ÉCOLOGIE DES MILIEUX MONTAGNARDS ET DE HAUTE ALTITUDE
Documents d'Écologie Pyrénéenne, III-IV, 1984 : 229-231

A comparative study of Amphibians and Reptiles in medium and high altitude areas in the Pyrenees

by

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

Summary : *Amphibians and Reptiles living in submediterranean gall oak forests were studied in the Sierra de Guara range at an altitude of 950 metres a.s.l., and those living in high pastures were studied in the Tendeñera Massif at 2000 m a.s.l. Both sets of fauna differ in many aspects, the differences being both qualitative and quantitative. Thus, the number of species in the high pastures is smaller than that in the gall oak forest (6 to 13). In the gall oak forests the proportion of Reptiles compared to Amphibians is greater than that in the pas tures (77 % in the first case and 17 % in the second). These differences are basically due to the different climatic conditions to which the areas studied are subjected. In the high altitude areas, low temperatures, persistent snow, a short summer season, etc ... only permit the settlement of those species which are well adapted or very versatile. The variation in feeding habits provides very interesting details.*

Etude comparative des Amphibiens et des Reptiles en milieux de moyenne et de haute altitude dans les Pyrénées

Résumé : Les Amphibiens et les Reptiles vivant dans les forêts subméditerranéennes de *Quercus* gr. *faginea* en Sierra de Guara à une altitude de 950 m, et ceux des pelouses de haute altitude du massif de Tendeñera à 2000 m ont été étudiés et comparés. Les deux ensembles de faune diffèrent par plusieurs aspects de façon qualitative et quantitative.

Ainsi, le nombre d'espèces dans les pelouses de haute altitude est plus faible que dans les forêts de *Quercus* gr. *faginea* (6 à 13). Dans les Chênaies, la proportion de Reptiles par rapport à celle des Amphibiens est plus importante que dans les pelouses (77 % pour le premier cas 17 % dans lé second).

Ces différences sont dues fondamentalement aux conditions climatiques différentes des deux stations.

A haute altitude, les basses températures, la neige persistante, la courte période de végétation, etc... permettent seulement l'installation d'espèces bien adaptées ou de grande amplitude écologique. Les variations observées dans les habitudes alimentaires fournissent des détails très intéressants.

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The present study was carried out throughout two Introdution to Research Courses directed by Dr. A. PALANCA and C. CASTÁN with the cooperation of the High Aragon Environment-Fauna Relationship Work Group (I.M.O.). The fieldwork was carried out during the months of July and August in Nocito (1980) and Tendenera (1981), and the objective was to determine aspects of the feeding habits of Amphibians and Reptiles living in medium and high altitude areas in the Pyrenees.

A - AREAS STUDIED (ordered according to altitude from lowest to highest) : the areas studied are the ones described in the paper entitled. « A Comparative Study of Butterflies in Medium and High Altitude Areas in the Pyrenees », presented at this Conference by J. JAUREGUI and others ; for that reason we shall offer just a summary description.

NOCITO BASIN : Its UTM location is 3OTYM28. The village of Nocito is located in the middle of the basin, at the foot of the Sierra de Guara mountains at an altitude of 950 m a.s.l.

1) Herbaceous communities near Nocito : in the flat areas close to the river, the greater part of the land is taken up by ancient cultivated fields which, having been abandoned, become quite good pasture have grounds. Within these areas we can find :

1.1 Walls of buildings ; stone walls dividing enclosed fields ; the fields themselves.

1.2. Rivers and ponds.

2) Gall oak forest : the predominant tree is the gall oak (*Quercus* gr. *faginea).*

3) Dry thickets : restricted originally to summits and watersheds, at present they occupy large extensions on the slopes after the disappearance of large parts of the gall oak forests.

4) Lapillera ravine : Both Mediterranean and Atlantic forestal species can be found here forming very rich mixed forests. The clearings in these forests are covered with the kind of grass typically found in humid places, and with an abundance of large-leaved plants.

5) Tozal de Guara watershed : a watershed at an altitude of 1900 m a.s.l. It is deforested and inhospitable, and only a few shrub can be found growing close to the ground in the more sheltered places.

SUPRAFORESTAL PASTURES IN THE TENDEÑERA MASSIF : these are located on the northern slopes of the Tendeñera massif at altitudes between 2000 and 2200 m. a.s.l. They surround the glacial lake called Ibon de los Asnos. UTM location : 3OTYN3024.

6) Thalweg : at an altitude of 2120 m a.s.l. Covered by short thick grass which is heavily snowed under in winter.

7) Mandilar summit (2211 m a.s.l.). The summit is made up of flysch exposed to wind and periglacial phenomena.

