

1-1-2000

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## Systematic Studies on *Rhysotritia ardua* (C.L. Koch) (Acari, Oribatida) in Erzincan and Erzurum Plains

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Received: 06.09.1999

**Abstract:** Morphological features of *Rhysotritia ardua* (C.L. Koch) collected from Erzincan and Erzurum plains were reexamined and illustrated under light and scanning electron microscopes. Abnormalities in the notogastral, anal and adanal setae were observed.

**Key Words:** *Rhysotritia ardua*, Acari, Oribatida, Systematics, Erzincan and Erzurum plains.

### Erzincan ve Erzurum Ovalarındaki *Rhysotritia ardua* (C.L. Koch) (Acari, Oribatida) Üzerine Sistematik Araştırmalar

**Özet:** Erzincan ve Erzurum ovalarından toplanan *Rhysotritia ardua* (C.L. Koch)'nın morfolojik özellikleri ışık ve tarama elektron mikroskobunda yeniden incelenmiş ve şekilleri çizilmiştir. Notogaster, anal ve adanal setalarda anormallikler tespit edilmiştir.

**Anahtar Sözcükler:** *Rhysotritia ardua*, Acari, Oribatida, Sistematik, Erzincan ve Erzurum ovaları.

#### Introduction

*Rhysotritia ardua* (C.L. Koch) is a cosmopolitan species of oribatid mites. In Turkey, this species was recorded first by Ayyıldız and Özkan (1). The purpose of this paper is to reexamine the morphological features of this species on the basis of material collected during the faunistic survey of Euphthiracaroid mites of Erzincan and Erzurum plains, which are the highest area of Turkey.

#### Materials and Methods

Soil mites were collected and preserved as given by Ayyıldız and Özkan (1). Euphthiracaroid mites were picked from the samples under a stereo microscope and mounted on slides in Hoyer's medium (2). The light (LM) and scanning electron microscopy (SEM) studies were done at the Acarology Laboratory of the Biology Department and at the Engineering Faculty, respectively. Examined materials are deposited at the Zoological Museum of Atatürk University, Erzurum. All measurements are given in µm.

Samples were collected at the following localities:

1. The Campus of Erzincan Education Faculty, 1.7.1997, soil and litter.

2. Institute of Garden Cultures, Erzincan, 6.7.1997, soil and litter.

3. Terzibaba Cemetery, Erzincan, 12.7.1997, soil and litter.

4. The road of Yaylabası village, 16.7.1997.

5. Yaylabası village, 2.9.1997, soil, litter and moss.

6. Çakırbağlar garden, Erzincan, 4.10.1997, soil and litter.

7. The Youth Park, Erzincan, 8.10.1997, soil and litter.

8. Şehitlik, Erzincan, 14.11.1997, soil and litter.

