opening address. Yet the wide subject which I selected—Lunacy in England (*England's Irren-Wesen*)—did not admit of shorter treatment or of further compression. It is, after all, but a bare outline that I have to-day been able to sketch of the present condition of the insane in England, and the manner and method of their care and treatment. I may claim to have endeavoured to give you a truthful picture of our present state, and I certainly have not desired to hide our many shortcomings from you. Indeed, my object in selecting this subject for my address is the hope, that the position I fill to-day in this great International Medical Congress may gain for my ideas on lunacy reform, which I have thus brought before this section, a practical recognition such as I could not, under other circumstances, expect my humble opinions to command. If such a result should follow, I truly believe that the use I have made of this great opportunity may be the means of extending to the insane of all classes in England that further measure of protection and liberty which the experience of the past working in the County Asylums of the Lunacy Act of 1845, on the lines of the non-restraint system, has now shown to be alike practicable and safe.

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 p. 383, *Oct.*, 1881.*)*

In the following cases, visual or auditory hallucinations, or both, were more or less vivid and persistent. First the visual, and then the auditory, will be considered, together with the lesions of the respective supposed cortical centres.

A. *The so-called cortical visual centre. Angular, and (in less degree) supra-marginal convolution, or lobule.*

CASE I. In one case where visual hallucinations, as well as auditory, had been very marked, adhesions and decided morbid changes affected all the gyri of the superior and external surfaces of the frontal and parietal lobes. Especially was this marked in front, where the entire outer layers of the grey matter stripped off, but every convolution (including the angular and supra-marginal) of the area just specified was extensively involved and further detail is unnecessary. The internal surface of the cerebral hemispheres was also

much affected. The same change also affected the prominences of the first and second temporo-sphenoidal gyri to a moderate extent and degree, but tapered off here and spared the third gyrus. The occipital lobe only showed the adhesion-changes, and to a slight extent, in the portions of the first and second occipital gyri which border upon the parietal lobe, or assist in forming the annectent convolutions. The grey matter of the uncinate gyri also separated along with the meninges, and a few scattered points of adhesion were found elsewhere on the inferior surface of the brain. The grey matter was hyperæmic, mottled by sections of the contents of visible dilated vessels, slightly softened, of a deep grey and somewhat slaty hue, of fair depth, and of imperfectly marked stratification.

The white substance of the brain was somewhat softened, and was mottled ; its puncta sanguinea were numerous. All the above appearances were symmetrical in the two hemispheres. Fornix softened. The left corpus striatum and optic thalamus seemed to be slightly shrunken, but there were no special morbid appearances on section. The pons Varolii and medulla oblongata were lessened in consistence, hyperæmic, and their meninges hypervascular. The cerebellum was hyperæmic and slightly softened.

Although the very widely spread principal changes *did* include the so-called cortical visual centre, but little can be concluded from this.

Case II. In another case, the cortex of the *right* cerebral hemisphere had undergone its most marked changes in the frontal lobe, especially at the posterior and upper part of its convexity. In this hemisphere the adhesions affected only the anterior portion of the upper surface of the first and second frontal convolutions, more particularly the latter. On this side the grey matter was of a deep pinkish hue, especially in the frontal region, and showed numerous visible vessels. In the upper parietal convolutions the colour was much paler. The colour was again deepened in the occipital region. The grey cortex was of ordinary depth, and was of increased consistence throughout this hemisphere, and particularly so in its superficial layers, and in the gyri at the vertex, and in the frontal lobe. The strata were indistinct. The grey cortex of the inferior surface was firmer than usual in the anterior region, but less so in the middle and posterior. The white matter was firm ; and was very hyperæmic, especially near the base of the brain. The corpus striatum and optic thalamus were plump, firm, hyperæmic, and presented numerous large puncta cruenta.

