



First record of the genus *Limonium* (Plumbaginaceae) from the Malesian region

KOH NAKAMURA^{1*}, ROSARIO RIVERA RUBITE², GORO KOKUBUGATA³, YOSHIKO KONO¹,
MASATSUGU YOKOTA⁴ & CHING-I PENG^{1*}

¹Biodiversity Research Center, Academia Sinica, Taipei 11542, Taiwan; e-mail: kohnakamur@gmail.com, bopeng@sinica.edu.tw

²University of the Philippines Manila, Department of Biology, College of Arts and Sciences, Padre Faura, Manila, Philippines and
Philippine National Herbarium, National Museum, Padre Burgos, Manila, the Philippines

³Department of Botany, National Museum of Nature and Science, Amakubo 4-1-1, Tsukuba, Ibaraki 305-0005, Japan

⁴Laboratory of Ecology and Systematics, Faculty of Science, University of the Ryukyus, Senbaru 1, Nishihara, Okinawa 903-0213,
Japan

* Authors for correspondence

The absence of the cosmopolitan genus *Limonium* Miller (1754: no pagination) (Plumbaginaceae) in the mega-diverse flora of the Malesian region (comprising Brunei Darussalam, Indonesia, Malaysia, Papua New Guinea, the Philippines, and Singapore; Merrill 1923, Ridley 1923, Steenis 1949, Backer & Bakhuizen van den Brink Jr. 1965, Balgooy 1993, Coode *et al.* 1996, Balgooy 2001, Conn *et al.* 2004, Chong *et al.* 2009, Pelsner *et al.* 2011) has intrigued taxonomists and biogeographers since Steenis (1949) noted this. During a field survey as part of the project on floristic and phylogenetic biogeography in the island chain of the Philippines, Taiwan, and southern Japan, we found a population of *Limonium* in the northern Philippines (Batan Islands) that represents the first record of the genus in the Malesian region. Batan Islands, comprising 10 small (≤ 83.1 km²) oceanic islands, is the northernmost tip of the Malesian region, being ca. 190 km north of Luzon Island of the Philippines and ca. 140 km southeast of Taiwan Island. From the geological location, the present finding suggests that a more extensive survey in Batan Islands may add some more East Asian temperate genera to the flora of the Malesian region, although two enumerations of the early and mid 20th century provide us baseline knowledge of the flora of Batan Islands (Merrill 1908, Hatusima 1966).

Limonium wrightii (Hance) Kuntze (1891: 396)

Bas.: *Statice wrightii* Hance (1866: 236). **Holotype**:—JAPAN. Ryukyu Islands, *Wright s.n.* (BM!)

Description:—A shrublet with woody stems densely covered with dark brown rigid scales and leaves congested on upper part of stems (Fig. 1A). The species has flower color polymorphism among populations (pink, yellow, orange, ivory, and white; Matsumura *et al.* 2006) and the Philippines population had pink flowers (Fig. 1B). Based on these characters, *L. wrightii* is clearly distinguished from congeners in the East Asian Pacific rim, which are herbs having only basal leaves and yellow flowers (Peng & Kamelin 1996, Matsumura *et al.* 2006).

Distribution and habitat:—The species has been reported previously only from Japan (the Ryukyu Archipelago, Izu Islands, and Ogasawara Islands) and southern Taiwan (southern part of Taiwan Island, Penghu Islands, and Lutao and Lanyu islands) (Li 1998, Matsumura *et al.* 2006). The newly discovered population was in Sabtang Island of Batan Islands (the Philippines). The population grew on a raised coral reef terrace at seashore (Fig. 1C), which is the typical habitat of the species.

Conservation status:—*Limonium wrightii* is listed in the red lists of Japan and Taiwan as a Vulnerable (VU) and Critically endangered (CR) species, respectively (Ministry of the Environment, Japan 2012, Wang *et al.* 2012). In Sabtang Island, the population of several tens of square meters comprised a few hundred individuals. This is the only known population in the Philippines and isolated from conspecific populations in

Taiwan and Japan. Although Batanes Province is in its entirety a protected area (Sanga 2001), the very small population is prone to the effects of human activities or stochastic events within a very short time period. The species is here assessed as Vulnerable under Criterion D2 of IUCN (2010, 2012) for the Philippines.

Specimina visa:—THE PHILIPPINES. Batanes: Sabtang Island, Savidug Village, ca. 2 m, E121° 53' 25.45", N20° 18' 48.49", 19 December 2011, *Nakamura 11922* (HAST).