9. Ekşisu, Erzincan, 3.3.1998, soil and litter.

10. The road of Erzincan-Kemah between 2nd-5th km, 13.3.1998, soil and litter.

11. Ulalar, Erzincan, 13.3.1998, soil and litter.

12. Nursery Directorate of Forestry, 13.3.1998, soil and litter.

13. The Garden of Fiber Factory, 26.3.1998, soil and litter.

14. The Campus of Atatürk University, 6.5.1997, soil and litter.

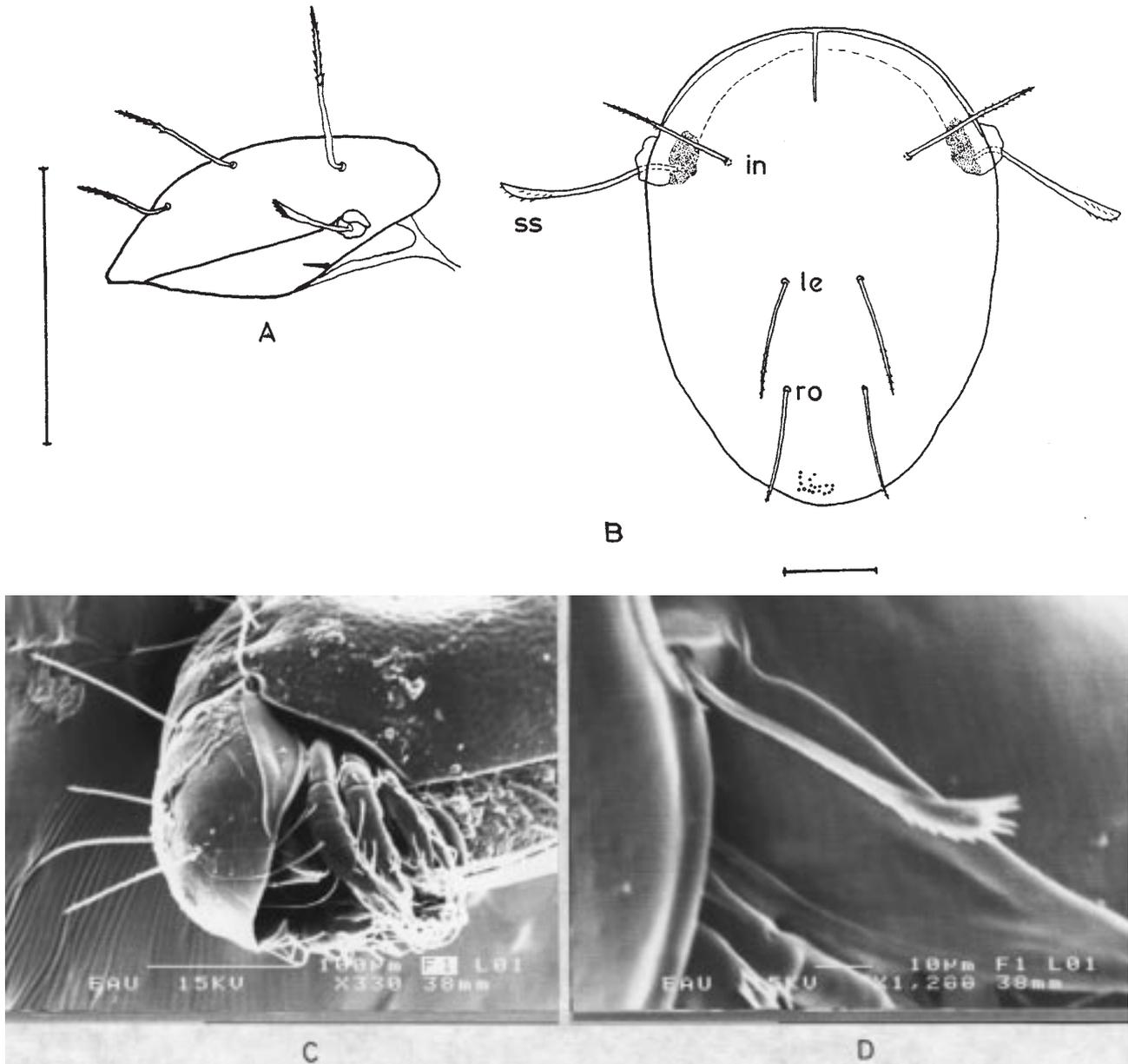


Figure 1. A) Lateral view of aspid. B) Dorsal view of aspid. C) SEM of aspid and its setae. D) SEM of sensillus. Scale bars= 200  $\mu$ m for A and 50  $\mu$ m for B.

15. Yenişehir, 9.5.1997, beneath poplar, soil and litter.

16. Ilıca, 31.5.1997, soil and litter.

17. The garden of Abdurrahman Gazi's Tomb, 25.6.1997, soil and litter.

18. Atatürk's Forest, Kiremitlik Tabya, 5.7.1997, soil, litter and moss.

19. Atatürk University, 3rd Well, 6.7.1997, soil and litter.

20. Aşkale, meadowland, 30.7.1997, soil.

### Results

Superfamily: Euphthiracaroidea Jacot, 1930

Family: Euphthiracaridae Jacot, 1930

Genus: *Rhysotritia* Markel and Meyer, 1959

*Rhysotritia ardua* (C.L. Koch, 1841)

**Aspis** (Figures 1A-D): 210-282 in length. Aspis with one lateral carina on each side; it terminates posteriorly in front of bothridium; on the anterior part of aspis, minute granules present. Sensillus (*ss*) 78 (50-107) in length, its apical part clearly flattened and barbed. Rostral seta (*ro*) weakly barbed; lamellar (*le*) and interlamellar (*in*) setae vigorously barbed on the apical half. The ratio of aspis setae with respect to length:  $ro < le < in$ . Relative distances of aspis ones:  $ro-ro < le-le < in-in$ . *le* approximately 1.2 times longer than *ro*, *in* about 2 times longer than *ro*. Exobothridial seta (*ex*) very small 10 (7-17).

