hydrogenation or incomplete cracking an asphalt-like material. As natural asphalt or material like jet, the proto product gives on complete cracking or complete hydrogenation a mixture of aliphatic, hydroaromatic and aromatic hydrocarbons. This mixture is very much like natural oil. Asphalts and jets are therefore intermediate stages of the transformation of the proto product into oil and are not formed from hydrocarbons through the reaction with oxygen.

Humic acids formed from carbohydrates yield also on coalification proto products. Identical results can be obtained by coalification of saccharinic and lactic acids, which, in turn, can be formed from carbohydrates through alkaline treatment.

Lignin, on the other hand, and its derivatives, the so-called lignin-humic acids, do not yield by any treatment whatever material which on hydrogenation is changed into asphalt-like material or into a mixture resembling natural oil.

Fats and waxes do not yield hydrocarbons under the above-mentioned conditions of coalification.

Carbohydrates form on coalification gases containing low hydrocarbons and much CO_2.

Bituminous coals, giving excellent hard coke, can be produced by the coalification of carbohydrates, such as cellulose, with weakly alkaline water. They can not be obtained through coalification of lignin and its derivatives.

Natural gas, asphalts, oils and bituminous coals may therefore be derived from the same substances or their derivatives—the carbohydrates formed by nature on such a great scale.

The so-called animal theory, which explains the formation of oil by the heat decomposition of fish, and the lignin theory, which assumes that bituminous coals are derivatives of lignin, can not be substantiated by experiments.

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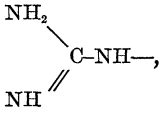
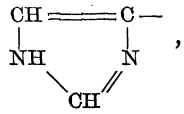
THE IONIZATION OF ARGININE AND HISTIDINE

CERTAIN anomalies in the behavior of the amino-acids arginine and histidine can be explained by the resonance theory.

The anomalies are as follows: The guanidine group of arginine is powerfully basic. The group does not react in the formaldehyde titration for the determination of amino groups. Yet its formula is usually written as

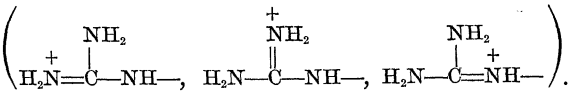


showing the presence of no powerfully basic radicals and revealing an amino group which should react in the formaldehyde titration. The imidazole group of histidine is definitely basic ($pK' = 6.0$). Its formula is written



showing no detectable basicity.

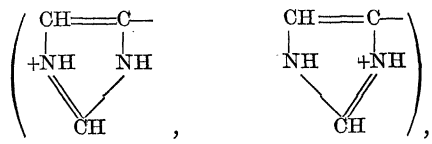
These anomalies may be explained by the assumption that the guanidine group adds H^+ not to the amino- but to the imino-group. The resulting ion has strong molecular resonance, and may be represented by the formula



This ion lacks the $-\overset{+}{N}H_3$ group which is necessary to the formaldehyde reaction

$$-\overset{+}{N}H_3 + HCHO \rightarrow -N{=}CH_2 + H^+ + H_2O$$

The imidazole group may be assumed to add hydrogen ion to form



the resonant condition of which accounts for the definite basicity of the group.

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CAUSE OF MORTALITY OF YOUNG GROUSE

FIELD studies in Algonquin Park, Ontario, during the present summer have shown the disappearance of young grouse (*Bonasa umbellus togata*) to be associated with a very high occurrence of a Leukocytozoon, of which the species has not yet been determined. Grouse in this area appear to be decreasing in numbers after having reached a peak of abundance last year. A mortality of at least 60 per cent. among chicks had taken place to mid-July in the area under immediate observation, and in practically all specimens examined, adult and young, the Leukocytozoon was found to be present. In view of the fact that similar parasites are known to be lethal to ducks and turkeys, a connection between its occurrence in grouse