

DESCRIPTION OF *CALOPTERYX WATERSTONI* SPEC. NOV.
FROM NORTHEASTERN TURKEY (ZYGOPTERA: CALOPTERYGIDAE)*

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C. waterstoni sp. n. (♂ holotype, ♂ and ♀ paratypes: Trabzon, Turkey, 23.-25.VIII.1959 and 18.VII.1960) is described, figured and compared with *C. hyalina*, a Levantine endemic. *C. waterstoni* is regarded as a representative of the Caucasian fauna which extends along the Pontic coast of Turkey.

INTRODUCTION

So far only two *Calopteryx* species with totally hyaline wings in both sexes are known from the western palearctic region. Both form part of the circum-mediterranean *Calopteryx* species flock and their distribution is confined to relatively small areas: *Calopteryx exul* Selys, 1853 is a Maghrebian endemic (Morocco, Algeria), the second, *C. hyalina* Martin, 1909, is a Levantine endemic (Syria, Lebanon and Israel). Both were at one time considered as subspecies of *C. splendens* (Harris, 1782) (SELYS, 1849; MARTIN, 1909); only lately were they given full specific status by some taxonomists (ST. QUENTIN, 1965; LIEFTINCK, 1966; DUMONT, 1972a, 1977; SCHNEIDER, 1981, 1983).

While working in the dragonfly collection of the Royal Scottish Museum (Edinburgh, Scotland) a series of *Calopteryx* specimens with hyaline wings in both sexes from NE Turkey attracted my attention. They turned out to belong to an undescribed species.

* Results of the travels of R. KINZELBACH to the countries of the Middle East, No. 85.

DESCRIPTION

CALOPTERYX WATERSTONI SP. N.

(Figures 1, 2, 4, 6)

Material. — Holotype ♂ (deposited in the Royal Scottish Museum = RSM, Edinburgh, Scotland): 25-VIII-1959, Trabzon (Turkey), at sea level; 41° 00'N/39° 43'E; K.M. Guichard leg. For type locality cf. Figure 1. Paratypes: 5 ♂, 7 ♀ (deposited in the RSM and the Senckenberg Museum, Frankfurt a. M., FRG; 23-VIII & 25-VIII-1959 and 18-VII-1960; same collector and locality as for holotype.

Comparative material. — *Calopteryx hyalina*: specimens of both sexes from Syria (including ♂ lectotype, paralectotypes and topotypical material from the Lake of Homs; for details cf. SCHNEIDER, 1981, 1983), Lebanon and Israel.

Derivatio nominis. — The species name is dedicated to Dr A.R. WATERSTON (Edinburgh, Scotland).

Male. — Abdomen without appendages 32.6-37.8 mm ($n=6$, $\bar{x}=35.4$ mm, holotype: 37.8 mm); right forewing 26.3-29.1 mm ($n=6$, $\bar{x}=28.2$ mm, holotype: 28.7 mm); right hindwing 25.0-28.1 mm ($n=6$, $\bar{x}=27.2$ mm, holotype: 27.9 mm).

Head, prothorax, mesepisterna and abdomen metallic ultramarine blue; thorax and abdomen laterally metallic green. For wing-venation cf. Figure 2; male anal appendages as in Figure 4. Inferior appendages ending with an inner tooth; second, outer tooth almost atrophied. In dried specimens ventrum of abdominal segment 10 and ventral surface of inferior appendages dull yellow, the ventra of the other segments more ochreous. Along the median carina of the sterna of abdominal segments 8 and 9 dark stripes with a pair of lateral dark spots on each ventrum (Fig. 6).

Female. — Abdomen without appendages 31.6-37.4 mm ($n=$, $\bar{x}=33.8$ mm); right forewing 28.6-32.8 mm ($n=4$, $\bar{x}=31.4$ mm) right hindwing 27.8-31.5 mm ($n=4$, $\bar{x}=30.3$ mm).

