Nat. Hist. Bull. Siam Soc. 63(1): 47–56, 2018

CONTRIBUTIONS TO THE FLORA OF MYANMAR II: NEW RECORDS OF EIGHT WOODY SPECIES FROM TANINTHARYI REGION, SOUTHERN MYANMAR

Shuichiro Tagane[1,2*], Nobuyuki Tanaka[3], Mu Mu Aung[4], Akiyo Naiki[5] and Tetsukazu Yahara[1]

ABSTRACT

The fieldwork carried out in Tanintharyi Region in 2016 resulted in the discovery of eight unrecorded angiosperms among the flora of Myanmar. They are *Mitrephora winitii* Craib (Annonaceae), *Argyreia roseopurpurea* (Kerr) Ooststr. (Convolvulaceae), *Diospyros bejaudii* Lecomte (Ebenaeae), *Cladogynos orientalis* Zipp. ex Span. (Euphorbiaceae), *Callicarpa furfuracea* Ridl. (Lamiaceae), *Memecylon paniculatum* Jack (Melastomataceae), *Ardisia congesta* Ridl. (Primulaceae) and *Coelospermum truncatum* (Wall.) Baill. ex K. Schum. (Rubiaceae). In each of the species, voucher specimens, the general distribution and photographs are presented.

Keywords: angiosperm, flora, Myanmar, new record, Tanintharyi, woody plant

INTRODUCTION

The Tanintharyi Region (formerly Tenasserim), located at the northwestern part of the Thai–Malay Peninsula, is a part of the Indo–Burma biodiversity hotspot, with the Indochinese–Sundaic flora and fauna transition (Myers *et al.*, 2000; Tordoff *et al.*, 2012). The area is still predominantly forested, ca. 80% of a total land area of 43,000 km^2, but recently large areas have been selectively logged and converted to agricultural land (Connette *et al.*, 2016). The vegetation is diverse along with elevational gradients, heterogeneous landscapes and geological conditions including granite, sandstone, shale and spectacular karst limestone (de Terra, 1944; Bender, 1983), which drove the diversification of plants to high endemism.

In spite of the high value of biodiversity of the area, the area is poorly known botanically. It had not been surveyed for over 40 years until 1996, mainly because of the tumultuous history of the civil war and conflict at the end of World War II. In 1996 and 1998, political stability allowed J. F. Maxwell to survey the flora in the gas pipeline area of the Tanintharyi Nature Reserve and a total of 666 species including 44 pteridophytes and 622 spermatophytes were reported (Maxwell, 2001). Since then, botanical studies on the flora of this area have

[1] Center for Asian Conservation Ecology, Kyushu University, 744 Motooka, Fukuoka, 819-0395, Japan.
[2] The Kagoshima University Museum, Kagoshima University, 1-21-30 Korimoto, Kagoshima, 890-0065, Japan.
[3] Department of Botany, National Museum of Nature and Science, Amakubo 4-1-1, Tsukuba 305-0005, Japan.
[4] Forest Research Institute, Forest Department, Ministry of Natural Resources and Environmental Conservation, Yezin, Nay Pyi Taw, Myanmar.
[5] Iriomote Station, Tropical Biosphere Research Center, University of the Ryukyus, 870 Uehara, Taketomi-cho, Yaeyama-gun, Okinawa, 907-1541, Japan.
Received 27 September 2017; accepted 24 January 2018.
* Corresponding author. E-mail: stagane29@gmail.com

gradually developed. KURZWEIL (2013) and RUCHISANSAKUN *ET AL.* (2017) described *Calanthe puncatata* Kurzweil (Orchidaceae) and *Impatiens tanintharyiensis* Ruchis., Suksathan & Saw-Lwin (Balsaminaceae), respectively, as new species based on their collections from Tanintharyi Region. KURZWEIL & LWIN (2015) reported nine new records of orchids for the flora of Myanmar, among which were three species from Tanintharyi: *Bulbophyllum capnophyton* J.J.Verm., Schuit. & de Vogel, *Micropera thailandica* (Seidenf. & Smitinand) Garay and *Stereosandra javanica* Blume. TANAKA *ET AL.* (2018) recorded nine new herbaceous species for the flora of Myanmar, among which five were from Thanintharyi: *Peliosanthes weberi* (L.Rodr.) N.Tanaka (Asparagaceae), *Porpax elwesii* (Rchb.f.) Rolfe (Orchidaceae), *Boesenbergia purpureorubra* Mood & L.M. Prince, *Globba praecox* Chokthaweep, *Zingiber thorelii* Gagnep. (Zingiberaceae). Additional new discoveries are expected in further floristic surveys.

