

one half as much. To show that this is not owing to mere employment, or the influence of town life, let us look at Newcastle as compared with rural Northumberland. There we know the agricultural labourers are better off and more comfortable, and get better wages than their class in any part of England. Newcastle had a population of 128,160 at the census of 1871 with 274 lunatics at that time, or at the rate of 2.2 per 1000. The rest of Northumberland had a population of 258,799 with 472 lunatics, or only at the rate of 1.9 per 1000. As might naturally have been expected the country shows itself more healthy than the town as regards even the production of insanity, other things being equal, and no doubt the chief of all those other things are good wages received by the labouring population, and all that they imply.

So far these investigations clearly show that, with certain exceptions, where the population of a county rapidly increases, its lunatics are few and do not increase so fast in proportion as the people, the reverse of this being generally true also; that lunacy goes hand in hand with pauperism all over the country, and that the presence of uniformly diffused wealth among a people certainly seems to lower the rate of production of mental disease.

(To be continued.)

Notes on Epilepsy, and its Pathological Consequences. By J. CRICHTON BROWNE, M.D. Edin., F.R.S.E., Medical Director West Riding Asylum, and Lecturer on Mental Diseases to the Leeds School of Medicine.

Although a certain number of those who are subject to epilepsy may pass through life without displaying any sensible diminution in mental capacity or power, it is nevertheless true that in a vast majority of the sufferers from this disease the mind is rapidly and seriously damaged by the recurrence of the seizures which are characteristic of it. Epilepsy, indeed, is one of the most prolific causes of insanity in this country, and fills our lunatic asylums with patients of a dangerous and intractable class. It would not, perhaps, be going too far to say that it invariably exerts a prejudicial influence on the minds of those who are afflicted by it, and that the statements which have been made to the contrary have arisen out of imperfect observation. Unfortunately, we have as yet no

test types by which to gauge the scope and accuracy of the 'mind's eye,' and hence serious impairment in its range and precision of action may readily exist without detection. Apprehension may be dimmed, judgment confused, and memory shortened, while no suspicion of mental failure has occurred to the patient or his friends. Then, again, modifications of disposition and temper are apt to be attributed to outward circumstances rather than inward derangements, so that when essentially morbid in origin they may fail to be recognised as such. Hence it is, I think, that epilepsy has often been credited with a blamelessness to which it has no just pretension. Its evil effects have not been found out, or have been traced to some other source, and it has been concluded that epilepsy may co-exist throughout life with perfect intellectual and moral integrity. Nay, some authors have gone further than this, and have written of epilepsy as if it were a thing to be desired, and, like the goitre of the Roman ladies, added a new charm to its victims. Falret says that epileptics sometimes evince real intellectual activity, and a rapid circulation of ideas, which corresponds to a certain degree of cerebral excitement. A roll of eminent epileptics has been drawn up, including the names of Cæsar, Mahomet, Napoleon, and Molière, and a connection has even been suggested between fits and genius. Dr. Morel has referred to a marvellous quickness of conception and imaginative intensity as distinctive of the epileptic condition in some persons. Surely, however, such qualities are not to be regarded as the fruits of epilepsy, but rather as characteristic growths of that kind of soil in which the pernicious plant is most likely to take root and flourish. Surely the fact—if it is one—that some great men have suffered from epilepsy in peculiar forms does not establish any causal relation between epilepsy and greatness, for how much greater might they not have been but for epileptic limitations? And surely the wild whirl of epileptic excitement is not to be confounded with the well-ordered evolutions of genuine intellectual activity. The experience of those who have seen most of epilepsy, will, I believe, confirm the assertion that no good thing can come out of it, and that it entails a blight and a blemish upon the mind of everyone who is affected by it. It robs the brain of its cunning; it strips the mind of its ornaments, of its garments of delicacy and gracefulness, and reduces it to savage rudeness and unrestrained movement. And then it wraps round it its own strong web of disease, fold after fold,

layer after layer, more and more confining it, and becoming at last its inevitable cerement. Esquirol has ably summed up the effects of epilepsy on a man's physical and psychological nature. He has shown that it shortens life, deranges nutrition, that it degrades the mental faculties, and that it undermines rectitude of character, and disposes to suicide, violence, falsehood, venery, and onanism.

It is not my purpose here to enumerate or analyse those mental infirmities which are induced by epilepsy, nor even to establish their invariable occurrence. My aim is only to describe and illustrate a certain number of the coarser and more obvious changes in the appearance and structure of the brain which result from epilepsy, and upon which some of these mental infirmities are unquestionably dependent. Having accumulated accurate reports of the post-mortem examinations of sixty epileptic patients of my own, who have died in the West Riding Asylum during the last seven years, it occurred to me that it might be useful to place on record a few of these, which best exemplify the changes in the brain and its coverings which correspond with certain advanced stages of the disease, and certain modes in which it terminates. Only changes corresponding with advanced stages can, of course, thus be demonstrated, as those mental complications which are held to justify the deprivation of liberty are not usually developed until epilepsy has held possession of the nervous system for many years, and as life is often far protracted after seclusion in an asylum has become necessary. Even those late and obvious modifications, however, in the structure or relations of the cerebrum and its meninges, which are found in the advanced stages of epilepsy, and in the pathological theatre of a lunatic hospital, are important in themselves, and reflect valuable light upon earlier and less conspicuous alterations, out of which they have themselves arisen. With the clue, which lies ready at hand in these coarse organic changes, we may proceed backwards to finer and less perceptible changes connected with earlier stages in epileptic degeneration, and from these, again, we may cautiously recede to those delicate and subtle changes which lie beyond our present means of exploration, and which are cotemporaneous with what may be termed the functional epoch in the history of the disorder.

It is customary and convenient to divide the phenomena of epilepsy into two classes—those manifested during the paroxysm, and those manifested during the interparoxysmal

period, and a minute examination of both of these is necessary to a comprehension of the disease. In enquiring, however, into the manner in which epilepsy operates upon the brain, deranges its action, and deteriorates its texture, it is only requisite to refer to the paroxysmal phenomena which are expressive of the essence of the malady. The inter-paroxysmal symptoms are merely significant of some consequences of the seizure, and do not betoken any active process of a damaging nature. It is in the different steps of the attack that the explanation of the pathological consequences of epilepsy as displayed in the brain must be sought. Now, taking these steps as three in number, we can recognise in each of them sources of danger to the cerebrum and its functions. We can, indeed, detect in them the precise methods by which epilepsy disorders and deteriorates the ideational centres. In the first step in which that heightened excitability of the medulla oblongata, in which the disorder essentially consists, is awakened, we have spasm of the vessels of the brain, with temporary deprivation of blood, and a general commotion of the nervous elements very inimical to their healthy activity. In the second step, in which clonic convulsions occur, we have venous congestion and pressure on the brain, due to spasm of the muscles of the neck, and fixturing of the muscles of respiration, and we may have the breaking up of the structure of the brain by a multitude of minute, or a few large clots. In the third step, in which coma remains, we have poisoning of the brain by imperfectly aerated blood.

