

Study of Centipede Communities of Three Habitats in the Province of Ciudad Real

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ABSTRACT

The present work is a study of centipede communities of three different habitats in the province of Ciudad Real. These are a poplar grove, a brushwood and rubbish heap. The specimens have been collected by direct sampling and by Berlese funnels. A check-list of the species collected is given. A frequency and abundance analysis have been carried out. The specific richness and diversity have been compared for the three different biocenoses.

RÉSUMÉ

Étude des peuplements de chilopodes de trois types d'habitats dans la province de Ciudad Real (Espagne).

Le présent travail étudie les peuplements de chilopodes de trois types d'habitats de la province de Ciudad Real, en Espagne. Il s'agit d'une peupleraie, d'un fourré de broussailles et d'un monceau de détrit. Le matériel a été récolté par échantillonnage direct et par extraction au Berlese. On donne la liste des espèces collectées, ainsi que leur fréquence et leur abondance. La richesse spécifique et la diversité spécifique ont été estimées de manière comparative au sein des trois biocénoses étudiées.

INTRODUCTION

Usually, when we study the soil fauna, we can observe the great variation that exists between the habitat characteristics and the community of organisms that live there.

The centipedes, because of their affinity to dampness and their restricted tolerance to variations of environment humidity, are easier to find in wet areas.

Consequently, it is rather strange to find populations in places which have a low humidity during the main part of the year.

MATERIAL AND METHODS

Environmental Description:

The area where the present study has been carried out is the Campo de Calatrava, province of Ciudad Real, in the Comunidad de Castilla-La Mancha. The afore mentioned Campo de Calatrava is placed in the Submeseta Sur, between the Montes de Toledo and Sierra Morena. Of note are its old volcanic eruptive defiles caused by isostatic adjustments that took place after the Pontian. Of note are the volcanic products called "Negrizales" or "Castillejos" as well as some volcanic cones. The soil is dun or red dun of crusty limestone and also mediterranean red soil over siliceous materials

mainly dedicated to agriculture. The climate is mesomediterranean and the vegetation is typical of the corological Luso-Extremadurensis province.

Studied Habitats

The studied habitats are three areas in the Campo de Calatrava. The first is a poplar grove with an altitude of 700 m and coordinates UTM 30SVJ5608, characterized by an abundance of dead leaves. The second is a brushwood with an altitude of 869 m and coordinates UTM 30SVH5199, characterized by rocks and scrubs of phytosociological communities as *Cisto clusii* - *Rosmarinetum* and *Herniario* - *Teucrietum pumilii*. The third is a rubbish heap, with an altitude of 800 m and coordinates UTM 30SVH4898, characterized by plenty of debris and vegetal nitrophile communities.

Methodology:

The habitats were sampled on one day of the first week of every month during 1987.

Five places in each habitat were chosen and the sampling was made in an area of 3 square meters. Check-lists with the number of specimens of each species were established and the frequency and abundance estimated. In order to compare the structure of each habitat, the following indices were used:

a) SHANNON-WIENER diversity (1949): $H' = - \sum P_i \ln P_i$

This index could be defined as a measure of the specific structure in an ecosystem, based in the number of species present and their relative abundances.

b) Specific richness according to MARGALEFF (1980): $R = (S-1)/\ln N$, where P is the abundance of each species in the habitat ($P_i = N_i/N$); S is the number of species and N the number of specimens.

RESULTS

Faunistic Composition

On the three studied areas eleven species have been found and can be assembled, according to a biogeographic point of view and to the BROLEMANN (1930) criteria, in the following way:

| | |
|----------------------------|--|
| European species: | <i>Lithobius lusitanus</i> Verhoeff, 1925. |
| Mediterranean species: | <i>Dignathodon microcephalum</i> Lucas, 1846. <i>Scolopendra cingulata</i> Latreille, 1829. <i>Lithobius variegatus rubriceps</i> Newport, 1845. |
| Holarctic species: | <i>Pachymerium ferrugineum</i> (C. Koch, 1835). <i>Schendyla nemorensis</i> (C. Koch, 1837). |
| Palaearctic species: | <i>Geophilus carpophagus</i> Leach, 1814. |
| Betico-riferenian species: | <i>Lithobius inermis</i> L. Koch, 1856. |
| Endemic species: | <i>Cryptops hispanus</i> Brölemann, 1920. |
| Atlantic species: | <i>Lithobius pilicornis</i> Newport, 1845. |
| Cosmopolitan species: | <i>Scutigera coleoptrata</i> (Linné, 1758). |

Taxocenoses study

In Tables 1, 2 and 3 we can see the number of specimens belonging to the different species. The total amount of specimens captured was 284 (49 in the poplar grove, 104 in the brushwood and 131 in the rubbish heap).

In the poplar grove, the total number of centipedes is 49 individuals, belonging to 5 different species. The most abundant species is *Pachymerium ferrugineum* (40.81%), after that comes *Lithobius lusitanus* (32.62%) and *Scutigera coleoptrata* (22.44%). In relation to the frequencies we must point out the relative importance of *Lithobius lusitanus* (31.66%) and *Pachymerium ferrugineum* (30.00%).

In the brushwood, the total number of centipedes is 104 individuals, belonging to 8 different species. The most abundant species is *Scolopendra cingulata* (29.80%), after that comes *Lithobius variegatus rubriceps* (24.03%) and *Pachymerium ferrugineum* (12.50%). In relation to the frequencies we must point out the relative importance of *Scolopendra cingulata* (48.33%) and *Lithobius variegatus rubriceps* (38.33%).

