intersection or centre of the wards, and the principle of association being a prominent feature of the system in operation, one attendant is able to superintend a very great proportion of the population. In the ward for the violent and dangerous only, two officers have hitherto been found necessary; in all the other wards, one is quite sufficient, provided the patients be made to give assistance, which is insisted on.

The proportion of attendants to patients, for day and night duties, is, at this moment, 1 for every 21 patients in the male division, and 1 for every 22 in the female division.

The combined action of the various appliances above described, notwithstanding the structural defects already mentioned, and other obstacles and difficulties, has been attended with pleasing results, and has earned a curative character for the establishment not at all discouraging.

The Registers show that from the opening of the new establishment, in 1861, to the present date, the average proportion of cures to admissions has been 43·46 per cent. In the year 1865 the cures rose one-third above the average of the preceding years, which may be considered as a very satisfactory, if not the highest, proportion that can be obtained in any asylum; and if a complete system of hydrotherapeutics, the Hammam or Turkish bath (a powerful curative means in this climate), and more extensive and varied industrial occupation be introduced, the proportion of cures will be greater, and the cost of the general maintenance of the asylum less.

CLINICAL NOTES AND CASES.

Vascular Lesions with Insanity. By G. Hunter Mackenzie, M.B. (Edin.), Senior Assistant Medical Officer, County Asylum, Gloucester.

The determining causes of the pathological states met with in the cerebral cells may be due to morbid activity of the cells themselves (Virchow), or to abnormal conditions of the vascular system influencing their nutrition. These may be—(1) inefficiency of the vis-a-tergo; (2) diminution of the nutritive properties of the blood; or, (3) obstruction in the vessels to the blood-supply; and their frequent association with insanity affords every reason for regarding them, in numerous instances, as direct cause and effect, and for view-

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ing many of the changes in the brains of the insane as of a secondary nature—the results of defective nourishment. Mal-nutrition of a nerve-cell must invariably induce abrogation or diminution of its normal functional activity, with atrophy of its structural elements. The condition of fatty and granular degeneration of the cellular elements of the brain is so universally met with, as to fail to account for the great diversity of clinical phenomena, and hence the various morbid states of the vascular system in the insane become of considerable primary etiological importance. As results of this disordered circulation, there is induced an asthenic irritability, and subsequently the destruction of the normal excitability of the cerebrum, associated with the characteristic physical appearances of wasting and decay.

The following cases are recorded as instances of insanity with well-marked vascular lesions:—

1.—*Case of Thrombosis of the Internal Carotid Arteries* (*Syphilitic*) *—Dementia—Death.*

E. W., widow, æt. 32, admitted into the Gloucester County Lunatic Asylum on 9th Feb., 1876.

History.—No hereditary taint; father phthisical. Age at commencement of attack, 31. There is a history of epileptiform convulsions dating from about a year preceding her admission into the Gloucester Asylum. Husband suffered from venereal disease, which patient's mother believes he communicated to his wife. Has had 3 children, one of whom (the eldest) is alive. The two youngest lived a few weeks only; they were weakly, and covered with a copious skin eruption about the genitals and anus. Had menorrhagia at last confinement, about 2 years ago. Has been subject to bilious attacks and indigestion.

Condition on Admission.—Heart and lungs healthy; pupils unequal, the left being the larger. Impaired articulation and locomotion. Suffers from complete dementia, as indicated by entire loss of memory, and inability to comprehend the simplest questions.

Course of Case (condensed).—The right hemiplegic convulsions frequently recurred, becoming gradually aggravated in character, and on the 16th October, 1876, culminated in complete paralysis of the whole of the right side, with marked difficulty of deglutition, and almost complete abolition of consciousness. These partly disappeared in a few hours, and were succeeded in the arm by a condition of tonic spasm. The pupils continued unequal, the left being dilated and sluggish; there was visible pulsation in the episternal notch, and the heart's action was irregular. The paralysis never entirely disappeared; when conscious, she complained of "pins and needles" in the right arm, and headache. On the 31st October she is reported as having

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had fits all night, the eyes being turned to the left and the mouth drawn to the right; there were no convulsions of the limbs. At 9 a.m. on the same day her condition was as follows:—Face pale; conjunctiva injected and nearly insensible; loud moist tracheal râles. Resp. 36; pulse 100, very small; there was greenish-yellow froth issuing from the mouth and nostrils; sensation was greatly diminished in right leg; arms flaccid and relaxed; right pupil alone sensitive to light. Nitrite of amyl by inhalation was tried; only on the first application was facial flushing produced. She died at 10.15 p.m.

