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Revision of the Sundaland species of the genus *Dysphaea* Selys, 1853 using molecular and morphological methods, with notes on allied species (Odonata: Euphaeidae)

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Abstract

The Sundaland species of the genus *Dysphaea* were studied using molecular and morphological methods. Four species are recognized: *D. dimidiata* Selys, *D. lugens* Selys, *D. ulu spec. nov.* (holotype ♂, from Borneo, Sarawak, Miri division, Upper Baram, Sungai Pejelai, Ulu Moh, 24 viii 2014; deposited in RMNH) and *D. vanida spec. nov.* (holotype ♂, from Thailand, Ranong province, Khlong Nakha, Khlong Bang Man, 12–13 v 1999; deposited in RMNH). The four species are described and illustrated for both sexes, with keys provided. The type specimens of the four *Dysphaea* taxa named by E. de Selys Longchamps, i.e. *dimidiata*, *limbata*, *semilimbata* and *lugens*, were studied and their taxonomic status is discussed. Lectotypes are designated for *D. dimidiata* and *D. limbata*. *D. dimidiata* is recorded from Palawan (the Philippines) for the first time. A molecular analysis using three markers (COI, 16S and 28S) is presented. This includes specimens of three Sundaland species of the genus (*D. lugens* missing) and two congeners from other regions (*D. basitincta* and *D. gloriosa*). Notes and photographs of the male holotype of *D. walli* Fraser (from Maymyo, Burma) are provided.

Key words: Odonata, Euphaeidae, *Dysphaea*, new species, Sundaland, COI, 16S, 28S

Introduction

Dysphaea Selys, 1853 is a small oriental genus of the family Euphaeidae with seven species recognized at present (Table 1). The distribution of the genus extends from southwestern India in the west to Java and Borneo in the east and to Yunnan, Guangxi and Guizhou in the north.

The genus-group name *Dysphaea* was introduced by Selys Longchamps (1853) as one of the four subgenera of the genus *Euphaea* [Selys, 1840] within the “Legion Euphaea”, which corresponds to the present family Euphaeidae. Later Selys Longchamps (1873) divided “Legion Euphaea” into three genera (*Epallage* [Charpentier, 1840], *Anisopleura* [Selys, 1853] and *Euphaea* [Selys, 1840]), but still ranked *Dysphaea* as a subgenus of *Euphaea*. Kirby (1890) listed *Dysphaea* as a full genus, as he did for all other Selysian subgenera.

Selys Longchamps introduced four species-group names in *Dysphaea*, all being from Sundaland. *D. dimidiata* Selys, 1853 (the type species of the genus) was described from a series of male specimens from Java (Selys Longchamps 1853). *D. limbata* Selys, 1859 was named as a ‘race of *dimidiata*’ based on male and female specimens from Mt Ophir (Johor, Malay Peninsula), Singapore, and Sarawak in Borneo (Selys Longchamps 1859). *D. lugens* Selys, 1873 was described from a single male specimen from ‘South Borneo’ and ranked as a ‘race of *dimidiata*?’ (Selys Longchamps 1873). *D. semilimbata* Selys, 1873 was described from a single male from Labuan, Borneo and was ranked as ‘variety or race of *dimidiata*?’ (Selys Longchamps 1873).

The relative status of these taxa obviously puzzled Selys Longchamps; in 1869 he upgraded *limbata* to the rank of full species (Selys Longchamps 1869), but 10 years later he reconsidered and recognised only a single species in the genus *Dysphaea* (= *dimidiata*) (Selys Longchamps 1879). In Selys Longchamps (1889) he retained this view and listed *lugens*, *semilimbata* (misspelled as *sublimbata*) and *limbata* as ‘forms’ or ‘races’ of *dimidiata*. The taxonomic status of these Sundaland taxa has been treated in different ways by various later authors. Kirby (1890)

and Benjamin Price (BMNH). The latter two curators also provided photographs of some type specimens. C.Y. Choong, André Günther, Sarah Luke, Shanlian Mo, Robin Ngiam, Albert G. Orr, Graham T. Reels, Philip Steinhoff and Hao-miao Zhang provided specimens and/or field photos to be used in this paper. Albert G. Orr and Jan van Tol kindly reviewed the manuscript before submitting and made useful suggestions. The first author received support from the SYNTHESYS Project [<http://www.synthesys.info/>] which is financed by European Community Research Infrastructure Action. The second author is grateful to the Sarawak Forest Department and Sarawak Forestry Corporation for granting permission the collect specimens in Sarawak and much assistance, as well as to the International Dragonfly Society, The Worldwide Dragonfly Association, the Mohamed bin Zayed Species Conservation Fund and Singapore National Parks for providing funding for field trips during which some of the material used in this paper was collected.

