fingers and toes, the inside of the labia majora, the prepuce and glans penis. The hair of the trunk is somewhat softer than that of the pubic region and scalp. Both sexes are affected in much the same way. The hair grows away from certain well-defined centres. On the forehead it grows to the right and left from a line down the middle of the forehead; on the back downward and outward from the spinal column; and the common centres of distribution are preserved upon the limbs and scalp. With the excessive growth of hair there is a deficiency in the development of the teeth, and the subjects of this deformity are usually of small size.

Reports have been published of several families of hairy people. Perhaps the best known is the Kostroma father and son, both of whom have been exhibited before the public. The son was for some years in a circus combination in this country under the name of "The Russian Dog-faced Boy." The writer saw him in 1886 when he was sixteen years old. He seemed to be a well-developed boy, though short in stature, muscular, active, energetic, and intelligent. He was said to be in good health and good-tempered. The accompanying picture shows the growth of the hair on his face. The hair was fine, glossy, blond, and about four inches long. The trunk was covered with hair that was specially well-marked down the spinal column, where it stood out like the mane of a horse. The body hair was very fine and more fluffy than that on the face. He had a cast in one eye and was near-sighted. He had only five teeth, two upper canine, and two lateral and one middle incisor, and these were misshapen and discolored.

Partial Congenital Hypertrichosis is of more frequent occurrence than is the universal form.

Many of the so-called cases are instances of nævus. True cases are most often associated with spina bifida, a growth of long hair being found on the lumbar region. Ornstein (*Berlin. Gesellschaft f. Anthropol.*, 1876, 1877, and 1885) says that sacral hypertrichosis is very common among the Greeks, and reports two cases of tails in Greek soldiers. One was one quarter of an inch long and cone-shaped; the other was not so long and was stumpy.

Bearded Women.—This is the form of hypertrichosis that is of most interest. Hair appears on the face of a woman at two distinct periods of life, namely, at puberty, and at middle life in connection with the menopause. The most difficult cases to manage, because the amount of the hair is the greatest, is the form that begins in early life. As in a man the hair continues thickening in amount until twenty-five or thirty years of age. At first the growth is fluffy, fine, lanugo-like. If left alone it may remain so for many years. If attempts are made to destroy it by pulling, shaving, or using depilating powders, it grows more rapidly coarse. Even if left to itself it will grow coarser in time. While all the regions spoken of as the bearded portions of the face are affected in pronounced cases in women, the growth is usually most marked on the upper lip and chin. In a few cases the beard is as coarse and full as that of the average man, though commonly there is but little hair on the lower lip. Such a growth on the face of a young woman may have a bad effect on her mind. She is apt to become abnormally sensitive about even a very moderate growth, attempts in many ways to destroy it, and only makes matters worse; in some instances she may become insane.

When the hair does not begin to grow coarse until the menopause it rarely grows to any great extent. Commonly there are only a few stiff hairs scattered about the chin and on the upper lip.

Transitory Hypertrichosis is met with. Such are growths of hair on a limb which has been for some time confined in a fracture box; that which comes after injury to certain nerves; that which follows prolonged irritation of a part by blisters. In such cases the exciting cause being removed the hair falls from the part. In some women the hair will grow on the face during pregnancy or amenorrhœa, the hair disappearing after delivery or the relief of the amenorrhœa.

ETIOLOGY.—Many theories have been formed to account for general hypertrichosis. Unna's theory is probably correct, which is that it is due to the persistence of the fœtal or primitive hair, the change in type from the fœtal to the permanent hair for some reason not taking place. It is known that at a certain time in its intra-uterine life the fœtus is covered with fine hair. Before birth this hair is all shed. Some children do not complete the change in type until a short time after birth. In the general hypertrichosis cases no change in type occurs. The occurrence of subsequent cases in the same family is doubtless due to heredity.

The cause of hirsuties on women's faces is heredity in the great majority of cases. Reversion to the male type, the woman bearing a markedly strong resemblance to her father, may account for some cases, and perhaps for the first case in a family that afterward shows this trait in many of its women. That there is some relation between proper functioning of the organs of reproduction and the hair on the face, as shown by absence of the one and the presence of the other, is evident; still in the great majority of patients no such relationship can be traced. Such influence is most constant and most pronounced at the time of the menopause. Few of my patients have shown masculine traits, and many of them have been mothers of several children.

Local partial acquired hypertrichosis is due to an increased blood supply to the part from the application of blisters and the like. Certain forms of insanity are attended with hypertrichosis.

TREATMENT.—For universal hypertrichosis there is practically nothing to be done, not because the hair could not be destroyed, as in the partial cases, but because the work would be endless.

For partial cases due to local causes nothing need be done, because the hair falls of itself when the local stimulant ceases to act. It is in hirsuties in women that our aid is chiefly called for, and the treatment effective in that form is equally effective in all forms of partial acquired or congenital hypertrichosis. The only means at our command that is at all reliable is electrolysis, and that is absolutely effective. We owe this operation primarily to Dr. Michel, of St. Louis, who invented it for the destruction of ingrowing eyelashes, he being an ophthalmic surgeon. Dr. W. A. Hardaway, of the same city, first used it for the cure of hirsuties and introduced it to the notice of the medical profession.

