

EPHEDRA MONOSPERMA (EPHEDRACEAE),
ANOTHER GYMNOSPERM OF NOTEWORTHY SIZE

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Abstract. Although gymnosperms are well known for their large size, being the largest, tallest and most massive living organisms on earth, an exceptionally diminutive gymnosperm, *Ephedra monosperma* Gmelin ex C. A. Meyer (Ephedraceae), from southwestern China is compared with the much more massive gymnosperms that tend to receive far greater attention and publicity. Photographs of *E. monosperma* and its natural habitat are provided and voucher specimens are cited.

Keywords: *Ephedra*, Ephedraceae, Sichuan Province, southern China, small plants

Gymnosperms are well known for their large size, being the largest, tallest and most massive living organisms on earth. Because of that, they tend to receive a great deal of attention and publicity and are major attractions not only for scientists but also for the curious public. Small gymnosperms, in contrast, are seldom noted and tend to attract little attention. We here report an exceptionally

diminutive gymnosperm, *Ephedra monosperma* Gmelin ex C. A. Meyer (Ephedraceae), from southwestern China and compare it with the much more massive gymnosperms that have been the focus of much attention in both popular and scientific media. Photographs of *E. monosperma* and its natural habitat are provided and voucher specimens are cited.

MATERIALS AND METHODS

Mature, fertile individuals of a particularly diminutive species of *Ephedra* were collected during an expedition to southwestern China (Sichuan and Qinghai provinces) in the summer of 2005. Herbarium specimens of the *Ephedra*

(voucher specimens cited below) and of the other vascular plants in the area were prepared. The specimens of *Ephedra* were measured with a centimeter rule and their dry weight was determined by use of a postage scale.

DISCUSSION

Gymnosperms are well known for their large size, being the largest, tallest and most massive living organisms on earth. The General Sherman tree, *Sequoiadendron giganteum* (Lindley) J. Buchholz (Cupressaceae; ‘giant sequoia’), in Sequoia National Park in the Sierra Nevada of California, at 83.8 meters (274.9 feet) tall, 11.1 meters (36.5 feet) in diameter at its base (anonymous, 2022), and weighing an estimated 1.2 million kilograms (2.7 million pounds) and with a volume of 1486 m³ (Forest Service, 1990), is arguably the world’s largest living organism (but see discussion by Earle, 2021a under ‘Big tree’ at <https://www.conifers.org/cu/Sequoiadendron.php>). Individuals of *Sequoia sempervirens* Endlicher (Cupressaceae; ‘coastal redwood’) are among the tallest plants on earth with many trees reaching 100 meters in height. The tallest, discovered

by Chris Atkins and Michael Taylor in August 2000 in the Rockefeller Forest of the Humboldt Redwoods State Park, California, was measured to be 112.7 m in height in July 2004 (Preston, 2006) and 115.85 m in height in 2011 (Earle, 2021b). In Mexico, the tree, *Taxodium mucronatum* Tenore (Cupressaceae; ‘El Árbol del Tule’), was reported to have a circumference of 42.0 m (137.8 ft; 14.05 m [46.1 ft] in diameter), in 2005 (Earle, 2021c).

Small trees, especially small gymnosperms, in contrast, are rarely mentioned. Here we report the world’s smallest gymnosperm (Fig. 1–5), which we collected at two locations on the border of Qinghai and Sichuan provinces in the Hengduan Mountains of southwestern China in August 2005. The smallest fully-fertile individual among our collections measured a mere 3.5 cm from the soil surface

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to the tip of the longest branch and had a dry weight of 52 grams. The trunk just below the first branch was 1.8 mm in diameter. The entire trunk of all individuals in the area was below ground level. The mature, berry-like cones were bright red. We determined these plants to be *Ephedra monosperma* Gmelin ex C. A. Meyer (Ephedraceae). Hao (1934a), in describing similar small plants from Amnye Maqen in eastern Qinghai as a new species, *E. minima* K. S. Hao, reported the plants to be scattered over the

“...nearly naked ground and give a fine display of scarlet fruits (*sic*) somewhat like red pears.” Hao (1934b) later corrected the description of the cones, more appropriately, to their resemblance to “red peas.” *Ephedra minima* is now placed in synonymy under *E. monosperma*. Our collections were from the upper edge of exposed river banks and adjacent to grazed meadows along two different rivers. Some plants extended slightly into the meadow at both sites.