8) Slopes surrounding the Ibon de los Asnos lake. Altitudes 2000 and 2200 m a.s.l. Gradients of approx. 45 %. Humid pastures surrounding the lake, areas covered by loose falling rocks on the slopes facing North (in which no Amphibians or Reptiles were captured), and dry stony pastures on the higher parts of the slopes facing South (the only Reptile captured was taken here : *Lacerta muralis).*

9) Ibon de los Asnos : a glacier lake, described quite extensively in the paper « Characterization of the Ibon de los Asnos Lake according to its Geomorphology, Flora and Fauna », presented at this Conference by R. GARCIA CANCELA *& al.*

B. RESULTS :

The feeding habits of Amphibians and Reptiles are related to their own behaviour and that of their preys. So, we find that :

Alytes obstetricans spends most of its life away from the water, and during the daytime hides under rocks where most of the arthropods on which it feeds can be found (ants, ground-beetles, centipedes, etc ...).

Bufo bufo has, in high altitude mountain areas, a behaviour similar to the one of *Alytes obstetricans,* feeding on arthropods living under rocks (weevils, ants, ground-beetles, etc ...) while in medium altitude mountain areas it is also found in rivers, supplementing its diet with arthropods moving on the surface (whirligig beetles).

Rana ridibunda is always found near the water, never moving far away from it. Its activity is diurnal and it feeds on arthropods moving on the surface of the water (pondskaters and whirligig beetles), flying close to it (two-winged flies, wasps) or those that fall into it, such as ladybirds.

In high mountain areas this species is substituted by *Rana temporaria,* which stays further from the water, feeding preferably in humid pastures on arthropods having diurnal activity such as ladybird, grasshoppers, ants and adult stoneflies.

The Amphibians *Euproctus asper* (an Urodelan endemic in the Pyrenees) and *Triturus helveticus* (another Urodelan) live in the water in high mountain lakes. They feed almost exclusively on arthropods and fresh water molluscs, and, contrary to other Amphibians, they usually eat under water. Their preys, larvae of beetles (among them large water-beetles), mayflies, two-winged flies, caddis flies, and adult fresch water molluscs, all live under water.

Lacerta muralis are lone Reptiles living in dry stony pastures on sunny high mountain slopes, and their activity is limited to the hotter hours of sunny days. They feed on grasshoppers, plant-lice, two-winged flies and spiders, arthropods which are usually found on sunny slopes during periods of activity corresponding to the ones indicated for this lizard.

The lizards *Lacerta hispanica, Lacerta lepida* and *Psamodromus algirus* feed on small beetles, ants, and grasshoppers which they capture during the daytime in thickets, on stone walls dividing fields or on the walls of the buildings in Nocito.

Snakes capture large preys. So, for example, water *Natrix* feed on small fish and tadpoles.

Finally, it is interesting to note the considerable difference between the number of species of Reptiles living in medium altitude mountain areas and those in high altitude areas. It has been established that the average altitude at which aragonese lizards live is 1300 m a.s.l., whereas the average altitude for Snakes is 1000 m.a.s.l.

The preys captured by the Amphibians and Reptiles studied are indicated in the following charts and diagrams. Each number corresponds to a certain type of prey :

Insecta

- *Coleoptera* 1
- *Hymenoptera* 2
- *Hemiptera* 3
- *Dictyoptera* 4
- *Diptera* 5
- *Orthoptera* 6
- *Lepidoptera* 7
- *Dermaptera* 8
- *Trichoptera* 9
- *Plecoptera* 10
- *Ephemeroptera* 11

Mollusca 12
Anelida 13
Crustacea 14
Arachnida 15
Miriapoda 16
Teleostea 17

Percentage of preys captured by the Amphibians and Reptiles studied

ALTITUDE		1	2	3^T	4^Y	5^P	6^E	7	8^O	9^F	10	11^P	12^R	13^E	14^Y	15	16	17
Amphibians	MED.	34	29	4	4	6	-	2	4	1	-	-	-	-	6	6	2	-
	HIG.	49	4	-	-	6	4	1	-	2	8	6	17	1	-	1	1	-
Reptiles	MED.	13	19	6	6	3	19	13	-	-	-	-	6	3	3	3	-	3
	HIG.	-	7	26	-	7	53	-	-	-	-	-	-	-	-	6	-	-
Lacerta hispanica	MED.	20	33	17	13	-	7	-	-	-	-	-	7	-	-	6	-	-
Lacerta muralis	HIG.		7	27	-	6	53	-	-	-	-	-	-	-	-	7	-	-
Rana ridibunda	MED.	12	28	20	-	32	-	-	-	-	-	-	-	-	-	8	-	-
Rana temporaria	HIG.	15	4	-	-	-	31	-	-	-	50	-	-	-	-	-	-	-
Alytes obstetricans	MED.	-	50	-	17	-	-	-	-	-	-	-	-	-	33	-	-	-
Alytes obstetricans	HIG.	7	23	-	-	46	8	-	-	-	-	-	-	-	-	8	7	-
Bufo bufo	MED.	42	28	-	4	-	-	3	5	1	-	-	-	-	7	6	2	
Bufo bufo	HIG.	80	13	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-