To elucidate the flora of the Tanintharyi Region, we carried out two botanical inventories, during 3–13 June 2016 and 15–29 January 2017 (Fig. 1), and collected a total of 814 specimens of vascular plant species. Among them, woody plant species newly recorded from Myanmar are reported in this study.

Species identification and records in Myanmar are based on herbarium specimens at The Forest Herbarium, Bangkok (BKF), The Herbarium of Faculty of Forestry, National University of Laos, Vientiane (FOF), The Herbarium of Kyushu University, Fukuoka (FU), The Kyoto University Museum, Kyoto (KYO), The Herbarium of Forest Research Institute, Nay Pyi Taw (RAF), Sarawak Herbarium, Kuching (SAR) and National Museum of Nature and Science, Tsukuba (TNS), specimen images on the web (e.g. JSTOR Global Plant, https://plants.jstor.org/), a checklist of Myanmar (KRESS, *ET AL.*, 2003) as well as the taxonomic literature on particular groups and regional floras including the Flora of Thailand (SMITINAND & LARSEN *ET AL.*, 1970–present). Voucher specimens were deposited at the herbaria of RAF, TNS and KYO.

SPECIES NEWLY RECORDED IN MYANMAR

Mitrephora winitii Craib [Annonaceae]—Fig. 2.

Bull. Misc. Inform. Kew 1922(8): 227 (1922).

This beautiful large-flowered *Mitrephora* was previously known as endemic to SE (Chon Buri Province) and SW (Prachuap Khiri Khan Province) Thailand (WEERASOORIYA & SAUNDERS, 2010). A small population with less than 20 individuals was found in a dry semi-deciduous stand on a hill, in Myanmar near the Thai border.

Specimen examined: Myanmar, Tanintharyi Region. On a hill, near Mawtaung Pass, border with Thailand, Mawtaung Township, 11°46′59.3″N, 99°38′27.5″E, 350 m msl (above mean sea level), 5 June 2016, *Naiki et al. MY288* [fl.] (KYO, RAF, TNS).

Distribution: Myanmar (Tanintharyi), Thailand (Southeast, Southwest).

Argyreia roseopurpurea (Kerr) Ooststr. [Convolvulaceae]—Fig. 3.

Blumea 7: 178 (1952).

This species is characterized by sparsely villous lower leaf surface, 7–9 pairs lateral veins on lamina, ellipsoid fruit (1–1.2 cm long) and reddish sepals in fruiting, (STAPLES, 2010; STAPLES & SYAHIDA-EMIZA, 2015). A fruiting plant was collected at the edge of a slightly disturbed primary evergreen forest.