FIGURE 1–2. **1**, Se Qu (Se River) in Sichuan Province, Sêrtar Xian, between Seda (Sêrtar) and Wengda (Sêrba). 32°9'7"N, 100°25'36"E. Elevation 3770 m. *Ephedra monosperma* S. G. Gmelin ex C. A. Meyer grows at interface between meadow and exposed upper river bank. Photograph by Hang Sun; **2**, Jiahui Chen photographing plants of *Ephedra monosperma* along the Se Qu (Se River), Sichuan Province, Sêrtar Xian, between Seda (Sêrtar) and Wengda (Sêrba). Photograph by Hang Sun.

VOUCHER SPECIMENS

Voucher specimens of our collections are in the herbaria of the Kunming Institute of Botany (KUN), Kunming, Yunnan, China, the Harvard University Herbaria (A), Cambridge, MA, U.S.A., the Field Museum of Natural History (F), Chicago, IL, U.S.A., and the Kochi Prefectural Botanical Garden (MBK), Kochi, Japan. Collection details are: China, Qinghai Province, Banma Xian (Baima Zong): Nianlong Xiang. Along Duo-ke Qu (Duo-ke River) ca. 65 km by road NW of the city of Seda (Sêrtar), 32°34'37"N, 100°32'48"E. Elevation 3670 – 3700 m, 9 Aug 2005, *D. E. Boufford, J. H. Chen, K. Fujikawa, S. L. Kelley, R. H. Ree,*

H. Sun, J. P. Yue, D. C. Zhang & Y. H. Zhang 34386; Sichuan Province, Sêrtar Xian: Between Seda (Sêrtar) and Wengda (Sêrba) along the Se Qu (Se River). 32°9'7"N, 100°25'36"E. Elevation 3770 m, 11 Aug 2005, *D. E. Boufford, J. H. Chen, K. Fujikawa, S. L. Kelley, R. H. Ree, H. Sun, J. P. Yue, D. C. Zhang & Y. H. Zhang* 34602. A similar collection from China in the Harvard University Herbaria (GH) is from Qinghai Province, Maqén Xian, Dawu: Dawu Xiang, along the Deleni He, S of Maqén (Maqén). 34°23'56"N, 100°15'41"E, elevation 3800 m, 3 Aug 1993, *T. N. Ho, B. Bartholomew & M. G. Gilbert* 725 (GH).

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⁹ For a particularly rich source of information on gymnosperms, see: The Gymnosperm Database, edited by C. J. Earle at <https://www.conifers.org/>

