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摘要 报道了最近在河南省宝天曼自然保护区所采 14 号藓类植物标本中，经研究，其中包括 1 个新变种，即：苏氏牛舌藓河南变种 *Anomodon solovjovii* Lazarenko var. *henanensis* Tan, Boufford ef Ying, var. nov.另外有 8 种为河南省新纪录。

关键词 藓类，河南，宝天曼自然保护区，秦岭

藓类植物，新变种，新纪录

A CONTRIBUTION TO THE MOSS FLORA OF HENAN PROVINCE, CHINA

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Abstract Henan Province is one of the least known provinces bryologically in China. From a small collection of 14 taxa of mosses made in the Neixiang Baotianman Nature Reserve in 1994, 8 taxa were new to the province, one was new to mainland China, and one, *Anomodon solovjovii* var. *henanensis* B. C. Tan, Boufford & T. S. Ying, represents a new record for the species in China and also a new variety. A list of the taxa collected, collection information associated with each, and their status in the province is provided.

Key words Mosses, Henan Province, Baotianman Nature Reserve, Qinling Mts

In a historical review of Chinese bryology, Koponen (1984) reported that Henan Province in eastern China had no record of mosses as recently as 1930. By 1990, the province had only 5 reported species of hepatics and hornworts (Piippo, 1990).

In spite of a resurgence in the study of Chinese mosses in recent years (Koponen and Luo, 1992; Lin

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et al., 1992; Tan *et al.*, 1994a; Tan *et al.*, 1994b), Henan Province remains under-explored bryologically. To date, only 57 genera and 95 species of mosses (Li and Yi, 1982; Redfearn *et al.*, 1994) are known from the province, placing it, together with Gansu, Ningxia and Qinghai, among the four bryologically least-known provinces in China today. In comparison, the inland province of Guizhou has an impressive moss flora consisting of 173 genera and 450 species (Zhong and Xiong, 1989~ 1990; Tan *et al.*, 1994a). Even the remote xeric province of Xinjiang has 130 documented genera and 339 species of mosses (Tan *et al.*, 1994b). Likewise, Bai (1987, 1993) has reported 120 genera and 284 species of mosses for the steppe and desert province of Inner Mongolia.

That the Henan moss flora is little known at present becomes apparent through examination of a small collection of 14 taxa of mosses made during a Chinese-American expedition to the Baotianman Nature Reserve in Neixiang Xian (County) (内乡景宝天曼自然保护区) in 1994.

This collection yielded 8 taxa new to the province (marked with an asterisk *). Of these, one species is new to mainland China (marked with two asterisks **), and another, *Anomodon solovjovii* var. *henanensis*,(苏氏牛舌藓河南变种) is new to science (marked with three asterisks ***) and represents a species new to China. *Bryonoguchia*(服部藓属或毛羽藓属), *Climacium*(万年藓属) and *Fabronia*(碎米藓属) represent three new generic records for the province. Except for *Anomodon solovjovii*(苏氏牛舌藓), *Bryonoguchia moekenboeri*(服部藓或毛羽藓), *Climacium japonicum*(日本万年藓), and *Leucodon temperatus*(温带白齿藓), all other new Henan records are of taxa widespread in China as well as in East Asia.

The collection site, the Neixiang Baotianman Nature Reserve, is one of two National Class Nature Reserves in Henan Province. The reserve occupies an area of 5 400 hectares and is situated between 33° 25′ and 33° 33′ N latitude and 111° 53′ and 112° 00′ E longitude. The highest peak in the reserve is about 1 845 m above sea level. The mean annual temperature is 15℃ and the annual precipitation exceeds 900 mm. The reserve is located on the easternmost end of the phytogeographically rich and important Qinling mountain range in east-central China.

The rugged topography of the Baotianman Reserve has resulted in the preservation of some tracts of natural and semi-natural vegetation at highter elevations that support a variety of rare and unusual plants. In general, the forests are composed mostly of various species of *Quercus* on dry slopes and ridges and a rich assemblage of broad leaved deciduous trees in the moister valleys and ravines. Among the more notable vascular plants in these latter areas are *Fortunearia sinensis* Rehder & E. H. Wilson and *Sinowilsonia henryi* Hemsley (Hamamelidaceae), the former a common shrub and the latter a dominant tree reaching 20 to 30 m in height, *Cyclocarya paliurus* (Batalain) Iljinskaja (Juglandaceae), *Saruma henryi* Oliver (Aristolochiaceae) and *Dipteronia sinensis* Oliver (Aceraceae). *Pteroceltis tatarinowii* Maxinowicz (Ulmaceae) is a common tree on exposed boulders and on the crest of rocky cliffs, and the hemi-parasitic shrubs *Buckleya henryi* Diels (on various broad leaved evergreen trees) and *B. graebneriana* Diels (Santalaceae) (on *Quercus*) are common.

