



NOTES ON CROATIAN JUMPING SPIDERS (ARANEAE: SALTICIDAE) FROM DALMATIA AND FROM THE KVARNER

LUDĚK J. DOBRORUKA

Bílá Třemešná 183, CZ-544 72, Czech Republic
(e-mail: l.j.dobroruka@worldonline.cz)

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During a survey carried out between 1994 and 2002 165 specimens of jumping spiders (29 species) from 15 localities in Croatia were recorded and investigated. For most species, short ecological data are given. A new combination is proposed: *Saitis imitata* (Simon, 1862) ex *Pseudeuophrys*. The epigyne and its internal structure of *S. imitata* are described in detail and illustrated for the first time. The species *Saitis sanctaeufemiae* Kolosváry, 1938 was excluded from the fauna of Croatia. *Marpissa nivoyi* is reported as new for the territory of Croatia.

Key words: Arachnology, Salticidae, *Saitis*, fauna, Croatia, Dalmatia, Kvarner

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Tijekom istraživanja od 1994. do 2002. godine na 15 lokaliteta zabilježeno je 165 primjeraka pauka skakača (29 vrsta). Za većinu vrsta daju se kratki ekološki podaci. Predlaže se nova kombinacija: *Saitis imitata* (Simon, 1862) ex *Pseudeuophrys*. Po prvi put se detaljno opisuje epiginij i njegova unutrašnja struktura kod *S. imitata*. Vrsta *Saitis sanctaeufemiae* Kolosváry, 1938 odbacuje se za faunu Hrvatske, a kao nova za Hrvatsku zabilježena je *Marpissa nivoyi*.

Ključne riječi: arahnologija, Salticidae, *Saitis*, fauna, Hrvatska, Dalmacija, Kvarner

INTRODUCTION

The Balkan Peninsula can be considered as one of important centers of the distribution of European arachnofauna. In the Croatian spider fauna, the territory of Dalmatia reveals considerably differences as compared to the Croatian inland, caused by the different paleo-environmental changes during the Pliocene and the subsequent changes in climatic conditions and biomes (LATTIN, 1967). The main vegetal formation in Dalmatia is hard-leaf evergreen brushwood of subtropical character

with a favourable temperature. As a result, many heliophilous and thermophilous species occur here.

From the arachnological point of view Croatia is (after Bulgaria and Greece) the best-investigated territory of the Balkan Peninsula (DELTSHEV, 1999). As well as in inventory lists by NIKOLIĆ & POLENEC (1981) and MILOŠEVIĆ (2002) a lot of valuable information can be found in SIMON (1868, 1876, 1937), in catalogues by PRÓSZYŃSKI (2003) and PLATNICK (2003) and some further scattered notes in papers published elsewhere. In some papers, however, the distribution is given as Yugoslavia (Yugoslavia) only (HANSEN, 1985). The situation is complicated by the fact that in some historical periods the territory of Croatia was the part of (or was occupied by) other countries (Austro-Hungarian Monarchy, Italy) and the material from these periods was labelled accordingly (CHYZER & KULCZYŃSKI, 1891). Most data regarding Croatian jumping spiders are from the Dalmatian coast and Adriatic islands (REIMOSER, 1920; 1929) whilst data from Kvarner are quite scarce (NIKOLIĆ & POLENEC, 1981).

MATERIALS AND METHODS

165 specimens of jumping spiders in 29 species from 15 localities were studied. The spiders were caught individually by hand, by sweeping up from vegetation and sieving the litter. Specimens were examined in a dish with ethanol, and the description of colours pertain to wet specimens. When necessary, the left pedipalp of males or the epigynes of females were removed for study. For the examination of internal structure the epigynes were macerated in 10 % KOH for 24–48 hours at normal room temperature and in some instances subsequently cleared for some hours in glycerol or $C_3H_8O_2$. After drawing, pedipalps and epigynes were placed in small plastic tubes with ethanol and put into the vials containing specimens from which they had been removed. The drawings were made with the aid of reticular eyepiece attached to the stereomicroscope. All measurements are given in millimetres. The material is deposited in the private collection of the author.

