

emphasize a study of function as altered by disease. Pathologic physiology, I believe, will play a far more important rôle in the diagnosis of the future than at present.

And then, in conclusion, we should not look on the laboratory as a short cut to a diagnosis. Sometimes it is, but often its workings are slow and cumbersome, and because of their complexity the results are not easily expressed in practical, every-day usable terms, and are, therefore, inconclusive or confusing. In other words the laboratory diagnosis is not yet one of machine-like accuracy; it is no nickel-in-the-slot affair, if you will pardon the homely comparison. The time has not yet come, let us hope it never will, when a diagnosis can be made without the exercise of brain power. We do not wish our professional work to be degraded by being "dementalized," to use Weir Mitchell's<sup>11</sup> expression. Anamnesis, physical and laboratory findings, are to be studied and compared and a result reached that not only gives a name to the disease but gives us a conception of the disease as it exists in the particular individual, with all that such a comprehensive diagnosis implies in the way of prognosis and hints as to therapy.

### Original Articles.

#### NOTE ON THE ARTERIES OF THE CORPUS STRIATUM.\*

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Two years ago while studying the gross appearances of arteriosclerosis in the arteries of the brain, we were impressed with the barren descriptions of and the lack of available information relating to the circulation of the corpus striatum.

The plan was then formed to make fresh dissections. These were made and as the result of this work revealed new and interesting material, it was decided to publish an informal report, a part of which is now presented.

The following is a representative textbook description of the circulation of the corpus striatum: The *a. cerebri* anterior near its base throws off several inconstant branches which go to the *caput nuclei caudati*; and a group comes from the *a. cerebri* anterior in the region of, and sometimes from, the *a. communicans anterior* and pursues a retrograde course to the innermost part of the *substantia perforata anterior* and thence into the *caput nuclei caudati*. The *a. cerebri media* near its base gives off numerous branches, some of which supply the *nucleus lentiformis* and pass through the *capsula interna* into the *nucleus caudatus*, while others supply the *thalamus* (which also receives blood from the *a. cerebri posterior*) and one of these is longer than the others and is called by M. Charcot the artery of hemorrhage.

<sup>11</sup> Mitchell, S. Weir: *The Early History of Instrumental Precision in Medicine*. New Haven, 1892.

\*These anatomical investigations, which are being conducted by Mr. Aitken, are a prefixed portion of a study on arteriosclerosis.

This description has been condensed from the reports of M. Duret in five numbers of *Le Progrès Medical* for 1873 and in the *Archives de Physiologie*, 1874, wherein he published the account of his investigations, though he communicated them to the *Société de Biologie* on Dec. 7, 1872, which, by remarkable coincidence, was the same day on which Dr. Heubner of the University of Leipzig published at Berlin an account of the circulation of this region which in all essential points was identical with M. Duret's.

J. M. Charcot, in his "Localization of Cerebral and Spinal Diseases," translated for and published by the New Sydenham Society, London, 1883, has by frequent quotation absorbed the above mentioned reports of M. Duret to such an extent that one cannot readily separate them; therefore M. Charcot will be referred to with the understanding that all relating to the circulation shall be accredited to M. Duret.

The published illustrations of the circulation of the corpus striatum are quite misleading. By following M. Duret's first drawing, they have been drawn invariably in cross section, though one can readily see from his description that they should be shown in sagittal section — for although the arteries of the corpus striatum enter the *substantia perforata anterior* in an order that is about at right angles to the *fissura longitudinalis cerebri*, those predominating at once bend outward toward the exterior wall of the *nucleus lentiformis*, and in so doing spread out, some going frontward and some backward, thus forming a "fan," so that their collective position is at right angles to that formed at their entrance of the *substantia perforata anterior* and parallel to the *fissura longitudinalis cerebri*.

M. Charcot's method of approach in dissecting out the arteries "consists in removing successively the gray matter of the island of Reil, the subjacent white substance, the *claustrum* and, lastly, the external capsule. In this manner the external surface of the *lenticular nucleus* is exposed in its whole extent. By means of this preparation they are seen to be arranged like a fan on the surface of the gray nucleus."

This method was followed in a general way, and it was noticed that these arteries formed themselves into three groups, each supported by one larger artery, there being one artery a little more than 1 mm. in diameter, taking a backward course, one medianward and one frontward; with these are several smaller arteries which grouped themselves in a manner suggesting the slats of the "fan."

These three groups will be referred to as

Group 1, which spreads frontward.

