was determined from the vertical intensity data as about 500 ft.

The anomalies due to geometric bodies of different sizes and shapes were computed, using solid-angle formulas, and it was found that anomalies resulting from a vertical cylinder of infinite depth extent with a radius of 500 ft, depth of burial of 400 ft, magnetic susceptibility of $12{,}350 \times 10^{-6}$ cgs units, and a density contrast of 0.25 most closely approximated the observed anomalies. Rock of dioritic or slightly more mafic composition but with about 4 percent magnetite enclosed in limestone or quartzite would have this susceptibility and density contrast. Since rocks of similar composition have been found in the area, postulation of such a body is reasonable. The near-circular pattern and lower northern gradient of the Draper anomaly indicate that the source is a stock-like intrusion with a northward dip rather than a local occurrence of mafic extrusive rock. The depth of burial determined is an approximation, since the body was assumed to be vertically polarized, but is not more than 1000 ft and is probably less than 500 ft.

If the source of the anomaly is an intrusion, mineralization and contact metamorphism similar to those observed elsewhere in the Salt Lake Valley may be associated with it. To determine this, additional geophysical work and/or drilling will be necessary.

KENNETH G. BOOKS

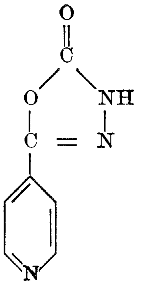
U.S. Geological Survey
Washington 25, D.C.

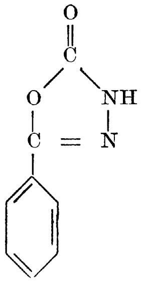
Received March 23, 1954.

The Action of Phosgene on Acid Hydrazides to Give 1,3,4-Oxdiazolones of Interest in the Treatment of Tuberculosis

FREUND and Kuh (*1*) have described the action of phosgene under pressure and at raised temperatures on certain phenylhydrazides to give small yields of N^4-phenyl substituted 1,3,4-oxdiazolones. Dornow and Bruncken (*2*) describe a similar reaction in which certain acid and diacid hydrazides yield 1,3,4-oxdiazolones on treatment in aqueous acid solution at room temperature with phosgene [see Lieser and Nischk (*3*)].

On treating isonicotinic acid hydrazide at room temperature in an inert solvent or in aqueous acids, such as hydrochloric acid, with phosgene, the corresponding 1,3,4-oxdiazolone (I) mp 265° C (decomposition) is formed in good yield.


(I)


(II)

2-Pyridyl-(4)-1,3,4-oxidiazolone-(5)

The reaction is apparently general for this type of acid hydrazide. Benzhydrazide reacts for example, with phosgene (*3*) to give 2-phenyl-1,3,4-oxdiazolone mp 138° C (II).

(I) is, as would be expected, soluble in aqueous acids and alkalis while (II) is, of course, soluble only in alkali. (I) on prolonged hydrolysis with concentrated hydrochloric acid yields practically quantitatively isonicotinic acid, hydrazine, and carbon dioxide.

(I) showed on *in vitro* tests slightly less activity against M. tuberculosis than isonicotinic acid hydrazide. *In vivo* tests in the guinea pig infected with strain H 37 Rv showed it to be, however, somewhat more active than isonicotinic acid hydrazide, both when assessed by weight-gain curves and histological examination of the various organs. The LD_{50} (subcutaneous) of (I) was approximately one-tenth that of isonicotinic acid hydrazide when determined in the mouse and one-third that of isonicotinic acid hydrazide in the rabbit (*per os*). Chronic dosing of (I) in 4 times the therapeutic dose in the guinea pig during 2 mo showed favorable weight-gain curves and no pathological changes in any organ. Chronic toxicity tests (*per os*) in the rabbit using 10 times the therapeutic dose showed no pathological changes.

(I) and certain derivatives (*4*) are at present undergoing clinical trial. Certain derivatives of (I) show a high degree of *in vitro* activity against isonicotinic acid hydrazide resistant strains on *M. tuberculosis.*

A. E. WILDER SMITH

Ed. Geistlich Sons, Ltd.
Chemical Works
Wolhusen, Switzerland

References and Notes

1. M. Freund and F. Kuh, *Ber.* **23**, 2821 (1890).
2. A. Dornow and K. Bruncken, *Ber.* **82**, 121 (1949).
3. Th. Lieser and G. Nischk, *Ber.* **82**, 527 (1949).
4. Patents applied for.

Received February 10, 1954.

A Constituent of Human Perspiration with Intense Ultraviolet Absorption

GOLDRING, Hawes, Hare, Beckman, and Stickney (*1*) have reported the presence of a substance in human perspiration with intense ultraviolet absorption, capable of affecting absorbance readings if transferred to cell contents or surfaces. We wish to confirm the existence of this material for both men and women, and to describe a number of characteristics observed in a preliminary study.

Extraction experiments on small areas of skin indicated that the substance is taken up insignificantly by hydrocarbon or chlorinated solvents, to some extent by ethanol and methanol, and extremely well by water and alkaline solutions. Relatively large amounts can be collected by rinsing down the body surface with water, especially after a period of strenuous physical activity.

The rinse water, clarified by filtration through an asbestos pad, shows characteristic ultraviolet absorption; the character of this absorption does not change on evaporation of the water under reduced pressure. The aqueous solubility of the absorbing material is so high that, although saline crystals separate out at a few milliliters volume, virtually the entire absorptive fraction remains in solution.