References

- Albarda, H. (1887) [Vijfde afdeeling] Neuroptera. Systematische lijst, met beschrijving der nieuwe of weinig bekende soorten. In: Snelleman, J.F. (Ed.), *Midden-Sumatra. Reizen en onderzoekingen der Sumatra-Expeditie, uitgerust door het aardrijkskundig genootschap, 1877–1879, beschreven door de leden der expeditie onder toezicht van Prof. P.J. Veth. Vierde deel. Natuurlijke historie. Eerste gedeelte. Fauna. Eerste helft. Bijdragen tot de kennis der fauna van Midden-Sumatra*. E.J. Brill, Leiden, pp. 1–26, pls. I–VIII, excl.
- Asahina, S. (1966) Sarawak Odonata taken by Mr. H. Hayashi. *Tombo—Acta Odonatologica*, 9 (1–4), 28–30.
- Asahina, S. (1981) Records of little or unknown Odonata from Thailand. *Tombo—Acta Odonatologica*, 23 (1/4), 3–16.
- Asahina, S. (1985) A list of the Odonata recorded from Thailand. Part XI. Euphaeidae. *Chô Chô*, 8 (12), 18–38.
- Asahina, S. (1990) A list of the Odonata recorded from Thailand. Part XXI. Supplement. *Tombo—Acta Odonatologica*, 33 (1/4), 2–20.
- Bárta, D. & Dolný, A. (2013) *Dragonflies of Sungai Wain. Ecological Field Guide to the Dragonflies of Lowland Mixed Dipterocarp Forest of Southeastern Kalimantan*. Taita Publishers, Hradec Králové, 168 pp.
- Choong, C.Y. (2009) A preliminary survey of Odonata fauna of Panti Forest Reserve. In: Ujang, R., Koh, H.L., Abdul Rahim, A.R., Mahmood, Y., Rani, M.R., Norhayati, A. & Latiff, A. (Eds.), *Hutan Simpan Panti, Johor: Pengurusan Hutan, Persekitaran Fizikal dan Kepelbagaian Biologi*. Jabatan Perhutanan Semenanjung Malaysia, Kuala Lumpur, pp. 223–228.
- Choong, C.Y. (2010) A preliminary survey of Odonata fauna of Bintang Hijau Forest Reserve. In: Ujang, R., Koh, H.L., Mustafa, N.M.S.N., Damanhuri, A. & Latiff, A. (Eds.), *Hutan Simpam Bintang Hijau, Perak. Pengurusan Hutan, Persekitaran Fizikal dan Kepelbagaian Biologi*. Jabatan Perhutanan Semenanjung Malaysia, Kuala Lumpur, pp. 228–232.
- Choong, C.Y. (2011) Odonata fauna of the Royal Belum State Park. In: Rahim, A.R.A., Koh, H.L., Abdullah, M. & Latiff, A. (Eds.), *Taman negeri diraja Belum, Perak. Pengurusan Hutan, Persekitaran Fizikal, Kepelbagaian Biologi dan Sosio-ekonomi*. Jabatan Perhutanan Semenanjung Malaysia, Kuala Lumpur, pp. 234–239.
- Choong, C.Y. (2013) Odonata diversity of Chamah Highlands, Kelantan. In: Karim, S.A., Rani, R., Bakar, M.F.A., Rahman, Y.A., Ramli, R., Hamzah, Z. & Latiff, A. (Eds.), *Gunung Chamah, Kelantan: Pengurusan Hutan, Persekitaran Fizikal, Kepelbagaian Biologi dan Pelancongan Ekologi*. Jabatan Perhutanan Negeri Kelantan, Kota Bharu, pp. 206–211.
- Choong, C.Y., Ng, Y.F. & Dow, R.A. (2012) Odonata from three forests of central Terengganu, Malaysia. *Malayan Nature Journal*, 64 (2), 95–104.
- Cleary, D.F.R., Moers, A.Ø., Eichhorn, K.A.O., van Tol, J., de Jong, R. & Menken, S.B.J. (2004) Diversity and community composition of butterflies and odonates in an ENSO-induced fire affected habitat mosaic: a case study from East Kalimantan, Indonesia. *Oikos*, 105, 426–446.
<http://dx.doi.org/10.1111/j.0030-1299.2004.12219.x>
- Coomans de Ruiter, L. (1936). Biologische waarnemingen over beekjuffers van Borneo (Een groep van mooi gekleurde libellen). *De tropische natuur*, 25(5), 69–78, 1 col. pl. excl.
- Dijkstra, K.-D.B., Kalkman, V.J., Dow, R.A., Stokvis, F.R. & van Tol, J. (2014) Redefining the damselfly families: the first comprehensive molecular phylogeny of Zygoptera (Odonata). *Systematic Entomology*, 39 (1), 68–96.
<http://dx.doi.org/10.1111/syen.12035>
- Dolný, A., Bárta, D., Lhota, S., Rusdianto & Drozd, P. (2011) Dragonflies (Odonata) in the Bornean rain forest as indicators of changes in biodiversity resulting from forest modifications and destruction. *Tropical Zoology*, 24, 63–86.
- Donnelly, N.[T.W.] (1997) Through darkest Borneo [and Malaysia] with net and camera. *Malangpo*, 14, 123–125.
- Donnelly, N.[T.W.] (1998) Back to Thailand and Malaysia—Farangpo 98. *Malangpo*, 15, 137–142.
- Donnelly, N.[T.W.] (2000) Farangpo 2000—Hong Kong, Thailand and Cambodia. *Malangpo*, 17, 160–162.
- Dow, R.A. (2005) Odonata, burglary and ballistic cicadas in South-east Asia. *Agrion*, 9 (1), 10–12.
- Dow, R.A. (2011) Stephen Stone anak Singki and new records of *Linaeschna polli* Martin from Sarawak. *Agrion*, 15 (2), 48–49.
- Dow, R.A. (2012) Odonata collected around the Borneo Highlands Resort on Gunung Penrissen, Kuching Division, Sarawak, Malaysia in July 2012. *International Dragonfly Fund Report*, 50, 1–12.
- Dow, R.A. & Reels, G.T. (2008) List of species recorded at Gunung Mulu National Park, Sarawak, Malaysian Borneo in 2005–

