetic study of the temperate bamboos, we examined the type specimens of *Metasasa carinata* W. T. Lin and *Pseudosasa acutivagina* T. H. Wen & S. C. Chen, as well as the type of *Indocalamus nanunicus* McClure (whose photo was compared), and collected additional specimens (those of the former two taxa being collected in their type localities). Although they were treated as a single entity by Yang and Chao (2001) and followed by Li et al. (2006), our investigation revealed that they are in fact three different species in two genera.

The genus *Metasasa* and its type species *M. carinata*

*Metasasa* W. T. Lin was erected as a small genus of Bambusoideae by Lin (1988) to accommodate a newly described species, *M. carinata*. A second species, *M. albofarinosa* W. T. Lin, was added later (Lin 1990). The two names were described based on materials from Guangdong, south China. Lin (1990) described *M. albofarinosa* as having shorter internodes, dense white powder under nodes, setae only at the base of culm sheaths, and drill-like culm blades, and stressed that those features made it distinguishable from *M. carinata*. After careful examination of the type specimens of those two species in the herbarium of South China Agricultural Univ. (CANT) and our collection and observations in the field (both near the type localities), we confirmed that they are in fact conspecific, as suggested by Yang and Chao (2001). We noticed that *M. carinata* also has dense white powder under nodes, while Lin (1988) missed this in his original description. We infer that this was a result of untypical specimens and poor records of the type collection of *M. carinata*. Other differences may occur due to diversified habitats.

While studying *Metasasa* and *I. nanunicus*, Yang and Chao (2001) suggested that the two-branched *Metasasa* was collected from abnormal plants of the type specimen of *M. carinata*. They compared the vegetative features of *M. carinata* and *I. nanunicus* and treated them as conspecific. As a result, *I. nanunicus* was transferred to *Acidosasa* C. D. Chu & C. S. Chao ex Keng f. During our study, two small populations of *M. carinata* near the type locality were observed, one of which was flowering. Those individuals are mostly two-branched per node at mid-culms, and one-branched at the base of the culms. The two-branched node is not an exception but rather quite common in this species, although we did observe some three-branched individuals (with a bigger branch in the middle and two smaller lateral branches) in Dawuling, Xinyi City, Guangdong Province. Therefore, the number of branches and the branching pattern are the primary differences between *M. carinata* and
I. nanunicus. Other noticeable differences include culm blades reflexed in M. carinata versus erect in I. nanunicus, and the length of ligules of culm sheaths and leaves (3–5 mm in M. carinata vs 7–9 mm in I. nanunicus).

Metasasa has semelautciant inflorescences, six stamens, lemmas much larger than paleas, mainly two unequal branches per node, and leptomorphic rhizomes. Those features resemble Acidosa except in the number of branches per node (Acidosasa has three). Therefore, Metasasa has been treated as a synonym of Acidosa by some authors (Li 1997a, 1997b, Yang and Chao 2001, Li et al. 2006). The generic affinity is confirmed by our field and herbarium studies. However, a new combination is required.

**Acidosasa carinata** (W. T. Lin) D. Z. Li & Y. X. Zhang comb. nov.


**Taxonomic synonym**: Metasasa albofarinosa W. T. Lin (1990, p. 19), ('albo-farinosa'). **Type**: China. Guangdong, Xinyi, Dawuling, 12 Apr 1987, Z. M. Wu 0233 (holotype: CANT!).

**Distribution**

Acidosasa carinata is endemic to south Guangdong. It grows in open fields, forest understory, and on slopes of hills from ca 33–1660 m a.s.l.

**Additional specimens examined**


The status of Indocalamus nanunicus

The type specimen of Indocalamus nanunicus McClure was collected from an introduced living plant in the Lingnan Univ. (now Sun Yat-Sen Univ.) in Guangdong without inflorescences. There was a solitary branch per node in the type specimen. However, McClure (1940) wrote that “as long as the plants remain dwarfed by unfavorable growing conditions the branches remain solitary at the culm nodes. The original plants which were growing wild along a stream, under favorable conditions, reached a height of about 4 meters and often produced the primary branches in threes.” The genus Indocalamus Nakai usually bears solitary branches at the nodes, while the genera Arundinaria Michx. (s.l.) and Pseudosasa Makino ex Nakai (s.l.) produce three branches per node. Therefore, this species was transferred to Arundinaria by Chao and Chu (1980) and Pseudosasa by Wang and Ye (1981), respectively.