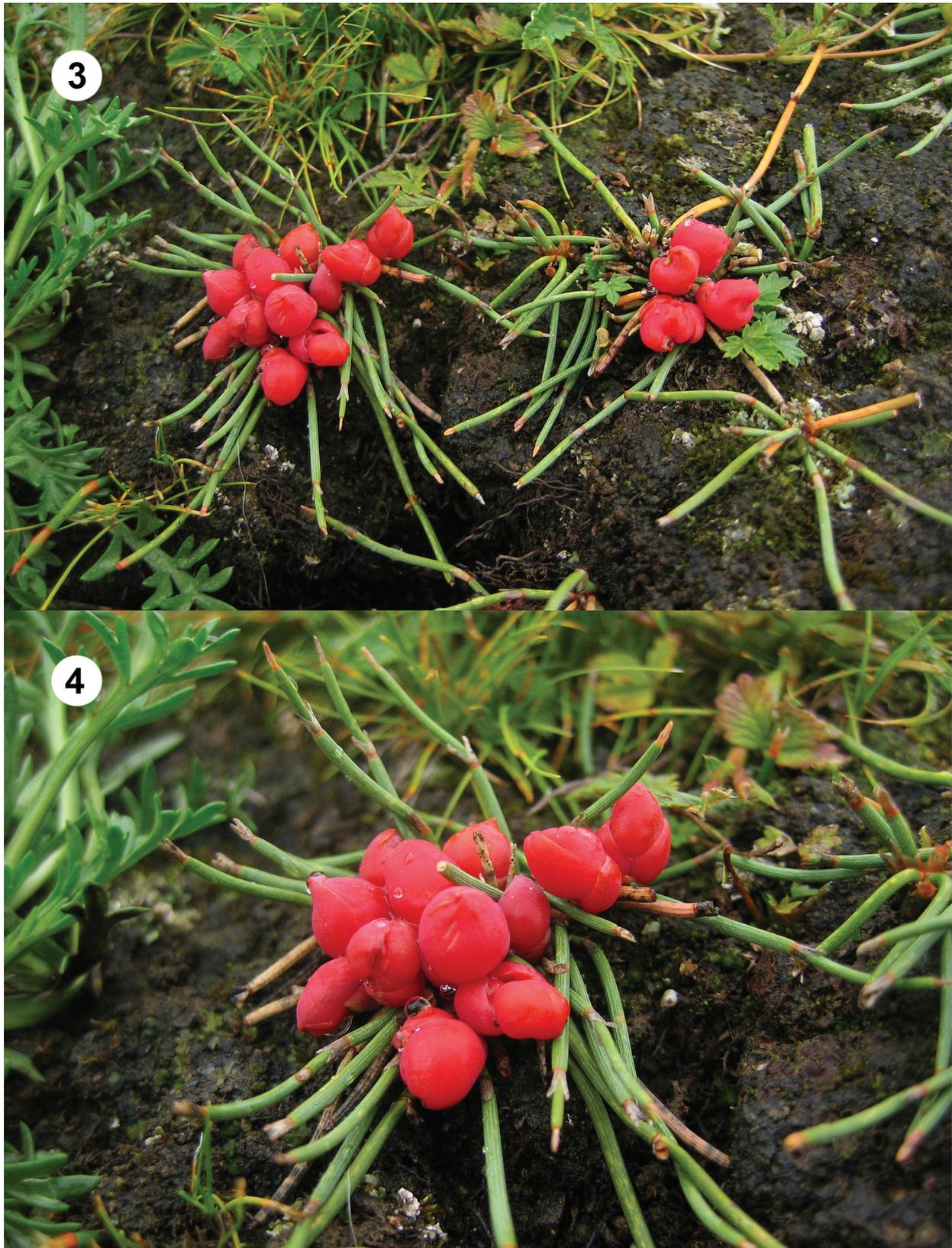


FIGURE 3–4. **3**, *Ephedra monosperma* S. G. Gmelin ex C. A. Meyer with *Kobresia* and *Potentilla* along the Se Qu (Se River), Sichuan Province, Sêrtar Xian, between Seda (Sêrtar) and Wengda (Sêrba). Photograph by Hang Sun; **4**, Close-up of several plants of *Ephedra monosperma* along the Se Qu (Se River), Sichuan Province, Sêrtar Xian, between Seda (Sêrtar) and Wengda (Sêrba). Photograph by Hang Sun.



FIGURE 5. Herbarium specimen with seven mature individuals of *Ephedra monosperma* S. G. Gmelin & C. A. Meyer. China. Sichuan: Sêrtar (Seda) Xian. Between Seda (Sêrtar) and Wengda (Sêrba) along the Se Qu (Se River). 32°9'7"N, 100°25'36"E; 3770 m. Meadow along river. Upper bank of river at immediate edge of meadow. Cones red. 11 August 2005. David E. Boufford, Jia-Hui CHEN, Kazumi FUJIKAWA, Susan L. Kelley, Richard H. Ree, Hang SUN, Ji-Pei YUE, Da-Cai ZHANG & Yong-Hong ZHANG 34602 (A).