

First record of *Poa scabriculumis* N. R. Cui (Poaceae) for the flora of Pan Himalayas

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Poa scabriculumis N.R. Cui, 1987, is known as endemic species of alpinas of Kunlun Mountains (Xinjiang Province, NW China). Later, in Flora of China, it was treated as subspecies of polytypical species *P. albertii* Regel, and sinonimized with other four relative species. In this work we restore the status of this species and present its new occurrence in Sichuan province (China). This paper presents taxonomic notes, morphological description, habitat, and the current geographic distribution for *P. scabriculumis*

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Introduction

Bluegrass - *Poa* L. - is one of the most wide spread and polymorphic genus of grasses. It contains about 500 species, which grow mainly in temperate and arctic regions [1]. Besides being common species in temperate floras, they play a significant role in plant communities, being the dominant species in meadows and steppes [2]. The section *Stenopoa* Dumort. is one of the most numerous, polymorphic and difficult. The species of this section are distributed primarily in Eurasia, particularly in the mountains of Asia [3]. Hybridization and apomixis have resulted in high morphological and karyological diversity, which has led to recognition of many new species. Lack of detailed information about many of the species currently makes it impossible to confirm or deny the appropriateness of recognizing them as species so most treated as members of aggregates, which are thought to consist of closely related species. The dwarf Asian alpine species seem to be one of the most complicated groups. P.N. Ovchinnikov, who revised *Poa* for Flora of Tajikistan [4], noted that significant morphological similarity between the many species of bluegrasses is partly a consequence of their being very poorly represented in herbaria. As a result, not only do we lack information on their geographic distribution, it is difficult to evaluate their appropriate taxonomic rank [5].

Poa scabriculumis used to be known only from alpine region of the Kunlun Mountains and it was considered to be endemic to Xinjiang Province [6, 7, 8]. Later, in Flora of China, in accordance with accepted species concept, it was treated as subspecies of polytypical species *P. albertii* Regel, 1881, and sinonimized with *P. koelzii* Bor, 1948, *P. indattenuata* Keng ex Keng f. et G.C. Song, 1994, *P. rangkulensis* Ovchinnikov et Chukavina, 1958, and *P. roemeri* Bor, 1970. In this work, we restore the status of this species and present its new occurrence (Fig. 1) in Hengduan Mountains (Sichuan province, China).

Material and methods

In the summer of 2015 the II Sichuan expedition was organized by the Institute of Botany, CAS (Beijing, China) to study the flora Hengduan Mountains. It was carried out within the frame of the international project "Flora of the Pan-Himalayas", and covered the area proximally within N 27.38° - 31.74° and E 100.68° - 103.18°.

The Hengduan Mountains, with elevations range from 1,300 to 6,000 m, support a range of habitats, from subtropical to temperate to montane biomes. It provides a very complex landscape with a high degree of biological diversity. The mountains are largely covered by subalpine coniferous forests [9], with alpine grasslands above the tree line.

This paper is based on observations made during fieldwork, conducted in August-September in Hengduan Mountains, and examination of specimens from BM, CDBI, E, K, KUN, LE, PE, SZ, XJA, XJBI, and XJNU. The samples of dwarfish *Stenopoa* from Tibet and adjacent area for comparison of indumentum, were kindly provided by Dr. R. J. Soreng (Smithsonian, USA) and Prof. Dr. G. Miehe (Philipps-Universität, Germany). The collections, obtained in the fieldwork were deposited in PE, SZ, KUN and TK. Nomenclatural information developed from our work has been shared with Dr. R. J. Soreng who has made it available via TROPICOS [10].

The research of stem epidermis was made according to generally accepted methods [11]. When studying stem epidermis, the following features were taken into account: the types of cells between and above the veins, the density and shape of the prickles. The studies were carried out with the help of the Biolam-L211 light microscope at a magnification of 10 x 20.



Figure 1. Distribution of *Poa scabriculmis*

Results

Poa scabriculmis N.R. Cui, Act. Bot. Bor.-Occ. Sinica (1987). Corrected from "scabristemmed" by L. Liu, FRPS 9(2): 211, 216, 434 [8].

Type: Xinjiang: Cele county, Kunlunshan, ad pratum alpinum crescens, alt. 3500-4000 m, 12 Sept. 1961 No. R17240, in XJA-1 AC (!).

New record. China, Sichuan, Kanding county, Zheduo Mt., near Kangding Aripport, N 30.1803°; E 101.7402°, alt. 4350 m, gravel slope. 10 Sept. 2015. Chen Y.-Sh., Xiang Ch.-L., Olonova M. TK-004117. The population, which has many plants, appears to be stable and not currently under any threat.