2006. *Echo*, 5, 2–3 [in *Agrion*, 12(1)].
- Dow, R.A. & Reels, G.T. (2009) Expedition to Mount Dulit, Sarawak, August–September 2008—Odonata. *International Dragonfly Fund Report*, 19, 1–16.
- Dow, R.A. & Reels, G.T. (2010) The Odonata of three National Parks in Sarawak. *Agrion*, 14 (1), 14–19.
- Dow, R.A., Reels, G.T. & Butler, S.G. (2013a) Odonata of the Dulit Range in Sarawak, Malaysian Borneo. *Notulae odonatologicae*, 8 (1), 8–14.
- Dow, R.A., Reels, G.T. & Butler, S.G. (2013b) Previously unpublished Odonata records from Sarawak, Borneo. Part II. Kubah National Park. *Faunistic Studies in South-East Asian and Pacific Island Odonata*, 6, 1–21.
- Dow, R.A., Reels, G.T. & Ngiam, R.W.J. (2015) Odonata collected at Usun Apau National Park, Miri Division, Sarawak, Malaysia in April and May 2012. *International Dragonfly Fund Report*, 79, 1–17.
- Dow, R.A. & Unggang, J. (2010) The Odonata of Binyo Penyilam, a unique tropical wetland area in Bintulu Division, Sarawak, Malaysia. *Journal of Threatened Taxa*, 2 (13), 1349–1358.
<http://dx.doi.org/10.11609/JoTT.o2478.1349-58>
- Dunkle, S.W. (1993) A Texan in Thailand. *Malangpo*, 10, 74–76.
- Fraser, F.C. (1927) Descriptions of twenty new Indian dragonflies. *Records of the Indian Museum*, 29, 63–90.
- Fraser, F.C. (1934) *The Fauna of British India including Ceylon and Burma. Odonata. Vol. 2*, Taylor and Francis, London, xxiii + 398 pp., col.pls. 1–4 excl.
- Fraser, F.C. (1942) Dr. Raymond Wheeler's collection of Odonata from the Federated Malay States, with the descriptions of a new genus and two new species. *The Proceedings of the Royal Entomological Society of London, Series B. Taxonomy*, 11 (7), 95–104.
<http://dx.doi.org/10.1111/j.1365-3113.1942.tb00729.x>
- Folmer, O., Black, M., Hoeh, W., Lutz, R. & Vrijenhoek, R. (1994) DNA primers for amplification of mitochondrial cytochrome oxidase subunit I from diverse metazoan invertebrates. *Molecular Marine Biology and Biotechnology*, 3 (5), 294–299.
- Funk, D.J. & Omland, K.E. (2003) Species-level paraphyly and polyphyly: frequency, causes, and consequences, with insights from animal mitochondrial DNA. *Annual Review of Ecology, Evolution, and Systematics*, 34, 397–423.
<http://dx.doi.org/10.1146/annurev.ecolsys.34.011802.132421>
- Furtado, J.L. (1969) Ecology of Malaysian odonates: Biotope and association of species. *Verhandlungen Internationale Vereinigung für Theoretische und Angewandte Limnologie*, 17, 863–887, 2 pls. excl.
- Hall, T.A. (1999) BioEdit: a user-friendly biological sequence alignment editor and analysis program for Windows 95/98/NT. *Nucleic Acids Symposium Series*, 41, 95–98.
