

creeps," but the feeling of shivering or terror does not pass without a like motor disturbance.

Among the causes of disease leading to the same alterations we might enumerate the pyrexial affections which, at times beginning with a more or less intense rigor, are followed by a general contraction of the cutaneous muscles. All the influences named act in a reflex manner, and are always rendered possible through the instrumentality of the central nervous system. Patients suffering from central affections, in whom the conduction from the centre to the periphery, or the reverse, is interrupted or diminished, show none of the above-named conditions.

Outside of the above-named conditions of contraction or spasm, the motor disturbances of the skin offer no important changes. In them, the muscular contraction is associated with that of the vessels, and subsequent displacement of the blood toward the interior of the body, and it is this sudden influence which causes the feeling of shivering; but when the molecular activity of the nerves becomes altered, we find altogether different sensations, the various forms of which we have already discussed in detail in treating of the disturbances of sensibility.

A N O M A L I E S

IN THE

GROWTH AND COLOR OF THE HAIR.

BY

PAUL MICHELSON, M.D.

KÖNIGSBERG (PRUSSIA).

ON EXPERIMENTS RELATIVE TO THE GENERAL ETIOLOGY OF ANOMALIES IN THE
GROWTH OF THE HAIR.

OF acknowledged importance in the etiology of anomalies in the growth of hair are, besides the inherited tendency, general disturbances of nutrition.

The injurious influence of unsuitable alimentation on the growth of hair may be demonstrated by Magendie's experiment, according to which dogs fed exclusively on cheese, and others fed on hard-boiled eggs, became weak and emaciated and lost their hair.

In more recent times, there is a progressive increase in the domain of those forms of alopecia in the causation of which trophoneurotic influences are at work, although very little has been done experimentally in this direction.

A very noteworthy experimental observation has been recently published by Brown-Séquard. He noticed that the offspring of guinea-pigs in which he had divided the sciatic nerve became epileptic, and whenever the epilepsy began to improve, the hair fell from the region of the epileptogenic zone on the head and neck.

Furthermore, Eulenburg observed falling of the hair from the posterior region in rabbits after chemical irritation of the sciatic nerve.

In my experiments on rabbits, the operation was always done on the nerve of one side, but both limbs were depilated. In no case was there even a temporary cessation of hair production on the operated side; on the contrary, in some of the animals the growth of hair proceeded even more rapidly on this than on the healthy side. The irregular manner in which the subsequent growth took place was conspicuous. Within the depilated territory supplied by the injured nerve, there appeared, a short time after the

operation, a good-sized bunch of vigorous hairs, quite isolated at first; and at an exactly symmetrical spot on the other side, a similar bunch, but of smaller dimensions. Then new insular bunches of hair sprang up on both sides beside the former; they gradually increased in extent, and finally coalesced. While the law of bilateral symmetry obviously influenced the above-described reparative process, still the restitution on the uninjured side was slower, and completed later.

Schiff stated that on the side on which the sympathetic had been divided the hair grew more rapidly.

Sigmund Mayer made the following observation: Both ears of an adult rabbit were simultaneously depilated, then on the one side pieces were excised from the cervical sympathetic and the great auricular nerve. After one and one-half or two months, the hairs on the injured side had grown to the length of two mm., while on the healthy side a distinct streak of hair only had developed along the course of the median artery.

A parallel experiment made by myself proceeded as follows: After both ears of a rabbit aged eight months had been completely depilated, I resected a piece of the left cervical sympathetic and the left great auricular nerve. At the same time the ears of a second animal of the same litter and precisely similar configuration were depilated without subjecting it to any other operation. The cervical wound of the former animal healed by suppuration, and the rabbit emaciated considerably during the first period after the operation. Still after twelve days there showed themselves on both ears, especially their external margins, small, colored hairs; subsequently, the restitution of the capillary growth progressed rapidly and uniformly on both sides and was completed in about ten weeks. In the non-mutilated animal, the health of which had remained permanently good, only a delicate uncolored down could be found after twelve days, and the growth during the following weeks was likewise tardier than in the operated rabbit.

In most recent times, the experiment on animals made by Lassar and Bishop has been relied upon in order to aid in proving the infectiousness of "alopecia præmatura."

