PHENOTYPIC AND GENOTYPIC VARIATION IN THE TWO KNOWN POPULATIONS OF CHIROCEPHALUS RUFFOI COTTARELLI & MURA, 1984 (ANOOSTRACA), ENDEMIC TO ITALY

BY

P. ZARATTINI, V. KETMAIER, E. DE MATTHAEIS and G. MURA
Dipartimento di Biologia Animale e dell’Uomo, Università La Sapienza, Viale dell’Università 32, I-00185 Rome, Italy

ABSTRACT

Thus far, the endemic fairy shrimp *Chirocephalus ruffoi* Cottarelli & Mura, 1984 is represented in Italy by two populations only, occurring in Pollino National Park (Calabro-Lucano Apennines) and Monte Rondinaio (Tosco-Emiliano Apennines), respectively. Given the distance between the two sites (one in southern Italy, the other in northern Italy, approximately 800 km apart), the probable lack of gene flow suggested both morphological and electrophoretic studies to clarify their systematic position.

SEM morphological investigations revealed clear, though slight, inter-population differences in cyst morphology. However, the substantial individual variation in male secondary sexual characters observed in both populations does not correspond to clear differences in the remaining characters of adult males.

Yet, the extent of genetic divergence between the two populations evaluated by means of allozyme variation analysis at 22 loci ($D = 0.259$), suggests the absence of gene flow between these.

Thus, as in other previous cases, morphological criteria and allozyme analysis would indicate contrasting conclusions concerning the systematic position of the taxa considered. Given the limited degree of current knowledge on the distribution of *C. ruffoi* in Italy, more extensive field investigations as well as the use of molecular analysis at the DNA level are needed to clarify the situation.

RÉSUMÉ

Jusqu’à présent, l’anostracé endémique *Chirocephalus ruffoi* Cottarelli & Mura, 1984, est représenté en Italie par seulement deux populations, présentes respectivement dans le Parc national Pollino (Apennins Calabro-Lucano) et le mont Rondinaio (Apennins Tosco-Emiliano). Etant donnée la distance entre les deux sites (800 km entre l’une dans le sud de l’Italie et l’autre dans le nord), l’absence suspectée de flux génique a suggéré de mener des recherches à la fois sur la morphologie et la génétique afin de clarifier le statut systématique des deux populations.

1) e-mail: elvira.dematthaeis@uniroma1.it
Les observations réalisées en microscopie électronique à balayage (SEM) ont révélé des différences inter-populations, claires bien que peu marquées, dans la morphologie des œufs de durée. Cependant, la variation individuelle substantielle des caractères sexuels secondaires chez les mâles, observée dans les deux populations, ne correspond pas aux différences clairement observées dans les autres caractères des adultes mâles.

Par ailleurs, la distance génétique, évaluée au moyen de l’analyse des allozymes sur 22 locus (\(D = 0.259\)) suggère l’absence de flux génique entre les deux populations.

Ainsi, comme dans d’autres cas étudiés précédemment, les critères morphologiques et l’analyse des allozymes conduisent à des conclusions contrastées quant au status systématique des taxa considérés. En raison de la connaissance limitée de la distribution de *C. ruffoi* en Italie, des recherches plus extensives sur le terrain ainsi que l’utilisation de l’analyse moléculaire (ADN) sont nécessaires pour clarifier la situation.

**INTRODUCTION**

Data from protein electrophoresis have been widely used to assess the level of genetic differentiation among natural populations. In many cases this allowed to elucidate patterns of evolutionary relationships and/or to detect speciation processes, impossible or difficult to trace solely on the basis of morphological studies.

In the Anostraca, however, such techniques have only been used rarely until now. In the literature, only a few previous cases are reported of taxa that exhibit minor morphological differences, but can all the same be identified as distinct species by means of allozyme analysis (Munuswamy, 1982; Thiéry & Fugate, 1994).

In this paper we report the results of a similar approach to the fairy shrimp *Chirocephalus ruffoi* Cottarelli & Mura, 1984. Thus far, the endemic *C. ruffoi* is represented in Italy by two known populations only, occurring in southern and northern Italy, respectively, about 800 km apart. The suspected lack of gene flow due to distance and location of the two biotopes, suggested morphological and genetic investigations in order to detect possible inter-population differences.

**MATERIAL AND METHODS**

The two study sites are located in the Calabro-Lucano Apennines (Basilicata-Calabria, southern Italy) at 1780-1900 m a.s.l., and in the Tosco-Emiliano Apennines (Emilia-Romagna, northern Italy) at 1700 m a.s.l., respectively. Descriptions of the ponds of origin have been provided elsewhere (Cottarelli & Mura, 1984; Recchioni et al., 1990; Mura & Zarattini, 1999). Both are located in protected areas, being part of the Pollino National Park, and of the regional Park of the Modenese Apennines, respectively.