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CUTANEOUS PIGMENTATION.

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THE views which are held with regard to the nature and origin of melanotic pigment in the skin are the following :

(1) That pigment does not arise in the epithelium, but is manufactured from hæmoglobin by special cells, termed chromatophores, and is conveyed by these cells from the cutis to the epithelium.

(2) That cutaneous pigment originates in the epithelium, and is a product of epithelial cell metabolism ; and that cutis pigment is secondary to epithelial.

(3) That epithelial and cutis pigment have no connection with one another, but are both formed by cell metabolism in the position in which they are found.

The first of these theories has found the most general acceptance since the work of Ehrmann, whose first paper on the subject appeared in 1885.

Ehrmann's work was mainly done on amphibious reptiles, which contain special pigment-cells in the skin.

These cells, Unna says, have not yet been demonstrated to his satisfaction in the human skin.

If the theory of the transference of pigment from the cutis to the epithelium be correct, its supporters should be able to demonstrate the presence of pigmented cells in the cutis as an invariable concomitant of all pigment formations, and that these cells should have a uniform distribution and some definite arrangement. Moreover, the appearance of pigmented cells in the cutis ought always to precede the appearance of pigment in the epithelium.

If, as Ehrmann and Karg state, pigment is carried to the basal layer of the epithelium, and is transferred from cell to cell until it is excreted on the surface, then, as the basal cells are those in which the most active metabolic processes take place, the pigment ought to accumulate in the more superficial layers of the epithelium, or, at least, ought to be distributed equally throughout its whole thickness, not only in the deeper layers, where it is the invariable rule to find it.

Again, localised pigmented growths (*nævi*, etc.) would gradually lose their colour if the pigment were not being constantly renewed from the deeper parts; the supporters of the wandering pigment theory ought to be able to bring forward some explanation why the pigment always wanders to the same spot.

Meirowsky (pp. 48-50), experimenting with Finsen light on the human skin, produced pigmentation within an hour of the exposure; at the same time, he did not find wandering cells, either in the cutis or in the epithelium.

In his investigations on the regeneration of the epithelium, he found that branched cells penetrated into the epithelium from the cutis; these cells did not show any uniformity of distribution, some sections containing several such cells, some only one or two, and others none; moreover, the epithelium did not show a more intense pigmentation in the neighbourhood of these cells than elsewhere.

These branched cells were not pigmented at the time of their entrance into the epithelium, and if they become pigmented later, must either form or absorb it whilst in the epithelium.

Both Ehrmann and Karg regard melanin as a derivative of hæmoglobin; it follows, therefore, that there can be no formation of pigment if the blood supply be absent. Yet Meirowsky (p. 54) produced an intense pigmentation in skin removed from the body, kept at 65° C. over a water-bath. I will speak later of the theory of the independent origin of epithelial and cutis pigment, which is advanced by Staffel and Meirowsky.

I have examined a large amount of material, including normal skin, lentigo, pigmented *nævi*, pigmented papillomata, X-ray pigmentation, human and guinea-pig's nipples, pigmentation following an irritant, negro's skin, rabbit's and guinea-pig's skin, leucoderma xeroderma pigmentosum, and arsenical pigmentation. I summarise briefly the histological appearances in these various conditions.

Pigment is always accumulated in the cells of the basal layer of the epithelium; it is also seen in the intercellular spaces. It is not confined rigidly to the basal layer, but is also present in more superficially situated cells when large in amount, or an active pigmentation is taking place, but always becomes smaller in amount as the surface is approached.

Where cells are columnar in character, with little cytoplasm at the sides of the nuclei the pigment has the appearance of little caps generally at the upper pole of the cell; sometimes these caps are seen at both poles. If the cell be rounded in shape the pigment is equally distributed round the nucleus, suggesting that the position of the pigment is dependent on the arrangement of the cytoplasm of the cell in relation to its nucleus. The pigment is arranged at the boundary between the nucleus and the cytoplasm, from which point it is fairly evenly distributed throughout the cytoplasm of the cell. In some cases there is undoubtedly pigment in the nucleus which cannot be distinguished easily if a nuclear stain be used.

Pigment in the epithelium is usually yellowish in colour and finely granular; sometimes in addition there are coarser granules of darker-coloured pigment.