Now, in these morbid conditions of the brain corresponding with the steps or stages of the epileptic attack, are contained the origins of all the pathological alterations in the cerebral hemispheres found in connection with epilepsy. However subsequently modified or qualified by accidental conditions, these pathological metamorphoses have evidently their starting point in one or other of the immediate effects of the attack upon the cerebrum, and thus in the attack itself. As a rule, too, these pathological metamorphoses are singularly uniform, and thus betray their community of origin. In looking over the descriptions of the morbid changes which have been seen in the brains of chronic epileptics who have laboured under mental aberration, no one can fail to be struck by the constancy with which certain changes recur. Foville, the most distinguished cerebral anatomist of his day, who drew his experience from the Asylum at Charenton, des-

cribed a general hardening of the medullary matter extending throughout the whole encephalon, extraordinary dilatation of the blood vessels, and a rosy colour of the grey matter of the convolutions as being always found in the epileptic brains which he examined. Bouchet Cazauvielh, Morgagni, and Parchappe have given similar descriptions, and in recording the results of our researches in this asylum I have been compelled to use language almost identical with that of Foville. Putting aside these appearances in the brain, which are unquestionably attributable to the mode of death or to intercurrent conditions, we arrive at this conclusion: that hypertrophy and induration are the characteristic brain changes in epileptic insanity. These will not be found in every case; in very recent, and in very far advanced cases they need not be looked for; but still in a large majority of cases they will be unmistakably present. In very recent cases they are not found, because they have not been fully established. In very far advanced cases they are not found, at least not in a marked degree, because ulterior changes springing out of them have obliterated them. In very recent cases the serious failure of brain power, which is sometimes seen, is to be traced not to the hypertrophy and induration of the organ, to which the same kind of failure, a little further on in the disease, is ascribable, but to a molecular perturbation analagous to what happens in concussion. The brain is suddenly thrown out of gear by the spasm in the contractile fibres of the vessels, and has not time to recover itself before it is again deranged by a recurrence of the spasm. That this is so is indicated by the fact that deep dementia has been observed to follow a series of attacks of *petit mal*, in which no clonic convulsions nor cerebral congestions occurred, but merely momentary unconsciousness with pallor of the face. Persistent mental weakness, however, does not follow *petit mal*. I have never seen a case of genuine continuous epileptic dementia which was not dependent upon the *haut mal* and the changes which the *haut mal* brings about, chiefly through pressure upon the cerebral tissue and cerebral hyperæmia. It is a popular observation that pressure and hyperæmia lead to hypertrophy. The excitation of pressure induces too copious a flow of blood, and increased growth and bulk ensue, and this is particularly apt to happen when the pressure is interrupted in character and only occurs from time to time. The first effect of the interrupted pressure which is applied to the brain in epilepsy appears to be a genuine hypertrophy and

augmentation in volume. But hypertrophy is generally partial, and even when it affects whole organs it is manifested principally in certain textures, and so the hypertrophy of the brain in epilepsy is manifested chiefly in the connective tissue. A kind of fibroid substitution slowly but surely goes on in those parts which are periodically subjected to congestion and induration, as well as an augmentation in volume ensue. The hair becomes coarse and the skin of the head and face hard and thick, and it is a noteworthy and well known fact that wounds of the head and face heal in epileptics by the first intention; that is to say, without any inflammatory process a formation of granulation tissue takes place, and this splits up into fibrils and forms adhesions. Then the skull becomes thickened also, and when it is removed the brain expands as if relieved from compression, and feels unusually dense and hard when touched. The specific gravity both of its grey and white matter is greater than in any other class of lunatics—and the absolute weight of the brain is also decidedly higher. The convolutions are flattened, and the sulci are mere lines, and do not gape nor contain fluid. The membranes show no signs of inflammatory disturbance. When the brain is cut into it is tough and firm, the grey matter being dark and the medullary white and glistening. The ventricles are of small size. Around the pons Varolii and medulla oblongata, and especially on the floor of the fourth ventricle, redness and vascular dilatation are visible, and the vessels when measured are found considerably distended, owing both to increase in their sectional area and thickening of their walls. These are the usual appearances in the brains of persons who have laboured under epileptic insanity, but they are subject, of course, to numerous variations. Thus a spotted, blotchy, marbled appearance of the medullary substance may be seen when an attack, or group of attacks, has immediately preceded death, and some atrophy or wasting, with opacity of the arachnoid, may be remarked when the disease has been long protracted and has passed into epileptic stupor. This latter condition of the brain is referable to impaired nutrition, owing to the thickening of the vessels, or to gradual contraction of the hypertrophied fibrous tissue, and puckering of the brain, if it may so be termed.

The gummy or glutinous growth in the pituitary body, which was asserted by Wenzel to be the cause of epilepsy, has never been met with in this asylum. Changes in the pineal gland have, however, been noted in several instances.

Epileptic Idiocy.

In considering the pathological effects of epilepsy in arresting or distorting brain growth and mental evolution, it is desirable to draw a distinction between epileptic idiots and idiot epileptics. With the latter, in whom the fits come on subsequent to evidences of congenital mental limitation, and in whom they are indeed but secondary and consecutive manifestations of an innate vice of the central nervous system which travels downwards, we have here nothing to do. In them epilepsy is itself a pathological consequence, and not the starting point in a morbid series. Only with the former, in whom the epilepsy is responsible for the mental failure, in whom the brain is crippled and stunted by and through the fits, need we now concern ourselves. And this class of epileptic idiots, beings in whom idiocy is due to and dependent upon epilepsy, is not so numerous as might be supposed. The number of cases of original privation of mental power, with defective cerebral development, due to epilepsy, which come under observation is comparatively small. The fact is, that the convulsions which are so common in infancy and early childhood are immediately fatal in a large proportion of instances, either by spasmodic closure of the glottis, or by congestion, or hæmorrhage, or exhaustion. They eventuate in death, and not in idiocy, and thus the feeblest and least viable brains are removed. It is computed that 73·3 per cent of all the deaths from diseases of the nervous system that take place in the first year of life must be attributed to convulsions. And then when convulsions do not kill at once, a certain tolerance of them seems to be established for a time, except under special circumstances—these special circumstances being the occurrence of an extravasation of blood in the head, short of a fatal amount, but sufficient to form a centre of degenerative changes, or the inheritance of a strong predisposition to neurotic disorders. Under these conditions idiocy may be anticipated for an epileptic infant or child who has survived the first dangers of the seizures, but apart from them, I am inclined to think that not idiocy, but dementia is the rock a-head. For a time the faculties go on developing in spite of the epilepsy. True, they may be in some degree stripped of their fair proportion, but they are not dwarfed and crippled to such an extent as to justify the imputation of idiocy or imbecility. The child may be backward and wayward and peculiar, but it grows

in bodily and mental stature, and becomes a rational and intelligent being. So long as the brain is growing rapidly, so long as the mind is unfolding, so long as the recuperative powers of youth are in their acme of energy, so long as the cranial walls are comparatively yielding, the baneful effects of epilepsy are not powerfully exerted. It is after puberty, when growth becomes slower, and when the skull is consolidated, that epilepsy becomes obviously disastrous, and entails the decay of the new-blown faculties. Fatuity or obscuration and loss of newly-acquired powers descends upon its victims. In many cases that have come under my observation this deferred effect of epilepsy in damaging mental faculties has been well exemplified. Four such cases are, indeed, quoted in this paper. In them epilepsy, though established in infancy, did not cause idiocy, but brought on dementia subsequent to the period of puberty.

In a certain number of instances, however, epilepsy in infancy is responsible for idiocy. As we have before hinted, when a clot has been formed in or upon the brain, or where a special proclivity to nervous diseases has been inherited, idiocy is not unlikely to follow in the train of epilepsy. And sometimes, too, without the intervention of a clot or hereditary predisposition, idiocy is still thus induced. Repeated seizures, with their disturbance of function and oppressive congestions, interfere with cerebral nutrition and development, and stunt and abolish the intellect. In doing this they operate very much as they do in inducing dementia. The prolonged determination of blood to the brain which they occasion lights up a spurious activity, and hypertrophy with condensation and hardening succeeds. Thus epileptic idiots are not micro-cephalic. As a rule they have large heads, and brains of fair weight. Although very low in the scale of intelligence, they may have brains of more than average bulk, and only when epilepsy has still further enfeebled a hereditarily weak brain, will diminution in dimension and weight be met with. Of course the derangement at an early period of life of the regulating influence of the supreme nervous centres in epileptic idiocy, and the profound interference with the organic functions which such a state of matters implies, will necessarily introduce additional pathological consequences beyond those produced by epilepsy in the adult. Amongst these additional consequences, however, the same morbid appearances which are seen in the epileptic dement are to be seen in the epileptic idiot. The convolutions are flattened

and in close apposition. The brain substance is firm, and the medullary substance white and glistening. Epileptic idiots sometimes die in the status epilepticus. Most of them sooner or later suffer from tubercular disease of the lungs.

