Entomol. Croat. 2011, Vol. 15. Num. 1-4: 237-253 Proceedings of the XXII Symposium Internationale Entomofaunisticum Europae Centralis

### PREGLEDNI RADOVI

#### **REVIEW PAPERS**

# HOW MUCH DO WE KNOW ABOUT CROATIAN SPIDERS? – A HISTORICAL OVERVIEW OF THE LITERATURE

Luka KATUŠIĆ1 & Mihael DRAKŠIĆ2

<sup>1</sup>State Institute for Nature Protection, Trg Mažuranića 5, Zagreb, Croatia, luka.katusic@dzzp.hr

<sup>2</sup>Association for Biological Research BIOM, Šestinski dol 12, Zagreb, Croatia, mihael.draksic@gmail.com

As is the case with most groups of invertebrates, the spider fauna of Croatia is still poorly known, as seen by the scarcity of relevant publications. Since the first written record by Alberto Fortis in the year 1774 only around 300 papers concerning this fauna have been published. Here we present a review of this literature to the present, and show the interest in this subject through recent history and determine the share of manuscripts published by Croatian authors. The analysis includes a list of 232 titles known to contain any data on the Croatian spider fauna. Our analysis shows that the most work was published in the second half of the 20th century, while the least productive period of Croatian arachnology lay between the end of World War I and the 1960s. Croatian authors are considerably less numerous than foreign researchers. It is only in the early 21st century that the number of publications by Croatian scientists matches that from the end of the 19th century. Within this analysis, a brief overview of the work of the most important arachnologists is given.

### Spiders, literature, analysis, records, Croatia

L. KATUŠIĆ i M. DRAKŠIĆ: Koliko znamo o paucima Hrvatske? - povijesni pregled literature. Entomol. Croat. 2011. Vol. 15. Num. 1-4: 237-253.

Kao i u slučaju većine drugih skupina beskralješnjaka, fauna pauka u Hrvatskoj slabo je istražena te je broj publikacija o njoj oskudan. Pretpostavlja se da je od prvog pisanog spomena Alberta Fortisa iz 1774. do danas objavljeno oko 300 radova koji spominju nalaze pauka iz Hrvatske. Ovdje je predstavljena kratka analiza popisa literature provedena da bi se pratio interes istraživača za pauke Hrvatske kroz povijest te odredila zastupljenost hrvatskih autora u obrađenom popisu literature. Analiza je obuhvatila popis od 232 naslova za koje nam je poznato da sadrže bilo kakav podatak o fauni pauka Hrvatske. Analiza ovog popisa pokazala je da je najveći broj publikacija izdan u drugoj polovici 20. stoljeća, dok je za hrvatsku arahnologiju najlošije razdoblje od kraja Prvog svjetskog rata do 1960. godine. U ukupnom broju objavljenih publikacija hrvatski autori su znatno manje zastupljeni. Tek početkom 21.

stoljeća broj radova hrvatskih autora o paucima dostiže onaj od kraja 19. stoljeća. U okviru ove analize dan je i kratak osvrt na rad naših najznačajnijih istraživača svijeta pauka.

Pauci, literatura, analiza, nalazi, Hrvatska

## Introduction – History of spider research in Croatia

As it is the case with most groups of invertebrates, the spider fauna of Croatia is still poorly known, as the available publications on this subject are scarce. It is not quite clear when the research of spiders in Croatia begun, but the oldest written record dates to the year 1774. The famous book Viaggio in Dalmazia dell' abate Alberto Fortis by Alberto Fortis (1741-1803) comprises 10 letters to his friends and colleagues in Europe with observations from his travel to the Croatian region of Dalmatia (Figure 1). Fortis was an abbot from Venice who travelled throughout Europe, spending time on several occasions in the Croatian regions of Dalmatia, Istria and Kvarner (Bratulić, 1984; Britvec, 1997). A true renaissance man, besides exploring the folk customs, history, poetry, language and the economy of the local inhabitants, Fortis was a dedicated naturalist who regularly noted observations about geography, climate, geology, flora and fauna (Bratulić, 1984; Britvec, 1997). In its time Viaggio in Dalmazia was very popular in Europe and was soon translated into French, German and English, while the Croatian edition saw the light of day only in 1984. In the part that describes the surroundings of the Dalmatian city of Trogir, Fortis mentions two dangerous "insects" which deliver painful bites<sup>1</sup>. These were the Mediterranean tarantula, possibly Lycosa tarantula (Linnaeus, 1758), and the black widow spider, Latrodectus tredecimgu*ttatus* (Rossi, 1790). Besides being the first written record for the occurrence of a spider species in Croatia, this is also the first written record about latrodectism (a medical condition resulting from the bite of a spider in the genus *Latrodectus*) and its traditional treatment (Britvec, 1997).