In preparing the list of specimens of mosses collected, we have provided ecological data for each of the taxa. Voucher specimens are deposited at FH, PE and the herbarium of the Baotianman Nature Reserve, with a few duplicates at H, IBSC, KUN, NY and MO.

The field work, which took place in May and June, 1993, was supported by a grant from the National Geographic Society (grant no. 5137-93), the Baotianman Nature Reserve and the Institute of Botany, Beijing. The major participants included D. E. Boufford (A / GH), T. S. Ying and X. C. Zhang (PE), H. X.

Cheng, B. D. Liu, Z. Y. Xi, Z. Y. Wang, C. J. Zhang and X. L. Zhu of the Baotianman Nature Reserve. We also wish to thank S. F. Ma and L. G. Zhang of the Neixiang for the arrangements they made for the field work. All moss determinations were made by B. C. Tan.

* * *苏氏牛舌藓河南变种 新变种

* * * **Anomodon solovjovii** Lazarenko var **henanensis** B. C. Tan, Boufford & T. S. Ying, var. nov. –Type: China, Henan Province, Neixiang Xian,(河南省内乡县境) Tumuai Pass north of the city of Xiaquan, on tree trunk in secondary forest along a steep ravine, *Boufford et al. 26458–B* (holotype PE; isotype FH, H). Fig. 1.

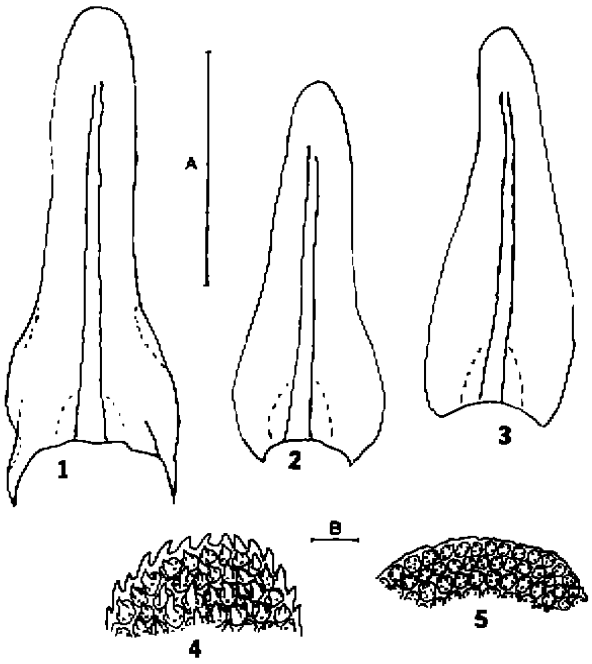

Fig.1 1～4. *Anomodon solovjovii* var. *henanensis* (Boufford *et al.* 26458–B, FH): 1～3. leaves; 4. leaf cell papillae. 5. Leaf cell papillae of *Anomodon minor* (Mexico. *Sharp 1052*, FH). [A bar = 0.5 mm; B bar = 25 μm].

Habitu et textura *A. minor* primo adspectu similis. A *A. solovjovii* varietate typica papilla cellularum foliorum minus longae differt.

The sharp leaf papillae of var. *henanensis*, compared to those of var. *solovjovii*, are shorter, measuring 6.5～13.75 μm long. The leaf papillae of var. *solovjovii* are strongly spinous and measure 9～22.5 μm long. Often, the leaf cells of var *henanensis*, unlike var. *solovjovii*, develop 2～3 smaller papillae surrounding the centrally located papilla; only small papillae were seen on each leaf cell in a few leaves.

The new variety has abundant slender, mat–forming, secondary Stems and branches with closely appressed leaves, when dry, akin to the plant habit of *A. minor* (Hedwig) Lindberg. The stem in cross section is without a central strand. The leaf morphology and size are also comparable to that of *A. minor*. *Anomodon solovjovii* var. *henanensis* can be easily distinguished, however, by the large, centrally located papilla on each leaf cell. The leaf cells are multipapillose with small papillae in *A. minor*.

One species likely to be confused with *A. solovjovii* var. *solovjovii* and var. *henanensis* is *A. abbreviatus* Mitt. The latter, however, is a robust plant for the genus. Its leaf has a longer, ligulate upper portion above the constriction, with a more acute leaf apex. Another difference between *A. solovjovii* and *A. abbreviatus* is found in the morphology of the abaxial leaf costal cells (Watanabe, 1972), which in the former consist of quadrate, sharply papillose cells similar to the adjacent laminal cells. In *A. abbreviatus*, the abaxial costal cells are smooth, mostly rectangular to linear, and quite dissimilar in appearance from the spinose, quadrate laminal cells. When fertile, *A. abbreviatus* has exerted capsules and smooth calyptrae while *A. solovjovii* has sessile capsules and the calyptrae papillose above. Unfortunately, the type of the new variety is sterile and it is impossible to confirm further its affinity with *A. solovjovii*. Nevertheless, the differences between the gametophytic features of these two seem distinctive. Iwatsuki (1963) and Watanabe (1972) illustrated well the differences between the two species, although their drawings of leaf cell papillae, in both cases, showed only one large, centrally located papilla per cell.

