

any centre of function is destroyed. This neighbourly assumption of peculiar and distinct labour is not found in any other part of the system, however willing the organs may be to give a helping hand to one another. We are told it may be the corresponding part of some other cortical area. This is virtually a giving up of the doctrine of these so-called "true motor centres."

Here let me say, in passing, that a fallacy in vivisection often arises in forgetting that experiments on the brains of inferior beings by the destruction of parts do not always produce analogous effects on man when corresponding parts are injured. We may remove the whole of a cerebral hemisphere of a pigeon or rabbit with the only functional result of a slight impairment in flying or jumping. No hemiplegia will follow, such as is the case with like injury to the dog or monkey. Man is much more sensitive to such lesions, only in certain parts. In fact, the whole brain may be removed in many creatures without affecting their locomotion. We know that in man disease, such as sclerosis, and softening, may cut off the spinal cord from cerebral influence, yet functional activity goes on with unabated vigour. In the same way, we find that if the base and central organs remain unimpaired, no marked symptoms arise, except by sympathetic connections with adjacent parts. This shows the fallacy of reasoning by analogy between man and animals based on experiments. There are common results and also great differences.

It is now important to say a few words about the circulation of the blood in the brain, to show how much more plentifully the centre and base are supplied with blood than are the superior parts of the cerebrum and cerebellum. *It is not to be forgotten that where the largest supply of blood is needed, there is found the greatest functional activity.* We are all well acquainted with the wonderful distribution and anastomoses of the blood in the base of the brain, both in the circle of Willis and in the cerebral arteries springing from this polygon of vessels. We are also aware of the fact that two sets of branches shoot from these main trunks in almost parallel lines. The one

class goes into the medullary and cortical substance in an outward direction from those central reservoirs, but does not reach the surface. Another class runs to the periphery and forms the *pia mater*, from which branch inwards numerous arterioles to supply the cortical and medullary parts not reached by the vessels springing from the centre. These two sources of supply are not only distinct as between each of their own vessels, but also unconnected to a great extent with one another. The anastomoses between these two sets of vessels is very slight indeed. The streamlet in each can be dried up or seriously interrupted in many ways without disturbing the neighbouring vessels to any appreciable degree. This accounts for so many circumscribed lesions in these parts, and for the little effect they produce on the adjacent tissues and circulation. I am inclined to think, that on account of this localization of circulation, and consequently a tendency to restricted areas of disease, a good many fallacies of reasoning have obtained currency in respect to centres of function. Heubner cites pathological cases which indicate that obliteration of one of the large vessels of the cortical system, or any of its branches, has during life given no pronounced symptom. (Charcot.)

Let us now turn to the arterial circulation in the *grey central ganglia*. This section includes the *thalami optici*, the *corpora striata* and their appendages. It needs only a moment's reflection of our anatomy to realize that the central ganglia are largely supplied from the Sylvian artery, as well as from the nutrient vessels, which spring in large numbers from all the cerebral arteries and from the basilar at its bifurcation. The sum total of all these shows a much greater capacity for blood supply per square inch than in any other part of the brain. Such being the case, we know this augmented normal supply means proportionally increased activity. Hence it follows as a matter of fact that any abnormal increase or decrease of blood means a greater or less physical or mental perturbation. Congestion, as well as anæmia, is followed by the same results—that is, more or less suspended sensibility and retarded voluntary action. Where the blood supply is found to be