Weber sandstone. The lower part of the Woodside is the time equivalent of the upper Park City (Phosphoria). The Woodside is cut by an unconformity, above which lies a conglomerate. The conglomerate was questionably classed as the basal member of the Ankareh by Sears (1926). The upper part of the Ankareh (?) of Sears consists of varicolored shales and sandstones and is directly overlain by the massive Navajo sandstone.

The conglomerate and the overlying varicolored beds are readily recognized from one end of the range to the other and constitute an unnamed lithologic unit which lies unconformably above the type Ankareh and below the restricted Nugget at the western end of the mountains, and unconformably above the Woodside and below the Navajo at the eastern end of the range. This unit is here named the Stanaker formation and the basal conglomerate, or grit, is named the Gartra grit member of the Stanaker formation. They are probably Upper Triassic in age.

The Jurassic formations of the western Uinta Mountains, from base upward are (1) Nugget sandstone, (2) Twin Creek limestone, (3) Preuss redbeds, (4) Stump sandstone, and (5) Morrison formation. Eastward along the mountains (1) the Nugget sandstone persists but is called Navajo to the east, (2) the Twin Creek limestone intertongues with the Carmel redbeds, (3) the Preuss redbeds grade into the cross-bedded Entrada sandstone, (4) the Stump sandstone grades into Curtis shales and limestones, and (5) the Morrison thins and becomes less conglomeratic. At the eastern end of the Uinta Mountains the Carmel redbeds thin out so that the Navajo is directly overlain by the Entrada, forming a single cross-bedded sandstone unit.

N. L. Taliaferro, University of California, Berkeley.
W. F. Barbat, Standard Oil Company of California, Taft. Notes on the Geology of the Deep Coles Levee Well, Kern County, California.

The Standard Oil Company of California's well K.C.L. 20-13 attained a depth of 16,246 feet in 1944. The section penetrated includes 3560 feet of combined Tulare and San Joaquin formations, 3110 feet of Etchegoin formation, 1630 feet of the Reef Ridge shale, 1000 feet of McLure shale above the Stevens sand, 880 feet of Stevens sand, and 1875 feet of McLure shale below Stevens and above *Pulvinulinella gyroidinaformis*. The interval from *P. gyroidinaformis* at 12,056 feet to the top of the Santos shale at 15,230 feet consists mostly of cemented sandstone and firm, nearly barren, silty shale. Middle Miocene foraminifers were found at 13,423 feet and the Olcese and Rio Bravo-Vedder sand zones are recognized in the intervals 13,906–14,073 and 14,900–15,230 feet respectively. The Santos shale is very hard and dense below 15,800 feet where the electric-log character changes. A decrease of about 25 millivolts from the normal shale line and an increase in resistivity of 2 to 3 times that of the overlying shale are noted. Shale porosities drop from 3.4% and 2.3% at 15,539 feet and 15,651 feet to 1.03% and 0.29% at 15,981 feet and 16,166 feet. Petrographic studies by Taliaferro are incomplete and can not be reported in time for this presentation.

Core dips are low (3°–10°) to 13,000 feet, then gradually rise to 65° at 16,166 feet. The maximum temperature at 16,186 feet was 400°F.

Subject to possible modification by the petrographic study, it is tentatively concluded that no metamorphic minerals have been formed by the load and shearing stresses of folding involved, but the rock at bottom is approaching the limit to which fine-grained sediments can be compressed without such changes.

Edward C. H. Lammers, Standard Oil Company of California, Los Angeles. Notes on Rocky Mountain Thrust Faults.

The low-angle thrust faults of the central Rocky Mountains are of two types. The faults along the Idaho-Wyoming border were formed when the exceptionally thick Paleozoic and Mesozoic strata of the Cordilleran geosyncline were intensely compressed during the Laramide revolution. Movement on these faults, which do not involve the crystalline rocks of the basement complex, is believed to have been dissipated at depth by shearing along bedding planes. The name "geosynclinal" thrust fault is proposed for faults of this type.

In contrast, the low-angle thrust faults of central Wyoming and southern Montana were produced by the further compression of large faulted blocks previously uplifted during an earlier stage of the Laramide revolution. The crystalline cores of these uplifts contributed large quantities of detritus to the Paleocene strata forming the foot-wall blocks of some of the thrusts. A study of the structures of the basement complex indicates that the present uplifts occupy the sites of pre-Cambrian mountain ranges. Hence, this group of thrust faults borders areas that have been recurrently structurally positive throughout geologic time. The name "geanticlinal" thrust fault is proposed for thrust faults of this type.

BAILEY WILLIS, Stanford University. Terrestrial Dynamics.

The progress in physics and geology requires a revision of geologic theories. We now know that the earth has a molten core, 4,000 miles in diameter, which is covered by a shell 1,800 miles thick, that is solid and mostly crystalline. It is called the mantle. And there is an outer crust 20 to 30 miles thick. The effective forces operating throughout this structure are gravity or load pressure, heat, and atomic attractions and repulsions. The heat may be attributed to compression and radioactive disintegration of atoms, but probably not to survival from an originally molten globe. In this hypothesis it is regarded as mainly due to radioactive processes.

It is reasonable to assume that radioactive minerals are present in the core and are its principle source of heat. Since the heat cannot escape the core must be heating and growing at the expense of the mantle. The earth is growing hotter, not cooling.

The boiling core emits gases and superheated liquids that bore into the mantle and form bubbles of magma. The bubbles rise by virtue of their bouyancy and boring activity. Their mineral composition changes by assimilation and adjustment of mineral species to environment. Starting from the core as nickel-iron and accessories they emerge in the crust as basalt and granite.

The mechanics of the pressure in and around a bubble of magma give it the shape of a pear, biggest at the top. On approaching the surface this effect develops the tack-shaped batholith. The cover over such a batholith is liable to uplift, indicated at the surface by elevated plateaus and broad domes or elongate swells, and to metamorphism, which may produce lateral pressures. The unbalanced load of an elevated mass also creates lateral pressure. Under certain circumstances the effect of lateral stress and strain in combination with magmatic heat may produce extensive horizontal intrusions 20 miles below the surface. Such a one is thought to have been the mass under the Appalachian geosyncline during the Paleozoic era. To that mobile foundation we may attribute the sinking of the sediments, and by a logical development of load stresses in combination with magmatic pressures we may explain the folding of the Appalachians, the outthrust of the Himalayas, and similar displacements.

Bubbles of igneous rock have risen to the surface at intervals during the last 2 billion years. They consist of two principle kinds, basalt and granite. They differ in fluidity or viscosity. The basalt reaches the surface and spreads out, forming such features as ocean beds and plateaus. The granite lifts the surface without breaking through, causes lateral stresses, and becomes the core of a mountain range. The possible mechanical effects are varied. We can not reason from one orogeny to another, without due consideration of the facts of unlike histories. The Appalachian mechanics will not explain the Rockies, or the Basin ranges, or the Alps. Each orogeny is a problem in itself. But they all are to be ex-