**Notogaster** (Figure 2A): 400-587 in length, 267-400 in width. The ratio length/width of notogaster approximately 1.5. Notogastral surface very finely punctured. 14 pairs of notogastral setae present; these setae robust and on the apical half distinctly barbed.

**Genito-Anal Region** (Figures. 2B, C). Nine pairs of genital setae short and fine. The 3 anteriormost pairs of them located close to each other. Two pairs of minute genital setae also present. Anal setae *an*<sub>1</sub> and *an*<sub>2</sub>

stronger, rough and pointed at the tip. Anal seta *an*<sub>3</sub> also small, weak and rather stronger than genital setae, being located close to and outside interlocking triangle. Adanal setae (*ad*<sub>1</sub>-*ad*<sub>3</sub>) approximately 1.4 times longer than anal setae (*an*<sub>1</sub> and *an*<sub>2</sub>). Adanal setae thick and barbed on the apical half. A round pore (*iad*) between setae *an*<sub>3</sub> and *ad*<sub>3</sub> present. Ano-genital region coated with small granules.

**Legs** (Figure 3): Leg I bidactyle, legs II-IV tridactyle. Paraxial lateral claw of leg I absent.

**Eggs** (Figure 4A): Egg numbers vary between 1 and 4 for each individual. Their average length and width are 210 (200-227) and 125 (110-133), respectively. The eggs are oval and have a slightly lobed and broken relief lined pattern.

**Abnormalities** (Figures. 4B, 5A, B): One of the examined specimens from locality 1 has notogastral setae in normal shape and number on one side of the body, and seta *ps*<sub>1</sub> rather weak and smooth, an extra seta *ps*<sub>2x</sub> (beside the seta *ps*<sub>2</sub>) on the other side. Moreover, in two samples from localities 4 and 18, an extra seta *an*<sub>x</sub> is present between setae *an*<sub>2</sub> and *ad*<sub>3</sub>. In another sample from locality 13, between setae *ad*<sub>2</sub> and *an*<sub>1</sub>, a seta *ad*<sub>2x</sub> is present. In addition, the conjugate of seta *ad*<sub>2</sub> is longer than a normal one.

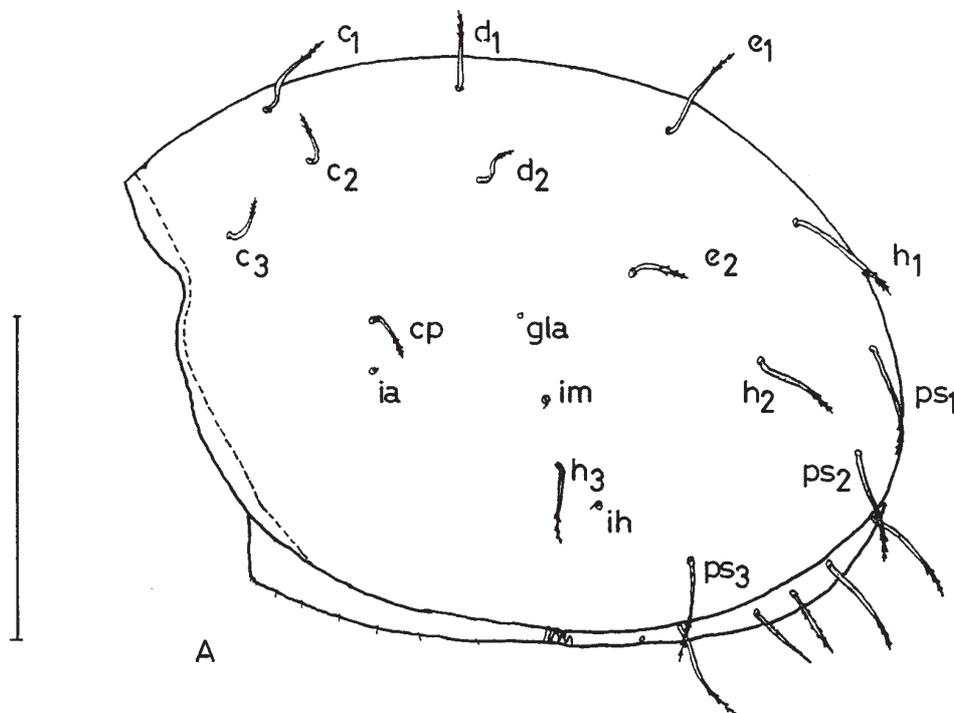


Figure 2. A) Lateral view of notogaster. Scale bar= 200 µm.

