

Ground-Beetles (*Coleoptera, Carabidae*) in the supra-forestral pastures of the Tendeñera massif

by

Miguel LORENZO FERNANDEZ * ; **Alfredo RODRIGUEZ DOMINGUEZ *** ;
Antonio PALANCA SOLER * and **Cristina CASTÁN LANASPA ****

*Colloque International
« Ecologie et Biogéographie
des Milieux Montagnards
et de Haute Altitude »
Gabas, 10-12 septembre 1982*

Summary : *The objective is to characterize according to their fauna areas which have previously been defined using floristic and geomorphological criteria. Ground-beetles were chosen as the object of study, and they were observed together with other fauna living under 350 stones which were located in different habitats : mat-grass pastures (« cervunales »), dry stony pastures, flysch summits, etc ...*

From the results we obtain conclusions about the liking that ground-beetles show for stones depending on the nature, situation and size of these, as well as about the interaction between ground beetles and other groups of animals living under stones.

Résumé : Ce travail a pour but la caractérisation, d'un point de vue faunistique, des zones supraforestières préalablement choisies en raison de critères relatifs à la flore et à la géomorphologie. C'est la raison pour laquelle on a étudié la faune habitant sous 350 pierres choisies au hasard dans les dites zones. On a repéré plus particulièrement les Carabidés. A partir de ces données, on a obtenu des conclusions concernant l'attraction (« querencia », « liking », différent du « préférence index » de LAUTERBACH, 1964) qu'éprouvent les Carabidés envers des types de pierres bien déterminés. Il en va de même en ce qui concerne le comportement de ceux-ci et de celui d'autres catégories d'animaux ayant les mêmes habitudes.

* Laboratorio de Zoología. Universidad de Santiago. Campus de Vigo. Apdo. 874. Vigo (Pontevedra). España.

** I.M.O. Apdo. 31. Jaca (Huesca). España.

The present study was carried out during the Introduction to Research Course directed by Dr.A.PALANCA and C. CASTAN with the cooperation of the High Aragon Environment-Fauna Relationship Work Group (I.M.O.). The objective was to determine aspects of the behaviour of Ground-beetles living in high altitude pyrenean mountain areas.

The most common species of Ground-beetles living under stones in High Aragon supraforestal pastures can be grouped according to their spatial distribution in the following way :

a. - Species colonizing slopes which are not very exposed to the sun (facing East and West) : *Zabrus oboesus* Serville, *Cymindis humeralis* Fourcroy, *Pterostichus dufouri* Dejean and *Bembidion pyrenaeum* Dejean in the higher areas and *Agonum muelleri* Herbst and *Pterostichus cupreus* L. in the lower ones.

b. - Species found on most slopes : *Pterostichus lepidus* Leske.

c. - Species found on sunny slopes and valley bottoms : *Calathus fuscipes* Goeze.

d. - Species found on valley bottoms : *Calathus melanocephalus* L., *Harpalus affinis* Schrank, *Notiophilus pusillus* Waterhouse, *Ophonus rufipes* De Geer, *Calathus erratus* Sahlberg, *Amara aenea* De Geer and *Bembidion testaceus* Duftschmid.

Ground-beetles prefer flat valley bottoms or high altitudes. The area which is the object of our study includes, partly, both characteristics : it is a relatively flat valley bottom around the Ibon de los Asnos glacier lake (in the Tendeñera Massif) and it is located at a fairly high altitude (2060 m.a.s.l.). Its U.T.M. location is 30TYN2430. In this area 350 stones and the faune living under them were studied.

Let us suppose that in a given pasture ground we find a large number of stones, and among these we choose at random 60 stones under which we find Ground-beetles or Antholes. These 60 stones are distributed in two groups : large stones (80 %) and small ones (20 %). Of these 60 stones, 50 have Antholes under them and 10 have Ground-beetles (Ground-beetles and Ants are usually never found together under the same stone). If Ants and Ground-beetles had a similar liking for stones of the same size, both Antholes and Ground-beetles would maintain the distribution ratio of 80 % -20 %.

Size of stone	Number of stones with Ground-beetles	Number of stones with Antholes	Total of stones
Large	8 (80 %)	40 (80 %)	48 (80 %)
Small	2 (20 %)	10 (20 %)	12 (20 %)

Let us now suppose that Ground-beetles have a greater liking than Ants for living under large stones :

Size of stone	Number of stones with Ground-beetles	Number of stones with Antholes	Total of stones
Large	10 (100 %)	40 (80 %)	50 (83 %)
Small	0 (0 %)	10 (20 %)	10 (17 %)

Here we observe a variation in the ration of distribution of Ground-beetles and Ants in relation to the proportion of large and small stones. The absolute number of large or small stones having Antholes has not changed, however.

