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Pliocene and Pleistocene Invertebrates from Punta Rosalía, Baja California, Mexico

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INTRODUCTION

The present paper records the presence of metazoan invertebrates from previously unreported exposures of Pliocene and Pleistocene sediments in the vicinity of Punta Rosalía (latitude 28° 40' N., longitude 114° 16' W.), a small headland on the southwestern coast of Baja California, Mexico. A cruise of the schooner "Puritan" to the region of Bahía Sebastian Vizcaino presented the senior author with an opportunity to make collections of megafossils during an anchorage stop at Bahía Santa Rosalía, on August 1, 1959.

Bahía Santa Rosalía is a small, cove-like bay situated between Punta Rosalía on the north and Punta San Rosarito on the south (see fig. 1). A natural breakwater south of the first headland shelters the extreme northern portion of the bay from the prevailing wind and permitted safe landings through the otherwise heavy coastal surf. In this area, the sandy beach is backed by a low terrace that forms the present sea cliff. The narrow terrace abuts, at an elevation of about 20 feet, against the base of a plateau that extends, dissected by the drainage pattern, along the coast for some distance at an elevation of approximately 90 feet. Scattered over the surface of the plateau along the coast are numerous marine shells from aboriginal camp sites. The presence in this area of

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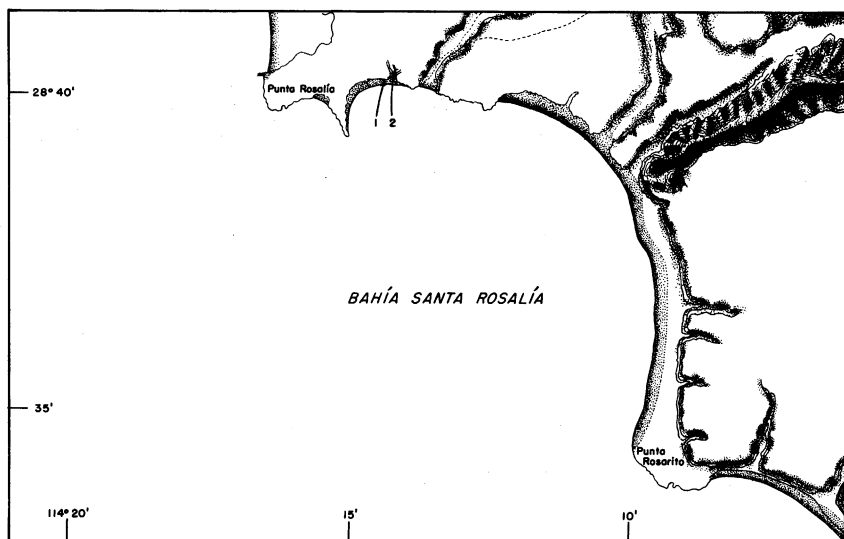


FIG. 1. Sketch of the Bahía Santa Rosalía area, Baja California, Mexico, showing location of the collecting stations (1, Pleistocene; 2, Pliocene) described in the text. After United States Hydrographic Office chart no. 1100.

shell middens bearing simple flake tools was previously noted by Massey (1947, p. 353).

The Pleistocene fossils were collected from conglomeratic sands resting on the terrace platform. The Pliocene fossils were taken from exposures in a small arroyo cut into the coastal edge of the plateau.

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PLEISTOCENE FOSSILS

The platform of the terrace is exposed near the base of the present sea cliff and truncates a sandstone (?Pliocene) that weathers yellowish brown. The sparsely fossiliferous conglomeratic sand is about 2 feet in thickness and is overlain by approximately 3 feet of apparently non-fossiliferous terrace cover along the beach (fig. 2). The fossiliferous

sand is largely coarse and poorly sorted and locally is cemented with shell material and subangular pebbles to form a coquina. The fossils are poorly preserved; many are fragmental, or are represented by casts, and were too fragile to remove intact from the sediments. An annotated list of species collected from this locality follows (see fig. 1 for the location of the collecting station).

MOLLUSCA

GASTROPODA

Acanthina cf. *A. lugubris* (Sowerby, 1821), one fragment

Astraea undosa (Wood, 1828), several large fragments and several small specimens

Conus californicus (Hinds, 1844), several small specimens

Macron aethiops (Reeve, 1847), one incomplete specimen

Olivella biplicata (Sowerby, 1825), several specimens

Olivella pedroana (Conrad, 1855), common in the coquina

Nassarius cf. *N. cerritensis* (Arnold, 1903), one poorly preserved large specimen

Tegula ligulata (Menke, 1850), two well-preserved specimens

PELECYPODA

Chione californiensis (Broderip, 1835), one small valve

Lucina nuttalli Conrad, 1837, one small valve

Mytilus californianus Conrad, 1837, single valves common, but in a friable condition that permitted only fragments to be removed from the matrix