The *left* hemisphere was more diseased, and weighed an ounce less, than the right. The grey cortex of the convexity of its frontal lobe was atrophied ; so was that of the parietal, but to a much less extent and degree, though, on the whole, it appeared, under the microscope, to be nearly as much diseased as that of the frontal. Adhesion was almost limited, on this side, to the upper part of the tip of the first frontal convolution. The convolutions were wasted and sunken over

an area of about half an inch square, immediately before and behind the external parieto-occipital fissure. The grey cortical substance was paler on this than on the right side; its layers were not nearly so thick as those of the right in the frontal lobe, but were of about the same depth in the posterior part of the parietal, and in the occipital lobe. The depth of the grey matter gradually diminished as one passed forward from the parietal lobe. The grey matter was unusually firm in all the upper regions of the cerebrum, especially in the frontal lobe, where the colour was ordinary, with a faint slaty tint in the inner layers. The vessels were visible to the naked eye in the grey matter, on this side, and there was a slight pinkish hue only in the posterior of the parietal, and in the occipital, convolutions. Elsewhere the colour was ordinary. Microscopically, the nerve-cells were more diseased in the left than in the right frontal region. The white matter was much the same as on the right side. The corpus striatum and optic thalamus were much paler than on the right side. Still they were firm and hyperæmic.

The grey cortical matter at the base of the cerebrum was thin, firm, and of ordinary hue in the orbital region, but thicker, softer, and more vascular over the base of the temporo-sphenoidal and occipital lobes, and at the back part of the internal surface.

The medulla oblongata was very firm, and the tissues beneath the floor of the fourth ventricle were pinkish.

The angular and supra-marginal gyri, therefore, were free from the adhesive change, and although they were not among the gyri microscopically examined, yet the gross morbid changes were comparatively less in their region than in many other parts. It is true, there was some atrophy near to the left angular gyrus, but it was mainly confined to the first external annectent gyrus. Contiguous to the angular gyrus, the change was not observed to invade it.

In this case there is no obvious support to the physiological doctrine now under debate.

Case III. In another case, where both visual and auditory hallucinations were most vivid, and were prominent clinical features, the distribution of the adhesive change gives some support to the assumed localization of the so-called cortical visual and auditory centres; for while the postero-parietal lobule and the upper border of the angular gyrus escaped, yet the first temporo-sphenoidal, the supra-marginal, and the greater part of the angular gyrus, suffered decidedly from the adhesive change.

More exactly: the adhesion was more marked in the *right* cerebral hemisphere than in the left; in the former it was most marked over the lower half of the parietal lobe, the lateral surface of the first and second gyri of the temporo-sphenoidal lobe, the lower part of the right ascending frontal gyrus, the third frontal gyrus; and to a less marked degree and extent, over the anterior and posterior ends of the middle frontal gyrus, leaving an intermediate oasis unaffected; and over the whole of

the superior surface of the first frontal gyrus. It was observed slightly on the orbital surface, and on the internal surface ; but the occipital lobe escaped, with the exception of the anterior end of the third occipital gyrus. Thus a large band on the posterior two-thirds of the upper portion of the right hemisphere escaped the adhesive change ; the breadth of this oasis was from two to three inches at different points, and it was limited anteriorly by the first frontal gyrus.

The adhesive change was much less advanced in the *left* hemisphere, but had a somewhat similar distribution, except that the superior surface of the first and second frontal gyri escaped, the orbital surface, however, being as much affected here as on the right side. The temporo-sphenoidal lobe, moreover, was equally diseased on this side, and the third frontal gyrus was considerably implicated.

Numerous vessels were apparent in the cerebral grey cortical matter, which had a faint lilac hue, and was atrophied in the anterior regions. The whole brain was of diminished consistence. The white matter was hyperæmic and pasty. The fornix and grey commissure were soft. The corpora striata were of a dull lilac, the optic thalami of a mottled lilac, hue. Right hemisphere 2 ozs. less in weight than left ; cerebellum slightly hyperæmic, especially on the right side near the median line ; a slight pia-matral hæmorrhage beneath the posterior part of its inferior vermiform process. Pons and med. oblong. hyperæmic. Ependyma of fourth ventricle granulated. Under microscope ; numerous nucleated cells and nuclei ; leucocytes ; deposit of blood pigment ; and some granular nerve-cells ; in cerebral cortex.

Case IV. Auditory hallucinations occurred at an early stage ; and, later, vivid visual hallucinations. The case afforded no support to the doctrine of localization now in question.

