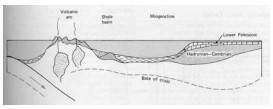
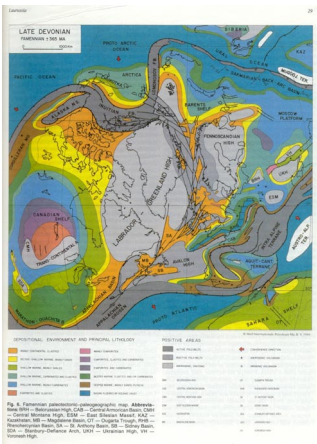
Cambrian/Silurian Carbonates

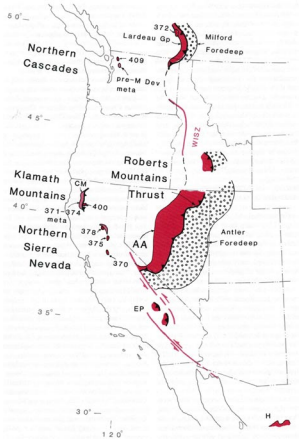
- Passive Margin Deposits
- Local Thick Deposits
- Broad Zone of Sedimentation
  - Extends from Well Upon the Craton Out to Shelf Edge





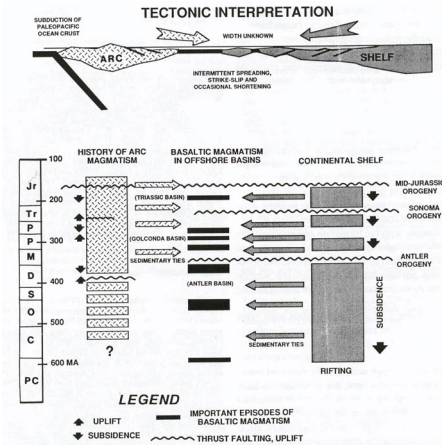
ANTLER OROGENY

- Overview
- Robert's Mountain Thrust Allochton
- Antler Foreland Basin
- Coeval Arc Rocks
  - NE Sierra Nevada
  - Eastern Klamath Mountains



OVERVIEW

- Early Eastward Thrusting
- Ocean Floor & Continental Slope Deposits
- Allochthon Pushed Over Passive Margin Rocks
- Associated with Arc Terrain Accretion



ROBERT'S MOUNTAIN ALLOCHTHON

- Wide-spread Thrust Plate
- Consists of Accretionary Wedge
- Covered by Pn Wildcat Peak Fm
  - Post Orogenic Molasse