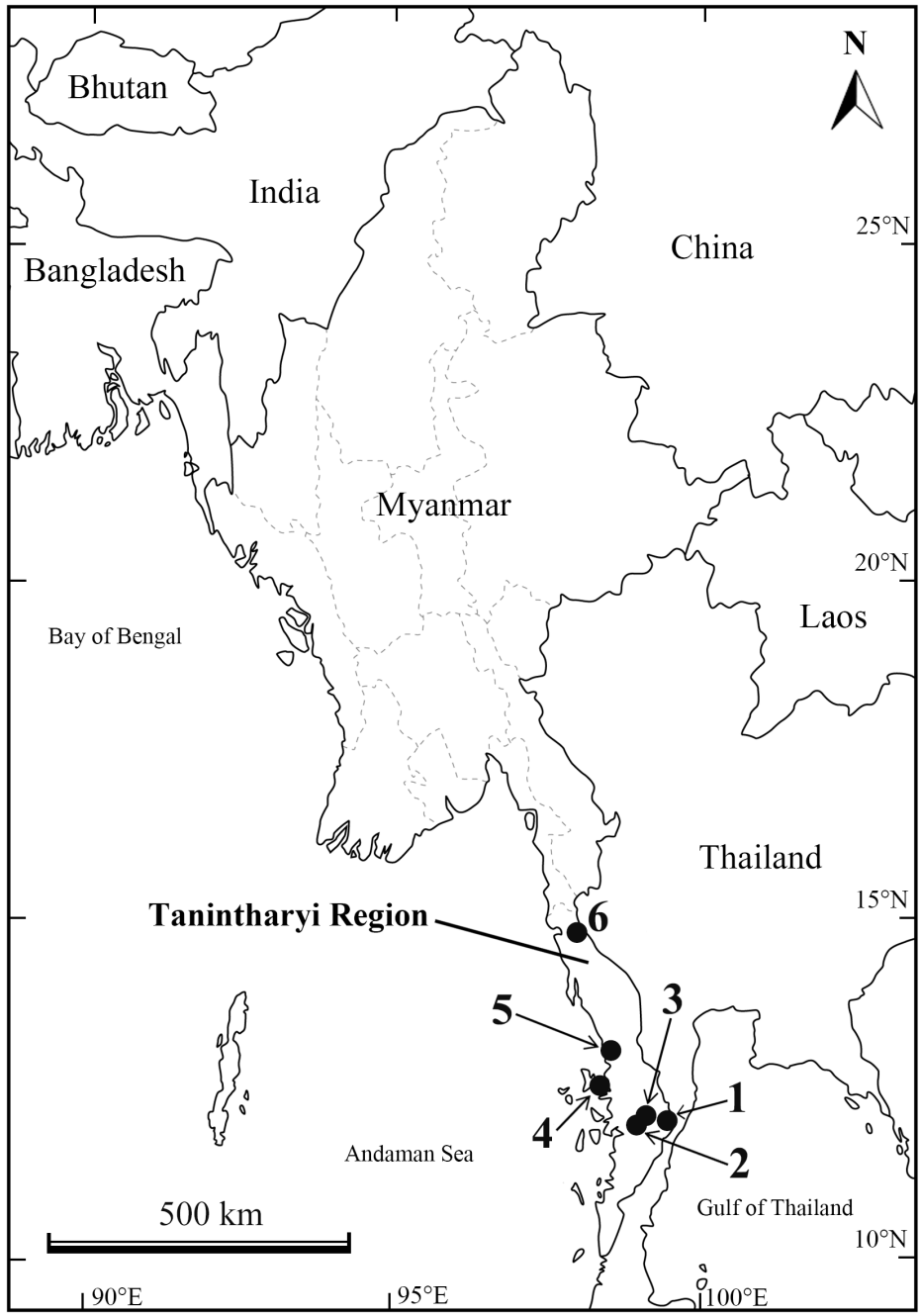

Figure 1. Collection sites in Tanintharyi Region, southern Myanmar. 1, *Mitrephora winitii, Diospyros bejaudii* and *Cladogynos orientalis*. 2, *Argyreia roseopurpurea*. 3, *Callicarpa furfuracea*. 4, *Memecylon paniculatum* and *Coelospermum truncatum*. 5 and 6, *Ardisia congesta*.

Specimen examined: Myanmar, Tanintharyi Region. Along the roadside, near the border of Boping Township, ca. 20 km N of Manoron, 11°43′30.47″N, 99°05′32.36″E, 218 m msl, 7 June 2016, *Tagane et al. MY401* [fr.] (KYO, RAF, TNS).

Distribution: Malaysia (Peninsula: Pahang), Myanmar (Tanintharyi), Thailand (Southwest, Peninsular).

Diospyros bejaudii Lecomte [Ebenaceae]—Fig. 4.

Bull. Mus. Natl. Hist. Nat. 1929, Ser. 2(1): 430 (1929).

This species occurs usually near or on limestone hills (PHENGKLAI, 1981) and our collection site was exactly that.

Specimen examined: Myanmar, Tanintharyi Region, Mawtaung Township, on a hill, near Mawtaung Pass, border with Thailand, 11°46′59.3″N, 99°38′27.5″E, 350 m msl, 5 June 2016, *Tagane et al. MY293* [ster.] (KYO, RAF, TNS).