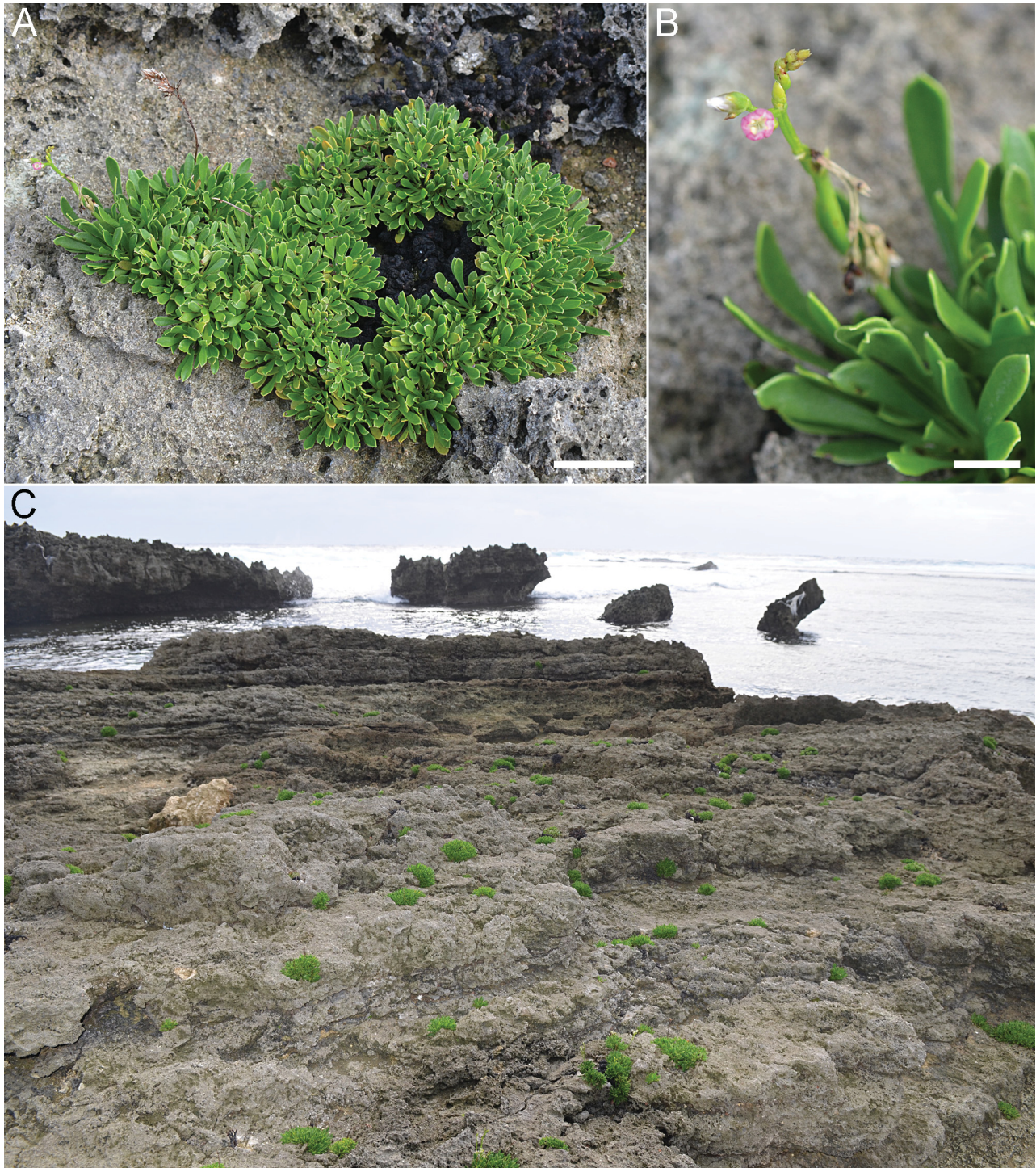


FIGURE 1. *Limonium wrightii* in Sabtang Island, Batanes, the Philippines. A. Habit. B. Flower. C. Habitat. Scale bars: 5 cm (A), and 1 cm (B).

Acknowledgements

This study was supported in part by a postdoctoral fellowship from Academia Sinica to K.N. and a research grant from Academia Sinica to C.-I P.