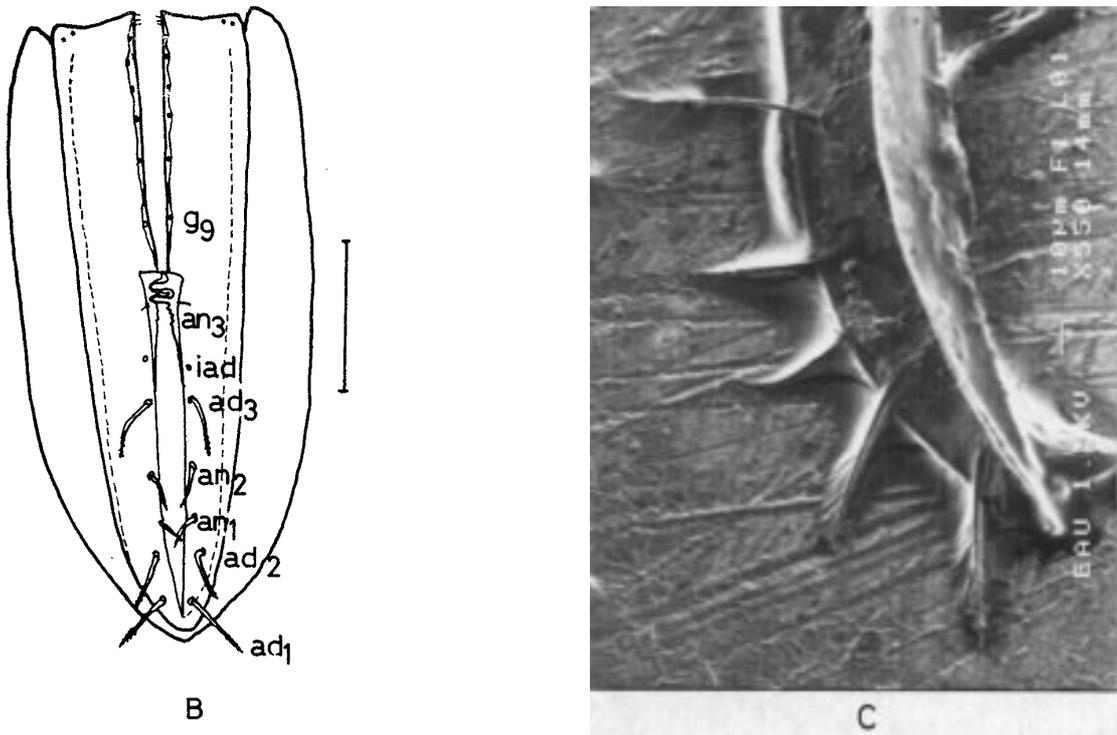


Figure 2. B) Genito-aggenital plate. C) SEM of ano-adanal setae. Scale bar= 100 µm for B.

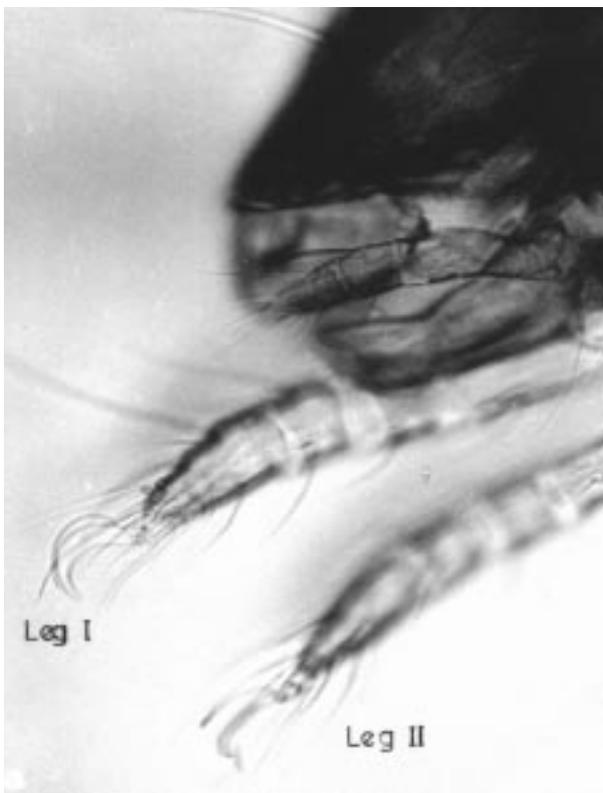


Figure 3. Legs I and II.

