The results described above may be summarized as follows: Irradiation of tincture of Digitalis, and solutions of cocaine and quinine with polarized light produces a change in their pharmacological activity. Such a change or deterioration occurs even after short exposures to such light, and is not produced to the same degree, even by longer exposures to ordinary non-polarized light. A most remarkable feature of this phenomenon is that such effects are produced by the *ordinary or long and visible light waves.* Studies on the effects of polarized light on other drugs are in progress. Experiments are also in progress with the object of determining more intimately the mechanism of the above phenomenon. Other studies are also being planned on the effects of polarized ultraviolet rays, and of circularly polarized light.

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THE EFFECT OF ULTRAVIOLET AND POLARIZED LIGHT ON MERCUROCHROME.

BY DAVID I. MACHT AND JUSTINA H. HILL.

INTRODUCTION.

Since the introduction of Mercurochrome-220 into therapeutics, the use of this antiseptic has become so extensive that any additional information concerning its clinical and pharmacological properties is deemed desirable. Inasmuch as light very frequently produces changes in the potency of many drugs it was deemed desirable to inquire into effects, if any, of various radiations on solutions of Mercurochrome. With this end in view the present investigation was undertaken. In order to determine the effect of various rays on the drug a solution of Mercurochrome 1:500 was irradiated with Mercury Vapor Quartz Lamps and the germicidal efficiency of the solution tested on bacteria according to the method described below.

METHOD.

Irradiation with ultraviolet rays was performed in two ways. In some experiments the Hanovia Alpine Sun Lamp was employed. This well-known apparatus is an air-cooled quartz lamp emitting wave-lengths as short as 1850 Angstrom units. In other experiments the water-cooled Krohmayer Quartz Lamp (Hanovia) was employed. This lamp does not emit any heat waves and the shortest waves produced by it are about 2000 Angstrom units.

Solutions of Mercurochrome were radiated in three kinds of containers. In some experiments the solution was exposed to the radiation in an ordinary soft glass test-tube. In other experiments the drug was radiated in Pyrex test-tubes and in still other experiments in order to obtain the action of the shortest ultraviolet rays the solutions were exposed to the lamps in clear quartz test-tubes. Spectrographic examination of the glass tube showed that it transmitted wave-lengths of only 3000 Angstrom units and longer; the Pyrex Glass transmitted wave-lengths as short as 2820 Angstrom units.

Two series of experiments were performed. In the first series the duration of exposure to the radiation was thirty minutes. In the second series the duration of exposure was one hour and eighteen minutes.

The potency or efficiency of Mercurochrome was tested in the following manner. Two cc. of the drug 1:500 was inoculated with one standard loopful of a twenty-four hour B. Coli culture. At the end of the exposure time, 0.1 cc. of the drug-and-organisms, mixture was removed by means of a sterile capillary pipette and transfered to 5 cc. of the sterile broth. Inasmuch as controls proved that in the transfer enough drug was carried over to prevent growth a second transfer of 1 cc. was made to 9 cc. of broth. A control of this method of dilution showed that prompt and heavy growth was obtained with these dilutions in the exposure of the drug, while the amount of drug present in the second transfer tube was not sufficient to visibly inhibit the growth of the organisms. The exposure time for the organisms studied was 1, 2, 3, 4 and 5 minutes.

RESULTS.

The findings or the results obtained are expressed in the subjoined table and are very clear cut and definite. It is evident from the data obtained that ultraviolet radiation of Mercurochrome solutions 1:500 *produced no appreciable deterioration in the potency of the drug.*

EXPERIMENTS WITH POLARIZED LIGHT.

Recent work by Macht and co-workers called attention to the fact that important biological changes may be produced by polarized light. In another publication to appear elsewhere[1] it will be shown that polarized light, even of the visible spectrum, produced marked deterioration in a number of well-known drugs as regard their pharmacological potency or activity. In a study of the effects of light on Mercurochrome it was, therefore, thought desirable to inquire into effects of polarized light upon solutions of the drug. Experiments with polarized light were performed in two ways. In one series of experiments light was polarized by passing through a large Nicol Prism 2.5 cm. in diameter using a Krohmayer Lamp as the source of light. The shortest rays transmitted by the Nicol Prism are found spectroscopically to be about three thousand Angstrom units. In another series of experiments polarized light was obtained by a special apparatus constructed by Prof. A. H. Pfund and the senior author utilizing the well-known principle of a pile of glass plates. This apparatus is described in full in another publication.[2] It consists of two chambers or compartments in one of which polarized light of the visible spectrum is obtained and in the other non-polarized light of the same intensity and the same temperature is utilized from the same source for control experiments. Solutions of Mercurochrome 1:500 were irradiated by both methods, the results obtained were very interesting. They were absolutely negative. No deterioration was produced in Mercurochrome by exposure to the polarized light.

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[1] JOUR. A. PH. A., this issue, p. 106.

[2] D. I. Macht, *J. Gen. Physiol.*, **10**, 41 (1926).

SUMMARY.

The results of the present investigations can be summarized very succinctly. Irradiation by powerful mercury vapor lamps both of the air-cooled and the water-cooled variety produced no deterioration in the antiseptic or germicidal potency of Mercurochrome solutions. Irradiation or exposure to polarized light also produced no change in the potency of Mercurochrome solution.

IRRADIATION OF MERCUROCHROME-220 IN SOLUTION 1:500.