References

- Backer, C.A. & Bakhuizen van den Brink Jr., R.C. (1965) *Flora of Java* 2. P. Noordhoff Ltd., Groningen, 641 pp.
- Balgooy, M.M.J. van (1993) *Pacific plant areas* 5. Rijksherbarium/Hortus Botanicus, Leiden University, Leiden, 251 pp.
- Balgooy, M.M.J. van (2001) *Malesian seed plants* 3. Nationaal Herbarium Nederland–Universiteit Leiden Branch, Leiden, 260 pp.
- Chong, K.Y., Tan, H.T.W. & Corlett, R.T. (2009) *A checklist of the total vascular plant flora of Singapore: native, naturalised and cultivated species*. Raffles Museum of Biodiversity Research, National University of Singapore, Singapore, 273 pp.
- Conn, B.J., Lee, L.L. & Kiapranis, R. (2004) *PNGplants database: plant collections from Papua New Guinea*. Available from <http://www.pngplants.org/PNGdatabase> (accessed 14 October 2013).
- Coode, M.J.E., Dransfield, J., Forman, L.L., Kirkup, D.W. & Said, I.M. (1996) *A checklist of the flowering plants & gymnosperms of Brunei Darussalam*. Ministry of Industry and Primary Resources, Brunei Darussalam, 476 pp.
- Hance, H.F. (1866) Adversaria in stirpes imprimis Asiae Orientalis: criticae minusve notas interjectis novarum plurimarum diagnosibus. In: Brongniart, A. & Decaisne, J. (eds.) *Annales des Sciences Naturelles, Botanique Sér. 5* 5. Victor Masson, Paris, pp. 202–261.
- Hatusima, S. (1966). An enumeration of the plants of Batan Island, N. Philippines. *Memoirs of the Faculty of Agriculture, Kagoshima University* 5(3): 13–70.
- IUCN (2010) *The IUCN Red list of the threatened species*, version 2010.4. Available from: <http://www.iucnredlist.org> (accessed: 2 November 2013).
- IUCN (2012) *Guidelines for application of IUCN red list criteria at regional and national levels*, version 4.0. IUCN, Gland, Switzerland and Cambridge, UK, iii + 41 pp.
- Kunze, O. (1891) *Revisio generum plantarum vascularium omnium atque cellularium multarum secundum leges nomenclaturae internationales cum enumeratione plantarum exoticarum in itinere mundi collectarum* 2. A. Felix, Leipzig, 637 pp.
- Li, H.L. (1998) Plumbaginaceae. In: Editorial Committee of the Flora of Taiwan, Second Edition (ed.) *Flora of Taiwan, 2nd ed.* 4. Editorial Committee of the Flora of Taiwan, Second Edition, Taipei, pp. 79–82.
- Matsumura, S.I., Yokoyama, J., Tateishi, Y. & Maki, M. (2006). Intraspecific variation of flower colour and its distribution within a sea lavender, *Limonium wrightii* (Plumbaginaceae), in the northwestern Pacific Islands. *Journal of Plant Research* 119: 625–632.
<http://dx.doi.org/10.1007/s10265-006-0022-7>
- Merrill, E.D. (1908) On a collection of plants from the Batanes and Babuyan Islands. *Philippine Journal of Science, section C, Botany* 3: 385–442.
- Merrill, E.D. (1923) *An enumeration of Philippine flowering plants* 3. Bureau of Printing, Manila, 628 pp.
- Miller, P. (1754) *The gardeners dictionary, Abridged ed.* 4. John and James Rivington, London, without pagination.
- Ministry of the Environment, Japan (2012) *Red Data List (Plants)*. Available from http://www.biodic.go.jp/rdb/rdb_f.html. (accessed 3 November 2013).
- Pelser, P.B., Barcelona J.F. & Nickrent D.L. (2011) *Co's digital flora of the Philippines*. Available from <http://www.philippineplants.org> (accessed 14 October 2013).
- Peng, Z.X. & Kamelin, V. (1996) Plumbaginaceae. In: Wu, Z.Y. & Raven, P.H. (eds.) *Flora of China* 15. Missouri Botanical Garden Press, St. Louis, Missouri, pp. 190–204.
- Ridley, H.N. (1923) *The Flora of the Malay Peninsula* 2. L. Reeve & Co. Ltd., London, 672 pp.
- Senga, R.G. (2001) Establishing protected areas in the Philippines. *The George Wright Forum* 18: 56–65.
- Steenis, C.G.G.J. van (1949) Plumbaginaceae. In: Steenis, C.G.G.J. van (ed.) *Flora Malesiana, Series 1* 4. P. Noordhoff Ltd., Groningen, pp. 105–112.
<http://dx.doi.org/10.2307/4113668>
- Wang J.C., Chiou, W.L. & Chang, H.M. (2012) *A preliminary Red List of Taiwanese vascular plants*. Endemic Species Research Institute & Taiwan Society of Plant Systematics, Nanto, Taiwan, 94 pp.