

Therefore large quantities of this element must have been dissolved in the first fluid of magma of the earth, and large quantities of it must still exist in the fluid magma of to-day under the crust of the earth.

To know and demonstrate in just what form the carbon is there, and how, from it, hydrocarbons were produced are not essential geological points, and I will consider it quite sufficient to recall that chemists of high standing in the scientific world, such as Berthelot and Mendeljeff, have long ago (in 1866 and 1877 respectively) suggested very probable forms such as carbides under which carbon could exist in the interior fluid magma, and probable re-actions under which hydrocarbon compounds could be generated. The present great daily production of the hydrocarbon acetylene by the simple action of water on carbide of calcium is very suggestive in that respect, and these considerations together with the further one, now proved and admitted, that eruptive magmas are hydato-pyrogenic, namely, contain the more or less notable admixture of water necessary to suggested possible reactions in the formation of hydrocarbons are sufficient in that respect. The vital point is to actually show the carbon and hydrocarbon in the igneous rocks, lavas and emanations proceeding from these internal fluid magmas. That, geology can do and has done, in a great many instances, at points widely distributed over the whole surface of the globe; and, we will now pass in review a few of these instances, namely:

1st. In the Archean rocks we find carbon under the form of graphite in gneisses, (1) in pegmatite dykes, in granites, (2) gabbros (3) and other rocks, the igneous origin of which is undeniable. In this connection Dr. A. E. Barlow in his excellent report on the Nipissing and Temiscaming region says: "This gneiss though somewhat remarkable in its chemical composition in that it contains cyanite, garnet and graphite in addition to the biotite which characterizes it, does not present any evidence whatever either in its microscopic structure or in its field relations of any

(1) Dr. A. E. Barlow, *Geol. Survey of Canada, An. Rep. (N.S.) Vol. X, p. 75 l.*

(2) *Minéralogie Micrographique*. Fouqué et Michel Lévy, Paris, 1879, p. 470.

(3) *Geol. Surv. of Can. An. Rep. (N.S.), Vol. X, p. 72 s.*