The combings of a man, aged 25 years, affected with this disease were cut fine and intimately mixed with vaseline; this ointment was transferred to the skin of healthy rabbits and guinea-pigs with good fur, and rubbed into the intact epidermis. In the course of the third week a decided loss of hair became perceptible on the anointed parts, and within another week portions of the skin the size of the palm of a hand were entirely bald. With the loss of hair there was very ample branny desquamation of the epidermis. The hairs and scales of the original test animals were then transferred to other animals; at the end of the second week, they were already quite bald on extensive surfaces.

In order to control these results, I made the following experiment: A mixture of about three parts of vaseline and one part of rancid olive oil was rubbed daily into the skin of the back of a vigorous full-grown rabbit with an excellent growth of hair. As early as the beginning of the second week of the experiment a distinct loss of hair was noticeable on the anointed parts of the animal which was kept isolated and well nourished; on the twelfth day its hairy covering on those spots was much reduced, the hairs still present were very loose. The skin was covered with fine scales, but otherwise quite unchanged. On the sixteenth day of the experiment, complete baldness over the anointed part which, however, soon regained its normal growth of hair after the inunctions were stopped.

HYPERTRICHOSIS.

Most of the affections described under the name hypertrichosis offer not only a dermatological, but also an anthropological interest.

We classify the cases of unusual trichosis of man, *i. e.*, the occurrence of a beard in women or an abnormal growth of hair, whether in one or the other sex, spread over a more or less extensive portion of the body, as follows:

I. Hypertrichosis, probably due to heredity or a tendency acquired during intra-uterine life, hypertrichosis *indoles hereditaria*.

a. Hypertrichosis *universalis*.

1. The abnormal pilosis of the so-called "hairy men."
2. The general profuse pilosis of the male body.

b. Hypertrichosis *localis*.

1. The abnormal pilosis of a region the skin of which is apparently unchanged.
2. The abnormal pilosis on pigmented and thickened (hypertrophic) skin.

II. Abnormal pilosis due to pathological influences acting during extra-uterine life, hypertrichosis *acquisita* (hypertrichosis *transitoria*—Klebs).

1. By neurotic influences (hypertrichosis *neurotica*).
2. By cutaneous irritations (hypertrichosis *irritativa*).

It is to be emphasized that the baldness of those parts which normally are not even covered with lanugo, and are absolutely hairless (palms of hands and soles of feet, ungual phalanges of fingers and toes, inner preputial surface, glans penis, vermilion border of lips and upper eyelids), is not altered by hypertrichosis. The proliferation always develops from preformed hair-germs.

I. *Hypertrichosis Indoles Hereditaria*.

As the best known specimens of *homines pilosi*, we enumerate: the East Indian



FIG. 26.—Andrian Jeftichjew, "the Russian Dog-Man."

family of Shwe-Maong, Andrian Jeftichjew, "the Russian dog-man" and his son Fedor,

and the "hairy family of Ambras." Common to these cases is a thick growth of hair extending over the whole body (excepting the parts mentioned), although by no means uniform throughout; naturally it is particularly conspicuous in the face, and there seems also most largely developed, thus giving to the type of the highest degree of hypertrichosis universalis s. hirsuties a decided animal cast.

Jeftichjew's portrait recalls the picture of a Scotch terrier. But the features of hairy men have also a certain resemblance to each other, which is caused by an essentially analogous arrangement of the hair.

We know from the labors of Eschricht¹ and Voigt² that the hairy investment with which the skin of the foetus covers itself in the fifth and sixth months of intra-uterine life maintains quite definite directions ("hair currents and eddies"); from these same "seed furrows," in the course of which there are usually only moderate individual differences, springs also the hairy growth of the homines silvestres. This growth of hair, moreover, is nearly always described as soft, woolly, or silky, resembling wool rather than real hair. Hence Ecker has concluded that universal hypertrichosis should be considered an arrest of development, a persistence and further growth of the embryonal hairy coat.

The hereditary basis of the abnormality is generally demonstrable; in the family of Shwe-Maong, it was observed through the third generation. As a rule, we also find in hairy men congenital dental defects. This conjunction cannot be purely accidental, for we see it repeated in very different and widely separated regions. The grandfather of the Burmese "hairy family" entirely lacked the twenty molars, of the four canines he had but one, nor were there any alveolar processes for the absent teeth. The daughter of the latter is likewise without molars and canines. Statements as to the tooth-formation of her children are not on record. A similar defect is also shown by the Russian hairy man. His upper jaw is quite toothless, excepting the left canine, but the teeth of the lower jaw are complete; at the time of the examination of his son Fedor, then three years old, the upper jaw was toothless, and there were but four incisors in the inferior maxilla.

