

conceived arrangement above portrayed, which brings the school classes into every division of the asylum; that the third end is attained, the School System, which exercises, moderately and judiciously, the faculties of the mind as above described, is a proof; and the spirit of order and cheerfulness pervading every part of the Richmond Asylum proves the fulfilment of its fourth aim.

A study of this description, supplemented by a visit to the asylum, will, I am convinced, amply repay the trouble, and serve to extend the knowledge of a system of moral treatment of the insane as near perfection as can well be of any institution of the present day.*

Hallucinations in General Paralysis of the Insane, especially in Relation to the Localization of Cerebral Functions. By WM. JULIUS MICKLE, M.D., M.R.C.P. London.

(Continued from Vol. XXVII., p. 511, Jan., 1882.)

In the next place we arrive at the consideration of—

B. The supposed cortical auditory centre. (First temporo-sphenoidal convolution.)

In treating of the localization of the cortical auditory centres, the same plan will be pursued as has just been carried out in reference to the visual.

CASE XVI.—Hallucinations of hearing were marked; and incomplete deafness came on at an early period. Here the assumed cortical auditory centres were affected, but less than certain other cortical centres.

Interlobar adhesions and congestion of the meninges were present. Also, thickening of arachnoid and pia mater, and serous infiltration of the latter, especially over the convexity of the frontal and of the anterior part of the parietal lobes, where the sulci were somewhat wide and rounded, and the convolutions somewhat wasted.

Adhesion and decortication were found over the frontal convolutions, over those of the anterior part of the parietal lobes, and, to a moderate degree, over those of the temporo-sphenoidal. The superior and external surfaces of the first two of these lobes, the external surface of the last, were those principally affected. Adhesion did not involve the occipital lobe, but was found strewn in patches over the internal surfaces of the cerebral hemispheres, and to a moderate degree on their inferior surfaces. It was nearly symmetrical in its

* See "Richmond Asylum Schools," by Dr. D. Hack Take, "Journal of Mental Science," Oct., 1875.

disposition on the two cerebral hemispheres. The cortical grey substance of the cerebrum was hyperæmic, of a mottled reddish-pink colour, softened, of fair depth, of imperfectly marked stratification. The white cerebral substance was universally softened and hyperæmic. The fluid in the lateral ventricles measured about three drachms. The grey commissure was wanting. The corpora striata and optic thalami were softened and hyperæmic. There were slight opacity and thickening of the meninges covering the base of the brain, especially in the orbital region. The cerebellum, pons, and medulla oblongata, were all diminished in consistence, as also was the spinal cord.

CASE XVII.—In this case, where auditory hallucinations were vivid and prolonged, but where visual hallucinations were not noticed, the cortical changes were extensive, and were more marked in the left than in the right hemisphere.

The left frontal gyri were somewhat wasted, and their anfractuosities widened, and the pia-mater covering this part was slightly infiltrated with serum. The wasting also involved the ascending parietal convolution and the superior parietal lobule slightly. The meninges were very hyperæmic; they were also thick and tough, particularly over the superior and external surfaces of the left cerebral hemisphere.

In the *left* hemisphere, adhesion and decortication were most marked on the following convolutions: the angular, the posterior parts of the supra-marginal, and of the second and third temporo-sphenoidal; the posterior half of the first frontal and the greater part of the second frontal; the second external annectent. These changes were found in less degree over the other annectent gyri and anterior part of the occipital lobe, and over the third frontal gyrus; still less at the ascending frontal and first temporo-sphenoidal gyri. They were absent over the ascending parietal. On the internal surface of the left hemisphere the adhesion and decortication were well marked at the parieto-occipital fissure; were decided, but less marked, near the frontal tip; and still less along the whole length of the gyrus marginalis. They were nearly universal on the left inferior surface, particularly on the orbital gyri. In the *right* cerebral hemisphere, adhesion and decortication were absent over the occipital and annectent gyri; slight on some of the parietal prominences; very slight over the temporo-sphenoidal; and were moderately well marked over the frontal gyri, especially the upper surface of the first frontal, the inner aspect of which (marginalis) also showed a slight extent of the same change, as also did the neighbouring portion of the gyrus fornicatus. The right orbital surface was unaffected thereby.

Brain softer than natural, especially its left hemisphere. Grey cortex thin on left side, its strata not very obvious, its vessels very visible, and its colour ordinary. The white medullary substance was hyperæmic, and its puncta cruenta were numerous, especially in the posterior regions, and in and about the left corpus striatum. The walls of the fourth ventricle were roughened by granulations. The

vessels were deeply injected, and the meninges unusually thick and tough, over the pons and medulla oblongata, and these parts were hyperæmic on section, of lilac hue, and their vessels were dilated. The arachnoid was thickened at the interpeduncular space. The cerebellum was hyperæmic.