Abbreviations used: PS = prosoma, OS = opisthosoma, PSL = prosoma length, PSW = prosoma width, OSL = opisthosoma length, AEW = anterior eye width, PEW = posterior eye width, EFL = eye field length, ALE = anterior lateral eyes, PLE = posterior lateral eyes, Fe = femur, Pt = patella, Tb = tibia, Mt = metatarsus, Ta = tarsus

RESULTS

Aelurillus v-insignitus (Clerck, 1757)

Material examined: 1 ♂, along the road Zadar – Starigrad – Paklenica, stony ground, 6. 5. 2002, L. Čepa legit. According to the colouration as well as morphological characters of pedipalps it belongs to the »black« form (PRÓSZYŃSKI, 1971; 2003).

Carrhotus xanthogramma (Latreille, 1819)

Material examined: 1 ♀, 2 juv., Krk, Punat, 2. – 8. 7. 1994; 1 ♀, 1 juv., Lošinj, Čikat, 23. 8. 1996; 1 ♂, Gorič, Krka, 5. 5. 2001, L. Čepa legit.

Euophrys frontalis (Walckenaer, 1802)

Material examined: 6 ♀♀, Krk, NW slope of Mt. Hlam, pine forest, under stones, 3. 7. 1995; 3 ♀♀, 4 juv., Krk, NE slope of Mt. Negrit, under stones in the grassy ditch, 4.7.1995

Euophrys gambosa (Simon, 1868)

Material examined: 1 ♀, Krk, NE slope of Mt. Negrit, under stones in a grassy ditch, 4.7.1995

Determined according to SIMON 1868, 1876, 1937, METZNER 1999, PRÓSZYŃSKI 2003 a,b.

Euophrys rufibarbis (Simon, 1868)

Material examined: 1 ♂, along the road Zadar – Starigrad – Paklenica, 6.5.2002, L. Čepa legit.

Evarcha jucunda (Lucas, 1846)

Material examined: 4 ♂♂, 1 ♀, Krk, Punat, 2. – 8. 7. 1994; 4 ♂♂, Krk, Punat, 2. – 8. 7. 1995; 1 ♂, 1 juv., Krk, Košljun, 6. 7. 1995; 1 ♂, 3 ♀♀, 1 juv., Lošinj, Čikat, 23. 8. 1995.

All specimens were swept from brushes or from higher plants. This confirms the statements given by HANSEN (2000).

Heliophanus equester L. Koch, 1867

Material examined: 1 ♂, Krk, Punat, on the wall, 5. 7. 1995.

Heliophanus flavipes (Hahn, 1831)

Material examined: 1 ♀, 1 juv., Krk, Košljun, swept from grass, 6. 7. 1995.

Heliophanus kochi Simon, 1868

Material examined: 1 ♀, Krk, Punat, under the stone, 2. – 8. 7. 1994; 1 ♂, Krk, Baška Draga, under a small stone in a very dry place, 4. 7. 1994; 2 ♀♀, Krk, NW slope of Mt. Hlam, under stones, 3. 7. 1995; 1 ♂, 1 ♀, Krk, Punat, under stones 1. 7. 1995; 1 ♀, Krk, NW slope of Mt. Negrit, under stone in grassland, 7. 7. 1995; 2 ♀♀, 1 ♀, Lošinj, Čikat, under stones in macchia, 24. 8. 1996; 1 ♀, Gorič, Krka, 5. 5. 2001, L. Čepa legit.; 1 ♀, Mys Jadrija, 5 km W Šibenik, 5. 5. 2001, L. Čepa legit.

Heliophanus lineiventris Simon, 1868

Material examined: 2 ♀♀, Krk, Punat, Trojna, under stones, 7. 7. 1995.

