tal troubles are found, and especially in those in which the mental disturbance takes the form of general paresis, we may expect to find a well-diffused cortical sclerosis.

Some years ago Delasiauve, Bouchet and Cazauvieihl, Meynert, Sommers, Bourneville, and others, found in many epileptic brains a peculiar induration of the cornu ammonis, which they regarded as peculiar to epilepsy. I have repeatedly found this appearance, and certainly it is worthy of consideration, though it cannot be regarded as pathognomonic. Sommers found this induration in thirty per cent. of his cases, while Bourneville found it in only seventeen per cent. The other authors whom I have mentioned regard it as an almost constant lesion. Kussmaul and Nothnagel, on the other hand, disbelieve in the importance of this lesion.

Epilepsy has been experimentally produced in various ways. Kussmaul and Tenner, Astley Cooper, and others, have by ligation and compression of the carotid, given rise to seizures which disappeared when the constriction was removed. Other experimenters have, by ligation of the superior and inferior venæ cavæ in animals, obtained the same result.

Nothnagel found that by tapping the heads of guinea-pigs an epilepsy was established, and various mechanical means of jarring the cerebral contents have been devised for the experimental production of epileptic convulsions.

The theory enunciated by Brown-Séquard was, in effect, that epilepsies might be provoked by irritation of certain sections of the cord in the lumbar region; that injury of the sciatic in certain animals (guinea-pigs chiefly) would give rise to convulsions; that the progeny of animals thus mutilated were the possessors of certain so-called epileptiginous zones, which, when irritated, would give rise to genuine epileptic paroxysms. These epileptiginous zones were located about the face and neck, and irritation, especially of certain branches of the fifth—the suboccipital chiefly—would produce the fit. In man such zones are, as a rule, not to be found.

Injury of the medulla oblongata has been followed by epilepsy, and electrical or mechanical irritation of the cortex cerebri, cerebral peduncles, or restiform bodies produces the same effect.

Finally, experiments have been made with certain toxic agents, among them alcohol and absinthe. Poulet found, for example, that the subcutaneous injection of the salts of ammonia gave rise to epilepsy.

The existence of epilepsy depends, undoubtedly, upon an instability of the cellular elements, and when a lesion exists it is, as Jackson has shown, undoubtedly of an "irritative" character. The starting-point of the convulsion is probably primarily in the cortex cerebri, and secondarily in the medulla. The view of Van der Kolk, which has been accepted with modifications by Reynolds and others, is that the focus of the disease is in the medulla oblongata. In the established form of epilepsy this centre is in a condition of excitability, and through the receipt of reflex impressions, either from higher parts of the cerebrum or from the periphery, an altered inhibitory vascular state ensues, the parts lying at the floor of the fourth ventricle become the seat of hyperæmia, and then follow various pathological changes, viz., a secondary anæmia and hyperæmia of the cerebrum, and irritation of convulsive centres. As a result of these pathological changes there will be tonic and clonic convulsions of muscles supplied by the nuclei of the lower cranial nerves, with consequential disturbances in the domain of the spinal accessory and other nerves. Spasms of muscles of the neck, asphyxia, compression of jugulars, secondary stupor, tongue biting, etc., are among the phenomena observed in these cases. Van der Kolk believes that the biting of the tongue is due to irritation of the nucleus of the hypoglossus.

Diagnosis.—The diagnosis of the ordinary epileptic attack is not a difficult matter. The seizure is of such a dramatic and pronounced character that it is scarcely possible to err in regard to its true nature. The minor seizures are sometimes confounded with attacks of syncope, but when we exclude the disorders of motility, which do not belong to the latter, there should be no chance for mistake. It must be remembered that seizures of petit mal do not occur in an isolated form, but that there is a history of numerous previous attacks.

It is important to diagnose whether or not the paroxysm is the manifestation of coarse disease of the brain; and, in such cases, limited or rather extensive paralysis will often be found, as well as optic-nerve atrophy, disturbed reflexes, and distal sensory trouble.

Hysterical epilepsy is, as a rule, a complaint of women, and the attacks seem to bear some relation to the occurrence of the menses. Charcot speaks of the hysterical modifications of epilepsy as follows: 1. A form in which hysteria is engrafted upon primary epilepsy. 2. A form of primary epilepsy which is complicated after marriage by hysteria. The hysterical influence is destroyed by pregnancy. 3. Primary hysteria with superadded epilepsy at a later date. 4. Convulsive hysteria with coexistent petit mal. 5. An epileptic attack with residual hysterical contraction and hemianæsthesia.

