

## ON THE RELATION OF HORMONES TO COSMETICS\*

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THIS PAPER cannot be nearly as complete nor erudite as I would wish, nor indeed as you deserve; unfortunately circumstances were such that my notice was too short for its adequate preparation. One may derive a shadow of comfort from the fact that the potential field of discussion, namely, hormones in cosmetics, even in its primitive state of today is already so complex that only a small fraction could be handled in a short paper, and even that in a cursory fashion.

Some years ago I gave a paper entitled "The Biology of Advertising." In this work I showed that advertising was a functional activity of living tissue ranking second only to the assimilation of food. Using a similar term to avoid the local connotation that has become associated with the word advertising, namely, "calling attention to—" one was able to show that Nature cannot distribute her products without calling attention to them. At least apparently she never does even after a hundred

million years or so of practical experience. There are many important and some quite amusing conclusions to be drawn from this study which served to arouse my increasing interest in the practical study of cosmetics. Rather naturally my angle of approach was that of a pharmacologist who, today, must be regarded as one who learns to master the normal chemical controls of the body and then by means of his drugs, synthetics, hormones, call them what you will, puts them under scientific exploitation.

The age-old use of cosmetics was an empirical attempt of the human to do the same sort of thing, namely, increase her or his biological function of "calling attention to," or advertising her or his person. The greater bulk of these efforts even to the present time has been the surface application of various pigments and perfumes, which incidentally is a recognition that both play a normal role in the advertising function.

However, from the dim past come tales of other less successful but highly significant attempts to effect

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a further control by the internal use of so-called Love Philtre's. Some of these mixtures were somewhat horrible to contemplate and probably many were effective only by some autohypnotic or suggestive process, if effective at all, but from these primitive experiments there is a gleam of sanity shining through the nightmare of dark horrors, namely, a dim recognition that a something existed inside the body that made it externally attractive. Today with our available knowledge that almost certainly all functions are subject to chemical controls, although we have not yet discovered all of them, we are aware that the manifold variations of the advertising function largely come under the domination of the sterolic type of hormones, either directly or indirectly. However, it is also true that other chemical controls play a part in the total picture, among which must be added the general metabolic stimulator, thyroid, and the pattern maker or, as Cushing termed it, the orchestra leader, pituitary.

Moreover, we also know that differences of reaction in tissue derived from the same primitive layer to a single drug are largely quantitative in nature. Thus it follows that a drug, such as those very loosely called sex hormones, which normally produce marked changes in quite widely distributed tissues, also can produce under favorable conditions, changes in the same general type of tissue almost anywhere.

Now the most obvious features of the advertising function are to be associated with its external appearance, and as my time is most limited, I shall confine my few remarks to these, with, however, the clear understanding that notable changes may be duplicated or even exaggerated in internal tissues derived from similar primitive layers. Moreover, that these changes are by no means confined to the reproductive tissues.

Taking the known external or obvious changes that can be caused by the sterolic drugs, we find they fall into two major types: those associated with changes in the caliber of blood-vessels, usually associated with increased dilator activity; and those associated with the growth stimulus of epithelial tissue, with its associated functions. One of these is of peculiar interest to us at this time, namely, the pigmentation of the superficial areas. We must not forget that there are other important changes caused by appropriate hormonal stimulus. One of these of cosmetic interest is the curious thickening and binding down of the female skin leading to a more attractive type of rounded molding, especially of the arms and legs.

Another is the specialized deposits of fatty tissue also apparently designed largely to increase general attractiveness, although they may also function for shock-absorbing purposes. Such deposits fall under the domination in part of the pituitary gland, but whether directly or by way of some secondary

control does not seem clearly established.

To complete a catalog of the changes and manifestations of the advertising function, even for the human, would be wearisome and unnecessary. We are all too well aware of the wonderful changes that develop or take place in the female as she nears and enters a state of nubility. The lovely texture of the skin with its remarkable range of pigmentary notes, varying from the vivid clear red of the lips framing the pearly and highly fluorescent teeth to the marble white of the neck. Bedecked here and there in appropriate places is melanotic shading of various shades forming pleasant and intriguing contrast with the veiled reds and blues of the underlying blood vessels, or the pale green of the bloodless skin. All subject to a reflectance imitated by no other material. All of this remarkable display, as well as the crowning epithelial extravagance of the variously pigmented hair, depends on the correct growth, development, maturation, and degeneration of epithelial cells, supported by an appropriately patterned and functioning blood supply. We can, moreover, be quite dogmatic that these changes are purposely devised for they do not occur in eunuchs no matter how healthy they may be otherwise. One phenomenon in particular seems more or less absent in such subjects, namely, certain odoriferous accompaniments of the advertising pattern, and which are partly derived from special scent

glands, but nevertheless do not seem entirely confined to their activity, for other perfumes diminish, including the delicate sweet fragrance noted in the hair of young females not to be found in older people.