In the bamboo account of ‘Flora of China’, Arundinaria was treated to include Bashania Keng f. & T. P. Yi. However, according to our molecular study (Zeng et al. 2010), the genus Arundinaria should be delimited more narrowly, i.e. comprising three species confined to eastern USA only. The inflorescence of I. nanunicus is unknown, but the primary vegetative features, such as three subequal branches per node, branches appressed to culms, culm sheaths shorter than internodes, and ligules of the culm sheaths 7–9 mm long, suggest an affinity with Pseudosasa subg. Sinitae S. L. Chen & G. Y. Sheng, rather than Bashania. Based on these observations, we propose to restore Pseudosasa nanunica (McClure) Z. P. Wang & G. H. Ye.

When I. nanunicus was transferred to Acidosa, Yang and Chao (2001) put several synonyms under this name and this was mostly followed by the recently published bamboo account of ‘Flora of China’ (Li et al. 2006). One of the synonyms, Pseudosasa acutivagina T. H. Wen & S. C. Chen was treated as an independent species in the Flora but with notes saying that it is possibly a synonym of A. nanunica. We examined the type specimen of P. acutivagina and many other specimens, particularly the type materials of other species names that were considered as synonyms of A. nanunica. We confirmed that P. acutivagina is morphologically different from the others, whereas the other names are indeed synonyms of P. nanunica. In addition, our molecular study (Zeng et al. 2010) also supported P. acutivagina as a distinct species. Therefore, we propose to maintain Pseudosasa acutivagina T. H. Wen & S. C. Chen.


**Based on the same type**: Pseudosasa projecta (W. T. Lin) P. C. Keng in Geng and Song (1994, p. 65). **Type**: China. Guangdong, Jiexi, Heshe, 26 Jun 1987, Z. J. Feng 80595 (holotype: CANT!).


**Based on the same type**: Pseudosasa paucifolia W. T. Lin (1992, p. 352) syn. nov. **Type**: China. Guangdong, Yingde, Lianjiangkou, 9 Dec 1987, M. Y. Xiao 54458 (holotype: CANT!).


**Based on the same type**: Arundinaria bicorniculata W. T. Lin & Z. J. Feng (1993, p. 50) syn. nov. **Type**: China. Guangdong, Pingyuan,

Distribution

*P. nanunica* occurs mainly in central and south China, especially in south Hunan and north Guangdong. It grows in the understory, on slopes of hills, in valleys or along streams.

Additional specimens examined


*Pseudosasa acutivagina* T. H. Wen and S. C. Chen in Wen (1984, p. 31)

Type: China. Zhejiang, Qingyuan, Guanmenao, 8 Jun 1983, S. Q. Chen QY83053 (holotype: ZJFI!).

The culm sheaths of this species are longer than the internodes, with brown setae on the abaxial surfaces, and most dense at the base. Ligules of the culm sheaths are about 1 mm long. These characters clearly distinguish it from *P. nanunica* and *A. carinata*. Our molecular results (Zeng et al. 2010) illustrated that this species was nested in a clade different from the other two species.

Distribution

This species occurs in Zhejiang, China. It usually grows on slopes below 500 m a.s.l.

Additional specimens examined


Acknowledgements—We thank the curators of CANT, IBSC, NAS, SIFS and ZJFI for permission to access their collections. We are also grateful to Zhang-Ping You (Nanling Natl Nature Reserve, Guangdong), Ming-Xiang Wu (Qingyuan, Zhejiang), Wei Fang (Kunming Inst. of Bot., CAS), Dr Chun-Xia Zeng and Dr Qin Wang (CAS) for help with field work. This work was funded by a project supported by the National Natural Science Foundation of China (NSFC 30770154 to De-Zhu Li), the ‘National Basic Research Program of China’ (973 program, 2007CB411600 and 2008GA001), the ‘Knowledge Innovation Program of the Chinese Academy of Sciences’ (KSCX2-YW-N-029), and a grant from the National Geographic Society (USA) (7336-02 to Lynn G. Clark and De-Zhu Li).

References


