3. Ouabain appears to be a suitable standard for Strophanthus assay because it has the same rate of absorption and type of action. It is, however, definitely unsuitable as a standard for Digitalis (4) and Squill assay.

4. The present U. S. P. method (One-Hour Frog) is unsatisfactory even for Strophanthus. One hour is possibly sufficient time for absorption of a small dose of a Strophanthus dilution, but is not sufficient for complete *action* and the necessary excess causes erratic results due to individual variations in reaction. An M. L. D. Frog Method overcomes these objections and at a temperature of about 20° C., six hours is a suitable time limit for both Strophanthus and Digitalis. A Six-Hour M. L. D. Frog Method is therefore suggested for consideration for the next U. S. P. in place of the present One-Hour Frog Method.

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PHARMACOLOGICAL NOTE ON PARAFFIN, LANOLIN, BEESWAX, PETROLATUM AND CETACEUM.*

BY DAVID I. MACHT.

INTRODUCTORY.

It is well known to all those having acquaintance with pharmacology that slight changes in the chemical composition of various substances, and more particularly of powerful drugs such as many of the alkaloids, hormones, etc., can be more easily detected by means of pharmacodynamic examination than by any ordinary physicochemical method; indeed, in some cases no physicochemical method is at present available for distinguishing between various substances closely related, and yet such substances may exhibit marked differences in their biological effects. Thus, for instance, Abel and his co-workers have been able to detect extremely minute quantities of an active pituitary principle in dilutions which could not be measured by ordinary chemical means (1). Again, Hatcher and his collaborators have found that they could detect traces of strychnine very readily by biological methods, whereas a quantitative chemical determination with the minute amounts present was out of the question (2). In the same way, Macht and Anderson were able to distinguish changes produced in certain drugs by polarized light by biological methods very much more readily than by physicochemical means (3).

With the development of phytopharmacological methods in studying drugs and chemicals, introduced by the present writer (4) it has been repeatedly shown that by means of living plant seedlings or tests on living plant protoplasm, minute quantities of powerful pharmacological principles can be detected now which could not hitherto be detected by older zoöpharmacological tests. This was found to be especially true for active principles elaborated by animals. Thus, Macht

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and his co-workers have been able to demonstrate, by means of phytopharmacology the presence of a toxin in the blood and secretions of menstruating women (5), the presence of other toxins in the blood and spinal fluid of pernicious anemia (6), and the discovery, for the first time, of an etiological noxious agent in the blood serum of pemphigus (7). It was furthermore found by the present writer that, in general, drugs or chemicals of zoögenic origin, that is, obtained from animals, are more toxic for living plants than drugs of phytogenic origin, or substances obtained from plants, are for the same living seedlings (8). Thus, for instance, epinephrine, an animal product, is much more toxic for plant protoplasm than "vegetable adrenalin," or ephedrine (9). Again, minute quantities of cantharidin, obtained from the Spanish fly, are much more toxic for plant protoplasm than ricin, a very deadly poison for animals, which is obtained from the castor oil bean (10). Recently, the author has been able to distinguish between aqueous or saline extracts of *Carbo ligni*, on the one hand, and *Carbo animalis purificatus*, on the other, by means of phytopharmacological methods because of the presence of minute quantities of animal products in the latter which are not present in wood charcoal (11). These observations suggested the present brief study.

MATERIAL AND METHOD OF STUDY.

The following substances, extensively employed in pharmaceutical work as bases for preparation of ointments and other medicinals, were obtained in the purest form available and studied by phytopharmacological means: (1) pure white paraffin, a substance of mineral origin; (2) *Cera alba* and (3) *Cera flava*, or white and yellow beeswax, products elaborated by the honey bee; (4) *Cetaceum* or spermaceti, a substance obtained from the sperm whale; (5) lanolin, or *Adeps lanae hydrosus*, or wool fat, a fat of animal origin; (6) white petrolatum, or petroleum jelly, and (7) yellow petrolatum, or petróleum jelly; (8) white vaseline and (9) yellow vaseline. It was thought that perhaps saline extracts of these very slightly soluble drugs might show a difference in phytopharmacological effect when carefully studied by special methods developed by the author.

The method of experimentation was very simple. A small quantity of each of the substances was boiled for a few minutes in a solution of equal parts of Shive and distilled water. After cooling, the solution was filtered to remove all of the fat, and the filtrate was employed as a plant physiological solution for the growth of the seedlings of *Lupinus albus*, as described by the author's special methods (12). Growth in such extracts of the fats was compared with controls immersed in normal solution of Shive and distilled water mixed in equal proportions.

RESULTS.

The results obtained are exhibited in the subjoined table. It will be noted that the various extracts differed in the degree of inhibition of the growth of seedlings. Some of them gave an index of from 85 to 90 per cent, whereas others gave a coefficient of growth below 70 per cent. It is interesting to note that in each case the more toxic effect for the growth of Lupinus albus seedlings was produced by the extracts obtained from beeswax, spermaceti and lanolin, all of which are *animal products*. On the other hand, paraffin and the petroleum jellies were very little toxic for the plant protoplasm. It is interesting to note that the

figures obtained for white and yellow petrolatum, or petroleum jelly, on the one hand, and white and yellow vaseline, on the other, were identical. Furthermore no marked difference was observed between the yellow and white varieties of petrolatum, vaseline or beeswax by the phytopharmacological tests. The author has shown elsewhere that oxycholesterin, even in minutest quantity, is very toxic for plant protoplasm. In view of the presence of oxycholesterin and its derivatives in wool fat, the toxicity of lanolin can be explained. The hydrogen-ion concentration of all the solutions was determined by the potentiometer and the figures obtained were practically identical with that of the control and certainly not sufficient to account for the difference in the phytotoxicity. The present investigation gives further support to the extensive observations of the writer and his collaborators in regard to the greater sensitivity of plant protoplasm to animal poisons.

TABLE I.

	Index of growth.		Index of growth.		Index of growth.
1. Paraffinum.....	85%	4. Cetaceum.....	69%	7. Lanolin.....	68%
2. Cera alba.....	67%	5. White petrolatum.	88%	8. White vaseline....	88%
3. Cera flava.....	68%	6. Yellow petrolatum	91%	9. Yellow vaseline...	91%

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METHYLENE BLUE U. S. P. AS PRECIPITANT OF IRISH MOSS.*

BY GEORGE E. ÉWE.

When a solution of methylene blue U. S. P. is added to a decoction of Irish moss dark blue insoluble clots are formed.

The writer is unable to find mention of this fact in the literature, and since the known means of identifying the common gums, or distinguishing between them, are very meagre, it may be helpful to pharmacists to make known this action of methylene blue upon Irish moss, or emphasize it if it has already been noted and published elsewhere.

A solution of methylene blue precipitates a decoction of Irish moss whether the moss is previously washed with cold water or not; or whether the decoction of Irish moss is hot or cold. The dark blue clots are almost entirely insoluble in water, even at boiling temperature. When an excess of Irish moss decoction is added to

* Scientific Section, A. PH. A., Rapid City meeting, 1929. No discussion.