THE MALAYSIAN FORESTER 2024, 87 (1): 1 - 9

NEPENTHES RIDZAIANA AND *N.* X *LANGKAWIENSIS* (NEPENTHACEAE), A NEW SPECIES AND A NEW NOTHOSPECIES OF PITCHER PLANTS FROM LANGKAWI ISLAND, MALAYSIA

A. LATIFF[1]*, MOHD NORFAIZAL, G.[2], E.E. BESI[3], M.E. MAT-ESA[3], R. GO[3], D. SANDIN[3], MOHD. RIDZUWAN ENDOT[4], NORULHUDA ALI[5], KHAIRUDDIN PERDAN[4], E.J. YAPP[6] AND R. MOHD NOR FIRDAUS[6]

[1]Department of Biology and Biotechnology, Faculty of Science and Technology, Universiti Kebangsaan Malaysia (UKM), 43500 Bangi, Selangor, Malaysia
[2]Resource Utilisation and Agrobiodiversity Conservation Programme (BE2), Agrobiodiversity and Environment Research Centre, Malaysian Agricultural Research and Development Institute (MARDI) Headquarters, 43400 Serdang, Selangor, Malaysia
[3]Department of Biology, Faculty of Science, Universiti Putra Malaysia (UPM), 43400 Serdang, Selangor, Malaysia
[4]Silviculture & Forest Biodiversity Conservation Division, Forestry Department of Peninsular Malaysia, Jalan Sultan Salahuddin, 50660 Kuala Lumpur, Malaysia
[5]Forest Biodiversity Control Section, Silviculture & Forest Biodiversity Conservation Division, Forestry Department of Peninsular Malaysia, Jalan Sultan Salahuddin, 50660 Kuala Lumpur, Malaysia
[6]Forest Biodiversity Section, Silviculture & Forest Biodiversity Conservation Division, Forestry Department of Peninsular Malaysia, Jalan Sultan Salahuddin,50660 Kuala Lumpur, Malaysia

*Corresponding author
Email: pakteh48@yahoo.com

Abstract: A new species and a new nothospecies of *Nepenthes*, *N. ridzaiana* Latiff, M.N. Faizal et Besi, *sp. nov*. and *Nepenthes X langkawiensis* Latiff, M.N. Faizal et Besi *nothosp. nov*. are herein described and illustrated from Langkawi Island, Kedah, Malaysia. These taxa are so far known only from a few populations in hilly and lowland forest areas of Langkawi Island. An updated identification key to the *Nepenthes* of Peninsular Malaysia is also provided.

Key words: Carnivorous plants, Langkawi Island, *Nepenthes*, Peninsular Malaysia, pitcher plants

INTRODUCTION

Nepenthes species are most commonly encountered in disturbed secondary forest, peat swamp forest, kerangas or heath forest from sea level up to 700 m altitude. Records of *Nepenthes* in Peninsular Malaysia were enumerated by Ridley (1923) with a total of ten species, namely *N. ampullaria* Jack, *N. albomarginata* Lobb, *N. gracillima* Ridl., *N. alba* Ridl., *N. ramispina* Ridl., *N. sanguinea* Lindl., *N. macfarlanei* Hemsl., *N. gracilis* Korth., *N. rafflesiana* Jack and *N. phyllamphora* Willd. (= *N. mirabilis* (Lour.) Druce) followed by several related publications by Holttum (1940), Kiew (1990), Clarke (2002), Adam et al. (2005), Latiff et al. (2011), Clarke and Lee (2012), Latiff and Norsiah Bahari (2016). Recent updates on the diversity of *Nepenthes* of

Peninsular Malaysia gave a total of 14 species with additional three more new species in 2019 and 2020, with the description of *N. latiffiana* M. N. Faizal, A. Amin & N. Dome*; N. domei* M. N Faizal, A. Amin & Latiff and *N. malayensis* A. Amin, M. N. Faizal & Latiff (Ghazalli et al. 2020; Tamizi et al. 2020). In the recent surveys in 2021, the authors have encountered several populations of unusual pitcher plants thriving in the hill and lowland forests of Langkawi Island, Kedah, Malaysia which could not match the known taxa (Shivas 1984, Rohana 1988, Cheek & Jebb 2001, McPherson 2009, Ghazalli et al. 2022). We provide herein, species description of *N. ridzaiana* sp. *nov*. and its natural hybrid with *N. mirabilis*, N. X *langkawiensis nothosp. nov.* The descriptions of both taxa, can be considered as comprehensive as they contain the distinct characters.