Thus, among some of the parts most affected in the *left* hemisphere were the posterior portions of the second and third temporo-sphenoidal gyri (the first being comparatively free), the angular gyrus, and the posterior part of the supra-marginal. In the right hemisphere, adhesion was very slight on the temporo-sphenoidal gyri, and only slight on the parietal. According to the theory, the functions of sight, and probably those of smell and taste, should have shown much disorder and subsequent impairment, while that of hearing should have been less actively deranged, though, no doubt, perturbed by the propinquity of its centre to the more active morbid changes. In reality, however, hearing was the special sense particularly disordered.

It may be added that, under the microscope, the vessels and nerve cells were considerably more diseased in the left third frontal convolution than in the first frontal; while the ascending frontal presented much the same changes as the first frontal, except that the vessels were more altered in the former. In the occipital lobe the microscopical morbid changes were slight.

CASE XVIII.—Auditory hallucinations.

On the right side the external temporo-sphenoidal surface, including the supposed auditory centre, suffered considerably; on the left side much less. So far the theory is supported.

In the right frontal lobe, the grey cortex of the superior and external surfaces was markedly indurated, and was atrophied, reddish, hyperæmic. The rest of the right grey cortex was only slightly firm, and was far more normal in appearance, as was also the grey cortex of the left cerebral hemisphere. The white substance was injected in the right frontal lobe, pale in the rest of the right hemisphere, of ordinary vascularity in the left, and universally of a slightly increased consistence.

As for adhesion and decortication—in the *right* hemisphere there were a few points of adhesion on the prominences of the ascending convolutions, especially of the ascending frontal; also on the posterior part of the inner (marginal) surface of the first frontal. The third frontal was affected. The external surface of the temporo-sphenoidal suffered considerably. The inferior surfaces of the temporo-sphenoidal and of the frontal lobe were comparatively much freer from this change. In the *left* hemisphere, as compared with the corresponding portions of the right, the anterior two-thirds of the parietal lobe suffered much more, the superior surfaces of the frontal gyri suffered a little more, and the external surface of the temporo-sphenoidal considerably less than the corresponding parts on the right side. The left third frontal gyrus was quite free. Naming

them in the direct order of its severity, the following were the lobes most affected by this change—left parietal; right parietal; right temporo-sphenoidal; left temporo-sphenoidal; left frontal; and right frontal.

The lateral ventricles, especially the right, were large; their ependyma was firm. The right basal ganglia were pale, the corpus striatum being also somewhat wasted. The pons and medulla oblongata were rather firm, and their meninges thickened. The spinal cord was somewhat softened in its upper portions, and the left posterior grey cornu was atrophied in the dorsal region.

Under the microscope. Examined in the *fresh* state, the grey cortex of the right first frontal convolution exhibited much neuroglia; hyperplasia of the neuroglial nuclei and of the vascular, with hypertrophy also of the latter; some thickening and irregularity of certain vessel walls; many small, round, and oval cells; small size of pyramidal nerve-cells. In the left first frontal convolution the nerve-cells and vessels were more normal. In the fresh cord the multiplication of nuclei and the condition of the cells were much the same. *Prepared sections* of the right first frontal gyrus took the carmine stain badly, and showed unstained patches of a ground-glass appearance; the vessel-walls were thick; the nerve-cells atrophied, some granular, some of ground-glass appearance, some undergoing disintegration; round and oval nucleated cells; scattered dark pigment grains. The left first frontal gyrus took the staining better than the right; its changes were the same as those in the right, but were much less marked. Of the right third frontal the same may be said, except that it more nearly approached the condition of the right first frontal. A number of unstained sclerotic patches were seen here also. The left third frontal resembled the right, except that the nerve-cells were more granular. The spinal cord did not stain very well; the walls of some of its vessels were thickened, and their nuclei hyperplastic; there was also increase of connective tissue, aggregations of granules, a few compound granule corpuscles, and numerous small round and oval cells containing either a nucleus or molecules.

CASE XIX.—In this case were vivid auditory hallucinations; no other hallucinations were noticed. Here the supposed auditory cortical centre was comparatively little affected, the visual suffered severely, and yet with vivid auditory hallucinations no visual hallucinations were observed; if present at any time, they were kept in the background. The case, therefore, does not harmonize well with the special theory of localization.