I have observed another form, viz., that in which an epileptic patient was seized with hystero-epileptic paroxysms at the menstrual period.

In some instances the diagnosis must be made between the grand attack and the convulsions of *uræmia* or *alcoholism*. The uræmic convulsion is usually preceded by a history of mental obscuration with perhaps some ataxic aphasia and headache. The presence of œdema, albuminous urine, casts, and the skin pallor, furnish confirmatory indications.

The alcoholic convulsions, unless due to chronic alcoholism, are preceded by a debauch. If the urine be examined it will be found that the bichromate of potash test will reveal the presence of alcohol by a very peculiar and striking change of color to green.

Sometimes we may confuse the lighter attacks with auditory vertigo, or with lithæmic or gastric vertigo, but the rotary character of the disturbance in the former, and the connection of the latter with digestive disturbance, are to be borne in mind.

It is of the utmost importance that the medical man, especially if he be called upon to treat and inspect soldiers, prisoners, or the inmates of the pauper asylums, should be on his guard in regard to the simulation of epilepsy. This form of imposture is common enough, and is very difficult of detection. Various authors upon medical jurisprudence have recorded a number of cases in which a malingerer kept up the deception for a period of several years. The case of "Clegg, the Dummy Chucker," reported by Carlos MacDonald, is of this kind. The subject was an habitual criminal who repeatedly threw himself from high platforms in the jail to the stone floor below, and bore many self-inflicted injuries without a murmur, that he might escape certain duties or punishments. He was finally detected by MacDonald. The impostor cannot change the size of his pupils, nor can he counterfeit the color of the skin which belongs to the real fit. The epileptic, as a rule, doubles his thumb under his other fingers, which are strongly flexed—a thing neglected by the impostor. The latter is ordinarily on the alert to see how his behavior will impress the bystander, and an occasional suggestion from an outsider will be acted upon by the designing person, who will thus betray his consciousness as well as his anxiety to make an impression.

Prognosis.—Epilepsy is certainly one of the most discouraging of all diseases of the nervous system so far as the hope of cure is concerned, but the prognosis is much less bad at the present time than it was before the introduction of the bromides. Those forms of epilepsy which are of idiopathic origin, or which are dependent upon coarse cerebral disease, osseous lesions, or advanced syphilis, are wellnigh hopeless, but of those cases which owe their genesis to less profound causes, a few are modified or cured by treatment. It is impossible to give satisfactory statistics of cures, from the fact that most of the cases are imperfectly watched. Sex seems to have little or nothing to do with the patient's chances. The cases in which the disease develops before the tenth

year, or after adolescence, are more readily helped than those in which it begins between the tenth and twentieth years (Gowers); and this is probably due to the fact that the idiopathic causation is more common before twenty. The form with grave attacks alone is more easily cured than that in which petit mal is a feature;—and uncomplicated petit mal is perhaps the least hopeful of any form. The curability of the disease depends much upon its duration and the number of attacks, and one author believes that all cases in which five hundred attacks have occurred are absolutely beyond the reach of any treatment. Cases of hereditary origin are commonly regarded as the least amenable, but Gowers is not of this opinion. Fifteen per cent. of Gowers' successful cases were those in which heredity existed. My own experience does not confirm this. Those cases in which the fits are separated by long intervals are most readily cured, but if the attacks be severe and if they recur at short intervals, the prospects of a cure are poor. Attacks which seem to be connected with disordered menstrual function are sometimes very readily abolished. The existence of an aura renders prognosis slightly more unfavorable, although in some instances the aura enables the patient to abort the fits. Cases in which cranial deformities exist are usually bad, and the attacks are irregular and eccentric. The existence of mental impairment or aberration of any kind is always unfavorable.

