OSTEOLOGICAL DIFFERENCES IN ALLOPATRIC POPULATIONS OF THE *ODONTOPHRYNUS OCCIDENTALIS* GROUP FROM WESTERN ARGENTINA

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OSTEOLOGICAL DIFFERENCES IN ALLOPATRIC POPULATIONS OF THE *ODONTOPHRYNUS OCCIDENTALIS* GROUP FROM WESTERN ARGENTINA

E. G. CRESPO * & J. M. CEI **

ABSTRACT: An osteological comparison of new-metamorphosed specimens from three populations of the *O. occidentalis* group was carried out.

The results confirm the accentuated differentiation of the Sierra Famatina population.

INTRODUCTION

As a result of an extensive program of field work carried out in Western Argentina in 1978, in order to study the *Odontophrynus occidentalis* — complex, we have found some tadpoles which we have identified as a form of this complex, forming a small geographical isolate at Sierra Famatina (2.000-2.200 — La Rioja).

These tadpoles have at once called our attention because, although showing the basic pattern of the group, they were, in many respects, very different from the previously known populations.

Morphological (CEI & CRESPO 1982) and caryological (RUIZ *et al* 1982) studies carried out later on these tadpoles confirmed the accentuated degree of differentiation of that population.

Despite considerable effort it was not possible to collect any adult. For this reason the tadpoles were taken to the laboratory where their development was pursued.

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As some of the tadpoles metamorphosed in the meantime, we have found that it would be interesting to carry out the osteological comparison of some of them with other specimens (at the same stage of development) from other populations.

The reduced number of animals, on which this preliminary work is based, is obviously justified by the fact that we expect that the remainder specimens have reached the adult stage. This was done in order that we might then subject them to more extensive biological controls.

MATERIAL AND METHODS

We have used new-metamorphosed specimens of three populations of *Odontophrynus occidentalis* group: CHANCANI (1), SIERRA FAMATINA (2) and MENDOZA (3), [map 1].

The Chancani biotope is characterized by a rocky environment with a scanty vegetal covering and with several slow rivers, which notwithstanding have very clear waters. In that region, the winter is cold and dry and the summer is warm and less dry. Among other species which can be found we mention *Pleurodema bufonina* and some siluriform fishes.

