Pseudoniphargus (subterranean crustacean amphipod) from Morocco: systematics, phylogeny and ecological and biogeographic aspects

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The interstitial groundwater amphipod Pseudoniphargus (Crustacea) is highly diversified in Morocco. Five species have been described from the northern part of the country. Recent surveys in the same region have resulted in the discovery of about ten species new for science. The phylogenetic relationships within the Moroccan species show three lineages. Freshwater species are derived from marine ancestors. Both the two-step model of colonization and evolution and the geological history of the region provide an understanding of their origin. During the Tortonian period, the marine ancestor lived in the coastal groundwater of the Tethyan South Rifian channel between the Rif and Africa. The establishment in continental groundwaters is due to the Tethys regressions in the late Tortonian and the early Messinian periods. Further diversification and speciation of extant endemic species result from the Rifian orogenesis as well as from the edification of recent hydrographic systems.