across the meter from each cell is exactly equal, no current flows through the meter but the current flows through both cells and resistor in series. Any change in illumination on either cell will disturb the balance and the difference in current will flow through the meter.

TECHNIQUE.

On account of the voltage drop in this resistor which is necessary to balance the voltage and resistance differences of the two cells, a special technique is required to compensate for this factor since the factor changes with variations in the current. Two samples of the specimen to be tested identical in size and color are first placed one under one cell and the other under the other cell in exactly the same relative position and the potentiometer adjusted to zero reading on the meter. One of these then is removed and replaced with the standard color card. If only one specimen of sufficient area is available, it must be placed under one of the cells and a blank tray placed under the other, and the deflection noted, then the specimen and tray reversed, and the deflection in the opposite direction noted. The potentiometer is then adjusted to equalize the deflection. This must be repeated until exactly equal deflections are secured in the two directions. The standard color card is substituted for the empty tray in this latter method or the second tray of the two identical specimens in the first method and the card moved to a tint which gives zero deflection.

A mask of non-reflecting material must be provided to cover the specimen or the standard color card, as the case may be. In each mask should be an opening to leave a definite portion free to receive illumination. The openings in the two masks should be of the same area and in the same relative position with respect to the lamp and the cells, both for adjustment and final balance.

CONCLUSIONS.

With suitable selection and sufficient care in manipulation, null method equipment may be used for color evaluation of drugs and other samples with favorable accuracy; without suitable equipment and careful operation, the error may be much greater than by visual comparison.

CHOLESTEROL IN OINTMENTS.*

BY PING-LU LI[1] AND RUDOLPH A. KUEVER.[2]

INTRODUCTION.

Ointments have been extensively used as external applications for diseases of certain etiological origin. The effectiveness of such preparations depends upon the extent to which they diffuse and absorb, and also upon the potency of the major ingredient. In addition to the characteristic action of the major ingredient, the base employed also has a direct relationship to the above mentioned requirements.

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[1] Abstracted from a thesis presented to the Graduate College of the State University of Iowa in partial fulfilment of the requirements for the degree of Master of Science.

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A base may either facilitate or retard the rate of diffusion and absorption. With this in view the present work was undertaken to investigate and formulate a new ointment base, and to determine the antiseptic potency of certain ointments made with it.

Ammoniated Mercury Ointment has been official since the first edition of the United States Pharmacopœia (1). It was Ointment of Ammoniated Submuriate of Mercury until 1842 when the title was changed to Ointment of Ammoniated Mercury. In the eleventh revision, it takes the name of Ammoniated Mercury Ointment. There have been several changes in the base used in the preparation of this ointment.

From 1820 to 1890 lard alone or lard and wax in varying proportions were employed. In 1905 a mixture of white petrolatum and hydrous wool fat became the base. In 1926 a small quantity of liquid petrolatum was added. At present the base is composed of wool fat, white wax and white petrolatum.

To study ointment bases it was deemed desirable to devise a satisfactory method to determine melting points of ointment bases. A glass-capillary 10 cm. in length, 1 mm. internal diameter with an enlarged end 2 mm. in diameter and 3 mm. in length, was found to give satisfactory results. Tubes of larger and longer dimensions were not so satisfactory.

The enlarged end is filled to the shoulder, attached to a thermometer and suspended in a water-bath which is being stirred and heated at the rate of 5° C. per minute to within 5° C. of the suspected melting point when rise becomes 0.5° C. per minute. The temperature at which the base is observed to rise in the capillary, above the shoulder, is taken as the melting point.

PROPOSED OINTMENT BASE.

White petrolatum	98 Gm.
Cholesterol	2 Gm.

Melt the white petrolatum and heat it to 80° C.; add the cholesterol (2) and stir until it is dissolved and the mixture has congealed.

This base is capable of holding large quantities of aqueous solutions or suspensions in a rather permanent form.

OINTMENT OF AMMONIATED MERCURY WITH PROPOSED BASE.

Ammoniated mercury (wet) (3)	33 Gm.
Proposed base	67 Gm.

Dissolve 50 Gm. of mercuric chloride in 1000 cc. of hot distilled water, cool and filter. Slowly and with constant stirring, pour this solution into 28 cc. of stronger ammonia water previously diluted with 1000 cc. of distilled water. Allow the precipitate to settle and decant the supernatant liquid as completely as possible. Add 2000 cc. of distilled water to the precipitate, stir well and again decant the supernatant liquid. Repeat this process until the decanted liquid no longer contains ammonia. Transfer the precipitate to a filter and allow it to drain. As soon as it has drained completely, transfer it to a suitable receptacle to prevent loss of moisture.

Accurately weigh about 2 Gm. of the wet precipitate, on a watch glass, and dry it in an oven at 50° C. to constant weight. The difference between the weight of the wet and the dry precipitate represents the amount of water originally present. Knowing this value, the percentage of water in the wet precipitate can be easily computed.