Autopsy, 41 hours after.—Body well nourished; rigor mortis well marked.

Head.—Pericranium fairly injected, cranium soft and of moderate thickness. Meningeal vessels full. 2oz. fluid in arachnoid cavity. Weight of brain 46 oz. Brain of normal consistence throughout; it seemed well-nourished and symmetrical, with the exception of the vessels on the surface of the left hemisphere; these were dilated, and contained dark blood (not hypostatic). The left internal carotid artery, at its termination, was entirely occluded by a thrombus extending into the commencement of the left middle cerebral; this vessel, beyond the occlusion, was fairly distended with dark blood. The posterior branch (4th of Duret and Heubner) of the left middle cerebral was greatly dilated, and contained a long, thready, organised clot. The 1st and 2nd branches of the posterior cerebral—supplying the uncinate gyrus and its vicinity—were larger and fuller than the corresponding vessels on the opposite side. The branches of the anterior cerebral were also larger, and the main trunk of this vessel, running posteriorly along the convolution of the corpus callosum, was especially prominent—its fellow being a mere twig. The left corpus striatum had a small patch of a faint yellow colour on its ventricular aspect.

Microscopical Examination of Recent Brain.—The blood-vessels of the left corpus striatum were of large size, with well-defined, regular walls, and, at places, cohering granules in the perivascular canals. No puckerings, contractions, or thickenings of the vessels were present. The nerve-cells, with their nuclei, had mostly degenerated into fatty granular masses. No difference in the microscopical characters of the two hemispheres was detected.

Thorax and Abdomen.—The heart was healthy, weighing $7\frac{3}{4}$ oz. The right lung sank in water; it was full of sanguineous froth, and nearly solid. The gall-bladder was distended. The other viscera were normal.

The right and left carotid vessels, with their branches, were hardened in a solution of chromic acid and bichromate of potash. Microscopic examination of sections thus obtained, showed that the lesion was symmetrical, and that the right carotid was affected in a similar manner and locality to the left, but to a much less degree. At its division into its cerebral branches, the endotheloid and sub-endothe-

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loid layers of the interna had entirely lost their normal appearance, and undergone marked alteration from hyperplasia and exudation, leading to encroachment upon the lumen of the vessel, but nowhere to complete occlusion. This abnormal epitheloid lining was easily detached from the elastic layer of the inner coat, which, at places, had become wholly obscured by infiltration. There seemed also to be hyperplasia of the outer (fibrous) coat. (See Plate, fig. I.)

The physical symptoms of this case were firstly those of irritation, and subsequently of gradually increasing paralysis, from partial cerebral anæmia. The immediate cause of this was for some time doubtful. The age of the patient excluded atheroma, and consequently atheromatous thrombosis of the vessels; and the healthy condition of the heart and lungs, and gradual accession of the symptoms, forbade the idea of embolism. It was distinguished from hæmorrhage by its slow progressive development, and from cerebral congestion by the mental and physical symptoms being more profound and permanent, and latterly by the existence of paralysis. Marasmic thrombosis was possible, but from its rarity, and the condition of the patient, might be left out of consideration in determining the nature of the lesion. By the process of exclusion, and not from any peculiarity in the symptoms, we were forced to consider whether the lesions might not be due to specific causes acting through the medium of the blood or blood-vessels. If the symptoms had depended on the altered condition of the blood alone, it is fair to infer that they would have been more general in character, since the brain would have been affected in its entirety. A diagnosis —arrived at before a history of specific disease had been obtained, but too late to warrant a trial of appropriate treatment—was accordingly made of syphilitic thrombosis of the cerebral vessels, most probably of the left middle cerebral artery, acting alone, or in conjunction with the syphilitic virus, and leading to abnormal circulation in the left hemisphere.

