# UPPER TRIASSIC FOSSIL FAUNA FROM CRATON-BOUND STRATA OF THE EASTERN PART OF THE YUKON-CHARLEY RIVERS NATIONAL PRESERVE, EAST-CENTRAL ALASKA

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Yukon-Charley Rivers National Preserve (YUCH) was originally proclaimed a national monument on December 1, 1978. The monument was soon redesignated a national preserve on December 2, 1980. The preserve is located along the Canadian border in east-central Alaska where it protects 185 km (115 mi) of the 2,897 km (1,800 mi) Yukon River. The entire Charley River basin is within the preserve consisting of 142 km (88 mi) of one of the most spectacular wild rivers in Alaska. Numerous historic cabins and other structures found within the preserve are reminders of how important the Yukon River was during the 1898 gold rush. An earlier attempt to summarize the paleontological and geological framework for YUCH was made by the National Park Service in 2011 (Santucci et al., 2011).

In terms of geological resources the area around Yukon-Charley Rivers National Preserve (YUCH) is probably the most thoroughly geologically investigated NPS unit within Alaska. Early investigations extend well back into the last decade of the 19th Century and the first decade of the 20th Century. Studies from this interval include McConnell (1890), Spurr (1898), Collier (1903), Brooks and Kindle (1908), Gilmore (1908), and Quakenbush (1909). Cairnes (1914a, 1914b) from the Geological Survey of Canada published the results of his major mapping effort along the Alaska-Yukon boundary area between the Yukon and Porcupine rivers. Subsequently the work of John B. Mertie, Jr. outlined much of what we know of the geological framework for YUCH, his work covering rocks of all ages, including the sedimentary rocks north of the Tintina fault, and the polymetamorphosed rocks of the Yukon-Tanana Upland south of the fault.

References to regional geological mapping within the boundaries of YUCH include: Brabb (1962 – Charley River quadrangle); (Brabb and Churkin (1964 – Charley River quadrangle; 1965 – Eagle D-1 quadrangle; 1969a – Charley River quadrangle [colorized]); Dover (1992 – SE Charley River quadrangle); Cairnes (1914a, b – boundary strip area along Alaska-Yukon boundary); Dover and Miyaoka (1988 – Charley River quadrangle); Foster (1976 – Eagle quadrangle), Mertie (1930, 1933, 1937 and 1942); Miyaoka (1990 – SE Charley River quadrangle); and Van Kooten et al. (1997a – parts of Charley River and Eagle quadrangle).

Triassic strata are widely exposed in the craton-bound portion of YUCH, notably in the Charley River A-1, A-2, A-3, B-2 and B-3 1:63,000 scale quadrangle, situated in the eastern portion YUCH. These consist of Middle and Upper Triassic strata of the lower part of the Glenn Shale, established by Brabb (1969), which overlies the Permian age Takhkandit Limestone. The lower part is separated from the upper part of the Glenn Shale (primarily Lower Cretaceous) by a significant hiatus, with Jurassic strata and fossils being notably missing for the most part, except for a few occurrences of the bivalve *Otapiria* in lowermost Jurassic strata.

The Glenn Shale is primarily composed of a gray to black carbonaceous shale, and is suggested to be 1,500 m (4,000 ft) thick. Two unconformities have been recognized within the Glenn Shale. The lower portion of the Glenn Shale is approximately 120 m (390 ft) thick and is exposed along the Yukon River and along Trout Creek. These rocks contain a rich, diverse Middle and Late Triassic (late Ladinian to Norian) aged marine invertebrate fauna including rhynchonellid, spiriferid, and terebratuloid brachiopods; nuculid and pectenid pelecypods (*Halobia* and *Monotis*); ammonoids and nautiloids. Higher in the section, the remains of the pelecypod *Otapiria* indicate a probable Early Jurassic age. The crinoid *Pentacrinus subangularis* var. *alaska* of Early Jurassic age has been reported nearby from the same beds. Lower Cretaceous beds are also recognized in the formation and include both Berriasian and probable Valanginian age Buchias. The long time span and great thickness of this formation suggests that future detailed mapping will probably result in a much finer segregation of stratigraphic units within the Glenn Shale.

The National Park Service is currently compiling a comprehensive paleontological resources inventory of the fossil fauna and flora of the Preserve. The lower Glenn Shale is among the geologic strata that will be focused on. Its robust bivalve, ammonoid, nautiloid and brachiopod fauna provides an important glimpse into the composition of a relatively high-latitude Triassic biota along in the northwestern-most corner of what at that time comprised cratonic North America. Primary references to the megafauna include the works of Smith (1927), Kummel (1953), Silberling (1963), Grant-Mackie and Silberling (1990), Silberling *et al.* (1997), and McRoberts (1997). Study of the radiolarian fauna was provided by Robinson (1989) and Robinson and Pessagno (1998). It is our intent to greatly amplify our knowledge of the fossil biota from YUCH, including potential ichthyosaurs (one rib has previously been collected from the lower Glenn Shale). Expanded knowledge of the diversity of the macroinvertebrate fauna of the lower part of the Glenn Shale will be most useful for comparing and contrasting North American mid-latitude cratonic Late Triassic biotas with those from nearby accreted terranes such as Wrangellia (south-central Alaska) and the Lewes River Group of the Stikinia terrane (from Whitehorse area of the Yukon Territory).