To make 100 Gm. of Ammoniated Mercury Ointment with the proposed base, containing 10% of ammoniated mercury, weigh out the required amount of the wet precipitate and gradually

add the required amount of the ointment base, triturating thoroughly, until a homogeneous ointment is obtained. By this method an impalpable ointment is readily prepared.

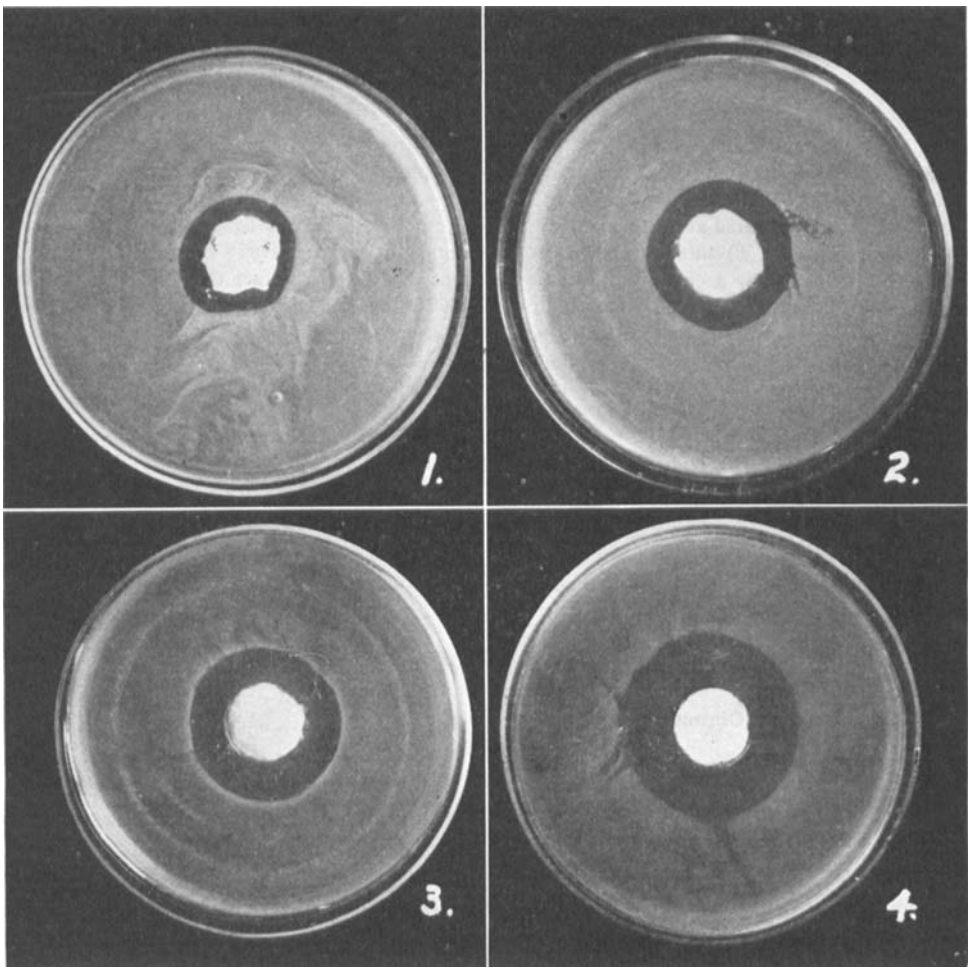

Fig. 1.—Ointment: Ammoniated Mercury Ointment, U. S. P. XI. Test Organism: Bacillus subtilis of 24 hour broth culture at 37°. Method: Agar-Plate. Period of Incubation: 48 hours. Width of Zone: 4 mm. Mercury Coefficient: 0.61.

Fig. 2.—Ointment: Ammoniated Mercury Ointment—proposed base. Test Organism: Bacillus subtilis of 24-hour broth culture at 37° C. Method: Agar-Plate. Period of Incubation: 48 hours. Width of Zone: 7 mm. Mercury Coefficient: 1.07.

Fig. 3.—Ointment: Phenylmercuric Nitrate Ointment, 1:1500—white petrolatum base. Test Organism: Staphylococcus aureus of 24 hour broth culture at 37° C. Method: Agar-Cup. Period of Incubation: 48 hours. Width of Zone: 9 mm. Mercury Coefficient: 1.38.

Fig. 4.—Ointment: Phenylmercuric Nitrate Ointment, 1:1500—proposed base. Test Organism: Staphylococcus aureus of 24 hour broth culture at 37° C. Method: Agar-Cup. Period of Incubation: 48 hours. Width of Zone: 13.5 mm. Mercury Coefficient: 2.07.

OINTMENT OF PHENYLMERCURIC NITRATE, 1:1500, WITH PROPOSED BASE.

Dissolve 1 Gm. of phenylmercuric nitrate in 750 cc. of water. Triturate this with an equal weight of proposed ointment base until a homogenous ointment is obtained.