The prevalence of arterial lesions in syphilis is now well recognised. Though not the most general affection in specific disease of the brain, syphilitic arteritis at the base, and constituting the sole syphilitic cerebral lesion, is not uncommon. A case has been described by Heubner in which the right anterior cerebral, the left middle cerebral, the basilar, and the left vertebral arteries were obliterated in part of their course by thrombosis of syphilitic origin. A similar class of cases is briefly referred to by Von Pierson, in which the blood-vessels

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at the base are affected—such affection being, as in the present instance, the sole syphilitic cerebral lesion, and invariably beginning in the endotheloid and sub-endotheloid layers of the tunica interna as a cellular hyperplasia. In this respect syphilitic disease of the larger vessels at the base appears to differ from a similar affection of the smaller arteries of the substance of the brain, by the changes in the latter consisting mainly in chronic thickening of the middle and fibrous coats from deposition of plasma, as pointed out by Batty Tuke. The result, in both cases, is the same—gradual diminution of the calibre of the vessel, leading to complete occlusion. It is still a matter of doubt whether, in thrombus of syphilitic origin, there is anything of an actually specific nature, and whether the differences between it and a non-syphilitic affection are not rather those of degree, arrangement, and period of accession, than of a histological or generic character. Its specificity is affirmed by Heubner, and denied by Friedlander, who found artificial thrombosis in animals to be identical with that produced by syphilis in man.

Though carefully searched for, no other manifestation of syphilis was found. The only corroborative evidence of the specific nature of the lesion, therefore, lay in the history. The sequence of the physical and mental phenomena may also be confirmatory. These agree, in a great measure, with those described by Wille as characteristic of a variety of syphilitic insanity, viz., the early accession of motor and sensory symptoms, the gradual decrease of mental power passing into dementia, and the subsequent onset of convulsions and paralysis. It is uncertain whether the preliminary hypochondriasis was present. To overcome the progressive obstruction in the internal carotid, and subsequently in the left middle cerebral arteries, the vessels on which lay the stress of establishing the collateral circulation had become markedly enlarged. This was notably the case with the branches of the anterior and posterior cerebral arteries running towards the area of distribution of the middle cerebral. The difference in size between those vessels and the corresponding vessels of the opposite hemisphere was very decided.

I have elected to describe this case as a simple vascular lesion, for, if we except the age of the patient, there was nothing in the clinical, physical, or mental symptoms to indicate its specific nature, and which might not have occurred in the course of a corresponding affection of non-syphilitic origin.

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2.—*Case of Aneurisms of the Basilar and Posterior Cerebral Arteries, and Embolism of the Right Internal Carotid Arteries, with left Hemiplegia—Dementia—Death.*

M. G., æt. 53, female, married; re-admitted into the Gloucester County Lunatic Asylum on the 18th October, 1876.

History.—Date of first admittance, 15th May, 1873. The leading features of her insanity were incoherent talking and great loquacity. She quieted considerably, and, on the application of her relatives, was discharged relieved on the 20th August of the same year. Re-admitted as above. The following additional particulars were ascertained:—Patient is second youngest in a family of 10, three of whom are alive. No hereditary taint; no relationship between father and mother. Had a "stroke" 8 years ago, which came on suddenly, while engaged in ordinary domestic work. On this occasion she lost the power of the whole of the left side, as well as of speech. Was very ill for some time and never quite recovered. Has suffered from frequent attacks of rheumatism. Cause of insanity unknown to relatives; has not been intemperate, nor suffered from poverty. Catamenia ceased at the age of 48. Has had 10 children, of whom 6 are dead.

State on Admission—Physical Condition.—In poor general condition; pupils in medium contraction, and equal; left side partially hemiplegic; articulation slow, hesitating, and thick, from inability to control the finer movements of the tongue; deglutition difficult; pulse 100, very small, so as to be scarcely perceptible; microscopical examination of blood normal. (Patient would not allow her chest to be examined.)

Mental Condition.—As on first admission.

Course of Case (condensed).—On account of her nocturnal restlessness, she received occasional draughts of chloral hydrate. On the 25th October her condition was, pulse 80, intermittent; pupils contracted and equal; heart's action irregular; mitral systolic bruit; mental state unchanged. Her condition remained almost unaltered until the 17th January, 1877, when she suddenly lapsed into a condition of incomplete coma, with the symptoms of serous effusion on the brain. She remained more or less in this condition until her death, on the 21st January.

Autopsy, 30 hours after.—Body well nourished; cadaveric rigidity well marked.