Distribution: Cambodia, Laos, Malaysia (Peninsula: Kelantan, Pahang, Perak, Perlis), Myanmar (Tanintharyi), Thailand (Northeast, West, Southeast, Peninsular), Vietnam.

Cladogynos orientalis Zipp. ex Span. [Euphorbiaceae]—Fig. 5.

Linnaea 15: 349 (1841).

Cladogynos Zipp. ex Span. is a monotypic genus widely distributed in SE Asia (CHAYAMARIT & VAN WELZEN, 2005, 2007). It is easily recognized by its shrubby habit and double serrate lamina with densely white pubescence and floccose on the lower leaf surface. This specimen was collected from dry semi-deciduous forest near the Thai border.

Specimen examined: Myanmar, Tanintharyi Region, Mawtaung Township, on the hill, near Mawtaung Pass, border with Thailand, 11°46′59.3″N, 99°38′27.5″E, 350 m msl, 5 June 2016, *Tanaka et al. MY291* [fr.] (KYO, RAF, TNS).

Distribution: Cambodia, China (Guangxi), Indonesia (Java, Lesser Sunda Islands, Moluccas, Sulawesi), Laos, Malaysia (Peninsula: Kelantan, Langkawi, Pahang, Perlis), Myanmar (Tanintharyi), the Philippines, Thailand (all regions), Vietnam.

Callicarpa furfuracea Ridl. [Lamiaceae]—Fig. 6.

J. Fed. Malay States Mus. 10: 150 (1920).

This species is easily recognized by its scandent shrubby (or woody climber) habit, to 3 m tall, broadly elliptic, ovate or obovate leaves and an interpetiolar woody ridge at nodes of the stem (LEERATIWOND *ET AL.*, 2009). We encountered this species along the edge of a primary lowland evergreen forest.

Specimen examined: Myanmar, Tanintharyi Region, SE of Tanintharyi Town, along the roadside en route from Mawtaung to Tanintharyi, 11°52′06.73″N, 99°17′38.46″E, 73 m msl, 6 June 2016, *Tagane et al. MY364* [ster.] (KYO, RAF, TNS).

Distribution: Malaysia (Peninsula: Pahang), Myanmar (Tanintharyi), Thailand (Peninsular).

Memecylon paniculatum Jack [Melastomataceae]—Fig. 7.

Malayan Misc. 2(7): 62 (1822).

This species is easily distinguished from other species of *Memecylon* by its characteristic 4-winged young twigs, relatively large and elliptic to elliptic-lanceolate leaves (10.5–21.2 × 4.1–7.4 cm), cordate base of the lamina and prominent lateral veins on the lower leaf surface. We found this species at the edge of evergreen forest on Pataw Island, located at the mouth of the Tanintharyi River.

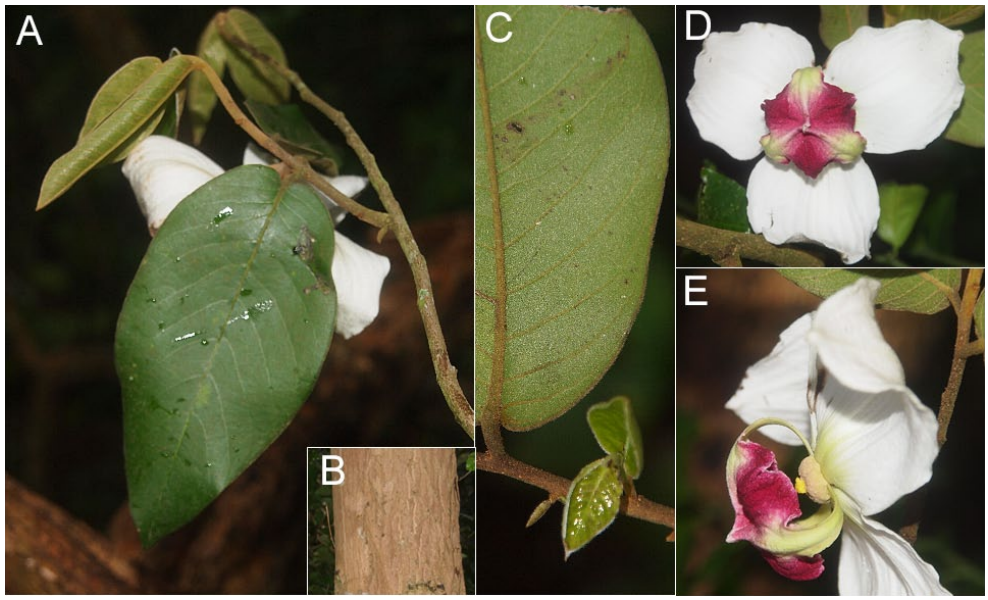

Figure 2. *Mitrephora winitii* Craib. A, flowering twig. B, trunk. C, abaxial leaf surface. D and E, flowers. Photographs by Shuichiro Tagane.