The arachnoid over the superior surface of the brain was somewhat thickened, opalescent, and tough; and there was convolitional wasting, mainly on the superior aspect of the cerebrum, as well as sub-arachnoid serosity. Interlobar adhesions were present. The pia-mater was hyperæmic. Adhesion and decortication were widely spread, and were especially seen on the superior and external surfaces

of the cerebrum. The four frontal convolutions and the ascending parietal, supra-marginal, and angular convolutions were those most markedly affected; the remaining portion of the parietal lobes was less involved; and the temporo-sphenoidal lobes were but little affected. The same adhesion and decortication also affected the cerebellum, the arachnoid tunic of which was opaque. The cerebral grey cortex was diminished in consistence. The white substance of the brain was also universally softened, and was the site of considerable hyperæmia. The lateral ventricles of the brain were large, and contained 1 oz. of serosity. The fornix was soft, almost diffuent; the corpora striata and optic thalami were soddened and softened; the pons Varolii was softened and of a pinkish hue; the posterior part, especially, of the medulla oblongata was softened and hyperæmic.

CASE XX.—Auditory hallucinations were moderately well marked. Visual hallucinations also were evidenced.

There were interlobar adhesions at the base of the brain. The meningeal thickening, condensation, opacity, and œdema were mainly confined to the frontal and parietal lobes. The calvaria, dura-mater sinuses, and meningeal veins were all passively engorged, in part from the mode of death.

Adhesion and decortication were absent.

The grey cortical substance of the cerebrum was rather thin, the atrophy being quite evident in the anterior region; also somewhat increased in consistence, particularly in the frontal region, where it was also paler than elsewhere, and where its stratification was less marked. The white substance was moderately hyperæmic. The lateral ventricles were rather large, and their lining membrane was thick and opaque. The pons Varolii and medulla oblongata were of ordinary consistence, and were hyperæmic, especially about the floor of the fourth ventricle.

The case was not a favourable one for purposes of localization.

CASE XXI.—A chronic case, in which from time to time were pronounced illusions of hearing, also hallucinations of hearing; the other hallucinations were those of touch; hypochondriacal (visceral, systemic, cœnæsthetic) sensations and delusions were prominent features of the case.

Chronic meningitis and pachymeningitis were found, particularly over the left side of the brain, the membranes being pale and much thickened. The brain was atrophied. The grey cortex of the cerebrum was pale, atrophied in front, and slightly firmer than normal, all of these conditions being slightly more on the left side, and the atrophy particularly affecting the frontal tips. The white cerebral substance was pale, slightly too firm in the frontal regions, especially in the left. The left hemisphere was of less weight than the right.

Adhesion and decortication were only very slight and superficial. On the *right* hemisphere they occurred only on the marginal convolution, just behind the frontal tip. A doubtful spot was observed over

the middle of the outer surface of the first and second temporo-sphenoidal gyri. On the *left* hemisphere they were found on the third frontal, the anterior part of the second frontal, the median surface of the first frontal near its tip, and the lower end of the ascending frontal.

The lateral ventricles contained $\frac{7}{8}$ oz. of serosity; their ependyma was slightly granulation-strewn. Adhesions existed between the velum interpositum and the fornix above it, and the surface of the optic thalami below it. The basal ganglia were pale. The ependyma of the fourth ventricle was altered in the usual way, and in a moderate degree. The pons and medulla oblongata were somewhat pale, the posterior columns of the latter slightly indurated, as were also the posterior columns of the spinal cord. The olfactory tracts were partially wasted.

Here there was no very special implication of the supposed cortical auditory centres in adhesion, except slightly and doubtfully on the right side. The cerebral changes, however, were extensive.

CASE XXII.—Vivid and long-continued auditory hallucinations; visual hallucinations present, but less marked than the auditory.

Arachnoid opaque and tough over the median, superior, and external cerebral surfaces, especially over the parietal lobe and the posterior zone of the frontal lobe, and slightly so on the anterior two-thirds of the inferior cerebral surface; also, corresponding pia-matral oedema, which even extended slightly to the occipital lobe. The pia-mater was thickened. The arachnoidal opacity and thickening were less decided over the external surface of the temporo-sphenoidal than over the frontal lobe, but in the former locality the vessels of the pia-mater were hyperæmic.

Adhesion and decortication affected the following parts of the brain:—In the *right* hemisphere all the frontal convolutions were considerably affected, but of these the ascending frontal least, its middle third escaping. All the parietal gyri were affected, especially the supra-marginal lobule, and the anterior part of the postero-parietal lobule. The angular gyrus was moderately implicated. The temporo-sphenoidal gyri were slightly affected, the first especially suffering of these; the third temporo-sphenoidal and inferior surface were considerably affected up to the subiculum cornu ammonis. Slight points of adhesion were scattered over the inferior occipital and occipito-temporal surfaces. On the internal surface the adhesions, scattered as far back as the occipital lobe, were principally on the paracentral lobule and along the peripheral border of the gyrus marginalis.