TABLE 1. — Poplar grove taxocenoses: number of males (M) and females (H) sampled, proportion among the sexes (M/H), total amount of specimens (NT), frequency (F) and abundance (A) for each species.

| | M | H | M/H | NT | F | A |
|--------------------------------|---|----|------|----|-------|------|
| <i>L. pilicornis</i> | 2 | 6 | 0.33 | 8 | 11.66 | 0.16 |
| <i>L. lusitanus</i> | 7 | 9 | 0.77 | 16 | 31.66 | 0.32 |
| <i>L. inermis</i> | - | - | - | - | - | - |
| <i>L. variegatus rubriceps</i> | - | - | - | - | - | - |
| <i>S. nemorensis</i> | 2 | 0 | - | 2 | 3.33 | 0.04 |
| <i>P. ferrugineum</i> | 9 | 11 | 0.81 | 20 | 30.00 | 0.40 |
| <i>D. microcephalum</i> | - | - | - | - | - | - |
| <i>G. carpophagus</i> | - | - | - | - | - | - |
| <i>C. hispanus</i> | - | - | - | - | - | - |
| <i>S. cingulata</i> | - | - | - | - | - | - |
| <i>S. coleoptrata</i> | 8 | 3 | 2.66 | 11 | 16.66 | 0.22 |

TABLE 2. — Brushwood taxocenoses: number of males (M) and females (H) sampled, proportion among the sexes (M/H), total amount of specimens (NT), frequency (F) and abundance (A) for each species.

| | M | H | M/H | NT | F | A |
|--------------------------------|----|----|------|----|-------|------|
| <i>L. pilicornis</i> | - | - | - | - | - | - |
| <i>L. lusitanus</i> | 8 | 3 | 2.66 | 11 | 15.00 | 0.10 |
| <i>L. inermis</i> | - | 2 | - | 2 | 3.33 | 0.01 |
| <i>L. variegatus rubriceps</i> | 14 | 11 | 1.27 | 25 | 38.33 | 0.24 |
| <i>S. nemorensis</i> | - | - | - | - | - | - |
| <i>P. ferrugineum</i> | 7 | 6 | 1.16 | 13 | 13.33 | 0.12 |
| <i>D. microcephalum</i> | - | - | - | - | - | - |
| <i>G. carpophagus</i> | 4 | 7 | 0.57 | 11 | 16.66 | 0.10 |
| <i>C. hispanus</i> | 2 | 0 | - | 2 | 3.33 | 0.01 |
| <i>S. cingulata</i> | 18 | 13 | 1.38 | 31 | 48.33 | 0.29 |
| <i>S. coleoptrata</i> | 2 | 7 | 0.28 | 9 | 11.66 | 0.08 |

TABLE 3. — Rubbish heap taxocenoses: number of males (M) and females (H) sampled, proportion among the two sexes (M/H), total amount of specimens (NT), frequency (F) and abundance (A) for each species.

| | M | H | M/H | NT | F | A |
|--------------------------------|----|----|------|----|-------|------|
| <i>L. pilicornis</i> | - | - | - | - | - | - |
| <i>L. lusitanus</i> | 12 | 7 | 1.71 | 19 | 28.33 | 0.14 |
| <i>L. inermis</i> | - | 2 | - | - | - | - |
| <i>L. variegatus rubriceps</i> | 13 | 18 | 0.72 | 31 | 48.33 | 0.23 |
| <i>S. nemorensis</i> | - | - | - | - | - | - |
| <i>P. ferrugineum</i> | - | - | - | - | - | - |
| <i>D. microcephalum</i> | 5 | 9 | 0.55 | 14 | 23.33 | 0.10 |
| <i>G. carpophagus</i> | 9 | 2 | 4.50 | 11 | 16.66 | 0.08 |
| <i>C. hispanus</i> | 4 | 3 | 1.33 | 7 | 10.00 | 0.05 |
| <i>S. cingulata</i> | 21 | 16 | 1.31 | 37 | 58.33 | 0.28 |
| <i>S. coleoptrata</i> | 3 | 9 | 0.33 | 12 | 18.33 | 0.09 |

On the rubbish heap, the total number of centipedes is 131 individuals, belonging to 7 different species. The most abundant species is *Scolopendra cingulata* (28.24%), after that comes *Lithobius variegatus rubriceps* (23.66%) and *Lithobius lusitanus* (14.50%).

In relation to the frequencies we must point out the relative importance of *Scolopendra cingulata* (58.33%) and *Lithobius variegatus rubriceps* (48.33%).

When comparing the results obtained from the three habitats, we must point out that the values for the specific diversity are very similar, being 1.73 for the rubbish heap, 1.68 for the brushwood and 1.46 for the poplar grove. The values for the specific richness are: 1.50 for the brushwood, 1.23 for the rubbish heap and 1.02 for the poplar grove. (Table 4).

TABLE 4. — Number of species (Nsp), total number of specimens (N), specific richness and diversity in the three studied habitats.

| | Nsp | N | Richness | Diversity |
|--------------|-----|-----|----------|-----------|
| Poplar grove | 5 | 49 | 1.02 | 1.46 |
| Brushwood | 8 | 104 | 1.50 | 1.68 |
| Rubbish heap | 7 | 131 | 1.23 | 1.73 |

CONCLUSION

The most abundant species in the rubbish heap and in the brushwood is *Scolopendra cingulata*, but it seems to be absent in the poplar grove; this is in agreement with its obvious preferences for rocky places.

The second most important species, *Lithobius lusitanus*, is found in the three studied habitats, showing probably a better adaptability to the different conditions of the environment.

Two other species, *Lithobius pilicornis* and *Schendyla nemorensis*, have been found only in the poplar grove and another one, *Lithobius inermis* only in the brushwood. They could be considered as a characteristic for the habitat.

In the present work dealing mainly with a comparison of the three ecosystem types, we have found very similar diversity values but different richness values. However, these results do not show any highly significant differences.

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