

ORIGIN OF OILA. L. KIDWELL¹ and PARKE A. DICKEY²

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The origin of oil has fascinated geologists and chemists alike for a great many years. The relative complexity of crude oil as a substance and its fluid and migratory nature all add to the difficulty of obtaining indisputable answers as to how it was formed.

The history of scientific inquiry on the origin of oil began with a period of limited observation and unlimited speculation extending into the 1920's. Between 1926 and 1952 the API sponsored Projects 6 and 43, which added greatly to the fundamental knowledge about natural organic compounds and provided some clues as to how petroleum might have formed.

During the past decade a great deal of progress has been made, largely due to advances in chemical and instrumental methods of analysis. As a result, we now know certain important facts: (1) Hydrocarbons, the main constituent of petroleum, are widespread in recent sediments but in amounts generally less than two per cent of the total organic content; (2) The Carbon-14 method has proven that the hydrocarbons and other organic fractions in Recent sediments are Recent in origin; (3) The ratio of hydrocarbons to other organic compounds is slightly different between Recent and ancient sediments but in both it is vastly different from that in crude oil; (4) Qualitatively, Recent sediments and crude oils contain the same types of hydrocarbons, with minor exceptions; (5) The assemblages of various types of hydrocarbons in both sediments and crude oil are remarkably simple, considering the vast number of compounds theoretically possible; (6) The solubility of hydrocarbons is much higher in colloidal electrolyte solutions than in ordinary solutions, and recent data suggest that the relative solubilities in such dilute electrolytes may be related to the amounts of these compounds present in crude oils.

These and other discoveries point to the formation of crude oil by a mechanism involving the physical concentration of hydrocarbons already disseminated through the Recent sediments or hydrocarbons formed from closely related compounds in the first few hundred feet of burial. The presence of natural solubilizers in water being squeezed from a compacting mass of sediments may selectively concentrate in colloidal form the various components which together form petroleum. The efficiency of the process is so very poor that only a small percentage of the available hydrocarbons are finally concentrated in a trap as crude oil.

Chemical studies of the organic compounds present in living organisms and in recent sediments containing their dead remains have proved to be very fruitful and should be continued, using the most advanced techniques available.

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