Fatal cases—that is, cases in which the patient's death has been directly due to the disease—are rare. When death occurs, we find that asphyxia is usually the immediate cause. It occasionally happens that epileptics are suffocated from the lodgment of a piece of meat in the air passages, while a number of accidents, among them falls, are apt to lead to death by drowning, by cranial fracture, or by suffocation caused by the unnatural position in which the patient's head has been placed as a result of the fall. In several instances of which I know, the patients fell into an open fire-place or against a hot stove. I have already alluded to the danger of rupturing a muscle or dislocating a joint. Another rare accident is the amputation of the tongue that may occur when it happens to get between the teeth.

According to Axenfeld and other French writers, the complication of epilepsy with hysteria is one calculated favorably to modify the prognosis of the former.

Treatment.—In our management of epilepsy, we are to avoid everything that smacks of routine treatment. The mere administration of a much recommended drug, without studying the indications for its use, will do little or no good. The epileptic paroxysm, after all, is but a discharge from over-excited and unstable nerve cells, and is a symptomatic condition of a great variety of pathological states. As a general plan of treatment it should be the earnest of our endeavors to maintain a condition of circulatory equilibrium, so that the cerebral blood pressure shall not undergo very rapid, sudden, or great changes. Cardiac stimulants or sedatives should, perhaps, form a part of the treatment in different cases, and these may be combined with remedies having specific neurotic or alterative effects. In some cases the use of digitalis is almost a necessity, and in others—those more particularly in which there is a tendency to cerebral hyperæmia—remedies of an opposite class are required. In what the older writers called anæmic epilepsy, the use of digitalis is absolutely important, or we may use a remedy which was first recommended by the writer a few years ago, viz., nitroglycerin, in doses of gr. $\frac{1}{100}$ to $\frac{1}{75}$ thrice daily.

There are a great number of remedies which have been used empirically almost from time immemorial. In many cases no intelligent idea is entertained as to their physiological action. It is not proposed to refer to many of them, except in the most superficial way, or not at all, for but few possess any virtues.

No general remedies have been of so much service as the bromides, especially those of sodium, ammonium, and potassium, and since their introduction, about twenty years ago, the number of cures has greatly increased. The prognosis has also improved, as our knowledge derived from experimental therapeutics has broadened. In 1865–70, five or ten grains of the bromide of potassium in divided doses was considered a maximum quantity, but already a few years later certain American physicians advocated immense doses—even an ounce daily. Maximum doses of twenty grains, repeated thrice daily, control the convulsions in cases which are amenable to treatment,—cases in which the attack has perhaps been previously aggravated by very large doses.

In most cases of this grave disease it is of the first importance to ascertain the length of the intervals between the attacks, the time of day at which they usually occur, and the patient's general condition. The amount of bromide to be given daily, say of the sodic salt, which is the best, may be fixed at from one to two drachms, to be given in divided doses, the largest one just before the expected attack. Should the latter occur in the early morning, it is best to administer the remedy at night, and perhaps to reinforce the quantity. In some cases in which the periodicity of the paroxysm can be definitely determined the dose may be increased, and the drug used more freely for several days before the expected explosion. Many practitioners commence by inducing a mild bromism, which is manifested by anæsthesia of the fauces, and by some appearance of acne upon the forehead, or by the bromic breath. It is exceedingly injudicious to go beyond this point, for when the nutritive processes are interfered with, the medicine does harm instead of good. The bromic salts should always be given in plenty of water, and Vichy is a decided improvement over simple water, because of its advantage in securing tolerance of the drug by the stomach. When epilepsy is dependent upon organic changes, either syphilitic or otherwise, a saturated solution of the iodide of potassium or sodium may be used separately and either of these salts given in milk, or Vichy should be used in large quantities. The so-called "American System" should be followed, in the administration of the iodide, and even half an ounce or more should be given daily. In cases in which the attack is preceded by headache, the iodide is especially serviceable. The bromides may be given in combination with tincture or infusion of digitalis, and small quantities of arsenic may be incorporated for the purpose of preventing skin troubles. In other cases the combination of chloral hydrate or aconite is advisable. The bromic treatment should be continued in a modified form for at least two or three years after the attacks disappear. It will be found, in some cases, that the combination of the three principal bromides sometimes acts more energetically and efficaciously than either singly. The use of fats, especially cod-liver oil, is often of the greatest service when the bromides fail alone. I have been enabled in this way to help many cases in which the bromides had been used before without any considerable success. The administration of the bromides in combination with opium or morphine constitutes the so-called Flechsig treatment. The patient is subjected to a continued treatment with opium or its alkaloid in increasing doses, and afterward when the toxic effects are mildly produced this drug is discontinued, and a course of bromides ordered. Rectal injections of a preparation of the substance known as bromopin, has been in use in Germany in doses of ηlxv. The patient is forbidden to use any salt in his food. The nightly enemata of this substance must be increased until 3 or 4 gm. are taken.

