Odonatologica 39(3): 185-193 *September 1, 2010*

HABITAT ASSOCIATIONS OF ODONATA IN MOUNTAINOUS WATER SITES IN NORTHEASTERN PORTUGAL

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Received September 19, 2008 / Revised and Accepted May 12, 2010

A total of 19 spp. (9 Zygoptera and 11 Anisoptera) was recorded in a survey carried out at 28 water sites located in the Alvão Natural Park, NE Portugal. Multivariate statistical procedures were used to analyse the relationship between the spp. and the characteristics of their habitat, in order to determine different spp. biotope preferences. Aside from spp. with unspecific habitat requirements, 2 main species assemblages could be detected. *Enallagma cyathigerum, Sympetrum fonscolombeii, S. sanguineum, Ischnura pumilio, Lestes virens* and *Anax imperator* preferred permanent water bodies characterized by high temperatures, while *Calopteryx virgo*, *Pyrrhosoma nymphula*, *Cordulegaster boltonii* and *Onychogomphus uncatus* preferred sites with fast-flowing water characterized by low and moderate temperatures. Conservation strategies should take these patterns and habitat requirements into consideration.

Odonatologica 39(3): 195-215 *September 1, 2010*

THREE NEW *DREPANOSTICTA* SPECIES FROM SRI LANKA (ZYGOPTERA: PLATYSTICTIDAE)

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Received March 8, 2010 / Revised and Accepted March 30, 2010

D. mojca sp. n. (holotype ♂: 10km NEE of Deniyaya; Matara distr.; Southern prov.; N 6.36^0, E 80.46^0; 02-V-2003; to be deposited at Sri Lanka National Museum, Colombo), *D. bine* sp. n. (holotype ♂: Opanayake, Ratnapura distr.; Sabaragamuwa prov.; N 6.62^0, E 80.66^0; 13-X-1970; deposited at National Museum of Natural History, Smithsonian Institution, Washington, USA) and *D. anamia* sp. n. (holotype ♂: Katugas Falls near Ratnapura; Ratnapura distr.; Sabaragamuwa prov.; N 6.68^0, E 80.41^0; 04-V-2003; to be deposited at Sri Lanka National Museum, Colombo), are described. Their currently known distribution, phenology, ecology and threat status are presented and discussed. The remarkable *Drepanosticta* diversity in Sri Lanka makes the island a globally important Platystictidae hotspot.

Odonatologica 39(3): 217-224 *September 1, 2010*

SEX RATIOS AT EMERGENCE IN POPULATIONS OF SOME CENTRAL EUROPEAN GOMPHIDAE SPECIES (ANISOPTERA)

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Received March 12, 2010 / Revised and Accepted April 1, 2010

At emergence (F-0) a significant bias for ♀♀ was observed within the Moravian (Czech Republic) populations of *Gomphus flavipes* (Charp.), *G. vulgatissimus* (L.) and *Ophiogomphus cecilia* (Fourcroy). ♂♂ represented 45.6% of all specimens (43.5% in the first and 46.4% in the second research year). The results of the χ^2 test supported the ♀-biased sex ratio in populations of all 3 spp. The sex ratio in populations varied significantly in time during the emergence season, caused by the fact that all 3 spp. demonstrated a significant protandric trend. The greatest changes in sex ratio during the emergence season were demonstrated by *G. flavipes* (coefficient value -0.007542); the smallest were recorded in *G. vulgatissimus* (CV -0.008617). Environmental impact did not prove to act be a factor which has an effect on the sex ratio of species with phenotypical determination of sex.

Odonatologica 39(3): 225-234 *September 1, 2010*

BEHAVIOURAL RESPONSES OF *ENALLAGMA* TO CHANGES IN WEATHER (ZYGOPTERA: COENAGRIONIDAE)

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Received June 15, 2009 / Revised and Accepted February 17, 2010

Odonates exhibit a variety of weather associated behaviours, including abandoning ponds just before storms begin. They may be able to detect changes in weather that alert them to approaching storms and allow them to escape the water's edge before it begins to rain. *E. annexum* and *E. boreale* were observed at a Colorado marsh (USA) to determine which weather factors contributed to the weather-induced behaviours they exhibit. They were observed for 191 five-minute periods and their flight activity quantified. Weather parameters were measured during each interval to account for rapid changes in conditions. Based on results from multiple regression analysis, it is clear that light intensity is the strongest weather parameter affecting zygopteran flight activity, but temperature, wind speed, and the presence of rain are also significant. The 2 spp. exhibited pond abandonment behaviour during storms. It is likely that storms are dangerous to zygopterans and their apparent ability to detect impending storms is a survival mechanism. Alternatively, pond abandonment behaviour may be triggered by the same factors necessary to trigger roosting and the zygopterans simply return to their roosting sites during storms.

