

In the 17th century, strata were usually recorded in tables. Data came from operations below ground. Surface outcrops were not stratigraphically important until subsurface order and regularity had been realized. Early 18th century interest in agriculture, soil improvement, and a passion for antiquities, heightened awareness of landscape. Strata and soils were traced with some certainty over whole countries. Late 18th century crises of industrial transportation encouraged construction of new roads and canals. Bedrock scarification and excavation uncovered long sections of strata formerly hidden. In 1796, at one such site, William Smith discovered with delight and amazement that particular fossil assemblages could be identified with particular strata.

**STRATIGRAPHIC STAND-OFF AT THE 49TH
PARALLEL, 1956. IN MEMORY OF
LAURENCE L. SLOSS**

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Ask two geologists a question and you will get two different answers. That was the whole tiresome truth after drilling the No. 4 Charles, Garfield County, Montana.

Mississippian limestones in the Montana segment of the Williston basin were for years called Mission Canyon and Lodgepole. In 1942, a well in Garfield County found thick evaporates overlying the Mississippi Canyon. They were named Charles formation, and its base was put at the lowest massive anhydrite. This seemed clear enough, though the lowest anhydrite was not everywhere in the same bed, nor even near it. Thick anhydrites were afterwards found at lower and lower stratigraphic levels toward the basin rim.

Two explanations arose. Firstly, a *mineral-focused* or *American* view saying the Charles formation is diachronous, because it crosses time lines; or secondly, a *stratum-focused* or *English* view drew from the knowledge of coal miners and quarrymen, and resisted foreign dogmas.

**THE EXTRATERRESTRIAL ORIGIN OF OIL - or are
we fossil fools and Thomas Gold was, like his name, a four
nine five pure genius**

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This paper is not designed to defend either position in the abiogenic/biogenic controversy because I have a better theory that I will reveal in a book that will be available at Amazon.com for \$29.95 hardcover. Meanwhile, stuck with our present state of knowledge, a series of events will be described that may be attributed to pure chance, luck, good fortune, amazing coincidence, divine guidance, or an amazing convergence of all of the above.

Though much of the data was compiled from astrophysical sources, at great expense, it is here presented so that the entire varsity football team of Colorado can follow it along with cab drivers everywhere, except in Houston, Texas.

Data included here is partially derived from the Cassini Huygens satellite to the moon Titan of Saturn and is not in real time because it takes 40 minutes for the signal to reach the earth.

This paper was reviewed by 4 peer groups, each more illustrious than the proceeding and given an A minus, not grade inflated, albeit the reviewers may well have been *in their cups*.

TIMETABLE OF PETROLEUM GEOLOGY

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This timetable is mainly about the modern theory of petroleum geology: the source, migration, trapping and production of petroleum. It is not a history of the discovery of oil and gas fields, and is not much concerned with early speculative theories as these are adequately treated in other sources. In selecting significant papers I have been guided by two principles: (i) the ideas presented are now known to have been at least partly correct, not simply those that may have been influential at the time; (ii) quantitative is favoured over qualitative expression. Use of these criteria signals a Whiggish approach to the history of petroleum geology, but is perhaps excusable in light of the large literature on the subject, much of which took little account of the then-known laws of physics and chemistry. For example, capillary action was known before Newton, and explained in modern terms at the beginning of the nineteenth century (its history was well reviewed by Maxwell and Rayleigh in an article on *Surface Tension* in the ninth and tenth editions of the *Encyclopedia Britannica*). The laws of hydrostatics were also known very early. Darcy established the law for fluid flow through porous media in 1856. Svante Arrhenius proposed his equation for the rate of chemical reactions in 1889. One of the great achievements of King Hubbert was to draw the attention of the petroleum industry to the significance of much of this body of knowledge.

Many early texts of petroleum geology apparently regarded theories of the source and migration of petroleum, and even the mechanism of trapping, as too speculative to deserve much discussion: The bulk of the texts were devoted mainly to case histories illustrating the different types of traps and in only a few discussed theoretical matters. This time table does not concern itself with describing the different types and classification of traps.