No. of exper.	Form of radiation.	Exposure time. 1 minute.	2 minutes.	3 minutes.	4 minutes.	5 minutes.	Inhibition controls.
1	Normal Mercurochrome (Ice Box).	1 Sterile 1 Grew	2 Sterile	2 Sterile	2 Sterile	2 Sterile	2 Grew
2	Krohmayer Lamp. Quartz Test-tube. 30 minutes' radiation.	2 Sterile	2 Sterile	2 Sterile	2 Sterile	2 Sterile	2 Grew
3	Krohmayer Lamp. Pyrex Test-tube. 30 minutes' radiation.	2 Sterile	2 Sterile	2 Sterile	2 Sterile	2 Sterile	2 Grew
4	Krohmayer Lamp. Soft Glass Tube. 30 minutes' radiation.	2 Sterile	2 Sterile	2 Sterile	2 Sterile	2 Sterile	2 Grew
5	Alpine Sun Lamp. Quartz Test-tube. 30 minutes' radiation.	2 Sterile	2 Sterile	2 Sterile	2 Sterile	2 Sterile	2 Grew
6	Alpine Sun Lamp. Soft Glass Tube. 30 minutes' radiation.	2 Sterile	2 Sterile	2 Sterile	2 Sterile	2 Sterile	2 Grew
7	Normal Mercurochrome. Not radiated (Ice Box).	1 Sterile 1 Grew	2 Sterile	2 Sterile	2 Sterile	2 Sterile	2 Grew
8	Krohmayer Quartz Test-tube. 1 hour 18 minutes' radiation.	1 Sterile 1 Grew	2 Sterile	2 Sterile	2 Sterile	2 Sterile	2 Grew
9	Krohmayer Lamp. Soft Glass Tube. 1 hour 18 minutes' radiation.	2 Sterile				2 Sterile	1 Grew
10	Alpine Sun Lamp. Quartz Test-tube. 1 hour 18 minutes' radiation.	1 Sterile 1 Grew				2 Sterile	1 Grew
11	Alpine Sun Lamp. Pyrex Test-tube. 1 hour 18 minutes' radiation.	2 Sterile				2 Sterile	1 Grew
12	Alpine Sun Lamp. Soft Glass Tube. 1 hour 18 minutes' radiation.	2 Sterile				2 Sterile	1 Grew
13	Polarized Light. Krohmayer Lamp. Nicol Prism Glass Tube. 30 minutes' radiation.	2 Sterile	2 Sterile	2 Sterile	2 Sterile	2 Sterile	2 Grew
14	Polarized Light. Nicol Prism Pyrex Tube Krohmayer Lamp. 1 hour 18 minutes.	2 Sterile	2 Sterile	2 Sterile	2 Sterile	2 Sterile	2 Grew
15	Polarized Light. Nicol Prism Pyrex Tube Krohmayer Lamp. 1 hour 18 minutes.	1 Sterile 1 Grew	2 Sterile	2 Sterile	2 Sterile	2 Sterile	2 Grew
16	Polarized Light. Macht-Pfund Apparatus. 1 hour T° 25° C.	2 Sterile	2 Sterile	2 Sterile	2 Sterile	2 Sterile	2 Grew

17	Non-Polarized Macht-Pfund Apparatus. 1 hour T° 25° C.	Control	2 Sterile	2 Sterile	2 Sterile	2 Sterile	2 Sterile	2 Grew
18	Polarized Light. Macht-Pfund Apparatus. 4 hours. T° 25° C.		1 Sterile 1 Grew				2 Sterile	1 Grew
19	Non-Polarized Macht-Pfund Apparatus. 4 hours T° 25° C.	Control	2 Sterile				2 Sterile	1 Grew
20	Dilution Controls.							4 Grew

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THE COLORIMETRIC ASSAY OF STROPHANTHUS.*

BY L. W. ROWE.

Although a complete account of the application by Knudson and Dresbach (1) and (2) of the Baljet reaction (3) to the colorimetric testing of strophanthus preparations was apparently never published, it was shown in the short abstract available, that the same technique was used as in testing digitalis preparations; that ouabain was used as a standard; and that comparison with the Hatcher Cat Method was entirely satisfactory from the standpoint of accuracy.

In spite of unsuccessful results with the colorimetric assay of digitalis preparations, (4) the application of the method to strophanthus seemed promising since such dilute solutions could be used that it would be unnecessary to subject them to the purifying process. Also ouabain or Tr. Strophanthus should be suitable as standards. Accordingly short series of tests were made on the same preparations by both the colorimetric and the Houghton frog methods. Since the drug differs from digitalis even though closely related in pharmacological and therapeutic action and since the results obtained were somewhat more favorable it was considered advisable to make a separate report of these tests rather than include them in the more extended series of digitalis tests.

TABLE I.

Preparation.	Standard.	Color test.	Frog test.	Color error.
Ouabain A	Ouabain X	100%	73%	27% high
Ouabain B	Ouabain X	78%	61%	22% high
Ouabain C	Ouabain X	140%	61%	56% high
Ouabain C	Ouabain X	100%	61%	39% high
Ouabain X (U. S. P. X)	Digitalin	100%	73%	27% high
Tr. Stroph. 1890	Ouabain X	50%	50%	
Tr. Stroph. 781,111	Digitalin	215%	155%	28% high

In this series four different lots of ouabain were compared by the two methods, a 1 to 25,000 solution being used in the color tests and no purification made. In each color test of ouabain "C" the result was very high and the two results did not agree at all closely. However, this was the first series and later comparisons were more satisfactory. It was found in this series that a U. S. P. 1890 tincture,

* Scientific Section, A. PH. A., Philadelphia meeting, 1926.