USE OF ENCYRTID (HYMENOPTERA: CHALCIDIOIDEA, ENCYRTIDAE) FAUNA TO ESTIMATE LIKE NUMBER OF SCALE (HEMIPTERA: COCCOIDEA) FAUNA IN GOLCUK NATURAL PARK, TURKEY

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Abstract
Encyrtid species collected by malaise trapping in Golcuk Natural Park, Turkey, together with previous records of encyrtids from the surrounding regions (Isparta Province), were used to estimate the number of scale species likely present in the Park. From these data we found 31 species of encyrtids known to be parasitoids of scale in Isparta province. These parasitoids are associated with in total 168 scale species as hosts worldwide; however, only 66 of those scales have been recorded from Turkey. The use of Chi-square statistic predicts that the list of scales in Turkey is very incomplete and the probability of finding more scale species in the area is very high, which is proved by various parasitoids recorded here.

Key Words: Golcuk, Encyrtidae, Coccoidea, Turkey

Introduction
Many phytophagous insect species seem, on average, to be considerably less abundant than ought to be possible based on the availability of their resources and, indeed, it is often difficult to record them in particular study areas because of their low densities. These low densities, especially for scale, can be due to the action of specialized natural enemies (especially parasitoids). Information on parasitoid community structure is important for several reasons. First, shared parasitism may be a significant factor structuring the whole insect community [Stenmo et al., 1994]. Parasitoids may, for example, determinate the number of herbivores that can coexist in a common habitat [Lawton, 1986; Holt & Lawton, 1993]. While host-parasitoid population dynamics and abundance have often been studied [Cribin, 1997; Maron & Harrison, 1997], no publications have previously attempted to use parasitoid fauna in a region to forecast the species assemblage used by them as hosts. The goal of our study is to make preliminary estimates of scale species likely to be present in the study area based on records of the local scale-attacking parasitoid fauna.
Materials and Methods

Fecal samples were collected from March to October, 2009, using the malaise traps located in the Sokhna National Park (ONP). Malaise traps were placed in two locations, first at Pinus Longaeva (altitude 1352 m) and second in an area that has been reforested with Acacia and which is near the main entrance of ONP (altitude 1414 m). The malaise traps were checked and washed every 5 days. After collecting the tape, the samples were sorted according to the superfamily and family. Later Chilopoda superfamily species were counted, and the literature was consulted. The species' names were then recognized and identified using the following references: 1) Acarapides and 2) Onchoceraeidae.

Results and Discussion

To test the possibility that more agile species would exist in the study area, we used Chi

Square analysis [Moxon & McCabe, 1994]. We used the hypothesis test given below:

H0: There is no significant difference between Egypt and World according to proportion of species in family groups.

H1: There is a significant difference between Egypt and World according to proportion of species in family groups.

The null hypothesis will be rejected, when we will find the chi-square statistic as is greater than the value of chi-square (at 5% level of significance). Fifty one species of onychophorans were recorded from recent or previous studies in the study region [Nassehi & Kutana, 2009; Japoshvili & Ceka, 2010; Japoshvili, 2011]. As less 168 scale species worldwide are known to be studied by this group of 51 species. However, only 60 of these (168 scale) have been recorded from Egypt (Nasehi, 2010; Ben-Dov et al. 2013) (Table 1).}

Turkey and World: according to proportion of species in family groups. Data means that there is still more species that can be found in Turkey.

<table>
<thead>
<tr>
<th>Family</th>
<th>Turkey</th>
<th>World</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Acrididae</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2. Anostostomidae</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3. Cercidae</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>4. Diplopoda</td>
<td>17</td>
<td>27</td>
</tr>
<tr>
<td>5. Euboreidae</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>6. Gerromidae</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>7. Pseudococcidae</td>
<td>14</td>
<td>33</td>
</tr>
<tr>
<td>Total</td>
<td>69</td>
<td>168</td>
</tr>
</tbody>
</table>

Therefore, given that 141 species of ensifera are known in Turkey (Japoshvili & Noyes 2005; Japoshvili & Karaca, 2007; Japoshvili et al., 2009; Japoshvili & Celik, 2010; Kaytan & Japoshvili, 2011), the number of scales known from Turkey will potentially, at least, double as the fauna should be subjected to more intensive collecting.

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References

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