We would conclude that, contrary to the first case, Ants have a smaller liking for large stones and a greater liking for small ones than Ground-beetles.

The first 3 % (which we can take as « negative ») would represent 3,6 % of the total percentage of large stones (83 %), and the second 3 % (which we can take as « positive ») would represent 3,6 % of the 83 % remaining if we subtract the percentage of small stones (17 %) from 100 %. These « negative » and « positive » 3,6 % are, of course, the same in both cases because in the example we are only considering two kinds of stones. If there were more than two kinds (as it is the case in our study), they would vary.

Size of stone	Ground-beetles	Antholes
Large	(+ 17) - 100 %	(-3) - 3,6 %
Small	(- 17) - 100 %	(+3) + 3,6 %

If we add 100 to these positive and negative % ages, we get all positive numbers which maintain their proportions on a basis of 200, which, divided by 20, gives us figures on a scale from 0 to 10 which are the « Relative Liking Index ».

Kind of stone	Relative Liking Index of	
	Ground-beetles	Ants
Large	10	4,82
Small	0	5,18

In the first case considered the relative liking index would equal 5.

Following these criteria, we have obtained tables in which the Relative Liking Index of Ground-beetles, Ants and Spiders is reflected, taking into account the following variables :

- Surface area of the stone in contact with the ground, expressed in square decimetres.
- Penetration into the ground, expressed in centimetres.

Other variables which were considered (height and type of stone, etc...) have no significant bearing on the behaviour of this fauna.

The number of inhabited stones is 212, out of which 156 (74 %) are inhabited by Ants, Ground-beetles or Spiders. The remaining 26 % are inhabited by other groups (*Hemiptera*, *Coleoptera*, *Curculionidae*).

The fauna of these 156 stones is distributed in the following way :

Antholes	Antholes & Spiders	Spiders	Spiders & G.-beetles	G.-beetles	G.-beetles & Antholes
55 (35 %)	3 (2 %)	50 (32 %)	19 (12 %)	23 (15 %)	3 (2 %)

The three remaining stones (2 %) are occupied by Antholes, Spiders and Ground-beetles.

Our exposition of results is limited to the 150 stones occupied exclusively by Antholes, Spiders or Ground-beetles and to those shared by these last 2 groups. Percentages under 5 % are not considered.

In view of the results shown in the following tables, we observe that Ants have a greater liking for stones considerably sunk into the ground (over 5 cm) and rather small in size (between 1 and 5 sq. dm.).

Spiders and Ground-beetles do not show a marked liking for any particular kind of stone ; however, their incompatibility with Ants appears quite clearly, and is more marked in the case of stones having a small surface in contact with the ground.

The incompatibility between Spiders and Ground-beetles is much smaller, although their mutual tolerance is greater under stones having a larger surface in contact with the ground.

RELATIVE LIKING INDEX

Kind of stone		Ants	Spiders	Spiders and Ground-beetles	Ground- beetles
Surface area of the stone in contact with the ground					
1 - 5 sq. dm.		6,7	4,7	1,4	5,1
6 - 10 sq. dm.		3,6	5,2	6,1	5,0
11 - 15 sq. dm.		2,5	4,3	6,0	5,1
Penetration into the ground					
0 - 4 cm.		3,1	6,7	6,3	5,9
5 - 9 cm.		5,7	3,9	3,5	2,8
10 - 14 cm.		5,5	2,6	3,3	4,3
Both variables combined					
1 - 7 sq. dm.	0 - 4 cm	4,1	6,3	2,0	5,7
1 - 7	5 - 14	6,4	2,5	2,3	2,5
8 - 15	0 - 4	0,0	5,0	7,2	4,6
8 - 15	0 - 14	5,0	4,3	5,1	5,4

BIBLIOGRAPHY

- ALI, H. A. (1971) - Key to some of the tribes of Carabidae (Coleoptera : Insecta), based on internal characters. *Bull. Coll. Sci. Univ. Basrah*, 2 : 17-29.
- JEANNEL, R. (1941-1942) - Coléoptères Carabiques. *Faune de France*. 39-40.
- LAUTERBACH, A. V. (1964) - Verbreitungs- und aktivitätsbestimmende Faktoren bei Carabiden in sauerlandischen Wäldern. *Naturkunde Münster*, 26 : 1-100.
- LINDROTH, C. H. (1974) - Coleoptera Carabidae. *Handbk. ident. Br. Insects*, 4 (2) : 1-148.
- NOONAN, G. R. (1976) - Synopsis of the supra-specific taxa of the tribe Harpalini (Coleoptera : Carabidae). *Quaest. Ent.*, 12 : 3-87.
- THIELE, H.U. (1977) - *Carabid beetles in their environments*. Springer-Verlag. Berlin.