In pigmented nævi there is, in addition to the hyperpigmentation of the epithelium, an extensive deposit in the detached epithelial islands*; in the latter situation the pigment has the appearance of a brownish mass of granular *débris*. Amongst this granular *débris* large cells can be seen filled with coarse, dark-coloured granules of pigment. In these islands the nuclei of the cells lie packed closely together with very little surrounding cytoplasm.

In the cutis pigment has no regular arrangement. It is often contained in cells, but is also found lying free in the lymphatics; this free pigment has often no pigmented cells in its vicinity. I have never observed any considerable amount of pigment in the cutis without the epithelium being hyperpigmented, but the epithelium frequently shows marked pigmentation without the cutis showing any noticeable increase of pigment.

If a number of paraffin and frozen sections from the same cases be compared, in many cases it is noticeable that there is considerably less pigment in the paraffin than in the frozen sections. This decrease

* Unna, p. 1132; Gilchrist, pp. 127-129.

is always of the lighter-coloured pigment, and is especially marked in the epithelium. This is not an invariable rule; some cases show little or no difference.

This phenomenon suggests that in cases of melanotic pigmentation we are dealing with a substance which at one stage of its development is soluble in one of the reagents used in preparing paraffin sections, or that there are two different forms of pigment.

ORIGINAL RESEARCH.

The fact of the disappearance of certain pigment in paraffin sections led me to experiment with the various reagents used in preparing paraffin sections in order to ascertain the reason for this decrease. I placed frozen sections in chloroform, alcohol, xylol, and hot paraffin. In some of the sections treated with alcohol, chloroform, and xylol there was a distinct diminution in the amount of pigment in the epithelium. Pigment in the cutis was not noticeably affected.

This suggested to me that pigment might be of a fatty nature; I therefore stained sections with osmic acid, and in some cases the basal cells appeared faintly stained. At the suggestion of Prof. Lorrain Smith I treated sections by a method described in a paper published by Dr. Mair and himself in 1908.

The method is as follows:

The tissue to be investigated is hardened in 10 per cent. formalin, cut on a freezing microtome, and is then placed in a saturated solution of potassium bichromate, which is placed in an incubator at 37° C.

From day to day one of these sections is removed from the solution, and, after washing, is stained with Kulschitsky's hæmatoxylin. Formula:

1 per cent. hæmatoxylin,
2 „ acetic acid,

differentiated with borax ferrocyanide; formula:

Borax	40 grm.
Ferrocyanide of potassium	50 „
Water	2000 c.c.,

dehydrated, cleared in xylol, and mounted in Canada balsam.

It is advisable when working with this method to use comparatively fresh material, as tissues which have been kept in formalin for a long

period do not behave in the same manner as fresh material. By this method I investigated normal skin, lentigo, pigmented nævi, pigmented papillomata, senile pigmentation, vitiligo, pigmented skin following on irritant, human and guinea-pig's nipples, Xeroderma pigmentosum, guinea-pig's and rabbit's skin.

The results were very uniform in character. On the second day a faint blue haze appears in the nuclei of some of the basal epithelial cells. This appearance is seen in normal skin as well as in abnormalities of pigmentation; in the former it is only occasional cells which stain in this manner. This reaction is not confined to the basal cells, but when pigment is lying in relation to more superficially placed cells it is present also in them. In all cases it is more marked in the basal layer than higher in the epithelium.

This blue haze becomes deeper and more distinctly granular up to the fifth day; on the fifth day the granules appear larger and show a tendency to have a peripheral arrangement in the cells. The granules in the nuclei are still stained. About the fifth day granules are seen in the intercellular spaces of the prickle-cell layer; the staining of these granules increases in intensity up to the tenth day. In some cases pigment appears to be stained, or, at least, there are blue granules to be seen in the position of the original pigment.

On the tenth day the blue-stained granules in the basal layer are more or less peripherally situated in the cells. The centres of the cells are now comparatively clear. The reaction has now reached its maximum, and remains almost stationary up to the fifteenth day, when it begins to gradually fade; it passes off, however, very slowly, and has not entirely disappeared on the forty-fifth day. The intensity of this reaction is proportionate to the activity of the pigment formation; in chronic cases it is slight, in acute well-marked.