1.—Ellen J—, admitted 8th June, 1864; died 4th July, 1870; age at death, 18; no occupation; single; from Goole. The mother of this girl was epileptic, and died in the West Riding Asylum. She herself began to have fits soon after birth, and her mental faculties were never developed. She never learnt to speak, nor to walk without assistance. She was always dirty in her habits, and throughout her life suffered from frequent fits. She died of phthisis pulmonalis.

Examination 32 hours after death. The body is considerably emaciated, the right arm and leg being considerably more wasted than the limbs of the other side. The skull is generally and considerably thickened, but the membranes are not thickened nor adherent. The whole brain weighs 34ozs. The convolutions are plump and in close apposition, and the brain substance is exceedingly firm. The skull, after the removal of the scalp, measures 13 inches in circumference, immediately above the superciliary ridges; 11 inches from ear to ear; and $10\frac{1}{2}$ inches from the root of the nose to the occipital spine. The arachnoid and pia mater, though not apparently much thickened, are generally adherent to the surface of the convolutions, and are stripped off with difficulty. They do not vary in thickness, as is commonly the case; but are as thick over the occipital as over the parietal lobes. The convolutions of the two hemispheres are simple in arrangement, and singularly symmetrical.

Both lungs are generally infiltrated with tubercle in large cheesy masses, and in small grey particles, in every stage of softening.

2.—Jonathan K—, admitted 12th July, 1868; died 9th June, 1870; age at death, 31; no occupation; single; Huddersfield. This patient had fits from birth, and could never be taught anything like other children. He was six years old before he learnt to walk, and then only in an unsteady, shambling fashion. He could never speak, but cried aloud, when irritated, in a most ferocious tone. He was dirty and degraded in his habits, and suffered from fits almost daily. He died of diarrhoea.

Examination 24 hours after death. The body is much emaciated and deformed, owing to spinal curvature, the back being rounded, the sternum pushed forwards, and the ribs crowded together and twisted. The general appearance of the body and countenance is indicative of a very low type of organization. The deformed and contracted thorax is doubled down upon the abdomen, so that the last rib rests on the crest of the ileum. The abdomen has a deep constriction across its middle, in a line with the umbilicus. The arms are long and the hands large. The knees also are of unusual size and remarkably clumsy outline. The forehead is low, and shelves rapidly backwards, and the

eyebrows are strikingly large and prominent. The opening of the eyelids is of great length, and the breadth of the face, measured across the cheek bones, is enormous. The nose is small and flat, and the mouth large, the lips being thick, swollen looking, and everted. Large, strong, incisors project on to the lower lip. The hair is coarse, of dark colour, and thinly scattered over chin and cheeks. The skull is of great thickness, the bones being soft and of a bluish tinge. It is unsymmetrical, projecting posteriorly to the left side. The frontal sinuses are of great size, measuring one inch across, in an antero-posterior direction. The sinus of the right side is filled with a mucopurulent fluid, and has a thick fibrous lining membrane. The skull, after the reflection of the scalp, measures 22 inches in its greatest circumference; 12 inches from ear to ear; and $11\frac{1}{2}$ inches from the root of the nose to the occipital spine. The dura mater is adherent to the frontal bone. There is no thickening of the arachnoid, and the pia mater is thin, and strips easily. The convolutions of the frontal lobe are flattened, those of the parietal lobe are slightly wasted. The brain substance is firm, the medullary matter white and glistening. The whole brain weighs 50ozs.

Death during or immediately after a Fit.

Death during an epileptic fit, or immediately after it, is an exceedingly rare occurrence, and is, in my opinion, invariably due to the rupture of a vessel within the cranium. Even the most violent fits do not cause exhaustion sufficient to pass into fatal syncope, and even the most prolonged fixture of the respiratory muscles, stops short of complete asphyxia, unless, indeed, some auxiliary circumstance, such as partial stoppage of the mouth and nostrils, or the presence of a foreign substance in the pharynx or larynx, should aggravate its intensity. But the rupture of minute vessels during a seizure does occasionally take place in those parts which are subjected to most vascular distension, and would probably be a more common accompaniment of a fit but for the thickening and strengthening of the walls of those vessels liable to dilatation, which occur in epilepsy. The whole of the vessels of the head and face, and especially those of large calibre, undergo a conservative hypertrophy, and are exempt from weakening degenerations. I have never seen a trace of atheroma in the intracranial vessels of a genuine epileptic, not even when old age had been attained. In cases, however, in which the fits are rapidly established, and are of the gravest description, or in which the spasmodic contraction of the cervical muscles, impeding the return of blood from the head, is unusually sustained, there may be failure of even a thickened vessel with

extravasation of blood. Such an extravasation taking place in or upon the cerebrum at a moment when it is supremely exhausted, would be likely to have an effect altogether disproportioned to its amount, and might readily interrupt absolutely the cerebral functions. It might kill either by shock or compression.

Trousseau, following Van Sweiten, has pointed out that after a severe fit minute red spots, resembling flea-bites, permanent under pressure, and having all the characters of extravasations, may be found scattered over the skin of the face, chest, and throat. I have frequently had occasion to notice these spots, and have satisfied myself that, after an attack of the status epilepticus, they are almost always present. Sometimes, however, they are so minute as not to be readily recognised by the unaided eye, but under these circumstances a pocket glass insures their detection. It is to their presence, in large numbers, and when minute in size, that the singular lividity of the face, changing gradually through dusky yellow tints to the ordinary dingy pallor of the countenance of the chronic epileptic, so often seen after the status, is mainly due. Now it is reasonable to infer that these spots are not confined to the cutaneous surface, but that similar punctiform apoplexies affect the deeper parts which are subjected to equal, or even greater congestive turgescence during a fit. Several facts justify this inference. Similar petechiæ as well as ecchymosed blotches of a larger size, I have repeatedly seen in the sub-mucous cellular tissues of the mouth, after a series of fits. The existence of such miliary hæmorrhages in the brain and its membranes would adequately explain many of the mental symptoms observed subsequent to a severe fit or congeries of fits. It would account for the coma protracted beyond what is usually characteristic of the fit itself; the bewilderment and headache which remain after the coma, and the slow clearing off of these as contraction and absorption advance. But such miliary hæmorrhages have actually been seen in the brain and its coverings. I have notes of a case in which they seemed to occupy the diploic structure of the skull in immense abundance, and Calmeil observed like puncta on the surface of the convolutions. Van der Kolk encountered small sanguineous apoplexies in the substance of the pons Varolii in epilepsy. Then larger hæmorrhages are occasionally seen in or upon the brains of epileptics, and are probably common causes of paralysis, occurring in the course of epi-

lepsy. When death happens then in or close upon a fit, it seems not unlikely that it may be dependent upon such a hæmorrhage. It was so in the two following cases. The formation of a clot during the status epilepticus is illustrated by the case of Margaret G—., No. 8, while the changes which such a clot when not at once mortal afterwards undergoes, are illustrated by the case of Sophia M—., No. 22. I have quite recently found two small but unmistakable arachnoid cysts on the brain of an epileptic imbecile.

3.—James V. S. —, admitted 20th January, 1869, died 6th September, 1871; age at death 26; labourer; single; Ecclesall Bierlow. He experienced his first fit when two years old, two of his brothers being at that time epileptic also. He continued epileptic all his life. His mind became impaired after puberty. He became slow in thought and action, and sometimes fancied that he had an animal in his inside. He died suddenly after a fit, never recovering consciousness. Examination 34 hours after death. There is copious subcutaneous hypostasis on the dependent parts of the body, and slight rigor-mortis in the lower limbs. The face is somewhat livid, as are also the hands and ears and the tongue, under which there rests a firm quid of tobacco. The skull cap is normal, but the sinuses are filled with dark fluid blood, and the dura mater is generally congested. The pia mater is thick and dense, greatly injected, and on its surface, under the arachnoid, there are over the right hemisphere three distinct patches of extravasated blood. The largest and most marked of these is diffused over the frontal lobe. The substance of the brain is of more than ordinary firmness. The puncta vasulosa are very numerous, and the grey matter is of average depth. The cerebellum is congested, and its grey matter is of a strikingly dark colour. The pons Varolii is also much congested. The whole brain weighs 46ozs. The cerebellum, pons Varolii and medulla oblongata weigh 5½ozs.