Key to the species of *Nepenthes* in Peninsular Malaysia, including the new hybrid

1 Leaf base distinctly petiolate……..2
Leaf base tapering, decurrent or amplexicaul, but not petiolate ..…… 5

2 Pitcher lids narrow, without glands below; pitchers globose, in clusters on the ground, usually in rosettes on reduced petioles..……..….*N. ampullaria*
Pitcher lids elliptic or broad, with at least some glands below; pitchers infundibular, widely widening to the mouth, not in cluster on the ground, always on fully-developed leaves…….....3

3 Margin of lower leaves fimbriate……..….*N. mirabilis*
Margin of lower leaves not fimbriate…….....4

4 Pitchers without white, tomentose band below peristome; lids with many glands confined to rims……...*N. rafflesiana*
Pitchers with a white, tomentose band below peristome; lids with few, glands scattered, prominently at rims.…… …….....*N. albomarginata*

5 Stems triangular; decurrent leaf bases which run down the stem ridge……..….*N. gracilis*
Stems rounded or slightly angular; leaf base retuse…….....6

6 Lids round, retuse at base; stems rounded ……..…..….*N. latiffiana*
Lids elliptic, stems slightly angular……..…..7

7 Lids narrow, ovate, rounded at base, spurs simple; rounded nectar glands scattered on the lower part of the lid, and concentrated at the base of the lid…….....*N. domei*
Lids sub-orbicular or elliptic, and lacks an appendage, spurs unbranched; lid glands few, large 0.4-0.5 mm; upper pitchers usually ivory white with red patches…….....8

8 Pitcher spurs simple; lid glands few; upper pitchers usually ivory white with red patches……..…..*N. gracillima*
Pitcher spurs branched; lid glands numerous; upper pitchers usually green with black specks…….....…..9

9 Upper pitchers with white coloration often with red blotches and flecks……..……..….*N. alba*
Upper pitchers without white coloration, sub-cylindrical or very narrowly infundibular…….....…10

10 Stems sharply 3-angled in cross-section, smooth; peristomes scarcely toothed within……..……*N. sanguinea*
Stems broadly angled in cross-section, pubescent; peristomes cylindrical and shortly acuminate towards the rear...……...11
11 Stems slightly pubescent, broadly-angular; peristomes cylindrical, shortly acuminate towards the rear……...……*N. malayensis*
Stems densely pubescent, 3-angled; peristome flattened……..12
12 Stems manifestly 3-angled, pubescent; peristomes toothed, flattened near lids; lids with many bristle-like hairs below……..*N. macfarlanei*
Stems rounded, glabrous; peristomes not toothed; lids smooth on the abaxial surface……...13
13 Stems rounded in cross-section, leaf-base sub-petiolate; lids with a basal ridge with large glands……..…*N. benstonei*
Stems terete in cross-section; upper surface of leaf blade smooth, lower pitcher wings wide, running down towards ventral exterior surface...……...14
14 Stem terete-round in cross-section; leaf axil with minute hairs, lower pitcher ruby red with dark red, two-minute size wings, running down towards ventral exterior surface from mouth to tendrils ……....*N. ridzaiana*
Stem slightly round, in majority round-terete……...……15
Stem round, majority round-terete, leaf axil glabrous, lower pitchers greenish to pink…….……***N. X langkawiensis***

Taxonomic treatment

Nepenthes ridzaiana Latiff, M.N. Faizal et Besi *sp. nov.* (Figure 1)

Diagnosis. *Nepenthes ridzaiana* is closely related to but differs from *N. kerrii* of Peninsular Thailand in leaves morphology with lamina linear to lanceolate, apex acuminate, base truncate to cuneate and sessile, clasping the stems about half of its circumference (vs. lamina obovate, apex acuminate, base attenuate and sessile, clasping the stems three quarters of its circumference); lower pitchers morphology with ovate in the lower half, slightly cylindrical above, visible hip at the lower half and having two minute wings (vs. ovate in the lower half, narrowing above or completely ovate, hip at the mid-section or in the upper half, with two alae). Lower pitcher ruby red with dark red blotches (vs. orange with red blotches).

Type. Malaysia, Kedah, Langkawi Island, Gunung Matchinchang, 8 April 2022, Mohd. Norfaizal, E.J. Yapp, M.I. Muhamad Ikhwan, E.E. Besi MDI 12465 (holotype MDI!; isotype K!, KEP!)

