Clark County, Nevada, provide convincing evidence for right-lateral displacement that is in close accord with that postulated by Longwell.

The *Rhipidomella nevadensis* zone (=lower Indian Springs Member of Longwell and Dunbar, 1936) of (?) Early Pennsylvanian age is at the base of the Bird Spring Formation in the northwestern Spring Mountains on the southern side of the shear zone, but is present 26 mi. farther southeast (Dry Lake and Arrow Canyon Ranges) on the northern side of the shear zone. This fossil zone is missing, probably by facies change, from sections only a few miles farther southeast on both sides of Las Vegas Valley. The Arrowhead Limestone Member of the Monte Cristo Formation (Mississippian) is present in the southeastern Spring Mountains, the Goodsprings district east of the Keystone thrust (Hewett, 1931), and in the upper plate of the Keystone thrust in the central Spring Mountains, but is absent farther northwest. North of the shear zone this member is present in the central Muddy Mountains but is absent west of California Wash, indicating about 25 mi. of southeasterly displacement of rocks on the northern side of Las Vegas Valley. The Eureka Quartzite (Ordovician) is present in the northwestern Spring Mountains, and the Sheep, Las Vegas, and Arrow Canyon Ranges, but is absent east of California Wash and in the central Spring Mountains southeast of Mt. Charleston. The Kaibab Limestone (Middle Permian) is widely distributed in the Spring and Muddy Mountains, but is absent west of California Wash where thick fusulinid-bearing Permian limestones in the Las Vegas and Arrow Canyon Ranges presumably are chronologic equivalents.

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Fishery Management Problems as Related to Marine Seismic Surveys During Petroleum Explorations

Points to be covered:

1. Fisheries Department responsibility for protection of fishery resources in the state and contiguous waters extending seaward over the O.C.S. area.
2. The relative position of the fishing industry within the economic structure of Washington State and the importance of coastal fish stocks in the local, regional, and world food picture; the relative importance of anadromous, pelagic, and demersal fish stocks locally; and how values are established as the result of fish kills during seismic programs.
3. Fishing methods and areas where conflict is apt to be encountered with seismic exploration.
4. Permit provisions and requirements.
5. The problem of allowing seismic fleets to operate on a reasonable basis and to the fullest extent possible consistent with protection of fishery resources.
6. Public relations and what local reaction can do to your program.

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Intertidal and Shallow-Water Foraminifera of Tropical Pacific Ocean

Intertidal and shallow-water sediment samples from the tropical Pacific Ocean were studied and a quantitative analysis made of their constituents. The foraminiferal components exhibit both eurytopic and stenotopic distribution patterns. Seven methods of dispersal are listed and analyzed to help explain the eurytopic patterns. Hypotheses based on dispersal methods and fluctuations in populations are advanced to explain the stenotopic and sporadic fossil and recent occurrences of two important foraminiferal genera, *Tinoporus* (*Calcarina*) and *Baculogypsina*. An examination of the beach sands shows that although calcite, igneous, and metamorphic grains are the principal components in the majority of the samples, foraminiferal tests commonly comprise over 30 per cent of the sand. The remaining constituents are usually less than 1 per cent of the total. The analysis of the shallow-water Foraminifera from Johnson Island indicates that certain species have high numerical values in restricted areas. These occurrences are similar to those of the same species in the shallow waters of other islands.

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Planktonic Foraminifera in Water Column, Newport Submarine Canyon[1]

Plankton tows were taken at 55 stations over Newport Submarine Canyon, along with temperature, salinity, and transparency measurements. Two factors modify prevailing conditions: upwelling of water in the canyon, and effluent flow from the Orange County sewer outfall.

Colder isotherms penetrate warm nearshore water during times of upwelling. Under such conditions, planktonic foraminiferal numbers increase fourfold in areas of previously low concentrations. High values are found in the canyon axis, whereas planktonic frequency decreases both north and south of the axis. However, an anomalous situation exists over the sewer outfall, where in relatively warm water, large quantities of Foraminifera are present. Increase in quantity of these forms appears to be caused by a supply of fresh nutrients provided by upwelling in the canyon and organic matter discharged from the sewer. These factors make it possible for a larger population to persist.

Foraminifera range in size from 60 to 250 microns, the lower limit being determined by the mesh size of the plankton net. Size distribution is significant because many programs employ nets larger than 250 microns. *Globigerina bulloides* composes 90 per cent or more of the samples. Scattered specimens of *Globigerina pachyderma* occur in deep tows along with *G. quinqueloba*. Some benthonic forms, species of *Bolivina*, were found in the tows, presumably because of either transport by upwelling bottom currents or float mechanisms.

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Foraminferal Family Pseudoparrellidae Voloshinova

The family Pseudoparrellidae Voloshinova, 1952, commonly has not been recognized as a separate suprageneric category of the Foraminiferida. Previous family assignments of the genera now included in the Pseudoparrellidae have been based on incomplete or incorrect data. The family is now characterized by trochospiral or initially trochospiral test with monolamellid septa, radially-built, hyaline calcite walls and an aperture parallel to the margin of the test in the face of the last chamber. As redefined, the family includes six genera:

[1] This paper is a contribution of the Allan Hancock Foundation.