The simultaneous occurrence of irregularities in both systems, the hair and the teeth, odontogenetically derived unitedly from the corneous layer, has been repeatedly observed. Danz,³ Sedgwick,⁴ and others report cases of congenital baldness with inherited complete or partial defect of the teeth; hence the dental defect cannot be looked upon as compensatory to the superabundant growth of hair.

Generally strong pilosis of the male body, developed not uniformly, but chiefly over certain parts of the skin, as the face, chest, back, dorsal surface of the extremities, is hereditary in some families, and presents, as it were, a slighter degree of hirsuties congenita. For these cases likewise the law is valid that the abnormal pilosis exactly follows the direction of Eschricht-Voigt's lines.

Anomalous trichosis confined to isolated parts of the skin is found in the occurrence of a beard in women. With Bartels we might here distinguish three degrees: First, the so-called "Bärtchen" (little beard) of young women, in fact merely a somewhat stronger growth of the lanugo which is always more largely developed in the situation of the beard than elsewhere—the upper lip, the masseter region, at times the chin. In the second

¹ Müller's Arch. f. Anat., Phys., etc., Jahrg. 1837, pp. 37 et seq. Denkschr. d. Wien. Acad. d. Wissensch. (Math.-naturw. Kl.), Bd. 13, 1857.

² B. Eble, l. c., p. 245.

⁴ Cited by Darwin, "Variiren d. Thiere u. Pflanzen," Bd. 2, p. 434. Stuttgart, 1868.

degree, hair likewise sprouts from the regions typical of the male sex, but those affected are generally beyond the climacteric period and have previously shown no very pronounced tendency to the development of a beard; many of them incline also in otherways (deep voice, large bones) toward the virile habit. The several hairs are generally thick, bristle-like, but not very close together. Finally the third degree is the rarest: actual beards occur in women of every age, of course by preference again in such as are past the bloom of youth. In this category belong, among others, the well-known case related by Beigel, of a Swiss woman aged twenty, in the fifth month of pregnancy, who presented herself in 1852, with a goatee and moustache four inches in length, at a London hospital, in order to obtain a certificate as to her sex.

As "heterogeny of trichosis" would have to be enumerated in this connection the premature development of hair associated with sexual precocity which always appears in the places typical of the respective sex—in girls only on the genitals, in boys, besides, on the chin, the upper lip and the cheeks, often also the chest. As an example we cite Beigel's case of a child aged six years, whose pudenda resembled those of a woman of twenty, both respecting their general development and their hairy covering.

Circumscribed hypertrichosis on an apparently unchanged portion of the skin, which normally is not provided with dense growth of hair in either sex and at any time ("heterotopy of trichosis"—Bartels), has been observed especially in the sacral and lumbar region, in the latter several times complicated with spina bifida.

In Ornstein's case of sacral trichosis we notice that the direction of the hairs corresponds to the neighborhood of Voigt's "coccygeal cross."¹ The latter is only displaced slightly upward, which is not of unusual occurrence.²

A hereditary family peculiarity is quite notable at times in the shape of a hair proliferation met with in the face of older men, combined with increased density of the hairs of the beard and eyebrows. At the external ear, on the bridge of the nose, within the nostrils and the auditory canal, bunches of thick, chiefly gray or white hairs spring forth—a process probably parallel with the development of a beard in women beyond the climacteric.

We now come to the abnormal trichosis on pigmented, or pigmented and thickened skin, an illustration of which is found in the adjacent figure.

Dr. Schulz, Regimental Surgeon, to whom I am indebted for the photograph and notes of this case, first observed the patient in 1878.

¹ Voigt, l. c., p. 13, and Plate I, Fig. 4.

² Comp. A. Ecker, "Der Steisshaarwirbel," etc. Arch. f. Anthropol., Bd. 12 (1880), p. 132.