The inner meninges were rather pale, were opaque, thickened, œdematous, and non-adherent to the brain. The serous infiltration of the meninges was most marked, and associated with decided wasting of the convolutions, close to the great longitudinal fissure, immediately before and behind the ascending gyri on each side. The grey cortex of the cerebrum was of fair thickness, somewhat mottled by blood-containing vessels ; its inner layers were pale whitish-yellow ; its outer greyish ; at the base it was pale. Over the superior and external surfaces of frontal and parietal lobes it was firm, this condition gradually shading off to nearly the normal consistence at the occipital lobe and at the base. Lateral ventricles rather large, fornix firm, basal ganglia rather pale. No special changes observed in 7th nerves, or medulla oblongata, or labyrinth, or tympanum. Spinal cord slightly softened. Microscopical. Right frontal cortex : many small round or oval cells containing several dark molecules ; nuclei of vascular walls increased in number ; increased number of Deiter's cells ; slight atrophy and degeneration of some of the nerve-cells, several of which were partly surrounded with vacuoles. Ascending gyri, much the same. Spinal cord ; degeneration of some of the multipolar cells.

Case V. Visual hallucinations (also auditory).

Arachnoid and pia-mater much thickened and opaque, even over the base of the brain; also anæmic and œdematous. Adhesion and decortication excessive, and not only from the prominences of the convolutions, but also, to some extent, from the declivities of the anfractuosities. On the *left* cerebral hemisphere this cerebro-meningeal adhesion was almost universal, affecting *all* its surfaces; and especially the parietal lobe and part of the frontal; being almost as much in degree, also, at the tip of the frontal; somewhat less over the occipital; still less over the temporo-sphenoidal, of which lobe the inferior surface was affected more than the external. In the *right* hemisphere was a similar condition and distribution of adhesion, but less marked. Grey cortical substance generally pale, slightly reddish in parts, somewhat wasted, of ordinary consistence. Lateral ventricles dilated, particularly the left one; left corpus striatum slightly shrunken; basal ganglia rather pale. White cerebral substance pale, slightly firmish. Pale and somewhat softened cerebellum.

Thus the cortical lesion was too extensive for purposes of exact localization.

Case VI. Vivid visual hallucinations were present here, and the supposed visual cortical centres suffered very considerably.

The meninges were thickened, opaque, hyperæmic. Marked adhesion and decortication of the summits of certain of the cerebral gyri existed. On the *right* cerebral hemisphere this occurred, especially over the entire upper surface of the first and second frontal gyri, and over that part of the third adjoining the vertical branch of the Sylvian fissure; scattered points of the same were found on both ascending convolutions; the supra-marginal gyrus (lobule) suffered severely, the angular rather less, the postero-parietal lobule slightly, the first occipital very slightly; the temporo-sphenoidal convolutions were considerably affected along their whole external surface; the under surface of the temporo-sphenoidal lobe suffered somewhat; the back part of the orbital surface considerably, as also the internal cerebral surface bordering upon the periphery of the great longitudinal fissure.

On the *left* hemisphere were well-marked, extensive, adhesions over nearly the whole area of the summits of the three tiers of the frontal gyri, the lower two-thirds of the ascending frontal, and the supra-marginal. Moderate adhesions existed over the angular gyrus, the front part of the postero-parietal lobule, the whole external and inferior surfaces of the temporo-sphenoidal lobe, also on the orbital surface. There were slight adhesions over the anterior part of the occipital lobe. The ascending parietal escaped this change, except in its lower half-inch.

The grey cortex was wasted in the frontal and parietal regions; was rather pale at the base; the surface of its erosions was reddish. Brain, generally, hyperæmic; also soft and flabby, except the anterior portions of the white substance. Fornix diffluent; basal ganglia somewhat soft, hyperæmic; cerebellum rather diminished in consistence;

some meningeal adhesions on its surface; pons Varolii and medulla oblongata rather soft and vascular; ependyma of fourth ventricle thick, and of a gelatinous, sanded appearance. Chronic spinal meningitis, especially over posterior aspect; grey degeneration of posterior columns of the cord.

Case VII. Visual hallucinations (auditory less marked). Here the supra-marginal gyri were considerably affected, the angular only slightly, and the case harmonises very fairly with the theory.

The meningeal opacity and thickening were more marked than elsewhere over the posterior part of the frontal and the anterior part of the parietal lobe. The adhesion and decortication were mainly at the vertex of the cerebrum. In the *right* cerebral hemisphere adhesion was well-marked on the supra-marginal gyrus, very slight on the angular, moderate on the anterior part of the postero-parietal lobule and on the corresponding part of the internal surface of the hemisphere; very slight on the upper and lower extremities of both ascending gyri, well marked over most of the upper surface of the first and second frontal; very slight over the posterior portion of the third frontal; well marked over gyrus marginalis; almost absent from the tip of the frontal lobe; non-existent on the temporo-sphenoidal; slight about the olfactory nerve.

