A SYNOPSIS OF THE NEOTROPICAL SPECIES OF ‘AESHNA’ FABRICIUS: THE GENUS RHIONAESCHNA FÖRSTER (ODONATA: AESHNIDAE)

This study includes a revisionary, phylogenetic and biogeographical analysis of Neotropical components of Aeshna Fabricius characterized by a midventral tubercle on abdominal sternum I. Phylogenetic relationships of the Neotropical species of Aeshna were inferred based on 39 adult characters. Ingroup taxa included 68 out of the 85 species currently assigned to Aeshna, and two species each of Andaeshna De Marmels and Anaciaeschna Selys. Oreaeschna dictatrix Lieftinck was chosen as outgroup. The strict consensus tree obtained after successive weighting revealed that Aeshna is not monophyletic; some of its species are more closely related to Anaciaeschna or Andaeshna. The name Aeshna should consequently be restricted to the Holarctic group including the type species Aeshna grandis Fabricius. In the present synopsis the generic name Rhionaeschna Förster is assigned to the New World group characterized by the presence of a conical tubercle on abdominal sternum I, comprising 39 species formerly assigned to Aeshna. The synopsis includes keys to adults of both sexes, diagnoses, biological notes, distribution maps and more than 400 diagnostic illustrations. Rhionaeschna demarmelisi n. sp. is described, R. maita Förster is considered a junior synonym of R. brevifrons (Hagen), R. peralta (Rix) is considered a valid species, not a synonym of R. variegata (Fabricius), R. planaltica (Calvert) is raised to specific rank, ‘Aeshna’ williamsoniana Calvert, formerly included in the subgenus Hesperaeschna Cockrell, is excluded from Rhionaeschna, and lectotypes are designated for R. maita, R. intricata (Martin), R. multicolor (Hagen), R. bonariensis (Rambur), R. diffinis (Rambur), and R. peralta. Females of three species and larvae of 16 species are still unknown. Rhionaeschna occurs from southern Argentina to southern Canada, but is primarily Neotropical with its highest diversity along the Andean mountain range between Venezuela and Bolivia. It is absent from the Amazon basin, only three species occur north to the Neotropical region. The sister group of Rhionaeschna includes some African species of ‘Aeshna’ (A. rileyi Calvert, A. subpupillata McLachlan and A. moori Pinhey). Rhionaeschna plus the African clade constitute the sister group of Andaeshna, Anaciaeschna, Anax Leach, Hemianax Selys and several species of ‘Aeshna’ of uncertain affinities (i.e. A. affinis Vander Linden, A. brevistyla Rambur, A. ellipta Kirby, A. mixta Latreille, A. inoeces Müller and A. williamsoniana); the phylogenetic relationships within this complex are not yet known and their resolution is beyond the scope of this study. Rhionaeschna is absent from the Brazilian shield. Its related species and genera (‘A.’ rileyi, ‘A.’ subpupillata, ‘A.’ moori in Africa; ‘A.’ brevistyla in Australia and New Zealand, Andaeshna in the Andes and ‘A.’ williamsoniana in Central America, ‘A.’ inoeces and highest species numbers of Anaciaeschna, Hemianax and Anax species in the Indo-Australian region) display a low diversity in Africa, which suggests a trans-Pacific rather than trans-Atlantic (Gondwanian) track, as has been hypothesized for other groups of similarly distributed odonates.

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The genus *Aeshna* was described by Fabricius in 1775 to include four species: *A. forcipata* Linnaeus, *A. grandis* Linnaeus, *A. variegata* Fabricius and *A. clavata* Fabricius. Selys (1883) fixed *A. juncea* as the type species of *Aeshna*, but as this species was not included in the original description of the genus, its designation is invalid according to the ICZN (1999). Latreille (1810) mentioned *A. forcipata* as the type species of *Aeshna*, but *Aeshna forcipata* of Latreille is a synonym of *Libellula vulgatissimus* and not the same species as *A. forcipata* Linnaeus, and thus it is also ineligible as the type species of *Aeshna*. Therefore, the first valid type designation is that of Cowley (1934), who designated *Aeshna grandis* as type species of *Aeshna*.

*Aeshna* was the first described genus of Aeshnidae, and the current number of genera within this family now stands at 50. Nineteen genera (40% of the total number of currently accepted genera) have been created to include species originally described as *Aeshna* as follows: *Amphiaceschna* Selys, 1871, *Anactaeschna* Selys, 1878, *Andaestheschna* De Marmels, 1994, *Basiaceschna* Selys, 1883, *Boyeria* McLachlan, 1896, *Calanteschna* Selys, 1883, *Casteraeschna* Calvert, 1952, *Coryphaeschna* Williamson, 1903, *Epiaeschna* Hagen, 1877, *Gomphouseschna* Selys, 1871, *Gynacantha* Hagen, 1867, *Hageneschna* Selys, 1883, *Planeschna* McLachlan, 1896, *Polycanthagyna* Fraser, 1933, *Remartinia* Navás, 1911, and *Staurophlebia* Brauer, 1865. No unique characters define *Aeshna*, its species being usually identified as those not belonging to other genera. Peters (1987) analyzed the European genera of Aeshnidae and concluded that *Aeshna* was not monophyletic, with *Aeshna affinis* van der Linden, 1820 and *A. mixta* Latreille, 1805 more closely related to *Anactaeschna* and *Anax* than to the remaining European *Aeshna* species.

The most recent treatment of the Neotropical species of *Aeshna* was by Calvert (1956). His study comprised species currently assigned to *Andaestheschna*, *Remartinia*, *Casteraeschna* and *Coryphaeschna*. Calvert (1956) included detailed redescriptions of all species but no diagnoses were provided outside the keys. The keys were based almost exclusively on thoracic color pattern, which can be intraspecifically variable, and several of his species accounts were composite descriptions of more than one species. For example, I found that *A. peralta* included specimens of *A. peralta*, *A. variegata* and *A. brasilensis*, *A. variegata* included *A. variegata* and *A. marchali*, *A. cornigera* included *A. cornigera* and *A. planaltica*, *A. planaltica* included *A. planaltica* and *A. nubigena*, *A. vingintipunctata* included *A. vingintipunctata*, *A. obscura* and *A. pallipes*, *A. intricata* included *A. intricata*, *A. brevicercia*, *A. fisifrons*, *A. intri-