On the *left* hemisphere the adhesions were mainly on the first, second, and third frontal gyri, and on the temporo-sphenoidal, a few very slight spots only of adhesion being found on the other frontal, and on some of the parietal and occipital gyri. The external and inferior temporo-sphenoidal surfaces were affected as on the right side, and on the orbital surface only the first and second gyri. The

internal surface was affected similarly as in the right hemisphere, the adhesions here being also continuous with that over the postero-parietal lobule.

The cerebral grey cortex, somewhat wasted, showed many vessels, and on the right side was of slightly increased consistence, but was soft in the temporo-sphenoidal regions, especially the left. The posterior part of the left parietal grey matter was rather pale; that of the occipital lobe was more reddish and injected, as was also that of the right parietal. The white substance was somewhat hyperæmic, and was softened in the temporo-sphenoidal lobes. Thick opaline ependyma of the lateral ventricles, which were large. Basal ganglia alike on the two sides, and of a faint lilac hue on section. Cerebellar meninges somewhat thickened, and slightly adherent in parts, at the under-surface and at borders of lateral lobes. Ependyma of fourth ventricle somewhat altered, and medulla oblongata slightly firm. Pons of ordinary appearance.

Microscopical.—Moderately well-marked microscopical changes were found in the vessels, nerve-cells, and nuclear interstitial elements, and about equally in the right gyrus uncinatus, right first temporo-sphenoidal, and left first temporo-sphenoidal convolutions; also changes in the right and left postero-parietal lobules, doubtfully more marked in the former of these two.

Thus the supposed auditory cortical centres were decidedly affected on both sides in this case.

CASE XXIII.—Auditory and visual hallucinations existed in this example.

The meninges were thickened and increased in consistence, especially on the superior and external surfaces. The pia-mater was œdematous, equally over the frontal and parietal lobes, and in a less degree over the temporo-sphenoidal and the anterior part of the occipital; over the frontal lobes it was rather pale and of gelatiniform appearance. A lesser degree of the meningeal changes and œdema extended over the whole inferior surface of the cerebrum.

Adhesion and decortication were comparatively slight, were symmetrically disposed on the two cerebral hemispheres, and were mainly of the supra-marginal, angular, and first and second temporo-sphenoidal gyri. A few spots of the same existed on the inferior temporo-sphenoidal and the orbital surfaces. Also on the left frontal region, and here they were confined to its posterior zone, that is, to the ascending frontal gyrus and the ends of the frontal tiers abutting thereupon.

The cortical grey matter was somewhat pale, but exhibited many dilated vessels, and was of slightly increased consistence, but of lessened depth. The white matter was slightly increased in consistence. The lateral ventricles were large. The corpora striata were of slightly diminished consistence; it was doubtful whether the left one was not slightly the smaller. Optic thalami of dull mottled lilac hue. Granulations on ependyma of fourth ventricle.

This case agrees well with the theory, the supposed auditory and visual cortical areas being the very parts most affected with adhesion.

CASE XXIV.—Here the changes observed in the so-called cortical auditory centres were also so extremely extensive and severe over a large portion of the cerebrum as to nullify minute localization of the kind required. (For details see Case 5, under the heading of Visual Hallucinations.)

CASE XXV.—Auditory hallucinations were vivid, and were often evinced. So were visual hallucinations, and full details of the post-mortem appearances having been already given under the heading of Visual Hallucinations, it is only necessary to remark in this place that the supposed cortical auditory centres suffered considerably in both hemispheres of the brain. The details appear under Case 6, *supra*.

CASE XXVI.—The auditory hallucinations were not so highly pronounced as the visual in this case. Adhesion and decortication affected the first and second temporo-sphenoidal convolutions to a slight extent only, and that on the left side solely. Auditory hallucinations, however, were less marked than visual, and correspondingly the supposed auditory cortical centres were much less affected than the supposed visual cortical centres. Particulars are given under Case 7 of Visual Hallucinations.

CASE XXVII.—Auditory and other hallucinations. In this case, while the second temporo-sphenoidal convolutions were slightly affected by adhesive changes, the first temporo sphenoidal were almost free therefrom. Hallucinations, however, were not clearly evinced for more than a moderate period of time in the course of the disease. A summary of the pathological appearances is given under Case 8, above.