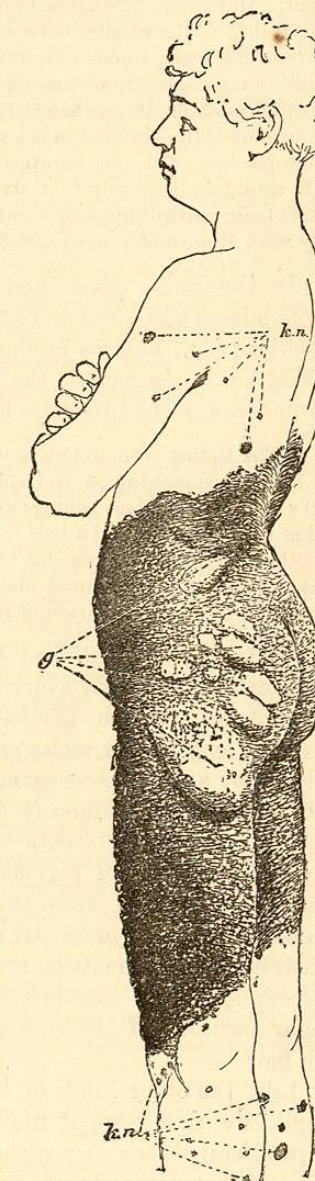


FIG. 27.—Large naevus pilosus in the shape of bathing-tights. Within it, several benign tumors (Fibroma molluscum) g. External to it also numerous smaller naevi, k.n., k.n.

This individual, named Balke, stated that he was born with the large nævus spreading over the upper part of the thighs and the lower portion of the trunk, in shape like bathing-tights and resembling the pelt of an animal; the same was true of the smaller hairy spots (*k.n.*) and the larger and smaller tumors (*g*). Subsequently the altered portions of the skin had gradually become somewhat larger. Hereditary predisposition could not be determined. The skin of the large hairy nævus, as well as that of the smaller ones, is stated by Dr. Schulz to have been in the main thickened, in part uneven, verrucose, in color from very light to intensely dark brown; the consistence of the larger mammiform and smaller tumors, soft, doughy-elastic. The integument of the tumors was paler, smoother, and much less hairy than the surroundings and did not firmly adhere to the tumors. The tumors being situated in the subcutaneous cellular tissue, could also be displaced on the underlying muscles. The photographs were rather inferior in technical execution; but they permitted me to ascertain definitely that, whenever any positive arrangement of the short (at most three centimetres long, according to Dr. Schulz), dark and curly hair was evident in the picture, it agreed exactly with Eschricht-Voigt's foetal lines of direction.

In the Balke case, therefore, there was a combination of a congenital very large nævus pilosus and a number of smaller ones with congenital tumors, which may be classed as benign, *i. e.*, fibroma molluscum (Virchow). The same combination has been observed by Walther.¹ As regards the at first sight so very striking extent of the large nævus, a search through the literature brought to light several parallel cases.

1. The Indian woman Orangutang presented at the office of the *Lancet* (*The Lancet*, l. c.). 2. The Milan case mentioned by Hebra (l. c., p. 30). 3. H. Hildebrandt's case No. 1 (l. c.). 4. Ruggieri's case (l. c.). Here belongs also 5, the case described by Jablokoff and J. Klein, of a girl, who died at the age of six and a half months of tuberculosis. 6. The case figured in Hebra's atlas² over the title "carcinoma melanodes" would exactly correspond to the Balke case, were it not that the limit of the darkly pigmented nodular skin falls higher on the right thigh than the left, about corresponding to the distribution of the lumbo-inguinal nerve.³

All the above-mentioned hairy moles have in common: the bilaterally symmetrical arrangement; in nearly every one either the upper or the lower limit coincides with the course of the cutaneous nerves.

That larger hairy moles may also develop unilaterally in the region of certain nerves is shown by a nævus occupying the domain of the second branch of the trigeminus, figured by Fr. A. v. Ammon (l. c.).

The quality of the skin in the nævi under consideration is generally described as varying in intensity of pigmentation (gray to black), rarely as smooth, chiefly as rough, somewhat thickened, verrucose, nodular. Smaller warty nævi pilosi, frequent concomitants of every kind of hereditary hypertrichosis, are often found beside the large moles; a definite arrangement of these small nævi is generally not clearly recognizable. In Hildebrandt's first case (see above), in midst of the hairy, darkly discolored surface, insular portions of the skin appear more greatly thickened and more densely covered with hair.

Like the other kinds of hypertrichosis, nævi crinosi likewise are congenital or develop in the first years of life on an hereditary basis; in them, too, the arrangement of the proliferated hair corresponds to the lines of direction of the embryonal hairy investiture. If this circumstance is not everywhere equally evident in the illustrations, this is probably in part owing to the fact that the real arrangement of short and curly hair is

¹ Ph. Fr. Walther, "Ueber die angeborenen Fetthautgeschwülste." Landshut, 1814, in Rayer, l. c., p. 282.