All the cavities of the heart contain fluid blood, and the liver and kidneys are intensely congested.

4.—Samuel W. —, admitted 10th February, 1871, died 14th November, 1872; age at death 27; mill-hand; single; Bradford. He began to have fits when 19 years of age, and suffered from them ever afterwards. Mental infirmity speedily supervened, and then came outbursts of fierce excitement, with reckless violence. The convulsions were always unusually severe. He died suddenly, immediately after a fit. Examination 30 hours after death. Cadaveric rigidity is present in both arms and legs, and all dependent parts are deeply livid. The skull is of average thickness. The dura mater is not adherent, but is slightly thickened. On reflecting it a small thin film of red fluid blood is found lying over the occipital lobe on the left side, immediately beneath the arachnoid. It rests on the pia mater, and has evidently proceeded from the rupture of one of its minute

vessels. Its greatest diameter is an inch-and-a-half, and it is not a line in thickness. There is no trace of thickening or cloudiness of the arachnoid nor wasting of the convolutum. The latter are in very close apposition, and have, indeed, the appearance as if they had been compressed and flattened. The pia mater strips easily. Both grey and white matter are unusually firm and hard. The former is of good depth, but has everywhere a dark, somewhat purple colour. The hardness of the brain substance everywhere is quite remarkable. Puncta sanguineæ are not numerous, and there is only a small quantity of fluid in the ventricles, which are of small dimensions. The vessels around the pons Varolii, and on the floor of the fourth ventricle, are dilated and engorged. The whole brain weighs $52\frac{1}{2}$ ozs. The cerebellum, pons Varolii and medulla oblongata weigh $6\frac{1}{2}$ ozs.

The heart's cavities contain dark fluid blood, but no clots. Both lungs and the pyramids of both kidneys are dark coloured and congested.

Death from Exhaustion after Epileptic Mania.

Death from exhaustion after epileptic mania is by no means a frequent casualty, as, notwithstanding the extreme violence which is generally characteristic of this form of excitement, it tells less upon bodily strength than acute mania, because it is of shorter duration. The full force, however, of its pernicious effects, when left uncontrolled, has not perhaps been felt in this asylum in recent years, as it is always checked and modified by the administration of ergot, or the hypodermic injection of ergotine. Only in two cases have I seen epileptic mania end in death from exhaustion. In one of these, the patient, a young woman, was in an exceedingly delicate state of health, and was believed to labour under some visceral disease, a diagnosis which could not, however, be tested, as no *post mortem* examination could be secured. She died from prostration and fainting, just as calmness seemed to be returning after four days of ungoverned rage. In the other case, the patient, a middle-aged woman, was just recovering from pneumonia, and was much debilitated when the attack of excitement which destroyed her came on. I am inclined to believe that in all cases of death from exhaustion after epileptic mania, it will be found that strength has been reduced by some other disorder, beyond and independent of the epileptic condition.

The active hyperæmia, which coincides with epileptic mania, probably contributes materially to the hypertrophy and induration of the brain in chronic epileptic lunatics. Every recurring maniacal paroxysm leaves distinct vestiges

behind it in fresh lines of mental disintegration. Every explosion of excitement shakes and shatters the mind. In time it steadies and settles down again, but still it is permanently weakened, and as similar explosions again and again follow, it is finally overthrown, and reduced to a heap of ruins.

5.—Jane S——, admitted 1st January, 1870; died 5th October, 1872; age at death, 28; housewife; married; Leeds. She was first attacked by fits at the age of puberty, and continued to suffer from them always afterwards. As she advanced in life her intelligence failed, and then paroxysms of frantic excitement occurred. She passed through one period of status epilepticus. In the autumn of 1872 she was weakened by an attack of pneumonia. On October 5th she died suddenly, after a paroxysm of violent excitement, no fit having occurred, apparently from exhaustion and syncope.

Examination 62 hours after death. Rigor mortis is present in the legs, but not in the arms. The skin of the neck, shoulders, and upper part of the chest is of a livid hue. The skull is symmetrical, and of average thickness and hardness. There is some fluid blood in the sinuses. The arachnoid is not at all thickened, nor is there any atheroma of vessels. The pia mater is normal, and strips freely. The brain substance is firm and hard. The convolutions are very close together, the sulci being almost obliterated. The grey matter is darker than usual, and has, in fact, a dull reddish tinge. The cineritious and the medullary substance are both singularly hard and firm, and the latter has also a very white glistening appearance. The gumata sanguineæ are numerous, and the choroids and velum interpositum are decidedly congested. There is no fluid in the centricles, but the walls of the third have a curious red colour, and the vessels on the floor of the fourth are markedly dilated. The whole brain weighs 46ozs. The cerebellum, pons Varolii, and medulla oblongata weigh 5½ozs. The cardiac cavities all contain dark fluid blood. The lungs, liver, and kidneys are congested, and both ovaries are converted into cysts.

Death in the Status Epilepticus.

The status epilepticus consists in a series of fits following one another with such rapidity that the coma due to one has not passed off before the convulsive stage of the next has been established. It is a prolonged coma and asphyxia, varied by distinct convulsive seizures, and often by convulsive twitchings of the muscles between the seizures. It is characterised by an intensification of the symptoms which are ordinarily present in an attack of *haut mal*. The unconsciousness is profound; the duskiess and lividity of the sur-

face are particularly evident, and the muscular movements, at its outset at least, are extremely violent. The temperature of the body is elevated, the pulse is quick, but compressible, a profuse perspiration bathes the skin, the pupils are dilated and inactive, and reflex excitability is much diminished. As the attack proceeds, and the activity of the medulla oblongata becomes diminished, the breathing grows more laboured and stertorous, and the functions of the sensorial centres are more completely suspended. The condition terminates either in a tardy restoration to consciousness—the fits becoming less frequent—or in death. A considerable number of epileptics die in the status—indeed, in this asylum, it is perhaps the most common mode of death in epileptics. A terrible succession of fits prevents the adequate aeration of the blood, paralyses the nervous centres, and weakens the heart, and ends in a final cessation of all the vital functions. I have known as many as one hundred distinct fits occur during the status in the course of twenty-four hours, and have repeatedly counted ten and twelve fits in one hour. As might be expected, the status is only met with in long-standing cases of epilepsy.

The brains of those who have died during the status present generally in a marked manner the hypertrophy and induration which have been referred to as characteristic of epileptic insanity, besides the evidences of an enormous accumulation of blood in the venous system. The gorged sinuses, discoloured tissues, and numerous puncta sanguineæ prove that a congestion has preceded death, the severity of which is sometimes also indicated by subcutaneous or submucous extravasations or by intracranial clots. Apart from these clots and ecchymoses, and the hypertrophy and induration of the cerebral substance, the whole aspect of the brain of a patient who has died during the status, and also of all the organs of the body, powerfully recall to mind the appearances seen in cases of death from asphyxia. As will be gathered from the next section of this paper, it is impossible to point out any distinctive differences between the *post mortem* appearances in epileptics who have been accidentally suffocated and those in epileptics who have died in the status. Important practical results cannot fail to be deduced from the fact, of the accuracy of which I have convinced myself by a careful investigation, that death in the status, as well as some of the phenomena of that condition, are due to asphyxia and not to coma.

6.—Mary N—, admitted 10th February, 1871; died 26th December, 1871; age at death, 34; single; needlewoman; Leeds. She was healthy until 19 years of age, and was then suddenly attacked by epileptic fits, for which no cause could be assigned save her sedentary habits. To these fits she continued subject during the remainder of her life. They occurred at first at wide intervals, but afterwards became more frequent. Progressive mental decay set in along with them, and increased as they did, until she became exceedingly childish and silly. She was never excited, but often irritable and quarrelsome. She had a large number of fits in rapid succession for six days before her death, and was quite unconscious for four days.