The reaction varies very much in amount, but in no single case which I examined did I totally fail to obtain it, and it was always in association with the presence of pigment.

It is to be noticed that on the second day, when the reaction first appears, it is seen as a faint haze, uniformly distributed throughout the nucleus. After longer treatment this haze becomes distinctly granular, and about the fifth day the granules begin to have a peripheral arrangement round the nucleus. Central granules still remain, but are now coarser in character. By the tenth day the

centres of the cells are clearer, whereas the peripheral staining and the intercellular globular granules in lymph-spaces are at their maximum. Noticeably in a case of leucoderma, there is an accumulation of blue-stained granules in the perivascular, and perineural lymphatics of the cutis, and at one or two places a stream of granules can be traced leading from the epithelium to the blood-vessels (Fig. 8). In the separated epithelial islands of pigmented nævi there is some reaction which corresponds in time and appearance to that described in the epithelium.

Sebaceous glands also react in a very similar manner to the basal epithelial cells, granules staining slightly after one day's bichromating, reaching a maximum after ten days, and commencing to lose their capacity to take the stain after the fifteenth. An explanation of the reason why the granules in sebaceous glands appear to stain earlier than the epithelial granules may be that slight changes in colour are detected more easily in glands than in the epithelium. Moreover, in one case there was a faint suspicion of reaction in the epithelium after twenty-four hours' treatment with bichromate.

Nerve-fibres stain after one day's treatment with bichromate of potash, corresponding in time of taking the stain to the epithelium and sebaceous glands. I did not observe this reaction in cells of the cutis, even when they contained pigment.

Lorrain Smith and Mair,* in the paper to which I have already referred, established the fact that the staining of lipoids by Weigert's method is dependent on the presence of an unsaturated grouping in their molecular constitution; therefore, the presence of blue-staining granules in tissues treated by this method must be due to the fact that they contain lipid substances in an unsaturated state.

It is reasonable to suppose that substances when first formed, or when still in a transitional state, are in an unsaturated condition, and that the earlier the stage in which they are in, the more unstable they will be in composition.

It may be accepted that in living cells constant chemical changes are taking place, and the greater the activity of a cell at any time the more rapid will the chemical changes be. It follows, therefore, that the more active a cell is the greater will be the amount of material in a transitional state.

* *Loc. cit.*

I have described, in both normal skin and in pigment abnormalities, how granules are stained when sections have been treated with potassium bichromate, and afterwards stained with Kulschitsky's hæmatoxylin.

The granules which stained after a short period of bichromating as a rule are limited to the basal epithelial cells, and in normal skin are only in occasional cells. In normal skin, pigment is not equally distributed along the basal layer, but is arranged intermittently in small groups of cells.

In abnormal pigmentations, where the pigment is fairly evenly distributed along the basal layer, these blue granules are also uniformly distributed. In some cases, in which pigment formation is active, these blue granules are not confined to the basal cells, but are contained also in some of the more superficial cells.

These granules stain first after bichromating for two days. They are then very small, and are distributed uniformly throughout the nuclei. As the bichromating is continued larger and more distinct granules appear, which have a peripheral arrangement; and finally, granules are stained which are not confined to cells, but lie in the intercellular lymph-spaces of the epithelium.

It is to be surmised that when chemical changes are taking place in a cell, the products which are the resultant would first appear in a finely divided state, and later, by the running together of these finely divided particles, larger and more distinctly separated granules would be formed; also, that they would be in such a condition of unstable equilibrium that they would stain more readily by a method which was dependent for its staining capacity on the presence of unsaturated molecules.

From this it follows that the finer granules are the precursors of the larger granules which stain later, and that these granules are the products either of metabolic processes taking place in the cells or of a degenerative change, as these granules are seen in the nucleus in their finest form; probably this change has its seat in the nucleus.

These granules vary in amount in direct proportion to the activity of the pigment formation, not in proportion to amount of pigment present; that is to say, when the skin is actively producing pigment these granules are well marked; when the process is slow they are few in number.

