ent cystine content of these urines on standing, as indicated by the Sullivan method, has also been observed by us.

7722 P

A Preliminary Analysis of the Spectra of Some Hemoglobin Derivatives.*

DAVID L. DRABKIN.

From the Department of Physiological Chemistry, School of Medicine, University of Pennsylvania, Philadelphia.

The absorption spectra of oxyhemoglobin, carboxyhemoglobin, cyanhemoglobin, methemoglobin (pH 5.9) and methemoglobin (pH 9.2) have been studied quantitatively in both the visible and ultraviolet regions.

These pigments have complex absorption patterns. The absorption curves are all very different in the visible region, but exhibit a general similarity of shape in the ultraviolet where most of the light absorption is evident.

The absorption curves of certain far simpler substances have yielded to an analysis which resolves the complex of peaks and troughs into a series of curves (bands), whose summation gives the observed absorption pattern.[1] Bands whose peaks are at equal frequency distances from each other may be considered to possess an intimate relationship, and probably represent the same fundamental disturbance in the molecule caused by the absorption of energy. This is an important deduction since it greatly simplifies the interpretation of a complex absorption curve.

It is noteworthy that this type of analysis may be applied to the absorption curves of such complex molecules as these various hemoglobin derivatives. The spectrum of cyanhemoglobin is composed of a single series of bands, spaced at regular intervals. The absorption curves of the other pigments studied possess bands which belong to the same series, although they also show other bands. Cyanhemoglobin and oxyhemoglobin may be used as examples (Table I).

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[1] Hagenbach, A., and Percy, R., *Helv. Chim. Acta*, 1922, **5**, 454. Brode, W. R., *Proc. Roy. Soc. (Lond.)*, A, 1928, **118**, 286.

TABLE I.

Uncorrected Position of Peaks				
Cyanhemoglobin		Oxyhemoglobin		
λ in mμ	$\nu \times 10^{-2}$	λ in mμ	$\nu \times 10^{-2}$	$\nu \times 10^{-2}$ in Multiples of 60
		575	174	
545	184	540	185	3
418	239	415	241	4
351	285	345	290	5
272	368	276	362	6
229*	437	240*	417	7

*Readings in this spectral region are uncertain.

This preliminary analysis permits the following tentative deductions to be drawn: All the hemoglobin derivatives have bands which belong to a single series, the members of which may be expressed by $n = \frac{\nu \times 10^{-2}}{60}$. n represents a simple integer, such as 3, 4, 5, 6, and 7, which are demonstrable in the regions of the spectra studied. This series of bands is probably related to the general structure of the hemoglobin molecule.

The so-called α-band of oxyhemoglobin (peak at λ 575 mμ) probably belongs to another series. Since a similar discrepant band is present also in the spectrum of carboxyhemoglobin this portion of the absorption curve may be related to the union of hemoglobin with O_2 or CO.

Upon the basis of this analysis the possible existence of absorption in the infra-red may be prophesied. In the case of cyanhemoglobin, for example, the first 2 members of the $\frac{\nu \times 10^{-2}}{60}$ series would be expected at approximately λ 1660 mμ and λ 830 mμ.

7723 C

Velocity of Blood Flow as Influenced by Exercise and Increased Air Pressure.

JAMES A. HAWKINS, CHARLES W. SHILLING AND RAYMOND A. HANSEN.

From the Laboratory of the Experimental Diving Unit, Navy Yard, Washington, D. C.

In a series of studies to determine the effect of increased air pressure on the human body, encountered in deep sea diving, one of the most important things to determine is the velocity of blood flow during rest and exercise at normal and increased air pressures.