



**CONFIRMATION OF EXISTANCE OF STICK INSECT, *Bacillus rossius* (Rossi, 1788) (Insecta: Phasmatodea, Bacillidae) IN BOSNIA AND HERZEGOVINA**

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**SYNOPSIS**

**Key words:**  
Stick-insects,  
*Bacillus rossius*,  
Bosnia and  
Herzegovina,  
taxonomy, ecology

Basic data regarding a finding of a stick-insect in the surrounding of Neum – Bosnia and Herzegovina is given in this paper. S. Lelo has seen one stick-insect in June 1999 in *Quercetus ilicis* alliance near Neum and afterwards, with others authors, has tried to find more specimens. Finally one female was found in the same place on 10 May 2009.

**INTRODUCTION**

Research of Bosnian entomofauna has a very long tradition with first written records dating back all the way to the Ottoman period, i.e. to the first half of the 19<sup>th</sup> century and foreign researchers. Since then and through to nowadays entomological research has been conducted continuously in Bosnia and Herzegovina. In spite of that no detailed information regarding the findings of stick insects order – Phasmatodea: = Phasmatoptera (WERNER, 1906; GEORGIJEVIĆ, 1974; LELO, 2005-2008) in Bosnia and Herzegovina could be found in any of the entomological papers. However, in June 1999 Lelo observed a single stick insect (*Bacillus sp.*) in Neum on a shrub above the road (running along the coast of the peninsula), but was unaware of the above stated fact at the time.

There are three known families of stick insects in Europe consisting of six genera and fourteen species: Bacillidae – *Bacillus atticus* Brunner von Wattenwyl, 1882; *B. grandii* Nascetti & Bullini, 1982; *B. lynceorum* Bullini, Nascetti & Bianchi Bullini, 1984; *B. rossius* (Rossius, 1790); *B. whitei* Nascetti & Bullini, 1982; *Clonopsis gallica* (Charpentier, 1825); Heteronemiidae – *Leptynia attenuata* Pantel, 1890; *L. caprai* Scali, 1996; *L. hispanica* (Bolivar, 1878); *L. montana* Scali, 1996; *Ramulus bituberculata* (Redtenbacher, 1889); Phasmatidae – *Acanthoxyla geisovii* (Kaup, 1866); *A. inermis* Salmon, 1955; *Clitarchus hookeri* (White, 1846). The most

up-to-date checklist of European insects, which deals with stick insects in detail, i.e. Fauna Europaea portal, has none of the above species recorded on the territory of Bosnia and Herzegovina. On the other hand, on the graphic representation of distribution of species of the genus *Bacillus* Berthold, 1827 in southern Europe, Lelong imprecisely marked areas of distribution of *B. rossius* Rossius and *B. atticus* Brunner von Wattenwyl species so that it seems that there are records of these species in Bosnia and Herzegovina (LELONG, 1993). Furthermore Lelong lists *B. atticus* Brunner von Wattenwyl as present in Istria and Dalmatia (which excludes this species as even possibly present in Bosnia and Herzegovina), and for *B. rossius redtenbacheri* Nascetti & Bullini, 1983 he lists southern Italy, Sardinia, Dalmatia (as a part of SFRY), Albania and Greece (LELONG, 1993; MANTOVANI & SCALI, 1992).

Based on all previously mentioned facts and on distribution of subspecies *B. rossius redtenbacheri* Nascetti & Bullini, as stated on the Fauna European portal (Balearic islands, Corsica, Sardinia, France, Italy, Croatia, Montenegro, Greece, Crete and North Aegean Islands), we considered it highly plausible to expect this species, or more specifically subspecies, in the southern most regions of Bosnia and Herzegovina.