If it be accepted that these granules are due to the presence of unsaturated lipoid molecules, which are the product of chemical changes taking place in cells, and are concomitant with the presence of pigment in the epithelium, then, I think, melanotic pigment may be regarded as a product of metabolic processes taking place in epithelial cells. I have already spoken of the solubility of certain pigment in C_2H_6O , $CHCl_3$, etc. It is to be noticed that the sections from cases in which the pigment shows distinct solubility are those in which blue granules appear in quantity. As additional evidence that these granules have some connection with pigment is the fact that in some cases pigment itself stains blue, or if not, is so intimately mixed with the material which does stain that the material stained obscures the presence of pigment.

To further investigate the nature of these granules I selected sections from cases in which granules stained well with hæmatoxylin after bichromating, and stained them with Scharlach R.

They gave a distinct reaction when stained with this reagent, which in most cases was confined to the basal layer; in one case (Xeroderma pigmentosa), in addition to staining in the basal layer, red globular granules were also stained in the intercellular lymph-spaces of the epithelium mapping out the epithelial cells with a mosaic of red granules (Fig. 11). This fact is interesting, associated with the fact that after sections have been treated with potassium bichromate for five days, granules are stained with hæmatoxylin which map out the same spaces. From this, I think it may be concluded that the granules stained by hæmatoxylin and Scharlach R. are the same. The reaction of these granules with Scharlach R. points to their being of a lipoid nature. I have already spoken of the action of osmic acid in these cases.

In order to still further investigate the nature of these granules, I treated sections from various cases with solvents. They were placed in alcohol, chloroform, and acetone, and kept in an incubator at $37^\circ C$. for twenty-four hours. After this treatment they no longer stained with hæmatoxylin after bichromating. I then placed sections in cold acetone, on the chance of this substance being lecithin (which is soluble in hot but not in cold). This solvent acted in the same manner as the solvents at $37^\circ C$.

From these experiments it is seen that this substance, whatever its

composition may be, is soluble in alcohol, chloroform, and acetone at 37° C.; also in acetone at room temperature. When we consider this fact, together with its reaction with Scharlach and osmic acid, I think it can be asserted with certainty that it is of a fatty nature.

The fact that sebaceous glands react with hæmatoxylin after bichromating in a manner very similar to the basal epithelial cells, both in time of onset and duration, suggests that they produce a substance similar in character to the epithelial cells. (Morphologically, sebaceous glands are epithelial structures.)

The myelin of nerve-fibres also stains after very similar periods of treatment with bichromate.

Melanin, as far as is known, is composed of C.H.O.N.S. in varying proportions.

Dressler makes the following analysis of melanin: C = 51.73, H = 5, O = 7 = N 13.24, ash, 1.47. Therefore it may be safely concluded that it is proteid in character.

I have already brought forward evidence to show that the appearance of melanotic pigment in the epithelium is always associated with the appearance of a lipid substance. I have also noticed that the amount of lipid substance appearing stands in direct proportion to the activity of the pigment process.

What explanation can be given for this phenomenon?

Most authorities, who do not accept the theory that pigment is a derivative of hæmoglobin, are agreed that epidermal pigment is mainly situated in the cytoplasm of the basal cells, that it is a product of the nucleus, and that there is an overflow into the intercellular lymph-spaces (Mertsching, Jarisch, Wieting and Hamdi, Hertwig, etc.).

My observations agree with these investigators. I have already mentioned that the reason why the use of a nuclear stain obscures the presence of pigment is because it is deposited at the outer zone of the nucleus, and in some cases is contained within it. The nucleus of a cell is composed of substances complex in character, which may be roughly divided into two classes—fatty and proteid. These two substances are either in chemical combination or intimately mixed together, and in cell life are constantly undergoing change in their chemical relations.

It is reasonable to suppose that the nucleus during its functional

activity excretes certain substances, the product of metabolic processes, which will consist of a fatty and proteid part.

I have already spoken of the proteid character of melanin, and in my opinion melanotic pigment is included in the proteid portion of the excretion of epidermal cell metabolism. I consider the blue-stained granules which are seen in the nuclei of epithelial cells after bichromating and staining with hæmatoxylin as a precursor or mother-substance of pigment.