The hypophosphites act admirably where there is weak digestion, and if the bromic state becomes too profound it will be found that some preparation of iron, strychnine, and quinine will dispel the symptoms. Great care should be taken not to push the latter too far.

Delasiauve refers to no less than eighty-nine remedies or forms of treatment, and this is but a small number when we consider that his book appeared nearly half a century ago, and that new remedies are constantly being recommended. The discovery of the bromides, as I have already stated, constitutes the only real advance. As to

the other remedies it will suffice if I enumerate chloride of potassium, sulphate of zinc, oxide of zinc, sulphate of copper, chloride of gold, nitrate of silver, and phosphorus, as remedies which have had their day and which are still occasionally of service; while the list of vegetable remedies is simply legion. Valerian, camphor, the camphor monobromate, asafœtida, musk, castor, opium, belladonna, aconite, indigo, turpentine, and conium are among the most prominent of these.

In many cases of epilepsy, especially when it is suspected that the attacks are due to the absorption of toxic material from the intestines, it will be found that persistent and systematic antisepsis will do much good. The benefit obtained from the administration of salicylate of soda, naphthalin, and calomel, and from intestinal flushing is often very great.

Galvanism is the only form of electricity that ever does any good, and this only in exceptional cases. The current from no more than ten or fifteen Leclanché cells should be used, one electrode being placed anteriorly and the other posteriorly upon the head. Static electricity is useless; chloroform and ether may be resorted to when the status epilepticus is found, but unless the convulsion be very severe, I prefer to administer nitroglycerin or the amyl nitrite.

The lighter attacks are very obstinate, and are not helped to the same extent as are the more severe ones. Belladonna, ergot, and hyoscyamus have all been tried with various degrees of success. I have found nitroglycerin to be of great benefit in some cases, and it should be prescribed with the idea of producing a continued state of moderate cerebral hyperæmia.

An important indication is the provision of remedies for the abortion of attacks. When the aura is of a sensory character and begins in an extremity, the use of an encircling blister or ligature about the arm will, if the paroxysms are frequent, or if the patient has time to take preventive measures, stop the progress of an attack. One of my patients, whose aura often begins in the arm, provides himself with a rubber band which he hastily slips over his hand. Brown-Séquard recommends forcible flexion of the wrist. The inhalation of ammonia or of nitrite of amyl, or the prompt resort to a tablet containing from gr. $\frac{1}{100}$ to $\frac{1}{75}$ of nitroglycerin, will ward off the fits. A glass of sherry or some alcoholic stimulant will also often act very promptly. It is well for the patient to keep such a draught by his bedside, to take as soon as he awakens, if he has morning seizures.

The diet of the epileptic should be of a vegetable nature. Meats are highly injurious, but the *moderate* use of game, poultry, fish, and oysters is to be advised. Fresh vegetables, fruit—except grapes,—milk and cold bread, should form the chief articles of diet. Stimulants are, of course, out of the question in most cases, but coffee, which is usually denied the patient, is (if mild) by no means so hurtful a thing as it is ordinarily supposed to be.

Friction, cold baths, and exercise are to be insisted upon, and mild intellectual labor is good for the subject. Steam or furnace heat is responsible as an exciting cause in many cases, and if possible open fires, properly guarded, should be placed in the patient's room.

Surgical measures have been of avail, if we are to believe all the reports; yet the experience of many successful surgeons, who have watched their cases for a long time, is against their efficacy. If they are to be used it should only be in cases in which the evidence of a traumatic origin is very clear.

Dr. W. Briggs[12] seems to have had extraordinarily favorable results from trephining, for of 30 cases of the traumatic variety in which he performed the operation, 25 were cured, 3 relieved, 1 was not helped, and 1 died. Walsham's[13] results were not quite so favorable. Of 130 cases of traumatic epilepsy operated upon, 75 were cured, 18 improved, 7 not helped, and 30 died.