- Hämäläinen, M. (1988) Dragonfly collecting in Thailand. III. September–November 1986. *Malangpo*, 5, 23–27.
- Hämäläinen, M. (1989) Dragonfly collecting in Thailand. IV. January–February 1986. *Malangpo*, 6, 33–35.
- Hämäläinen, M. & Pinratana, A. (1999) *Atlas of the dragonflies of Thailand - distribution maps by provinces*. Brothers of St. Gabriel in Thailand, Bangkok, vi + 176 pp.
- Hämäläinen, M., Norma-Rashid, Y. and Zakaria-Ismail, M. (1996) Notes on Odonata collected in Kelantan (Peninsular Malaysia) in April 1995. *Opuscula zoologica fluminensia*, 146, 1–11.
- Hebert, P.D.N., Penton, E.H., Burns, J.M., Janzen, D.H. & Hallwachs, W. (2004) Ten species in one: DNA barcoding reveals cryptic species in the neotropical skipper butterfly *Astraptes fulgerator*. *Proceedings of the National Academy of Sciences of the United States of America*, 101 (41), 14812–14817.
<http://dx.doi.org/10.1073/pnas.0406166101>
- Hincks, W.D. (1930) Some notes on a collection of Sarawak Odonata. *Sarawak Museum Journal*, 4, 49–56.
- Huisman, J. & Van Tol, J. (1989) Dragonflies and caddisflies (Odonata and Trichoptera) from waters around the Danum Valley Field Centre. *Sabah Society Journal*, 9, 90–109.
- Huelsenbeck, J.P. & Ronquist, F. (2001) MrBayes: bayesian inference of phylogenetic trees. *Bioinformatics*, 17, 754–755.
<http://dx.doi.org/10.1093/bioinformatics/17.8.754>
- Kalkman, V.J. (2004) From cool hill resorts to humid rainforest: an odonatological trip to Peninsular Malaysia (July 2002). *Agrion*, 8 (2), 26–28.
- Katoh, K., Asimenos, G. & Toh, H. (2009) Multiple alignment of DNA sequences with MAFFT. *Methods in Molecular Biology*, 537, 39–64.
http://dx.doi.org/10.1007/978-1-59745-251-9_3
- Kearse, M., Moir, R., Wilson, A., Stones-Havas, S., Cheung, M., Sturrock, S., Buxton, S., Cooper, A., Markowitz, S., Duran, C., Thierer, T., Ashton, B., Mentjies, P. & Drummond, A. (2012) Geneious Basic: an integrated and extendable desktop software platform for the organization and analysis of sequence data. *Bioinformatics*, 28 (12), 1647–1649.
<http://dx.doi.org/10.1093/bioinformatics/bts199>
- Kemp, R.G. & Kemp, G.S. (1989) Some dragonfly records from the states of Pahang and Perak, West Malaysia. *Notulae odonatologicae*, 3(3), 37–40.
- Kennedy, C.H. (1920) The phylogeny of the zygopterous dragonflies as based on the evidence of the penes. *The Ohio Journal of Science*, 21, 19–29, pls. 1–3 excl.
- Khunwiset, S. & Chanpaisaeng, J. (2002) A survey of Odonata adults and larvae in Thong Pha Phum district, Kanchanaburi province, Thailand. *Malangpo*, 19, 192–194.