Terrestrial climbers to 7 m tall. **Stems** round to terete, 4-7 mm in diameter, internodes 0.7-4.6 cm long. **Leaves** coriaceous, 0.4-0.6 mm thick, lamina linear to lanceolate, 7-19 cm long, 0.7-2.5 cm wide, apex acuminate, base truncate to cuneate and sessile, clasping the stems by half of its circumference; longitudinal veins 4 on each side of the midribs in distal quarter of the lamina, pinnate veins arising obliquely from midribs; tendrils rounded, 14-18 cm long, 1-2 mm in diameter. **Lower pitchers** 3-5 × 5-16 cm, ovate in the lower half and slight cylindrical above, hip at the lower

half, visible; with two minute wings, 4-7 mm wide, running down towards ventral exterior surface from mouth to tendrils, with narrow filaments; pitcher mouth ovate to rounded, peristomes rounded, with slight widened lateral sides (0.5-0.7 cm wide each side), overall 4-10 mm wide, teeth 0.3 mm long; **lids** round-oval, 1.8-4.3 × 1.4-5.1 cm, smooth or slightly wavy margins, base cordate, nectar glands large, densely arranged along the midribs, to 1 mm in diameter; spurs 1.5-4 mm long, simple; longitudinal veins 2-5 on each side of midribs. **Upper pitchers** 4-6 × 11-17 cm, tubulose; without wings; pitcher mouth rounded to ovate; peristomes rounded, with a distinct column; lids as lower pitchers. **Indumentum** of minute hairs, less than 0.2 mm long on the leaf parts. **Colour.** Leaves dark green; stems, midribs and tendrils dark green to dark red; lower pitchers red with dark red blotched, inner pitcher with red blotches, non-glandular zone, peristomes and lids red; upper pitchers light green to yellowish, with red blotches over upper half part of the inner surface, peristomes yellow greenish, lids green to yellow.

Figure 1. *Nepenthes ridzaiana sp. nov.*: (A) Population *in situ*, (B) Lower pitchers, (C) Upper pitchers, and (D) Variation of upper pitchers with yellowish–green body [Photos by Muhammad Ikhwanuddin Mat-Esa].

Distribution and Ecology. *Nepenthes ridzaiana* is currently known only from the restricted areas at the type locality on Gunung Machinchang. Langkawi Island, Malaysia, with over 50 populations. This species occurs as terrestrial climbers on hilly

terrains with slight shade, upper hill forest habitats, at an altitude of ca. 701 m above sea level. Apparently, the species had been collected from Kelantan in 2006, Terengganu in 1974 and 2010 and Pahang in 2017 but identified as various species.

Etymology. Named in honour of Dato' Indera Mohd. Ridza Awang, Director-General, Forestry Department Peninsular Malaysia for his strong support of forest conservation in Peninsular Malaysia.

Note. In 2010 one of the authors, A. Latiff climbed Gunung Machinchang in search of an orchid, *Porpax elwisii* and discovered the species of pitcher plant on the face of an outcrop which he identified as *N. sanguinea* (Latiff et al. 2011) thus making the second species for the Langkawi Archipelago as the only known species on Langkawi Island then was *N. mirabilis.*

Additional specimens examined. THAILAND, Satun, Tarutao Marine Park, 500 m, 1928, Kerr 14127 (BK); MALAYSIA, Kelantan, Machang, Bukit Bakar, 27 September 2006, T.L. Yao et al. FRI 53169 (KEP) (identified as *N. benstonei*); Terengganu, Gunung Tebu, 31 May 1974, Mohd. Shah et al. FRI 13147 (identified as *N. benstonei*); Terengganu, Gunung Padang, 21 Mac 2010, Mohd Hairul et al. FRI 70887 (KEP) (identified as *N. sanguinea*); Pahang, Cameron Highlands, Ulu Bertam FR, 26 April 2017, K. Imin et al. FRI87122 (KEP) (identified as *N. macfarlanei*).