In some examples it will be found that the aura proceeds from a cicatrix upon the scalp, and the exsection of this, even if no removal of bone is undertaken, may be sufficient. In such cases as those reported by Lande,[14] in which a neuritis was the cause of the convulsion, exsection or nerve-stretching might do good, but of course such hopeful results are problematical.

Dr. Frederick Petersen has summed up his conclusions relative to the care and colonization of epileptics as follows:

"All are to be treated in accordance with the usual regulations as to diet, hydrotherapy, and medicinal agencies, with the hope that in this way beween one and six per cent. of them may be cured, and the disorder in a larger percentage ameliorated.

"Out-of-door employment in agriculture and kindred pursuits is to be provided in abundance. All manner of trades and occupations are to be carried on in an epileptic community, organized on the village plan. Facilities for education are to be afforded to almost every extent.

"Amusement and entertainment and the enjoyment of social intercourse are to be privileges from which no epileptic will hereafter be debarred.

"In this way the happiness of a large number of these miserable creatures will be materially increased, in spite of the distressing disease which they are called upon to suffer, usually for the whole of their lives; and though remedial agents applied to their malady may prove inefficient, their fate can never be as wretched or hopeless as it has been throughout the world heretofore."

Allan McLane Hamilton.

[1] Traité de l'Epilepsie, p. 55.
[2] Archives of Medicine, iv., 1, 1880, p. 1.
[3] N. Y. Med. Jour. and Obstet. Review, June, 1882.
[4] West Riding Reports, vol. iii., p. 315; vi., p. 266; Brain, iii., 2, p. 192.
[5] Untersuchungen über die Lokalisation der Functionen der Grosshirnrinde des Menschen, p. 63.
[6] *Loc. cit.*, p. 11.
[7] Archives of Practical and Scientific Medicine and Surgery, Philadelphia and New York, 1873, i., 360.
[8] Annales Méd.-Psych., 1852.
[9] On Epilepsy, etc., 1870.
[10] The Medulla Oblongata, etc.
[11] Archives de Méd., Dec., 1869.
[12] American Practitioner, July, 1884.
[13] St. Bartholomew's Hospital Reports, vol. xix.
[14] Mém. et Bulletin, Société de Méd. et Chirurgie de 1874, i., 56–65.

EPITHELIOMA. See *Carcinoma*.

EPITHELIOMA OF THE SKIN, MULTIPLE, BENIGN, CYSTIC.—(Synonyms: Epithelioma adenoides cysticum [Brooke]; Acanthoma adenoides cysticum [Unna].)

Symptomatology.—The affection is characterized by the presence of numerous pale-yellow, pearly, or pinkish-colored nodules, from the size of a pin's head to that of a pea. The small growths are quite firmly embedded in or project above the skin. Some of the tumors are translucent and closely resemble vesicles, while others are made up of milium-like bodies and are traversed by minute capillaries. The face, scalp, neck, upper parts of the back and chest are the sites of predilection. In general the growths are discrete, but they tend to group themselves about the root and alæ of the nose, the eyebrows, and the mouth. The confluence of several nodules has been noted.

In the majority of cases heretofore reported the affection has been observed at or before the age of puberty.

The small, pinhead-sized growths increase slowly in size until they attain the size of a split pea, seldom larger, and in very exceptional cases they only undergo ulceration or disappear spontaneously.

They impair in no way the general health nor do they give rise to subjective sensations of any kind. The entire course of the disease, except in the case reported by Dr. White,[1] is so free from any evidence of malignancy that the word *benign* has been employed to qualify the term *epithelioma* used to designate this singular eruption. White's patient, in addition to numerous small nodules of the usual type, presented three or four open epitheliomatous ulcers involving the entire thickness of the skin.

Single, hemispherical, brownish-red, or translucent nodules have been removed from the ala of the nose, the eyelids, or other parts of the face and have been found

to have a structure identical with or closely allied to that of the multiple benign tumors in question. They may develop in early adult life or in older individuals, but they pursue a relatively benign course.

