west. The oldest channel (Laguna age) is traced to almost 330 ft (100 m) below King Island in the western Sacramento-San Joaquin delta; the youngest channel (Modesto age) is about -33 ft (-10 m) at Lodi.

Because of their depth, these ancient channels are not presently exploitable. They are, however, a gold-bearing repository, and with newer technology may be potentially tappable in the not too distant future.

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Sedimentology and Paleolimnology of Miocene Peace Valley Formation, Ridge Basin, Central Transverse Range, California

The Peace Valley Formation of Miocene age occupies the axis of an asymmetrical trough in southern California known as the Ridge basin. Sandstone tongues of the Ridge Route Formation extend across the basin and separate the Peace Valley Formation into five members: the Paradise Ranch, Osito Canyon, Cereza Peak, and Posey Canyon Shale Members and the Alamos Canyon Siltstone Member.

The Paradise Ranch shale is a relatively deep freshwater facies, which was deposited in an anoxic lake that possibly was deeper than 65 to 80 ft (20 to 25 m). This unit consists of clay shale with interbedded turbidites, which form upward-thickening depositional lobes.

The Osito Canyon and Cereza Peak shales are shallow freshwater facies. Claystone is the dominant lithology in this extensively bioturbated facies. Deltaic distributary-channel and channel-levee deposits occur in this facies. Wave ripples, ostracodes, and bioturbation suggest deposition in an oxic lake. The sediment accumulation rate for this facies is from 11.1 to 11.7 ft/1,000 years (3.1 to 3.3 m/1,000 years), which is more than twice that of the deep freshwater facies 5.1 ft/1,000 years (1.4 m/1,000 years).

The Posey Canyon Shale and Alamos Canyon Siltstone are deep, brackish-water facies. The absence of insect burrows, mammal tracks, wave ripples, and mudcrack casts suggests that the lake was deeper than wave base or seasonal exposure, which may indicate depths from 65 to 80 ft (20 to 25 m). Dolostone, analcime-rich shale, clay shale, and claystone, as well as debrisflow and turbidite deposits, occur in this facies. Ridge Basin Lake was probably chemically stratified during accumulation of the deep brackish-water facies. The change from shallow freshwater to deep brackish-water deposition probably reflects a change from a hydrologically open to a closed basin.

Vitrinite reflectance indicates that, although the vertical composite thickness of the Peace Valley Formation exceeds 5 mi (8 km), the vertical thickness never exceeded 2.5 mi (4 km) at any given location.

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Nonmarine Trace Fossils in Miocene-Pliocene Ridge Basin, Central Transverse Range, California

The trace fossils *Palaeophycus, ?Scoyenia, ?Scolicia,* and *?Chondrites* occur in lacustrine and fluvial deposits of the Miocene-Pliocene Ridge basin of southern California. *Palaeophycus* is the most common ichnofossil in the sequence. *Palaeophycus* is a curved, cylindrical burrow that rarely branches. This ichnofossil is divided by diameter into two types: type A and type B. Type A averages 2 to 6 mm and type B

averages 8 to 18 mm in diameter. Subaerial burrowing by insects probably formed these traces, hence they possibly can be used as evidence of subaerial exposure of the sediment. *?Scoyenia* is morphologically similar to *Palaeophycus* except *?Scoyenia* contains meniscate packing indicating active filling of the burrow, whereas *Palaeophycus* was passively filled. *?Scoyenia* was probably formed by deposit-feeding insects. Both *Palaeophycus* and *?Scoyenia* occur in fluvial and shallow freshwater lacustrine facies.

*Scolicia* was formed by grazing gastropods. These ichnofossils are ribbonlike depressions which occur both as simple, sinuous furrows and as intertwined paths. *Scolicia* is found in delta-front and shallow nearshore lacustrine environments in the Ridge basin. The presence of this trace fossil indicates that water depths were less than a few tens of meters.

*Chondrites* is found in prodelta, delta-front, and deep brackish-water lacustrine deposits. It appears as small (averaging 1.75 mm), curved, commonly branching burrows which locally are replaced by pyrite. Aquatic worms constructed this trace fossil. In the deep, brackish-water deposits, zones of unbioturbated sediment are interbedded with zones of sediment which are partially or totally bioturbated by *?Chondrites*. This probably is the result of alternating oxic and anoxic conditions in the lake's bottom waters.

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Sedimentary Facies of Nonmarine Lower Miocene Diligencia Formation, Canyon Spring Area, Orocopia Mountains, Southern California

The Diligencia Formation in the Canyon Spring area consists of a 2,950-ft (800m) section of interbedded sedimentary and volcanic rocks that accumulated in an east-west-trending intermontane valley. Sedimentary facies are alluvial fan-braided fluvial, shoreline with interfingering basalt flows, fluvialdeltaic, and lacustrine. The alluvial fan-braided fluvial facies occurs in the basal part of the formation in the Canyon Spring area. Alluvial-fan processes predominated in the lower part of this facies where coarse debris was derived from an uplifted Precambrian schistose gneiss-augen gneiss basement complex on the south. Braided-fluvial processes predominated in the upper part of the facies where alternating sequences of sand and mudcracked mud accumulated.

Basin subsidence occurred with syntectonic outpourings of basalt. Some of the flows are pillow basalts that interfingered with rippled, well-sorted, fine-grained sand of the shoreline facies. Fossils are sparse in the shoreline facies and include ostracodes, land-mammal remains, and horizontal burrows. Spring-tufa deposits are present in a laterally persistent bed. As infilling of the lake occurred, deltas formed where gravelbearing, sandy fluvial sediments of the fluvial-deltaic facies entered the lake. These deposits interfinger with the shoreline facies, and some of the boulders are anorthosite and Lowe-type granodiorite. Offshore, thin-bedded mud and silt of the lacustrine facies interfingered with the delta deposits. Evaporite lagoon conditions and volcanic activity (ash deposits) were intermittent.

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Late Miocene Activity on San Gabriel Fault as Indicated by Paleoenvironment of Castaic Formation