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APPARENT RIGHT-LATERAL SEPARATION ON CHATHAM STRAIT FAULT, SOUTHEASTERN ALASKA

Abstract: Right-lateral separation of about 120 miles along Chatham Strait Fault is suggested by apparent displacement of major geologic features on opposite sides of the fault.

Chatham Strait and Lynn Canal form a remarkably straight trench that extends over 250 miles in southeastern Alaska. Wright and Wright (1908, p. 40) were the first to suggest faulting as the cause of the straightness. They described the area as follows:

"The largest and most important fault plane in southeastern Alaska, which is suggested both geologically and topographically, extends from the head of Lynn Canal in a S. 10° E. direction 200 miles or more through Chatham Strait into the Pacific Ocean. The displacement at its southern end is evidently greater than at the head of Lynn Canal, where the main fault appears to diverge into two or more directions. . . . The displacement and the direction of throw of this fault are not clearly defined, though *the former probably amounts to many miles.*" (The italics are mine).

St. Amand (1957, p. 1356, 1357) believed that the Chatham Strait fault was a continuation of the Denali fault—a fault that extends from Bristol Bay along the front of the Alaskan Range and through Canada nearly to the head of the Lynn Canal. He suggested right-lateral separation of as much as 150 miles along parts of the Denali fault but ventured no opinion on either the direction or amount of displacement along the Lynn Canal–Chatham Strait segment.

Twenhofel and Sainsbury (1958, p. 1434, 1435) also believed that the Chatham Strait fault was a continuation of the Denali fault. They did not commit themselves as to the amount or direction of displacement but suggested that the west side was upthrown. They believed the age of the latest movement was Cretaceous or younger.

Since 1956, much additional mapping has been done on both sides of the Chatham Strait fault (Barker, 1957; Berg and Hinckley, 1963; Lathram and others, 1959; Lathram and others, 1960; Loney and others, 1963; Condon, 1961; Loney and others 196–, in press), and a comparison of the major geologic features, as now known, supports the opinion that a major dislocation has indeed taken place (Fig. 1). Generally unmetamorphosed Ordovician and Silurian strata of the Northern Prince of Wales and Kuiu islands are opposite metamorphosed Permian and younger rocks on Baranof Island and strike in the same direction; furthermore, the main northwest-trending belt of Tertiary deposits along Clarence Strait does not continue across Chatham Strait. Farther north, unmetamorphosed Devonian and Mississippian rocks of the simply folded Freshwater Bay syncline are opposite metamorphosed, complexly folded Devonian and Permian rocks on Admiralty Island where Mississippian strata are absent; and unmetamorphosed Silurian beds that make up the bulk of the Chilkat Range lie directly across from the metamorphosed Devonian and Permian beds of Admiralty Island.

These major features would be grossly aligned, however, if a right-lateral movement of about 120 miles were assumed. The unmetamorphosed, simply folded Devonian and Mississippian rocks in and south of San Cristoval Bay would line up with the Freshwater Bay syncline. The generally unmetamorphosed Ordovician and Silurian rocks of the Northern Prince of Wales and Kuiu islands would strike toward rocks of comparable age and comparable lack of metamorphism in the Chilkat Range, and the Tertiary belt along Clarence Strait would strike toward a Tertiary belt along the Chilkat River that trends northwest into Canada. The belt of metamorphic rocks of Devonian age in central Chichagof Island would align with the metamorphic rocks of Silurian and Devonian age on Dall Island, and the Permian and younger rocks of Baranof Island would strike southeastward past Prince of Wales Island toward Graham Island where Triassic and younger rocks are also exposed (MacKenzie, 1916). The Clarence Strait fault

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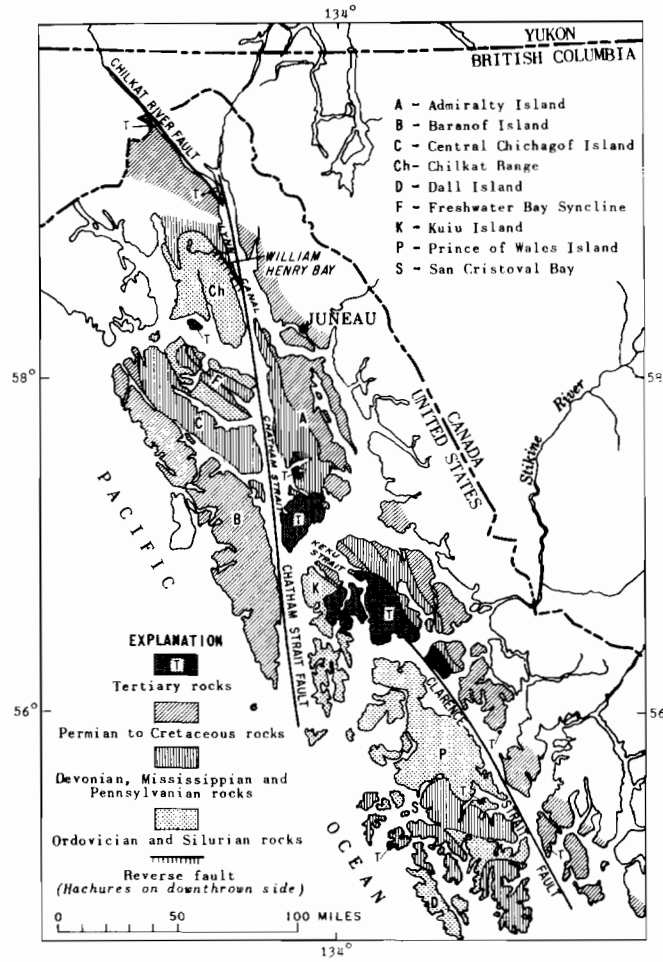

Figure 1. Map showing geologic features displaced by the Chatham Strait fault

would line up with the Chilkat River fault, and, since these faults separate Mesozoic rocks on the northeast from Paleozoic rocks on the southwest (Twenhofel and Sainsbury, 1958, p. 1436; Lathram, unpub. data), they might possibly be a continuation of the Denali fault.

A few problems arise, however, if displacement of such magnitude is assumed. Near William Henry Bay, on the west side of the fault, Mississippian rocks are absent between the Upper Devonian and Permian strata that lie beneath a thrust plate of Middle Devonian rocks, whereas in Keku Straits, on the other side of the fault, several thousand feet of Mississippian rocks are present. Fifteen miles of water intervenes between the exposures on Keku Straits and the probable trace of the fault, and Mississippian beds may pinch out within the eastern fault block. Also, although rocks of the Coast Range batholith have probably been cut by branches of the Chatham Strait fault north of the head of Lynn Canal (Twenhofel and Sainsbury, 1958, p. 1434) the western portion of the batholith shows no evidence of having been offset by any large amount. However, the Coast Range batholith is poorly known in this area and may contain rocks younger than the fault, or, more probably, the Chatham Strait fault may change strike and follow the Chilkat River fault.

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