Note on *Nepenthes mirabilis* of Langkawi Island

Nepenthes mirabilis (Lour.) Druce, Rep. Exch. CI. Br. Id. (1916) 637; Merr., Interpr. (1917) 242; Danser, Bull. Jard. Bot. Buitenzorg III, 9 (1928) 330; Sh. Kurata, *Nepenthes* of Mt Kinabalu, Sabah (1976) 56; Tamin & M. Hotta in M. Hotta, Diversity and Dynamics of Plant Life in Sumatra (1986) 88; Jebb, Science in New Guinea 17 (1991) 32, f. 16; J.H. Adam & Wilcock, Mai. Nat. J. 46 (1992) 76; Phillipps & A.L. Lamb, Pitcher Plants of Borneo (1996) 109, f. 57; Jebb & Cheek, Blumea 42 (1997) 63; Clarke, *Nepenthes* of Borneo (1997) 105, f. 70 & 71; J.H. Adam & Wilcock, Sarawak Mus. J. 50 ('1996', 1998) 160. — *Phyllamphora mirabilis* Lour., Fl. Cochin. 2 (1790) 606. — *Nepenthes phyllamphora* Willd., Sp. PL, ser. 4, 2 (1805) 874. — Type: Loureiro s.n. (Pn. v.), Vietnam, near Hue.

Before the discovery of the new species, *N. ridzaiana*, on Langkawi Islands the only known species on this archipelago is *Nepenthes mirabilis.* One of the authors, A. Latiff had in 1982 and 2004 observed a few populations of the species growing profusely on the bunds between the paddy fields at Kubang Badak at about sea level. In 2011, he went back to that locality and found that none of the population survived, possibly burnt by the farmers to grow mangoes. After a thorough search in the vicinity of Kubang Badak, he found not a plant there but a population was observed growing on the forest edges behind Kampung Ewa, Langkawi.

Nepenthes X langkawiensis Latiff, M.N. Faizal et Besi *nothosp. nov.* – (Figure 2)

Type: Malaysia, Kedah, Langkawi Island, Teluk Datai, 8 April 2021, Mohd. Norfaizal, E.J. Yapp, M.I. Muhamad Ikhwan, E.E. Besi MDI 12468 (holotype MDI!; isotype K!, KEP!)