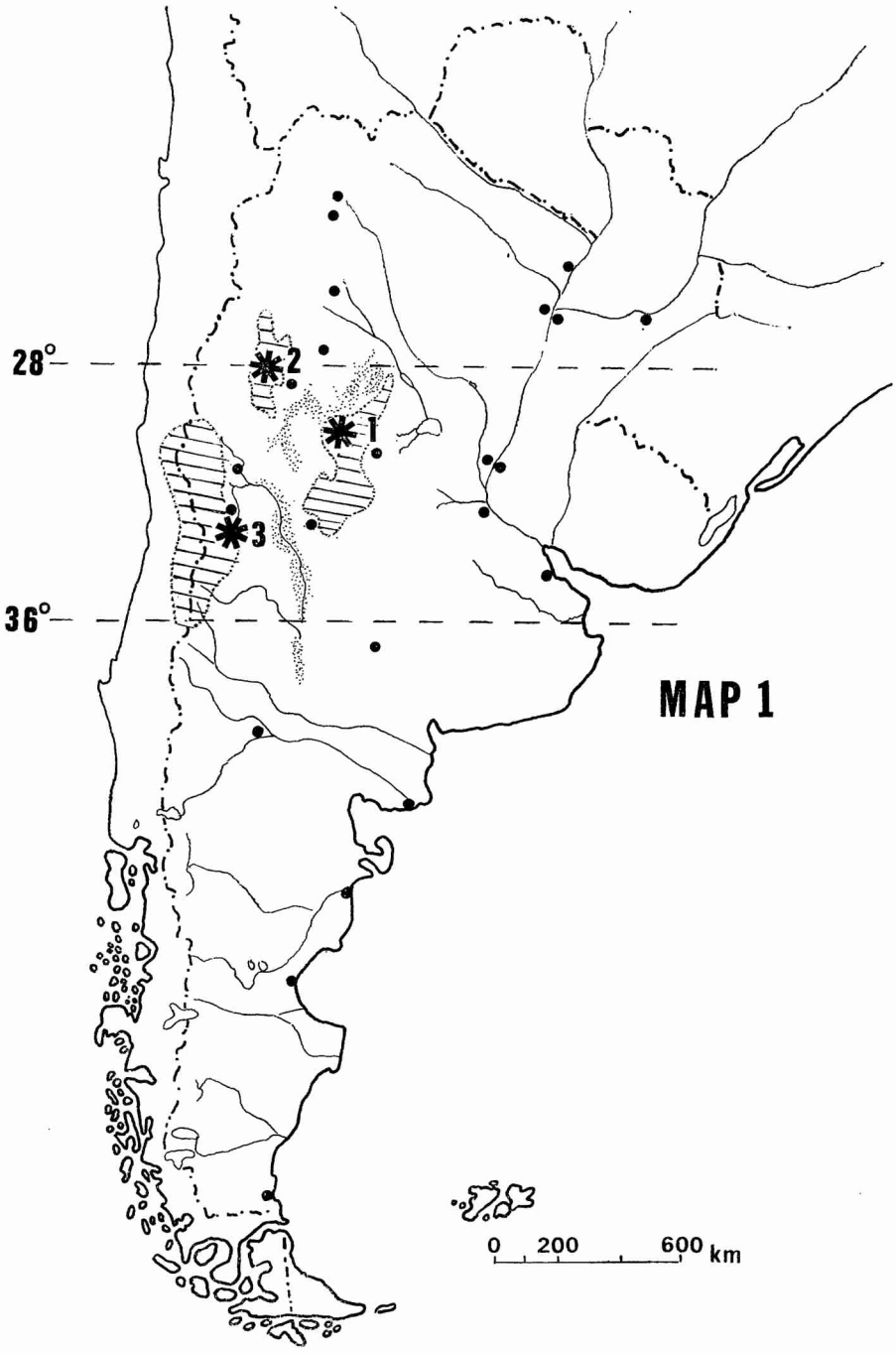
Enormous granitic blocs standing out among a xerophytic vegetation, from which columnar cacti emerge, are the dominant landscape elements of Sierra Famatina. The tadpoles found in those places inhabit the clear waters of the Aguadita river, where they find refuge under the granitic rocks of its bottom.

In this mountain the winter is also cold and dry, but the summer is mild and rainy. The water flow persists all through year and frequently house species such as: *Hyla riojana*, *Bufo arenarum* and *B. spinulosus*. We have not found any kind of fishes.

Finally, the population of Mendoza lives in the vicinity of the Andine pre-cordillera, a region of very arid hills, with alluvial rocks and xerophytic vegetation. In that environment the tadpoles development takes place generally in the limpid running waters of the brooks, as well as in temporary pounds.

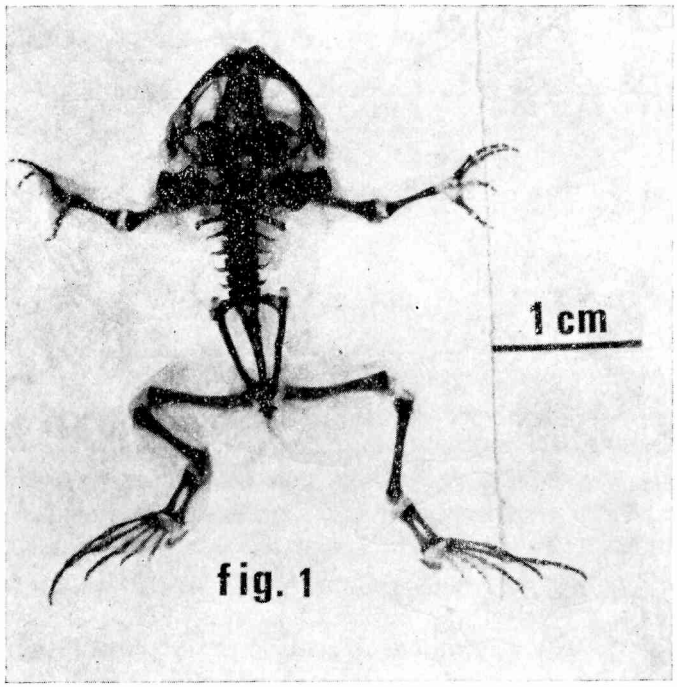
In this locality the winter is also cold and dry but the summer is warm and somewhat rainy. Among species sharing this biotope, *Bufo arenarum* and *Pleurodema nebulosa*, should be pointed out.

