MODERN COSMETIC PREPARATIONS.

THEIR CHEMICAL COMPOSITION, AND THE PATHOLOGICAL
DEVELOPMENTS ATTRIBUTABLE TO THEM.

BY

R. M. B. MacKENNA, M.A., M.B., M.R.C.P.,
HONORARY DERMATOLOGIST, LIVERPOOL STANLEY HOSPITAL.

THE notes from which this paper is composed were made approximately a year ago; they were not intended for publication, but for my own information. A short article on cosmetics in the *British Medical Journal* of February 8th¹ stated that "information that would be gratefully received by our profession" would be that "revealing the composition of face creams of various kinds, and other secrets of the toilet." This article has prompted me to write the following paper, which will, I hope, give some of the required information. For financial reasons it has been impossible to buy many of the expensive preparations mentioned, and to have detailed analyses made; many of the formulae are therefore taken from the *Book of Receipts*² and from other sources mentioned in the text.

COSMETIC TREATMENT OF THE FACE.

It is of some interest to consider the cosmetic treatment of the face, as recommended by many shops, and to subject this line of treatment to a brief analysis. The majority of "beauty specialists" suggest that soap and water should not be used, but the face should be "cleansed" (*sic*) by the application of cold cream; any surplus should be removed with absorbent paper or a towel, and vanishing cream should then be applied. The toilet should be completed by the judicious use of a powder, which may vary in hue from green or mauve to pink or tan. At night the face is "cleansed" with cold cream or similar application, and a lotion or a "skin food," or both, is applied, and in many cases the lady goes to bed with a thick coating of the latter covering her face.

The superstition that soap and water are bad for the complexion probably arose in the days when toilet soaps contained an excess of alkali, and therefore did tend to irritate the skin. Nowadays, when soap-making has almost reached its zenith, it is only in exceptional cases that the skin of the face is irritated by toilet soaps. A good toilet soap does not contain more than 0.25 per cent. free alkali, an amount which does not irritate the majority of skins. Superfatted soaps contain approximately 1 per cent. of lanoline, which has the effect of counteracting any irritation caused by free alkali, and these are the best soaps for toilet use. Soaps containing coco-nut oil lather well in hard water, but the oil has an irritating effect, and these soaps should be avoided. True Castile soap is made with sodium stearates and olive oil, and is a good soap, but many of the cheaper varieties are made with coco-nut oil, and may have a deleterious effect on the skin.

"Transparent soaps are made by adding to the soap alcohol or glycerin, or sugar, to an amount that prevents crystallization, and holds the soap in a colloid state. This in no way damages its quality. Transparent soaps are usually cold made and are apt to contain an excess of free alkali, for in its absence the soap will not maintain its brilliancy. The only way to avoid this is by dissolving the soap in alcohol and resolidifying it by evaporation of the alcohol—an expensive process—so that, as a rule, only the best transparent soaps are free from an excess of alkali."—Pusey.³

If the patient complains that soap irritates the skin, inquiry should be made as to what soap is being used, and a superfatted soap should be ordered. In exceptional cases any good shaving soap, which is the most highly superfatted soap readily obtainable, may be recommended for cleansing purposes.

Cold Cream.

The formulae of cold creams vary considerably. The majority contain borax, and the following may be taken as typical examples:

A.		B.	
White wax	... lb. j	White wax	... 3ijss
Liq. paraffin	... Oij	Spermaceti	... 3ijss
Almond oil	... Oij	Almond oil	... 3xvj
Heat until wax is melted, then add:		Anhydrous wool fat	... 3j
Borax	... 3j	Melt, and add:	
Water	... Oj	Borax	... 3ij
Misce.		Water	... 3x

H. S. Groat⁴ states that "of the many formulae of this next class (that is, cold creams with an almond oil base) the following gives the most universal satisfaction:"

Ol. amygdalae dulcis	... 77
Lanum	... 15
Paraffin	... 18
Cera alba	... 18
Sodii bichlorate	... 1.5
Liq. hydrogen perox.	... 1.5
Ol. rosae geranii	... 0.2
Aq. destillata	... 27
Ol. rosae	... 0.4

Misce.

Despite the fact that Groat's observations were made in 1915, there are many creams on the market whose formulae are slight modifications of the above. Groat also gives the two following as common formulae for cold cream:

Petrolatum liq.	... 120	Ol. ricini	... 180
Cera alba	... 40	Cetaceum	... 60
Aq.	... 40	Cera alba	... 15
Sodium bichlorate	... 1.4	Sodium bichlorate	... 1.5
Misce.		Ol. rosae	... āā-q.s.
		Ol. amygdalae dulcis	... āā-q.s.