Heliophanus melinus L. Koch, 1867

Material examined: 1 ♀, 1 juv., Krk, Košljun, swept from grass, 6. 7. 1995; 1 ♀, Krk, Stara Baška, 4. 7. 1995; 1 ♂, Gorič, Krka, 5. 5. 2001, L. Čepa legit. 1 ♂, 1 ♀, along the road Zadar – Starigrad – Paklenica, 6. 5. 2002, L. Čepa legit.

Heliophanus tribulosus Simon, 1868

Material examined: 1 ♂ sad., 1 juv., Krk, Punat, 7. 7. 1994; 1 ♀, Krk, Punat, in a silky cocoon with 7 larvae, among needles of *Pinus halepensis*, 2. – 8. 7. 1995; 1 ♀, Krk, under a stone in a very dry place along the road between Kuka and Vrbnik, 5. 7. 1995; 1 ♀, Krk, NE slope of Mt. Negrit, 7. 7. 1995.

Chalcoscirtus infimus (Simon, 1868)

Material examined: 1 ♀, Krk, Punat, 2. – 8. 7. 1995; 1 ♀, Krk, Stara Baška, in an almost bare stony place, 4. 7. 1995; 1 ?, Krk, Punat, under a stone in low grass 1. 7. 1995.

Icius hamatus (C. L. Koch, 1846)

Material examined: 2 juv., Krk, Baška Draga, pine forest, 4. 7. 1994; 1 ♂, Gorič, Krka, 5. 5. 2001, L. Čepa legit.; 1 ♂, Mys Jadrija, 5 km W Šibenik, 5. 5. 2001, L. Čepa legit.

Determination according to ALICATA & CANTARELLA (1993), ANDREEVA *et al.* (1984), METZNER (1999), SIMON (1937).

Macaroeris nidicolens (Walckenaer, 1802)

Material examined: 1 ♂, along the road Zadar – Starigrad – Paklenica, 6. 5. 2002, L. Čepa legit.

Marpissa nivoyi (Lucas, 1846)

Material examined: 4 ♀♀, Krk, Baška Draga, swept from grass (*Calamagrostis* sp.) in the pine forest, 4. 7. 1994. New for the territory of Croatia.

Marpissa nivoyi is distributed in Southern Europe (along sea beaches it reaches Denmark), in North Africa and to the east up to Central Asia (Kazakhstan, Kyrgyzstan). In European countries it was not recorded from Poland and Austria. In the territory of the former Yugoslavia it was recorded from Serbia and Slovenia (KUNTNER, 1997; ZABKA, 1997; BLICK, HÄNGGI & THALER, 2002; PRÓSZYŃSKI, 1976; 2003).

Menemerus semilimbatus (Hahn, 1827)

Material examined: 1 ♂, Krk, Vrbnik, on the wall, 5. 7. 1994; 2 ♀♀, 2 ♀♀ sad., Krk, Punat, on a wall, 2. – 8. 7. 1995; 1 ♂, 3 ♀♀, Krk, Glavotok, on a stony wall, 5. 7. 1995. All specimens were living synanthropically.

Pellenes nigrociliatus (Simon in L. Koch, 1875)

Material examined: 1 ♂, Mys Jadrija, 5 km W Šibenik, 5. 5. 2001, L. Čepa legit.

Pellenes tripunctatus (Walckenaer, 1802)

Material examined: 1 ♀, 2 juv., Krk, Baška Draga, edge of the pine forest, 4. 7. 1994; 1 ♀, along the Zadar – Starigrad – Paklenica road, 6. 5. 2002, L. Čepa legit.

Because of the occurrence of the closely related species *Pellenes seriatus* (Thorell, 1875) in Greece and in Slovenia (METZNER, 1999, FIŠER & KOSTANJŠEK, 2003), which is often mistaken with *P. tripunctatus*, we compared the structures of the epigyne of both the mentioned species. The Croatian females belong unambiguously to *Pellenes tripunctatus*.