The requisites for the operation are a constant-current galvanic battery, a sponge electrode, a needle-holder electrode, needles, a pair of epilating forceps with easy spring, good eyes, and a steady hand. A reclining chair that can be raised or lowered is a convenience. I always use a dentist's chair. If the operator's eyes are not good it will be necessary for him to wear glasses. A needle-holder electrode with a lens attached is on the market.

The patient must be placed in front of a window, preferably one with northerly exposure so as to avoid the glare of the sun. She is given the sponge electrode, moistened with a solution of baking soda, and attached to the positive pole of the battery. Some prefer that the positive pole should be immersed in a bowl of water, and that the patient place her fingers in this. The needle, which is either a steel jeweller's broach, No. 5, 7, or 8, or one of platinum, is placed in the needle electrode attached to the negative pole of the battery. The operator takes hold of the hair with the forceps, puts it slightly on the stretch, and passes the needle into the hair follicle alongside of the hair, and to a depth of about an eighth of an inch. If the needle is properly passed no resistance will be felt. If not, one feels the tissues give way under the pressure of the needle. The needle being in place, the patient is told to place her hand on the sponge or into the water, as the case may be, and thus the current is caused to run. The patient experiences a burning sensation somewhat like the sting of a bee, a little frothing takes place about the needle, and in a few seconds the hair will leave the follicle on slight traction. The hair is always to be removed by the operator. As soon as the hair is out the patient removes her hand from the sponge and the operator then withdraws the needle. It is important always to follow this exact order of inserting the needle before having the hand placed on the sponge, and removing it after the hand is taken off from the sponge so as to avoid the slight shock that otherwise would be felt.

The amount of current to be used varies with the patient's ability to endure pain, and with the place upon which it is necessary to work. A milliampèremeter is a comfort in working, and a current strength of 1 to 2 milliampères is adequate for the work. If one has not the metre the current strength may be roughly said to be that from six to eight freshly charged cells. Most pain is felt on the upper lip and the nearer to the nose we go the greater is the pain. From forty-five to seventy hairs can be removed in an hour. The coarser the hair the fewer can be removed in the time. There is no scarring in the majority of cases, excepting on the upper lip, where it is difficult to avoid slight pitting of the skin. Some skins will show the marks of the work in the form of pitting, just as some skins will develop keloidal scars after slight wounds. A certain number of hairs will come back, because it is not possible for any one exactly to hit the hair papilla every time. The returns will vary from fifteen to twenty-five per cent., and more if the operator is not skilled. This necessitates going over the face a second or third time. Care must be had not to take the hairs out in too close proximity, at least one hair being left between every two extracted. If this precaution is had the danger of scarring will be greatly reduced.

Attempts at destroying hair by other means have been made. Next to electrolysis the best method is probably by the use of what is called the *Microbrenner*, a fine needle heated to a white heat by an apparatus like the Paquelin cautery. I have had no experience with it, but some of our German confrères speak enthusiastically of it, saying that more hairs can be permanently destroyed by it in a given time than by electrolysis. Treatment by the *x*-ray is the most recent method. Permanent results have been reported. I should be afraid, however, to use this method on account of the danger of burning.

Depilating powders are worse than useless. They simply burn off the tops of the hair and have no effect on the roots. The consequence is that the hairs become rapidly coarser as in shaving. Those that are most used are one composed of sulphuret of barium, ʒ iss.; oxide of zinc, ʒ vi., and carmine, gr. i.; and one of sulphide of soda, ʒ ij., and prepared chalk ʒ vi. These powders are mixed with water at the time of using and thus made into pastes that are spread on the skin. The first is to be washed off in three minutes and the last in ten or fifteen minutes. *George T. Jackson.*

HYPERTROPHY.—In its broadest sense hypertrophy is an increase in substance of an organ or tissue, due either to an increase in the number or size of its individual elements, or to a combination of both these changes, without other alterations of structure. An increase in size alone of the individual cells is known as *quantitative* or *true hypertrophy;* increase in the number of cells alone as *numerical hypertrophy* or *hyperplasia*. The gross changes in hypertrophy are: increase of size and weight, in the case of hollow organs a thickening of the walls; increase in consistence; and in the case of muscle a darker color due to an increased formation of muscle pigment. Hollow organs when viewed externally may not give evidences of hypertrophy, since the increase of size may take place at the expense of the cavity, as in the case of concentric hypertrophy of the heart. The weight of an organ is the most reliable standard for the judgment of hypertrophy, but it must be borne in mind that both increase in size and weight of tissues may be due to other pathological conditions than true hypertrophy or hyperplasia. It therefore becomes necessary to make sure that an apparently hypertrophic organ is of normal structure, and this is possible only on microscopical examination.