² Plate X., No. 10.

³ Comp. Schwalbe, "Lehrb. d. Neurologie." Erlangen, 1881, p. 979.

often difficult of recognition. By applying moisture along the "nap" of the hair, the confusion may be cleared up.

Etiology and Anatomy.—We possess but little positive knowledge respecting the etiology of hypertrichosis, outside of hereditary predisposition. The attempt to explain it as atavism according to the doctrine of descent, lacks for the present every solid basis.

Virchow was inclined to seek a "neuristic" explanation, and he called particular attention to the fact that in the "wild men of the woods" the most essential alterations lie in the region of the trigeminus.

It has been already indicated that the more extensive proliferation of hair on thickened, or pigmented, or thickened and pigmented skin follows the course of certain nerves more closely than the other categories of hypertrichosis belonging here.

But whatever may be the basis on which the anomalies belonging to our first class are developed, we have to deal with a hypertrophic condition of the hair matrix. Considered from this point of view, there is then merely a difference in degree in the hypertrichosis on a cutaneous surface which is thickened, verrucose, or even partially interspersed with fibroma molluscum; for the latter is in the main nothing but a hyperplasia of the skin and the subcutaneous cellular tissue.

NOTE.—Most modern authors, following Virchow (l. c., p. 339), sharply separate hypertrichosis on thickened, or thickened and pigmented, skin from the proliferation of hair on the unchanged cutis. In our opinion, however, these anomalies are genetically equivalent; but we shall refer to some of the literature which shows that there are manifold analogies and transitions between the congenital alterations of the skin now under discussion. 1. Lombroso's case (*Giorn. ital. d. mal. ven.*, etc., 1871, ref. in *Viertjschr. f. D. u. S.*, 1871, p. 294). Microcephalic girl, hypertrichosis universalis, changes in the inferior maxilla and the teeth. The skin is defined as dark (30-54 of Broca's scale). 2. Virchow's description of Fedor Jettichjew. Besides the hypertrichosis in the face and the adjoining parts, insular patches of more intense pilosis on the back and arms. 3. Gerhardt, *Jahrb. f. Kinderheilk.*, 1871 (iv., 3, pp. 270 et seq.), case 1. Neuropathic cutaneous papillomata on the right side of the trunk, right arm and left half of the face. In the left half of the mouth several teeth are small and irregular. 4. Same author, *ibid.*, case 2. Congenital warty, light to dark brown excrescences, intermingled with spots of the same color. 5. Fibroma molluscum with pigmented cutaneous surface, but without hypertrichosis has been observed many times. Especially interesting is the second case of Dyce Duckworth (ref. in Schmidt's *Jahrb.*, Bd. 167, p. 183)—besides the tumors covered with dark skin, pigment spots on the back, shoulders, and legs—and particularly the masterly description of v. Recklinghausen's first case ("Multiple Fibrome der Haut," Berlin, 1882): Multiple soft fibromas of the external skin and subcutaneous tissue, multiple fibromatous neuromata of the cutaneous nerves, the trunks and branches of the nerves of the extremities, the sacral plexuses, the vagi and the abdominal sympathetic, the frontal branches of the trigeminus, some muscular twigs of the obturator nerve, etc. On the skin, innumerable lentil-sized pigment spots, a larger one on the left buttock; also, intense, diffuse brown coloration along the external side of the thighs, around the external pudenda, in the sacral and inguinal fold, and in the skin on the top of the shoulder.

A detailed autopsy is on record of the Jablokoff-Klein case (see above).

The cause of death was tuberculosis. In the corpus striatum and cerebellum were three small, blackish-brown, sharply defined nodes. Two slate-colored spots in the pons Varolii and one of the temporal convolutions. From their histological character, Klein interprets the nodes in the brain as sarcomata, probably of metastatic origin. The seat of the pigment accumulation in the skin was the stratum mucosum and the papillary layer; here, as in the melanotic cerebral nodes, the pigment was found partly in irregularly scattered round cells, partly and chiefly in regularly arranged spindle-cells which occupied the adventitial spaces of the transitional vessels and the capillaries. The spinal ganglia were unchanged.