MORPHOLOGICAL AND BIOMETRICAL CONSIDERATIONS OF TWO DIAPTOMIDS (MIXODIAPTOMUS LACINIATUS, DIAPTONUS CYANEUS) FROM A HIGH MOUNTAIN LAKE, LA CALDERA, GRANADA, SPAIN (COPEPODA, CALANOIDA) ¹)

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INTRODUCTION

Sierra Nevada, in the central and highest region of the Penibetic Chain (Southern Spain) contains about fifty lakes and ponds located above 2,500 m, the knowledge of which is limited to a note by Löfler (1974) on the littoral copepods in three of these lakes, and the work that Martinez (1975, 1977, 1980) and Cruz-Pizarro (1978, 1981) are carrying out.

La Caldera (3,050 m a.s.l.) is a cirque lake (of glacial origin), oligotrophic, and with alpine characteristics. Its total surface area is about 23,000 m², and 11.30 m is the maximum depth recorded. During 8 to 10 months of the year (September-October to June-July) it remains frozen. For a more complete treatise on its morphometry and physico-chemical characteristics, as well as the composition and ecology of its phytoplankton, see Martinez (1975, 1977).

Two diaptomids of different size, Mixodiaptomus laciniatus and Diaptomus cyaneus, are present in the zooplankton community, the former being the dominant one, both in biomass and in number of individuals. Any effort towards the accurate description of these species is justified because diaptomids, owing to their limited mechanisms of dispersion, provide good examples of regional endemization by processes of microevolution.

MATERIAL AND METHODS

The material for the present study comes from a series of vertical hauls (bottom to surface) taken in the pelagic zone of the lake with a simple plankton net (40 μm mesh size). Frequency of sampling was about every 3-7 days from July 28 to October 3, with a total of 16 collections. Additional samples of a

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Results and Discussion

*Mixodiaptomus laciniatus* Lilljeborg, 1889, is a typical cold stenothermal species whose present distribution in Europe seems to be a clear example of boreoalpine disjunction of northern origin.

Described as a highly variable species (Kiefer, 1978) with tendency to morphological microevolution (Baldi, 1946, 1950), two subspecies have been reported: *M. laciniatus migoti* Monard, 1928, in the French Pyrenees and *M. laciniatus atlantis* Kiefer, 1954, in populations from Morocco. According to Dumont & Decraemer (1977), the latter subspecies is widespread in the dayats of the Middle Atlas and Dussart (1967) believes that it might extend to Spain and, perhaps, the French Pyrenees. Ortiz (1957) describes the only finding of this subspecies outside of Africa, from mountains in Central Spain.

*M. laciniatus* behaves in lake La Caldera as acyclic and univoltine. The study of its life history has shown that the first nauplii observed during the thaw reach maturity before a new freeze, and ovigerous females (2-11 subitaneous eggs per sac) were observed at the end of September in 1977. The instar composition of the population at those times, viz., with lack of nauplii, suggests that a high proportion of them spend the ice-covered period as eggs while the last emerged nauplii of the ice-free period complete their development under the ice. Thus, adults observed during July and August of 1977 were the last individuals from the 1976 generation (Cruz-Pizarro, 1981).

Description. — Female: Body size between 938 and 1,367 μm (mean: 1,163 μm). Rostral processes pointed (fig. 1A). Lateral expansions of Th4 rounded and of Th5 slender but, although covering Gsg, are not remarkably directed towards the posterior (as in Moroccan populations) (fig. 1C, D). Abd trisegmented; anterior region of Gsg little expanded, slightly asymmetrical, with two small hyaline spines (fig. 1F). Furcal rami short and wide (mean value of ratio length/width = 1.77), without inner pubescence.

A1 reaches, when reflexed, the end of the furcal rami. Bristle of the first segment between 129 and 173 μm (mean: 153 μm), exceeding segment 4 (fig. 1E). Bristles of the second segment are of variable length; usually, the first is largest (60 μm), and the third shortest (50 μm).

P5 shows a dramatic variability, both in size and in position of the posterior hyaline spine of the coxa, as well as in the length ratio Enp/Exp1. The endopodite, always undivided, reaches the end of Exp1 in individuals collected at the beginning of the ice-free period (1976 generation: G1), the maximum value...