Philaeus chrysops (Poda, 1761)

Material examined: 1 ♂, Krk, Vrbnik, on the wall, 5. 7. 1994; 1 ♂, Krk, NW slope of Mt. Hlam, among stones at the edge of a pine forest, 3. 7. 1995; 1 ♂, 3 ♀♀, Krk, Punat, Trojna, on the ground at the base of a stony wall 2. 7. 1995; 2 ♀♀, Krk, NE slope of Mt. Negrit, stony grassland, 7. 7. 1995; 1 ♂, 1 ♀, Krk, Punat, Trojna, dry grassland, 7. 7. 1995; 4 ♂♂, 1 ♀, Gorič, Krka, 5. 5. 2001, L. Čepa legit.; 1 ♀, Mys Jadrija, 5 km W Šibenik, 5. 5. 2001, L. Čepa legit.; 1 ♂, 2 ♀♀, along the Zadar – Starigrad – Paklenica road, 6. 5. 2002, L. Čepa legit.

Phlegra bresnieri (Lucas, 1846)

Material examined: 1 ♀, Krk, Punat, 7. 7. 1994 under a stone in sparse vegetation; 2 ♀♀, Krk, Punat, 2. – 8. 7. 1994; 4 ♀♀, Krk, Punat, Trojna, under stones, 2. 7. 1995; 6 ♀♀, Krk, Punat, 5. 7. 1995; 4 ♀♀, Krk, Punat, Trojna, under stones, 7. 7. 1995; 3 ♀♀, Krk, Punat, 1. 7. 1995. All females were collected from silky cocoons.

Pseudeuophrys vafra (Blackwall, 1867)

Material examined: 1 ♂, 1 ♀, Krk, Punat, 2. – 8. 7. 1994; 3 ♀♀, Krk, Punat, garden, on the wall, 2. – 8. 7. 1995. One female was collected along with the prey it had taken, a winged male ant.

Pseudicius encarpatus (Walckenaer, 1802)

Material examined: 2 ♂♂, Krk, Punat, on a fig tree, 2. – 8. 7. 1994; 1 ♂, Krk, Baška Draga, on the trunk of a poplar tree, 4. 7. 1994.

Saitis imitata (Simon, 1868) n.comb.

Attus imitatus Simon 1868: 62 (F), 1876: 197 (M)

Hasarius imitatus Simon 1876: 90

Euophrys imitata Prószyński 1976: map 62; 1984: 41 (M)

Euophrys imitata Chyzer & Kulczyński 1891: 39, 43 (MF)

Euophrys imitata Platnick 2003

Pseudeuophrys imitata Prószyński 2003 (transferred from *Euophrys*)

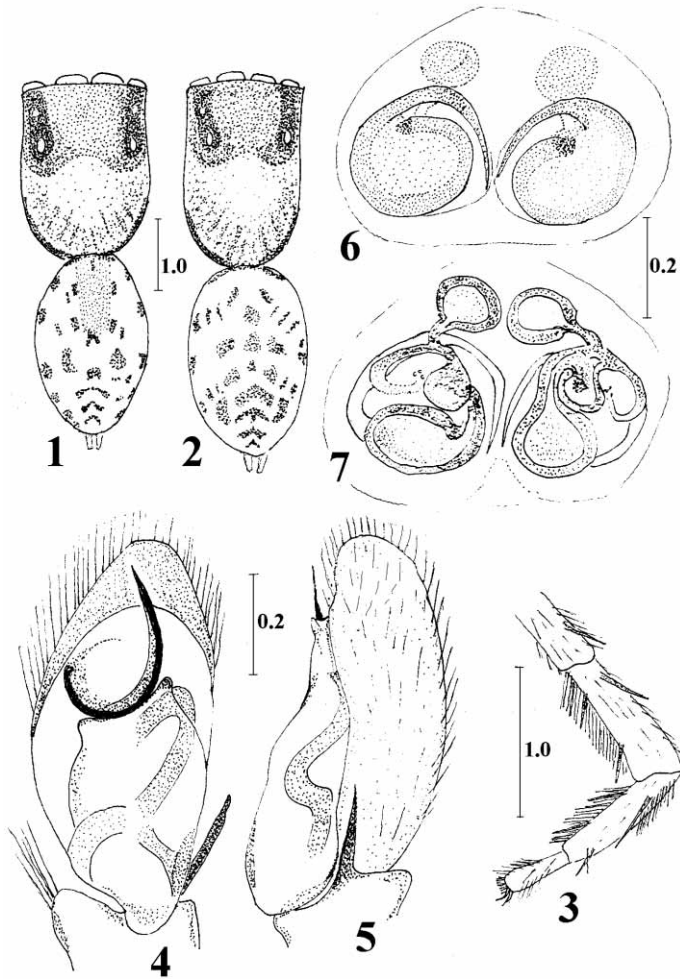
Material examined: 1 ♂, 1 ♀, Krk, Punat, swept from low vegetation, 7. 7. 1994; 2 ♀♀, 1 juv., Lošinj, Mali Lošinj, on the ground in low vegetation, 23. – 24. 8. 1996; 3 ♀♀, 2 ♀♀ sad., Lošinj, Čikat, a heap of stones, 28. 3. 1996