Microscopically, true hypertrophy is shown by increase in size of the individual cells with increase in size and staining power of their nuclei. Since there are individual differences in the size of cells a standard of comparison can be obtained only by the most exact measurement of the cells of the tissue in question. Hypertrophy of the nucleus may exist without enlargement of the cell body. The practical distinction between true hypertrophy and hyperplasia is often difficult; they usually exist together. Numerical atrophy may be combined with true hypertrophy, the cells may be increased in size, while diminished in number; on the other hand hyperplasia is often accompanied by a loss of bulk on the part of the individual elements. Only very rarely do all the cells of a tissue or organ show a uniform hypertrophy, atrophic cells usually exist side by side with those of increased size.

The causes leading to hypertrophy may be either intrinsic or extrinsic. In the former case morbid impulses to growth or multiplication either exist in the germinal cells or arise through germ variation. Such impulses may develop during either intra- or extra-uterine life. They may be ascribed to an increased tendency to growth and cell multiplication or to an absence of the normal inhibitory ~~influences~~, but beyond such theoretical explanation we cannot as yet venture. Intrinsic hypertrophy is usually spoken of as congenital or inherited hypertrophy. The hypertrophies not dependent upon congenital tendencies are usually the result of an increased functional demand, increased nutritional activity, or of a disturbance of the normal equilibrium between growth and decay. Underlying hyperplasiæ are the factors leading to cell division.

Intrinsic Hypertrophy.—The more common forms of overgrowth due to congenital tendencies are: general and partial giantism, ichthyosis, elephantiasis, lipomatosis, hypertrichosis, hyperonychia, onychogryphosis, leontiasis, exostoses, etc. Hypertrophy due to congenital excessive impulses of growth rarely affects the internal organs; but certain hypertrophies of brain, thymus, lymph glands, spleen, etc., are at present explained as being of congenital origin. It is impossible to say to what extent the various forms of hypertrophy mentioned above as being of congenital origin are in reality the result of intrinsic forces, since similar proliferations, ichthyosis, elephantiasis, etc., may be caused by external influences. However, in those cases in which the hypertrophic growth is of hereditary nature and appears early without adequate extrinsic cause, the grounds for considering the existence of a congenital predisposition are very good. Even in those cases in which the overgrowth was excited by external injurious influences the existence of a congenital predisposition is not precluded, since we know by experience that such causes give rise to pathological changes of this nature only when there is a special predisposition inherent in the tissues.

Acquired Hypertrophy.—The most common varieties of hypertrophy due to extrinsic influences without the co-operation of congenital predispositions are: hypertrophy due to increased functional activity, hypertrophy caused by lessened wear, hypertrophy resulting from failure of involution, hypertrophy caused by removal of pressure, and finally hypertrophy caused by chronic irritation, either chemical, mechanical, or infectious.

Hypertrophy from overwork occurs most frequently in muscles and glands, rarely in other tissues. The physical and chemical changes in the muscle cell or gland cell resulting from increased function in some way stimulates cell growth. The degree of the hypertrophy depends upon the age of the individual and the general state of the nutrition. Increased work on the part of the heart due to valvular, arterial, pulmonary, or renal conditions causes a more or less marked hypertrophy of that part of the heart upon which the greater share of the work falls. Such hypertrophy being in compensation for the disturbances of circulation produced by the primary pathological condition is known as *compensatory hypertrophy*. Either side of the heart alone may be affected or the

entire organ may become enlarged. Further, hypertrophy of individual muscle bands or layers may occur according to the functional demands of the case. Compensation is more nearly complete in the case of young and well-nourished individuals. Increase in bulk of the voluntary muscles follows increased muscular exercise. The fibres increase both in length and in thickness, and there is most probably an increase also in the number of the fibres. Hypertrophy of individual muscle groups occurs in certain trades or occupations (laborer's hypertrophy). Hypertrophy of the involuntary muscle occurs physiologically in the pregnant uterus, the muscle cells attaining a size of seven to twenty times the normal length and five times the normal breadth. In the case of uterine tumors and hæmatometra hypertrophy of the uterine wall may also occur but to a less degree. Hypertrophy of the muscular coat of blood-vessels occurs in conditions of increased blood pressure, particularly in the case of the dilatation of vessels in the establishment of a collateral circulation. In the case of enlarged prostate, urethral stricture, calculi, etc., the bladder walls may become greatly thickened; a similar hypertrophy of the muscularis of stomach and intestines may occur above a stricture.

Of the glandular organs the kidneys and liver are most capable of undergoing hypertrophy. In increased functional activity of the kidney, as in the case of diabetes and excessive drinkers, both kidneys may become enlarged. Compensatory hypertrophy of one organ may take place after the destruction or removal of the other, so that the remaining kidney may in size and weight equal or exceed that of two normal kidneys. The younger the individual, the more complete the compensation. On microscopical examination the enlargement is found to be due chiefly to a hypertrophy of existing structures, but in young individuals a hyperplasia of tubules and glomeruli also occurs.