- Kimmins, D.E. (1936) The Odonata of the Oxford University Sarawak expedition. *Journal of the Federated Malay States Museum*, 18, 65–108.
- Kimmins, D.E. (1966) A list of the Odonata types described by F. C. Fraser, now in the British Museum (Natural History). *Bulletin of the British Museum (Natural History) Entomology*, 18 (6), 175–227.
- Kirby, W.F. (1890) *A synonymic catalogue of Neuroptera Odonata or dragonflies. With an appendix of fossil species*. Gurney & Jackson, London, vii + 202 pp.
<http://dx.doi.org/10.5962/bhl.title.5534>
- Kitagawa, K. & Katatani, N. (2005) Notes on Thai Odonata, Part 4. The Odonata from Kanchanaburi. *Aeschna*, 42, 23–30.
- Kitagawa, K. & Katatani, N. (2007) The dragonflies of Johor in August, 2005. *Aeschna*, 43, 27–35.
- Krüger, L. (1898) Die Odonaten von Sumatra. I. Theil. Familie Agrioniden. *Stettiner entomologische Zeitung*, 59, 64–139.
- Laidlaw, F.F. (1902) On a collection of dragonflies made by members of the Skeat expedition in the Malay Peninsula in 1899–1900. *Proceedings of the Zoological Society of London*, 1902, 63–92, plates V–VI excl.
<http://dx.doi.org/10.1111/j.1469-7998.1902.tb08207.x>
- Laidlaw, F.F. (1903) Report on the dragon flies. *Fasciculi Malayensis. Anthropological and zoological results of an expedition to Perak and the Siamese Malay States, 1901–1902. Undertaken by Nelson Annandale & Herbert C. Robinson. Zoology*, 1, 189–200.
- Laidlaw, F.F. (1920) Contributions to the study of the dragonfly fauna of Borneo. Part IV. A list of species known to occur in the island. *Proceedings of the Zoological Society of London*, 1920, 311–342.
<http://dx.doi.org/10.1111/j.1469-7998.1920.tb07074.x>
- Laidlaw, F.F. (1924) A survey of the dragonfly fauna of the Malaya peninsula, with notes on that of neighbouring countries. Part II. *Journal of the Malayan Branch of the Royal Asiatic Society*, 2 (3), 296–308, pls. 3–5 excl.
- Laidlaw, F.F. (1931a) A list of the dragonflies (Odonata) of the Malay Peninsula with descriptions of new species. *Journal of the Federated Malay States Museums*, 16 (3/4), 175–233.
- Laidlaw, F.F. (1931b) A revised list of the dragonflies (Odonata) of Borneo. *Journal of the Federated Malay States Museums*, 16 (3/4), 234–250.
- Lieftinck, M.A. (1934) An annotated list of the Odonata of Java, with notes on their distribution, habits and life–history. *Treubia*, 14, 377–462, 1 map excl.
- Lieftinck, M.A. (1935) A Synopsis of the Odonata (Dragonflies) of Sumatra. *Miscellanea Zoologica Sumatrana*, 92–93, 1–23.
- Lieftinck, M.A. (1936) Zon, water en libellen. *De tropische natuur* 25 (spec. issue): 100–111.
- Lieftinck, M.A. (1949) Over de levenswijze van *Dysphaea dimidiata* Selys. *Tijdschrift voor Entomologie*, 90, ix–xi.