Petricola carditoides (Conrad, 1837), one valve

Pseudochama exogyra (Conrad, 1837), one eroded specimen

Semele decisa (Conrad, 1837), one large valve

Tivela stultorum (Mawe, 1823), large valves common

ECHINODERMATA

ECHINOIDEA

Dendraster sp., fragments common

CIRRIPEDIA

Balanus sp., plates uncommon

Although small in numbers of species, this assemblage is adequate for the depositional environment to be interpreted. The faunal elements represented in the collection live at the present time in the intertidal zone or in shallow infratidal depths on rock or sand substrates. Such habitats now occur at this locality, where the rocky headlands divide the coast into areas of cobble or sandy beaches. Evidence that the fossiliferous marine sediments were deposited in 15 feet of water or less is indicated by the 20-foot elevation of the angle of the shore line, less the 5-foot elevation of the terrace platform exposed in



FIG. 2. Exposure of fossiliferous sediments of late Pleistocene age and alluvial cover in the present sea cliff at Bahía Santa Rosalía (collecting station no. 1).

the present beach cliff. Some of the faunal constituents undoubtedly were transported shoreward by wave action and currents from shallow infratidal habitats in deeper water off shore. Deposition on a Pleistocene coast with a topography essentially the same as the present one is suggested by the available faunistic and physiographic data.

The thermal significance of this small assemblage is difficult to infer in relation to the inferred thermal requirements of late Pleistocene

terrace faunas known from southern California and western Baja California. All the recognizable species in the collection are recorded to range at the present time at this latitude (Keen, 1937), and all are elements of the Californian fauna. None of the thermopiles that characterize the warm-water assemblages of protected embayments is present in the collection. The presence of *Macron aethiops* (Reeve, 1847) in the assemblage may indicate that water temperatures were slightly warmer than the hydroclimates supporting the open-coast, cool-water assemblages reported from late Pleistocene terrace faunas along the northwestern coast of Baja California and southern California. This species is recorded to range at the present time from San Quintín Bay (Stearns, 1894) to the Gulf of California (Grant and Gale, 1931) and is not confined to protected-bay habitats. It occurs in late Pleistocene deposits carrying Panamic elements at San Pedro, California (Woodring and others, 1946), and at San Quintín Bay (Jordan, 1926), Scammon's Lagoon (Jordan, 1924), Turtle Bay (Chace, 1956), and Magdalena Bay, Baja California (Jordan, 1936). On the basis of the collected fauna, the present assemblage is interpreted to represent an open-coast biofacies reflecting possibly a slightly warmer hydroclimate than the climates of similar assemblages reported from higher latitudes of Baja and Alta California.

A late Pleistocene age is assigned to this assemblage largely on the basis of the totally modern composition of the fauna and the occurrence of the marine sediments on the platform of the lowest emergent terrace of the area (see Addicott and Emerson, 1959).

PLIOCENE FOSSILS

A small assemblage of megafossils, mostly mollusks, was collected from three isolated exposures on the sides of a small arroyo (see fig. 3). The fossils occur in a poorly consolidated, light gray, fine sand that is locally cemented to form non-fossiliferous lenses. The fossiliferous sediments are exposed at an observed maximum elevation of about 55 feet, with exposures of 20 to 30 feet in thickness, but the exposures are covered at the base by alluvium and at the top by talus slump. If the platform of the Pleistocene terrace truncates these sediments along the present coast line, the Pliocene sediments locally attain a thickness of at least 50 feet. An annotated list of species collected in the arroyo follows (see fig. 1 for location of the collecting stations).