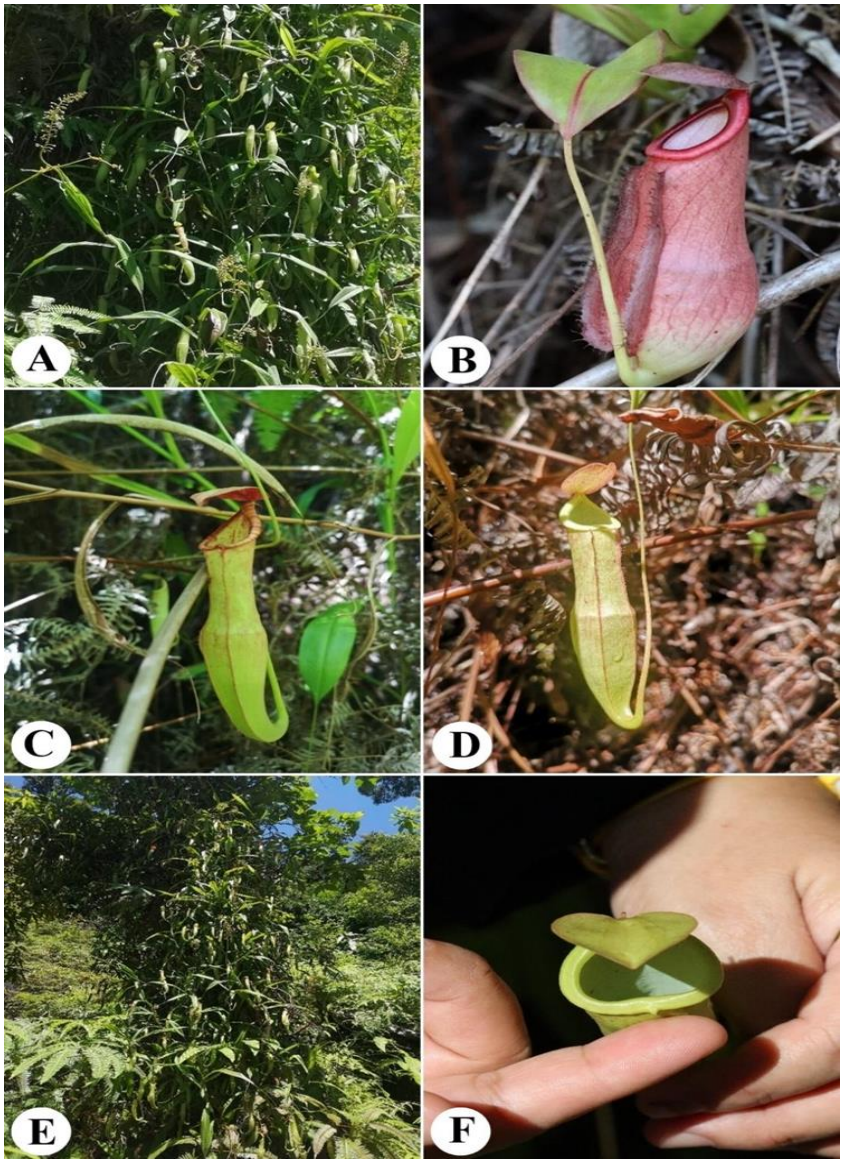

Figure 2. *Nepenthes X langkawiensis nothosp. nov.*: (A) Population *in situ*, (B) Lower pitchers, (C) Upper pitchers, (D) Variation of upper pitchers with green peristome, (E) Upper pitchers of *N. X langkawiensis*, and (F) Peristome [Photos by Mohd Norfaizal Ghazalli & Mohd Nor Firdaus Rahim].

Note. This natural hybrid showed the characters of both parents, the margin of lower leaf blades fimbriate, upper pitchers not winged of *N. mirabilis*, and its peristome is rounded, with slightly widened lateral sides and at the tip of the peristome of *N. ridzaiana.*

It is a natural hybrid of *N. ridzaiana* and *N. mirabilis*, and both parents are sympatric at Teluk Datai lowland area in Langkawi Island, Kedah, Malaysia.

Terrestrial climbers up to 15 m tall. Climbing stems slightly round to terete, 7-14 mm diameter, internodes 2.4-8.5 cm long, axillary buds inconspicuous. **Leaves** thinly chartaceous, petiolate, leaves of rosettes and short stems lanceolate, apex acuminate, margin fimbriate, petiole base sheathing, leaves of climbing stems linear to obovate, oblong or lanceolate, 16-35 × 3.5-8 cm, apex acute, margin slight wavy to entire, petioles slightly winged, 4-15 cm long, with red line at the abaxial part, clasping the stems by half to ¾ of its circumference. Longitudinal nerves 3-7 on each side of the midrib, conspicuous. Pennate nerves numerous, curving towards margin, to almost perpendicular. **Lower pitchers** ovoid in lower half, with slight hip at the middle, cylindrical in upper half, 6-16 × 3-5 cm, with 2 fringed wings up to 4 mm wide, 1.8-2.7 mm long; mouth broadly ovate to rounded, straight to slight curved; peristomes slight round to flattened, 3-13 mm broad, ribs 0.3-0.45 mm, conspicuous, lids rounded to elliptic, 1.5-2.5 × 1.5-2.3 cm, apex rounded to slightly retuse, base rounded to orbiculate, lower surface smooth, nectar glands dense, rounded, 0.1-0.2 mm, smallest towards margin, larger and slightly elliptic, 0.3-0.4 mm long; spurs flattened 0.5-1 mm, entire. **Upper pitchers** gradually form from tendrils, cylindrical and slightly laterally flattened, with slight infundibuliform at base, cylindrical above, with hip formation point 1/3 from the base, 14-18 × 2.5-6 cm; mouth broadly ovate to rounded, straight to slight curved; peristomes slightly round to flattened,4-15 mm broad, ribs 0.3-0.56 mm, conspicuous; spurs entire, 3-3.5 × 1.15 mm, apex rounded. **Indumentum** usually inconspicuous, with sparse white stellate trichomes; nectar glands 0.2 mm diameter. **Colour.** leaves green; stems, midribs and tendrils green to red formation; lower pitchers green to reddish green, inner pitchers green, non-glandular zone, peristomes and lids green to reddish; upper pitchers light green to reddish, peristome green, lids green to yellowish-red.

Distribution and habitat. *Nepenthes X langkawiensis* is currently known only from the restricted area at the type locality of the lowland area in Langkawi Island, Malaysia.

Ecology. *Nepenthes X langkawiensis* occurs as terrestrial climbers on lowland areas, at an altitude of ca. 91-100 m above sea level.

Etymology. Named after the type locality, Langkawi Island, Kedah, Malaysia.

ACKNOWLEDGEMENTS

The authors would like to extend our appreciation to the Forest Department of Peninsular Malaysia and Panorama Langkawi Sdn. Bhd. for giving us the permission to access the site and surrounding areas for this study. Our sincerest appreciation is also extended to Malaysian Agricultural Research and Development Institute (MARDI), MDI Herbarium staff who directly or indirectly contributed to this study, with special thanks to Ms. Salmaniza Salleh for the herbarium and laboratory specimen preparation. Special thanks also due to Mr. Khairul Azim Abdul Rapar and

Mdm. Noor Yuswita Ramli of Langkawi Hiker Association for guiding us during our fieldwork in Langkawi Island, Kedah, Malaysia.