As a part of basic data for this species (and subspecies) we can note that the species was described in Italy (Pisa – Tuscany). Individuals are dorsoventrally flattened, elongated and have short antennae. The length of males falls within the range of 52-79mm, and the length of females is between 64-105mm. Females are green or brown, while males are thinner and generally more gracile in comparison to females. The species can be found on bushes and shrubs most commonly those of *Rubus fruticosus* and other Rosaceae family members, located in costal areas, which they prefer. Although stick insects are present throughout the year, number of adults peaks during August and September. The species is sexually dimorphic, and sexes develop under the influence of sex chromosomes: in females  $2n = 36$  (xx) and in males  $2n = 35$  (XO). After mating (or parthenogenesis in the absence of a male) the female lays fertilised eggs (around 1,000) on the ground. Nymphs develop over the period of three to eight months and they are sexually mature in spring. Adults live for several months. The species is not endangered and its impact on humans is unknown. There are several subspecies differentiated within this species with differences being based on results of qualitative and quantitative analysis of the shell (SCALI et al., 1987; MANTOVANI & SCALI, 1992; PERTOLDI et al., 2001).

The analysis of speciation within the genus (using karyological analysis, allozyme analysis and ecological studies) and between previously described populations indicates complex hybridisation relationships (interspecific hybridisation, polyploidy, chromosomal re-assortment) and presence of species which are typical double cross hybrids (*B. whitei*) and triple cross hybrids (*B. lynceorum*) (SCALI & MANTOVANI, 1989).

## MATERIALS AND METHODS

In cooperation with the Speleological Society “Vjetrenica” (Municipality Ravno) and as a part of a research project dealing with terrestrial fauna of Popovo polje, regular zoological surveys of Popovo polje and its neighbouring areas (especially those bordering with Croatia on the stretch from Dole to Visočik and most importantly in the area of Neum, the only town truly located in the area of the Mediterranean climate (Fig. 1) was conducted over the period from April 2006 to May 2009. Surveys have been undertaken by extensive terrain inspection with use of an entomological net (collection of insects with short taps against the bottom side of exposed branches of shrubs and bushes).

Identification of the species was done using the identification key: LELONG, 1990.



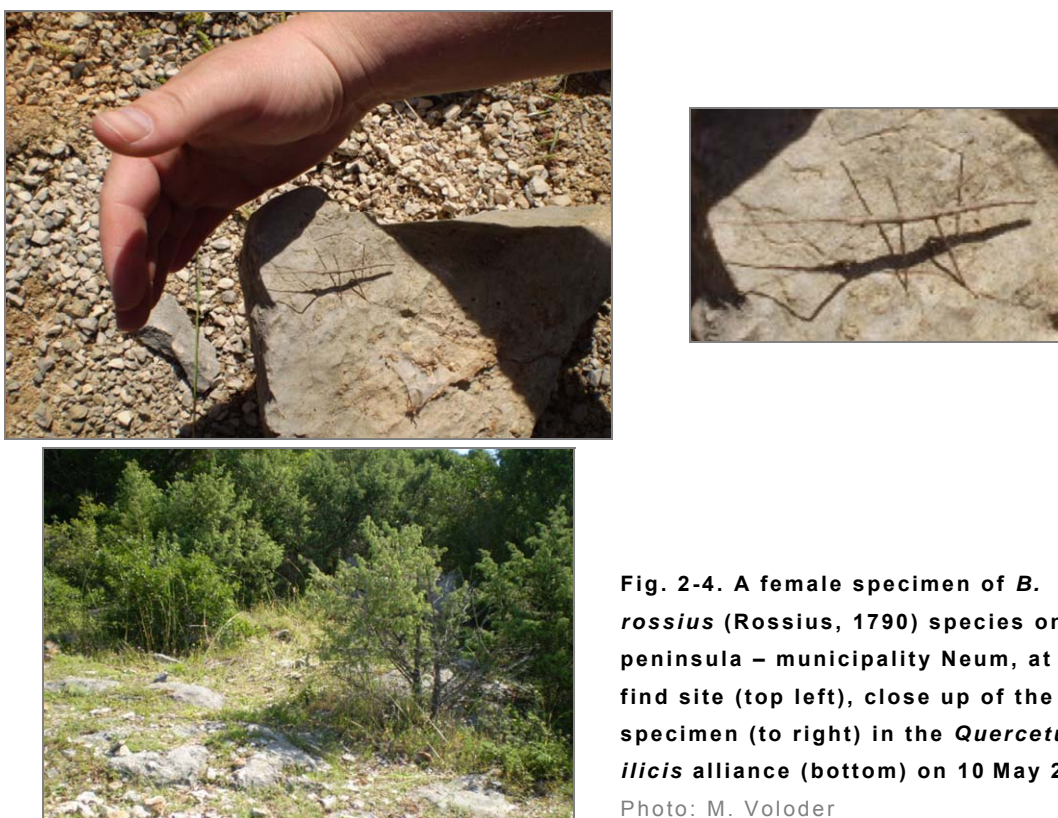
Fig. 1. The area of survey shown against an outline map of Bosnia and Herzegovina.