Hypertrophy of the liver as a whole is extremely rare.

Destruction of a portion of the liver substance is followed by a hypertrophy of the remaining normal liver tissue. The lobules become larger and also increase in number. In animal experiments it has been shown that complete restoration of as much as half of the organ is possible. In simple or inflammatory atrophies of the liver hypertrophy of single cells is very common.

Destruction of one adrenal may be followed by compensatory hypertrophy of the other. In the case of the salivary glands, mammæ, ovaries, and testicles, compensatory hypertrophy does not take place at all or only to a slight degree, except during the developmental period. Hypertrophy of the mamma has been found in connection with galactorrhœa, and in one-sided lactation after loss of one breast.

Removal or destruction of a portion of the thyroid is rarely followed by hypertrophy of the remaining thyroid tissue, but the hypophysis suffers an enlargement which must be regarded as compensatory in nature. The writer has seen in a case of acromegaly an enormous hypertrophy of the parathyroids which might possibly be explained as being of the nature of a compensation for the hypophysis.

Agenesia or aplasia of one lung may be compensated by hypertrophy of the normal organ, and a similar compensation may occur in early life in conditions leading to disuse of one lung. In later years, however, the loss of one lung is followed only by an emphysematous distention of the other, which usually leads to atrophy of the alveolar walls and not to hypertrophy. Emphysematous distention of the air spaces with hyperplastic thickening of their walls has been observed in the lungs of athletes, singers, and players of wind instruments.

Compensatory hyperplasia of the different blood-forming organs, spleen, lymph glands, and bone marrow in conditions affecting one or the other is not uncommon. In various forms of anæmia, leukæmia, etc., where the function of either the spleen or bone marrow is inadequate, the hæmolymph glands become enlarged and suffer structural changes by which they come to resemble either splenic tissue or lymphoid marrow.

Compensatory hyperplasia of the fibula has been observed in cases in which through disease the tibia had been rendered useless in the support of the body.

Hypertrophy from lessened wear occurs particularly in the case of the nails and teeth. If the wear of the nails be prevented, or if they are left uncut, they may become very much enlarged. Teeth growing irregularly, so that the cutting or grinding surfaces are not brought into apposition develop into the so-called tusks. In animals the claws and beaks of birds, and the teeth of rodents may through disuse form extensive overgrowths.

Removal of pressure as in the case of atrophy of the brain may lead to a thickening of the inner table of the skull. Similarly in other regions of the body removal of the normal pressure is often followed by hyperplasia of the adipose tissue.

Failure of the normal involution of the uterus after pregnancy gives rise to an abnormally large uterus during the non-pregnant state. The thymus gland instead of disappearing at the usual period may persist or even show enlargement.

As the result of slight prolonged or frequently repeated mechanical irritation local hyperplasias of tissue may arise (local ichthyosis, callus, corns, etc.); hyperplastic overgrowths are also caused by chemical action (hypertrophy of bone caused by phosphorus and arsenic); and finally infective inflammations frequently give rise to overgrowths or new formations of tissue (condyloma, tuberculous and syphilitic processes, actinomycosis, etc.). Chronic inflammations of the skin are often characterized by hyperplasia of fibrous connective tissue resembling elephantiasis; in syphilis extensive overgrowths of bone not infrequently occur. In inflammatory affections of the lung and pleura, as well as in congenital heart lesions, enlargement of the terminal phalanges and articular ends of the long bones may occur (ostéoarthropathie hypertrophiante). The so-called clubbed or drum-stick fingers acquire an important diagnostic significance in these conditions. Hyperplasia of the spleen and of the lymph-adenoid tissue throughout the body is of not infrequent occurrence. The nature of such overgrowth is as yet obscure, but it is most likely of infectious or toxic origin. In a number of cases the hyperplasia of the lymph glands has been shown to be an atypical tuberculous process.

The extensive hypertrophy of the bones and internal organs observed in the condition known as acromegaly forms one of the most interesting varieties of the acquired hypertrophies. The nature of this disease is as yet unknown; in the majority of the cases an adenomatous hyperplasia of the hypophysis has been present and this has been regarded as the cause of the disease. Other writers have explained it as due to a congenital predisposition, to disturbances of the pineal body, sexual organs, thymus, or thyroid, or to abnormal nervous influences.