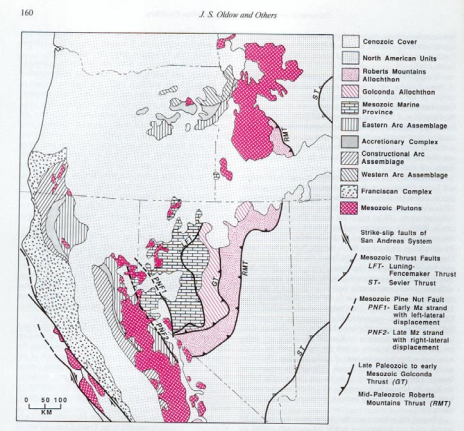
ROBERT'S MOUNTAIN UPPER PLATE

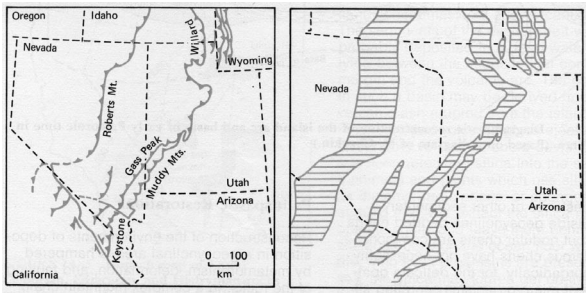
Sediments

1. Turbidite Sequence
2. Graptolitic Shale
3. Radiolarian Chert
4. Carbonates and Siliciclastics

Volcanics

1. Ocean Floor Basalts
2. Tholeiitic Pillow Lavas & Dikes





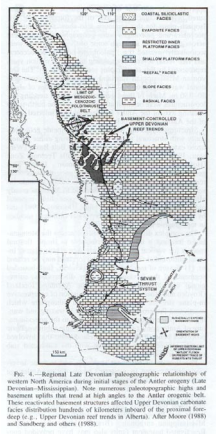


FIG. 4.—Regional Late Devonian paleogeographic relationships of western North America during initial stages of the Antler orogeny (Late Devonian–Mississippian). Note numerous paleotopographic highs and basement uplifts that trend at high angles to the Antler orogenic belt. These reactivated basement structures affected Upper Devonian carbonate facies distribution hundreds of kilometers inboard of the proximal fore-deep (e.g., Upper Devonian reef trends in Alberta). After Moore (1988) and Sandberg and others (1988).

Boundary Thrust

- Robert's Mountain Thrust
- Nevada-Idaho (Possibly Into Canada)

Central Basin & Range Example

- Effected by Post-Antler Events
- Windows Through the Upper Plate

Upper Plate

- Cambrian to Ordovician
- Basinal Shale, Sandstone
- Ocean Floor Volcanics

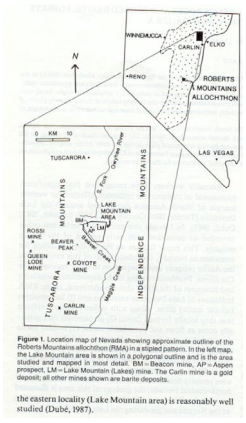


Figure 1. Location map of Nevada showing approximate outline of the Roberts Mountains allochthon (RMA) in a stipled pattern. In the left map, the Lake Mountain area is shown in a polygonal outline and is the area studied and mapped in most detail. BM = Beacon mine, AP = Aspen prospect, LM = Lake Mountain (Lakes) mine. The Carlin mine is a gold deposit; all other mines shown are barite deposits.

the eastern locality (Lake Mountain area) is reasonably well studied (Dubé, 1987).

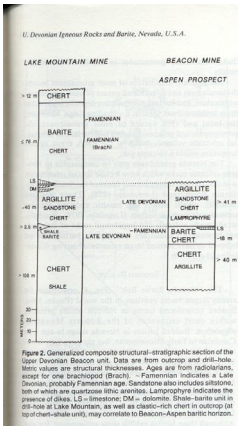


Figure 2. Generalized composite structural–stratigraphic section of the Upper Devonian Beacon unit. Data are from outcrop and drill-hole. Metric values are structural thicknesses. Ages are from radiolarians, except for one brachiopod (Brachi). – Famennian indicates a Late Devonian, probably Famennian age. Sandstone also includes siltstone, both of which are quartzose lithic arenites. Lamprophyre indicates the presence of dikes. LS = limestone; DM = dolomite. Shale–barite unit in drill-hole at Lake Mountain, as well as clastic-rich chert in outcrop (at top of chert–shale unit), may correlate to Beacon–Aspen baritic horizon.

Lower Plate (Windows)

- Ordovician/Devonian
- Limestone and Shale
- Telescoped Portions of Passive Margin

CAUSE OF FORELAND BASIN?

Timing

– Hiatus Between Thrusting and Molasse

Possible Cause for Basin Subsidence

– Loading of Crust Associated with RMA

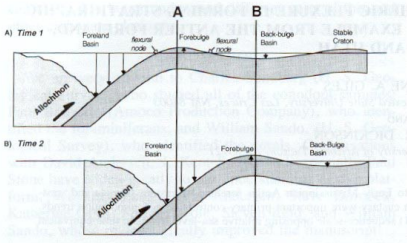


FIG. 1.—Diagrammatic cross sections displaying the relationship of lithospheric flexure to accommodation space in foreland systems. Arrows pointing down indicate an increase in accommodation space produced by lithospheric downwarping and arrows pointing up indicate a decrease in accommodation space due to lithospheric upwarping. (A) *Time 1*: thrust load emplaced, resulting in downwarping of the lithosphere (foreland basin), cratonward upwarping (forebulge), and farther cratonward, gentle downwarping (back-bulge basin). (B) *Time 2*: the thrust load migrates cratonward resulting in cratonward migration of the flexural features; former uplifted area of forebulge (locality A, *Time* 1) is downwarped and incorporated into foreland basin, whereas former back-bulge basin (locality B, *Time* 1) is upwarped over migratory forebulge at *Time* 2.