Examination 43 hours after death. The skin is generally of a swarthy colour, and is particularly so about the head and shoulders. The skull is slightly thickened posteriorly, and bulges a little to the left side behind. The bones composing it are all of a bluish tinge. There is no adhesion of the dura mater, but all the sinuses are filled with dark fluid blood. The brain entirely fills the cranial cavity, and indeed seems to swell out when the skull cap is removed. There is no thickening of the arachnoid nor pia mater. The gyri are plump, well formed, and in close contact with each other. The superficial veins are engorged, and there is a good deal of congestion about the pons Varolii and medulla oblongata. The puncta sanguineæ are numerous. The central ganglia are of a deep red tint, as is also the medullary matter of the hemispheres. The pons Varolii and medulla oblongata are also redder than usual. There is no atheroma of the intra-cranial vessels, but their walls seem to be somewhat thickened, as they are very tenacious, and can be torn out of their sheaths. The floor of the fourth ventricle is smooth and normal. The brain generally is of firm consistence, and weighs 48ozs.

There are firm organised coagula in all the cardiac cavities, and both lungs are congested.

7.—John M—, admitted 23rd January, 1864; died 27th January, 1868; age at death, 26; labourer; single. Epileptic for many years. No cause known. Generally demented, but subject to attacks of furious maniacal excitement. Died in the status convulsivus, after five days of incessant fits.

Examination 49 hours after death. Rigor mortis is well marked, and the body is well nourished. The skin of the scalp is enormously thickened and hardened, so as to be of almost semi-cartilaginous consistence. It is adherent to the skull, requiring the use of the knife and much force to separate it. This thickening is most marked posteriorly. The skull is also thickened, and quite unsymmetrical, being largest on the right side. The occipital bone is half an inch thick at its upper margin, and, like all the other bones composing the skull, is of a bluish colour. The dura mater is somewhat adherent to the skull, and all the sinuses are filled with dark fluid blood. The arachnoid is unchanged, but the pia mater is thickened. The grey matter of the

convolutions has a dark greyish purple appearance, and puncta sanguinæ are very numerous in the medullary substance. The whole brain is congested, and contains a large amount of fluid blood. There is no fluid in the ventricles, but the choroid plexuses are congested, and the corpora striata and optic thalami when sliced are darker than usual. The walls of the third ventricle and the grey commissure are of a deep red colour. The pineal gland, which is of the size of a bean, is converted into a cyst with glairy gelatinous contents. The vessels over the pons Varolii and medulla oblongata look dilated and tortuous, and are engorged with blood. The substance of these parts, like that of the brain, is remarkably firm. The whole brain weighs 52ozs. The cerebellum, pons Varolii, and medulla oblongata weigh $6\frac{1}{2}$ ozs.

The heart weighs 10ozs. All its cavities are filled with dark fluid blood. The lungs are normal, but the liver, kidneys, and supra-renal capsules are all much congested.

8.—Margaret G——, admitted 17th January, 1872; died 3rd December, 1872; age at death, 27; single; charwoman; Holbeck. She became epileptic after an injury to the head in girlhood, and for six years previous to her admission here had been an inmate of a workhouse, where she had one fit periodically every month. Her mind was gradually enfeebled, and latterly she was visited by paroxysms of excitement, in which she tore her clothing, and assaulted anyone who spoke to her. Placed under atropine treatment in the asylum, she had only one very brief and trifling attack of excitement, on February 23rd, 1872, and appeared to improve steadily, until November 25th, when she had a very severe fit, followed in a few hours by a rapid succession of seizures with no recovery of consciousness. For eight days thereafter she remained unconscious, and had 50 fits in the 24 hours, on an average. She died in the status epilepticus, on December 3rd.

Examination 50 hours after death. There are several minute spots of sub-cuticular ecchymoses scattered over the abdomen. Rigor mortis is present in the upper and in the lower limbs. During the removal of the brain a strong and distinctive odour of chloroform is observed in the brain and its membranes. [No chloroform in any shape had been administered during life.] The skull is small, narrow and rather thicker than usual, but fairly symmetrical. The sinuses are filled with dark fluid blood, and all the vessels of the pia mater are intensely engorged. The arachnoid is not thickened, and the pia mater strips freely. At one or two points in the sulci, between the convolutions, there are minute but obvious extravasations of blood. There is no atheroma of vessels. The puncta sanguinæ are very numerous, and the brain altogether seems to contain a large amount of blood. The grey matter of the convolutions is of ordinary depth. There is a small quantity of clear fluid in the lateral ventricles, and the choroids are swollen and injected. At the outer margin of the middle of the

left optic thalamus there is a small cavity about the size of a pea, evidently due to a clot of recent origin. It has very irregular walls, and broken down granular contents of pulpy consistence, and reddish colour. The pia mater, over the pons Varolii and medulla oblongata, is greatly congested, and the grey matter of the cerebellum is of a red colour. The whole brain weighs 44ozs., and the cerebellum, pons Varolii, and medulla oblongata weigh 7ozs. The left ventricle of the heart is firmly contracted. Both auricles contain decolorized clots.

9.—Michael G —, admitted 1st April, 1869; died 15th February, 1870; age at death 29; barber; single; Leeds. Epileptic for 13 years. Fits brought on by onanism, always preceded by giddiness, and followed by headache; weak-minded, but amiable, and well disposed. Died after an attack of excitement, a series of fits extending over ten days, and three days complete status epilepticus.

Examination 12 hours after death. The skull is of a pyramidal shape, and is much and generally thickened, most so, however, anteriorly, and on the right side. The bones entering into its constitution are all of a bluish tinge. All the sinuses and superficial veins are loaded with dark fluid blood. There is a slight degree of opacity of the arachnoid in the immediate neighbourhood of the median fissure. When the upper part of the skull and dura mater were removed the brain expanded and overlapped the cut edge of the skull, as if it had been compressed. The convolutions are plump, and sulci are scarcely discernible. The outer layers of the grey matter are of a bluish colour, and the deeper layers are of a rosy pink hue. The white matter is of tenacious, doughy consistence, and is studded with numerous puncta sanguinea. No fluid is discovered in the ventricles, but the choroid plexuses are found much congested. The optic thalami of opposite sides are firmly united to each other over a considerable surface in the middle of the third ventricle and in the position of the grey commissure. The vessels over the pons Varolii and medulla oblongata are distended with blood, and the floor of the fourth ventricle is of a pinkish colour. The whole brain weighs $42\frac{1}{2}$ ozs. The cerebellum, pons Varolii, and medulla oblongata weigh $5\frac{1}{2}$ ozs.

The heart weighs $10\frac{1}{2}$ ozs., and contains dark clots in all its cavities. The pyramids of both kidneys are congested and dark coloured.

10.—Henry S —, admitted 15th March, 1861; died 15th Nov., 1867; age at death, 30; labourer; single; Sheffield. He suffered from epileptic fits for many years prior to his admission to the asylum. He became stupid, and then excited, and was dangerous to all who approached him. He died, after a series of fits, almost continuous for three days, in the complete status epilepticus. Small doses of spiritus chloriformyli with sumbul had been administered to him during the status.

Examination 23 hours after death. No cadaveric rigidity. Skin of face, head, and neck, purplish and blotchy. The skull is of average

thickness, slightly adherent to the dura mater on the right side, and very unsymmetrical, its right side being more capacious than its left. The grooves for the meningeal vessels are large and deep on the right side. On opening the dura mater an unmistakable odour of chloroform is perceived. The sinuses and superficial veins are all engorged with blood, and the bones of the skull are of a bluish colour, apparently because they are also fully charged with venous blood. The cortical substance is unusually firm and elastic to the touch, and the medullary matter is also preternaturally hard and dense. On slicing the brain, the *puncta sanguinea* are found to be exceedingly numerous, while the smell of chloroform becomes stronger. The medullary matter of the frontal lobes is of a purplish tinge, but is not at all softened. The *velum interpositum* and choroid plexuses are much congested, and large engorged vessels are seen ramifying on the ventricular walls. The *tæniæ semicirculares* are thicker than normal, and stand out prominently. The cerebellum, pons Varolii, and medulla oblongata are all of a pinkish purple colour. Weight of whole brain, 48ozs.; cerebellum, pons Varolii, and medulla oblongata, 6ozs.