These granules are complex in character, being composed of a fatty and a lipoid element. The proteid portion precipitates out after its escape from the nucleus, and remains as a foreign body in the cytoplasm of the cell; I regard the larger granules, situated in the periphery of the cells, as the lipoid substance after this separation has taken place; these granules then escape into the intercellular lymph-spaces, and are a possible source from which the eleidin granules of the epithelium are derived. The fact that the larger granules are not so easily oxidised, as is shown by their later staining after bichromating, indicates that they are of a more stable composition, and therefore I think it is justifiable to conclude that the fine granules are antecedent to the larger.

If this lipoid material be produced in large amount, it can be seen not only lying in the intercellular spaces, but also along the boundary between the epithelium and the cutis, and in some cases granules can be seen escaping in large numbers along the lymphatics of the cutis, and accumulating in the perineural and perivascular lymphatics (Fig. 8). If the activity of the process be excessive the whole nucleus may separate into its component parts *in situ*, and be observed as a mass of granular pigment (melanin). This appearance has been described in melano-sarcomata; whereas, if the process be slow, the lipoid substance may separate from the complex granule before it has escaped from the nucleus, leaving granules of melanin behind. In these cases the granules are only few in number. This explains why pigment is sometimes seen in the nucleus.

As evidence in support of this theory I advance the following facts:

(a) The blue granules, which owe their staining capacity after bichromating to the presence of an unsaturated lipoid substance, appear first as a fine haze uniformly distributed throughout the nucleus.

(b) Later, coarser granules stain which show a more peripheral arrangement.

(c) Finally, coarse granules stain in the intercellular lymph-spaces.

(d) These granules are soluble in chloroform, alcohol, and hot and cold acetone.

(e) Pigment at one stage of its development is also soluble in chloroform and alcohol. (I regard this pigment as a transitional state between a colourless substance out of which melanin is formed and fully formed melanin.)

(f) Those sections which contain soluble pigment in large amount also stain strongly with hæmatoxylin after bichromating.

(g) Some pigment also stains with hæmatoxylin, or at least it is so intimately mixed with the lipid substance that the blue stain no longer allows the pigment to be seen.

The relation between the amount of soluble pigment present and the reaction with hæmatoxylin is only what might be expected, as the more active the pigment production taking place, the larger will be the amount of pigment in a transitional stage of development. The fact that granules are stained in sebaceous glands (which are epithelial structures) by the bichromate method, which correspond very closely in the time of taking the stain and duration to the granules in the epithelium, suggested to me that the process of sebaceous secretion and pigment formation is analogous.

In support of this supposition is the fact that those parts of the body in which sebaceous secretion is active are also the parts which are especially liable to become hyperpigmented (the axilla and groin, etc.). This tends to show that the conditions which favour sebaceous secretion also favour the formation of pigment.

Moreover, if the duct of a sebaceous gland be plugged, the comedo which forms in it, if of old standing, has a distinctly brownish colour. Against this view it may be argued that if the process be identical then melanin ought to be found in sebaceous glands; but in one case the products of epithelial cell activity are excreted into a duct, by which it is quickly carried away, whereas in the other the process is much more gradual, as these products have to be either absorbed by the cytoplasm of the cell or to slowly escape into the intercellular lymph-spaces and be carried away by the lymphatics.

CUTIS PIGMENT.

If the capability of epidermal cells to produce melanotic pigment be accepted, then the problem of the appearance of pigment in the cutis is simplified to the question of whether it is formed there or is secondary to epithelial pigment.

Staffel and Meirowsky* are of the opinion that pigment is produced by metabolic processes in cells both in the cutis and in the epithelium. They observed mast-cells, which contained both granulations and pigment, also what they regarded as transitional forms between simple round-cells containing no pigment, and strongly pigmented branched cells. In my opinion the presence of pigment in mast- and plasma-cells does not justify the conclusion that it is formed there; its presence can be equally well explained if these cells absorb pigment-granules, with which they come in contact in the lymphatic spaces. Pigment is sometimes seen lying in the lymphatic spaces of the cutis when none, or very few cells are present. These pigmented cells are only in evidence in large numbers in cases in which there is well-marked perivascular infiltration (the sections from the case of Xeroderma pigmentosa illustrate this well, Fig. 5). In this case there is an active production of pigment taking place in the epithelium, and in consequence a large amount of pigment escapes into the lymph-spaces; at the same time the well-marked perivascular infiltration in the cutis gives rise to the production of numerous wandering cells, and if these cells absorb the pigment with which they come into contact, this would explain why in this case numerous pigmented cells are present in the cutis. In the human skin I have not seen pigment in the cutis when the epithelium has not also been hyper-pigmented, whereas the epithelium may be strongly pigmented with very little, if any, pigment in the cutis.

