Myrmecological studies along ecological gradients in Iran, questions and methods

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Introduction

Iran comprises a large part of the Iranian plateau and covers an area of 1,623,779 km2. Biogeographically, the country is divided into 6 biomes and 14 ecoregions. There is little documentation on the ants in Iran except several local restricted investigations on the fauna of the country. Nevertheless so far about 120 species have been recorded (Paknia et al. submitted). Currently we conduct the first comprehensive study on ants in Iran.

Our study comprises two parts: taxonomy and ecology of the ants of Iran. The taxonomic aims are to clarify the ant fauna of Iran and to detect and find new species. Our ecological study aims at an investigation of the community pattern of the ant species and at a detection of the underlying mechanism that structure Iranian ant assemblages in different biomes.

Our main questions are:

-How many species of ants are there in Iran?

- How changes community structure and species richness of ants along an environmental gradient?

Has temperature and/or precipitation a significant influence on species richness and diversity of ants in Iran?

Material and methods

First field work in Iran was carried out from May until August 2007. We conducted our sampling along a long transect (ca 1600 km) from the north to the south of Iran. We collected ants across three main biomes (Fig. 1) and five main ecoregions (Fig. 2). Totally we sampled ants from 10 sample sites (two samples sites for every ecoregion) (Figs. 2-4).

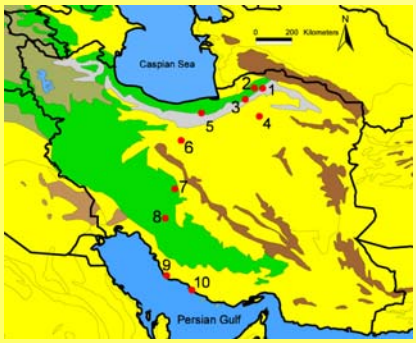

Fig. 1 Map of the biomes of Iran, showing three main biomes that were sampled along the transect (green: temperate broadleaf and mixed forests, grey: temperate coniferous forests and yellow: desert and xeric shrublands). Red points show the samples sites (1- Mirzabilu steppe, 2- Golestan forest, 3- Khoshyelagh steppe, 4- Turan arid area, 5- farim forest, 6- Kavir arid area, 7- Kolah ghazi arid area, 8- Dena semi arid area, 9- Mond arid area, 10- Naiband arid area).

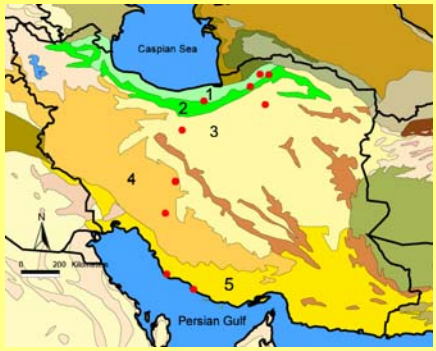

Fig. 2 Map of ecoregions of Iran, documenting five main ecoregions that were sampled along our transect (1- Caspian Hyrcanian mixed forests, 2- Elburz Range forest steppe, 3- Central Persian desert basins, 4- Zagros Mountains forest steppe and 5- South Iran Nubo Sindian desert and semi desert).

Conclusion

Based on our preliminary results we predict that we used too much effort for our sampling, especially about Caspian forests ecoregion. While we hypothesized high species richness of ground ants in the Caspian forest sites, we found only moderate diversity in this habitat. However, these prelimi-nary results have to be verified with species rarefaction methods.

Fig. 3 Farim collection site in Caspian forest ecoregion (in Fig.1, number 5).

Fig. 4 Naiband sampling site in South Iran Nubo Sindian desert and semi desert ecoregion (in Fig. 1, number 10)

We used pitfall traps and bait traps for all the sites and added the Winkler collector method for the sampling of leaf litter in the Caspian forests. We used a total of 60 pitfall traps, that were placed in two 300 m-transects. Traps were collected after 3 days. In each sample site we set up 66 bait traps with sugar water and tuna fish in a grid (6 x 11) with the traps baits spaced 10 m intervals, for two days.

We checked the baits at least three times during the day and one time in the night and collected several samples from the baits each time.

Except for the Caspian forest samples sites, we measured vegetation cover of the sample sites by taking vertical photos of a 1x1 m plastic frame that we placed randomly on ground, for each site at least 40 times. For each of two sample sites of the Caspian forest ecoregion we collected 20 samples of 1m^2 of leaf litter in different habitats for extraction with Winkler collectors. We measured canopy cover by taking photos for every Winkler sample. We left the litter samples in the Winkler apparatus for at least 2 days to ensure proper drying of samples.

Results

As our study is still ongoing we can only present some of the preliminary results. Preliminary identification showed that collected ants belong to four subfamilies and 16 genera. In the Caspian forest ecoregion we collected ants from 8 genera (*Temnothorax*, *Crematogaster*, *Aphaenogaster*, *Tetramorium*, *Lasius*, *Formica*, *Camponotus*, and *Ponera*). Just in the Elburz Range forest steppe we found *Myrmica sp.* In arid and semi arid areas we collected ants from 12 genera (*Cataglyphis*, *Camponotus*, *Lepisiota*, *Messor*, *Tetramorium*, *Cardiocondyla*, *Temnothorax*, *Pheidole*, *Crematogaster*, *Monomorium*, *Aphaenogaster*, *Tapinoma* and *Pachycondyla*), although the structure of ant communities in different ecoregions was different.

Fig. 5 sampling the leaf litter by Winkler collector in Caspian forest ecoregion.

Reference

Paknia, O., Radchenko A., Alipanah H. and Pfeiffer M. A Preliminary Checklist of the Ants (Hymenoptera: Formicidae) of Iran, Myrmecological News. [Submitted]