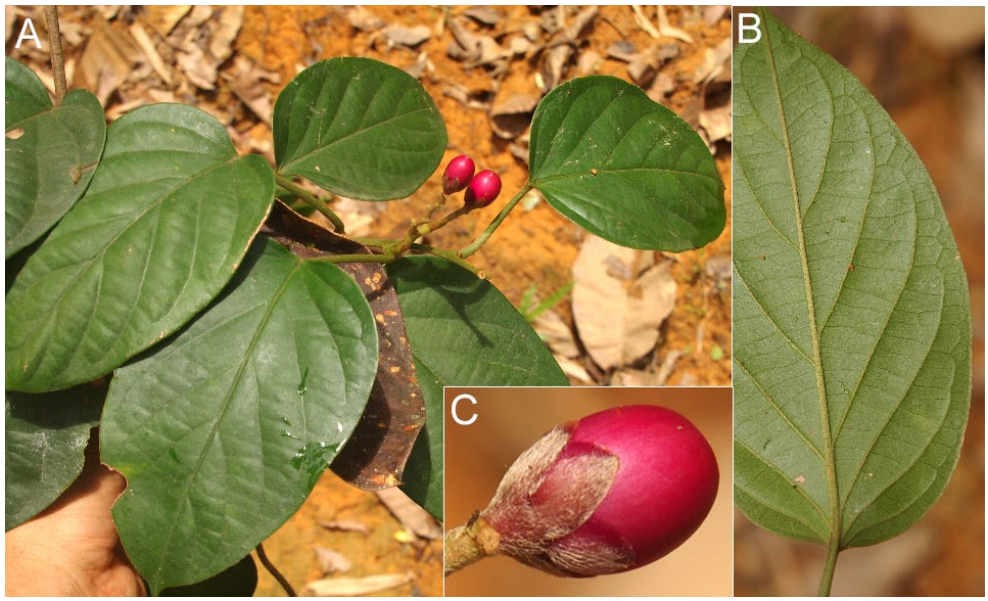

Figure 3. *Argyreia roseopurpurea* (Kerr) Ooststr. A, fruiting shoot. B, abaxial leaf surface. C, fruit. Photographs by Shuichiro Tagane.

Figure 4. *Diospyros bejaudii* Lecomte. A, leafy twig. B, abaxial leaf surface. Photographs by Shuichiro Tagane.