Head, thorax and abdominal segments 1 to 4 metallic green; abdominal

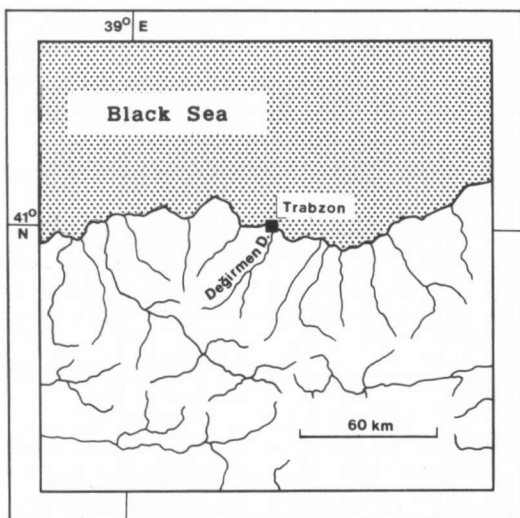
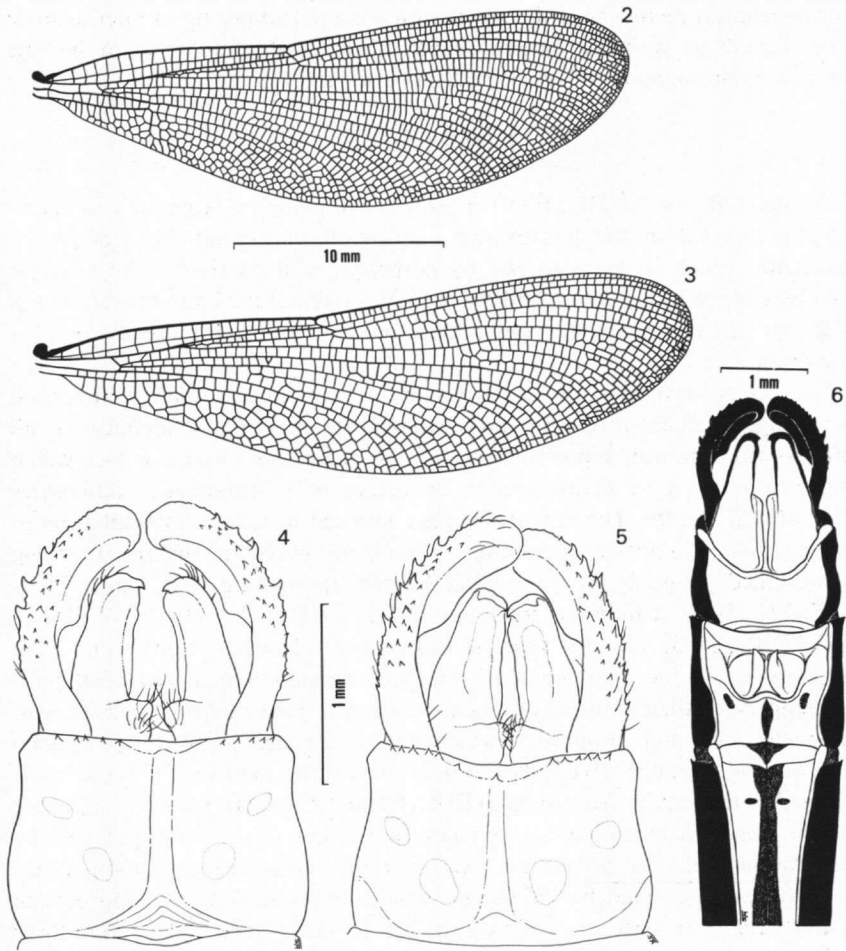


Fig. 1. *Calopteryx waterstoni* sp. n.: topographic position of the type locality.



Figs 2-6. *Calopteryx waterstoni* sp. n. and *C. hyalina* (Martin): (2-3) Right forewing of male: (2) *C. waterstoni*, paratype 1, (3) *C. hyalina*, Naba al-Barada, Syria; — (4-5) Male anal appendages, dorsal view: (4) *C. waterstoni*, holotype, (5) *C. hyalina*, Naba al-Barada, Syria; — (6) *C. waterstoni*, holotype ♂: last abdominal segments, ventral view.

segments 5 to 10 copper-coloured. Shape and venation of wings as in males; pseudopterostigma white, covering 3 to 5 cells in both wings, measuring 1.1-1.8 mm in the fore- and 1.0-1.8 mm in the hindwings; the radius is just slightly curved below the pseudopterostigma.