Determination of the species according to SIMON (1862, 1876), CHYZER & KULCZYŃSKI (1891), PRÓSZYŃSKI (1984). The generic rank is discussed hereafter.

Measurements:

♂: PSL = 2.5; PSW = 1.9; OL = 2.5; AEW = 1.75; PEW = 1.5; EFL = 1.0

♀♀: Krk, Punat: PSL = 2.6; PSW = 1.8; OL = 3.0; AEW = 1.75; PEW = 1.75; EFL = 1.12; Lošinj, Mali Lošinj (adults only): PSL = 2.88; 2.9, PSW = 2.05; 2.0; OL = 3.03; 2.95, AEW = 1.9; 1.9, PEW = 1.75; 1.75, EFL = 1.08; 1.0; Lošinj, Čikat (adults only): PSL = 2.63; 2.8; 3.0, PSW = 2.0; 2.0; 2.0, OL = 1.88; 2.9; 2.45, AEW = 2.0; 1.9; 1.95, PEW = 1.75; 1.7; 1.95, EFL = 1.18; 1.1; 0.98



Figs. 1-7. *Saitis imitata*. 1 – general appearance of the male, 2 – general appearance of the female, 3 – leg III of the male, 4 – palpal organ ventral, 5 – palpal organ lateral, 6 – epigyne, 7 – internal structure of epigyne.

Male: colouration (Fig. 1): PS yellowish orange, the frontal part blackish brown, the area around ALE and PLE brown-black. The posterior half of the PS with a thin black rim, which is paler in its median part. The lateral sides of PS suffused with blackish brown shade and faint strikes. OS dorsal cream, scutum dull orange yellow. Markings on the OS grey. OS ventral cream, in the posterior half suffused with grey. Spinnerets dorsal cream, ventro-lateral grey. Clypeus yellowish-orange with dense white hairs. Chelicerae: pedicels dull yellow, proximally pale yellowish orange with two short parallel grey vertical stripes. The lateral edge of pedicels (fron-

tal aspect) dark brownish black. Median edge of pedicels (frontal aspect) normal, not concave. Labium yellowish brown with dull yellow tip, maxillae yellowish brown with broad yellow tips. Sternum dull yellow-orange, in the centre with grey shadow. Legs: Coxae I–III dull grey-brown, coxae IV dull yellow-orange suffused with grey. Femurs dark grey-brown, dorsally dull yellowish orange, patellae and tibiae of the same colour but lighter, tarsi and metatarsi dark orange-yellow. Tb III ventral with long dark bristles, which form a fringe (Fig. 3). Mt III ventral with similar bristles, which are in the wet specimen lighter, however. Tarsi I – III with 2 trichobothria. Palps: Fe olive brown, distal dull yellow, Tb dull yellow with dense white hairs, cymbium dark yellow-orange with olive-brown and white setae. Bulbus yellow-orange. Pedipalp structure in Figs. 4 and 5 agrees with figures published by PRÓSZYŃSKI (1984, 2003).

