

of any particular field differing from that of any other field on' in the proportion of these series and the members of the series."

Mabery referred, I believe, in the above definition only to crude oil or petroleum proper, but it applies equally well to natural gas, to maltha and to viscous or brittle solid asphalts, and, it may be said, therefore, that all the members of the great petroleum series, as here understood and defined, are mixtures of different hydrocarbons in greater or less variety.

MODE OF OCCURRENCE.

Coals.—With regard to the mode of occurrence of the members of the coal series it is only necessary for the purpose of this paper to note that they are always found in regular beds of the sedimentary strata spreading uniformly far and wide, often over hundreds and even thousands of square miles. The marsh gas of the decomposing vegetation has partly escaped into the atmosphere in the early part of the process or possibly even later, if the folding, fissuring and faulting of the coal measures have been strong, as for instance in the anthracite fields of Pennsylvania. What marsh gas did not thus escape, however, has not mysteriously transformed itself into the mixture of the many varieties of hydrocarbons constituting petroleum, but it is still found as marsh gas directly in the coal from which it originated and where it becomes to-day the dreaded fire damp of the coal miner, often mixed with considerable choke damp or carbonic acid and with considerable nitrogen. This gaseous mixture is a very different gas from the mixture of hydrocarbons constituting natural gas; it is never, like natural gas, associated with liquid petroleum and with large quantities of very strong salt and sulphur waters and can only be confused with it by superficial observers.

There is only one more point which I think pertinent to make here with regard to the mode of occurrence of the coals, and that is that no coal beds are found below the Carboniferous period. A small amount of coal or carbonaceous matter is, however, found in some of the Devonian shales, but this never passes into pure coal beds and fewer and fewer of these carbonaceous shales are found in the Silurian and Cambrian. The science of geology has always interpreted and explained this fact—that so little coal is