Diagnosis. — A distinct member of the genus *Calopteryx* Leach, 1815 with hyaline wings in both sexes; wing-venation more open than in all other circum-

-mediterranean members of the genus with coloured wings; tip of inferior male anal appendages with only one tooth. Distribution: only known from the type locality, Trabzon, on the Black Sea coast (Turkey).

DISCUSSION

As pointed out by DUMONT (1977) the typological approach of many investigators led to the unsatisfactory situation of present day *Calopteryx* taxonomy which is characterized by nomenclatorial confusion. All Oriental members of the genus are urgently in need of revision. I therefore hesitated for a long time to describe a new species, adding another name to the already complex nomenclature.

Characters conventionally used in dragonfly taxonomy (e.g. male genitalia and appendages, female pronotum and ovipositor) are virtually identical in all circum-mediterranean representatives of the genus *Calopteryx*, a fact which makes it difficult to define species by means of morphological differences (DUMONT, 1972b). The absence of a pronounced structural differentiation of the genitalia in *Calopteryx* species may be explained by the fact that interbreeding is prevented primarily by ethological barriers (pre mating RIBs sensu TENNESSEN, 1982). Studies carried out by BUCHHOLTZ (1951, 1955) and HEYMER (1973) revealed that in *Calopteryx* adequate visual stimuli are prerequisites to the recognition of conspecific mates and a successful pair-forming. According to these authors males have a "female schema" consisting of "characteristics and properties which taken together elicit the courtship behaviour of the male" (HEYMER, 1977). Very little is known about the "male schema" of the female. According to BUCHHOLTZ and HEYMER (l.c.) visual stimuli presented by the males are colour and shape of the wing spot and the colouration of the last abdominal sterna. Consequently heterospecific pairings are above all prevented by the female, who only responds by the appropriate mating behaviour when she perceives the correct visual stimuli. Therefore these male characters are unambiguous and not subject to much variation. The fact that in east-mediterranean *Calopteryx* species only female morphs are to be found (e.g. in *intermedia*, *migrellica* and *syriaca*) is in agreement with this reasoning. I conclude that *C. waterstoni* is, as *C. exul* and *C. hyalina*, reproductively isolated from sympatric congeners with coloured wings and merits full specific status.

The question whether there is a genetical relation between *waterstoni* and *hyalina* or whether these two species have evolved independently from different ancestors will remain open until a revision of all Oriental *Calopteryx* species has been carried out and more is known on the distribution of *waterstoni*. The occurrence of *C. waterstoni* on the Pontic coast of Turkey suggests that it is another representative of the so-called "Caucasian fauna" which seems to extend further west than believed so far. Besides the considerable disjunction between

Table I

Ratio between greatest length and breadth of right forewing in *Calopteryx waterstoni* sp. n. and *C. hyalina* (Martin)

Species and sex	Mean	Range
<i>waterstoni</i> ♂ (n=6)	3.3	3.2 - 3.3
♀ (n=7)	3.6	3.5 - 3.6
<i>hyalina</i> ♂ (n=6)	3.6	3.4 - 3.7
♀ (n=11)	3.6	3.4 - 3.7

the distribution areas of *C. waterstoni* and *hyalina*, morphological differences justify the separation of the two taxa. The wings are more densely reticulated in *waterstoni*. The wings of *waterstoni* males are significantly broader than those of *hyalina* males as expressed by the ratio of greatest length to greatest breadth of the forewing. This does not apply to females (Tab. I). The inferior anal appendages of the males end with a single tooth in *C. waterstoni* while there are two teeth in *C. hyalina* (Figs 4, 5). Contrary to *C. hyalina*, males of *waterstoni* have black markings on sterna 8 and 9 (Fig. 6).

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