Group 2, medianward, and

Group 3 will be that which runs backward.

The present description will be confined to Group 1.

The arteries thus exposed were presumably from the *a. cerebri media* and an attempt was made to classify these three divisions and see if there were any precise order in which they were thrown off from the *a. cerebri media*.

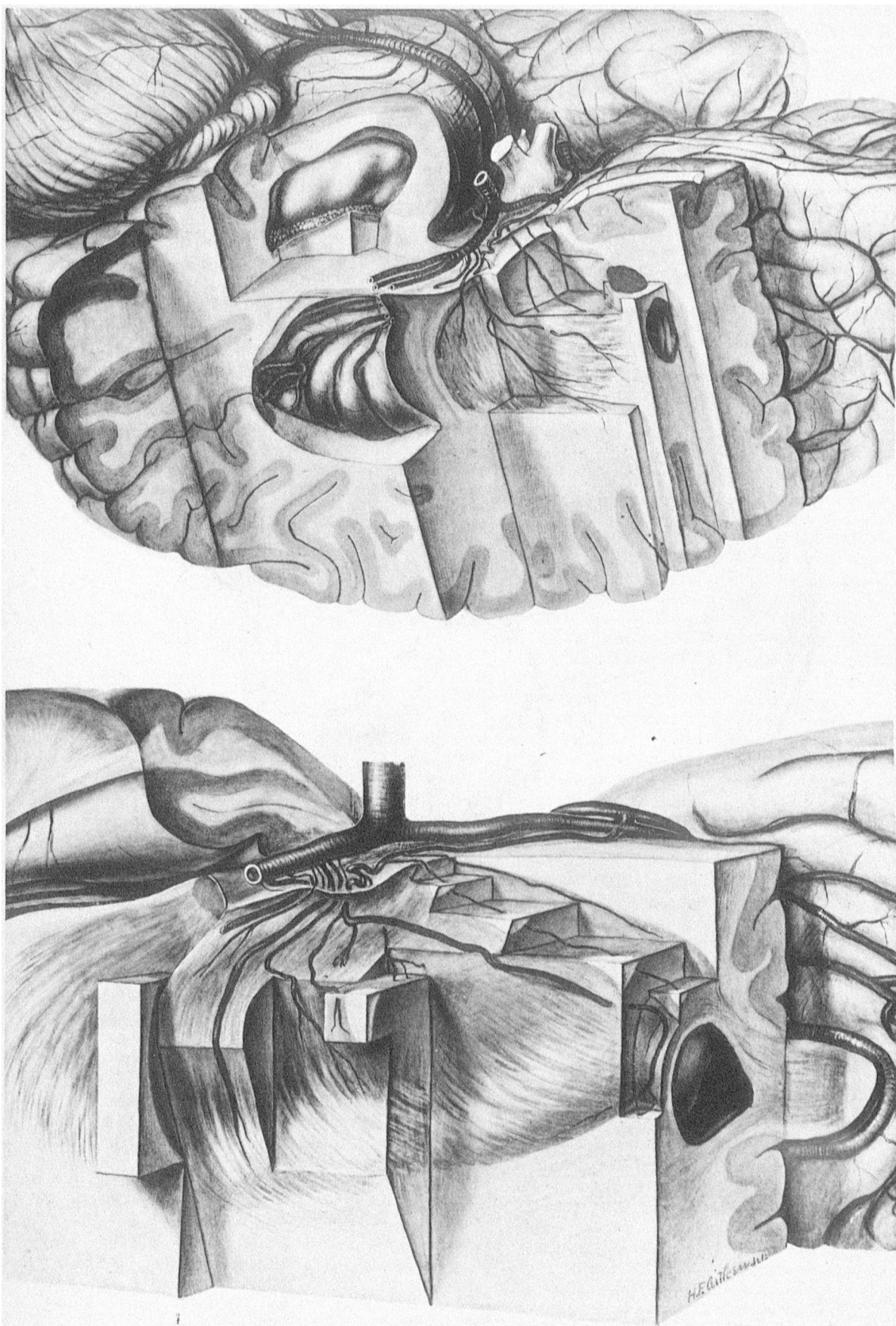
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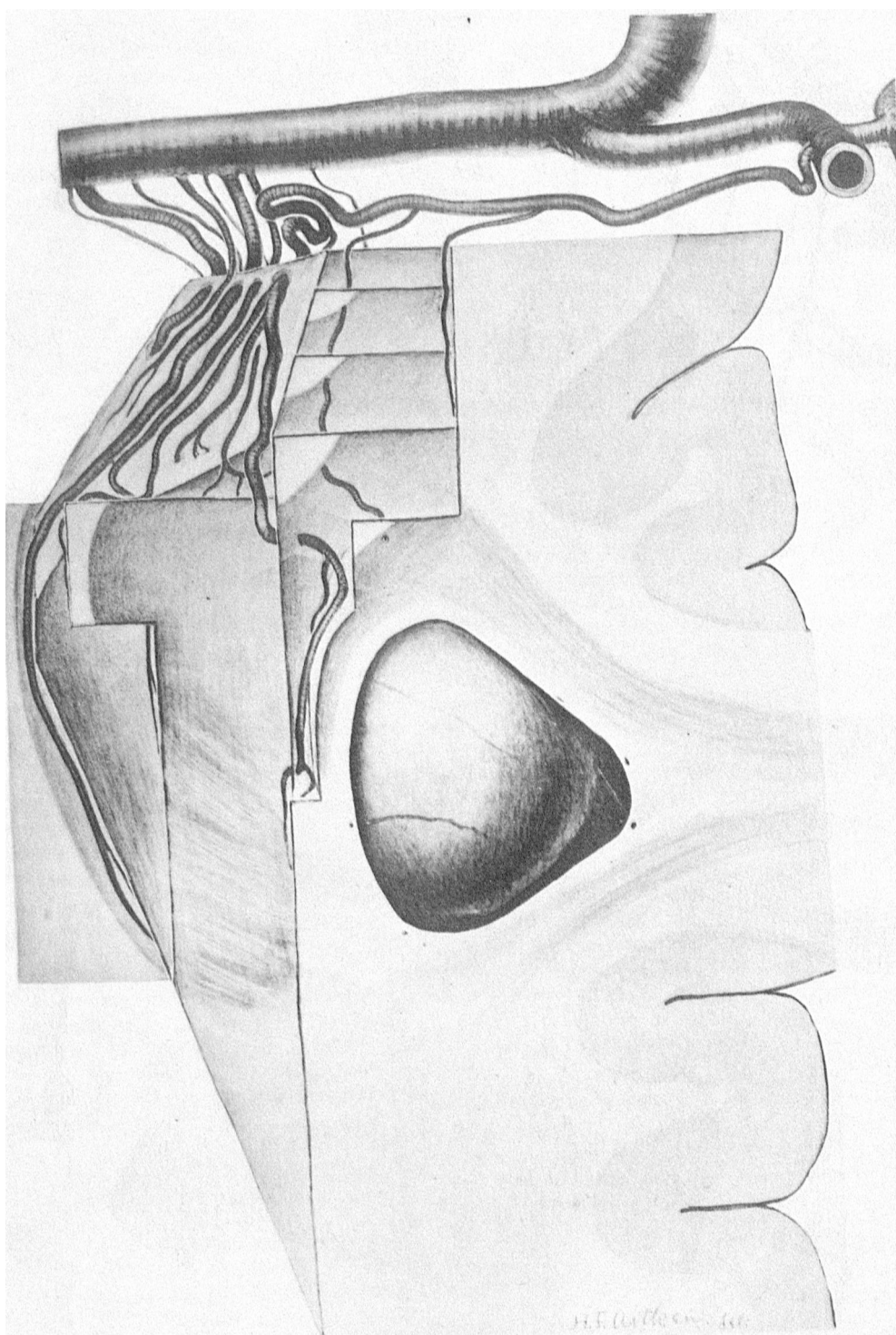
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To accomplish this it was necessary to follow each artery to its origin in the *a. cerebri media*.