Misce.

He points out that "there is a noticeable difference between cold creams made with and those made without borax"; the former are always "whiter and fluffier and seemingly not as greasy as the others, due to the uniting of the borax chemically with the palmitate, stearate, or fatty alcohol of the hard and soft basis." He qualifies this statement by pointing out that these reactions will occur only when the solutions are both heated to above 120° F.

There is certainly a difference in the consistency of cold creams which contain borax and those which do not, but I am advised by two authorities in chemistry that it is improbable that any chemical reactions of importance take place during the manufacture of these cold creams; in their opinion the constituents enter into that complex physical relationship known as emulsification, but in some cases a small amount of boric acid may be formed by chemical interaction.

Vanishing Creams.

A typical formula for vanishing cream is the following, which is a modification of pasta hamamelidis (*B.P.C.*):

Stearic acid	... 3ij
Glycerin	... 3ij
Sodii carb.	... 3ijj
Aq.	... 3x

Melt the stearic acid and add to the hot solution of glycerin and sodium carbonate. Keep on a water-bath for one hour, stirring frequently. Add a little water from time to time to make up loss by evaporation, transfer to a water-bath, and add gradually:

Solution of witch hazel	... 3iv
Otto of rose	... mxxx
Extract of violet	... mxxx
Rose water to	... lb. l½

Stir until thoroughly mixed.

In this formula the stearic acid will react with the glycerin and the sodium carbonate to form stearin and sodium stearate, whilst some 13 parts of free glycerin will remain. Sodium stearate is, of course, a soap, while stearin is, to all intents and purposes, tallow.

Many other formulae are in use, but the majority contain an excess of glycerin, and a few also contain soft or liquid paraffin. It is interesting to note that, of two formulae which came to my notice, one contained approximately a drachm of casein in every ounce of the cream, while the other contained a small amount of agar-agar.

Pathological Effects Attributable to Cold Cream and
Vanishing Creams.

The probable and possible ill effects of the frequent application of the preparations detailed above may be classified as: (a) deleterious effects caused by the chemical nature of the ingredients; (b) deleterious effects caused by the physical properties of the ingredients. The reader is reminded that any remarks made under these headings refer to the prolonged use of the preparations. This reservation is justifiable, because once a woman has taken the trouble to learn a beauty treatment the routine is usually carried on daily for some years.

The deleterious effects caused by the chemical nature of cold creams are slight. The creams are merely mixtures of oils, fats, and waxes, but a certain percentage of cold

creams contain liquid paraffin, which is a mixture of liquid hydrocarbons. Crude paraffin is known to have cancer-producing properties, but there is no direct evidence to show whether or not liquid paraffin possesses similar deleterious properties. Any irritant effect which the cold creams possess is definitely intensified by the successive application of vanishing creams, for while the stearin and the sodium stearate have but little action except to form a waxy bloom of soap plus tallow on the skin, the glycerin is absorbed by the skin, and, being powerfully hygroscopic, must considerably upset the metabolism of the superficial cells of the epidermis. This action is intensified by the mildly astringent action of the hamamelis, which will tend to precipitate the proteins in any cell with which it comes in contact. The glands of the skin must perforce suffer more than the cells of the epidermis, as once the creams reach the lumen of the glands the chemicals exert their action on the delicate secreting cells. In this connexion it will be remembered that the majority of rodent ulcers commence in the sebaceous glands, and it will be interesting to note whether during the next twenty years there will be a steady increase in the number of cases of rodent ulcer and epithelioma of the face in women, and whether we shall see more neoplasms of this nature in young women than is at present the case. Some patients are surprisingly susceptible to boric acid, and even a small amount absorbed through an abrasion of the skin may cause an acute generalized vesicular or scaly eruption. The boric acid in cold creams may therefore be an unsuspected source of mischief.