## RESULTS AND DISCUSSION

On 10 May 2009, after a long-term survey, we confirmed existence of *Bacillus rossius* (Rossius, 1790) species in Bosnia and Herzegovina. Around 9:30 AM, a single female was caught on Klek peninsula in the *Quercetus ilicis* vegetational alliance (Fig. 2-4).

The individual is very young. It is a mottled grey coloured female with total body length of 45mm. Antennae are short and segments are almost indistinguishable and uncountable. Pronotum is smooth, slightly saddle-shaped and with no visible spots or lines (*Clonopsis gallica* Charpentier species has a pronotum which is granulated, non saddle-shaped and has a forward curving lines on each side). Ventral sides of the femora of mesothoratic legs have three pigmented protuberances with teeth which rise distally in size, and on the outer sides of femora there is a horizontal, dorsoventrally placed, spine. Penultimate abdominal segment has a pair of extensions (Fig. 5-6).

At the moment we only have one individual of the species *B. rossius* (Rossius, 1790) so we limit our confirmation of existence in Bosnia and Herzegovina to the species and the order, and upon collecting more specimens we will deal with the characteristics of the local population of the species in more depth.



**Fig. 2-4. A female specimen of *B. rossius* (Rossius, 1790) species on Klek peninsula – municipality Neum, at the find site (top left), close up of the specimen (to right) in the *Quercetus ilicis* alliance (bottom) on 10 May 2009.**

Photo: M. Voloder

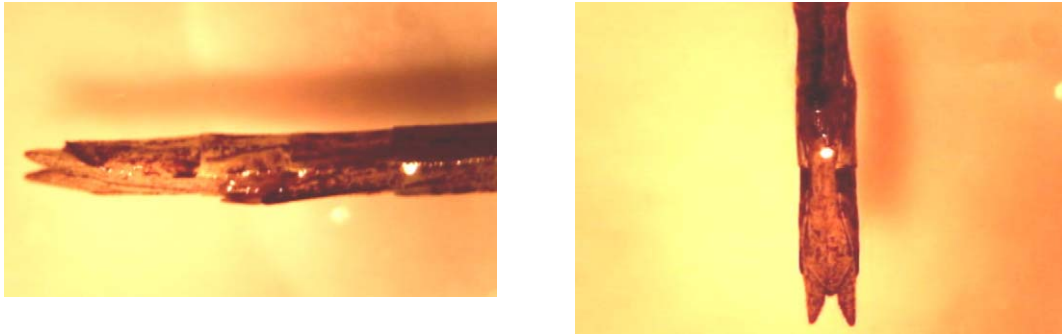


Fig. 5-6: Abdomen of the female of *B. rossius* (Rossius, 1790) species from Klek peninsula – municipality Neum. Photo: S. Lelo and M. Kašić-Lelo.

### CONCLUSION

After hypothesising, based on data of Lelong and Lelo's 1999 data and long-term surveying of the terrain in the wider area of Neum (more precisely within municipalities Neum, Ravno and Čapljina), that Bosnia and Herzegovina is surely inhabited by *Bacillus rossius* (Rossius, 1790) species, a single female of the species was discovered on the peninsula of Klek, near Neum and thus we proved the existence of representatives of order Phasmatodea in Bosnia and Herzegovina.