Morphology. Plants perennial, densely tufted. Culms erect, thick, about 2.5-3 mm at the base, densely scabrous (see Fig. 2), ca. 20-25 cm tall, bases enclosed by leaf sheaths. Nodes 1-2, usually near the base. Shoots usually extravaginal, rarely some intravaginal, sometimes with ascending tillers. Leaf sheaths scabrid; ligules 2-4 mm. Blades scabrid on both sides, usually folded or inrolled, about 1 mm wide. Panicles oblong, narrow, dense, 2-4 × 0.5-1.5 cm; branches scabrous, 2 (3) per node, primary basal branches 1-2 cm. Spikelets lanceolate, sometimes tinged with purple or variegated, about 4 mm; both glumes lanceolate, 3-veined, keels finely toothed; rachilla smooth or warty; florets 1-2(3); lemmas ovate-lanceolate, margins membranous, upper part of keel finely toothed, lower half and marginal veins in lower 1/3 papillose, inter-nerves lower part glabrous or, rarely, sparsely villous, callus glabrous; lemmas of lowermost florets ca. 4 mm long; palea slightly shorter, keels minutely ciliate; anthers 1-1.3 mm long, yellow or tinged with purple (Fig. 3). Growing on gravel slopes in alpine communities.

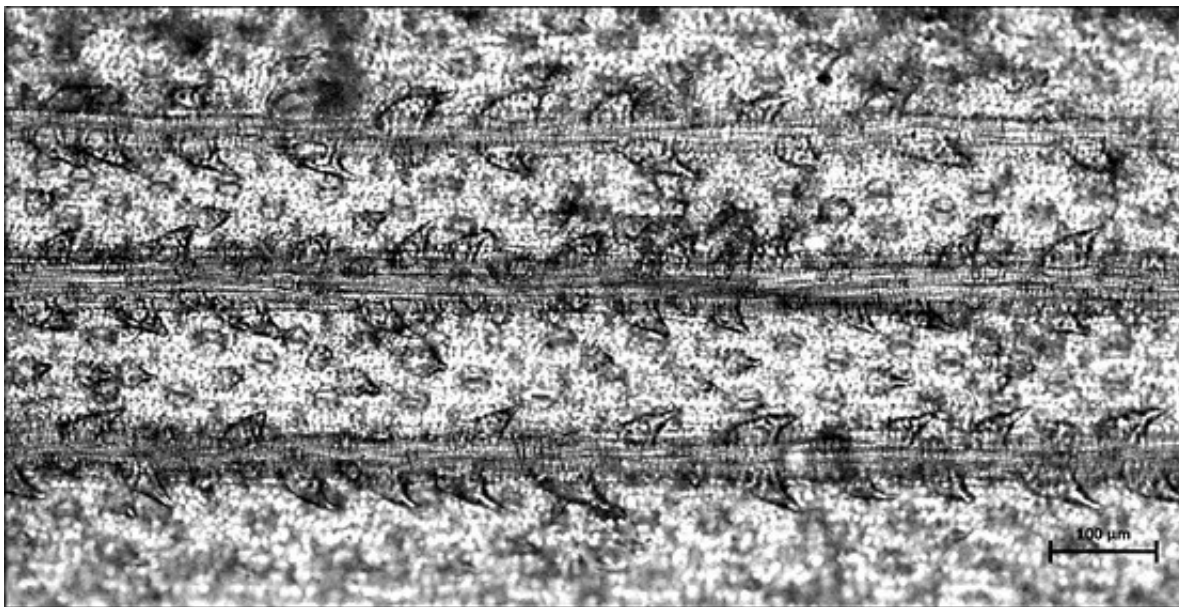


Figure 2. The stem surface of *Poa scabriculmis* N.R. Cui

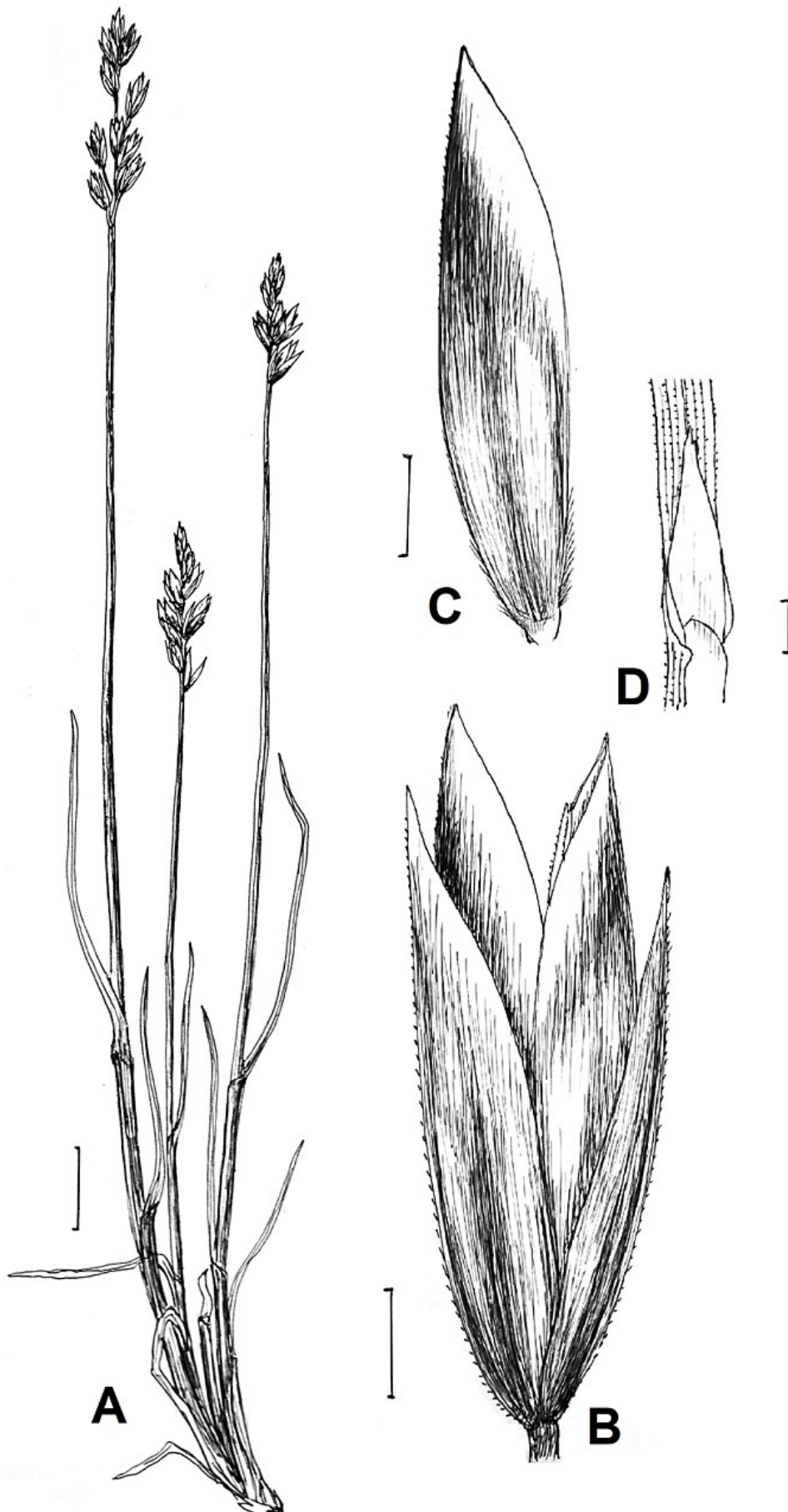


Figure 3. *Poa scabriculumis* N.R. Cui A: Habit; B: Spikelet; C: Lemma; D: Ligule. Scale bar: A = 1 cm. B, C, and D = 1 mm.

Discussion

Poa scabriculumis N.R. Cui was described as *P. scabristemmed* D.F. Cui [12] from the samples collected in alpine meadows of Kunlun in Chinese province Xinjiang, ca N 36.5° E 81° [10]. Later its name was corrected as *P. scabriculumis* by L. Liu [8]. In Flora of China [13], where a polytypic species concept was accepted and hybrid complexes treated as polytypic species, it and four other species (*P. koelzii*, *P. indattenuata*, *P. rangkulensis*, and *P. roemerii*) were treated as synonyms of the polytypic *P. albertii*, as a *P. albertii* subsp. *kunlunensis*, because this taxon was the first one, described at subspecies rank.