11.—Jane J——, admitted 29th July, 1866; died 2nd May, 1868; age at death, 18. She was a healthy girl until 14 years of age, when epileptic fits first came on. To these she continued subject till her death. Under their influence her memory rapidly failed, and attacks of excitement were developed. The fits occurred with great frequency, and most often came on immediately after dinner. She died, after being in the *status epilepticus* for several days, quite unconscious, and with incessant fits.

Examination 54 hours after death. No rigor mortis is detectable. The skull is thickened anteriorly, is unsymmetrical, and is stained of a deep blue colour. The dura mater is slightly thickened, and the sinuses are engorged. The arachnoid is slightly opaque, and all the superficial vessels are distended with blood. The brain substance is very hard. The grey matter is dark in colour, and is found on section to be marked with bright red streaks perpendicular to the surface of the brain. The white matter is variegated with numerous reddish and bluish specks. There is no wasting of the convolutions nor ganglia, and there is no fluid in the ventricles. The fornix, however, is soft and diffuent, and the vessels of the choroid and *velum interpositum* are enlarged, and filled with dark blood. The pineal gland is hypertrophied, and the walls of the third ventricle are of a deep pink colour. The *corpora quadrigemina* are hypertrophied and softened. Some patches of lymph are seen scattered over the upper surface of the cerebellum, situated between the arachnoid and pia mater. The vessels over the cerebellum, pons Varolii, and medulla oblongata are all of large size, and blood-filled. The whole brain weighs 44ozs. The cerebellum, pons Varolii, and medulla oblongata weigh 5½ozs. The right lung, the liver, and the kidneys, are a good deal congested.

Death from Accidental Suffocation in or after a Fit.

A curious tendency to a prone decubitus exists in chronic epileptics, and this tendency sometimes ends in their being suffocated during a fit, by turning completely on to their faces, and burying their mouths and nostrils in their pillows or mattresses. Of fifty epileptics in the West Riding Asylum who are subjected to special night supervision, forty lie habitually half turned on to their faces, and ten are apt to turn over during a fit. I never knew a general paralytic suffocated during an epileptiform seizure, for with them the decubitus is dorsal; but among epileptics an accident of that kind is very liable to occur. Epilepsy is itself a partial suffocation, and very little is required to complete asphyxia during a fit. Those epileptics who are suffocated by turning on to their faces have always suffered from the malady for a long time, and of an aggravated type; recent cases of epilepsy rarely terminate in this way. Then it is to be remembered that the high temperature of the body during a fit, and the quickened circulation, will tend to aggravate the effects of asphyxia, and to hurry them on into death. As it is only in thoroughly matured cases of epilepsy that accidental suffocation in or after a fit takes place, the characteristic morbid changes of epilepsy are always found in the brains of patients dying in this way. Superadded to these, however, is the venous engorgement which ensues on imperfect oxygenation of the blood, and this is witnessed in the other viscera as well as in the brain. As has been before mentioned, the appearances observed in the body of an epileptic suffocated in a fit can scarcely be distinguished from those observed in the body of another epileptic who has died in the status. It has seemed to me that in epileptics suffocated the congestion of the pyramids of the kidney is always much more intense—giving them, indeed, a deep black colour—than it is in other epileptics dying after a chain of convulsions.

After suffocation, as after the status, a bluish colour of the bones of the skull, loading of the sinuses with dark blood, injection with dark blood of the dura mater, pia mater, cerebral substance, choroid plexuses, and velum interpositum, are almost constantly present. Dilatation, too, of the vessels upon and around the pons Varolii and medulla oblongata, and on the floor of the fourth ventricle, is never absent. Decided distension of vessels, with a peculiar surrounding redness or darkness of colour in the nerve substance may be noticed in

the course of the roots of the hypoglossal, vagus and spinal accessory nerves.

12.—Jane H—, admitted 28th December, 1866; died 19th August, 1868; age at death, 23; field-hand; single; Goole. She became epileptic when 14 years old, and ever after continued so. As she attained maturity, incoherence of thought, and occasional attacks of excitement occurred. The fits came in groups, and were mixed up with hysterical symptoms. She was found with her face pressed down into the bed-clothes, the state of the body and bed clearly indicating that she had been suffocated in a fit.

Examination 37 hours after death. Rigor mortis present. The skull is of average thickness, and symmetrical, but very dark coloured. The dura mater is slightly thickened, and of a dark blue colour posteriorly, from injection with blood. The arachnoid and pia mater are not at all thickened, but the latter is much injected, and of a bright red colour. The grey matter is of a dark colour, and its deeper layers of a bright red tint. The medullary matter is rosy throughout, and the puncta sanguineæ are very numerous. The minute vessels are torn out of their sheaths, and are seen lying on the surface of sections of the brain in mossy shreds. The grey matter of the corpora striata and optic thalami is darker than usual, and somewhat pinkish. There is no fluid in the ventricles, but the choroid plexuses and velum interpositum are dark coloured and congested. The arachnoid is thickened over the pons Varolii on each side of the basilar artery. The vessels over the pons Varolii and medulla oblongata are much dilated, and amongst them there are several minute specks, as if extravasations of blood. The pons and medulla, when stripped of their membranes, have a reddish colour externally, and this is not removed by a powerful stream of water. They both present dark, pink patches on section. The restiform bodies of the medulla oblongata are especially congested, and of a darker colour than the rest. The whole brain weighs 46ozs.; the cerebellum, pons, and medulla 6ozs.

Dark-coloured fluid blood occupies all the chambers of the heart. The lungs are slightly congested, and the kidneys intensely so, their pyramids being almost black.

13.—John M—, admitted 27th January, 1862; died 5th April, 1869; age at death, 38; married; weaver; Mirfield. He had suffered from fits for many years, but no information could be obtained as to how they were originally induced. He gradually became demented, at times violent, the fits, as a rule, recurring every month, and being always accompanied by fierce excitement. He was found dead, lying with his face deeply buried in the pillow, froth and blood saturating that portion on which his mouth rested, and his hands being firmly clenched. He had evidently been suffocated during or immediately after a fit.

Examination 16 hours after death. The skull is very unsym-

metrical, bulging anteriorly towards the left, and laterally towards the right side. The bones of the skull are of a dark colour, and are thickened anteriorly in the frontal, and posteriorly in the occipital region. The sinuses are all filled with dark blood; there is no trace of thickening of the arachnoid, but the vessels of the pia mater are all distended, giving the surface of the brain a deeply congested aspect. The pia mater does not strip freely; it is slightly and generally adherent. The convolutions are plump, and in close apposition; the sulci are deep, but do not gape; the grey matter is normal in depth and colour. Its deeper layers are paler than the more superficial ones. *Puncta sanguinea* are very numerous; there is no fluid in the ventricles, and the ganglia are plump and natural. The choroid plexuses and the *velum interpositum* are much congested, and the pineal gland is of very large size. The fornix is somewhat softened; there is marked congestion on the surface of the cerebellum, pons Varolii, and medulla oblongata; the vessels of those parts look dilated, and certainly in no other region of the encephalon is there so much congestion. The whole brain weighs 50ozs. The cerebellum, pons Varolii, and medulla oblongata weigh 8ozs. The right side of the heart is full of dark fluid blood; the left side is empty. The lungs, liver, and kidneys are all congested to a great extent.