After Fortis' *Viaggio in Dalmazia*, it took more than 70 years for a mention of spiders in a published work by a Croatian author. This work was *La Dalmazia descritta* by Francesco Carrara (1846) (Figure 2). Francesco (Frane) Carrara (1812-

<sup>&</sup>lt;sup>1</sup> "Una spezie di Tarantola similissima a quelle di Calabria, e di Puglia v' e conosciuta sotto il nome di Pauk, comune a tutti i Ragni, nell' Idioma llirico. I contadini, che nella stagione ardente deggiono agire in campagna, sono frequentemente soggetti, al morfo di questo brutto insetto, come anche a quello dell Ragno variegato, di corre gambe, onosciuto in Corsica sotto il nome di Malmignatto"



Figure 1. Viaggio in Dalmazia by Alberto Fortis (1774).

1854) was an eminent Dalmatian intellectual, history professor, archaeologist and naturalist. Driven by his ambitious and questing spirit and provoked by the fact that all the works about cultural and natural heritage of Dalmatia of that time were written by foreign authors, Carrara decided to write a work of encyclopaedic proportions, covering all the cultural, historical, political and natural aspects of the Dalmatia of the time (Špikić, 2006). In his comprehensive, but unfortunately unfinished work, natural subjects were dominant. Due to his scholarly reputation, Carrara managed to gather an admirable team of experts from the Austro-Hungarian Empire, who wrote the different chapters on the flora and fauna in this book (Špikić, 2006).

The chapter about spiders was written by the Austrian arachnologist Friedrich Wilhelm Rossi, who not only lists 50 species then known from Dalmatia, but also describes two new species of spiders - *Eresus fulvus* (a synonym of *Eresus kollari* Rossi, 1846 (Platnick, 2011)) and *Philodromus cammarus* Rossi, 1846.

It took another 50 years of research by foreign experts before another work by a Croatian expert was published. In 1886, Adolf Eugen Jurinac, published a short article, "Faunistični pabirci po okolini krapinskoj", recording several spider species for the first time. Among these were three species collected in the caves of Hrvatsko Zagorje – *Meta menardi* (Latreille, 1804) and two unidentified species of the genus *Theridion* Walckenaer, 1805. Jurinac (1854-1925) was a Croatian naturalist from Varaždin, educated at Vienna University (Durbešić, 1984). His main interest was th ecave fauna of the Croatian karst, and the regions of Hrvatsko Zagorje and Slavonija. In 1887, Jurinac published a more comprehensive work (*Prilog hrvatskoj fauni ogulinsko-slunjske okolice i pećina*), where he



Figure 2. La Dalmazia descritta by Francesco Carrara.

mentions records of 8 spider species found in the environs of the town of Ogulin.

The first complete list of Dalmatian spiders was published in 1891 (*Prilog fauni dalmatinskih pauka (Araneae et Opiliones)*), by Rikard Gasperini. Gasperini (1853-1939) was born in Split and, as was common for intellectuals of that time, studied in Vienna (Nonveiller, 1989). A professor of natural sciences in Split, and a versatile naturalist, he was interested in palaeontology, chemistry, botany and zoology (mainly insects: Hymenoptera) (Cvitanić, 1964; Nonveiller, 1989). In *Prilog fauni dalmatinskih pauka (Araneae et Opiliones)* Gasperini lists 195 spider species occurring in Dalmatia, and includes Simon's description of one new species - *Coelotes gasperinii* Simon, 1891 (now placed in *Inermocoelotes*). In 1892, Gasperini published an addition to his first work (*Prilog k dalmatinskoj fauni (Isopoda, Myriapoda, Arachnida*)), listing 229 species of spiders, as well as other arachnids, isopods and myriapods.