The physical effects of the use of vanishing and cold creams on the face are considerable. First, with the exception of the glycerin, none of the constituents are absorbed. A fatty layer is therefore left on the skin, which gives a waxy "bloom" to the cheeks and hides any defects of the skin. This is the only cosmetic value which the preparations possess. The fats block the sebaceous and sweat glands. Perspiration is interfered with, and the control of the skin temperature by the evaporation of insensible perspiration, and also the conduction and convection of heat, is retarded. This causes the temperature of the skin to rise, and leads to a continued dilatation of the superficial blood capillaries, and eventually to the production of acne rosacea. The slight increase in temperature may also stimulate the activities of the *Demodex folliculorum*, and also of the *morococcus* of Unna, and any other organisms which may be present in the sebaceous ducts; as the majority of these organisms are resistant to mild antiseptics, the boric acid, etc., has but little effect on them. The formation of comedones is thus facilitated, and acne vulgaris may develop, especially if the patient is between 17 and 25 years of age.

Applications which Act by Irritation.

Of the various other cosmetic preparations on the market we may refer to "wrinkle removers" and "skin tighteners." These are of two varieties. The first variety consists of relatively innocuous ointments which may contain lard or lanoline, or both, and which have to be massaged into the skin. Their action depends entirely on the fact that massage causes contraction of the underlying muscles, and the wrinkles are thereby smoothed out. Their efficacy depends to a certain extent on the vigour with which they are applied. The second variety consists of irritant applications, and the majority of them are pernicious, as they are used chiefly by women over 45 to apply to the periorbital area, which is one of the sites of election of rodent ulcer. Two typical formulae are:

Zinc sulpho-carbolate	gr.xx	Alum	...	gr.x
Zinc oxide	...	Zinc sulphate	...	gr.v
Glycerin	...	Glycerin	...	3j
Rose water	...	Tincture of benzoin	...	3j
Elder-flower water	...	Ess. of Eau de Cologne	...	xxxx
Misce.		Distilled water to	...	0j
		Misce.		

These lotions act by irritating the skin so that a reflex contraction occurs in the superficial muscles, whereby the wrinkles are obliterated. The last state of the patient who employs these lotions is invariably worse than the first, as senile changes and atrophy of the muscle fibres are hastened, and the wrinkles deepen and cannot be removed.

Lotions.

Various lotions are sold for cosmetic purposes; the majority of them are open to the same criticism as vanishing and cold creams. The following formulae are of interest.

Glycerin and Cucumber Lotion.

Beef suet	...	3ij
Prepared lard	...	3iv
Powdered curd soap	...	3ij
Borax	...	3j
Distilled water	...	3xviii

Strain through muslin and add:

Glycerin	...	3vj
Rectified spirit	...	3ss
Otto of rose	...	m v
Oil of ylang-ylang	...	m j
Essence of cucumber	...	3iv
Misce.		

Elder-flower Milk.

Bitter almonds	...	3jss
Borax	...	gr.xxx
Glycerin	...	3ij
Elder-flower water	...	0j
Oil of ylang-ylang	...	m v
Misce.		

Milk of Roses.

Blanched almonds	...	3ij
Blanched Castile soap	...	3ij
Make a paste and add, previously melted together:		
Spermaceti	...	gr.lx
White wax	...	gr.cxx
Almond oil	...	3ij

Mix: dilute with water to 19 oz., and add one ounce of essence of rose.

"Skin Foods."

Various ointments are on the market and are sold as "skin foods." They exert an emollient action, and the skin is stimulated by the massage with which they are applied. They are not, of course, absorbed. Care is taken that they are not greasy, as it is believed that "grease makes the hair grow." The following are typical examples:

Liq. hamamelidis	...	3j
Ung. althaeae*	...	...
Ung. cetacci	...	...
Ung. aq. rosae	...	...
Misce.		

White wax	...	3jss
Spermaceti	...	3jss
Coco-nut oil	...	3j
Wool fat	...	3j
Ol. amygdalae dulc.	...	3ij

Melt, and add:

Orange-flower water	...	3j
Tinct. benzoin simplex	...	mij
Misce.		

Like cold cream, this form of ointment softens the superficial cells of the horny layer and gives the face a smooth, soft appearance, but these ointments are obviously open to the objection that they tend to produce acne rosacea and acne vulgaris, and this is especially so because the "skin foods" are usually applied at night and the patient sleeps with her face plastered with them. It will be noticed that the last preparation contains coco-nut oil, which is definitely a skin irritant.

Treatment.