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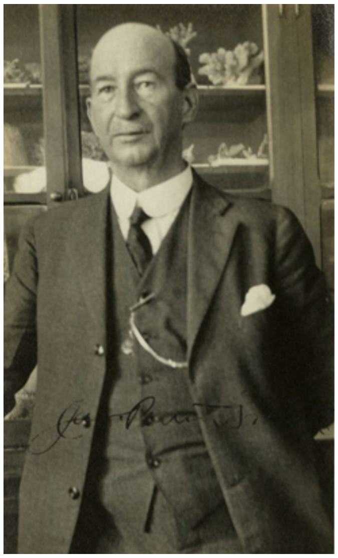
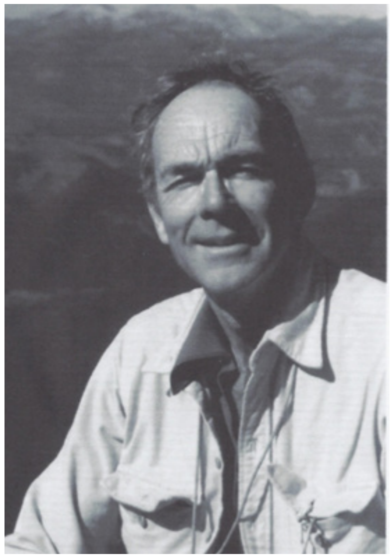
**Two renowned Triassic paleontologists whose studies in the Triassic of Alaska, California, and Nevada led to the conceptulization of accreded terrnaes in western North America.**

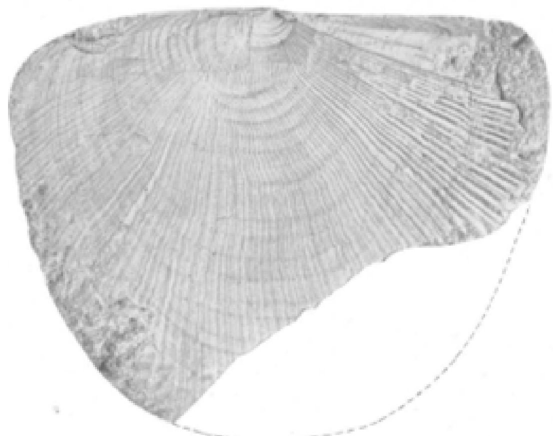


James Perrin Smith (1864-1934), renowened Stanford University paleontologists.



Norman J. Silberling (1928-2011), USGS paleontologist and stratigrapher, earlier with Stanford University.

**Selected primary megafossil elements of the lower part (Middle nad Upper Triassic) of the Glenn Shale.**



The bivalve *Halobia cordilleriana* Smith, 1927 (type specimen), from Smith, 1927, Pl. XCIX, fig. 2.

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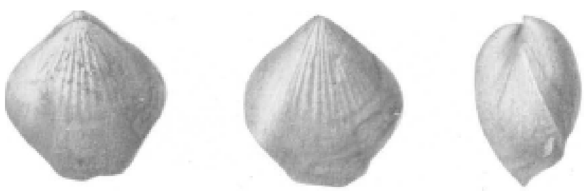
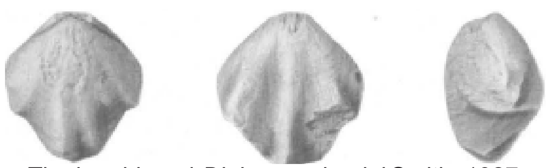
The bivalve *Lima martini* Smith, 1927 (from Smith, 1927, Pl. CI, fig. 11.



The brachiopod *Rhynchonella blackwelderi* Smith, 1927 (from Smith, 1927, Pl. CII , figs. 1-3

The bivalve Pecten *(Entolium) yukonensis* Smith, 1927 (from Smith, 1927, Pl. CI, figs 9 (type).



The brachiopod *Dielasma chapini* Smith, 1927 (from Smith, 1927, Pl. CII, figs. 4-6)

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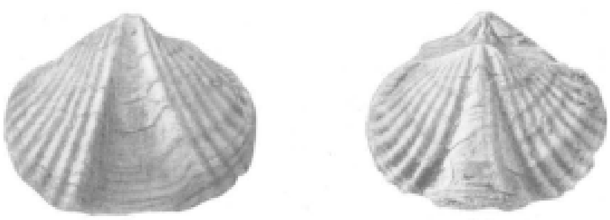
The bivalve *Eumorphotis nationalis* Smith, 1927 (from Smith, 1927, Pl. CI, fig. 12.



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The brachiopod *Spiriferina yukonensis* Smith, 1927 (from Smith, 1927, Pl. CI, figs. 13-14, type specimen)

The nautiloids *Germanonautilus brooksi* Smith, 1927 (on the left) and the *ammonoid Cladiscites* martini Smith, 1927 (right) (from Smith, 1927, Pl. CII, fig. 7 and fig. 17.


Marine vertebrate bone (ichthyosaur) from USGS Mesozoic, loc. 9387.