multi-element taxonomy is that it provides a more natural basis for specific and generic concepts, and a foundation for discussions of functional morphology, paleoecology, phylogeny, and conodont biostratigraphy.

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Genesis of Sand Ridges on Storm-Dominated Shelves—Status Report

Sand-ridge topographies are relatively common on storm-dominated shelves, as well as on tidal shelves. The definitive studies of fluid process and seafloor response have not yet been undertaken, but enough data are now available to construct reasonable models of ridge genesis and design experiments. Any model for ridge formation must explain the following observations. (1) Ridges form a 20 to 40° angle with the coast that opens into the prevailing direction of storm flow. (2) Sand waves on the sand ridges form 85° angles with the coast. (3) The coarsest sands are on the up-current side of sand ridges and the finest sands are on the down-current side.

A mean flow model is based on J. D. Smith's stability analysis of sand beds at low Froude numbers. Because of a phase shift between bottom topography and flow parameters, maximum shear stress occurs on the up-current slopes of bottom perturbations, hence their crests must aggrade. The skew with respect to the coast is explained as a shearing out of the bed form by the increasing efficiency of transport as the beach is approached and wave re-suspension of sediment intensifies.

A shear wave model attributes sand ridges to stationary, eddy-like instabilities in inner-shelf flow that result from an onshore-offshore velocity gradient over a sloping bottom. In this model, ridge orientation is determined by the orientation of the long axis of the eddy. Studies in progress should allow us to discriminate between these two models of sand-ridge formation.

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Rationalization of Koyukuk "Crunch," Northern and Central Alaska

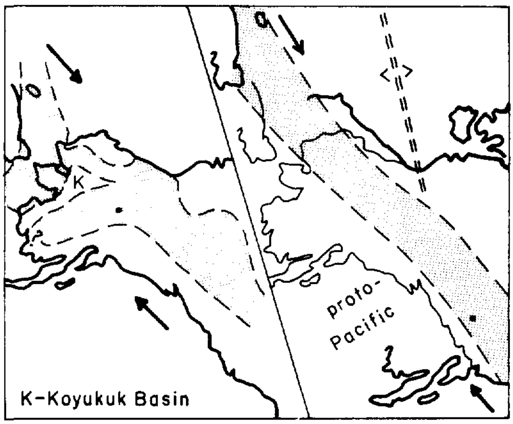
Rocks of northern Alaska may have had tectonic continuity with rocks of central Alaska. The present syntaxis would have formed along with those at the ends of the Brooks Range in response to right-lateral drift between the Arctic and outboard plates. The Cretaceous Koyukuk basin is interpreted to have been "crunched" between the northwestern and southeastern syntaxes.

Palinspastic data suggest that (1) the Fairbanks area was once south of the Prince Rupert area, (2) the Arctic Alaska basin separated the Ellesmerian-Antler orogene from the proto-Pacific ocean, and (3) Cretaceous foreshortening against this continental edge resulted in construction of the Brooks Range foldbelt and the flanking Koyukuk and Colville basins. Space is sufficient to accommodate later accretion of Wrangellia and other lithospheric "crumbs" to Alaska.

This surmise, which could be tested by analysis of paleomagnetism, accommodates more observations that the Patton-Carey alternative of rifting followed by partial closing of the Koyukuk basin sphenochasm. It would also explain or clarify the following: (1) the 135° acuity (instead of natural, curvilinear trends) for belts of "ophiolite," of glaucophane, of metamorphism, of plutonism, etc; (2) the thrust-superpositions of coeval sequences along the upper Yukon; (3) the absence of tectonic provenances for Cretaceous orogenic deposition in central Alaska; and (4) the young igneous detritus on the west edge of the MacKenzie delta, more than 100 km from the closest source.

If validated, this hypothesis would greatly reduce estimates of the hydrocarbon potential of central Alaska, but would predict extensions of Brooks Range copper and lead-zinc provinces southwestward across the Yukon River and eastward beyond Fairbanks.

Pre-Syntaxis Palinspastics



Inferred Syntaxes

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Interpretation of Fossil Fluvial Bivalve Burrows in Catskill Formation, Based on Analogy with *Margaritifera margaritifera* (L.)

Large burrow structures attributable to the bivalve *Archanodon* are common in sandstones of the Towamensing Member of the Upper Devonian Catskill Formation in Pennsylvania and in its correlatives in New York and New Jersey. These structures show preferential curvature, cross-sectional ellipse parallelism, and internal asymmetric crescentic features. Vectorial analysis of these features has been based upon studies of the behavior of living specimens of *Margaritifera margaritifera* (L.).

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