If cutis pigment be formed in the cutis, and is of the same nature as epithelial, then it ought to correspond in appearance and react in a similar manner with various reagents.

I have observed the following facts in regard to cutis pigment: It is darker in colour, more coarsely granular, not so soluble in various reagents, and not so easily decolourised with hydrogen peroxide. These characteristics may be observed not only in pigment lying free

* Staffel, pp. 138-141; Meirowsky, pp. 92-95.

in the lymphatics but also in that contained in cells. Hitherto I have not been able after bichromating and staining with hæmatoxylin to produce those appearances in the cells of the cutis which I have described in epidermal cells.

From a consideration of these facts I am led to the conclusion that cutis pigment is of a more stable composition than epithelial, and is probably epithelial pigment which has been carried by the lymphatics to the cutis.

CONCLUSIONS.

(1) That the formation of melanotic pigment is a normal function of epidermal cell metabolism.

(2) That it is a lipochrome in origin, the melanin being the chromatic proteid portion after its separation from the complex lipid granules. (That the epidermal cells are capable of producing lipid material is shown by the secretion of sebaceous glands.)

(3) That it is a product of the nucleus.

(4) That epidermal pigment is disposed of by the lymph-stream by way of the cutis.

(5) That the formation of melanotic pigment in the cutis is not proved.

If the epithelial origin of melanotic pigment be accepted these pigment abnormalities may be explained in the following manner.

An increase of pigment can take place in two ways, namely :

(1) By stimulation of epidermal cells to increased activity through various agents (light, heat, toxæmic conditions, etc.).

This pigmentation is transitory in character, and if the stimulus cease the pigmentation gradually disappears. This is well illustrated by the early temporary pigmentation following exposure of the skin to the action of X-rays.

(2) By deficient drainage due to the obstruction of the lymphatics of the cutis. The normal amount of pigment being formed it is unable to escape as quickly as it is elaborated, and therefore accumulates. Unless this obstruction is removed the pigmentation is permanent, and has a tendency to become progressively worse.

This is well seen in cases of late pigmentation coming on some time after numerous exposures to the action of X-rays (Fig. 4).

It is possible that in the latter class of case another factor may

play a part, namely, decreased vitality of the individual cells, brought about by a diminution in their nutrition. Hertwig has shown in his investigations on *Eichhornii actinospharium* that when this organism is kept in hunger-cultures it becomes pigmented by the degeneration of part of its nucleus.

Loss of pigment may be explained as follows: Hertwig has shown that the actinospharium becomes pigmented by overfeeding as well as by starving. At the same time as the pigment increases in amount the nucleus increases enormously in size. If the overfeeding be continued until the animal loses its power of assimilation, the cell enters into a state which he designates as "depression." The state of depression is proportional in degree to the duration and extent of the previous overfeeding. If the depression does not pass off as indicated by a decrease in the size of the nucleus, there is physiological death of the cell.

In the cases of vitiligo I examined, the appearances in the epidermal cell corresponded very closely to the condition described by Hertwig ("as a state of depression"), as shown by the increase of size of the nucleus.

In vitiligo an increase of pigment takes place before the skin becomes depigmented.

I think the probable explanation of what takes place is as follows. The epidermal cells are stimulated to increased activity by some cause (probably toxic), and, in consequence, we find an increased formation of pigment. This stimulus being continued, the cells enter into a state of depression, in which condition their functional activity is in abeyance, therefore their pigment production ceases, and the pigment formed is gradually carried away by the lymph-stream, leaving the part free from pigment. The production of pigment does not recommence until the functional activity of the epidermal cell is restored.

I wish to thank my colleagues at the Manchester and Salford Hospital for the Diseases of the Skin for their assistance in collecting material, and also to express my indebtedness to Prof. Lorrain Smith for kindly advice during the course of my investigations.

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PLATE I.

FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

FIG. 5.

FIG. 6.

PLATE II.

FIG. 7.

FIG. 8.