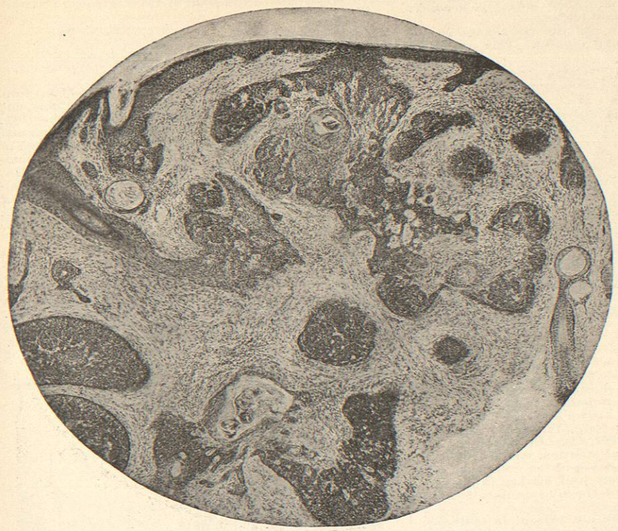

Fig. 1922.—Multiple Benign Cystic Epithelioma showing Down Growth of Surface Epithelium. Spencer, one inch; ocular, one inch and one-quarter. (Original.)

The cause of the affection is obscure. In Brooke's[2] and my own cases[3] a distinct hereditary history was obtained. The onset of the affection at the age of puberty may depend in some manner on the general stimulus to which all epithelial tissues are subjected at this time. The view has been held by some that these tumors depend on misplaced embryonic epithelial cells which remain latent until puberty or later in life.

Pathology and Morbid Anatomy.—In the earlier descriptions of the affection the cases described by Jacquet and Darier[4] as "Hydradénomes eruptifs," by Török[5] as syringo-cystadenoma, and by other writers with designations of similar meaning, were considered to be of the same general nature.

Unna[6] has, however, wisely separated the class of cases described by Jacquet and Darier, Török and others from those of Balzer, Brooke and myself; the first group of cases being, in his opinion, adenomata of the coil ducts, to which he gives the name "syringadenomata," while the second group undoubtedly originate in the epidermis and are called by him "acanthoma adenoides cysticum."

The microscope shows these benign epithelial growths to be made up of proliferating masses and narrow tracts of small epithelial cells corresponding to those in the lowermost layer of the epidermis and external root sheath of the hair follicles. The origin of the new growth from the epidermis and hair follicles is shown in Fig. 1922, which represents a section from the original case described by me.[7] Similar observations have been made by Brooke[8] and by Bowen (in White's case).

The epithelial masses and tracts on their outer side are usually surrounded or defined by a well-marked layer of cylindrical cells, a condition which characterizes many benign epithelial growths. Atypical "pearl bodies," enclosing horny or colloid tissue as well as colloid degeneration of individual epithelial cells, have also been met with. The connective tissue between the new cell growths is somewhat condensed and the seat of a moderate infiltration of lymphoid cells.

Treatment. — Some of the small tumors can be removed by incising the overlying epidermis and expressing them by moderate pressure. If this method is not successful the dermal curette may be employed. The resulting wound readily heals with a small depressed scar.

The use of caustics is not advocated, as it is possible by their improper use to evoke a latent malignancy.

John A. Fordyce.

[1] Jour. Cutaneous and Gen.-Urin. Dis., p. 477, 1894.
[2] British Journal of Dermatology, p. 271, 1892.
[3] Journ. Cutaneous and Gen.-Urin. Dis., p. 459, 1892.
[4] Ann. de Dermat. et de Syph., p. 317, 1887.
[5] Monatsheft f. prakt. Dermat., p. 116, Bd. viii.
[6] Histopathology of Diseases of the Skin, p. 117.
[7] Jour. Cutaneous and Gen.-Urin. Dis., p. 459, 1892.
[8] Brit. Jour. of Dermat., p. 289, 1892.

EPITHELIUM.—Epithelial tissue is composed of cells placed close to each other, the intercellular substance being reduced to a minimum.

The cells, as a rule, are soft, yielding readily to press-

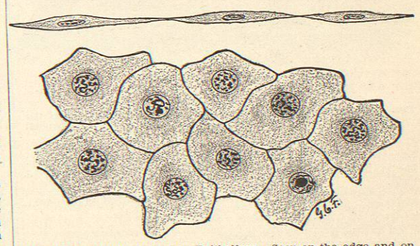

Fig. 1923.—Simple Squamous Epithelium. Seen on the edge and on the flat.