The physician who ruthlessly forbids the use of these preparations may find his patient returning reproachfully to him with an itchy red dermatitis of the face and neck, and, as this dermatitis clears up as soon as she reverts to her favourite "skin food," her confidence in her physician is, naturally, shaken. The explanation of the matter is obvious. The normal skin does require an emollient to keep the horny layer from cracking and becoming "chapped." This emollient is normally provided by the sebum manufactured by the skin itself. If, however, the sebaceous glands are continually blocked for several years with external applications they cease to function, and if the emollient applications are stopped it may take some weeks before the glands recommence to secrete. In some cases they never recover, much to the benefit of the "beauty specialist." It is therefore advisable, at the outset, to warn the patient that she may have ruined the glands of her skin by applying cosmetics, and that she may have to continue to use various creams for the rest of her life; the treatment should commence by gradually discarding the use of cosmetics, in order to give the glands time to recover. A spirituous lotion of mercury perchloride may be used for a few days to remove all traces of fats

*Ung. althaeae, marshmallow ointment—a herbal remedy.

from the skin, and, as the "beauty specialist" would say, "to cleanse the pores." I suggest the following:

Hydrarg. perchlor.	gr. 1/6
Glycerin	ss
Surgical spirit	5ij
Aq.	ad 3i
Misce.	

This lotion should be used with caution. If the patient perseveres in her refusal to use cosmetics, and avoids exposure to direct sunlight and cold winds for about fourteen days, the skin will become normal in the majority of cases, and the vicious circle engendered by the routine use of cosmetics will be broken.

The present trend of fashion seems to be that a woman considers she is looking her best if her skin is covered with a translucent layer of greasy substance. If the teachers in girls' boarding schools would prohibit the use of cosmetics we would be able to produce a race of women whose complexions were as good as those of men, but at present the possibility of this eventuality seems very remote.

THE HAIR.

Much ingenuity has been shown in devising shampoo lotions for the hair. The majority of these are harmless.

Hair-waving may be temporary or permanent. Either type of waving is comparatively innocuous, but as heat is employed in permanent waving fragility of the hair may result, and the patient may complain that the ends of the hair fray out, and that they break easily.

In regard to hair dyes: a considerable amount of research is being done by fully trained chemists in order to obtain a perfectly harmless dye which will be non-toxic to the patient, non-injurious to the hair, and which will "consist of two or three solutions of such a nature that, by adjusting the proportions of each, any and every possible shade can be produced."

As nearly every English textbook of dermatology contains a phrase such as, "the only duty of the dermatologist in regard to hair dyes is to warn his patient against their use," there is widespread ignorance in the profession on the subject. Before a dye is applied to the hair the sebum must be removed. This is usually done by washing the head, and thereafter applying an alkali—for example, sodium or potassium hydroxide or ammonia. If too much alkali is used a dermatitis of the scalp may occur, and the hair may be damaged. Leftwich⁵ has shown that a solution containing 10 per cent. of ammonia decreases the tensile strength of hair by two-thirds, but that a solution containing 1.2 per cent. of ammonia has but little effect.

Dyes may be classified as being of two types: (1) those which are not absorbed into the cortex of the hair; (2) those which penetrate the cortex.

The first category includes kohl (antimony trisulphide), which was used by the Egyptians, but as the compounds of antimony are powerful irritants this preparation is no longer used. The modern form of kohl is finely ground carbon made up into a pencil with wax or paraffin. This is the common eyebrow pencil, and its use is obviously a dirty but innocuous habit. Iron sulphide is occasionally used to darken grey hairs. The hair is sponged with a solution containing ferrous sulphate; twenty-four hours later a lotion containing an alkaline sulphide—for example, $(\text{NH}_4)_2\text{S}$ —is applied, and iron sulphide (FeS) is precipitated on the hairs. The alkaline sulphides have the property of dissolving keratin, and are used as depilatories; consequently, if the sulphide solution is too strong a regrettable accident may occur. A less nauseating but more dangerous way of obtaining the same result is by using solutions of lead acetate and sodium thiosulphate. It is obvious that if there are any abrasions on the skin there is a danger of absorption of the acetate, which, if the patient is pregnant, may have serious results. Lead dyes are usually sold as "hair restorers" for home use.

Silver dyes are also employed. They can be prepared to produce a range of shades from ash-blond to black. The simplest method of employing these is to precipitate black sulphide of silver on the hair by the use of solutions of silver nitrate and alkaline sulphides. Another method consists in precipitating silver on the hair by the addition of a solution of pyrogalllic acid to an ammoniacal solution

of silver nitrate. This method is highly dangerous. Pyrogalllic acid is a keratolytic, and is known to be able to cause a dermatitis in susceptible persons. An incidental disadvantage in the use of silver dyes is that some barbers use potassium cyanide to remove any traces of silver salts from the skin.