Although all these scientists had a certain interest in spiders, Narcis Damin is regarded as the first Croatian arachnologist. Damin (1845-1905) was born in the town of Senj, where he graduated. He worked in Rijeka and Gospić, before settling in Bakar as a professor at the Nautical school (Langhoffer, 1906). He was mainly interested in faunistics and spider taxonomy, but also had a noteworthy expertise in botany and entomology (Britvec & Milošević, 1998). In his articles of 1893 (Über Parthenogenesis bei Spinnen) and 1894 (On parthenogenesis in spiders (Résumé)) he was the first arachnologist to describe parthenogenesis in spiders (Langhoffer, 1906). He collaborated closely with famous arachnologists Kornel Chyzer and Ladislav Kulczynski, the authors of a remarkable work "Araneae Hungariae", from whom he gathered most of his knowledge about spiders (Langhoffer, 1906). As a tribute to Damin's dedication, Chyzer named a newly discovered species of jumping spider after him - Attus damini Chyzer, 1891 (now placed in *Sitticus*). Although most of his research was focused on the northern part of the Adriatic (Hrvatsko Primorje), other Croatian entomologists provided spider specimens from other parts of Croatia, and before long Damin gathered quite a respectable collection. In 1900 he published a complete checklist of Croatian spider fauna, numbering 556 species, based on his collection and all available literature references (Damin, 1900). Besides several articles about spiders, Damin's legacy includes a large specimen collection, deposited in the Croatian Natural History Museum, and an unfinished monograph about Croatian

spiders, along with 4 small volumes of beautiful hand drawings of spiders (Figure 3). Damin remains the most famous and most prolific Croatian arachnologist, and should be considered the founder of Croatian arachnology.



Figure 3. Damin's monograph on spiders of Croatia (Photo: L. Katušić).

Shortly after Damin, another Croatian arachnologist, Dragutin Poljugan, started his short career in spider research. Poljugan (1881- 1950) was then the only arachnologist from the eastern part of Croatia. Poljugan wrote several articles about spiders, but his interest in spider research ceased shortly after he became the director of Vinkovci high school in 1920.

After Damin and Poljugan, for a long time there was no devoted Croatian arachnologist, until the appearance of Franjo Nikolić (1922-1977). Although he started studying theology, Nikolić soon turned to his real interest – zoology, specifically arachnology. His research was mainly focused on the area of southern Dalmatia (Dubrovnik, Konavle, Hercegovina, Montenegro and the Dalmatian islands), but he also worked on material brought to him from other parts of the region (Lučić, 2002). Working from specimens from Slovenia, Nikolić descri-

bed a new species of subterranean spider *Typhlorhode aspinifera* Nikolic, 1963 (now placed in *Rhode*). His most important work is the *Catalogue of Spiders of Yugoslavia*, which is a part of the series *Catalogus Faunae Jugoslaviae* (1981), published by the Slovenian Academy of Arts and Sciences. As Nikolić died before finishing the Catalogue, his work was completed by Anton Polenec, a famous Slovenian arachnologist. The Catalogue listed 649 species, and was the first comprehensive checklist of the spider fauna of the former Yugoslavia. Almost 25 years after Nikolić's death, his spider collection was finally found and brought to the Croatian Natural History Museum, where it still awaits full analysis.

Zvonimir Maretić (1921-1989) also significantly contributed to the knowledge of Croatian spiders. Maretić worked in the Department of Infectious Diseases as an expert on poisonous animals, and especially on spider bites. He published numerous papers on arachnidism that considerably contributed to the knowledge on the distribution and biology of the black widow spider (*Latrodectus tredecimguttaus*) and other potentially dangerous spiders. In 1951, he produced the first black widow spider antivenin in Europe.

Among numerous experts who conducted research on spiders of Croatia, the above mentioned scientists were the only Croatian arachnologists until the end of the 20<sup>th</sup> century. Recently, with the founding of the Croatian Biospeleological Society, new research into subterranean spiders has begun (Ozimec, 2002; Pavlek & Ozimec, 2009). New research on epigean spider communities began with the founding of the Section for spiders of the Biology Students Association- BIUS (Kemfelja et al. 2005; Meštrović et al., 2005; Majer et al., 2010), and the Association for Biological Research – BIOM (Katušić, 2008).

Although it is evident that spider research in Croatia has been carried out since the 19<sup>th</sup> century, there are still several questions to be addressed. How much have these authors really contributed to the knowledge of the Croatian spider fauna? How much do we really know about spiders in Croatia? What is the real number of species present in Croatia? Our experience showed that every new research projects has added several new species to the Croatian fauna. Given that much collected material still sits unidentified in museums and personal collections, or if identified, the data remains unpublished, there is an evident need for a revision of the checklist of Croatian spiders. To date, 710 spider species are recorded for Croatian spider fauna (van Helsdingen, 2011).

In order to track the research interest in the Croatian spider fauna through history and to determine the share of publications by Croatian authors in the

processed literature list, a short analysis of the literature reference list has been conducted. Some of the results are presented in this article.

