We are developing further this way of studying the intimate details of crystal structure; results of measurements on our photographs will be published in another place.

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THE MEASUREMENT OF BLOOD OXYGEN IN MALARIA WITH THE USE OF THE OXIMETER[1]

THE statement that the blood oxygen level falls during the malaria paroxysm has been made frequently; however, there are no detailed studies to support it. Such a study is being pursued with the use of Millikan's oximeter as a part of the malaria research program in progress at the University of Tennessee.

The oximeter is an instrument designed to measure continuously the per cent. of oxygen saturation of the blood hemoglobin. This instrument has been described sufficiently by Millikan,[2] to warrant the omission of any description of its principles and operation here. It has been in use mainly in the aviation altitude indoctrination program, but its use in experimental human physiology in the study of disease and for control of anesthesia in the operating room has just begun.

Patients with neurosyphilis undergoing malaria fever therapy were used. Selected patients were followed with the oximeter throughout their paroxysms, starting about half an hour before the predicted onset of chills and ending with the return of temperature to normal. Control studies were made on these patients before inoculation with malaria. The degree of O_2 saturation as read on the scale of the oximeter was recorded at frequent intervals and the data plotted on a curve. The curve for the control determination and that for the malarial paroxysm could then be compared.

Preliminary studies on ten patients showed some interesting findings. Control studies on the same patient showed that the curves approximated each other very closely, but curves for different patients may vary widely. These variations appeared to bear some relationship to the patient's usual level of activity. The patient who was generally more active dis-

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[2] G. A. Millikan, *Rev. Sci. Instruments*, 13: 434, 1942, and "Oximetry: Continuous Measurement of Blood Oxygen," in "Medical Physics," The Year Book Publishers, 1944.