Female: colouration (Fig. 2): PS as in the male but somewhat paler, OS as in the male. Clypeus light yellowish orange, white setae sparser than in the male. Chelicerae like the male's, somewhat lighter. Sternum dull yellow-orange. Legs: coxae I and II dull yellow orange, coxae III and IV yellow. Trochanter, Fe, Pt, TB Mt and Ta I and II dull orange-yellow, in the legs III and IV lighter. Tarsi I – III with 2 trichobothria. Palps yellow-orange with white and some light olive-brown setae. The females from Mali Lošinj and Čikat differ slightly in colouration from the female from Krk in bolder markings, darker colouration of legs and in ventral colouration of OS with 3 dull grey longitudinal stripes. Epigyne as in Figs. 6 and 7.

In comparison with other European species of *Saitis* the spermathecae of *S. imitata* are more massive. The structure slightly resembles those in *S. taurica* Kulczyński, 1904 or *S. ariadnae* Metzner, 1999. Surprisingly, however, the epigyne and its structure are very similar to the West Mediterranean species *Euophrys semiglabrata* (Simon, 1867), which was transferred from the genus *Attus* and/or *Phlegra* by HĘCIAK & PRÓSZYŃSKI (1984) with the note however, that the spermathecae of *E. semiglabrata* cannot be compared with any European species of *Euophrys*. Later (PRÓSZYŃSKI, 2003b) the generic status of *Euophrys semiglabrata* was designated as only provisional. The close resemblance of *Attus semiglabrata* to *Attus imitata* was recognized and discussed by SIMON (1871, p.178).

Undoubtedly the genera *Pseudeuophrys* and *Saitis* are very close (FLANCZEWSKA 1981, LOGUNOV 1998) and the decisive differences are sometimes hard to define. Even the same authors use different interpretations for the investigated species, e.g. METZNER (1999) and LOGUNOV (1998, 2001) for *Pseudeuophrys prinkipona* (Roewer, 1951) and *Pseudeuophrys sengleti* Metzner, 1999. Therefore they came to opposite results in determination of genera. The reliability of some characters has to be revised. LOGUNOV (1998) writes that the embolus of both genera is situated in the apical hollow of the tegulum, later, however (LOGUNOV, 2001) he states that the apical hollow is present in *Pseudeuophrys* but absent in *Saitis*. The posterior bulbus lobe in *Saitis* is slender and long, as in *Euophrys*; in *Pseudeuophrys* it is short, broad and rounded or even missing. In females the most reliable character is the shape and structure of spermathecae which in *Saitis* are two-chambered, and in *Pseudeuophrys* one-chambered. We can perhaps consider the number of trichobothria on tarsi I–III (2 in *Saitis*, 1 in *Pseudeuophrys*) and the median profile of pedicels (normal in *Saitis*,

concave in *Pseudeuophrys*) quite reliable characters. Further investigation of both genera is needed as well as further comparison of *Euophrys* (?) *semiglabrata* and *Saitis imitata* with all other European species of the genus *Saitis*.

Some authors note the occurrence of *S. imitata* in Italy. There is no good reason, however, for such a statement. The species is not mentioned by HANSEN (1985). BONNET (1955–1959) based his claims on CANESTRINI & PAVESI (1870) who quoted from SIMON (1868) only. SIMON's mistakes in localization, however, have already been mentioned by PAVESI (CANESTRINI & PAVESI, 1870) and by HANSEN (1985). The distribution given by PRÓSZYŃSKI (1976) is based on findings given by CHYZER & KULCZYŃSKI (1891): Fiume (= Rijeka), Kostrena, Sta Lucia (the hamlet of Sveta Lucia is today a part of the scattered village of Kostrena), Buccari (= Bakar).