Head.—Calvarium soft and thin. Parietal layer of arachnoid readily separated from dura mater; 6 oz. serous effusion in arachnoid cavity; brain firm, of normal consistence, with puncta cruenta (venous) much larger, and more abundant than usual; it weighed 35¾ oz. On the basilar artery were 2 contiguous aneurismal dilatations of about equal size—being about ½ inch in length, by ⅛ inch in breadth at their widest (central) part. Projecting from the posterior cerebral artery

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into the locus perforatus posticus, was a third aneurism, saccular in form, and about the size of a cherry-stone. The aneurisms contained clotted blood, decolorised in the centre. The inferior half of their walls was thin, and consisted of the outer coat alone. There was softening of both crura cerebri, but mainly of the right. (See fig. II)

Thorax.—Heart flabby; left ventricle dilated. The cusps of the mitral valves were shortened and thickened; the valve was incompetent; weight of heart, 12¼ oz. Atheroma of aorta just above valves. The left internal carotid artery had an independent origin from the aorta, and the left external carotid and left subclavian arteries sprung from the aorta by a common trunk, from which the left vertebral artery was also given off.

The pathological conditions met with in this case render it interesting. The history of the first attack, dating eight years previous to admission into the asylum, pointed to cerebral hæmorrhage, or embolism, as the lesion. Against the latter was the fact that the resulting hemiplegia was left-sided, whereas unilateral paralysis from embolism is almost universally right. In endo-carditis, or other heart-affections in which deposits are detached, and carried in the current of the circulation to the brain, the course generally taken is that which lies nearest the axis of the aortic blood-current, and hence the frequency of embolism of the left internal carotid artery or its branches. In this case the internal carotid arose from the arch of the aorta by a smaller trunk than usual, and to the consequent lessening of the volume of blood entering was probably due the fact of the deposit taking its unusual course. The embolism was recent, and it is possible that the first attack may have also been of an embolic nature, with subsequent re-establishment of the circulation.

On re-admission, the partial left hemiplegia, thick articulation, childishness, and weakness of the emotional faculties, with valvular disease of the heart—all of long standing—pointed to serious organic cerebral disease, most probably hæmorrhage. The fatal illness was sudden in its onset, and was throughout unattended by any direct symptoms, except coma of varying degrees of intensity. The sequence of some of the lesions found on autopsy appears to have been detachment of a fibrinous concretion or clot from the heart, and its impaction in the right internal carotid artery, with subsequent fluxionary hyperæmia in the collateral branches, and distension of the vascular tumours. As a consequence of that distension, and of the extreme tenuity of the aneu-

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rismal walls, transudation of serum took place; this, in its turn, compressed the venæ galeni and the longitudinal sinus, congestive hyperæmia ensued, and the amount of effusion progressively increased.

Cerebral aneurisms are not common. They are most frequently met with in persons of advanced age, and are generally situated on the basilar artery, where also they attain their largest size. Gouguenheim collected statistics of 68 cases, and of these 17 were basilar. With regard to their anatomy, Virchow and Kölliker have shown that they are of four varieties, according to the coat or coats forming their walls. From their entirely vascular nature, and consequent liability to sudden and marked alterations in bulk, they constitute the most dangerous class of brain tumours. It has been pointed out by various writers, amongst others by Niemeyer, that tumours of the brain may attain a large size without producing marked symptoms, if they be of slow growth, and non-vascular; if, however, they be connected with a vessel, or are richly supplied with blood, they may, though small, by their sudden alteration in size, produce serious effects, not through direct pressure, but by encroaching on the cranial cavity, interfere with the capillary circulation, and produce collateral œdema. From the attempts of the basilar artery to aid in establishing a collateral circulation, on the internal carotid becoming blocked, the aneurisms must have become unusually distended, and diminished to a corresponding degree the space of the posterior cranial fossa. The extensive serous effusion was therefore due to two causes —direct transudation through the aneurismal walls, and the ensuing congestion of the cerebral veins and sinuses.

There appears to be no known symptom, nor set of symptoms, which can justify a diagnosis of aneurism of the basilar artery. Griesinger affirms the compression of both carotids firmly against the transverse processes of the cervical vertebræ, and consequent production of convulsions, to be pathognomonic. The correctness of this is denied by Niemeyer, who, while laying down a number of symptoms as indicative of encroachment on the space of the posterior cranial fossa, does not venture to differentiate between the various causes to which this may be due. From the mental condition of the patient, it could not be ascertained if all Niemeyer's symptoms were present, but she undoubtedly suffered from diminution of sensibility and motor power, but no complete paralysis and anæsthesia, and impaired articulation and

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locomotion. The peculiar dizziness referred to by him—which does not occur while the patient is quietly lying or sitting down, but results from certain bodily movements, and which he considers an invariable symptom of diminution of the space of the posterior cranial fossa—appeared absent.