# Methods

Several steps were taken in gathering all the available publications containing data on spiders of Croatia. First, all the references from the above mentioned published checklists of the Croatian araneofauna and from any other publications that mention spider records from Croatia were entered in the database. As the listed references mostly date from 19<sup>th</sup> and early 20<sup>th</sup> centuries, some of them have still not been acquired and verified. In the second step, arachnologists were contacted through the mailing lists of the International Society for Arachnology and European Society for Arachnology, and asked for any literature references known to contain information about records of spiders from Croatia. On-line databases were used to search and download listed literature references, as well as to find new ones (Table 1). The World Spider Catalogue (Platnick, 2011) was used to determine the current systematic placement of mentioned species.

Table 1. A list of the most important databases used to search for the literature	
references which contain records from Croatia	

\_ . . . . . . .

~ -

Name of the database	URL
Hrčak - Portal of scientific journals of Croatia	http://hrcak.srce.hr/?lang=en
Ruđer Bošković Institute Library	http://lib.irb.hr/web/en/about.html
CROSBI - Croatian Scientific Bibliography	http://bib.irb.hr/
The digital library of the Croatian Academy of Sciences and Arts	http://hazu.arhivpro.hr/?sitetext=111
On line catalogue of the libraries in the city of Zagreb	http://www.katalog.kgz.hr/pages/katalogSearch. aspx?sustavId=1&tvrtkaId=2
Internet Archive	http://www.archive.org/
Biodiversity Heritage Library	http://www.biodiversitylibrary.org/
Google Scholar	http://scholar.google.hr/
Google Books	http://books.google.com/

Table	1	continued
ruore	1.	continucu

ISI Web of Science	http://apps.webofknowledge.com/UA_GeneralSearch_ input.do?product=UA&search_mode=GeneralSearch&SI =R1p9H6ca95p35dpH1fe&preferencesSaved=				
Academic Search Complete	http://www.ebscohost.com/academic/academic-search- complete				
Biostor	http://biostor.org/				
Open library	http://openlibrary.org/				
World Spider Catalogue	http://research.amnh.org/iz/spiders/catalog/INTRO1.html				

On-line databases were searched using several regional keywords - Croatia, Dalmatia, Istria, Slavonia, Yugoslavia and other similar toponyms - in combination with different name variations for the order Araneae and class Arachnida. The keywords were in Croatian, English, German, Italian, French and, when possible, Latin.

The 232 literature references listed in our database were included in this analysis. The additional 70 publications listed in the database, but not acquired and therefore not verified were omitted from the analysis. Unpublished research reports and catalogues of different museum collections were also excluded from this analysis. In order to differentiate publications which contain new records about spiders and thus reflect an author's tangible interest in researching spiders of Croatia, from publications which repeat the old findings, the literature references were classified in three groups:

- "New records" literature references which contain new records of spiders
- "Old records" literature references that repeat or generalise old records of spiders
- "No records" literature references by Croatian authors about spiders which do not contain faunistic data (i.e. papers that mention the spider species, but do not give the locality of the finding).

For the purpose of identifying the share of publications by Croatian arachnologists, and in order to determine the interest of Croatian scientists in arachnology, all publications included were labelled depending on whether the author is Croatian ("C") or of foreign nationality ("F"). Finally, to identify the period of highest research interest in spiders of Croatia, literature references were grouped in 11 time periods (Table 2.).

Table 2. Classifications of the publications used in the analysis by the author's nationality, type of faunistic data given in the publication, and according to the time period in which it is published.

Nationality		Croatian (C)		Foreign (F)			
Data type	New r	ecords	Old records		No records		
Time period	1774-1840	1841-1860	1861-1880	1881-1900	1901-1920	1921-1940	
	1941-1960	1960-1980	1961-1980	1981-2000	2001-2011		

To estimate whether the current number of record species in Croatia is close to the real number of species present, and whether the number of record species is correlated with the number of publications and surface area of the country, we performed two simple regression analyses. In the first one, a number of publications was plotted against the number of recorded species, adding a logarithmic regression trend line (best-fit least-squares). The shape of the curve and coefficient of determination ( $R^2$ ) should indicate how much the recent publications contribute to the number of new species being recorded in Croatia.

In the second analysis, following Kuntner and Šereg (2002), the areas of 35 European countries (in square kilometres) were plotted against a number of species recorded in the country. Area was normalized using a log function, on the base of 10. A linear regression trend line (best-fit least-squares) was added to the graph and coefficient of determination was calculated in order to determine how much the area of the country contributes to the number of species recorded in European countries. The smallest European countries and countries extending outside Europe were omitted from the analysis. The number of species for each country was set according to Van Helsdingen (2011).