Dyes which penetrate the cortex of the hair include henna and the aniline derivatives. One can state emphatically that a pure henna dye is harmless. It produces an auburn colour, and is sometimes incorporated in shampoos. Many preparations on the market are mixed with aniline dyes, and are so compounded that any hue from light brown to black may be obtained. "Henna-reng" is a mixture of henna with indigo, and is comparatively innocuous.

The Para-phenylene-diamine Dyes.

There now remains to be discussed a group of dangerous aniline dyes known collectively as "Para." These are used considerably, as they belong to the second category of dyes, and therefore are semi-permanent, and cannot be washed out. In addition, the hair may be waved after the dye has been applied, which for obvious reasons cannot be done after a precipitated "dye" has been used.

The dye of this class in common use is para-phenylene-diamine, which is generally used to dye the hair black. Para-toluylene-diamine and para-diamino-phenol are also frequently used in conjunction with para-phenylene-diamine to produce reddish, blonde, or ash shades. The exact chemical action of para-phenylene-diamine on the hair is unknown; but the following formulae, taken from Redgrove and Foan, are probably correct:

Para-phenylene diamine + Oxygen = Quinone-di-imine + Water.

It has been suggested that Bandrowsky's base combines with keratin, but there is no proof of this. Schueller⁶ has stated that quinone-di-imine is a substance which is toxic to the human skin, but that the pigment which is finally formed is non-toxic. Probably Bandrowsky's base is capable of causing toxic effects, because dermatitis of the neck occurs in susceptible persons who have worn furs dyed with these substances.

In order to achieve the oxidation of the para-phenylene-diamine the compound is mixed immediately before use with 15 or 20 volumes of hydrogen peroxide. Potassium dichromate, or potassium chlorate, mixed with a salt of vanadium is sometimes used as an oxidizing agent. To assist penetration of the hair a caustic alkali or ammonia is usually added. The dye is then applied to the hair by means of a brush, and approximately a quarter of an hour elapses before the correct colour develops. A wet shampoo is usually employed to remove any surplus dye.

So many accidents have occurred from the indiscriminate use of para-phenylene-diamine that the majority of barbers now employ a sensitization test, known as Sabouraud-Rousseau's test. The skin over the mastoid process is cleansed with alcohol, and the dye and its oxidant are applied. When the mixture has dried the area is covered with flexible collodion. After twenty-four hours the collodion is removed and the skin washed with soap and water. If the patient is sensitive to the dye a mild reaction will have occurred. Foan states that some of the leading French hairdressers advocate that this test should

also be made on the skin over the median basilic and internal saphenous veins, as experience has shown that some patients give a negative reaction behind the ear and a positive one over these last-mentioned areas. The probable explanation of this is that there has been some error in the application of the reagents to the skin behind the ear, so that oxidation has not occurred. A single application of the dye may sensitize a patient, and therefore the test should be applied on every occasion that the hair is dyed.

The toxic effects of para-phenylene-diamine may be classified as local and general. The local effects vary in intensity with the susceptibility of the patient and the form in which the dye is applied to the skin. For example, it is quite a common occurrence for a patient to come for advice with a blotchy erythematous dermatitis of the neck, and sometimes of the face, and to give a history that she tried on a series of furs in a shop. Half an hour later she noticed that her neck was itchy and red, but this soon passed off. The next day the fur was delivered, and in the full pride of possession she wore it for a short period. Within an hour or two the neck became red, itchy, and inflamed. In some cases vesicles form. The dermatitis arising from an hour's exposure to a fur dyed with "para" may, if untreated, last for as long as fourteen days. If the head has been dyed, and the patient is susceptible, an acute erythematous dermatitis of the scalp rapidly develops. Vesicles and bullae may form and rupture. The dermatitis spreads to the face and neck. The scalp may become "boggy" and oedematous, and periorbital oedema is a common occurrence. The patient commonly complains of headache, nausea, vomiting, and diarrhoea. The temperature may rise to 104°, and there may be a rigor. In very acute cases albuminuria occurs. These symptoms are due to two causes: (a) toxæmia caused by the acute dermatitis; (b) poisoning due to absorption of the dye.