General Considerations.—Both true hypertrophy and hyperplasia are to be regarded as being of unstable nature, inasmuch as they depend upon the duration of the cause and the increased supply of nutrition. Increase of size demands also increase of space, and in the case of some of the organs and tissues a space limit may be ultimately reached. Hypertrophic tissue requires hypertrophic vessels to furnish the increased amount of blood needed. Changes in the vessels or in the circulation by which the supply of nutrition is diminished lead quickly to atrophy and fatty degeneration of hypertrophic tissue. Similarly diminished functional activity, particularly in the case of the heart and voluntary muscles, is followed by rapid fatty degeneration of the muscle fibres. Further, the inherent vitality of cells, particularly their histogenetic vitality, is limited; tissues which have used up their reserve in compensating for some deficiency are the sooner exhausted. A heart in a state of compensatory hypertrophy may not be able to meet ordinary emergencies which under normal conditions have no effect upon the non-hypertrophied heart; that is, a heart though hypertrophic may be insufficient. Sooner or later, therefore, a failure of compensation must occur, such failure depending upon many factors: inherent cell vitality, conditions of nutrition and removal of waste products, functional activity, etc. In general it may be said that, while fully developed heart and voluntary muscles are desirable, compensatory enlargement due to excessive exercise, increased nervous stimuli, etc., as in the case of the "athletic heart," "smoker's heart," etc., must be regarded as distinctly pathological, inasmuch as such hypertrophy is at the expense of the heart's reserve power.

Aldred Scott Warthin.

HYPNOL.—This is the product of the combination of antipyrin and chloral in definite proportions. It was introduced by Bardet in 1890, who gives its preparation as follows: Mix a solution of 47 gm. of chloral hydrate in 50 c.c. of distilled water, with a solution of 53 gm. of antipyrin in 50 c.c. of distilled water, and after an hour remove the oily fluid from the aqueous layer. At the end of twenty-four hours this solidifies into a mass of rhombic prisms. The salt is colorless and soluble in five parts of water. It is said to have the combined effect of its constituent drugs and has been recommended as an hypnotic in sleeplessness, especially when accompanied by pain. The dose is from ten to fifteen or twenty grains. It has a less disagreeable taste, and is less disturbing to the stomach than either chloral or antipyrin and forms an excellent means of administering these two drugs, which are incompatible in all other proportions.

Beaumont Small.

HYPNONE.—Acetophenone, $C_6H_5CO.CH_3$. This chemical compound has long been known to chemists and classed as a ketone. It bears somewhat the same relation to chloral that ether does to alcohol. It is a colorless liquid at 70° F., very volatile, and possesses a sharp caustic taste and a penetrating odor, resembling bitter almonds. At 57.2° F. it solidifies. It is soluble in alcohol, ether, and fixed oils, but is not soluble in water or in glycerin.

Acetophenone was introduced as an hypnotic, in 1885, by Dujardin-Beaumetz and Bardet under the name of hypnone. It was thought to be of particular value in the insomnia of insanity, alcoholism, and nervous disorders. It, however, has fallen into disuse on account of the uncertainty of its action. The dose was given as from three to ten minims, but much larger quantities have been given without producing any effect. As much as twenty minims have been given hypodermically in cases of insanity. No bad effects have been recorded from its use. Experiments upon lower animals show that its prolonged use lessens the hæmoglobin of the blood and produces emaciation. Death is caused by respiratory failure, following muscular paralysis and coma.

Beaumont Small.

HYPNOSIS.—Hypnosis is a subjective, induced condition of the mind in which the normal influence of the judgment and volition are more or less restricted, while the susceptibility to suggestion is enormously increased. To the ordinary observer it seems to be a trance-like sleep, in which the mind of the subject becomes subordinate to that of the operator.

Hypnotism is that branch of mental science which deals with the phenomena of hypnosis and the methods for its induction.

Suggestion is any method of evoking in the mind of the subject an idea or association of ideas for the control of his mental activities. It becomes *hypnotic suggestion* when the subject operated upon is in a state of hypnosis. Suggestion is called *post-hypnotic* when the idea imparted during hypnosis is to be executed at a more or less remote period subsequent to awakening from the hypnotic state. It is the post-hypnotic suggestion primarily that is of therapeutic value in hypnotism.

Rapport is the relation that exists between the subject and the operator by whom the hypnotic phenomena are called forth.

To review the history of hypnotism would be beyond the scope of this brief article, but it is important to consider its salient points. Much of the mysticism and occult science of the middle ages, indeed of antiquity itself, can be explained through its employment.

Attention was first drawn to it in a definite way by Mesmer, a Viennese doctor, in the latter part of the eighteenth century. He maintained the existence of a force which he called "animal magnetism" by means of which persons could influence one another, and it is this "animal influence" which constitutes the essential nature of mesmerism.

Much interest was manifested both by laymen and by physicians in Mesmer's claims, but in the early part of the nineteenth century Abbé Faria showed that the phenomena were wholly subjective and not at all dependent upon any unknown force.

In 1841 Braid, a physician in Manchester, England, gave the whole subject a new impetus by his more scientific experiments. His method of inducing hypnosis was by the process of fixation of attention, which resulted in a sleep-like condition, to which he gave the name "hypnotism." Under the influence of his teaching much progress was made in the elucidation of the subject, and it gained a more stable position in the domain of science.

Later, Liébeault, of Nancy, after a thorough examination of the phenomena of hypnotism and animal magnetism, reached the conclusion that they were wholly dependent upon the influence of suggestion. Professor Bernheim, a pupil of Liébeault, further developed this view, regarding hypnotic phenomena as physiological rather than pathological and wholly due to suggestions made by the operator.

