Rocks of the Stuart Fork Formation, previously considered part of the central metamorphic belt of the Klamath Mountains, California, are correlative with unnamed rocks of the adjacent western Paleozoic and Triassic belt. Originally designated by Hershey in 1901 as the Abrams Formation of Precambrian (?) age, the type Stuart Fork rocks in the Minersville Quadrangle represent western Paleozoic and Triassic belt rocks exposed in a large window through an overlying thrust plate of central metamorphic belt units (Salmon and Grouse Ridge Formations). The Stuart Fork window or fenster, which occupies the core of a major north-south antiformal fold nearly 20 mi. long, lies 7–10 mi. east of the western belt.

Correlation of Stuart Fork rocks with those of the western belt is based on lithologic similarities (rhythmically bedded metacherts, slates and phyllites, basic metavolcanic rocks, and marbles, in decreasing order of abundance), mutual tectonic separation from overlying Salmon hornblende schists of higher metamorphic grade, and similar metamorphic and structural histories. It is probable that additional mapping of Stuart Fork rocks in the northern Cecilville and Coffee Creek Quadrangles will show them to be continuous with the western Paleozoic and Triassic terrane. Fossils collected in the western belt from limestones southeast of Cecilville have not yet been identified, but limestones in the same belt to the south have yielded Pennsylvanian (?) to Triassic faunas. The age of Salmon and Grouse Ridge rocks, also considered to be Precambrian (?) by Hershey, which structurally overlie Stuart Fork—western belt rocks, is still unknown.

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(Movie Film)

"RIVERS-OF-SAND" AND OTHER EROSIONAL PROCESSES IN SUBMARINE CANYONS

Observations of the sediment and micro-relief found in submarine canyons from the *Trieste I* and *II*, Cousteau's diving saucer, and by SCUBA diving indicate that submarine erosional processes are actively modifying the shape of many canyons. Sediment that is trapped in the bowl-shaped heads of nearshore canyons has been shown by marker stakes and other objects embedded in this fill, to creep slowly or slump intermittently downslope. This slow movement erodes the bottom and the sides of the lower part of the canyon by corrosion. The concentration of erosive forces at the base of the canyon walls commonly results in large overhangs and a cross-axial profile that has an hour-glass shape.

In areas where storm-induced bottom currents rapidly introduce sand-size non-cohesive sediments on slopes that exceed the angle of repose, spectacular quasi-liquid sand flows develop that erode both the existing sediment fill and the rock walls of the canyon. In Baja California, Mexico, sand flows have been observed that can be truly called "rivers of sand."

The motion pictures presented at this convention were collected over the past 5 years in La Jolla and Scripps Canyons off southern California, canyons that are cut in sedimentary rocks, and in San Lucas and Los Frailes Canyons on the eastern side of the southern tip of Baja California, Mexico, canyons that are cut in granite. The film depicts the sedimentary and erosional processes active in these canyons.

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UPPER CRETACEOUS PLANKTONIC FORAMINIFERA FROM YOLO AND COLUSA COUNTIES, CALIFORNIA

Samples containing pelagic Foraminifera were examined from five-widely spaced localities in the Upper Cretaceous Venado, Yolo, and Sites Formations on the western side of the Sacramento Valley, California.

The basal formation, the Venado, overlies the late Cenomanian "Antelope Shale," and is predominantly a sandstone unit with discontinuous beds of conglomerate and thin, dark-colored carbonaceous siltstone. Along Putah Creek, Yolo County, the Venado contains *Globotruncana* and *Hedbergella*, which suggest a Turonian age.

The overlying Yolo Formation is a dark-colored siltstone with some sandstone and shale beds. The siltstone and shale contain an abundant, well-preserved foraminiferal fauna, including *Clavihedbergella*, *Globigerinelloides*, and *Heterohelix*.

The Sites Formation is composed of thin, rhythmic sequences of siltstone and sandstone interbedded with thick sandstone beds. The finer clastics, in many places with a high mica and carbonaceous content, yielded the largest and most diversified planktonic assemblage. The genera *Globotruncana*, *Rugoglobigerina*, *Hedbergella*, and *Schackoina* are present.

The pelagic microfossils appear to correlate with the microfaunas from the Turonian of Europe and the Austin Group of the Gulf Coast. The Venado and Yolo Formations are correlated with Popenoe's Members II and III, and the Sites with Member IV of the Cretaceous strata in the Redding area, California. The planktonic assemblages fall within Goudkoff's H and G-2 zones.

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EFFECTS OF WATER TABLE AND TIDE CYCLE ON SWASH-BACKWASH SEDIMENT DISTRIBUTION AND BEACH PROFILE DEVELOPMENT

A study of deposition in the swash-backwash zone along a sandy beach indicates that fluctuations in sea-level relative to beach water-table level, resulting from the semi-diurnal tide cycle, show appreciable effects on sediment distribution. In the swash-backwash zone, sediment distribution is dependent on the interaction of swash deposition, swash erosion, backwash deposition and backwash erosion. When the tide level is high and the beach water-table is low, swash deposition and swash erosion predominate; this results in the formation of a thick lens of sediment on the shoreward side of the swash-backwash zone and a scoured area on the surf side of the zone. In contrast, a relatively high water-table results in maximum back-wash erosion and backwash deposition; thick lenses of sediment form near the surf boundary. Therefore, as sea-level fluctuates above and below the general water-table level with the tide, the zone of deposition correspondingly shifts its position within the swash-backwash zone and either increases or decreases the gradient of the beach slope. As the tide rises, sediments deposited by previous swashes are redistributed by the encroaching surf. Above the limit of surf encroachment and in the highest swash-mark area, a berm forms, which displays an onlap-offlap series of