We have compared 5 new-metamorphosed specimens of similar dimensions belonging to each population. The specimens were cleared and stained according to the procedure followed by WASSERSUG (1976): fixation in 10% for-



Dotted areas: natural barriers — xerophitic and salty depressions («salares» or «salinas»)
Hatched areas: mountains (**1** - 1.000; **2** - 2.000 - 2.200m; **3** - 1.000m)

malin; washing in drinkling tap and deionized water; cartilage staining in «Alcian-blue» solution; differentiation and dehydration in absolut ethanol; maceration and bone staining in potassium hydroxid and alizarin «red S» solutions; final clearing *via* a crescent graded series of glycerol-water solutions. The specimens were stored in 100% glycerol [fig. 1].



Specimen from CHANCANI

All measurements were made through a stereoscopic microscope using either a compass or a micrometric ocular, according to the parameters and accurated to 0.1 mm.

After a previous selection we have used the following osteological parameters:

— Total length (dorsal) — the distance between the anteriormost point of the premaxillary articulation and the posterior end of the pelvic girdle.

— Skull length (dorsal) — the distance between the anteriormost point of the premaxillary articulation and the dorsal midpoint of the *foramen magnum*.

— Skull width (dorsal) — the distance between the lateral edges of the otooccipitals at their widest breadth.

— Snout length — the distance on the dorsal midline, between the tangent to the anterior margins of the orbits and the anteriormost point of the premaxillary articulation.

— Coccix length (= Urostyle) — the distance on the dorsal midline between the sacral-coccygeal articulation and the posterior end of that bone.

— Femur length — the greatest length of this bone.

— Tibiofibula length — the greatest distance between their proximal and distal tips.

— Fourth toe length — the greatest distance between their proximal and distal ends.

— Humerus length — the greatest distance between their proximal and distal ends.

— Radius-ulna length — the greatest distance between their proximal and distal ends.

— Ilium length — the greatest distance between their proximal and distal tips.

— Sacrum width (including the diapophyses) — the distance between the lateral edges midpoints of the sacral diapophyses (dorsal).

— Third finger length — the greatest distance between their proximal and distal ends.

— Metatarsal tubercle length — the greatest dimension of this structure.

— Coracoid length — the distance between the midpoints of their proximal and distal edges.

— Clavicle length — the greatest distance between their proximal and distal edges.

— Vertebral column length — the distance on the dorsal midline from the most anterior edge of the articular facets of the first vertebra to the most posterior edge of the articular facet of the sacral centrum.

We have used the following ratios compounded from the parameters referred before:

1) Skull length/Skull width
2) Snout length/Skull length
3) Coccyx length/Skull length
4) Vertebral column length/Total length
5) Femur length/Total length
6) Tibiofibula length/Total length
7) Tibiofibula length/Femur length
8) Tibiale-fibulare length/Total length
9) Tibiale-fibulare length/Femur length
10) IV toe length/Total length
11) Femur length/IV toe length
12) Tibiofibula length/IV toe length
13) Tarsus length/IV toe length
14) Humerus length/Total length

15) Radius-ulna length/Humerus length
16) Radius-ulna length/Total length
17) Ilium length/Total length
18) Vertebral column length/Ilium length
19) Coccyx length/Ilium length
20) Sacrum width/Total length
21) Sacrum width/Total length
22) Sacrum width/Vertebral column length
23) Sacrum width/Coccyx length
24) III finger length/Total length
25) III finger length/Humerus length
26) Radius-ulna length/III finger length
27) Metatarsal tubercle length/Total length
28) Metatarsal tubercle length/IV toe length
29) Coracoid length/Total length
30) Coracoid length/Vertebral column length
31) Clavicle length/Total length
32) Skull length/Total length
33) Skull length/Total length

A cluster analysis based on taxonomic distances and following the UPGMA (Unweighted pair group method) was applied to the three populations considered.