**Distribution:** Europe, North America, Canada, Tahiti, Japan, Turkey, Oriental, Australian and subantarctic (1, 3, 4).

**Examined materials:** 1 (665 exs.), 2 (295 exs.), 3 (74 exs.), 4 (982 exs.), 5 (64 exs.) 6 (2 exs.), 7 (2 exs.), 8 (101 exs.), 9 (73 exs.) 10 (57 exs.), 11 (41 exs.), 12 (70 exs.), 13 (192 exs.), 14 (3 exs.), 15 (4 exs.), 16 (2 exs.), 17 (20 exs.), 18 (1 ex.), 19 (2 exs.), 20 (19 exs.).

### Discussion

*Rhysotritia ardua* (C.L. Koch, 1841) is characterized by aspis with a single lateral carina on each side, notogastral setae weakly or strongly barbed, the number of claws on legs I-IV very variable (3).

In our examined samples, it was found that the dimensions of *R. ardua* are as follows: aspis length 243 (210-283), width 178 (147-213), height 99 (70-137); notogaster length 497 (400-587), width 327 (253-400) and height 335 (267-400). Dimensions of this species have been determined by other authors as follows: aspis length (175) 210-314 (the value 175 given by Kamill et al., (5) from New Mexico is an exception and it is

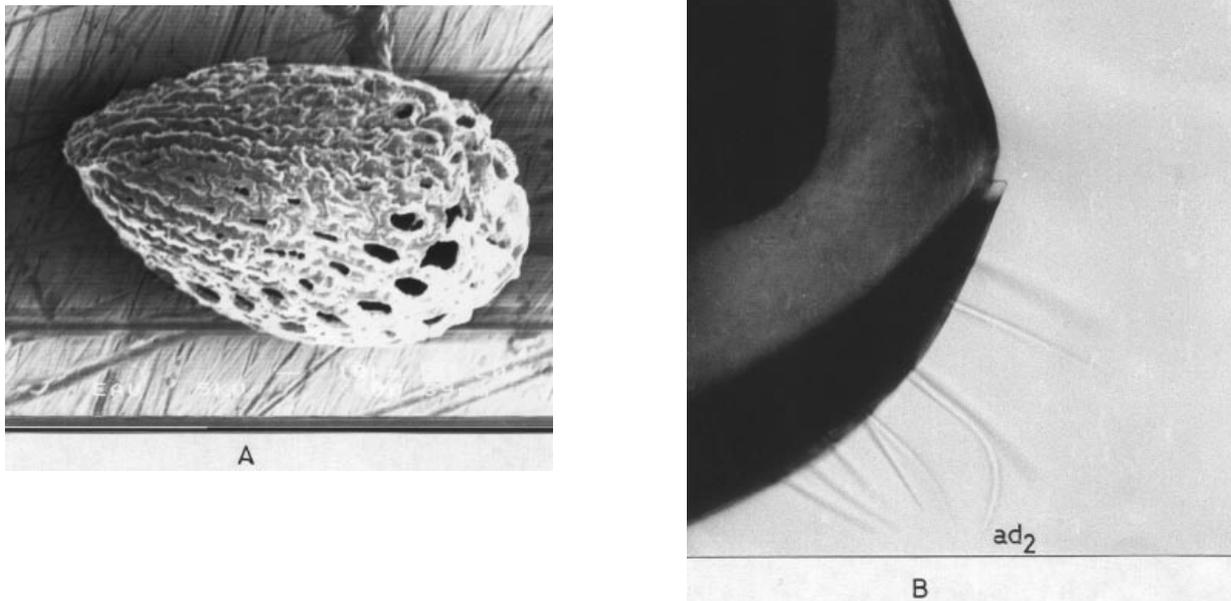


Figure 4. A) SEM of an egg, B) Abnormalities of anal and adanal setae.

