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**PART I.—ON THE OFFICIAL OINTMENTS,
WITH SPECIAL REFERENCE TO THE
SUBSTANCES USED AS BASES.**

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WHILE many of the pharmacopoeial ointments are admirable preparations and well suited for their intended purpose, the fact that others fail to satisfy those practitioners who have the greatest experience in their use is shown by the frequency with which a preparation of a different formula to the official one is preferred in dermatological clinics.

In many of these cases the fault appears to be in the character of the base employed, and it seems desirable at the present time to discuss briefly the properties of the substances used as bases and the classes of ointments for which they are respectively best adapted.

For the study of this subject all the official ointments and many others have been made in various ways and with different bases, the products examined experimentally, and, when found suitable, used clinically in the regular treatment of patients at the Manchester and Salford Hospital for Skin Diseases. The work is far from complete, and it is hoped to study more fully the properties of such possible bases as palm oil, cocoanut oil, sodium stearate, goose fat, parinol, paragenum, and other substances. The present note is only concerned with the substances in the *British Pharmacopoeia* which are, or may be, used as bases for the ointments.

The forty-four ointments of the *British Pharmacopoeia*, 1898, are used for widely different purposes, which may be classified as: (1) Protective; (2) emollient; (3) absorbent; (4) sedative and astringent; (5) stimulant; (6) irritant; (7) parasiticide.

The first three of these classes depend on the base, and the last four on the nature of the active substances incorporated with it. In some cases (for example, the mercurial ointments) an ointment may be included in more than one class.

The substances given in the accompanying table are used in the *Pharmacopoeia*, alone or in combination, as bases for ointments. With them are included the simple ointment of the *British Pharmacopoeia*, 1885, and cacao butter, which is sometimes employed as a base. The bases are arranged in the order of their melting points.

The melting points were all obtained from ordinary commercial samples by the method described by Mr. James Grier,¹ and with one exception they agree closely with those directed in the *Pharmacopoeia*. The exception is in the case of soft paraffin, samples of which obtained from different sources differed somewhat widely, and ointments made even from those within the somewhat wide limits of the *Pharmacopoeia* showed a marked difference of consistence.

It would be a decided gain to uniformity of product if the melting point of soft paraffin were brought within narrower limits, or, failing that, two varieties allowed, one with a melting point 31–34°, the other 37°–40°.

The melting point alone does not give any adequate criterion of the suitability of a substance for an ointment base; thus, the simple ointment of the *British Pharmacopoeia*, 1885, shows a higher melting point than hard paraffin, and cacao butter, which is too hard to use alone, has a lower melting point than hard or soft paraffin. Anhydrous wool fat is useless alone, owing to its adhesive character, though its melting point was actually below that of some samples of soft paraffin.

Apparently those substances which soften gradually at temperatures considerably below their melting points are

Base.	Melting Point, as determined.	Melting Point, B.P., 1898.
	Degrees C.	Degrees C.
Beeswax, white	62	
Beeswax, yellow	60.5	62.5–63.9
Simple ointment, B.P. 1885	57.5	
Hard paraffin	55	54.5–57.2
Suet	49–50	44.4–48.9
Spermaceti ointment	49–50	
Spermaceti	48.5	46–50
Paraffin ointment	42.5	
Hydrous wool fat	40–41	
Anhydrous wool fat	39–40	40–44
Hydrous wool fat 1+ soft paraffin 3	40	
Lard, prepared	39	37.8–39
Lard, benzoated	37–39	
Soft paraffin, yellow, Variety A	45	35.5–38.9
“ “ “ Variety B	37.5	
“ “ “ Variety C	34	
“ “ white, Variety A	39	
“ “ “ Variety B	37	
“ “ “ Variety C	31.5	
Cacao butter	33	
Olive oil (becomes pasty)		10
Almond oil (congeals)		–20

more useful as bases than those which retain their solidity until the melting point is approached and then liquefy rapidly. This latter property is possessed by cocoanut oil and cacao butter, and is in the latter case a most valuable property in its use as a suppository base.

The other fixed oils in the *Pharmacopoeia* are of little use, castor oil and cod-liver oil owing to their smell and linseed oil owing to its drying properties. Possibly cottonseed oil or sesame oil might be equally good and cheaper than almond and olive oils.