14.—John H——, admitted, 2nd February, 1871; died 7th October, 1871; age at death, 37; delver; single; Bradford. He became epileptic when sixteen weeks old, and was subject to fits ever afterwards. At first his mental development was not interfered with. In boyhood, however, he became heavy and lethargic and irritable, and when he reached man's estate he suffered from attacks of violent mental excitement, in which he was most dangerous to all who approached him. He was found suffocated, having turned on his pillow in a fit.

Examination 55 hours after death. Rigor mortis is universally present, and there is considerable hypostatic congestion of dependent parts. The fingers and toes are livid. The skull-cap is normal. The sinuses are full of dark fluid blood. The arachnoid is slightly milky over the frontal and parietal lobes on both sides, and this condition terminates abruptly at the parieto occipital fissure. The convolutions are not at all wasted, and the brain is plump and firm. The whole brain is, indeed, unusually hard and solid. The pia mater strips freely. The fornix is soft and pulpy. The choroid is congested, and the intra-ventricular veins all look as if dilated. There is a decided blueness of the floor of the fourth ventricle, and some dilatation of the vessels which ramify on it. There is congestion around the pons Varolii. The whole brain weighs 54ozs.

The lungs are congested and œdematous, and studded with tubercle, and the kidneys are congested.

15.—Joseph G——, admitted 8th June, 1871; died 24th October, 1872; age at death, 29; labourer; single; Dewsbury. He first had

fits when two years old, and was then teething. At that time the fits only troubled him for a few months, and thereafter he was free from them until he was 14 years old, when, without any known cause, they suddenly recurred with great violence. During the remainder of his life he suffered from them at short intervals. His mind became exceedingly weak, and paroxysms of intense and dangerous excitement accompanied the fits. In the midst of such a paroxysm he was found dead, with his face deeply buried in his epileptic pillow. The wet state of the bed and the disordered bedding, the firm flexure of his thumbs across the palms of the hand, and the presence of froth and blood about his mouth, proved that he had been suffocated in or immediately after a fit. When he was found, which must have been about an hour after death, there was great lividity of his face, and not of the belly or dependent parts, but of the back nates and back of the thighs.

Examination 20 hours after death. The body is stout, and presents over its whole surface numerous purple blotches. Cadaveric rigidity is present. The skull is of average thickness and density, but is not symmetrical, bulging posteriorly to the left side. The bones entering into the constitution are pinkish in colour. The sinuses are all engorged with dark blood, as are also the superficial veins. There is no thickening of the dura mater or arachnoid, and the pia mater is freely separable from the gyri, which are in no degree wasted, but which are indeed plump and closely packed. The brain substance, grey and white, is decidedly abnormally firm and hard. It cuts toughly. The grey matter has rather a reddish tinge. The choroids and velum interpositum are dark coloured and congested. No fluid escaped. The vessels on the floor of the fourth ventricle and around the pons Varolii and medulla oblongata are dilated. The whole brain weighs $49\frac{1}{2}$ ozs. The cerebellum, pons Varolii, and medulla oblongata weigh 6ozs.

The lungs and kidneys are congested.

Epileptic Stupor.

When epilepsy has not been cut short by the status or accidental suffocation or any intercurrent malady, its natural tendency is to terminate in a condition of abject mental fatuity and bodily prostration, which may be designated epileptic stupor, and which steadily lapses towards death. In this condition consciousness is only partially preserved, and great and persistent muscular weakness prevails. A state of degradation is reached only comparable with the lowest kind of idiocy. On examining the brains of patients who have passed into this stupor, and have died in it, marked differences are noticed between the appearances which they present and those which are seen in the brains of epileptics who have

died before sinking into it. Traces of the former induration may be still discernible, the substance of the brain being tough and leathery, but hypertrophy has given place to a certain degree of atrophy. The fibroid tissue, formerly swollen and hypertrophied, has undergone contraction. The proper nervous elements, so long subjected to compression, have wasted; the thickened and distended vessels have failed to minister fully to nutrition, and so even softening may have set in. A special temperament or diathesis may help to the incursion of this epileptic stupor and atrophy, as also may repeated attacks of the status epilepticus or apoplectic clots exercising pressure. The atrophy is evidenced by some opacity of the arachnoid, diminished size of the gyri, and enlargement of the sulci, which also contain some compensatory serous fluid, a quantity of which also generally occupies the enlarged ventricles. The atrophy of epilepsy is moderate in degree. It rarely approaches that of old age, chronic alcoholism, or simple brain wasting.

16.—Benjamin F — , admitted 7th June, 1867; died 8th January, 1872; age at death 44; packer; married; Leeds. He began to have fits when 37 years old. At first these fits involved merely momentary palor and bewilderment, but even while they maintained this character his memory lost its accuracy, his disposition was changed, and he became silly, irrational, and irascible. Soon after his admission to the Asylum regular convulsions were developed, and these continued to recur from time to time, till the close of life. His wits were brightened for a brief season under treatment, but were soon again clouded more heavily than ever. He lost all recollection of the past, and could not correctly apprehend the present. He grew thin and feeble, slow in all his movements, and then tottering and uncertain. Soon he was totally incoherent and helpless, could not move without help, and was dirty in his habits. After months of stupor he sank and died.

Examination 50 hours after death. Rigor mortis present. Considerable suggillation of dependent parts. The skull is symmetrical and of average thickness, but of a bluish tinge. The parietal is adherent to the visceral layer of the arachnoid, in the vicinity of the median fissure. The arachnoid is white, and opaque over the frontal and parietal lobes, and over the annectant gyri. Here the opacity terminates, not spreading over the occipital lobes. Downwards, however, the opacity extends on to the temporo-sphenoidal lobes, where it is markedly visible, and also on to the orbital lobule. Over the cerebellum it is again seen. On the right side, beneath the arachnoid, and occupying the posterior halves of the middle and inferior frontal gyri, is a deep depression about the size of a walnut, filled with serum,

and with a brownish stained bottom formed of pia mater and subjacent grey matter. This cavity looks as if it had resulted from the absorption of a superficial clot. On the left side the remains of a more recent, but still old clot are seen on the surface of the middle temporo-sphenoidal gyrus, being about the size of half a filbert. The convolutions are somewhat wasted, and the brain substance is tough; 2ozs. of fluid flow away. There is no atheroma of vessels.

17.—Isaac K —, admitted 1st January, 1867; died 21st December, 1869; age at death 24; labourer; single; Clifford-cum-Boston. When 16 years of age, being then a healthy and intelligent lad, his left foot was caught in a thrashing machine and was badly cut and crushed. Immediately after this injury he had his first epileptic fit, which was followed by many other fits at irregular intervals. His mind was speedily involved. He grew dull and lethargic, except when excited, and then he used to fancy that he had reptiles in his inside, and that he had been stung all over by wasps. Tortured by these fancies he attempted suicide. When received into the Asylum he was quite fatuous and very feeble, staggering when he walked, and dribbling from his mouth when he attempted to speak. The fatuity increased upon him until he was utterly helpless and mindless. He died after a prolonged period of stupor.

Examination 10 hours after death. The body is much emaciated, and its surface exceedingly pale and anæmic. There is the mark of a cut across the left heel, and the left foot is deformed. The skull bulges a little at the middle of the right parietal bone, and posteriorly on the left side. There is slight wasting of the convolutions, and the grey matter is very pale, its division into layers being unusually perceptible, and the deeper layers being paler than the more superficial. Two ounces of fluid escaped while the brain was being removed. The vessels on the floor of the fourth ventricle are singularly dilated. The whole brain weighs 44ozs. The cerebellum, pons Varolii, and medulla oblongata weigh 6ozs.

There is cheesy tubercle in both lungs, and at the apex of the right there is a cavity.

18.—Sarah W —, admitted 30th October, 1869; died March 7th, 1871; age at death 35. She was first attacked by fits when 19 years of age, and was then suffering from menstrual irregularity. Her intellect did not become impaired until she was 29 years of age, then, however, it rapidly failed, and she grew stupid and intractable. Delusions, having reference to religious matters, troubled her for a time, and, when about 32 years of age, she sunk into deep dementia. She could not recognise her nearest relations, nor frame an intelligible sentence. She lost control over her muscles, which were rigid when at rest, and jerky when in motion. She became emaciated and inattentive to the calls of nature, and more and more oblivious to all that was going on around her. She died after a period of coma.