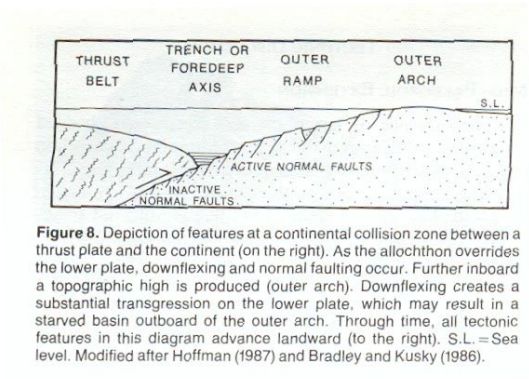


Figure 8. Depiction of features at a continental collision zone between a thrust plate and the continent (on the right). As the allochthon overrides the lower plate, downflexing and normal faulting occur. Further inboard a topographic high is produced (outer arch). Downflexing creates a substantial transgression on the lower plate, which may result in a starved basin outboard of the outer arch. Through time, all tectonic features in this diagram advance landward (to the right). S.L. = Sea level. Modified after Hoffman (1987) and Bradley and Kusky (1986).

ANTLER FORELAND BASIN

- Well Developed in Central Nevada
- Thick Black Shales Over Limestones
  - Chainman Shale (Miss) > 1.5 Km Thick
- Rapid Subsidence of Basins
- Sediment Transport
  1. Eastward at Western Margin
  2. Westward at Eastern Margin

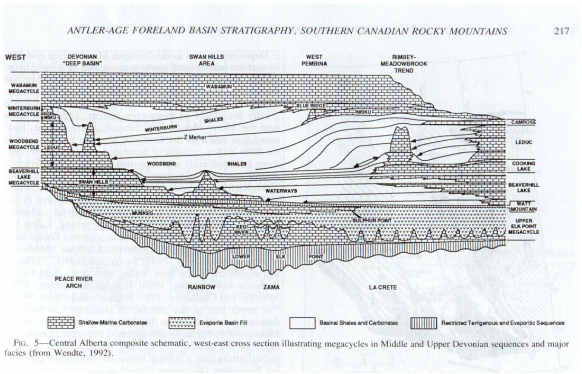


FIG. 5—Central Alberta composite schematic, west-east cross section illustrating megacycles in Middle and Upper Devonian sequences and major facies (from Wendte, 1992).

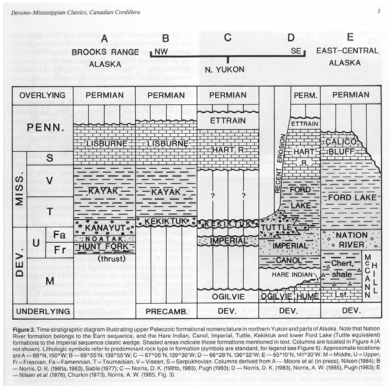
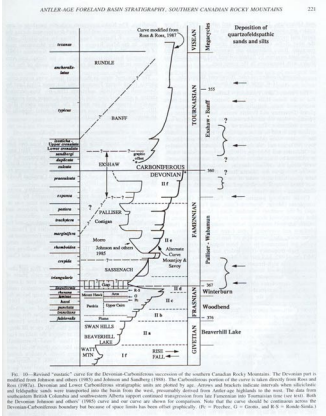