The characters of stem epidermis are frequently used to differentiate taxa within *Stenopoa* [2, 14, 15]. The detailed additional research of stem epidermis within dwarf species of *Stenopoa* has confirmed the unique characters of *P. scabriculumis*.

Indeed, very scabrid surface of the whole cauline internodes, caused by the dense prickles along the stem, was characteristic for *P. scabriculumis*. This character was constant in observed population of this species, found in Sichuan, and was quite rare and found only in individual specimens within populations of other similar species.

In Flora of Pan Himalayas, another concept is accepted in order to provide a stronger scientific basis for conservation of local biodiversity throughout this large and poorly known region. In this situation, a narrower species concept was adopted, and hybridogenous complexes were treated as aggregates, (aggr.). These aggregates are not formal taxa but groups of species with similar characteristics and, it is thought, of similar origins. Using such informal designation “aggregate” helps highlight areas that merit further research [16]. In accordance with such a treatment, and taking into account the unique anatomical characteristics of stem epidermis, *P. scabriculumis* was recognized as a species within aggr. *P. albertii*, members of which are thought to have arisen from hybridization between *P. attenuata* Trin., 1835, s.l. and *P. glauca* Vahl, 1790 [16].

Pan Himalayas cover the territory of Himalaya and adjacent mountain regions, from Wakhan corridor and North-Eastern Hindu Kush eastwards to the Hengshuan Mountains. The area in Kunlunshan, where *P. scabriculumis* was described, is outside the Pan Himalayas. Our discovery expands the distribution of *P. scabriculumis* and expands the area of species known from Sichuan and the Pan Himalayas.

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