Anomodon solovjovii is new to China. Previous records are from South Ussuri in Siberia and South Korea. Host trees of *A. solovjovii* include *Quercus mongolica*, *Acer mono* and *Carpinus cordata*. var. *henanensis* represents an interesting, disjunct population of this species in the interior of eastern China. Whether its distinction from the typical variety is only quantitative and not worthy of a taxonomic recognition depends on future collections of the two varieties from the large intervening area between the Korean peninsula and Qinling Mountains.

List of Mosses collected in the Baotianman Reserve

仙鹤藓 *Atrichum undulatum* (Hedwig) P. Beauvois–Between Pingfang and Saozhouchang, on steep, gravelly road cut at 1350 m., *Boufford et al.* 26401–*E*.

服部藓或毛羽藓 * *Bryonoguchia moekenboeri* (Sande Lacoste) Z. Iwatsuki–Downstream from Pingfang, at margin of a dried–up pond, 1250～1350m, *Boufford et al* 26437–*C*.

奇异真藓(近似型)*Bryum* cf. *paradoxum* Schwaegrichen –Hou Gou, on dry slanting ledge, 750–1100 m, *Boufford et al.* 26190–*B*. The collection has no sporophyte to confirm its gametophytic identity.

拟三列真藓 * *Bryum pseudotriquetrum* (Hedwig) Gaertner, Meyer & Schreber–Dahualishu Gou, on granitic ledge, 950–1150 m, *Boufford et al.* 26349–*D*.

日本万年藓 * *Climacium japonicum* Lindberg – Mihu Gou, forming large colony on forest floor, 10001250 m, *Boufford et al.* 26315–*B*

牛角藓 *Cratoneuron filicinum* (Hedwig) Shruce–Xiao River, in mucky soil on seepy ledge upstream from the confluence with Tuan river, 650–950 m, *Boufford et al* 26340–*B*.

广叶绢藓 * *Entodon flavescens* (Hooker) Jaeger [syn. *E. rubicundus* (Mitten) Jaeger] –Xueyao Gou, on periodically inundated boulder at edge of stream, 850–950 m, *Boufford et al.*, 26153–*B*.

downstream from Pingfang, on rock in grove of *Betula* at 1450 m., *Boufford et al.* 26437–*B*

碎米藓 * *Fabronia ciliaris* (Bridel) Bridel [syn. *F. schensiana* C. Mueller ?] –Dahongsi River, on vertical rock face, growing among matted populations of *Macromitrium japonicum*, *Boufford et al* 26284–*B*. The illustration and description of *F. schensiana* from the Tsinling [Qinling] Mts. in Zhang (1978) is indistinguishable from *F. ciliaris*.

温带白齿藓 * * *Leucodon temperatus* H. Akiyama –Between Pingfang and Saozhouchang, on trunk of *Quercus* at 1700 m., *Boufford et al* 26401–*D*. The distinctions between the present species and the East Asiatic *L. coreensis* Card. outlined

in akiyama (1988) are difficult to visualize. Known previously as a Taiwan endemic (Akiyama, 1988), *L. temperatus* is new to mainland China!

日本蔓藓 *Macromitrium japonicum* Dozy & Molkenboer [syn. *M. incurvum* (Lindberg) Mitten] –Dahualishu Gou, on trunk of *Morus*, 950–1150 m, *Boufford et al.* 26349–*B*.

小金发藓或杉叶藓 *Pogonatum inflexum* (Lindberg) Sande Lacoste –Between Pingfang and Saozhouchang, on steep, gravelly road cut, 1350 m, *Boufford et al.* 26401–*B*.

葛氏缩叶藓 *Ptychomitrium gardneri* Lesquereux [syn. *P. polyphylloides* (C. Mueller) Paris] –Xueyao Gou, on boulder at edge of stream in very dry area, 850–950 m, *Boufford et al.* 26153–*C*; Qili Gou, on dry boulder at 750 m., *Boufford et al.* 26172–*B*.

中华缩叶藓 *Ptychomitrium sinense* (Mitten) Jaeger –Nanyin Po., on dry boulder at 700 m., *Boufford et al.* 26141–*B*. Dahongsi River, on dry boulder, 900–1300 m, *Boufford et al.* 26284–*C*.

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