Figure 2. Time-stratigraphic diagram illustrating upper Paleozoic formational nomenclature in northern Yukon and parts of Alaska. Note that Nation River formation belongs to the Earn sequence, and the Hare Indian, Canol, Imperial, Tuttle, Kekiktuk and lower Ford Lake (Tuttle equivalent) formations to the Imperial sequence clastic wedge. Shaded areas indicate those formations mentioned in text. Columns are located in Figure 4 (A not shown). Lithologic symbols refer to predominant rock type in formation (symbols are standard; for explanation see Figure 5). Localities are A — 69°N, 150°W; B — 68°55'N, 138°55'W; C — 67°05'N, 139°30'W; D — 66°29'N, 136°32'W; E — 65°10'N, 140°30'W. M = Middle, U = Upper. Fr = Frasnian, Fa = Famennian, T = Tournaisian, V = Visean, S = Serpukhovian. Columns derived from A — Moore et al. (in press); Nilsen (1984); B — Norris, D. K. (1985b, 1983); Sable (1977); C — Norris, D. K. (1985b, 1983); Pugh (1983); D — Norris, D. K. (1963); Norris, A. W. (1985); Pugh (1983); E — Nilsen et al. (1978); Churkin (1973); Norris, A. W. (1985, Fig. 3).



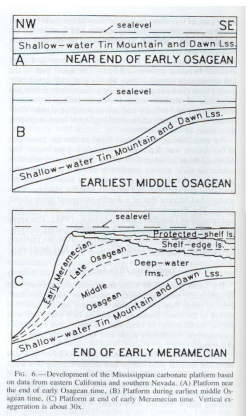
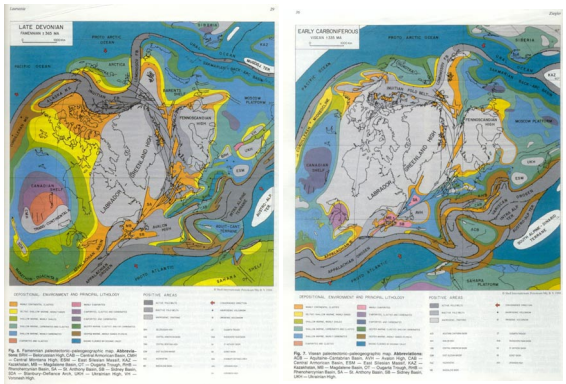


FIG. 6.—Development of the Mississippian carbonate platform based on data from eastern California and southern Nevada. (A) Platform near the end of early Osagean time, (B) Platform during earliest middle Osagean time, (C) Platform at end of early Meramecian time. Vertical exaggeration is about 30x.



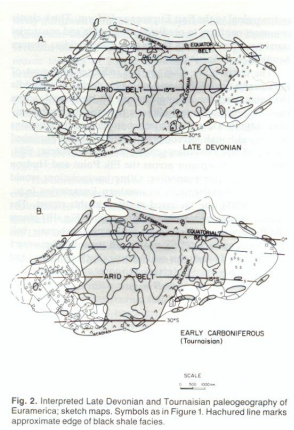
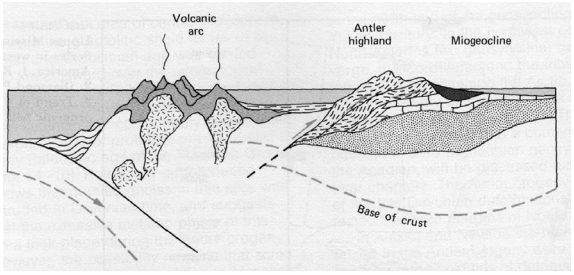


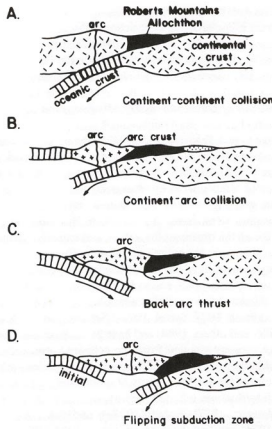
Fig. 2. Interpreted Late Devonian and Tournaisian paleogeography of Euramerica; sketch maps. Symbols as in Figure 1. Hachured line marks approximate edge of black shale facies.

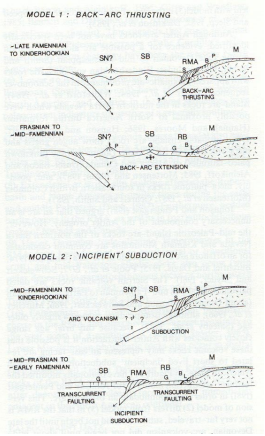
POSSIBLE TECTONIC MODELS

Obduction of East-facing Arc
- Westward Subduction
- Paleogeographic Constraints
- Oblique Subduction?