Between the *substantia perforata anterior* and the trunk of the *a. cerebri media* there is a tangled and confused mesh of *pia mater* and vessels, and in tracing one of these little arteries through this snarl without losing or breaking it, or destroying any of the adjacent and sometimes adherent vessels, is a tedious and difficult task.

Had M. Duret and M. Charcot traced these vessels to their origins, they would not have written the following:

"The predominant share of the circulation of the *corpus striatum* belongs to the *sylvian artery* which supplies: (1) the greater part of the *caudate nucleus*; (2) all of the *lenticular nucleus*; (3) a portion of the *optic thalamus*; (4) the whole extent of the *internal capsule*. The *anterior cerebral*, on the other hand, has a very unassuming position in this system. It furnishes twigs to the head of the *caudate nucleus* only and even this distribution is not constant."

This statement regarding the relative importance of these two arteries is repeated throughout the writings of these authors and has been preserved in anatomical textbooks.

While one hesitates to dispute such well established authorities, the dissection of numerous brains made evident the need of modifying the statement when it was found that Group I had its origin in the *a. cerebri anterior*.

The main artery of this group has its course in the *a. cerebri anterior*, directly opposite the *a. communicans anterior*. It starts backward on the superior surface of the *a. cerebri anterior* and is sometimes adherent to it, and is not visible unless the *a. cerebri anterior* is freed from it and drawn to one side. It can then readily be traced back to the bifurcation of the *a. carotis interna* where it takes an outward turn and follows the *a. cerebri media* and enters the tangle of the *pia mater* and vessels that lie between the *a. cerebri media* and the *substantia perforata anterior*.

This artery differs from the other arteries of the *corpus striatum* by giving off branches before it enters the *substantia perforata anterior*. As soon as it takes the outward turn at the bifurcation of the *a. carotis interna* it sends a branch through the *substantia perforata anterior* into the inferior surface of the *nucleus lentiformis*, and remaining close to the surface it passes forward into the lower portion of the *caput nuclei caudati*. Near this branch the artery gives off a similar branch which takes a parallel course and is a little longer, ending in the *nucleus caudatus* at its extreme anterior portion. The greater portions of these two branches are in the *putamen* and supply it with minute branches. The artery, just before it enters the *substantia perforata anterior*, sends one more branch which spends itself in the *putamen*.

The artery itself then goes through the *substantia perforata anterior* into the *nucleus lentiformis* where it gives out several branches that are more or less confined to the *putamen*, though sometimes they enter the *capsula interna*;

it then changes its course to one more anterior, sometimes bifurcating, and continues to the *capsula interna* through which it passes into the *nucleus caudatus* to its extreme anterior part. It here breaks up into numerous branches, some of which turn back along the *cauda nuclei caudati*, while others enter and end in the *capsula externa*.

This description is founded on the dissection of 25 brains in which the artery was found on both sides in 100% of the cases, though there were a few cases where this artery was not so highly developed as is described above. In such cases the remainder of the circulation was taken up by the *a. cerebri media*.

There can be little doubt that M. Charcot has described the main trunk of this artery after it has entered the brain, and both he and M. Duret, if they speak of the first three branches, describe them also as coming from the *a. cerebri media*. M. Charcot says:

"An artery is of special importance from its size and from the pre-eminent part which it plays in the *intra-encephalic hemorrhage*. We should in a manner be justified in styling it, *the artery of cerebral hemorrhage*." "After penetrating the *lenticular nucleus* it gains the substance of the *caudate nucleus* by crossing the upper part of the *internal capsule*. It then continues forward and extends to the most anterior part of the *caudate nucleus*."

The three plates show the bases of the brains in superior positions, necessitated by the requirements of light and shade. They are drawn in a manner that is somewhat diagrammatic. Plate I is about actual size, showing the situations of the *insula*; the *hippocampus*; the *chiasma opticum*; the *cornu anterius ventriculi lateralis*, etc., in relation to the *corpus striatum*. Plate II is enlarged one diameter; groups 1 and 2 are easily distinguishable. Plate III is a front view of the same dissection shown in Plate II and is enlarged three diameters above actual size.

We wish to here thank Dr. J. H. Wright for his valuable advice and Dr. Oscar Richardson for generously supplying material which made possible our work in this region.

## PNEUMATURIA, WITH REPORT OF A CASE.

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PNEUMATURIA may be defined as the passage of free gas with the urine, either during micturition or on catheterization. The earliest case on record is probably that quoted by Raciborsky, from the "Curiosities of Nature," of 1671, in which there is mentioned "a leading citizen of Gotha who was afflicted by anal colic, with rumbling, tension of the abdomen, pain about the naval and, what is strange, wind was passed by the penis as if through the usual and accustomed channel, sometimes with, sometimes without, urine.\*

\* "Est vir primarius hic Gothæ, qui collicæ per anum affligitur, eum borborismus, tensione abdominis, doloribus circa umbilicum, et quod peculiare est flatus per penem quasi solemnî et consueta tunc excernuntur via, sæpe cum, sæpe sine urina." *Miscellanea curiosæ, decuria prima, annus, secundus, p. 85.*