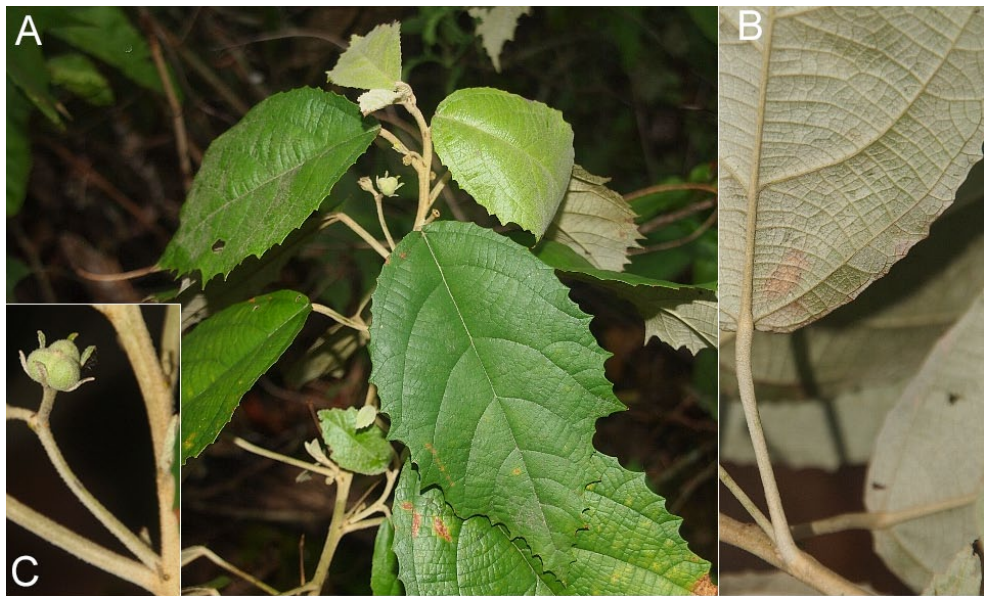

Figure 5. *Cladogynos orientalis* Zipp. ex Span. A, fruiting twig. B: abaxial leaf surface. C, young fruit. Photographs by Shuichiro Tagane.

Figure 6. *Callicarpa furfuracea* Ridl. A, leafy twig. B, shoot apex. C, abaxial leaf surface. Photographs by Shuichiro Tagane.

Figure 7. *Memecylon paniculatus* Jack. A, leafy twig. B, abaxial leaf surface. Photographs by Shuichiro Tagane.

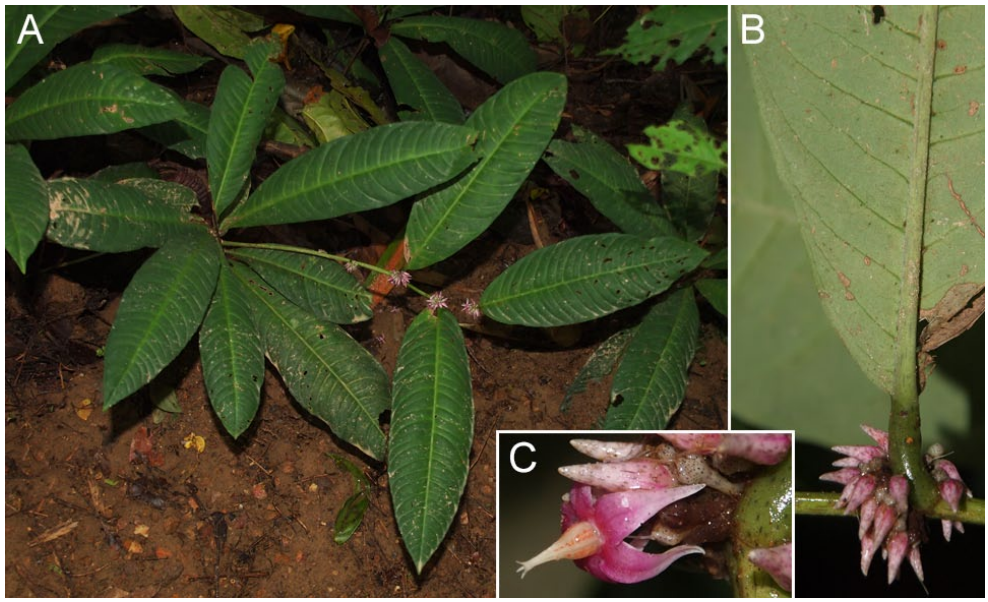

Figure 8. *Ardisia congesta* Ridl. A, habit. B, abaxial leaf surface with young and mature flower buds. C, mature flower buds and open flower. Photographs by Shuichiro Tagane.

Figure 9. *Coelospermum truncatum* (Wall.) Baill. ex K. Schum. (*Tanaka et al. MY495* [KYO]). A,: fruiting twig. B, adaxial and abaxial leaf surface.

Specimen examined: Myanmar, Tanintharyi Region, Myeik District, Kyunsu Township, Pataw Island, near the Pagoda on the top of the hill, 12°27′20.70″N, 98°34′35.80″E, 246 m msl, 8 June 2016, *Tagane et al. MY462* [ster.] (RAF, TNS).

Distribution: Cambodia, Indonesia (Java, Kalimantan, Sumatra, Sulawesi), Malaysia (Borneo, Peninsula), Myanmar (Tanintharyi), Philippines, Singapore, Thailand (Peninsular).