In 1878 Charcot, the eminent French neurologist, began his studies in hypnosis as manifested in the large group of hystero-epileptics at the Salpêtrière Hospital. His observations, however, were confined to that class of subjects, and resulted in the doctrine that it was a "morbid neurosis dependent almost always on soil predisposed by hysteria." Suggestion he regarded as a "symptom of hypnosis, not its cause." (Art. "Hypnotism," Charcot, in Tuke's "Dict. Psychological Medicine," 1892, vol. i., p. 606.) Since that time the study has been taken up by psychologists as well as by physicians, the trend of opinion being rather in the direction of the Nancy school, which regards hypnosis as physiological rather than pathological. Suggestion is employed as the most important means for evoking it.

The nature of hypnosis, however, is far from being well established; neither Mesmer's assumption of a mysterious "animal force," nor Braid's doctrine of "fixed attention," nor the theory of "suggestion" of the Nancy school, nor yet Charcot's association of it with hysteria, is sufficient to explain its manifestations. The hypothesis of the dissociation of consciousness is a better attempt to furnish an explanation of its varied phenomena (see article *Consciousness, Disorders of*).

According to many psychologists much of the activity of the human mind takes place below the plane of consciousness, the so-called subconscious or subliminal mentality. In this domain lie many of the unconscious phenomena of feeling on the one hand, and of impulse on the other (see article on *Automatic Actions*). It is in the emergence of this subconscious mental field which is peculiarly susceptible to suggestion, simple or hypnotic, that Frederick Myers would explain hypnosis.

As it were, for the time being the subconscious mentality dominates the conscious mind and controls the intelligence, quite the reverse of the normal order. In this respect hypnosis is related to hysteria, the dream states of sleep, hallucinations of the insane, etc., but it is not necessarily a morbid phenomenon, nor dependent upon a morbid condition of the mind.

Suggestion serves then to call forth the phenomena. It is rather the signal for their manifestation than either the cause (Nancy school) or the symptom (Charcot).

The methods employed for the induction of hypnosis depend necessarily upon the views of the operator:

1. *Magnetic Method.*—Those who believe in animal magnetism assume that a special magnetic influence emanates from the operator upon the subject. Therefore standing in front, the hypnotist gazes fixedly upon the eyes of the subject and makes long sweeping passes from the head downward, believing that in some way the peculiar fluid streams from his fingers and thus best influences his subject.

2. *Fixed Attention.*—Braid's method consists in fixing the eyes upon a bright object placed a little above the eyes in the median line; the intent being to produce visual fatigue quickly through the undue strain of convergent strabismus.

In a successful experiment after a time the subject becomes relaxed, his eyelids tremulously close, and he appears to be in a semi-somnolent condition. This is the usual method of procedure, but is somewhat open to objection. The unusual nervous tension required at times has resulted in an acute hysterical attack.

3. *Method of Salpêtrière School.*—Charcot in his experiments upon hysterics established three more or less distinct states of hypnosis:

(1) The cataleptic state, produced—

(*a*) Primarily by the influence of a sudden intense noise, by a bright light flashed before the eye, or further by fixation, more or less prolonged, of the eyes upon any object;

(*b*) Secondarily, to the lethargic state when the eyes hitherto closed are suddenly opened to a bright light by raising the eyelids.

(2) Lethargic state, produced—

(*a*) Primarily by the influence of fixation of the eyes upon an object placed at a certain distance away;

(*b*) Secondarily to the cataleptic state, by simple closure of the eyelids.

(3) State of induced somnambulism, produced—

(*a*) Primarily in some subjects by fixation of attention, or

(*b*) Secondarily, easily with subjects already in a lethargic or cataleptic state, by making simple pressure or light friction upon the vertex.

In these various states of hypnosis certain characteristic phenomena are present. In the *cataleptic* condition the subject is immobile, he appears to be fascinated. The eyes are open, staring, and soon become suffused with tears. There is no winking of the eyelids. Very frequently there is anæsthesia of the conjunctiva and even of the cornea. The limbs and all parts of the body preserve their position for a long time, even attitudes very difficult to maintain which may have been given them—a "wax-like flexibility" very characteristic. The tendon reflexes are abolished and neuromuscular hyperexcitability is absent. While analgesia is complete, certain senses, muscular, visual, and auditory, preserve their activity. This persistence of sensorial activity makes it possible through suggestion to provoke hallucinations and develop automatic impulses at the will of the operator.

In the *lethargic* state, the similitude of profound sleep, there is complete analgesia of the skin and mucous surfaces accessible. The limbs are relaxed, and if raised fall slowly. The pupils are rolled upward, the eyes closed or half closed, while one sees an almost incessant quivering of the eyelids. The tendon reflexes are exaggerated and neuromuscular hyperexcitability is always present, though in varying degrees. This phenomenon, similar to the muscular contractions caused by the faradic current, may be produced by mechanical pressure alone, *e.g.*, by the touch of a pencil. Even muscular contractions more or less prolonged may result, which are readily resolved by stimulating antagonistic muscles.