- Lieftinck, M.A. (1950) Further studies on southeast Asiatic species of *Macromia* Rambur, with notes on their ecology, habits and life history, and with description of larvae and two new species (Odon., Epophthalmiinae). *Treubia*, 20, 657–716.
- Lieftinck, M.A. (1953) New dragonflies (Odonata) from Borneo, with notes on their habits and larvae. *Treubia*, 22 (2), 381–406.
- Lieftinck, M.A. (1954) Handlist of Malaysian Odonata. A catalogue of the dragonflies of the Malay Peninsula, Sumatra, Java and Borneo, including the adjacent small islands. *Treubia*, 22 (Supplement), i–xiii + 1–202, 1 folded map excl.
- Lieftinck, M.A. (1959) Waterjuffers voor de lens. *De levende natuur*, 62, 98–106.
- Matsuki, K. & Kitagawa, K. (1993) Bornean Odonata taken by Dr. T. Ueda. II. Zygoptera. *Aeschna*, 27, 1–10.
- Michalski, J. (1992) Our trip to Thailand with Brother Amnuay Pinratana. *Malangpo*, 9, 57–61.
- Ng, Y.F., Choong, C.Y. & Dow, R.A. (2012) Odonata records from Kuala Tahan, Pahang, Peninsular Malaysia in December 2010. *Notulae odonatologicae*, 7 (9), 82–86.
- Ng, Y.F., Dow, R.A. & Choong, C.Y. (2011) New records of Odonata (Insecta) from the Cameron Highlands, with first records of two species for Malaysia. *Journal of Science and Technology in the Tropics*, 7, 9–16. [2011]
- Norma-Rashid, Y. (1995) Preliminary odonate survey of Perak, Peninsular Malaysia. *Notulae odonatologicae*, 4 (5), 80–82.
- Norma Rashid, Y. (2009) Odonata diversity with one new record for Malaysia in the Kenaboi Forest Reserve, Negeri Sembilan, Malaysia. *Malaysia Journal of Science*, 28 (4), 65–72.
- Norma-Rashid, Y., Choong, Y.C. & Ng, Y.F. (2011) The Dragonfly fauna (adults) of the Lanjak Entimau Wildlife Sanctuary [sic]. In: Mohamed, H., Ipor, I., Meekiong, K., Ahmad, S. & Ampeng, A. (Eds.), *Lanjak Entimau Wildlife Sanctuary 'Hidden Jewel of Sarawak'. Proceedings of the seminar: Lanjak Entimau Scientific Expedition 4–5 March 2009*. Akademi Sains Malaysia, Kuala Lumpur, pp. 323–330.
- Norma-Rashid, Y., Mohd-Sofian, A. & Zakaria-Ismail, M. (2001) Diversity and distribution of Odonata (dragonflies and damselflies) in the freshwater swamp lake Tasek Bera, Malaysia. *Hydrobiologia*, 459, 135–146.
<http://dx.doi.org/10.1023/A:1012562611307>
- Norma-Rashid, Y., Zakaria-Ismail, M. & Hämäläinen, M. (1996) Odonate fauna from Kelantan, Pahang and Muar drainages, Malaysia. In: Zainal Abidin, A.N. & Zubaid, A. (Eds.), *Conservation and faunal diversity in Malaysia*. Penerbit Universiti Kebangsaan Malaysia, Bangi, pp. 129–139.
- Nylander, J.A.A. (2004) Mr Modeltest v2. Program distributed by the author, Evolutionary Biology Centre, Uppsala University, Uppsala.
- Orr, A.G. (2001) An annotated checklist of the Odonata of Brunei with ecological notes and descriptions of hitherto unknown males and larvae. *International Journal of Odonatology*, 4, 167–220.
<http://dx.doi.org/10.1080/13887890.2001.9748168>