## Results

As mentioned above, 232 literature references were identified, verified and included in the analysis. In total, 157 publications containing new records, 71 publications containing old records and 4 publications without records of spiders for Croatia were identified. Foreign arachnologists include spider records from Croatia in 168 publications (72 %), while only 64 such publications (28 %) were written by Croatian authors (Table 3).

Table 3. Number of literature reference distributed according to the author's nationality, type of faunistic data given in the publication, and according to the time period in which it is published

Time period	Foreign authors (F)			Croatian authors (C)				Grand
	new records	old records	F Total	new records	no records	old records	C Total	Total
1774-1840	3		3					3
1841-1860	6		6	1			1	7
1861-1880	4	17	21					21
1881-1900	4	8	12	14	1		15	27
1901-1920	5	4	9	5	2		7	16
1921-1940	27	7	34	1			1	35
1941-1960	4	1	5	3	1	1	5	10
1961-1980	22	5	27	5		5	10	37
1981-2000	17	5	22	7		2	9	31
2001-2011	17	12	29	12		4	16	45
Grand Total	109	59	168	48	4	12	64	232

Overall, the highest number of papers on Croatian spiders was published from 2001 to 2011, when there is also the highest number of Croatian authors. A peak in both the absolute number, and the proportion of foreign authors occurred in the period from 1921 until 1940 (Figure 4.)

As previously stated, we believe that the research interest in spiders of Croatia, by both foreign and Croatian arachnologists, can be identified through the number of publications which contain data on new records of spider specimens from Croatia. Taking this into account, the ratio of publications with new records by Croatian and foreign authors was identified. The share of publications by Croatian authors in the number of publications containing new records is slightly higher (31 %) than the share in the total number of publications (29 %).

Plotting the number of publications with new records against the time line shows that the period with highest productivity, i.e. research interest of Croatian arachnologists, happened at the end of the 19<sup>th</sup> century, when Croatian authors produced 14 publications with new faunistic data. Research interest of foreign arachnologists was the highest in the period from 1921 until 1940. From 2001, 12 articles with new faunistic data have been published so far (Figure 5).

Entomol. Croat. 2011. Vol. 15. Num. 1-4: 237-253 Proceedings of the XXII Symposium Internationale Entomofaunisticum Europae Centralis L. KATUŠIĆ & M. DRAKŠIĆ: How Much Do We Know about Croatian Spiders? – A Historical Overview of the Literature

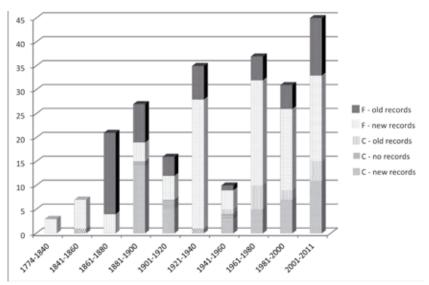


Figure 4. Distribution of publications on spider fauna of Croatia through history, according to the type of data contained and the author's nationality (F - foreign publications; C - Croatian publications).

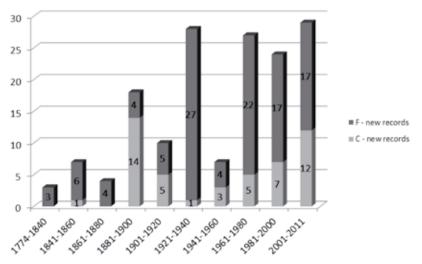


Figure 5. Distribution of publications on spider fauna of Croatia containing only new records through history (F - foreign publications; C - Croatian publications)

As expected, a semi-log plot of number of recorded spider species versus number of publications showed a clear correlation ( $R^2 = 0,809$ ) between the number of published references and the number of recorded species (Figure 6). According to trend line there is a continuous increase in the number of species, but with a noticeable decrease in the slope.

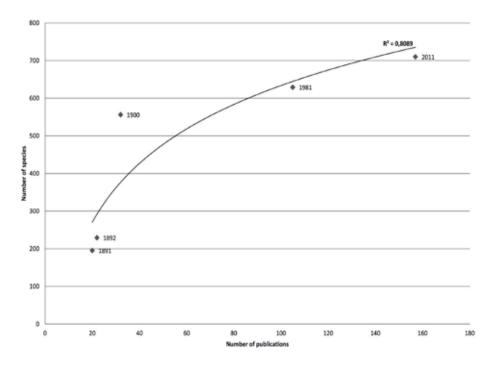


Figure 6. Semi-log plot of number of recorded species of spiders in Croatia versus number of publications with a fitted least-squares line ( $R^2 = 0.809$ ).