The *induced somnambulistic* state corresponds more particularly to the condition of "magnetic sleep," so-called. It more nearly resembles the state of lethargy, yet there is no neuromuscular hyperexcitability as described above. Cutaneous analgesia is present, but at the same time there is a very remarkable hyperacuity of certain forms of sensibility of the skin, of the muscular sense and of some of the special senses, sight, hearing, and smell. It is easy through suggestion to call forth very complicated automatic actions which are induced manifestations peculiar to the state of artificial somnambulism, the active hypnotic condition (Charcot, "Œuvres Complètes," Tome ix.).

4. *Method of Suggestion.*—The method of inducing hypnosis by suggestion was practically, though not primarily, developed by the Nancy school, of which Liébeault and Bernheim are the leaders. The idea of sleep is suggested to the subject's mind by every possible means, physical as well as mental. The subject is thoroughly reassured and placed in a comfortable position, so as to invite mental and physical repose. He is then told that he feels sleepy, that his eyelids are getting heavy, that he can scarcely keep awake, in fact he is going to sleep, etc., until a condition of semi-somnolence is established. This method has the merit of resulting in no danger to the subject, but it may require many séances before the successful end is gained.

The combination of the two methods of fixed attention with sleep suggestion is most commonly used in America, and with proper care will yield satisfactory results.

It is essential, however, to the successful therapeutic use of hypnotism that the subject be well trained as a hypnotic before suggestive treatment be given. It is just here, doubtless, that many physicians have failed while the professional hypnotizer has succeeded.

The following plan, suggested by A. E. Carpenter, merits attention and will lead to more successful results than the usual haphazard efforts for inducing hypnosis sufficiently deep for therapeutical or experimental purposes: No séance should last over long, lest undue fatigue result. The séance may be repeated, however, once or twice a day until the operator secures satisfactory results or concludes that his subject cannot be impressed. If, however, the state of semi-somnolence is developed, assure the subject that he cannot open his eyes, at the same time making a slight pressure upon the eyelids; and we find that the lids come open with more or less difficulty, or not at all. Later, the command alone is sufficient to prevent the lids being opened, and the patient becomes receptive to audible suggestion. Further suggestion both by touch and by command will affect other muscles; for example, the patient is told that he cannot open his hands when firmly clasped, pressure at the same time being made on the spine at the base of the skull. This is repeated until the experiment succeeds. Later the same condition may be produced by command alone, or again by the mere clasping of the hands together. In a similar manner control of all the muscles of the body may be secured. In turn the special senses may be educated in a similar way. The sense of feeling is most readily affected by suggestion and should be attempted first. It is important at the outset, when making suggestion, that the idea conveyed be not inconsistent with fact; for example, in a warm room it is wiser to suggest undue heat than extreme cold. After securing thorough control of the sense of feeling, subdue the sense of sight, employing the sense of feeling to aid in its control; for example, by making a suggestion which would involve both feeling and sight. In the same way one may gain control of the senses of hearing, taste, and smell, through means of others already subordinated. When once all the senses are under control of the operator, the therapeutic application of suggestion becomes simple. In some instances an impressionable subject becomes so susceptible to suggestion that hypnosis may be subjectively induced by mere concentration of attention—the autohypnotic state so called. Naturally it is of extreme importance to the success of the performance that the whole manner and tone of the operator convey assurance and never doubt of the result. Nor must it be forgotten that it is not impossible for the operator himself to become hypnotized by the exercise of too fixed attention upon the patient. Undoubtedly many operators have been deceived by apparent hypnotic phenomena through the reaction of suggestion upon their own minds. They see what they are "looking for."

The phenomena of hypnosis under the influence of suggestion are very variable, from the simple trance-like sleep to the complete control of the subject obtained in the condition of somnambulism. In the deeper phases the subject seems conscious only of the hypnotist and implicitly believes and follows out whatever suggestion is made. Upon awaking from the hypnotic state no conscious memory remains, yet a suggestion given during hypnosis may be implicitly obeyed at a period more or less remote. This is the post-hypnotic suggestion so called, and enables the operator to influence the subject after the hypnotic state has passed away. Thus in the treatment of dipsomania a suggestion is made during hypnosis that whenever he takes a dram he will be overcome with nausea. This associated idea is ever ready to meet the imperative habit and develops disgust and thus works a cure. This indirect or associated suggestion seems more powerful than the direct command to avoid drinking.

In the lighter phases of hypnosis the subject seems semi-conscious, but does not readily or at all respond to suggestions widely at variance with fact. He may not be able to open his eyes or shut his mouth, or raise a hand except at the will of the operator, but the assurance that his neuralgic pain is gone brings a smile or even breaks the spell. In the deeper or somnambulistic state no delusion suggested by the operator is too incredible. Every suggestion becomes an imperative idea, dominating feeling and emotion and controlling their physical expression. It is, however, a striking commentary upon the subjective nature of hypnosis that no suggestion of an idea foreign to the cognizance of the subject will gain representation. The fountain never rises above its source.