- Orr, A.G. (2002) Notes on the *Rhinocypha cucullata* Selys group from Borneo, with a description of *R. viola* spec. nov. (Zygoptera: Chlorocyphidae). *Odonatologica*, 31 (3), 287–295.
- Orr, A.G. (2003) *A guide to the dragonflies of Borneo: their identification and biology*. Natural History Publications (Borneo), Kota Kinabalu, x + 195 pp.
- Orr, A.G. (2005) *A pocket guide: Dragonflies of Peninsular Malaysia and Singapore*. Natural History Publications (Borneo), Kota Kinabalu, vi + 127 pp.
- Paulson, D.R. (1981) Peculiar wing position in *Dysphaea dimidiata* Selys (Zygoptera: Euphaeidae). *Notulae Odonatologicae*, 1 (8), 134–135.
- Rambaut, A. (2014) FigTree. Available at <http://tree.bio.ed.ac.uk/software/figtree/>
- Ratnasingham, S. & Hebert, P.D.N. (2007) BOLD: the barcode of life data system (www.barcodinglife.org). *Molecular Ecology Notes*, 7, 355–364.
<http://dx.doi.org/10.1111/j.1471-8286.2007.01678.x>
- Ris, F. (1911) Libellen von Sintang, Borneo gesammelt von Dr L. Martin. *Annales de la Société Entomologique de Belgique*, 55, 231–255.
- Schmidt, E. (1934) Odonata der Deutschen Limnologischen Sunda-Expedition. 1. Imagines. Mit Beschreibungen zweier neuer *Ictinus* aus Celebes und Neu-Guinea. *Archiv für Hydrobiologie, Supplement-Band*, 13, 316–397, plates 14–17, excl.
- Seehausen, M. (2014) Forgotten duplicates from the Odonata collection of Edmond de Selys Longchamps rediscovered at the Übersee-Museum Bremen (Germany). *International Dragonfly Fund—Report*, 70, 1–15.
- Selys Longchamps, E. de (1853) Synopsis des Caloptérygines. *Bulletins de l'Académie royale des sciences, des lettres et des beaux-arts de Belgique*, 20 (Annexe), 1–73.
- Selys Longchamps, E. de (1859) Additions au synopsis des Caloptérygines. *Bulletins de l'Académie royale des sciences, des lettres et des beaux-arts de Belgique*, Series 2, 7, 437–451.
- Selys Longchamps, E. de (1869) Secondes additions au synopsis de Calopterygines. *Bulletins de l'Académie royale des sciences, des lettres et des beaux-arts de Belgique*, Series 2, 27, 645–680.
- Selys Longchamps, E. de (1873) Troisièmes additions au synopsis de Calopterygines. *Bulletins de l'Académie royale des sciences, des lettres et des beaux-arts de Belgique*, Series 2, 35, 469–519.
- Selys Longchamps E. de (1879) Quatrièmes additions au Synopsis des Caloptérygines. *Bulletins de l'Académie royale des sciences, des lettres et des beaux-arts de Belgique*, Series 2, 47, 349–409.
- Selys Longchamps, E. de (1889) Odonates de Sumatra comprenant les espèces recueillies à Pulo Nias par M. le Dr. E. Modigliani. *Annali Museo Civico Storia Naturale Genova*, 27, 444–484.
- Selys Longchamps, E. de & Hagen, H.A. (1854) Monographie des Calopterygines. *Mémoires de la Société Royale des Sciences de Liège*, 9, i–xi + 1–291, pls. 1–14, excl.
- Stamatakis, A., Hoover, P. & Rougemont, J. (2008) A rapid bootstrap algorithm for the RAxML web-servers. *Systematic Biology*, 57, 758–771.
<http://dx.doi.org/10.1080/10635150802429642>
- Tang, H.B., Wang, L.K. & Hämäläinen, M. (2010) *A photographic guide to the dragonflies of Singapore*. The Raffles Museum of Biodiversity Research, Singapore, 223 pp.
- Thompson, D.J. & van Tol, J. (1993) Damselflies and dragonflies from four forest types in Brunei. *Brunei Museum Journal*, 8, 57–72.
- Tsuda, S. & Kitagawa, K. (1988) Odonata of southeast Asia collected by the late Mr. M. Iwasaki. Part 2. Odonata of North Sumatra, Indonesia. *Gracile*, 39, 1–5.
- van Tol, J. (2006) Odonata. In: van Tol, J. (Ed.), *Gunung Lumut Biodiversity Assessment*. National Museum of Natural History Naturalis, Leiden, pp. 12–15.
Available from: https://science.naturalis.nl/media/medialibrary/2013/08/2005_gunung_lumut_report_pdf.pdf
- Wahizatul-Afzan, A., Julia, J. & Amirrudun, A. (2006) Diversity and distribution of dragonflies (Insecta: Odonata) in Sekayu Recreational Forest, Terengganu. *Journal of Sustainability Science and Management*, 1 (2), 97–106.
- Williamson, E.B. (1904) The dragonflies (Odonata) of Burma and Lower Siam. I. Subfamily Calopteryginae. *Proceedings of the United States National Museum*, 28, 165–187.
<http://dx.doi.org/10.5479/si.00963801.28-1389.165>
- Wilson, K.D.P. & Gibert, E. (2005) Endau–Rompin 20–24 July '04. *Agrion*, 9 (2), 26–28.
- Wilson, K.D.P. & Reels, G.T. (2001) Odonata of Hainan, China. *Odonatologica*, 30 (2), 145–208.