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Systematics of Indo-Pacific fireflies with a redefinition of Australasian *Atyphella* Olliff, Madagascan *Photuroluciola* Pic, and description of seven new genera from the Luciolinae (Coleoptera: Lampyridae)

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Abstract

This major systematic revision of fireflies (Coleoptera: Lampyridae) concentrates on the genera related to *Atyphella* Olliff in the Luciolinae. Seven new genera and 19 new species are described, which with two exceptions occur in the area encompassed by Australia, the Republic of Palau, Federated States of Micronesia, Papua New Guinea, Indonesia (West Irian), Solomon Islands, New Caledonia, Vanuatu and Fiji. Keys to the genera and subgenera of the Luciolinae are included. The revision is based upon a phylogenetic analysis of 343 morphological characters of males, females and larvae of 112 Luciolinae species, including the type species of the six genera and four subgenera of the Luciolinae *sensu* McDermott (1966). The genus *Atyphella* Olliff is redefined and redescribed from 23 species including 14 endemic Australian species, and nine species from the wider study area. *A. leucura* Olivier, *A. scabra* Olivier and *A. testaceolineata* Pic are redescribed. *A. palauensis* Wittmer is elevated to species level from *A. carolinae palauensis* Wittmer and redescribed. *Aquilonia* **gen. n.** is described for *Aq. costata* (Lea), transferred from *Atyphella* Olliff. *Convexa* **gen. n.** is described for *C. wolffi* (Olivier), transferred from *Atyphella*. *Gilvainsula* **gen. n.** includes the new species, *G. similismessoria* **sp. n.**, and *G. messoria* (Olivier), transferred from *Atyphella* Olliff. *Lloydiella* **gen. n.** includes four species; *Ll. majuscula* (Lea) transferred from *Atyphella*, and three new species, *Ll. japonensis* **sp. n.**, *Ll. uberia* **sp. n.**, and *Ll. wareo* **sp. n.** *Pygatyphella* (Ballantyne) is elevated to generic status from *Luciola* (*Pygatyphella*) Ballantyne and redescribed from 22 species including ten new species *Pygat. japonensis* **sp. n.**, *Pygat. karimui* **sp. n.**, *Pygat. kiunga* **sp. n.**, *Pygat. limbatifusca* **sp. n.**, *Pygat. nabiria* **sp. n.**, *Pygat. okapa* **sp. n.**, *Pygat. russellia* **sp. n.**, *Pygat. tomba* **sp. n.**, *Pygat. uberia* **sp. n.**, and *Pygat. wisselmerenia* **sp. n.**, with *uberia* representing specimens known in previous analyses as ‘Sisiak’. *Pygat. eliptaminensis* (Ballantyne), *Pygat. marginata* (Ballantyne), *Pygat. peculiaris* (Olivier) and *Pygat. pulcherrima* (Ballantyne) are transferred from *Luciola* (*Pygatyphella*) Ballantyne. *Pygat. tagensis* (Ballantyne), *Pygat. hounensis* (Ballantyne), *Pygat. obsoleta* (Olivier), and *Pygat. undulata* (Pic) are transferred from *Atyphella* Olliff; *Pygat. obsoleta* is reassessed, geographic varieties are suggested, and the species redescribed from a greatly expanded number of specimens. *Pygat. ignota* (Olivier), *Pygat. plagiata* (Blanchard) and *Pygat. salomonis* (Olivier) are transferred from *Luciola* Laporte and redescribed. *Pygat. limbatipennis* (Pic) is transferred from *Atyphella salomonis* var *limbatipennis* Pic, and redescribed. *Magnalata* **gen. n.** is described for three species, *M. rennellia* **sp. n.**, *M. limbata* (Blanchard) transferred from *Luciola*, and *M. carolinae* (Olivier) transferred from *Atyphella*. *Missimia* **gen. n.** is erected for a single species *M. flavida* **sp. n.** based on four specimens dealt with in previous phylogenetic analyses as ‘Mt Missim’. *PhoturoLuciola* Pic is elevated to generic status from *Luciola* (*PhoturoLuciola*) Pic and redescribed from its single species *Photuro. deplanata* Pic. *Asymmetricata* **gen. n.** is erected for two SE Asian species *As. ovalis* (Hope) and *As. circumdata* (Motsch.), both transferred from *Luciola* and redescribed. Where available, females are associated and are characterised briefly. *A. testaceolineata*, *M. limbata*, *Pygat. huonensis*, *Pygat. limbatipennis*, *Pygat. peculiaris*, and *Pygat. uberia* **sp. n.** are identified by light patterns. Discussion addresses: the interpretation of female aptery, the extent of the labrum, numbering of abdominal segments using actual segment number, and use of the term ventrite to reflect visible abdominal sternites. Functional morphology of many terminal abdomen modifications is addressed as is the range and nature of colour patterns. Determination of polarity in various states of bipartite light organs is overviewed, as are problems with the homology of characters, and difficulties in interpretation of characters in soft bodied insects especially those preserved in ethanol.

Key words: *Aquilonia* **gen. n.**, *Asymmetricata* **gen. n.**, *Convexa* **gen. n.**, *Gilvainsula* **gen. n.**, *Lloydiella* **gen. n.**, *Magnalata* **gen. n.**, *Missimia* **gen. n.**, *Pygatyphella* (Ballantyne), Australia, Republic of Palau, Federated States of Micronesia, Papua New Guinea, Indonesia, Solomon Islands, New Caledonia, Fiji, Vanuatu, taxonomy, new species, identification keys, morphological phylogenetic analysis