

**PHENOLOXIDASE PRODUCTION:
THE IMPORTANCE OF TIME AFTER
JUVENILE HORMONE ANALOGUE ADMINISTRATION
IN *HETAERINA AMERICANA* (FABRICIUS)
(ZYGOPTERA: CALOPTERYGIDAE)**

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It has been suggested that juvenile hormone (JH) negatively affects the phenoloxidase (PO), a key enzyme of the immune response in invertebrates. However, this negative effect has only been recorded over a short time period (2 to 3 h) after the administration of JH (or a JH analog). In the present study, using *H. americana*, it was corroborated that PO decreased a short time (3 h) after the administration of methoprene, a JH analog (JHa), but no effect was observed 24 h after the JHa application. This suggests that the time after the application of JHa should be taken into account in order to assess its actual effect on the immune response and PO expression and in studies that use the JH as a link between secondary sexual characters and immune response.

**NO FIRM EVIDENCE OF IMMUNOLOGICAL COSTS
OF INSECT OVIPOSITION AND COPULATION:
A TEST WITH DRAGONFLIES
(ZYGOPTERA)**

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The immune response is a costly trait as investment in immunity is frequently traded off against life history components. In insects, for example, experimental tests have provided evidence that oviposition and copulatory activities impair immune ability in the form of encapsulation ability. Here such tests are replicated by using four zygopteran spp., viz. *Argia joergenseni*, *Calopteryx splendens*, *C. virgo* and *Hetaerina americana*, having encapsulation, phenoloxidase and nitric oxide activity – three key components in the insect immune response – as dependent variables. The results provide no consistent results. Only in *A. joergenseni* there was any evidence of oviposition activity (or, in the case of *H. americana*, submergence) affecting encapsulation, but neither in *C. splendens* nor in *H. americana* did copulation have any such effect. In *H. americana*, nitric oxide activity was lower in ♀♀ that had been submerged but there was no effect on phenoloxidase activity. Thus, former observations indicating that oviposition and copulation negatively affect the immune response, cannot be generalized.

**ADDITIONS AND REFINEMENTS TO THE MOLECULAR
PHYLOGENY OF THE CALOPTERYGINAE S.L.
(ZYGOPTERA: CALOPTERYGIDAE)**

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Of 8 previously unstudied calopterygine taxa, the ITS 1 and 2 was sequenced and inserted into a pre-existing phylogenetic tree of all Eurasian and American genera. ITS is mainly appropriate for looking at shallow phylogenetic relationships, and resolved the relationship within and between genera best, with weak support for relationships at the subfamily level. Thus, *Atrocalopteryx-Matrona* was found to be a complex but very robust clade, while *Vestalis* s.l. was confirmed to consist of 2 distinct genera. The generic versus specific or subspecific status of few other taxa is discussed. Within *Mnais* and *Vestalis*, the position was tested of 2 suspected “aberrant” members, *M. gregoryi* and *V. beryllae*. Both were confirmed to belong to the genera to which they had been traditionally assigned.

SHORT COMMUNICATIONS

***DESMOGOMPHUS ANCHICAYENSIS* SPEC. NOV.
FROM COLOMBIA
(ANISOPTERA: GOMPHIDAE)**

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The new sp. is described and illustrated based on larvae collected in the Anchicayá zone, Valle del Cauca, Colombia. Holotype ♂: F2 larva, 12-IX-2008; deposited in Instituto de Ecología, Xalapa, Mexico. It differs from the 2 described congeners in the position of dorsal and lateral abdominal hooks, the presence of a beveled edge in the dorsal surface of the prementum and an angled ventral margin of the paraprocts. Specimens are rare and difficult to collect because they inhabit threatened habitats in an area restricted to researchers.