FIG. 9.

FIG. 10.

FIG. 11.

Pigment und die pigment bildenden Zellen des Menschen und der Wirbelthiere in ihre Entwicklung. nebst Bemerkungen ueber Blutbildung und Haurwechsel, Heft vi, *Biblioth. mit Abth. D. Derm. u. Syph.* Herausgegeben von D. A. Leisser. Cassel, 1896, S. 61.

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DESCRIPTION OF PLATES I AND II.

PLATE I.

FIG. 1.—Pigmented papilloma stained with Leishmann's stain. Showing the arrangement of pigment in the epithelial cells bordering the attenuated papillæ. $\times 50$.

FIG. 2.—Pigmentation following the application of a mustard plaster, stained with hæmalum and eosin. Showing a narrow strip of myxomatous degeneration immediately below the epithelium. $\times 75$.

FIG. 3.—From the same as Fig. 2. Showing deposit of pigment in the basal layer of the epithelium and myxomatous degeneration immediately below the epithelium. $\times 160$.

FIG. 4.—X-ray pigmentation stained with eosin. Showing deposit of pigment in the lower epithelial cells, which are rounded in shape. The papillæ are quite obliterated; the normal tissue of the cutis is replaced by scar-tissue. $\times 300$.

FIG. 5.—Case of Xeroderma pigmentosum stained with hæmalum and eosin. Showing pigment deposited in the basal epithelium and darkly pigmented, various shaped and sized cells in the cutis. $\times 200$.

FIG. 6.—Lentigo which has been stained with Kulschitsky's hæmatoxylin after being treated with bichromate of potash for eleven days at 37° C. Showing blue granules along the basal epithelium; also the intercellular lymph-spaces of the epithelium mapped out with blue granules. $\times 200$.

PLATE II.

FIG. 7.—Leucoderma, Case 2.—Bichromated for seven days at 37° C.; and stained with Kulschitsky's hæmatoxylin. Showing blue granules in some of the

basal cells; other basal cells show no staining, also the intercellular spaces of the more superficially lying epithelial cells mapped out with blue granules. $\times 200$.

FIG. 8.—Leucoderma, Case 2.—Bichromated for twelve days at 37°C .; and stained with Kulschitsky's hæmatoxylin. Showing blue granules in some of the basal cells; also in the intercellular spaces of the more superficially lying epithelial cells, and a stream of blue granules from the epithelium to the perivascular lymphatics. $\times 200$.

FIG. 9.—Normal skin, bichromated for seven days at 37°C ., and stained with Kulschitsky's hæmatoxylin. Showing blue granules in the basal epithelium, also the intercellular lymph-spaces of the epithelium mapped out with blue granules. $\times 200$.

FIG. 10.—Transverse section of a hair-follicle, bichromated for twelve days at 37°C ., and stained with Kulschitsky's hæmatoxylin. Showing blue granules in the cells of the outer layer of the hair-follicle. $\times 200$.

FIG. 11.—Xeroderma pigmentosum, stained with Scharlach R. and hæmalum. Showing red staining in the basal layer, and the intercellular spaces of the epithelial cells mapped out with red granules. $\times 500$.

ROYAL SOCIETY OF MEDICINE.

DERMATOLOGICAL SECTION.

A MEETING of the Dermatological Section of the Royal Society of Medicine was held on Thursday, June 15th, Dr. T. COLCOTT FOX, President, in the Chair.

Dr. ADAMSON and Mr. McDONAGH showed sections of *sporotrichosis*. A full account of this case will be published in the next issue of the Journal.

Dr. H. G. ADAMSON showed (1) a case of *macular atrophy in a syphilitic patient*. The patient, William C—, aged 48 years, was a house painter. He attended the hospital on May 26th, 1911, for some patchy eczema on the arms and legs. It was then noticed that he had some leucodermic patches on the forehead and neck, and on stripping him the trunk was found to be covered with numbers of atrophic macules. The following note was made: "The patient is a well-built, well-nourished man apparently in good general health. The skin of the forehead and neck appears unusually dark, and scattered irregularly over these dark areas are numerous oval *leucodermic patches* of the size of a split pea up to that of a finger-nail. The leucodermic patches are very white and stand out sharply against the dark background. They are not quite of the type of