Opposite to the graph with number of publications, a semi-log plot of the number of recorded species versus area of the country showed no correlation ( $R^2 = 0.1699$ ), i.e. only 17 % of the variance in the number of species can be explained by the area of the country.

According to its position just slightly above the trend-line, the current number of species recorded in Croatia is typical for its surface area (Figure 7).

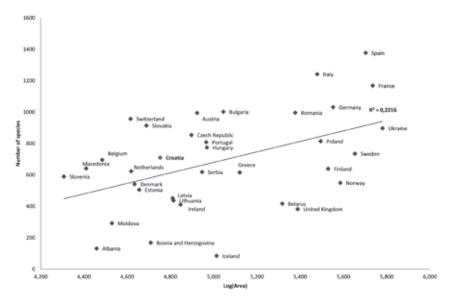


Figure 7. Semi-log plot of number of recorded species of spiders in European countries versus country area with a fitted least-squares line ( $R^2 = 0.169$ ).

### **Discussion and Conclusions**

Although this analysis did not cover all the existing publications which contain records about spiders from Croatia, we believe that the dataset used is large enough to show the trend of interest in arachnology in Croatia. To our knowledge, this analysis is a first attempt to quantify the interest and productivity of Croatian authors in arachnology.

The analysis showed a clear dominance of publications containing faunistic data on spiders of Croatia by foreign authors ( $\sim$  70 %), considering both publications with new records, and the total number of publications. Although this is not evidence that these authors contributed most to the knowledge of Croatian spiders, it is indicative of a considerable foreign interest in Croatian spider fauna. So far, 69 foreign authors have been identified, as opposed to 25 Croatian.

As described in the Introduction, the most productive Croatian arachnologist is Narcis Damin, with 11 published articles containing new faunistic data (e.g. Damin, 1896a; Damin 1896b; Damin, 1900). As his works comprise almost a

quarter of the complete oeuvre of Croatian authors, it is not surprising that the period of his research activities is in fact the period when the most new faunistic data were published. Therefore, the end of the 19<sup>th</sup> century and the beginning of the 20<sup>th</sup> could be considered the peak of Croatian arachnology. The foreign author who published the highest number of articles about spiders in Croatia was a famous Czech arachnologist Josef Kratochvíl (1909-1992), with 20 publications, mostly about subterranean spiders (e.g. Kratocvhil, 1935; Kratochvil, 1939; Kratocvhil, 1978). It is because of his dedicated work in the first half of the 20<sup>th</sup> century that this period represents the peak of the interest of foreign arachnologists in the Croatian spider fauna.

According to the results of the regression analysis, the number of the recorded species is strongly related with the number of publications, as expected. However, it is noticeable that recently there are on average fewer records of new species per publication, with a decreasing trend. This could indicate that the current number of species recorded in Croatia is getting closer to the real number of species present.

The results regarding correlation between number of species and surface area of the country are identical to the results by Kuntner and Šereg (2002). Both analyses showed that the size of the country is not a decisive variable accounting for number of recorded species. Other factors that should be taken into account are habitat diversity of the country and sampling completeness (Kuntner & Šereg, 2002). According to the trend line, the current number of species recorded in Croatia is around the European average based on the surface area of the country. However, as stated above, there are lots of variances in the number of species that cannot be explained by the size of the country. The largest positive deviations are shown by France, Spain and Italy, most probably due of their very large habitat heterogeneity and a long tradition in arachnology, i.e. state of research of spider fauna (e.g Simon, 1874; Cardoso, 2010; Trotta, 2005.). On the other hand, Albania and Bosnia and Herzegovina are well below the trend line, the reason probably being a significant undersampling bias. Generally, northern European countries (e.g. Norway, Iceland, Finland, Moldova) show below average spider fauna richness, presumably due to environmental conditions resulting in lower habitat and overall species diversity (Kuntner and Šereg, 2002). Since the country is at the area of contact of four biographical regions, offering high habitat diversity, it is expected that the final number of spider species recorded for Croatia should be over the European average.

