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The merging of taxonomy and conservation biology: a synthesis of Australian butterfly systematics (Lepidoptera: Hesperioidea and Papilionoidea) for the 21st century

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Abstract

Taxonomy is a major scientific discipline that underpins the preservation of biological diversity, but the discipline of taxonomy itself has, until recently, remained somewhat disconnected from conservation biology. Checklists summarise available taxonomic and systematic knowledge and in part provide a framework to optimise efforts and scarce resources for biodiversity conservation. Butterflies have been identified as a key bioindicator group of invertebrates for monitoring, assessing environmental change and for biodiversity conservation. A revised checklist of the butterflies (Hesperioidea: Hesperiidae and Papilionoidea: Papilionidae, Pieridae, Nymphalidae, Riodinidae, Lycaenidae) of Australia is presented, incorporating recent changes to both the higher and lower systematic levels of classification based on review of the literature, mandatory changes of specific epithets to achieve gender agreement, together with recommended common names. A total of 1,134 available species group names are listed, of which 423 are junior synonyms. Currently, 596 valid lower taxa (i.e. species and subspecies) are recognised in the fauna. Of the valid species, 430 are recorded from Australia, of which 404 occur on the mainland and Tasmania and 26 are restricted to remote oceanic islands. Gender changes affect 40 species/subspecies group names, of which 27 are valid taxa and 13 are junior synonyms. Comments are made on the size and composition of the fauna, taxonomic impediment, species concepts and utility of subspecies. Modelling the rate of species accumulation based on taxonomic research effort over the past 100 years using a generalized logistic function suggests that about 91% of the Australian butterfly fauna has been catalogued so far. A detailed review of known problems concerning the taxonomy among the lower systematic levels (i.e. genera, species and subspecies) is presented as candidates for future systematic research. Although Australian butterflies are relatively well-known taxonomically, it is estimated that there are approximately 40 species yet to be formally recorded/recognised and more than 60 problems at the lower systematic levels in which the nomenclature, taxonomic status of species/subspecies or monophyly of genera need to be resolved.

Key words: Biodiversity crisis, biodincator, butterfly, checklists, conservation biology, Lepidoptera, species concepts, taxonomic impediment