### REFERENCES

- GEORGIJEVIĆ, E., (ed.) 1974: [Research of Forest Entomofauna of Bosnia and Herzegovina]. Forest Research Institute Sarajevo, Project: E 30-FS-20.
- HELLER, K. G. & BOHN, H., 2007: *Fauna Europaea: Insecta, Phasmatodea*. Version 1.3. Available from: <http://www.faunaeur.org>.
- LELONG, P., 1990: Identification and Biology of French Phasmids. - *Le Monde Des Phasmes*, 9-10: 3-12.
- LELONG, P., 1993: Phylogeny and Reproduction of Genus *Bacillus* in the Mediterranean. - *Le Monde Des Phasmes*, 22: 3-13.
- LELO, S., (ed), 2005-2008: Fauna of Bosnia and Herzegovina – A Biosystematic Review: 1<sup>st</sup> and 2<sup>nd</sup>-4<sup>th</sup> updated edition. Internal publication of the Society for inventory and protection of animals, Ilijaš, Canton Sarajevo, pp. 1-403.
- MANTOVANI, B. & SCALI, V., 1992: Hybridogenesis and Androgenesis in the Stick-insect *Bacillus rossius-grandii benazzii* (Insecta, Phasmatoidea). - *Evolution*, 46(3): 783-796.
- PERTOLDI, C., LOESCHCKE, V. & SCALI, V., 2001: Developmental Stability in Sexually Reproducing and Parthenogenetic Populations of *Bacillus rossius rossius* and *Bacillus rossius redtenbacheri*. - *Evolutionary Ecology*, 4: 449-463.
- SCALI, V. & MANTOVANI, B. 1989: Updating of Systematics and Speciation Mechanisms of *Bacillus* (Insecta, Phasmatoidea). - *Italian Journal of Zoology*, 56: 87-98.

SCALI, V., MANTOVANI, B., MAZZINI, M. NASCETTI, G. & BULLINI, L. 1987: Intraspecific Ootaxonomy of *Bacillus rossius* (Rosi) (Insecta, Phasmatodea). - *Italian Journal of Zoology*, 54: 41-47.

WERNER, F., 1906: Dermaptera and Orthoptera of Bosnia and Herzegovina. - *Glasnik Zemaljskog muzeja Bosne i Hercegovine*, Sarajevo, 16: 563-574.

## Summary

### **Potvrda egzistencije štapić insekta, *Bacillus rossius* (Rossi, 1788) (Insecta: Phasmatodea, Baccilidae), u Bosni i Hercegovini**

Istraživanje bosanskohercegovačke entomofaune ima veoma dugu tradiciju, a prvi pisani podaci potiču iz Osmanskog perioda, tj. prve polovine 19. stoljeća. Od tada pa sve do danas entomološka istraživanja se kontinuirano odvijaju u Bosni i Hercegovini. Ipak, ni u jednom radu o insektima Bosne i Hercegovine nismo pronašli podatak o nalazu nekog od predstavnika Phasmatodea: =Phasmatoptera (Werner 1906, Georgijević 1974, Lelo 2005-2008). Međutim Lelo je 1999. godine u Neumu, na vegetaciji (koja se proteže iznad ceste uz obalu poluostrva Klek) uočio jednog štapić-insekta (*Bacillus sp.*), ali tada nije znao za gore navedenu činjenicu. Na portalu Fauna Europaea, ni jedna od pripadajućih vrsta reda Phasmatodea nije navedena za teritorij Bosne i Hercegovine. S druge strane na grafičkom prikazu rasprostranjenja vrste roda *Bacillus* Berthold, 1827 u južnoj Evropi Lelong je pomalo nejasno naznačio nalaze vrste *B. rossius* Rossius i *B. atticus* Brunner von Wattenwyl, kao da se radi o navodima iz Bosne i Hercegovine (Lelong 1993). Pored navedenog, postoje navodi areala na istraživanom području gdje L. Lelong za *B. atticus* Brunner von Wattenwyl navodi Istru i Dalmaciju (čime isključuje datu vrstu čak i kao potencijalnu u Bosni i Hercegovini), a za *B. rossius redtenbacheri* Nascetti & Bullini, 1983 južnu Italiju, Sardiniju i Dalmaciju (kao dio SFRJ), Albaniju i Grčku (LELONG, 1993; MANTOVANI & SCALI, 1992).

Nakon dugogodišnjih istraživanja 10. maja 2009. godine potvrdili smo postojanje vrste *Bacillus rossius* (Rossius, 1790) u Bosni i Hercegovini. Na poluotoku Klek u vegetacijskoj zajednici *Quercetus ilicis*, oko 9.<sup>30</sup> minuta uhvaćena je jedna ženka posmatrane vrste.

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