The treatment is prophylactic (that is, avoid exposure to the dye), local, and general. In mild cases the dermatitis may subside if a simple calamine lotion containing 2 per cent. ichthyol is applied. In acute cases the hair should be cut as near the scalp as possible, and calamine lotion with 1 per cent. ichthyol applied frequently on linen or gauze dressings, no oil silk being used. It is most dangerous to attempt to remove the dye from the hair by the use of hydrogen peroxide or sodium thiosulphate, as these measures may only intensify the symptoms. I have found that the most efficient way of reducing the oedema of the eyelids is to use the following "drops":

R. Liq. adrenalin. hydrochlor. m.viii
Sodii bichloratis gr. x
Aq. ad 3j

Misce. Sig.: Dilute with an equal quantity of warm water and use as "drops" for the eyes.

A third of a pastille dose of x rays will help to control the dermatitis. The general symptoms should be treated on the usual lines. As the majority of these cases result in legal proceedings, it is as well for the practitioner to ask the patient's permission to inform the barber who is responsible that an acute dermatitis has supervened, so that the case may be examined during the acute stage by the medical representative of the barber's insurance company.

Hair-bleaching.

Bleaching of the hair frequently precedes dyeing, for if the patient has had her hair dyed some months previously it is impossible to obtain a satisfactory coloration of hair which is grey in the proximal, green in the middle, and auburn in the distal thirds. The hair has to be made a single colour. Oxidizing agents—for example, sodium hypochlorite (which is sold as "eau de javel") and hydrogen peroxide (10 to 20 volumes)—are commonly used. The hydrogen peroxide is used in conjunction with ammonium hydroxide, as the latter removes sebum and also neutralizes any dilute sulphuric acid which may remain in the peroxide. Hydrogen peroxide has been shown by Leftwich⁵ to have little, if any, deleterious action on the hair. Potassium cyanide and oxalic acid are both used as bleaching agents; their use cannot be too emphatically condemned.

Summary.

1. Various formulae for cold creams and vanishing creams have been considered and discussed. It has been shown that these may have an irritant effect on the skin, which may in time lead to the production of rodent ulcers and epitheliomata, and that these applications are prolific originators of comedones, acne vulgaris, and acne rosacea.

2. The formulae of irritant applications ("wrinkle removers") have been studied, and their effect in the production of neoplasms of the skin has been discussed.

3. Formulae for skin foods and lotions have been given, and a line of treatment for a skin ruined by the injudicious use of cosmetics has been indicated.

4. The hair dyes in common use have been briefly enumerated, special reference being made to the para-phenylene-diamine group of dyes. A brief account has been given of the signs, symptoms, and treatment of para-phenylene-diamine dermatitis.

It is my pleasant duty to acknowledge my indebtedness to Professor Dilling and Professor Hilditch of Liverpool University, and to W. E. de B. Diamond, Ph.D., for advice in regard to the problems in pure chemistry with which I have been confronted in the preparation of this paper. My thanks are also due to Mr. E. W. Lucas and Mr. H. B. Stevens for permission to publish formulae A and B and the formulae for vanishing cream, wrinkle removers, and the various lotions, all of which are taken from their *Book of Receipts*; also to Mr. H. S. Redgrove, B.Sc., A.I.C., and Mr. G. A. Foan, who have allowed me to make full use of their book *Blonde or Brunette?* the standard book on hair dyes and hair dyeing (Heinemann (Medical Books) Ltd.).

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A CASE OF RUPTURED OVARIAN PREGNANCY.

BY

E. L. GRAFF, M.A., M.B., B.Ch. CANTAB.,
LATE OBSTETRIC RESIDENT, GUY'S HOSPITAL.

THE case here recorded provides definite proof of a pregnancy occurring in the ovary. E. W. Riches,¹ in a recent publication, relates that "Lockyer, reviewing the literature from 1910 to 1917, found records of 22 genuine cases. Prior to 1910 there were recorded, according to a German estimate, 33 cases, and according to an American estimate only 19. Since 1917 a further 29 cases have been recorded

FIG. 1.—A, Corpus luteum; B, chorionic villi embedded in blood clot; C, amniotic cavity; D, blood extravasated through wall of cyst.

by various authors, making a total of 84 cases in all." This case, with Riches's, brings the total of recorded cases to 86.

N. A., aged 35 years, had had three previous normal pregnancies, her youngest child being 4 years of age. Her periods occurred at two- to three-weekly intervals, and lasted three days.