Ardisia congesta Ridl. [Primulaceae]—Fig. 8.

J. Fed. Malay States Mus. 10: 100 (1920).

This species is characterized by flowers in a subsessile umbels crowded in leaf axils. It was considered to be endemic to Peninsular Thailand (Chumphon Province) (Larsen & Hu, 1996), but we found this species locally abundant in the understory of lowland evergreen forests in Tanintharyi Region.

Specimens examined: Myanmar, Tanintharyi Region: Palaw Township, Awwyatha Temple, along the trail to the hillside at the back of the in preserved wet evergreen forest, 12°56′28.8″N, 98°39′13.5″E, 101 m msl, 3 June 2016, *Tagane et al. MY210* [fl.] (KYO, RAF, TNS); Yaephyu Township, Taninthayi Nature Reserve, roadside along the gas pipeline, 14°44′17.25″N, 98°11′39.59″E, 148 m msl, 11 June 2016, *Tagane et al. MY570* [fl.] (RAF, TNS).

Distribution: Myanmar (Tanintharyi), Thailand (Peninsular).

Coelospermum truncatum (Wall.) Baill. ex K. Schum., [Rubiaceae]—Fig. 9.

Engl. & Prantl, Nat. Pflanzenfam. 4: 136 (1891).

The genus *Coelospermum* Blume is a small genus consisting of seven species. Among them, only *C. truncatum* has wide distribution range in the Indochina and Malesian Regions except the Philippines, whereas the others are mostly restricted to narrower ranges (Johansson, 1988). In Myanmar, we found this liana at the edge of evergreen forest on Pataw Island, forming the northern limit of Andaman Sea side.

Specimen examined: Myanmar, Tanintharyi Region, Myeik District, Kyunsu Township, Pataw Island, near the Pagoda on the top of the hill, 12°27′17.11″N, 98°34′33.27″E, 51 m msl, 8 June 2016, *Tanaka et al. MY495* [fr.] (KYO, RAF, TNS).

Distribution: Cambodia (Kampot), China (Hainan), Indonesia (Java, Sumatra), Malaysia (Borneo, Peninsula), Myanmar (Tanintharyi), Thailand (Northeast, Southwest, Southeast, Peninsular), Vietnam (South).

CONCLUSION

Eight woody plant species in eight genera and eight families are newly recorded in the flora of Myanmar and extend to Myanmar in their distribution ranges, among which two genera, *Cladogynos* and *Coelospermum,* are new.

Many new records of plants are still expected for Myanmar. To develop a better conservation planning, it is necessary to conduct further intensive botanical inventories and accurately document the plant species diversity as reliable baseline information.

ACKNOWLEDGEMENTS

This study was carried out by the integrated research project “Biological Inventory in SE Asia with special attention to Myanmar” initiated by the National Museum of Nature and Science, Japan, based on an MoU with the Forest Department, Ministry of Natural Resources

and Environmental Conservation, Myanmar. The authors are grateful to the Forest Department of Myanmar for permitting and supporting our botanical inventory in the protected area. Avelinah Julius (Chiba University and Forest Research Institute Malaysia) is acknowledged for her helpful comments during species identification. We also thank curators of the herbaria BKF, FOF, FU, KYO, RAF, TNS for access to their specimens. This study was supported by the Environment Research and Technology Development Fund (4-1601) of the Ministry of the Environment, Japan, and JSPS KAKENHI (15H02640).

REFERENCES

BENDER, F. 1983. *Geology of Burma*. Gebrüder Borntraeger, Berlin. 293 pp.

CHAYAMARIT, K., AND P. C. VAN WELZEN. 2005. *Cladogynos*. Pages 158–159 *in* K. Chayamarit and P. C. van Welzen (eds.), *Flora of Thailand* 8(1). The Forest Herbarium, Bangkok.

CHAYAMARIT, K., AND P. C. VAN WELZEN. 2007. Appendix of plates of Euphorbiaceae (A–F) Part I. Page 615, Plate 6 *in* P. C. van Welzen and K. Chayamarit (eds.), *Flora of Thailand* 8(2). The Forest Herbarium, Bangkok.

