PHYSIOLOGY

Blood Pigment Analysis Gives Clue to Oxygen Use

FIRST complete analysis of the spectrum of hemoglobin, the complex blood pigment that carries life-giving oxygen from the lungs to the rest of the body, was reported to the spectroscopy conference at the Massachusetts Institute of Technology by Dr. David L. Drabkin of the University of Pennsylvania.

His investigation, made with the spectroscope, reveals much unexpected information concerning the body's oxygen carrier, whose importance scientists realize well, but about which much remains to be learned.

The research is expected to afford scientists a better understanding of the nature of the union of hemoglobin and oxygen or other gases, and of the energy changes involved in this union.

Enormous Molecules

Why nature has chosen a colored pigment to carry oxygen, why hemoglobin with its huge molecular weight of 68,000 is used to carry oxygen whose molecular weight of only 32 seems insignificant in comparison, how the globin is attached to the iron-porphyrin groups are other problems Dr. Drabkin's research may solve by its analysis of the whole living blood.

On the answers may hang some of the most important and valuable discoveries medicine has made concerning the human body in recent years.

Dr. Drabkin used the spectroscope in his investigation to analyze the light given off by hemoglobin when he hurled tiny electrons into the very atoms of which the plasma is composed.

The most significant fact disclosed was the unexpected one that the telltale rainbows of light, by which substances are identified, were regularly spaced along the spectrum, and that the complete picture of hemoglobin represented the additive result of the individual characteristic bands, whose structure could be expressed mathematically.

This regular spacing, previously demonstrated only with relatively simple chemical substances, enabled Dr. Drabkin to derive a formula which tremendously simplifies the complicated spectroscopic picture scientists have had of the hemoglobin spectrum.

"This new analysis," Dr. Drabkin told the conference, "has proved remarkably adequate for this type of complex, organic compound, and may prove to have more general usefulness and significance. It is gratifying, for the present, that it has proved possible to express the complex pattern in simple mathematical terms, as a summation of normal curves."

Particularly striking was Dr. Drabkin's discovery that, although many of the properties of hemoglobin are ascribed to its protein constituent, globin, spectroscopic analysis has indicated that the iron-porphyrin group may play a more important role. This is borne out by the close resemblance of the pictures of hemoglobin compound to that of potassium ferricyanide, a simple iron derivative.

Dr. Drabkin also succeeded in simplifying pictures of complex hemoglobin derivatives, which, although widely different under ordinary conditions, were disclosed upon analysis to be fundamentally alike in nature.

Analyze Gland Secretions

A new method for the somewhat similar use of the spectroscope to detect sodium and potassium in important research on gland secretions, was reported to the conference by Dr. G. O. Langstroth, of McGill University, who with D. R. McRae and Prof. J. S. Foster, has been conducting quantitative analyses of these vital fluids.

The importance of the body's many glands, which range in size from the microscopic peptic glands of the stomach, to the liver, the largest glandular organ, has been recognized for some time, but there are still many questions concerning them which science has been unable to answer.

Any step toward a solution of these problems which will bring scientists nearer to an understanding of the functions and methods of various gland secretions is important, since it may contribute to curative measures in diseases resulting from gland failure. By use of insulin, produced by a part of the pancreas, for example, medicine is now able to control dread diabetes. Injection of this secretion into the patient makes up a deficiency in the natural production.

Most attempts to study gland secretions have been hindered by the inability of scientists to obtain appreciable amounts of them, but the method announced by Dr. Langstroth overcomes this obstacle by requiring only a quarter of a cubic centimeter sample, about five or six drops, for a complete determination for both sodium and potassium.

Nor does the investigation depend on the form in which either of the elements is present, nor, within reasonable limits, on the extraneous composition of the sample.

Dr. Langstroth estimated the precision for a single determination to be about 10 per cent, but an idea of the reliability of the method can be gained from his report that in a series of 40 pairs of determinations the average deviation from the mean was less than five per cent. The method also has the usual advantage of the spectroscope, exceptional simplicity in comparison with other techniques.

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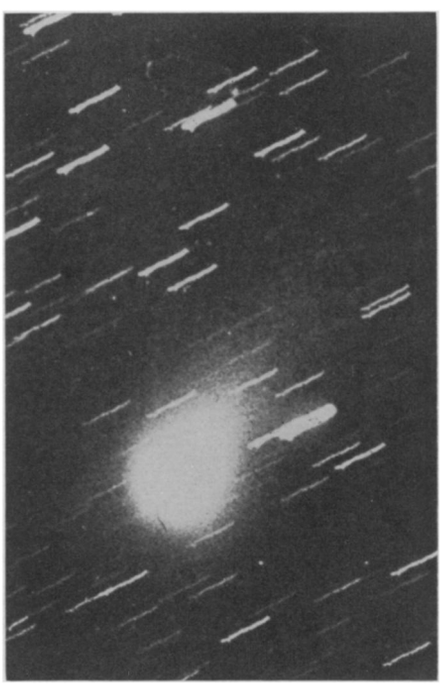

A COMET POSES

Peltier's comet, photographed with the eight-foot star camera of the Cook Observatory, Wynnewood, Pa., by Dr. Orren Mohler, of the Cook Observatory staff. The comet's faint tail can be seen, extending upwards and to the right. In order to secure a sharp picture of the comet, the camera was kept pointed towards it while it was moving against the starry background. This photograph had an exposure of one hour, and so the stars appear as trails.