

## ODONATA OF THE WESTERN BLACK SEA REGION OF TURKEY, WITH TAXONOMIC NOTES AND SPECIES LIST OF THE REGION

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40 spp./sspp. from 58 localities were recorded during 2003 and 2005-2007. *Sympetma fusca*, *Erythromma lindenii*, *Somatochlora meridionalis*, *Orthetrum albistylum* and *Sympetrum pedemontanum* are new for the region. *S. meridionalis* records are the easternmost within its range. Geographical distribution of some other spp. is discussed, and notes on the morphology and taxonomic status of the regional *Calopteryx splendens*, *C. virgo*, *Ischnura elegans* and *Cordulegaster insignis* are provided. The distributions of *Coenagrion pulchellum*, *C. scitulum*, *Pyrrhosoma n. nymphula*, *Aeshna cyanea*, *Cordulia aenea* and *Sympetrum depressiusculum* in Turkey are still largely unknown. Based on all available records, a list of the 51 spp./sspp. currently known from the Western Black Sea Region is presented.

**SPATIAL DISTRIBUTION AND SPECIES COMPOSITION  
OF LARVAL ODONATA IN THE ARTIFICIAL REED  
COMMUNITY ESTABLISHED AS A HABITAT FOR  
*MORTONAGRION HIROSEI* ASAHINA  
(ZYGOPTERA: COENAGRIONIDAE)**

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Yearly changes in the odonate larval community were surveyed for 4 yr after setting up an artificial reed community adjacent to the original habitat of *Mortonagrion hirosei*, an endangered brackish water sp. Only *M. hirosei* larvae were found in the original habitat during the survey period. In the first yr of the established habitat, *Ischnura senegalensis* was the dominant sp. in the larval community. Although the abundance of *M. hirosei* larvae increased year by year, becoming the most abundant sp. after the second year, the species composition of the larval community of the established habitat was different between the West and East because of environmental factors, such as saline concentration and reed shoot density. *M. hirosei* larvae had expanded their distribution to the entire area of the established habitat in 2005, while the distribution of *I. senegalensis* had been restricted to several patchy areas in accordance with a decrease in their population. There was a negative relationship between the number of *M. hirosei* and *I. senegalensis* larvae. The prey-predator relationship and competitive relationship between the 2 spp. should have affected the population dynamics and distribution of *M. hirosei*. The odonate larval community and habitat environment that is optimal for *M. hirosei* conservation are discussed from the viewpoint of both biotic and abiotic factors.

**DESCRIPTION OF THE LARVA OF *ACANTHAGRION*  
*QUADRATUM* SELYS, WITH A KEY TO THE KNOWN LARVAE  
OF THE GENUS (ZYGOPTERA: COENAGRIONIDAE)**

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The larva is described, illustrated, and compared with other described congeneric larvae. *A. quadratum* is distinguished from all others by possessing 3 premental setae, 4 setae on labial palp, and caudal lamellae 8-10 times longer than their widest part. A key to the 9 known congeneric larvae is provided

## A COMPARATIVE INVESTIGATION OF THE ANTENNAL SENSILLA IN ADULT ANISOPTERA

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A fine structural overview of the flagellar sensilla of *Onychogomphus forcipatus* (Gomphidae), *Aeshna cyanea* (Aeshnidae), *Somatochlora metallica* (Cordulidae) and *Cordulegaster boltonii* (Cordulegastridae) revealed the presence of pits containing sensilla typically located on the latero-ventral side of the first flagellar segments in all four species. These sensilla are represented by coeloconic single-walled olfactory sensilla and deeply sunken sensilla styloconica (type-1 and type-2) sharing common features typical of thermo-hygroreceptors. Sensilla styloconica are located inside deep convoluted cavities. It is suggested that olfactory and thermo-hygroreceptive sensilla are the main sensilla on the antennae of all anisopteran families. The attribution of the coeloconic sensilla of dragonflies to single-walled olfactory sensilla (confirmed by the finding of pore tubules in *O. forcipatus*), together with their common occurrence in the suborder Anisoptera, are relevant for phylogenetic studies.