CONNETTE, G., P. OSWALD, M. SONGER, AND P. LEIMGRUBER. 2016. Mapping Distinct Forest Types Improves Overall Forest Identification Based on Multi-Spectral Landsat Imagery for Myanmar's Tanintharyi Region. *Remote Sensing* 8: 882; doi:10.3390/rs8110882

DE TERRA, H. 1944. Geographic Factors of the Natural Regions of Burma. *Ann. Assoc. Amer. Geogr.* 34: 67–96.

JOHANSSON, J. T. 1988. Revision of the genus *Caelospermum* Blume (Rubiaceae, Rubioideae, Morindeae). *Blumea* 33: 265–297.

KRESS, J., R. A. DEFILIPPS, E. FARR, AND YIN YIN KYI. 2003. *A Checklist of the Trees, Shrubs, Herbs, and Climbers of Myanmar.* Smithsonian Institution, Contributions from the United States National Herbarium. 590 pp.

KURZWEIL, H. 2013. *Calanthe punctata* (Orchidaceae), a new species from southern Myanmar. *Gard. Bull. Singapore* 65(2): 163–168.

KURZWEIL, H., AND S. LWIN. 2015. New orchid records for Myanmar, including the first record of the genus *Stereosandra*. *Gard. Bull. Singapore* 67(1): 107–122.

LARSEN, K., AND C.-M. HU. 1996. Myrsinaceae. Pages 81–178 *in* K. Larsen, and T. Santisuk (eds.), *Flora of Thailand* 6. The Forest Herbarium, Bangkok.

LEERATIWOND, C., P. CHANTARANOTHAI, AND A. J. PATON. 2009. A synopsis of the genus *Callicarpa* L. (Lamiaceae) in Thailand. *Thai Forest Bull., Bot.* 37: 36–58.

MAXWELL, J. F. 2001. Vegetation and vascular flora along the Yetagun-Yadana Gas Pipeline, Taninthayi (Tenasserim) Division, Myanmar. *Nat. Hist. Bull. Siam Soc.* 49: 29–59.

MYERS, N., R. A. MITTERMEIER, C. G. MITTERMEIER, G. A. B. DA FONSECA, AND J. KENT. 2000. Biodiversity hotspots for conservation priorities. *Nature* 403: 853–858.

PHENGKLAI, C. 1981. Ebenaceae. Pages 281–392 *in* T. Smitinand, and K. Larsen (eds.), *Flora of Thailand* 2. The Forest Herbarium, Bangkok.

RUCHISANSAKUN, S., P. SUKSANTHAN, T. VAN DER NIET, SAW-LWIN, AND S. B. JANSSENS. 2017. *Impatiens tanintharyiensis* (Balsaminaceae), a new species from Southern Myanmar. *Phytotaxa* 296(2): 171–179.

SMITINAND, T., AND K. LARSEN *ET AL.* (eds.) (1970–present) *Flora of Thailand*. The Forest Herbarium, Bangkok.

STAPLES, G. 2010. Convolvulaceae. Pages 330–468 *in* T. Santisuk, and K. Larsen (eds.), *Flora of Thailand* 10(3). The Forest Herbarium, Bangkok.

STAPLES, G., AND S. SYAHIDA-EMIZA. 2015. Convolvulaceae. Pages 55–198 *in* R. Kiew, R. C. K. Chung, L. G. Saw, and E. Soepadmo (eds.), *Flora of Peninsular Malaysia* 5. Forest Research Institute Malaysia, Kepong.

TANAKA NOB., S. TAGANE, A. NAIKI, MU MU AUNG, NOR. TANAKA, S. DEY, J. MOOD, AND J, MURATA. 2018. Contributions to the Flora of Myanmar I: Nine taxa of monocots newly recorded from Myanmar. *Bull. Natl. Mus. Nat. Sci., Ser. B,* 44(1): 31–39.

TORDOFF A.W., M. C. BALTZER, J. R. FELLOWES, J. D. PILGRIM, AND P. F. LANGHAMMER. 2012. Key biodiversity areas in the Indo-Burma hotspot: Process, progress and future directions. *JoTT Communication* 4(8): 2779–2787.

WEERASOORIYA, A. D., AND R. M. K. SAUNDERS. 2010. Monograph of *Mitrephora* (Annonaceae). *Syst. Bot. Monogr.* 90: 1–167.