Project Update: November 2019

During the past few months we completed the analysis of our results. The molecular analysis of our samples was not planned but had to be done due to unavailability of identification keys for common yet uninvestigated genus *Pauesia* (which constituted more than 80% of our samples).

In our samples, aside from *Pauesia* parasitoids, we identified some rare specialised parasitoid species: Aphidius schimitcheki, Diaeretus leucopterus, Praon bicolor, Ephedrus koponeni and Ephedrus hyadaphidis.



Ephedrus koponeni is found outside its type locality (Finland) for the first time. We collected this species on two locations, Mokra Gora (Prokletije) and Arbinje (Stara planina mountain). This finding is rather important since it opens new questions concerning the distribution of specialized parasitoid species. It will be interesting to further explore whether *E. koponeni* is present throughout the rest of Europe, but just hasn't been sampled yet, or if this species has an extremely disjunct distribution.

Furthermore, by net sweeping on mountain Golija we found one male specimen of the newly described species *Ephedrus hyadaphidis*, until now known only from high mountain habitats in Montenegro.

As mentioned in previous updates, we were unable to collect any samples from *Picea omorika*, the endemic species found only on several locations in Serbia and Bosnia and Herzegovina. The reasons are discussed in the second update.

We successfully collected samples from other two endemic coniferous species, *Pinus heldreichii* and *Pinus peuce*. The parasitoid *Diaeretus leucopterus* emerged from several mummies collected on *Pinus heldrecihii*, while *Ephedrus koponeni*, two species of *Pauesia* and *Praon bicolor* emerged from the aphids sampled from *Pinus peuce*.

Findings of this project were presented at the XII Symposium of entomologists of Serbia, held in Niš, Serbia (September 25th–29th). Participants of the Symposium were professional and amateur entomologists from all over the country. We presented our results, showed how they connect to our previous and future work, and the Rufford foundation itself and funding opportunities for our young colleagues.



Unfortunately, during October, a large wildfire spread across Stara planina mountain, and was recorded at that time as the largest one in Europe. The fire blaze which spread

through the enormous surface (around 40000 hectares) of the mountain devastated the coniferous forests. Majority of the localities from where we collected our samples are now probably gone. As much as this highlights the importance of the work, we did last year, we might not be able to follow up on those localities and check if parasitoid species are well established, depending on the state of the fire devastation.

The most surprising result concerns the genus *Pauesia*. Currently, there are five species reported for Serbia (*P. juniperorum, P. cupressobii, P. unilachni, P. picta and P. pini*). Molecular analysis of the barcoding region of the mitochondrial cytochrome c oxidase subunit I gene (COI) of our samples revealed at least nine species of this genus. For now, we are not sure whether these four species are all known and already described, or some new species is hiding among them. Cryptic species are very common among Aphidiinae, and due to their small size and difficulty in morphological distinction, these species can only be discovered by molecular analyses.

Aphid and parasitoid populations in Mokra Gora and Stara planina mountain show the lowest level of disturbance. High diversity of parasitoid species in these localities is probably due to undisturbed habitats and mostly healthy coniferous forests. Fortunately for the forests in Mokra Gora, this is a state border area, so there isn't much human interference or tourism. As mentioned in one of the previous updates, the biggest threat to this area is the unlawful cutting of the trees, due to political disputes in the area. Coniferous forests in Stara planina mt. were in very good condition, with high diversity of parasitoids discovered. Parts of Stara planina mt. are not as secluded or free of human activity as Mokra Gora. However, there is strong awareness about the importance of nature conservation among the locals on Stara planina mt., and the people who live there actively work to protect the forests. Aside from some attempts by the state to build huge ski centers, most of the tourism is very nature friendly and Stara planina mt. is mostly visited by researchers and hikers, who understand the value of conserved nature. Unfortunately, after the October fires, the extent of the damage is still unclear, and it would be beneficial to visit Stara planina mt. again soon and assess the state of parasitoid and other insect populations.