Closure of Back-arc Basis
- Behind West-facing Arc
- Eastern Subduction





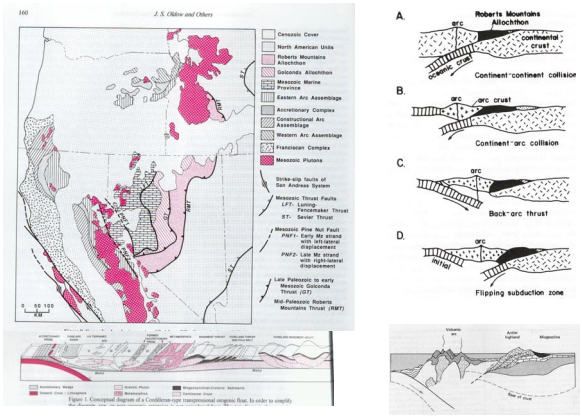


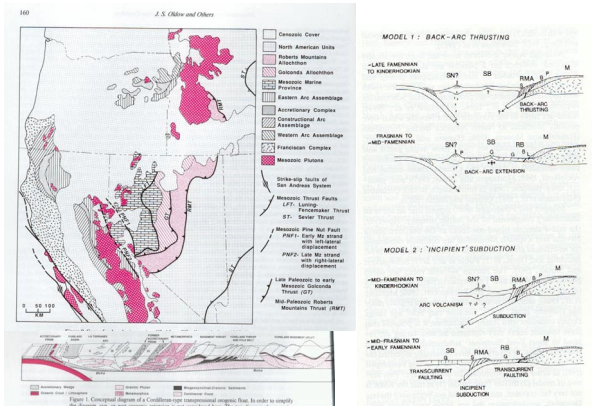
CAUSE OF THRUSTING?

Northern Sierra Nevada
1. Shoo Fly - Melange Complex
2. Blue Schist/Green Schist

Eastern Klamath Mts.
1. Trinity Ophiolite Intruded by Ord/Sil Plutons
2. Stacking Sequence Suggests East-dipping Subduction

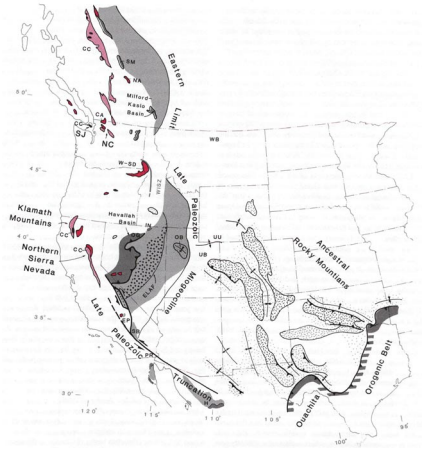
Eastern Oregon
1. Olds Ferry/Wallawa Terrain

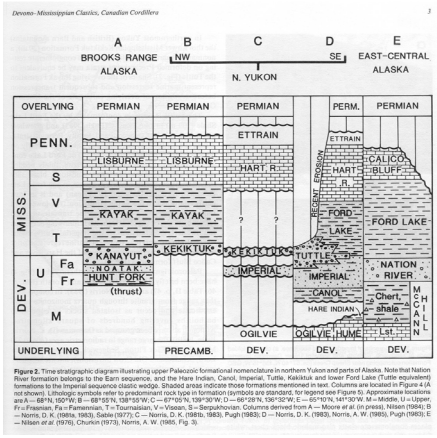


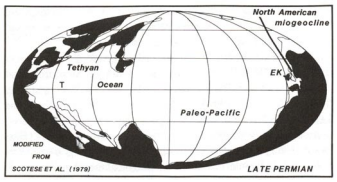


PENNSYLVANIAN-PERMIAN

- Quiescence
- Volcanism Ceases
- Havallah Basin of Extension?
- Passive Margin (?) Shelf Sedimentation







ANCESTRAL ROCKIES UPLIFT

- Paradox Basin & Uncompaghre Uplift
- Transgressive Association
- Allegheny Events in Marathon/Ouachita Belt