Ammoniated Mercury Ointment, U. S. P., and ammointed mercury ointment made with the proposed base were tested for antiseptic potency. Ointment of phenylmercuric nitrate, 1:1500, made by suspending the finely powdered salt in white petrolatum, and ointment of phenylmercuric nitrate, 1:500, with the proposed base were likewise tested bacteriologically. Both agar-plate and agar-cup methods with non-spore-forming Staphylococcus aureus and spore-forming Bacillus subtilis were employed.

THE MERCURY COEFFICIENT.

Reddish and Wales (4), in 1929, experimented with Ointment of Ammoniated Mercury U. S. P. X, and obtained a zone 5 mm. wide, using Staphylococcus as the test organism and plain agar as the culture medium. Bryan (5), in 1934, made the same ointment with lanolin as a base, and obtained an inhibited zone having a width of 8 mm. He used this figure for computing the mercury coefficient of 40 different ointments. A change in the base gives a different width of inhibited zone, indicating a change in antiseptic potency. Due to the fact that the base used in making the Ammoniated Mercury Ointment, U. S. P. XI, has been changed to 5 parts of wool fat, 5 parts of white wax and 80 parts of white petrolatum, the width of the zone thus obtained, is used to find the mercury coefficient of the ointments mentioned above. To find the mercury coefficient of an ointment divide the width of the inhibited zone of the ointment to be tested by 6.5, the width of the inhibited zone of Ammoniated Mercury Ointment, U. S. P. XI.

Name.	Test Organism.	Method.	Width of Zone.	Mercury Coefficient.
Ammoniated Mercury Ointment, U. S. P. XI	*B. subtilis*	Agar-Cup	4.0 mm.	0.61
Ammoniated Mercury Ointment, U. S. P. XI	*B. subtilis*	Agar-Plate	4.0 mm.	0.61
Ammoniated Mercury Ointment, proposed base	*B. subtilis*	Agar-Cup	7.0 mm.	1.07
Ammoniated Mercury Ointment, proposed base	*B. subtilis*	Agar-Plate	7.0 mm.	1.07
Ammoniated Mercury Ointment, U. S. P. XI	*Staph. aureus*	Agar-Plate	6.5 mm.	1.00
Ammoniated Mercury Ointment, proposed base	*Staph. aureus*	Agar-Plate	8.5 mm.	1.30
Phenylmercuric Nitrate Ointment, 1:1500—white petrolatum base	*B. subtilis*	Agar-Cup	8.0 mm.	1.23
Phenylmercuric Nitrate Ointment, 1:1500—proposed base	*B. subtilis*	Agar-Cup	12.5 mm.	1.92
Phenylmercuric Nitrate Ointment, 1:1500—white petrolatum base	*Staph. aureus*	Agar-Cup	9.0 mm.	1.38
Phenylmercuric Nitrate Ointment, 1:1500—proposed base	*Staph. aureus*	Agar-Cup	13.5 mm.	2.07

SUMMARY.

The value of cholesterol, as an ointment base ingredient, to enable the base to hold large quantities of aqueous solutions or suspensions, has been established.

Ammoniated Mercury Ointment made with the proposed base, has a higher antiseptic potency than that made by the U. S. P. method.

Phenylmercuric nitrate ointment made with an aqueous solution of the salt, in the proposd base, possessed distinctly higher antiseptic potency.

By means of the new base, ointments can be made containing large quantities of water—making an emulsion, the inner phase of which is aqueous while the outer one is oleaginous.

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EXPERIMENTS WITH EPHEDRA IN THE SOUTHWEST.*

BY A. F. SIEVERS.

There is wide interest in the effects of the war in the Far East on the present and future status of the drug mahuang obtained from several species of Ephedra, the domestic requirements of which have come mainly from China. Manufacturers of ephedrine and of preparations containing this alkaloid are naturally concerned about the future source of the crude drug. Other parts of the world, particularly India, are being drawn upon and perhaps more extensive use of a synthetic product already on the market may result. While these adjustments are going on, the possibility is naturally being suggested that Ephedra be grown in this country in order that we may be independent of foreign supplies, not only during the present emergency but indefinitely. The general public has become interested through frequent mention of the matter in newspapers and trade journals. This is evidenced by the many inquiries received in the Department of Agriculture from people in many walks of life who want to know how to grow this drug plant, how much profit there is in it, how the active product is extracted, how it is marketed, where to obtain seed or plants, etc. Many of those interested live in regions where the Ephedra species would not grow or thrive and others are entirely lacking in the necessary experience in special plant culture. It is the duty of a Government agency to inform them frankly of the true situation and the reasons therefor.

It is not intended in this paper to discourage interest in, and consideration of, the possibilities of domestic growing of Ephedra. However, as in the case of other special crops, some of the news items that have appeared in the public press are misleading. They point out that here is an opportunity for farmers and others to grow a valuable crop but fail to mention the difficulties likely to be encountered. The purpose at this time is to emphasize the desirability of research to determine fundamental facts concerning the culture of such plants, if information is lacking, before their commercial growing is undertaken. At least this will prevent some of the mistakes that will otherwise probably be made. Medicinal plant culture differs in at least one important respect from the growing of most of the staple crops with

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