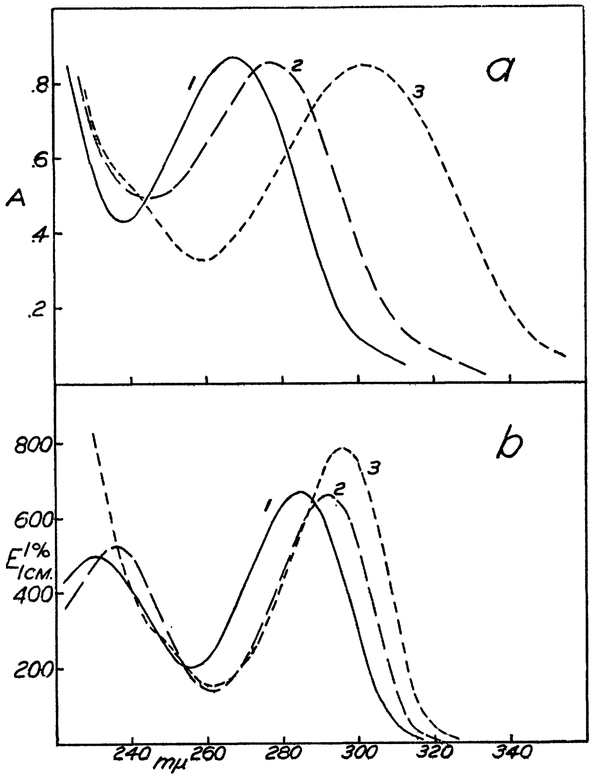


FIG. 1. Ultraviolet absorption spectra of: (*a*) the absorbing substances in human perspiration: 1, in 0.1 *N* HCl; 2, at pH 11; 3, in 0.1 *N* NaOH; and (*b*) uric acid: 1, in 0.1 *N* HCl; 2, at pH 7; 3, in 0.1 *N* NaOH.

It is relatively stable, as demonstrated by the fact that the characteristic absorption was unchanged after several weeks of standing in normal acid and alkali, and after an additional hour on the steam bath. Apparently no hydrolysis occurred during the acid treatment, since on extraction with butanol, there was no transfer of absorption to the solvent layer. It is not distillable with steam. Attempts to separate a clean fraction of the absorbing material by solution of the concentrate in ethanol followed by addition of hydrocarbon solvent were not successful. Chromatographic treatment was also unavailing; eluates from several columns gave little improvement or poor recovery. The absorption curves of a typical concentrate determined at pH values chosen to show its three characteristic spectrum species are given in Fig. 1*a*.

Of the water-soluble constituents reported for human perspiration (*2, 3*), including uric acid, ethereal phenol sulfates, and traces of amino acids, vitamins, and skatol, only uric acid (Fig. 1*b*) would seem to possess absorption of the type and stability of that observed. The spectrum similarity is not particularly convincing, in view of the differences in wavelength of the bands and response to changes in pH. However, conjugation of the absorbing moiety with a saccharide, which may be assumed from its high water solubility, could be expected to cause some changes in absorption and ionizing tendencies. A Murexide test gave equivocal results.

The intense absorption and extreme solubility of this component of human perspiration serves to emphasize that, in ultraviolet spectrophotometry, care must be exercised to insure that no contact of the fingers with cell contents or surfaces shall occur.

Added in proof. It has just been called to our attention that Zenisek and Kral [*Biochim. et Biophys. Acta* **12**, 479 (1953)] have identified urocanic (imidazole-acrylic) acid in human sweat by experiments involving paper chromatography. The absorption wavelengths are similar to those of the concentrate above.

J. M. VANDENBELT
C. E. CHILDS
DENISE LUNDQUEST
JERE SALADONIS

The Research Laboratories
Parke, Davis & Company
Detroit, Michigan

References

1. GOLDRING, L. S., *et al. Anal. Chem.* **25**, 869 (1953).
2. HOWELL, W. H. *A Textbook of Physiology.* XIV ed., p. 875. Philadelphia: Saunders, 1940.
3. MICKELSEN, O., and KEYS, A. *J. Biol. Chem.* **149**, 479 (1943).

Received January 5, 1954.

Origin of the Compositional Variation of the Lavas of Paricutin Volcano, Mexico

Lava erupting continuously from Paricutin volcano during the period from February 1943 to March 1952 showed a progressive change of composition from 55 percent silica in the olivine-bearing basaltic andesite erupted in 1943 to slightly more than 60 percent silica in the orthopyroxene andesite erupted in 1952. The variation was gradual and surprisingly smooth except for a rapid decrease in magnesia and a rise in silica in 1947, which reflected a rapid decrease in modal olivine. The serial variation of the oxide constituents is that of the calc-alkalic igneous suite and conforms closely to the silica-variation diagram of the Paricutin region as a whole. The 22 analyzed lavas of Paricutin volcano, all from a single magma chamber and, no doubt, developed by the same process or processes, furnish an exceptionally favorable set of data for exploring the adequacy of the processes that might account for the igneous rock diversification in this petrographic province.

It is found from graphical tests on the Paricutin silica-variation diagram that selective removal or introduction of olivine, pyroxene, plagioclase, and mag-