The human male also shows many signs of advertising activity, although less of purely physical nature than his counterpart. Changes occur in the skin and various hairy parts sprout into activity. Neither of these changes takes place in those gonadically inactive; moreover, the smell of such persons has no particular advertising meaning. One of the most remarkable differences between the normal and the eunuchoid male is to be found in the retention by the latter of the childish type of skin, including its molding. Some type of pituitary deficiencies seen at a distance too far for the fine network of the aging process to be remarked, retain a youthful appearance for remarkable periods. Moreover, when we turn to general biology for supporting evidence of these general facts we find a wealth of data to choose from.

For example, the rapid and facile changes in the caliber of blood vessels, especially of the exposed parts, leading to advertising changes of peculiar charm, may be used to create a much more striking display in other forms, such as the brilliant reds and blues of the comb and wattles of Mr. Turkey strutting his stuff, or the rather blatant buttock coloring of certain monkeys, to name but two examples known definitely to be dependent on sex hormones.

These changes in the blood supply of certain tissues resulting from the activity of sex hormones has yet only been examined in a few specialized areas. I have little doubt that this effect is really rather generalized just as to the effect of histamine, which in small doses mimics the blushing areas, is really generalized. The claimed value of sex hormone treatment for coronary spasm in the heart tends to support this view, and extends it to the internal vessels.

While the question of a little more, or a little less blood to a part may appear of rather trivial importance, we must recall that just this difference turns a colorless corpse with sharply edged contours and hard molding lines, to a body glowing with color and having a texture suggestive of warmth and softness. While I do not care to stress this point in the absence of adequate data, it is possible to conceive that that increased heat radiation, easily perceptible from an entirely permissible distance, may also be a part of this advertising function. The continual attention this rather minor physical matter has attracted from writers of so-called love stories suggests it may have a biological meaning other than just an excess metabolism. It is of course also dependent on the caliber of the blood vessels.

When we consider the possibilities inherent in a skilled control of this important color advertising medium, one matter stands out rather sharply. We know that change in

advertising signs attracts more attention than the same sign undergoing no change. In consequence most of our signs are occulting. The reason is of course that stimuli of fixed intensity become adapted to, whereas those of varying intensity do not, or not nearly as readily. The value of the blushing mechanism, as a bit of the advertising function, then becomes quite obvious. Following this line of thought for a moment allows of two rather interesting conclusions. The first is that the use of pigments on areas normally of relatively fixed intensity such as the lips, the nails, the hair, the eyelashes, or whiskers, for we should not entirely neglect the male, is a reasonable and rational procedure. Nature herself sometimes intensifies such areas with remarkable results. Moreover the careful use of shading around the eyes to enhance that caused by sex hormone activity again is a fairly obvious procedure, although one sometimes feels that the human should stay within her pattern and not stray to that, say, of the raccoon.

However, when we consider the areas of coloring that depend for much of their charm on variability, like the cheeks, and in some delightful specimens including the neck downward as far as one is permitted freely to observe, the use of heavy pigmentary deposits of fixed reflectance qualities does not seem sound advertising procedure. What is gained at first sight becomes lost in the insensitivity developing from a fixed stimulus. Indeed this fact

can be observed by the effect on the user herself who, after all, studies the effects more closely than anyone else. Almost inevitably one finds the intensity of the pigmentary deposits increasing until in some cases finally all relation to the natural colors are entirely lost. The advertising value in these cases is thus lost or changed. In the first case she merely becomes unattractive and inartistically overpainted, in the second her efforts to increase the attractiveness of the whole woman is transformed to an advertisement of merely one of her functions.

In view of the fact that healthy human skin possesses qualities of light reflectance that are so unending as to be a source of continual stimulus to the artist, or cause the poor color photographer to go quietly mad, and he may be found in some colorless spot pathetically playing with his slide rule, it does not appear that to cover over this remarkable medium with simple pigments is evidence of skillful control of function.

Before leaving the blood vessels entirely we must recall that on them depends importantly the textural qualities of the skin, both visibly as well as to the touch. This results largely from two associated factors, namely, the amount of blood in and flowing through the skin, and secondly the amount of extravascular fluid either between or inside the cells. The facial tissues are those most easily affected by conditions affecting water interchange, even

quite normal ones, which again adds a little variety to what otherwise would be a gradually crumbling mask. The increasing transparency and heightened color of the excited girl dancing with her latest true lover is not just an illusion.

Actually the face may under such conditions become measurably thinner owing to the withdrawal of extracellular fluid, just as it does by means of a prolonged immersion in the less romantic hot-water bath.

While, therefore, it does not appear sound cosmetology to reduce the possibilities of the advertising function by the use of heavy pigments and powders in the wrong areas, their use as protective agents against the brutalities of weather and environment is very soundly based indeed, and in my opinion not carried nearly far enough. If you examine the skin of the faces of old women, and compare it with almost any other unexposed place you can be shocked at the damage done by exposure.