Saitis santaeufemiae Kolosváry, 1938

Saitis Sanctae-Eufemiae Kolosváry, 1938

Saitis sanctaeuphemiae Bonnet 1955–1959

S. sanctaeufemiae Prószyński 2001

S. sanctaeufemiae Platnick 2003

S. santaeufemiae Nikolić & Polenec 1981

Saitis sancteuphemiae Hansen 1985

NIKOLIĆ & POLENEC (1981) listed this species as a member of the Croatian fauna (as *S. santaeufemiae* [sic!]) and they gave Rovinj (Croatia, Istria) as the type locality. This is wrong, however. KOLOSVÁRY (1938) described his new species from »Kalabrien, am Strande des Meerbusen von Santa Eufemia«. The mistake was apparently caused by confusion of two sites named after the same saint: »Golfo di S. Eufemia« in Calabria, southern Italy (38° 55' N, 16° 25' E) and »Rat Sv. Eufemia«, near Rovinj, Istria, Croatia (45° 5' N, 13° 40' E), more than 1000 km apart. Therefore, the species *Saitis santaeufemiae* Kolosváry, 1938 has to be excluded from the fauna of Croatia. In the literature we can find variant subsequent spellings of the name of this species. This is caused perhaps because of the various interpretations of the specific name. According to the International Code of Zoological Nomenclature, Article 32 (d) (i) (1) the incorrect original spelling of the name (Kolosváry, 1938) have to be corrected by leaving out the hyphen only.

Salticus mutabilis Lucas, 1846

Material examined: 3 ♂♂, 1 ♀, Krk, Punat, on the wall, 2. – 8. 7. 1994; 1 ♂, 1 ♀, Krk, Punat, inner wall of the house, 2. – 8. 7. 1995,

Salticus zebraneus (C. L. Koch, 1837)

Material examined: 4 ♂♂, 4 ♀♀, Krk, Punat, on the pine trunk and on a wall, 2. – 8. 7. 1995; 1 ♂, Krk, NW slope of Mt. Hlam, on a pine trunk, 3. 7. 1995.

Sitticus floricola (C. L. Koch, 1837)

Material examined: 2 ♀♀, Gorič, Krka, 5. 5. 2001, L. Čepa legit.

Sitticus penicillatus (Simon, 1875)

Material examined: 1 ♀, Krk, a bare stony place near the Kuka – Vrbnik road, 5. 7. 1995.

Talavera aequipes (O. P. -Cambridge, 1871)

Material examined: 1 ♀, Krk, Stara Baška, on the ground in low grass, 4. 7. 1995.

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SUMMARY

**Notes on Croatian Jumping Spiders (Araneae: Salticidae)
from Dalmatia and from the Kvarner**

L. J. Dobroruka

The Balkan Peninsula can be considered one of the most important centers of distribution of European arachnofauna. From the arachnological point of view, Croatia is (after Bulgaria and Greece) the third best-investigated territory of the Balkan Peninsula. Dalmatia, the Adriatic and Kvarner islands show considerable differences as compared with the Croatian inland, caused by the different paleo-environmental changes during the Pliocene and the subsequent changes in climatic conditions and biomes. The main vegetal formation is hard-leaf evergreen brushwood of subtropical character with favourable temperature. Therefore, many thermophilous and heliophilous species occur here. A precise knowledge of the fauna of this territory is very important for further study of speciation and possible migration to more northern parts of Europe. Unfortunately, however, in the literature we can find only very scarce information on ecology of Croatian jumping spiders. The paper deals with jumping spiders (Araneae: Salticidae) and gives an annotated list of species collected in Dalmatia and Kvarner Islands in the years 1994 – 2002. In most species, ecological data are added. A new combination is proposed: *Saitis imitata* (Simon, 1868) ex *Euophrys* (*Pseudeuophrys*) *imitata*. The description of this rare and poorly known species is given; the female epigyne is illustrated and described for the first time. Further, the species *Saitis santaeufemiae* Kolosváry, 1938 is excluded from the fauna of Croatia.