A number of experiments have been made to determine the relative protective and penetrative powers of the various bases and also the extent to which certain active drugs were absorbed by the skin when applied to it in various combinations. The experiments are made by rubbing a carefully weighed quantity (usually 10 grains) of the ointment or base into a definite area of skin (usually 20 sq. in.) for a fixed time. The ointment is then scraped off the rubbing finger and the surface of the skin by a dulled Gillette safety razor blade fixed in a convenient handle and again weighed. To avoid the necessity of wiping the instrument the scraper is weighed with the ointment both before and after rubbing. With a little practice consistent results may be obtained. The loss of weight represents the amount of ointment absorbed, together with the amount lost in manipulation; as the latter is fairly constant in dealing with preparations of a similar consistency the results afford a relative indication of the respective amounts absorbed. There may, of course, be a possible slight gain from secretion and epidermis removed from the skin by scraping, but, if the skin be dried before the rubbing, experiment has shown that this factor may be neglected, as it is the same for each application and does not affect the relative results.

These experiments are still in progress, but sufficient results have been obtained to confirm the generally accepted views as to the relative penetrative powers of the usual bases.

Soft paraffin and paraffin ointment appear to be hardly absorbed at all, but remain on the skin as a protective layer for a considerable period. Lard and olive oil are absorbed to a considerable extent, about 15 per cent. after two minutes' rubbing. Hydrous wool fat, 20 per cent. provided the proper amount of water is present; old samples partially dried are less absorbed. Owing to its powerful adhesive properties no reliable result was obtained from anhydrous wool fat.

The greatest loss of weight occurred from a mixture of equal parts of glycerine of starch and hydrous wool fat, which is a useful base when a comparatively non-greasy emollient is required.

Classified according to base the official ointments should be divisible into—

Protective ointments, when the effect is desired to be on the epidermal surface only.

Emollient ointments, when the deeper parts of the skin are to be reached, and

Absorbent ointments, when it is desired to secure a passage through the skin into the body.

PROTECTIVE OINTMENTS.

The properties of soft paraffin especially mark it out as the most suitable base for protective ointments. It has, however, the disadvantage of being too soft and running easily in warm weather, and without sufficient body for certain purposes.

The official paraffin ointment, which is an attempt to remedy these defects, is not a satisfactory preparation, and is but little used. It is a difficult ointment to make satisfactorily and easily becomes granular when it contains small particles of hard paraffin. Possibly the hard paraffin does not completely amalgamate with the soft paraffin, and separates out on cooling or keeping.

The rather wide difference between the melting points of the two ingredients may partly account for this, but not entirely, as there is a wider gap between the melting points of beeswax and lard or olive oil, mixtures of which may be satisfactorily made.

Many attempts have been made to find a more satisfactory hardening agent for soft paraffin,² and numerous substances have been tried in the laboratory and at the hospital. Beeswax gives a very adhesive product which was found admirably suitable for coating the hands before a *post-mortem* examination, but unsuited for ordinary ointments.

Cacao butter gives a fair consistence, but requires some hours to set and is expensive.

No better protective base was found than that of the widely used Lassar's paste, where the desired consistency is obtained by adding starch one part and zinc oxide one part to two parts of soft paraffin. A base of this character would be a most useful addition to the *Pharmacopœia* and could be used for preparing the ointments of boric acid, salicylic acid, glycerine of subacetate of lead, or others intended to act only on the surface of the epidermis. Sulphur, phenol, resorcin, tar, and other drugs can be successfully incorporated with this base.

A good protective base of a softer character is obtained by mixing hydrous wool fat, one part, with three parts of soft paraffin; it is more emollient than soft paraffin alone, but sufficiently protective, and does not run so much. Most drugs can be incorporated with it, and it keeps well.

EMOLLIENT OINTMENTS.

The official rose-water ointment forms an admirable emollient base, but it is difficult to make, and does not keep well owing to the separation of the water; this separation is often brought about prematurely by the attempt to incorporate active drugs. These defects might possibly be remedied by the addition of borax (as in the *U.S.P.*) or a small quantity of wool fat, or a quantitative alteration of the formula.