When we consider the second of our two great factors under the control of the sex-type hormones, namely, the growth development, maturation, and degeneration of epithelial tissue, we are apt to become amazed and bewildered at the complication of the factors involved. It is to be doubted that even those of you who are interested in physiology, unless you have made special studies, have grasped the intricacies and the number of problems involved. I will freely confess that in spite of my own interest and a

fairly useful knowledge of function I am constantly running into a problem not previously considered. Part of the reason lies in the obvious fact that the greatest organ of the body, namely the skin, has never been very seriously studied from a functional angle. Indeed the only erudite phase of this knowledge consists largely in learning pictures of the changes when it is subject to some breakdown process or another, and putting appropriate Latin names thereto. Such people also learn to use various simple ointments and lotions. The dermatologist, as judged by his writings and texts, has yet to learn that one of the greatest functions of the body as well as its skin is advertising, and that this is not some simple incidental of neither professional nor scientific interest.

One may include the physiologist in this fair criticism for there is yet to be a text of functional activity that clearly names and discusses the function of advertising. It is true that some biologists have described and discussed various courting patterns which in man do not constitute the full function of advertising.

Now the skin and its appendages, which include the hair, nails, grease supply, perfume glands, and melanotic pigmentary process, as you are all aware, depend like the blood itself for a continuing entity in time on a perpetual growth. Unlike the blood and sperm, the skin cells are not freed. On the contrary they form a unique structure of the junction of living with dead

cells. Such a structure invites special difficulties for the dead tissue cannot do anything to protect its entity and must be guarded during its useful "life" to the body by special means. This is accomplished by three major ways. Orderly growth; orderly maturation and keratinization, and the application of antiseptic grease in appropriate quantities. Ordinary pus organisms do not attack dead skin readily but this is very susceptible to moulds and fungi, aggravated in the human by the added problem of sweating, which function is on the whole inimical to the skin.

There seems no doubt that each of these functions while intimately coupled can be separated, and excessive growth, keratinization or grease formation, or the reverse, can occur independently. Now we know with certainty that certain areas of epithelial tissues can be directly influenced by the local application of sex hormones. For example, the epithelium of the young vaginal tract can be transformed to its stratified adult form by a suppository. Or the breakdown with excessive keratinization of the same tissues in old women can be restored to reasonable functional normality by the same means. The lining of the nose also appears susceptible to direct local stimulus of the same drugs. While the effects of estrogenic hormones on the mammary tissue is too well known to discuss, it is not quite so commonly appreciated that the grease and wax glands of the human skin, on whose proper func-

tion depends its normal state, are closely similar and subject to hormonal influence. The greasy or dry skins of disturbed hormone function and the acne and seborrheas of puberty become understandable evidence of this widespread hormonal control of the skin. Moreover, the growth of hair and deepening of pigment, both skin functions, are definitely under hormonal influence. Of these facts there is no serious question. What seems still a matter of controversy is whether these changes can be obtained by local application. By this we mean that the drug acts directly on the tissue and does not require absorbing into the bloodstream and generalized distribution in which the local site will only get its proportionate share.

I may say that at least one substance, namely, the synthetic hormone, stilbesterol, is unquestionably absorbed rather freely through the unbroken skin as I have personally noted in both animals and man. However, does the application of stilbesterol to the area over the mammary gland cause this to show growth changes other than such as are caused by a blood-borne quota of stilbesterol?

From a purely pharmacological standpoint there is no reason at all to suppose a drug must be blood-borne to act on any tissue, providing it can otherwise be brought adequately to that area. This is especially clear when one notes that in only a few places is the blood directly in contact with living tissues, and the drugs must go to the

tissue itself to effect a response. Thus the means whereby a drug is gotten to a tissue fall into groups of convenience, ease, practicability, but not essentiality.

There is no reasonable doubt at all that the application of, say, stilbesterol to the relatively unprotected vaginal or nasal mucosa causes a direct effect. There is also no doubt at all that the drug is readily absorbed through the intact skin and thus can act on this wherever it has functional leverage. The one question yet unsolved is how far will such drugs be able to penetrate before they are picked up by the blood and lymph streams and carried away. There seems definite evidence for example of a local effect on the human mammary gland, but whether this involves the deeper parts or not is not, I think, established. However, from experience with other drugs falling into the fat-soluble group but having a visible action, like phosphorus or oil of mustard, very considerable caution is advisable in prophesying or guessing how far such an application might penetrate. Both of the named drugs penetrate to considerable depths, and oil of mustard usually goes deeper than one expects even in therapeutic applications.

As a final question one may ask what role are hormones likely to play in the cosmetic future. As I see the problem, cosmetology has largely to do with the biological function of advertising; this definitely falls under the control of certain drugs of the sex-hormone

type (but I think we cannot safely confine ourselves to them). At the present time the sex hormones clearly offer the most important key to the door of the control room of many functions associated with advertising and, when we can use this key correctly, we shall have established the science of functional cosmetology, which fundamentally is the pharmacology of the function of advertising. The present outlook seems to suggest that practical cosmetic controls will be derived

from synthetics, for the natural hormones do not act well locally, just as they do not act well by oral administration.

I think we may also add that when the cosmetologists have prepared scientific cosmetics of this type they will also find a very considerable use by the present-day empiricists in the treatment of many skin disorders, for after all a truly healthy skin with good function can hardly be made more beautiful.

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