**EFFECT OF PAPER MILL EFFLUENT ON THE EGG CHORION
OF THE DRAGONFLY *ANAX GUTTATUS* (BURMEISTER)
(ANISOPTERA: AESHNIDAE)**

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The egg of *A. guttatus* is endophytic and is cylindrical with a pointed anterior and a rounded posterior end. The chorion is divided into 2 layers, a thin, outer exochorion and a tough, thick, inner endochorion. The exochorion is modified anteriorly into a collar which is sculptured with 18-20 tiers of rectangular hexagonal impressions. Profound morphological and structural modifications are found in the eggs incubated in paper mill effluent for 5 days. The eggs became distorted due to swelling and the posterior rounded end became angular. The membranous exochorion degraded and transformed into thin, plate-like flakes which are shed, exposing the endochorion. The non-laminated, uniformly thick endochorion is converted into a laminated structure of overlapping plates with uneven thickness. The collar became pitted with minute perforations and started to disintegrate and detach from the egg and the hexagonal impressions became obliterated. 100% mortality was found in paper mill effluent treated eggs for 5 days, whereas eggs kept in pond water only had 10-13% mortality.

***ATROCALOPTERYX MELLI OROHAINANI* SSP. NOV.
ON THE ISLAND OF HAINAN, CHINA
(ZYGOPTERA: CALOPTERYGIDAE)**

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The new sp. is described from the mountain core of Hainan, southern China, where it usually occurs at altitudes not lower than 300 m asl. It lives on the same type of small, shaded rivers as the nominate ssp. on the continent, and is distinguished by its larger size, slightly less enfumed wings, and a 2.6% difference in the sequence of the barcoding portion of the mitochondrial DNA-cytochrome c oxidase subunit I gene (COI). Holotype ♂: Diaoluoshan mountain, 6-VIII-2011; deposited in the Inst. Hydrobiol., Jinan Univ., Guangzhou. It is argued that this geographically defined ssp. evolved because of persistent poor gene flow with continental populations, caused by the lowland “panhandle” between Hainan and the continent. This barrier was probably functioning equally well during interglacials (like at present) as during pleniglacials (when Hainan was connected to the mainland), because lack of suitable environments (small sized running waters), and dry and cold conditions continued to limit the contact with *A. melli* of the mainland.

**ON THE GENERIC STATUS OF *SCHIZOCORDULIA*
MACHADO, 2005 (ANISOPTERA: CORDULIIDAE)**

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R.W. GARRISON et al. (2006, *Dragonfly genera of the New World*, Hopkins Univ. Press, Baltimore) synonymized *Schizocordulia* Machado, 2005 with *Aeschnosoma* Selys, 1870, alleging that the characters used to separate them are specific rather than generic. However, a study of the literature revealed that except for size all these characters have always been regarded as generic and therefore *Schizocordulia* is revalidated as a good genus.

**DESCRIPTION OF THE LARVA OF *BOYERIA CRETENSIS*
PETERS AND COMPARISON WITH *B. IRENE*
(FONSCOLOMBE) (ANISOPTERA: AESHNIDAE)**

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B. cretensis larva, endemic to the Mediterranean island of Crete, is described and illustrated from specimens collected at the Mili river near Rethymno in NW Crete, Greece and biometric data are provided from larval stadia F-0 to F-6. Based on a biometric analysis, exuviae of the W Palaearctic *B. cretensis* and *B. irene* have been compared. In respect to some characters only small morphological differences have been found. However, major differences exist in the length of the body, abdomen, cerci, prementum and paraprocts; also in the paraproct-epiproct ratio; this applies to both males and females. Measurements of *B. irene* need to be taken from a wider geographical range to cover the variation in this species; this is discussed.

**DESCRIPTION OF THE LAST INSTAR LARVA
OF *AMPHIGOMPHUS HANSONI* CHAO,
WITH NOTES ON THE SYSTEMATIC STATUS
OF THE GENUS *AMPHIGOMPHUS* CHAO
(ANISOPTERA: GOMPHIDAE)**

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The larva is described and illustrated based on 2 specimens from Fujian province (China), and a comparison with *Nihonogomphus lieftincki* and *Orientogomphus armatus* larvae is provided. Judging from larval morphological characters, the genus *Amphigomphus* is closer to *Orientogomphus* than to *Nihonogomphus*.