

REGULAR EVENING MEETING

GEOLOGY OF THE WESTERN CANADIAN CONTINENTAL SHELF

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This paper deals primarily with the stratigraphy of the Tertiary sediments in the Tofino and Queen Charlotte basins of Canada's Pacific shelf. Information is included from Mesozoic and Tertiary outcrops along the shoreline margins of the basins, from the six Richfield Oil Corporation Wildcats on the Queen Charlotte Islands; from Shell Canada's aeromagnetic, reflection, and refraction seismic surveys; and from 14 offshore Wildcats drilled between May 1967 and May 1969.

The pre-Tertiary framework of the shelf consists of a thick and complex sequence of Mesozoic sedimentary, metamorphic, and intrusive and extrusive igneous rocks. Little is known about the early Tertiary history, but

data from the Tofino basin suggest widespread early-middle Eocene submarine volcanic activity, initial uplift followed by subsidence in late Eocene time, distinct transgressions of Oligocene-early Miocene seas, followed by a middle Miocene period of crustal deformation, uplift and regression. There was a major transgression in late Miocene and a lesser one in early Pliocene time, followed by a regressive phase in late Pliocene-Pleistocene time.

The early Tertiary volcanism in the Tofino basin spread northward and continued, at least sporadically, in the Queen Charlotte basin into the Miocene. Tertiary sedimentation in the Queen Charlotte basin did not begin until the Miocene and, although interrupted by perhaps two periods of uplift and erosion, continued through the Pliocene into the Pleistocene.

The maximum thickness of Tertiary sediments is more than 15,000 feet. Depositional environments range from deep-water, open-marine sequences of shales, siltstones, and sandstones in the Tofino Basin, through both deep- and shallow-water marine sediments in the Queen Charlotte basin, to a thick nonmarine sequence of sandstone, shale, siltstone, and coal in Hecate Strait and the Queen Charlotte Islands. The sands in both basins are composed primarily of feldspars and quartz, and those of the Queen Charlotte basin are characterized by high porosity and low permeability.

There is a wide variety of structural styles including areas of numerous large anticlines with multiple unconformities and complex growth and fault histories; areas of small, gentle, low-relief anticlines; and areas where the Tertiary sediments overlap older volcanics with little or no folding of the sediments. There are insufficient deep seismic reflections to interpret properly and to understand the structural style of the

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Tofino basin, but at least two basic mechanisms must be considered: (1) simple compressional folding with detachment from the basement, and (2) flowage of the overpressured shales into the cores of the anticlines. At various times in different places in the basin, each of these mechanisms might have been dominant.

Both oil and gas shows have been encountered, but no commercial accumulations have yet been found.

BIOGRAPHICAL DATA:

Born:

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Education:

1949 - BSc in Geology,
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Experience:

1949 - Present - Shell Canada Limited
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