It will be readily understood how the symptoms of disease may be relieved; but that the disease itself may be arrested or cured is by no means so credible.

Its greatest service will be found in dealing with morbid psychological conditions, such as fixed ideas, morbid habits, sexual perversion, etc.

The various students of hypnotism have formulated certain rules regarding its use which it is well always to observe.

Public séances of hypnotism by professional hypnotizers should be forbidden by law.

Hypnosis should be employed only by physicians or psychologists familiar with the physiology and pathology of the mind.

It should never be induced without the consent of the subject or his legal guardian.

It should not be employed except in the presence of a third person.

Suggestions which are contrary to his moral nature should never be made.

After the employment of hypnosis the patient should always be awakened and left in a calm mood.

Regarding its medico-legal relations, it is pretty well established that in no case can a suggestion contrary to the moral nature of the subject succeed, the antagonistic instinct serving in turn as an overpowering negative suggestion.

Hypnosis is not a miraculous method of treatment to supplant other means, but rather a species of education of the mind which must be sufficiently repeated to secure permanence.

While it seems an easy way to relieve many forms of nervous trouble, in reality its permanent value is very limited. It is true that anæsthesia has been successfully induced by its means, and serious operations have been performed without pain. Medical literature teems with examples, but so few patients are sufficiently susceptible at first trial that it is of little practical value.

Hypnosis prolonged for hours, even days, has occasionally been of value in intractable forms of hysteria, and undoubtedly should be tried when other more rational measures have failed. But training of the hysteric to secure self-control is of more lasting benefit, and far more rational.

Among American neurologists the concurrent opinion is against the employment of hypnotism as a therapeutical measure. At the present time its greatest utility lies in the field of investigation of psychological phenomena rather than in the relief of pathological conditions.

Edward B. Angell.

HYPNOTICS are medicines used to induce sleep. Their utility depends upon their power of arresting the functions of the cerebrum for some time without endangering life or health.

Two views prevail as to their mode of action. According to the older one, they induce sleep by rendering the brain anæmic. The anæmia is supposed to result from a direct influence on the vaso-motor nerves, in consequence of which the cerebral vessels contract and thus diminish the quantity of blood circulating in the brain. This view was based on two facts frequently observed in experiments on animals whose brain had been exposed to view, viz., that the brain invariably *is* anæmic during natural sleep, and that it *becomes* anæmic during the artificial sleep induced by medicines. The brain presenting the same pale appearance in both forms of sleep, it was concluded that both are due to the same cause—a lessened flow of blood in the cerebrum.

But the theory that normal sleep is caused by anæmia of the brain is no longer tenable; for it has been found that the quantity of blood circulating in the brain, in the normal state of the organism, depends upon the activity of the brain, increasing in proportion to the exercise of the mental functions, and abating when the mind is quiescent. Little blood being required during the dormancy of the mental functions, the brain is comparatively bloodless, and, if open to inspection, presents a very pale appearance.

But if the brain is anæmic during normal sleep, will not cerebral anæmia, produced artificially, be followed by sleep? Of this there can be no doubt, since it has been shown experimentally that compression of the large arteries supplying the brain is speedily productive of unconsciousness. Hence, if hypnotics should cause contraction of the cerebral vessels and thus produce anæmia, sleep would necessarily ensue. But in recent experiments on animals, whose skulls had been trephined so that the brain could be inspected, it was found that hypnotics may induce deep sleep without in the least altering the quantity of blood circulating in the brain. Usually, when the sleep was prolonged, the brain gradually became pale and comparatively bloodless. The absence of cerebral anæmia during the early part of artificial sleep disproves the theory that hypnotics act indirectly through the vaso-motor system.

The fact that hypnotics may induce sleep without at first altering the quantity of blood in the brain gave rise to the more recent theory that they act directly on the cerebral cells. The nature of this action is unknown. Experiments performed by Binz seem to show that it may be attended by a very slight and transient coagulation of the protoplasm of the cerebral cells. That some decided, though not very durable, change of the cortical substance of the brain is produced is evident from the experiments of Albertoni, in which it was found that in dogs large doses of bromide of potassium reduced the excitability of the motor centres so much that electric irritation no longer caused epileptic convulsions. In some instances the brain was pale, but in others no diminution of the quantity of blood was observed, and hence the lessened excitability was not attributable to anæmia. Recently the theory has been advanced that natural sleep results from contraction of the protoplasmic processes of the cortical neurons.

The use of hypnotics is indicated, as a rule, when insomnia is continuous, and hence a source of danger; this sometimes occurs both in acute and in chronic diseases. Generally, normal sleep returns as soon as the causes of the insomnia are removed; but sometimes it is impossible to remove the causes, or sleeplessness persists after the removal of all apparent causes.