Based on the current analysis, it is difficult to answer the question "how much do we know about Croatian spiders?". As was stated before, the araneo-fauna of Croatia is still understudied, mostly because there has been no continuous arachnology program in Croatia, but only the efforts of several dedicated individuals (e.g. Gasperini, 1891; Damin 1896; Nikolić, 1891). Encouragement comes from the fact that in the last decade, with the foundation of the Croatian Biospeleological Society, the Section for Spiders of the Biology Student Association – BIUS, and the Association for Biological Research – BIOM, arachnology in Croatia has gained a new impetus, and will soon surpass the golden period of Croatian arachnology from the end of the 19<sup>th</sup> century. Since the year 2000, 12 new and young Croatian authors have published articles on spiders of Croatia (e.g. Meštrović, 2005; Katušić, 2008; Majer, 2010), thus promising a bright future for Croatian arachnology.

In order to gain a correct insight into the state of research on spiders in Croatia, all the existing data from literature references, museum collections and recent researches must be organized in a dedicated database and analysed. This is a crucial initial step towards setting the priorities for future research, and establishing the landmark for biodiversity estimates and conservation of spiders in Croatia.

### Acknowledgements

Above all, we thank Ms. Darija Caleta from the Croatian Natural History Museum for the immense and thorough help she gave us in acquiring publications used in this analysis. We own our gratitude to Martina Pavlek and Roman Ozimec from the Croatian Biospeleological Society for the literature they provided, and also to all our colleagues from the International Society for Arachnology and the European Society for Arachnology who supported us with valuable advice, comments and the literature references we needed. We also thank to Marko Pećarević for improving English language of the manuscript.

### References

BRATULIĆ, J., 1984. Alberto Fortis i njegov put po Dalmaciji. U: Put po Dalmaciji (Croatian edition). Globus Zagreb, V-XXIV pp.

BRITVEC, B., 1997. Zapisi o kukcima i paucima u Hrvatskoj u djelima Alberta Fortisa. Entomol. Croat. 2 (1-2): 31-44.

Entomol. Croat. 2011. Vol. 15. Num. 1-4: 237-253

Proceedings of the XXII Symposium Internationale Entomofaunisticum Europae Centralis

- L. KATUŠIĆ & M. DRAKŠIĆ: How Much Do We Know about Croatian Spiders? A Historical Overview of the Literature
- BRITVEC, B., & MILOŠEVIĆ, B., 1998. Entomološka istraživanja kvarnersko-goranskog područja. In: Arko-Pijevac et al. (eds), Prirodoslovna istraživanja riječkog područja, Prirodoslovni muzej Rijeka, Rijeka, 129-144 pp.
- CARDOSO, P. & MORANO, E., 2010. The Iberian spider checklist (Araneae). Zootaxa 2495: 1-52.
- CARRARA, F., 1846. La Dalmazia descritta. Fratelli Battara Tipografi Editori Zara 130 pp.
- CVITANIĆ, A., 1964. Rikard Gasperini. Povodom 25-godišnjice smrti. Priroda 5: 130-135.

DAMIN, N., 1893. Über Parthenogenesis bei Spinnen. Verh. Zool.-Bot. Ges. Wien 43: 204-206.

DAMIN, N., 1894. On parthenogenesis in spiders (Résumé). Ins. Life 6: 42.

- DAMIN, N., 1896a. Gnaphosa Kulczynskii nov. sp. Soc. Hist.-Nat. Croat. 9: 343-345.
- DAMIN, N., 1896b. Prilog fauni dalmatinskih i istarskih pauka. Soc. Hist.-Nat. Croat. 9: 298-342.
- DAMIN, N., 1900. Pauci Dalmacije, Hrvatske, Slavonije i Istre. (Araneae Dalmatiae, Croatiae, Slavoniae et Istre partim editae, partim usque ad a. 1900 ineditae). Rad JAZU 143: 10-53.
- DURBEŠIĆ, P., 1984. Počeci entomoloških istraživanja u Hrvatskoj s bibliografijom (od prvih pisanih podataka do osnutka Jugoslavenskog entomološkog društva 1926. godine). Acta entomol. Jugosl. 20 (Suppl. 7): 7-56.
- FORTIS, A., 1774. Viaggio in Dalmazia, I-II (1774). Nachduck, Verlag Otto Sagner München und Veselin Masleša, Sarajevo, Sander slavische Samlung, Band 2, 486 pp.
- FORTIS, A. 1984. Put po Dalmaciji (Croatian edition Vol. 1. & 2.). Zadro, B. (Ed.) Globus Zagreb, 303 pp.
- GASPERINI, R., 1891. Prilog fauni dalmatinskih pauka (Araneae et Opiliones). God. izvješće C. K. vel. realke u Splitu za god. 1890./91.: 1-18.
- GASPERINI, R., 1892. Prilog k dalmatinskoj fauni (Isopoda, Myriapoda, Arachnida). God. izvješće vel. realke za god. 1891./92.: 1-22.
- JURINAC, A., 1886. Faunistični pabirci po okolini krapinskoj. Glasnik Zagreb 1: 145-153.
- JURINAC, A. E., 1887. Prilog hrvatskoj fauni ogulinsko-slunjske okolice i pećina. Rad JAZU, knj., 83: 86-128.
- KATUŠIĆ, L., 2008. Spiders (Arachnida: Araneae) on flooded and non-flooded meadows in the Lonjsko Polje Nature Park, Croatia. Nat. Croat. 17(2): 113-130.
- KEMFELJA, S., MEŠTROVIĆ, O., & KATUŠIĆ, L., 2005. Fauna pauka Nacionalnog parka Mljet. U: Zbornik istraživačkih radova Udruge studenata biologije BIUS u NP Mljet, BIUS Zagreb, 59-62 pp.
- KRATOCHVIL, J., 1935. Araignées nouvelles ou non encore signalées en Yougoslavie. Première partie. Folia zool. hydrobiol. 8: 10-25.
- KRATOCHVÍL, J., 1939. A propos des deux Araignées cavernicoles de Yougoslavie. Vest. Cesk. Zool. Spol. Praze 6-7: 279-289.
- KRATOCHVIL J., 1978. Araignees cavernicoles des iles dalmates. Acta Sc. Nat. Brno 12: 1-59.