Odonatologica 39(3): 235-241 *September 1, 2010*

A SCANNING ELECTRON MICROSCOPE STUDY OF THE ANTENNAL SENSILLA IN ADULT ZYGOPTERA

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Received October 18, 2009 / Revised and Accepted March 26, 2010

Scanning electron microscope studies of the antennal flagella of *Coenagrion puella* and *Ischnura elegans* (Coenagrionidae), *Platycnemis pennipes* (Platycnemididae), *Lestes barbarus*, *L. viridis* (Lestidae), *Calopteryx virgo* and *C. haemorrhoidalis* (Calopterygidae) reveal the presence of pits containing sensilla on the latero-ventral side of the antenna. All these pits are the opening of deep cavities bearing the same sensilla previously described on Anisoptera antennae. These sensilla are represented by: (i) coeloconic porous sensilla, visible on the antennal surface, whose structure is in agreement with that reported for single walled olfactory receptors, and by (ii) two types of sensilla styloconica (type-1 and type-2), located at the bottom of the cavities and sharing common features typical of thermo-hygroreceptors. The present data allow us to extend previous considerations on the sensory role of the dragonfly antennae to the whole order Odonata, suggesting that olfaction, together with the ability to perceive temperature and humidity, are the main sensory functions of the antennae of these insects.

Odonatologica 39(3): 243-252 *September 1, 2010*

FIRST RECORD OF PARASITIZED *TRITHEMIS PALLIDINERVIS* (KIRBY) FROM TAMIL NADU, INDIA BY *ARRENURUS* LARVAE, WITH A DESCRIPTION OF LARVAL MORPHOLOGY (ANISOPTERA: LIBELLULIDAE; ACARI: HYDRACHNIDIA)

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Received March 18, 2010 / Revised and Accepted March 31, 2010

Out of a total of 20 adult *T. pallidinervis* specimens (Odonata), collected in Tamil Nadu, India, 164 larvae of *Arrenurus* sp. were found; prevalence: 57.5%, intensity: 5-12. They were attached to the mesosternum and metasternum. Their morphology is very similar to that of *A. cuspidator* and *A. maculator*, but differs by the absence of Mp1 tripartite seta, V2 seta and secondary seta in PIII 1 and the presence of secondary setae on both sides of V3 setae. They also differ from *A. maculator* by the absence of hairbrush on the base of C1 seta.

Odonatologica 39(3): 253-258 *September 1, 2010*

SPERM TRANSFER PROCESS IN THE NON-TERRITORIAL *ISCHNURA ASIATICA* (BRAUER) DURING COPULATION (ZYGOPTERA: COENAGRIONIDAE)[1]

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Received October 29, 2009 / Reviewed and Accepted December 5, 2009

According to the movements of the ♂ abdomen, the copulation process in *I. asiatica* is divided into 3 stages (I, II and III). The mean duration of each stage was 75.8 ± 8.8 min, 6.4 ± 0.3 min and 15.8 ± 0.9 min for stage I, II and III, respectively (S.E.). No sperm transfer was found during stage I. The prolonged duration in stage I was related to the time of onset of copulation. Sperm was transferred into the bursa copulatrix during stage II. Although stage III was a phase without apparent abdominal movement, the sperm transfer was continued, following the sperm migration from the bursa copulatrix to the spermatheca. Immediately after copulation termination, the estimated number of sperm was 64,500 ± 4,425 in the bursa copulatrix and 43,143 ± 6,397 in the spermatheca (S.E.). The role of each stage in copulation will be discussed from the viewpoint of sperm competition.

Odonatologica 39(3): 259-264 *September 1, 2010*

SHORT COMMUNICATION

THE LARVA OF *APANISAGRION LAIS* (BRAUER *IN* SELYS) (ZYGOPTERA: COENAGRIONIDAE)

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Received April 26, 2010 / Reviewed and Accepted May 21, 2010

The larva is described and illustrated, based on material from Mexico. It is characterized by having 5+2 or 5+3 premental setae, 7 palpal setae, abdomen granular, caudal lamellae apically widened, female gonapophyses exceeding sternite 10, and male cerci sharply pointed.