Examination 65 hours after death. The body is much wasted. There are a few livid blotches on the upper part of the chest and arms, but no rigor mortis, nor hypostatic congestion. The scalp and skull are of normal thickness, and the latter is quite symmetrical. The arachnoid is raised from the surface of the convolutions by a large amount of serous fluid, so that the brain has a gelatinous appearance. The sinuses are occupied by dark blood and clots, and the inter-convolutional veins are also full of blood. The arachnoid presents numerous white milky patches, especially over the enlarged and water-logged sulci. The convolutions of the frontal and parietal lobes are much wasted and rounded off. The superficial half of the grey matter is pale, but the deeper half is of a pinkish colour. The medullary substance is of a dirty greyish-white colour, and presents on section numerous coarse vascular points, shreds of vessels, apparently thickened, and little orifices, out of which vessels have been torn. The grey matter, both where pale and pink, is also studded with similar vascular points and filaments. The ventricles contain clear fluid, of which about 3ozs. in all escaped during the removal of the brain, and the choroid plexuses and velum interpositum are injected. The corpora striata are of a darker tinge than is usual to them, but this does not extend to the optic thalami, at least in the same degree. The vessels on the surface of the pons Varolii look dilated, and there are numerous enlarged vessels on the floor of the fourth ventricle, which is of an uncommonly dark colour. The whole brain weighs 50ozs. The cerebellum, pons Varolii, and medulla oblongata weigh 7ozs.

There are a few nodules of tubercle at the apex of each lung.

19.—Penelope J——, admitted 13th September, 1867; died 18th March, 1868; age at death, 51; married; housewife; Goole. She was first attacked by epileptic fits when two years old, and continued to suffer from them all her life. Never strong minded, she became demented at middle age, and then suffered from occasional attacks of wild, reckless excitement. They ultimately ceased to trouble her, and during the last years of her life she was profoundly demented, and quite helpless; having lost all muscular power, she could not sit in her easy-chair unsupported. She understood nothing that was said to her, and never spoke, but sometimes shouted out an inarticulate cry.

Examination 30 hours after death. Body emaciated. Cadaveric rigidity well marked. The skull is thickened, unsymmetrical, eroded by channels for the meningeal vessels, and of a general bluish tinge. There is general opacity of the arachnoid, and 4ozs. of blood-stained serum escape from under it. The convolutions are considerably wasted, and the sulci are hollowed out into tortuous cavities containing serous fluid. The ventricles are large, and filled with fluid. The medullary substance is pale and glistening. The vessels on the surface of the pons Varolii and medulla oblongata are distended, and these parts, as well as the cervical portion of the spinal cord, have a dirty-brown colour, when looked at externally, as if from pigmentary deposit.

The thoracic and abdominal viscera are healthy, but of small size, as if somewhat atrophoid, except the liver, which weighs 54ozs., and is pale, soft, and decidedly fatty, and the stomach, which is of large size.

20.—Isabella H——, admitted 22nd February, 1871; died 19th May, 1872; age at death, 47; married; housewife; Leeds. When 42 years of age she began to experience attacks of vertigo with momentary loss of consciousness. These, after continuing three years, were converted into regular epileptic fits; immediately after the establishment of which mental weakness displayed itself. Then came depression of spirits with suicidal attempts, then restless excitement, lastly profound fatuity. For the last year of life she took no notice of what was going on around her, could understand nothing that was said to her, and could not form a sentence. Although having few fits she could not stand or walk, but rolled about helplessly, her muscles being very tremulous and feeble. She passed into a state of profound stupor before death.

Examination 42 hours after death. Body fairly nourished. The skull, which is of normal density, is slightly thicker than it ought to be in front. It is symmetrical, but its bones are of a bluish tinge, and present deep wide channels for the meningeal arteries. There is a small rounded nodule or exostosis of bone projecting from the left temporal bone, causing a shallow depression in the superior temporo sphenoidal gyrus of that side. The dura mater is not adherent. The arachnoid, which is slightly thickened, is floated up by large quantities of clear subjacent fluid, more than three ounces of which flowed away during the removal of the brain. All the superficial veins are filled with dark blood, especially posteriorly. The gyri of the frontal and parietal lobes are much wasted, those of the frontal lobe most so. The pia mater strips with facility. There is no atheroma of vessels. The grey matter is rather dark coloured, and the white matter has a purplish mottled appearance. The ventricles are full of fluid, and the floor of the fourth is of a dark purple colour. *Puncta sanguineæ* are numerous, and the ganglia at the base of the brain have all a darker colour than is usually seen in them. The whole brain weighs 42ozs. The cerebellum, pons Varolii, and medulla oblongata $5\frac{1}{2}$ ozs.

21.—Hannah G.—, admitted 14th September, 1864; died Jan. 26th, 1871; age at death, 34. She was said to have had epileptic fits all her life. These, however, became much more severe after she attained womanhood, and induced mental deterioration, with occasional excitement. Ultimately she passed into a state of profound dementia, and in that state continued for three years before her death. Fits occurred during the night, but never by day. She could not speak so that anyone could understand her, nor could she comprehend what was said to her. She could not walk, but staggered or sprawled about, and at last was confined to an easy-chair, in which she slowly and clumsily rolled to and fro. Her muscles were rigid. Divergent stra-

bismus appeared; the pupils became unequal; the breathing semi-stertorous; death was expedited by an abscess of the gall-bladder.

Examination 60 hours after death. The body is slightly emaciated. Rigor mortis is absent. The skull is very thin at the vertex, and along the sutures, and slightly unsymmetrical, bulging on the right side. There is very slight thickening of the arachnoid over the parietal gyri. The pia mater strips readily; the convolutions are wasted and lie very much apart, and the gyri large and gaping. The cineritious substance is thin, and the medullary is blotchy, and contains a good deal of blood, puncta sanguineæ being plentiful. The brain substance is preternaturally firm, and cuts somewhat crisply. The ventricles, which are of normal size, contain a small quantity of fluid, and the fornix is soft and pulpy. The choroid plexuses are dark and congested. The whole brain weighs 43ozs. The cerebellum, pons Varolii, and medulla oblongata, weigh $4\frac{1}{2}$ ozs.

22.—Sophia M——, admitted 7th June, 1853; died 13th July, 1872; age at death 47; domestic servant; single; Halifax. From early infancy she suffered from epileptic fits, but she grew up and was educated like other children; no weakness of mind being perceived in her until after her fifteenth year, when peculiarities of temper and obtuseness of intellect displayed themselves. These rapidly proceeded into dementia, broken in upon by excitement now and then. She passed through several periods of distinct status epilepticus, and after these sunk gradually into a condition of stupor, or mental and muscular helplessness. She died in the status epilepticus after two days of unconsciousness and several fits.

Examination 38 hours after death. There is considerable lividity of the face and all dependent parts. The skull-cap is symmetrical, but very thick and soft, and of a deep blue colour. There is little or no thickening or opacity of the arachnoid, but beneath it over the orbital lobule on each side, there is a dark-brown stain, and a little granular debris in the meshes of the pia mater, clearly the vestiges of former clots. The discolouration is most marked on the orbital portions of the marginal gyri, but extends over the internal and external orbital gyri. It is largest and deepest on the right side. Beneath it the cineritious substance of the gyri implicated is found stained brown and softened. The pia mater strips freely. The convolutions are plump, but the substance of the brain is generally softened. The puncta sanguineæ are numerous. The veins on the floor of the fourth ventricle are numerous, distended and tortuous. The whole brain weighs 43ozs. The cerebellum, pons Varolii, and medulla oblongata, weigh 6ozs.

The heart contains only fluid blood. The lungs are emphysematous. The liver and the pyramids of the kidneys are somewhat congested.