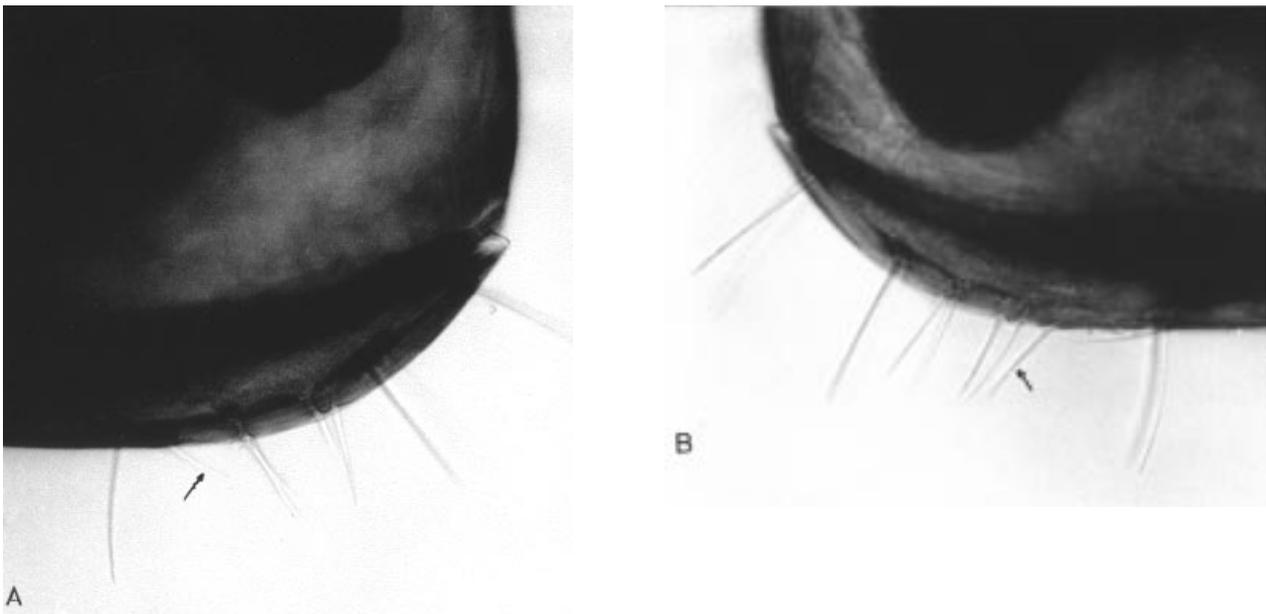


Figure 5. Abnormalities of anal setae.

measured in only one sample), the average width 290, height 250-430 (1, 3, 5, 6-12).

According to the above data, our measurements are found in the known range of the body dimension, but despite finding the height of aspis as 99 (70-137) in our samples, in comparison with the value 104 (84-119) only given by Jacot (7) to date, our measurements are in a

wider range. This difference could be considered in the variation limits.

Notogaster normally possess 14 pairs of setae, but in one of our examined samples from locality 1, there is an extra seta near seta  $ps_2$  and also seta  $ps_1$  is shorter than its conjugate and smooth.

In two samples from localities 4 and 18, an extra and asymmetrical seta  $an_x$  on the genito-anal plate has been found. In another sample, from locality 13, seta  $ad_2$  is longer than its conjugate and is curly and also an extra seta  $ad_x$  between setae  $ad_2$  and  $an_1$  is present.

It is known that this species has variations in body size, in shape of sensilli and in the number of claws (3, 5-7, 13-15). We have no evidence concerning the source of abnormalities at present, since the frequency and abundance of the abnormal samples are very small. It is seen that the structural features of the ventral region generally agree with Grandjean's figure (16).

In data related with the number of claws on legs, it is pointed that each leg has one claw (3, 6, 13, 14) or leg I has two claws, legs II-IV have three claws on each (1, 3, 7, 9, 15). The number of claws of our samples agree with this data. As stated by the above authors, this feature could be expected as a variation.

In the present study it was determined that the investigated female individuals possess 1-4 eggs, and the females with eggs were seen between March 1997 and November 1997. These findings are consistent with Jacot's (7). Grandjean (17) stated that eggs are oval, large and also have two membranes, the outer membrane is very ornamented, thick, yellowish or brown, the inner one is smooth, thin, colorless and elastic; furthermore corion, the outer membrane, has pores with equal size. In our samples it was found that eggs are oval and 125/210 in dimension. It was seen that the features of our samples are consistent with the description and figures given by Jacot (7) and Grandjean (17).

It was found that the other morphological features of our specimens are consistent with those of previously known specimens.

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