Pseudoparrella Cushman and ten Dam, *Epistominella* Husezima and Maruhasi, *Megastomella* Faulkner, de Klasz, and Rerat, *Stetsonia* F. L. Parker, and two undescribed genera. Species of the Pseudoparrellidae occur in Oligocene? to Recent deposits. Although some genera and species have been reported from much older rocks, these reports are based on misidentifications. Pseudoparrellidae are known from all parts of the world: *Pseudoparrella* is cosmopolitan; *Epistominella* is known from the northern Pacific and Arctic Ocean areas; *Megastomella* is known from the Miocene of Africa and California; *Stetsonia* is reported from the Gulf of Mexico and Arctic Ocean; and the other genera are known from the eastern Pacific area. Recent species generally are found in relatively deep water on fine-grained substrates and extinct species apparently had similar ecologic requirements.

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MIOCENE PLANKTONIC FORAMINIFERA FROM NEAR NEWPORT BEACH, CALIFORNIA

Planktonic Foraminifera are present in abundance in the middle to upper Miocene (upper Luisian and lower Mohnian) Monterey Shale exposed at Newport Bay, California. About 20 species of planktonic Foraminifera are tentatively recognized. The greatest number of species and individuals occur in the upper Luisian, including species of *Globigerina*, *Globoquadrina venezuelana*, *Orbulina suturalis*, and *Globigerinoides trilobus*. In the uppermost Luisian, just below the Luisian-Mohnian boundary, is a local zone characterized by *Hastigerina* (*Bolliella*) sp. nov. which may prove useful in regional correlation. Species and individuals are less numerous in the lower Mohnian, although *Globigerina bulloides*, *G. pachyderma*, and *Globorotalia scitula* are present. During the time represented by these rocks species of planktonic Foraminifera were not as numerous at Newport Bay as in tropical areas where the standard planktonic reference sections were defined. Thus correlation to these areas is not yet established.

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DEEP STRUCTURE OF CONTINENTS

Observations of heat flow and gravity suggest that continental structure extends to depths of the order of 500 km. The preliminary studies of surface waves tentatively confirm the existence of regional differences between continental and oceanic mantle. The distribution of earthquake foci along continental borders and the concentration of deep-focus earthquakes at the borders similarly imply differences in thermal structures extending to depths of the order of a few hundred kilometers. The deep structure of continents places heavy restrictions on any theory of continental drift. A relative motion of the continents must involve the mantle to depths of several hundred kilometers; it is no longer possible to imagine thin continental blocks "sailing" over a fluid mantle.

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OFFSHORE OREGON: SOME NOTES ON PETROGRAPHY AND GEOLOGIC HISTORY

Miocene and younger sedimentary rocks crop out on the continental shelf and slope off the central coast of Oregon. The predominant lithology is diatomaceous siltstone which contains different quantities of glass shards, Radiolaria, Foraminifera, sponge spicules, and glauconite. Glauconite sandstone was collected from the northern part of Heceta Bank. Angular, poorly sorted, volcanic sandstones were obtained in one sample from Heceta Bank and from several samples taken near the base of the continental slope.

Foraminifera contained in the rocks exposed on the continental shelf suggest that the rocks were deposited in water of bathyal depth. Thus, since late Tertiary time, rocks on this part of the continental shelf have been uplifted possibly as much as 5,000 ft.

The lithology and the faunal content of the rocks suggest that deposition during late Tertiary time occurred either on the continental slope or in one or more isolated basins somewhat removed from the continent. Subsidence contemporaneous with deposition resulted in thick accumulations of Tertiary sedimentary rocks. Late Tertiary and Quaternary tectonism resulted in the uplift and deformation of the Tertiary rocks in the area of the present continental shelf. Erosion and subsequent burial of portions of the Tertiary section occurred during late Quaternary fluctuations of sea-level.

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MONTEREY SUBMARINE CANYON, CALIFORNIA: GENESIS AND RELATIONSHIP TO CONTINENTAL GEOLOGY

New data from marine dredgings off Monterey, California, correlated with wells and outcrops on land, indicate that the Pleistocene Monterey and Soquel Canyons, and the middle Miocene (?) Carmel Canyon, are intimately related to the continental geologic history.

Late Cretaceous (?), middle Miocene, and Pleistocene structure controls canyon trends whereas the induration and distribution of post-lower Miocene sedimentary rocks and the Cretaceous granodiorites control the canyon-shape parameters. Carmel Canyon was the principal canyon until the mid-Pleistocene orogeny caused physiographic and structural changes. Zones of low induration and(or) weakness along fault trends and along contacts between sedimentary and igneous rocks permitted the canyons to be more easily eroded.

Late late Miocene, Pliocene, and early Pleistocene drainage from the Great Valley debouched at Monterey Bay via Elkhorn Slough which lies at the head of Monterey Canyon. All canyon heads were cut or modified subaerially by rivers to a depth of 300 ft. below present sea-level during eustatic sea-level changes. Canyon erosion below 300 ft. was by submarine processes, as the geologic record on land indicates no great uplift of the ocean floor.

Monterey Canyon and Elkhorn Slough lie directly above a buried middle Miocene canyon—the Pajaro Gorge. The older canyon is not ancestral to Monterey Canyon, but cause-and-effect relationships are noted.

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