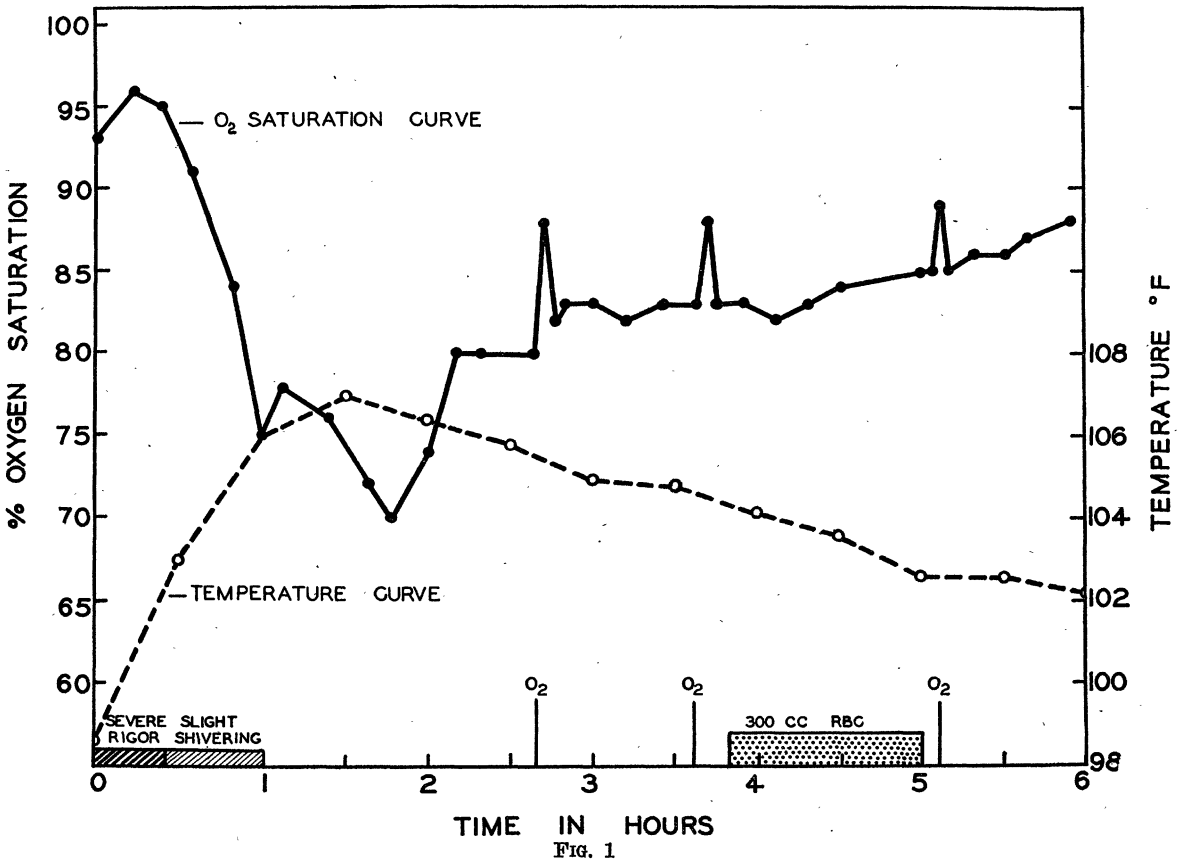

FIG. 1

played a wider fluctuation in the degree of O_2 saturation than did the one who was less active. During the chill, the patient was cyanosed; however, the level of O_2 saturation did not fall but as a rule rose by a few per cent. This was due to the hyperpnea which was associated with the chill and acted as a compensatory factor. Following the chill, the cyanosis, due principally to vasomotor changes, disappeared and the per cent. of oxygen saturation gradually fell as the temperature rose. The degree of fall seemed to depend upon the severity of the paroxysm. In one severe paroxysm, it was seen to fall to 70 per cent. When the paroxysm was mild, there was no appreciable fall and the resultant curve was similar to the preinoculation curve for that patient. As the temperature was returning to normal, the level of oxygen saturation rose and reached its original value, but did so some time before the temperature became normal.

Whenever the level of oxygen saturation fell considerably, as shown in Fig. 1, the administration of pure oxygen did not result in a return of the oxygen tension to the full 100 per cent. saturation obtained during standardization and prior to the onset of the paroxysm. There occurred an increase of but 5 to 10 per cent. Further, when 300 to 600 cc of red blood cells were introduced intravenously during the low period of saturation and this was followed by the administration of pure oxygen through the mask a slight elevation of oxygen saturation was effected but not a return to a full 100 per cent. saturation. The presence of some factor which was inhibiting full oxygenation of the blood hemoglobin might be proposed as an explanation of this phenomenon. The exact nature of this factor has not been clearly determined.

In these studies, several difficulties have been encountered. Whereas the continuous presence of the earpiece is well tolerated by cooperative patients for the first 2 or 3 hours, since the studies occupied from 5 to 6 hours it proved to be painfully irritating to even the most cooperative, when the temperature was high, at which time the threshold for pain is lowered. We have found that a little codeine and strapping of the earpiece to decrease its pull and jiggling will help to carry the study through. Colored patients were found to be unsuitable because of the effect of the skin pigment in decreasing the intensity of light reaching the filters and photoelectric cells, thus decreasing the sensitivity of the instrument. Observations on patients with falciparum malaria have not as yet been made because of the unpredictability of the paroxysms in this form of malaria. These studies, therefore, have been carried out solely in white patients with vivax malaria.

Further studies are in progress and a more detailed report of present and future observations will be made later.

YAN TIM WONG

THE RELATION OF HYPERSENSITIVENESS TO POISON IVY AND TO CASHEW NUT SHELL LIQUID[1]

PATCH test studies carried out during the past two years[2] have shown a remarkable biologic relation between hypersensitiveness to poison ivy and to a variety of compounds of phenolic structure, both synthetic and non-synthetic in origin. On the basis of chemical structure these substances may be classified conveniently as alkenyl or alkyl derivatives of catechol, resorcinol and phenol. Compounds of this type bearing normal unsaturated side-chains, frequently of 15 carbons, are typical of the noxious ingredients found in the "poisonous" members of the Anacardiaceae family, of which the best known in this country is poison ivy and its congeners. The active ingredient in the poison ivy plant is a catechol derivative with a normal 15-carbon side-chain in the 3-position, possessing an average unsaturation equivalent to two double bonds.[3]

Interest in the Anacardiaceae has increased with the growing commercial importance of many products obtained from various members of this universally distributed family of trees, shrubs and vines. In addition, large numbers of our Armed Forces, particularly in the Far East, are coming in contact with members of the Anacardiaceae, and the reports of disabling dermatitis from such sources are on the increase. It seems of value, therefore, to point out the chemical and biologic relation among the active ingredients found in the Anacardiaceae, with particular reference to persons already sensitive to the poison ivy plant.

Cashew nut shell liquid is one of the products from this family of plants that has found important commercial usage. This oily liquid is used as a raw material for the manufacture of certain resins and plastics which are incorporated in brake linings and insulating materials. The electrical properties of the latter are such that the material is of particular value in the insulation of the ignition system in airplane engines. However, the hazard of dermatitis from the raw oil, and in some cases even the finished resinous products derived from it, has been a problem of concern to handlers of these materials. Raw cashew nut shell liquid contains as its active ingredi-

[1] This study was made possible in part by a grant from the Irvington Varnish and Insulator Company, Irvington, N. J.

[2] H. Keil, D. Wasserman and C. R. Dawson, *Jour. Exp Med.*, 80: 275, 1944.

[3] D. Wasserman and C. R. Dawson, *Jour. Chem. Ed.*, 20: 448, 1943.