**GEOMETRIC MORPHOMETRIC ANALYSIS OF WING  
SHAPE VARIATION IN TEN EUROPEAN POPULATIONS OF  
*CALOPTERYX SPLENDENS* (HARRIS, 1782)  
(ZYGOPTERA: CALOPTERYGIDAE)**

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The wings of 10 *C. splendens* populations were examined by landmark-based geometric morphometric analysis. Subspecific taxa in this group are currently based on wing spot size in ♂♂. Here, the variation in wing shape and size is evaluated, to test whether shape is different at a population level, and whether this has implications at a taxonomic level. It was found that Geometric Morphometrics successfully discriminates populations; overall wing shape significantly differed between populations but the results were only partly compatible with taxonomic studies based on wing spot size. Irrespective of wing spot, all populations showed differentiation in wing shape even though not in wing size; 4 groups were recognized based on wing shape: (1) Turkish1 population; (2) Spanish, Finnish, Russian and Turkish2 populations; (3) Italian, German and French populations; (4) Greek and Albanian populations. Ordination of the populations based on consensus data and cluster analysis phenogram confirmed such a pattern. The Spanish population (*C. xanthostoma*), did not show a strong identity, while the Turkish1 (*C. s. waterstoni*) was quite isolated. The Italian population (*C. s. caprai*) showed more relation to the French (*C. s. faivreii*) and German populations than to Albanian and Greek populations.

SHORT COMMUNICATIONS

**FINE STRUCTURE OF THE EGG CHORION IN TWO  
ANISOPTERAN DRAGONFLIES FROM CENTRAL INDIA  
(LIBELLULIDAE)**

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The fine structure of the egg chorion in *Brachydiplax sibirina* (Ramb.) and *Orthetrum s. sabina* (Dru.), is described using the scanning electron microscope. The unwetted eggs of *B. sibirina* are bluish-green and spindle-shaped while those of *O. s. sabina* are oval and light brown in colour. The egg chorion is distinctly divided into an outer exochorion and an inner tough endochorion. The exochorion expands into a thick, sticky, jelly-like structure in water during oviposition, whereas the endochorion remains unchanged. The endochorion is thin and smooth in *O. s. sabina*, but in *B. sibirina* the undersurface of the endochorion is pitted and rough. The apical micropylar apparatus is composed of a sperm storage chamber (atrium) and a median projecting stalk, which possesses a pair of sub-terminal orifices. The atrium in *B. sibirina* is dome shaped with a tiny stalk whereas in *O. s. sabina* the micropylar apparatus is triangular with a longer stalk and a pair of almost apically placed orifices. Significant variations occur in the shape and size of the micropylar apparatus. The functional interrelationship of the micro morphological modifications in the chorionic structures is discussed.

**DESCRIPTION OF THE LARVA OF  
*MACROTREMIS MEURGEYI* DAIGLE  
FROM THE LESSER ANTILLES  
(ANISOPTERA: LIBELLULIDAE)**

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The last instar larva is described and illustrated for the first time, and compared with the known congeneric larvae from the Caribbean. Its peculiarities are: size reduction of dorsal hooks, the presence of a dorsal hook on segment 2, and the absence of dorsal hooks on segments 6-9. *M. meurgeyi* has a triangular ligula with 10 premental setae and 6 palpal setae. Notes on the ecology of this lotic sp. are provided.

**DESCRIPTION OF THE LAST INSTAR LARVA  
OF *HYLAEOTHEMIS CLEMENTIA* RIS FROM LAOS  
(ANISOPTERA: LIBELLULIDAE)**

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The larva is described and illustrated for the first time, based on the last instar exuvia. It is compared with the known Tetrathemistinae larvae and appears similar to the African *Neodythemis* rather than to the Asian members of the subfamily.