On the *left* hemisphere, adhesions were somewhat more extensive and intimate than on the right; their distribution was much the same. Now the left frontal gyri suffered more than the right, especially the third, and slight adhesions existed at the tip of the left frontal lobe. The first and second temporo-sphenoidal were slightly affected. But the adhesions on the angular, marginal, inner surface of postero-parietal lobule, and on the inferior surface, were like those on the right side.

Brain flabby and somewhat softened. Grey cortex slightly wasted in front. White substance hyperæmic and soft. Tips of temporo-sphenoidal lobes much softened; so, also, the fornix and corpus callosum. Basal ganglia hyperæmic. Pons and med. obl. slightly softened and hyperæmic. Ependyma of fourth ventricle thickened, and of gelatinous appearance, but not granulated, and no marked vascular dilatation was observed about the floor of the ventricle. Cerebellar softening, hyperæmia, and meningeal changes.

Case VIII. Early visual (and auditory) hallucinations.

Extensive arachnoid cyst over superior and external surface of left cerebral hemisphere. Arachnoidal opacity and pia-matral œdema less marked in front than behind, invading occipital region, slightly observed in temporo-sphenoidal, and slightly more marked over left than over right hemisphere. Adhesion and decortication very slight, and mainly at the posterior part of the *left* postero-parietal lobule, left angular gyrus, and gyrus rectus. Very slight adhesions also on the posterior extremity of the left second temporo-sphenoidal gyrus, and inferior aspect of the tip of the left gyrus uncinatus.

Also very slight adhesion, in *right* hemisphere, on the first frontal gyrus, anterior border of orbital surface, and second temporo-sphenoidal convolution.

Cerebral grey cortex reddish, wasted, and slightly firm anteriorly, pale elsewhere, slightly more wasted and firmer at left than at right orbital surface. White substance congested, slightly indurated in its anterior portions. Basal ganglia somewhat wasted, of ordinary consistence and vascularity. Ependyma of lateral ventricles not much altered. Ependyma of fourth ventricle somewhat thickened, opaque, and granulated. Pons and med. obl. of full vascularity. Slight adhesion and decortication of cerebellum.

Here, an angular gyrus was among the few parts suffering from the adhesive change, and the case favours the theory.

Case IX. Well-marked visual (and auditory) hallucinations for a considerable period of time. No special lesion of the supposed cortical visual centres, except very slightly in the right hemisphere.

The right cerebral hemisphere was the one the more diseased. The meningeal changes were well marked over the superior and external surfaces of the cerebrum, especially over the anterior two-thirds of these surfaces, attaining their *acme* over the frontal tips. The adhesions were few and slight; and on the *right* hemisphere occurred at the posterior part of the first frontal convolution, also near the posterior end of the second frontal, and at the upper border of the Sylvian fissure, affecting here the lower edge of the two ascending gyri and of the third frontal. Some still slighter adhesions were found on the angularis, supra-marginalis, and rectus.

In the *left* hemisphere the only convolution with adhesion was the gyrus rectus.

The cerebral grey cortex was reddish, mottled by dilated vessels, &c., of about ordinary consistence, but slightly firmer anteriorly, thin and pale in the orbital region. White substance highly vascular. Lateral ventricles large, their lining membrane somewhat altered. Basal ganglia of fairly healthy appearance. Cerebellum affected with slight meningeal adhesions, otherwise of natural appearance. Ependyma of fourth ventricle considerably changed (in usual way). Medulla oblongata slightly firmer than usual; it and the pons Varolii together only weighed $\frac{3}{4}$ oz.

Case X.—Hallucinations and illusions of all the special senses were exhibited. Confining attention here to those of sight, the visual centres were not among the parts more particularly diseased, and, indeed, were free from well-marked, gross, morbid change. Moreover, with hallucinations of all the special senses, of the several supposed cortical sensory centres, those of smell and taste alone were specially affected. The pons Varolii was extremely diseased.

Thickening, opacity, hyperæmia, and œdema of the meninges were present, with subarachnoid effusion. These changes, for the most part of ordinary distribution, were unusually marked over the pons Varolii,

and they lessened decidedly at the first temporo-sphenoidal sulcus. Adhesion and decortication were very slight and superficial, and only seen at a few points, namely, on both cerebral hemispheres, over the middle of the external surface of the second and third temporo-sphenoidal convolutions ; also over the internal surface of the left uncus gyri uncinati ; and at several spots on the inferior surface of the right hemisphere.