The abnormality in the origin of the branches of the arch of the aorta is unique. In only two recorded cases has the common carotid artery been absent (Quain); then the internal and external carotids arose separately from the arch of the aorta. The present appears to be the only case on record where the left external carotid, subclavian, and vertebral arteries sprung from the aorta by a common trunk, the left internal carotid arising separately.

3.—*Case of Embolism of Left Middle Cerebral Artery—Mania—Hemiplegia—Aphasia—Death.*

History.—M. K., female, married, æt. 50, admitted 22nd February, 1868, into the Gloucester County Lunatic Asylum, suffering from religious mania with delusions. Her father and brother had been insane. Was discharged recovered on the 10th December, 1867, and re-admitted on 22nd February, 1868, suffering from a relapse. On re-admission she had a well-marked double mitral bruit.

Course of Case.—During her residence in the asylum, she continued in a condition of recurrent excitement; the heart's action becoming very irregular, with occasional great dyspnœa. Treatment of the cardiac complaint was frequently attempted, but was invariably refused by the patient. On the 24th October, 1876, she is reported as suffering from great cardiac irregularity and weakness, with dyspnœa and œdema of legs and feet. On the 26th of the same month, at 4.30 p.m., she suddenly became aphasic, with increased cyanosis of lips and face, and augmented dyspnœa. There was no paralysis of limb; the mouth, however, was slightly drawn to the left side, and the power of articulation was abolished. A considerable amount of excitement was present. About 20 minutes after the onset of the aphasia, an attack of complete right hemiplegia supervened, the face being drawn more completely to the left, and the pupils in medium dilatation, with the right, if anything, a little the larger. Both were sluggish, and the eyes were more prominent and staring than usual. On this and the succeeding day she attempted to articulate, and puckered the mouth well, but could only say, "tit, tit, tit." On the 27th, the pulse was weak, fluttering, and intermittent; the cervical veins were enlarged, full, and pulsating. She can move the right leg slightly; is quite intelligent, and has been so during the whole of the attack. On the 31st there were some convulsive movements affecting the right side, and the eyes were turned to the right; the pupils were insensible to light, and dilated, the right being still slightly the larger. Pulse

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almost imperceptible. She subsequently became insensible, and died on the 3rd Nov.

Autopsy, 26 hours after—Considerable œdema of feet and legs; no cadaveric rigidity.

Head.—Calvarium thin, with adherent membranes; superficial cerebral vessels very full and tortuous; weight of brain, 47 oz. In the course of distribution of the left middle cerebral artery and its branches, patches of softening had occurred—

(*a.*) At the extremity of the superior temporo-sphenoidal convolution (adjoining the sylvian fissure).

(*b.*) At the operculum (the junction of the 3rd left frontal, ascending frontal, and ascending parietal convolutions).

(*c.*) At that part of the anterior convolution of the Island of Reil which immediately adjoins the operculum.

(*d.*) There was marked softening, with red extravasation, of the posterior thirds of the 2nd and 3rd left frontal, and, to a less degree, of the ascending frontal convolutions. This involved, mainly, and very extensively, the white matter, and extended in the direction of, and to, the ventricular wall.

(*e.*) Softening, but not marked disintegration, of the left corpus striatum was also present.

Microscopically, the softened white substance showed numerous irregularly defined and broken nerve-fibres; in the gray, oil globules were abundant.

Thorax.—3 oz. serous effusion in cavity of pericardium; weight of heart, 18½ oz.; right cavity full of clotted blood; aorta greatly dilated, as was also the tricuspid orifice. The cusps of the tricuspid and mitral orifices were thickened and contracted; the right lung was studded throughout with hæmorrhagic infarcti.

Abdomen.—Liver cirrhotic; kidneys granular and contracted with embolic infarcti in process of disintegration; spleen fibroid; mucous membrane of stomach rough, and dusky from venous congestion.

This case is simply recorded as an example of insanity associated with the other sequelæ of long-standing heart disease, and as a contribution to the already numerous instances of embolism of the left middle cerebral artery following valvular disease of the heart, in which the sudden nature of the lesion prevented the anastomosing vessels accommodating themselves to the increased current of blood necessary to the establishment of the collateral circulation.

EXPLANATION OF ILLUSTRATIONS.

Fig. 1.—Transverse section of the internal carotid artery, at its termination, showing syphilitic thrombosis, and partial infiltration of the elastic coat. (× 150.)

Fig. 2.—Showing aneurisms of the basilar and posterior cerebral arteries.

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