

A PRELIMINARY SURVEY OF THE TERRESTRIAL AND FRESHWATER SNAILS ON SANTA CRUZ ISLAND, NORTHERN CHANNEL ISLANDS, CALIFORNIA

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ABSTRACT

This study investigates the modern and fossil terrestrial and freshwater aquatic snails of Santa Cruz Island with the aim to assess the plant associations and preferred habitat of each snail species. Data were based on recent field collections and the published literature. Extant species of snails were collected from both terrestrial and aquatic habitats to provide a view of the distribution and diversity of the fauna. Since land snails are dependent on moisture-retaining places for shelter and a source of calcium for shell-building, patterns of geology and vegetation have a direct impact on their survival. The rugged island topography and vegetation found on the island today have been strongly influenced by the Santa Cruz Island Fault. Quaternary movement on the fault has divided the island into sharply differing north and south terrains. Juxtaposed diverse rock types and the erosional and physical features of these rocks have affected the distribution of plant communities, groundwater and soil type.

An alluvial stream terrace in the Cañada de los Sauces, located on the western coast of Santa Cruz Island, was profiled to study fossil snails that existed during the Pleistocene/Holocene transition. This canyon has further potential for reconstructing the snail community during the Pleistocene when big tree forests existed on the island. The modern snail survey data will be used to analyze the fossil snail assemblage for paleoenvironmental reconstruction.

For many years, Santa Cruz Island has served as a natural laboratory for island research. The coming years may permit scientific investigations with a different focus than before: observing an island recovering from ecological abuse and misuse. In order to understand and recognize change, it is critical to have a baseline inventory of the island's natural resources. The objectives of this study were to: 1) identify the terrestrial and aquatic snail species that presently live on the island, 2) analyze modern snail species in light of island geology and vegetation patterns for snail distribution, plant associations, and habitat preferences, and 3) interpret paleoclimatic and paleoenvironmental settings from fossil vegetation and snail assemblages found in Pleistocene and Holocene deposits.

A two-part study design was used to accomplish the above goals. Part one involved the Cañada de los Sauces

profile that was excavated and sampled for laboratory analysis. The alluvial stream terrace in the Cañada de los Sauces was chosen for a fossil snail profile because of the Douglas fir logs that had been previously dated at 14,200 yr BP, providing a baseline date. The profile extended above the Douglas fir layer approximately 6 m to the ground surface. The surface of this terrace has been dated at ~5,000 yr BP. In addition, the presence of fossil snails were observed eroding out of the top 1 m of sediment. The 6 m profile was stratigraphically divided into numbered units based on changes in sediment color, texture and lithology, starting from surface level down. The profile sediments for each unit were described in the field and a stratigraphic column was drawn on site. Sediment samples of each unit were taken, placed in gallon-size zip-lock bags and labeled. Each bag of sediment was screenwashed through 1-mm and 0.5-mm screens and air-dried. The dried sediments were picked for snails, placed in glass vials, identified and labeled.

Fossil snails in the Cañada de los Sauces profile extend from the surface down to 2.45 m below ground level, consisting of the aquatic snail *Physa virgata* and the terrestrial snails *Pristiloma shepardae* and *Helminthoglypta ayresiana*. Freshwater ostracods were also found in the sediments between 1.11 m and 1.66 m below surface (bs). At 2.45 m bs, fragments of *Helminthoglypta*. and marine shell fragments (thought to be part of a midden site) grade upward into sediments dominated by *Pristiloma*. At 1 m bs, numerous *Physa* and few *Pristiloma* are found. *Pristiloma* again dominates at 72 cm bs, with complete and fragmented *Helminthoglypta* and some *Pristiloma* from there to the surface.

Part two of the study entailed collecting modern snails from selected plant communities as a test for habitat preference. Nine principal plant communities on the island were sampled as possible habitat for snails: coastal bluff scrub, coastal sage scrub, island woodlands, southern oak woodlands, island chaparral, closed-cone pine forest, coastal strand, riparian woodland, and coastal grassland. Freshwater snails were gathered from streams and ponds. Since Santa Cruz Island is geologically different on either side of the Santa Cruz Island Fault, duplicate plant communities on the

northern and southern regimes were sampled to determine if substrate has an effect on snail habitat preference.

From this preliminary survey, the modern snails found on Santa Cruz Island were *Vertigo californica*, *Paralaoma caputspinulae*, *Striatura pugetensis* (new record), *Helminthoglypta ayresiana*, and *Physa* cf. *virgata*. Systematics for fossil and modern snail species, in addition to an abridged synonymy, expanded diagnosis, shell measurements, and habitat preference, include the local stratigraphic setting, the sediment level or plant community where each species occurred, general species abundance, and localities where species are most abundant at present.

The fossil snails will be analyzed in conjunction with the extant snail collection to assess paleoenvironmental and paleoclimatic conditions that may have existed on Santa Cruz Island between ~14,000 yr BP and ~5,000 BP. To aid in the paleoenvironmental interpretation, pollen samples were taken every 10 cm along the length of the profile. These pollen samples will be analyzed shortly.

Information gained from this study may help to determine the conservation needs of terrestrial and aquatic snails on Santa Cruz Island and to provide insights into the origin and evolutionary history of the fauna.