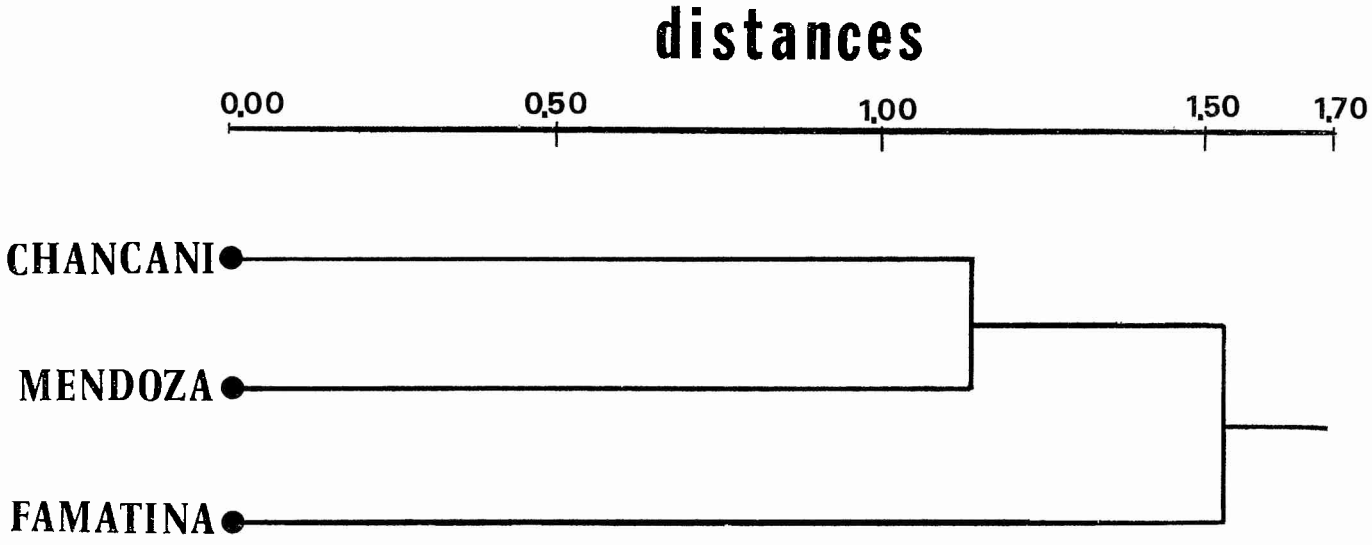
The variables used were taken as the means of the different parameters for each of the populations. These data were standardized by the method referred to by SNEATH & SOKAL (1973: 154).

RESULTS AND CONCLUSIONS

Symmetric matrix of the taxonomic distances for each of the three populations computed through the UPGMA clustering method:

	CHANCANI	FAMATINA	MENDOZA
CHANCANI	0.000	1.595	1.142
FAMATINA	1.595	0.000	1.467
MENDOZA	1.142	1.467	0.000

Distance phenogram based on the UPGMA clustering method and referring to the three populations considered. Data standardized by variables. Cophenetic correlation: 0.96.



The results we have obtained here, notwithstanding the small number of specimens tested, seem to confirm the accentuated differentiation of the Sierra Famatina population (1).

Post-Scriptum — In the meantime CEI *et al* (1982) have assigned a specific *status* to the Sierra Famatina population — *Odontophrynus barrioi.*

SUMÁRIO

Fizemos a comparação osteológica de recém-metamorfoseados de 3 populações do grupo *Odontophrynus occidentalis* — Chancani, Mendoza e Serra da Famatina — da região Ocidental da Argentina.

Os resultados revelam uma acentuada diferenciação da população da Serra da Famatina.

AGRADECIMENTOS

Agradeço aos Srs. Doutores Maria L. Madureira e José A. Quartau o apoio que nos prestaram no tratamento numérico dos parâmetros osteológicos dos espécimes em estudo e à Doutora A. M. Neves a revisão do texto.

(1) The most discriminating parameters of the Famatina population (unpublished results from a principal component analysis) are the following: [12] — tibiofibula length/IV toe length; [20] — sacrum width/total length; [21] — sacrum width/vertebral column width and [32] — skull length/total length.

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