their volatile content. He thought petroleum might have originated from de-bituminized coals, but his knowledge of coal distribution in relation to the oilfields told him otherwise. He saw that carbonaceous beds other than coal were the source, identifying them as thermally altered shales of "the lower-seated Silurian and Devonian deposits almost exclusively."

ORIGIN OF PETROLEUM IN PENNSYLVANIA, 1863

John G. C. M. Fuller, 2 Oak Tree Close, Rodmell Road, Tunbridge Wells, Kent TN2 5SS, England

Henry D. Rogers, Director of the First Geological Survey of Pennsylvania, noted in 1841 that there was a progressive decrease across the State in the volatile content of coals. He perceived that debituminization of anthracite had been caused by a process of thermal metamorphism, and that the volatiles driven off might have formed petroleum. In 1863, three years after the Drake well, as oilfields began to appear outside the coalfield areas, he pointed conclusively to deeper sources, naming bituminous shales of the Genessee, Marcellus, and Utica formations as the petroleum source. A hundred years later, oil-company geologists re-invented Rogers' ideas, treating them as new and confidential information.

SUBSURFACE DENSITY LOGGING - 1712

John G. C. M. Fuller, 2 Oak Tree Close, Rodmell Road, Tunbridge Wells, Kent TN2 5SS, England

Measuring rock densities in a subsurface environment could be presented, if it were true, as an oil-industry innovation. In fact, density logging of subsurface strata dates from the 18th century. In 1712 two members of the Royal Society published lithologic data, bed-thicknesses, and rock-densities found in a sequence of strata penetrated by a coal mine at Dudley, England. They measured the specific gravity of samples from each stratum, and made a stratigraphic table of the results. All their measurements accord with bulk-densities used for present-day well-logging. This unique work totally destroyed John Woodward's famous and popular *Theory of the Earth* (1695).