Entomol. Croat. 2011. Vol. 15. Num. 1-4: 237-253

Proceedings of the XXII Symposium Internationale Entomofaunisticum Europae Centralis

L. KATUŠIĆ & M. ĎRAKŠIĆ: How Much Do We Know about Croatian Spiders? – A Historical Overview of the Literature

- KUNTNER, M & ŠEREG, I., 2002. Additions to the spider fauna of Slovenia, with a comparison of spider species richness among European countries. Bull. Br. Arachnol. Soc. 12: 185-195.
- LANGHOFFER, A., 1906. Narcis Damin nekrolog. Glasnik Zagreb 18: 78-80.
- LUČIĆ, I., 2002, Zoolog Franjo Nikolić, u povodu 80. obljetnice rođenja i 25. obljetnice smrti -Izgon iz znanstvenog raja zbog pogrješnih grijeha? Dubrovački list (15<sup>th</sup> of May 2002): 10.
- MAJER, M., KELAVA, I., LUGIĆ, E. & ZEC, M., 2010. Araneofauna of the Mediterranean island of Vis (Croatia). In: Nentwig, W., Entling, E. & Kropf, C. (Eds.) European Arachnology 2008, Proceedings of the 24<sup>th</sup> European Congress of Arachnology, Bern, 25-29 August 2008. Natural History Museum. Bern, Special volume 1: 125-127.
- MEŠTROVIĆ, O., KEMFELJA, S., & KATUŠIĆ, L., 2005. Araneofauna Parka prirode Biokovo. In: Zbornik istraživačkih radova Udruge studenata biologije BIUS u PP Biokovo, BIUS Zagreb, 84-90, pp.
- NIKOLIĆ, F., 1981. Aranea. Catalogus Faunae Jugoslaviae 3(4): 1-135.
- NONVEILLER, G., 1989. Pioniri proučavanja insekata Dalmacije. Jugoslavensko entomološko društvo, Edit. sep. 2, Zagreb, 390 pp.
- OZIMEC, R., 2002. Arachnida. In: Gottstein, S. (Ed.), An overview of the cave and interstitial biota of Croatia, Nat. Croat. 11: 49-58,
- PAVLEK, M. & OZIMEC, R., 2009. New cave-dwelling species of genus *Troglohyphantes* (Araneae, Linyphiidae) for Croatian fauna. Nat. Croat. 18(1): 29-37.
- SIMON, E. L., 1874. Les Arachnides de France, Tome 1. Librarie Encyclopediquede Roter Paris, 272 pp.
- ŠPIKIĆ, M., 2006. Znanstveni vidici Francesca Carrare. U Dalmacija kako ju je opisao profesor doktor Frane Carrara s 48 minijaturnih prikaza predstavljajući najvažnije narodne nošnje. Etnografski muzej Split, Split V-XIII pp.
- TROTTA, A., 2005. Introduzione ai Ragni italiani (Arachnida Araneae). Memorie Soc. entomol. ital. 83: 3-178.
- VAN HELSDINGEN, P., 2011. Araneae, Database European spiders and their distribution. Version 2011.1. Retrieved 7.11.2011, from Fauna Europaea: http://www.european-arachnology.org/ reports/fauna.shtml.