MOLLUSCA

GASTROPODA

Acanthina emersoni Hertlein and Allison, 1959, four specimens

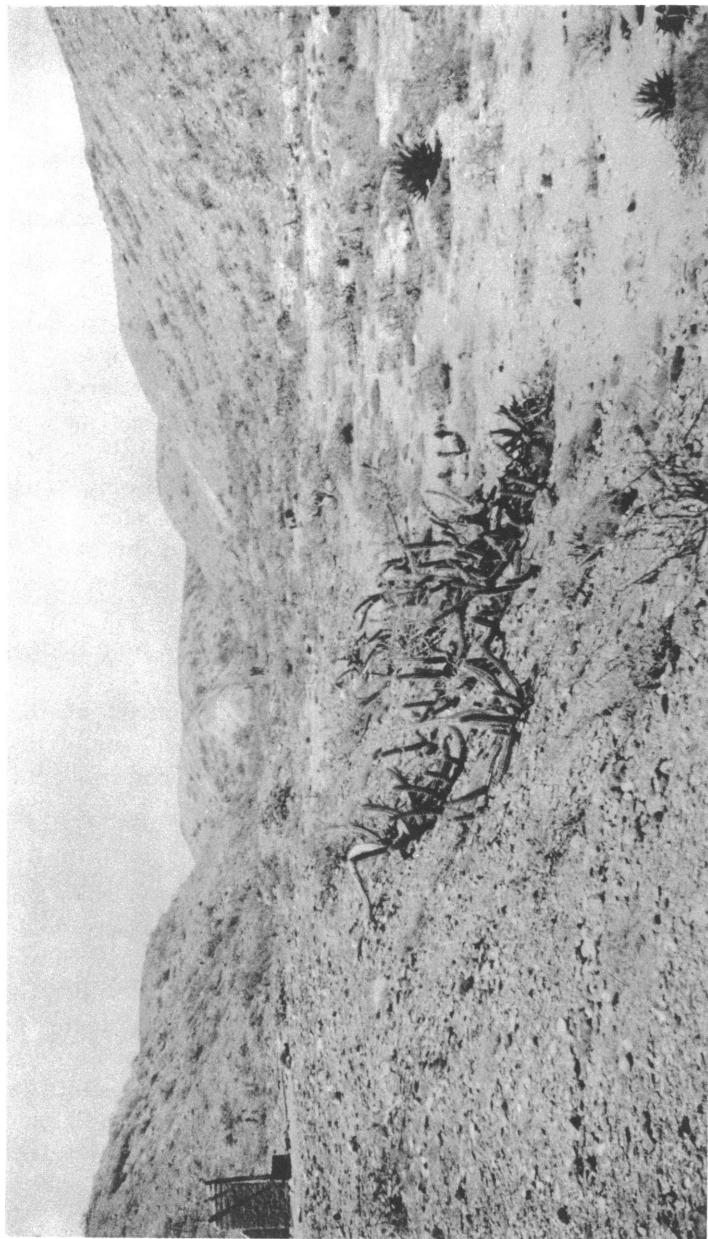


FIG. 3. Small arroyo where Pliocene megafossils were collected at Bahía Santa Rosalía. The dissected surface of the terrace appears in the left foreground, and two patches of fossiliferous, light-colored, Pliocene sediments are exposed on the sides of the arroyo in the center background (collecting station no. 2).

Forreria wrighti Jordan and Hertlein, 1926, one complete specimen and two fragments

PELECYPODA

Anomia peruviana d'Orbigny, 1846, one valve

Ostrea megodon Hanley, 1846, one valve

Ostrea vespertina Conrad, 1854, 25 single valves

Pecten circularis Sowerby, 1835, 30 single valves of a flat variety

Pecten circularis calli Hertlein, 1925, four single valves

Pecten cristobalensis Hertlein, 1925, one valve, with two fewer ribs than on typical forms

Pecten subdolos Hertlein, 1925, three valves

Pecten cf. *P. subdolos* Hertlein, 1925, 26 valves that differ from typical specimens in the more elevated ribs that commonly become broader towards the ventral margin, wider interspaces, and thicker shell; grading towards *Pecten invalidus* Hanna, 1924

CIRRIPEDIA

Balanus concavus Bronn, 1831, one scutum

Balanus nubilus Darwin, 1854, eight specimens

Although small in number, the species comprising this assemblage clearly indicate a Pliocene age for these deposits. Of the nine mollusks cited in the list, six are extinct forms and three are extant forms now living in tropical west American waters; one species ranges into warm temperate waters. All but one of the mollusks are recorded from Turtle Bay,¹ Baja California, in beds that are considered to be of middle Pliocene age (Jordan and Hertlein, 1926). Four, possibly five, of the mollusks also occur in beds of Pliocene age in the coastal region between San Diego, California, and Turtle Bay, Baja California. Of the two species of barnacles listed, *Balanus* cf. *B. concavus* has been recorded from the Pliocene of Turtle Bay, and *Balanus* cf. *B. nubilus* has been reported from late Pleistocene deposits of northwestern Baja California. *Balanus nubilus* and *Balanus concavus pacificus* live at the present time in west American waters.

The present assemblage apparently was deposited in shallow water, the temperature of which was approximately the same as that prevailing at the present time in the vicinity of Cedros Island and Turtle Bay.

The composition of the assemblage suggests that these sediments are comparable in age with the Pliocene sediments occurring at Turtle Bay (approximately middle Pliocene) and probably were deposited contemporaneously with discontinuous patches of Pliocene sediments

¹ Bahía San Bartolomé, Baja California, Mexico (latitude 27° 41' N., longitude 114° 53' W.).

known from along the coast of northwestern Baja California (Hertlein and Allison, 1959).

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