CASE XXVIII.—Auditory hallucinations as well as visual were very obvious for a somewhat prolonged period. Here the auditory cortical centres were not among the parts most obviously diseased, and were free from adhesion. The necroscopical records are referred to under Case 9.

CASE XXIX.—Hallucinations of hearing and of all the other special senses were present. The supposed auditory cortical centres escaped the adhesive change; the pons Varolii and medulla oblongata were extremely diseased. A summary of the morbid anatomy has already been given with Case 10 of Visual Hallucinations.

CASE XXX.—Vivid auditory hallucinations as well as visual existed here. The morbid changes were symmetrical in the two hemispheres. The so-called cortical auditory centres were affected only to a moderate extent and degree, and less than one would have anticipated on the theory now in question. Nevertheless the adhesion and decortication were very wide-spread, and the general encephalic changes were extremely pronounced, and these conditions would suffice to explain a functional disorder of almost any part of the brain. The case has already been described, when treating of visual hallucinations, as Case 1.

CASE XXXI.—Besides the visual hallucinations already referred to in Case 3, there were most vivid auditory hallucinations. From the summary already given it may be seen that the first and second temporo-sphenoidal gyri were markedly diseased, and even slightly more so in the left than in the right hemisphere. So far as it goes, therefore, the case falls in with the theory.

CASE XXXII.—Auditory hallucinations gave companionship to the visual in this case, the necropsy of which has been summarised when treating of the visual hallucinations under Case 4. Here the first and second temporo-sphenoidal convolutions were among the parts comparatively little diseased, the supero-external fronto-parietal regions being those principally affected.

In conclusion, and in recapitulation, it may be briefly stated—

That hallucinations and illusions are more frequent and important in general paralysis than is generally recognised.

That the percentages given in the foregoing papers as those in which hallucinations of the several senses exist in general paralysis are probably minimum percentages, and this for the reasons assigned therein.

That, contrary to what is usually believed, visual hallucinations occur with scarcely greater absolute frequency than auditory in general paralysis; but

That in general-paralytic soldiers the visual hallucinations bear a considerably higher ratio to the auditory than they do in the other insane soldiers.

That in the latter, namely, in the soldiers with non-acute insanity, and exclusive of general paralysis, auditory hallucinations predominate in frequency over visual; as they also do over the auditory hallucinations of general paralytics.

That in general characters the hallucinations of general paralysis are often of short duration, recurring, variable, non-systematized, numerous, absurd, crude, and, sometimes, disconnected, contradictory *inter se*, inobtrusive, and extremely pleasurable or painful.

That lesions of the cortical sensory centres of the cerebrum are concerned in an intimate way with the production of most of the hallucinations in general paralysis.

That in dealing with the hallucinations in general paralysis, in reference to cerebral localization, use may be made of the distribution of cerebro-meningeal adhesions and the cortical changes associated therewith.

That in cases of visual hallucination in general paralysis the angular gyrus is not affected in the marked manner one

would anticipate on the theory that it is the sole cortical visual centre; nor, in cases of auditory hallucinations, is the first temporo-sphenoidal, viewing it as the sole cortical auditory centre.

Thus the morbid anatomy of general paralysis fails to support the exclusive view that these gyri are, or contain, respectively the sole cortical centres of sight and hearing.

Taking the cases together, we find that the supra-marginal convolution is affected more than the angular in those with visual hallucinations, and the adhesions are often well marked on the postero-parietal lobule.

Also that the second temporo-sphenoidal gyrus seems to suffer more than the first in the cases with auditory hallucinations, taken collectively.

Mental Experts and Criminal Responsibility. By D. HACK TUKE, M.D., F.R.C.P.

I wish in the first instance to lay clearly down what are the objects to be attained in regard to alleged insanity in criminal cases; in the second place I shall speak of what is the course pursued in England to reach those ends, and point out its inadequacy and inconvenience; and, thirdly, I shall suggest certain modifications, or rather radical changes in our present system, which I submit will act beneficially in securing the objects I lay down as those we ought to have in view. I am not, of course, speaking here of the duties of the Expert; his rôle is much more limited in its range; but I am placing myself in the position of one who heartily desires to answer the question: Can the present method of ascertaining Criminal Responsibility in our Courts of Law be improved?

The first object I take to be to adopt the most scientific and therefore most efficient means of ascertaining the mental condition—the criminal responsibility—of the accused.

The second is to protect him from punishment if he is irresponsible.

The third is to protect society from the injury done by admitting the plea of insanity when the act committed is really criminal, thus relaxing the checks upon crime and failing to punish when punishment is due.

There is also a fourth and very important object, which