REFERENCES

Adam, J.H., Nurulhuda, E.M., Abdul Halim, H., Abdul Rahim, O., Hafiza, A.H., Gopir, G.K., Lydia, M.P., Ramlan, O., Qasim, M.B., Salmon, J., Shahibin, A.R. & Marlia, M.H. 2005. Pitcher plants recorded from BRIS forest in Jambu Bongkok, Kuala Terengganu, Malaysia. Wetland Science 3(3): 183-189.

Cheek M. & Jebb, M. 2001. Nepenthaceae. In: Flora Malesiana Series I (Seed Plants) 15: 1-157. Leiden: Netherlands.

Clarke, C. & Lee, C.C. 2012. A revision of *Nepenthes* (Nepenthaceae) from Gunung Tahan, Peninsular Malaysia. Garden's Bulletin, Singapore 64(1): 33-49.

Clarke, C. 2002. A guide to the pitcher plants of Peninsular Malaysia. Kota Kinabalu: Natural History Publications (Borneo). 32 pp.

Clarke, C.M. 1997. Nepenthes of Borneo. Kota Kinabalu: Natural History Publications (Borneo). 207 pp.

Clarke, C.M. 2001. Nepenthes of Sumatra & Peninsular Malaysia. Kota Kinabalu: Natural History Publications (Borneo). 326 pp.

Ghazalli, M.N., Besi, E.E., Mat Esa, M.I., Nikong, D., Yapp, E.J., Ali, N., A. Latiff, Talip, N., Go, R., Shakri, M.A., Endot, M.R. & Rahim, M.N.F. 2022. Kepelbagaian dan Panduan Pengecaman Nepenthes Semenanjung Malaysia. Kuala Lumpur: Jabatan Perhutanan Semenanjung Malaysia. 48 pp.

Ghazalli, M.N., Tamizi, A.A., Nikong, D., Besi, E.E., Esa, M.I.M., Mohd Nordin, A.R., Latiff, A., Zaini, A.Z. & Shakri, M.A. 2020. *Nepenthes latiffiana* and *N. domei* (Nepenthaceae), two new species of pitcher plants from Terengganu, Peninsular Malaysia. WEBBIA Journal of Plant Taxonomy and Geography 83(1): 5-28.

Holttum, R.E. 1940. Malayan pitcher plants. Malayan Nature Journal 1(2): 35-44.

Jebb, M. & Cheek, M. 1997. A skeletal revision of *Nepenthes* (Nepenthaceae). Blumea 42(1): 1-106.

Kiew, R. 1990. Pitcher plants of Gunung Tahan. Journal of Wildlife and Parks 10: 34-37.

Latiff, A. & Norsiah Bahari. 2016. An elegant *Nepenthes* × *hookeriana* from Padang Tujuh, Endau Rompin State Park, Pahang. Folia Malaysiana 17(1): 55-59.

Latiff, A., Ishak, K.I.K., Ong, C.G. & Che Aziz Ali. 2011. *Porpax elwisii* (Orchidaceae) and *Nepenthes sanguinea* (Nepenthaceae) two new records for Gunung Matchinchang, Langkawi, P. Langkawi. Folia Malaysiana 12(1): 43-46.

McPherson, S. 2009. Pitcher plants of the Old World. Vol. 1. Poole: Redfern Natural History Publications. 500 pp.

Ridley, H.N. 1924. Nepenthaceae. In: The Flora of the Malay Peninsula 3: 21-25. London: L. Reeve & Co.

Rohana, M.S. 1988. Systematic studies on *Nepenthes* species and hybrids of the Malay Peninsula (PhD Thesis). Faculty of Life Sciences, Universiti Kebangsaan Malaysia (unpublished).

Shivas, R.G. 1984. Pitcher plants of Peninsular Malaysia and Singapore. Singapore: Maruzen Asia. 58 pp.

Tamizi, A.A., Ghazalli, M.N., Nikong, D., Besi, E.E., Mat-Esa, M.I., Mohd-Nordin, A.R., Latiff, A. & Shakri, M.A. 2020. *Nepenthes malayensis* (Nepenthaceae), a new species of carnivorous pitcher plant from Peninsular Malaysia. Kew Bulletin 75(4): 1-14.