The cerebral grey cortex was slightly hyperæmic, especially in the anterior regions ; it was slightly atrophied in the frontal region ; in the left hemisphere it was paler than in the right, and was of a faint dull-whitish hue. The white medullary substance of the cerebrum was not much altered. At the orbital surface the cortical grey matter was thin and slightly hyperæmic ; that of the temporo-sphenoidal lobe was softened, and was paler on the left than on the right side.

Fornix softened ; ependyma of lateral ventricles slightly opaque ; basal ganglia of ordinary consistence and vascularity ; ependyma of fourth ventricle much thickened and granulated, the subjacent sections of a violet hue ; patches of sclerosis in the pons Varolii ; medulla oblongata pinkish on section ; pons Varolii and medulla oblongata together only weighed $\frac{3}{4}$oz. Cerebellum of ordinary appearance. Olfactory bulbs wasted, but non-adherent. Spinal cord ; a small blood-clot adhering to the posterior surface of the cord opposite to the third and fourth cervical vertebræ.

Case XI. In many respects an unusual case, chronic in its course, and presenting visual hallucinations, especially during the middle periods. The supposed visual cortical centre was not among the parts principally affected.

Slight traces of pachymeningitis and of ancient dura-matral hæmorrhage, especially on the right side. Arachnoidal opacity, pia-matral œdema, and some convolutional wasting, almost equally in the frontal and parietal regions ; much less marked elsewhere.

Adhesion and decortication very slight, and, of the two, somewhat more affecting the right than the left cerebral hemisphere, there being a few small adhesions on the anterior half of the inferior and external surfaces of the *right* temporo-sphenoidal lobe, namely, on the gyrus uncinatus, and second and third temporo-sphenoidal gyri ; also, on the posterior end of right first frontal, on the orbital surface, and marginal convolution. On the *left* side they were found only at the tip of the temporo-sphenoidal lobe, the inferior surface of anterior end of third temporo-sphenoidal gyrus, and upper edge of anterior part of second. The middle portions of the surface of the cerebellum were also similarly affected.

The right frontal grey cortex was somewhat wasted, and the subjacent white substance was of slightly increased consistence. Slight wasting of the parietal grey cortex was also obvious. The atrophy of the grey cortex was less in the left hemisphere, and was apparently limited (or nearly so) to its anterior one-half. Here, also, it was of a

more reddish hue than on the right side. Generally speaking, the hue and consistence of the grey cortex were ordinary; its stratification was badly marked.

Lateral ventricles large, "sanded" by minute granulations, contained fl℥ss of fluid. Fifth ventricle large, its walls opaque and thick. Basal ganglia flabby; optic thalami of pale, mottled aspect, slight softening of upper surface of right optic thalamus. Pons Varolii and medulla oblongata slightly hypervascular; ependyma of fourth ventricle strewn with granulations; the nervous substance beneath it congested and discoloured. Spinal cord; softening of grey cornua on left side.

Microscopical; the tip of the right frontal lobe presented somewhat more marked microscopical changes than the right ascending parietal gyrus, while in the right temporo-sphenoidal lobe the microscopical changes were less marked. The nerve-cells were in several phases of change, dull ground-glass-like, granular, or atrophied; interstitial overgrowth with most abundant nuclear effusion or proliferation were observed; also pigmentation and moderate vascular changes of the usual kind.

In the next, and in the remaining, cases under the present heading, both visual and auditory hallucinations were observed, and as full details of each will be given when treating, in the next section, of auditory hallucinations, it will be only necessary here to refer to that description, and to add a word of comment as to the visual centres.

Case XII. This is the same as case 16, full details of which are given below under the heading of "Auditory Hallucinations," *q.v.*

Here the angular gyrus escaped adhesion, and the supra-marginal was only moderately affected. That is to say, the supposed cortical visual centres were but slightly affected.

Case XIII. For details see case 20 under "Auditory Hallucinations." The case was not a favourable one for testing localization theories.

Case XIV. For details see case 22.

Here the visual hallucinations were less marked than the auditory. The supposed visual cortical centres were very considerably diseased, and were more so than the supposed auditory cortical centres.

Case XV. For details see case 23 under "Auditory Hallucinations."

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

(To be continued).