The *spermæci* ointment is the only firm emollient base in the *Pharmacopœia*; it is somewhat expensive, and the reintroduction of a simple ointment somewhat softer than that of the *B.P.* 1885 would be a valuable addition. For hospital use a cheaper oil might be used. Where a comparatively non-greasy emollient is desired equal parts of hydrous wool fat and glycerine of starch form a useful base, and with it suitable active drugs can be incorporated.

ABSORBENT OINTMENTS.

Lard and hydrous wool fat, already in the *Pharmacopœia*, fulfil all requisite purposes.

SUGGESTIONS FOR THE REVISION OF THE OFFICIAL OINTMENTS.

Mercurial Ointments.

Ammoniated Mercury Ointment is largely used for the treatment of impetigo and similar conditions. The present 10 per cent. strength is unnecessarily high, a 5 per cent.

ointment is better and less likely to cause trouble from absorption of mercury. The official ointment made with a paraffin base is much less efficacious than one made with lard or simple ointment. At the Skin Hospital, where large quantities are used, the official form has been compared with one made with lard. The cases have been treated with either the one or the other without selection and the results analysed. From some hundreds of cases it was clearly shown that patients treated with the paraffin base required on an average three weeks' treatment as compared with two weeks for those who had the same ointment, but with a lard base.

Red Mercuric Oxide Ointment.—This ointment is largely used for the treatment of pediculi, and a marked inferiority is found in the official ointment with a paraffin base when used for this purpose as compared with a lard or simple ointment base.

Mercurous Chloride Ointment.—The reduction in strength from 1 in 6½ to 1 in 10 does not appear to have been an advantage for the purposes for which this ointment is chiefly employed. The bulk of calomel in proportion to its weight is so small that no difficulty arises in making a stronger ointment. A 1 in 5 or 1 in 3 would be better than 1 in 10.

Mercuric Oleate Ointment.—The present precipitated oleate is considerably less active and penetrating than the oleate made by combining mercuric oxide and oleic acid, as in the *B.P.* 1885. The latter preparation is still prescribed for the treatment of certain forms of skin disease. The chief defect of the 10 per cent. oleate of the 1885 *B.P.* was the fact that it did not keep well, but a 20 per cent. oleate made in the same way keeps well, can be diluted as required, and would be a better preparation than either the present oleate or that of 1885.

The remaining six mercurial ointments require no alteration.

Tar Ointments.—The official tar ointment might be made softer with advantage; it is difficult to combine with other substances. An ointment from solution of coal-tar might be introduced, and also the useful combination of oil of cade with potash soap and lard used for chronic skin diseases.

Acetate and Subacetate of Lead.—The glycerine of the subacetate is not infrequently found to irritate in cases where the action of lead is desired. An ointment of the strong solution of the subacetate with a wool fat and soft paraffin base is a more useful preparation. The glycerine of the subacetate combines well with the starch, zinc oxide, and soft paraffin base, and might replace the present acetate of lead ointment which appears to be little used.

Zinc Oleate Ointment.—This is not a satisfactory preparation as usually made; it requires much time and trouble, and it is doubtful whether the result is worth the cost.

Capsicum ointment might be improved in consistence; it usually becomes granular or liquid.

Belladonna ointment is too strong, and may cause unpleasant symptoms.

Rose-water ointment might be improved.

Paraffin ointment should be deleted and a better protective base introduced; with it the ointments of boric acid, salicylic acid, glycerine of subacetate of lead should be made. A useful addition with the same base would be a resorcin ointment.

The remaining ointments now made with paraffin ointment should be made with an emollient or absorbent base.

Conium, eucalyptus, lead acetate, lead carbonate, and potassium iodide ointments might be deleted as they are comparatively little used. The potassium iodide ointment was recommended for scabies fifty or sixty years ago, but this use appears to have altogether disappeared.

The remaining official ointments appear to be satisfactory preparations.

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REFERENCES.

- ¹ Melting Point of Soft Paraffins, *Pharmaceutical Journal*, 1898.
- ² Franklin, *Yearbook of Pharmacy*, 1909.