

a greater or less degree of right hemiopia. On the other hand, right hemiopia, pure and simple, is not necessarily associated with defects in visual ideation.

The fact that visual ideation, more particularly in reference to the association of written symbols with their meanings, is apt to suffer more readily than simple perception, appears to illustrate the laws of evolution and dissolution of the nerve centres which have been expounded by Hughlings Jackson; as evolution is from the most simple and most stable up to the most complex and least stable, so destructive processes annihilate first the higher and last of all the lower functional manifestations.

The visual centres in the lower vertebrates have been investigated. Hitzig first noticed the occurrence of blindness in the opposite eye from destruction of the occipital region in dogs. Though in dogs the visual area is mainly in relation with the opposite eye it is also in relation with the outer quadrant of the same eye; hence destruction of the visual centre in one hemisphere paralyzes the inner three-fourths of the opposite retina and the outer fourth of the retina on the same side. But the facts recorded indicate that, for a short time at least, after the destruction of the middle portion of the second cerebral convolution, there is blindness in the opposite eye. It is likely that we have the same relations here as exist in monkeys, and that, for a time at least, after complete extirpation of the visual sphere, there is total blindness in the opposite eye. This is confirmed by the experiments of Bechterew, recently published. Bechterew finds that in dogs and cats there are two regions in the cortex related to vision; the one in the occipito-parietal region, in relation with the corresponding halves of both retinae; the other, more especially in the parietal region, in relation with the opposite eye alone. Recent researches indicate that there is only partial decussation in the chiasma of the cat, dog and also in the rabbit.

The exact limits of the visual sphere in dogs are still the subject of some difference of opinion, but all experiments agree in including in this area the posterior half of the second external convolution. This is the convolution which in its electrical reactions corresponds with the angular gyrus and occipital lobe in monkeys.

In rabbits the visual area would, according to the homology of the electrical reactions, occupy the occipito-parietal region of the hemisphere. It has been supposed that in this animal there is complete decussation of the optic tracts in the chiasma, but later experiments lead one to conclude that a small fascicle of uncrossed, or direct, fibres exist also in the optic tract of this animal. In the mouse and guinea-pig, however, the decussation is a complete one. In pigeons, and in birds in general, the region which in its electrical reactions is homologous with the visual centre of the higher animal occupies the parieto-posterior aspect of the hemisphere, where it forms a thick lamina over the corpus striatum. It is usually stated that in pigeons a complete decussation of the optic tracts occurs in the chiasma, but some doubts have been expressed on this point.

It seemed to Ferrier that if any bird can possess binocular vision,* it should be the owl, whose eyes are placed almost in the same plane. From experiments he concluded that no doubt can be entertained as to the binocular relations of each cerebral hemisphere in the owl.

Though the monkey rendered blind by total extirpation of its visual centres acquires the power of avoiding obstacles when left amidst its usual surroundings, yet this appears to be due rather to a sharpening of its other faculties, or more attentive appreciation of the impressions made on these by the objects with which it is surrounded, than to visual sensation. The question is, however, one which will bear further investigation; for if retinal impressions are coordinated with apparently purposive actions in the subordinate centres of the lower vertebrates such as fishes, reptiles and birds, there is at least the possibility that similar reactions may be discoverable in the higher animals, even though in a much less degree. It is certain, however, that the visual area of the cortex is not a mere functionally differentiated region capable of replacing, or of being replaced by, other cortical regions, inasmuch, as destruction of the visual centres leads to atrophy in primary optic centres, optic tracts, and optic nerves; and conversely, destruction of the optic radiations leads to atrophy strictly confined to the regions included within the visual zone. The differentiation of an area exclusively—so far at least