

some cases it seemed to diminish it. This was perhaps due to secondary factors (pressure of the distended skin which injures the graft or makes its sterile introduction into the wound more difficult); in a number of cases the growth of the transplant was equally good in pregnant and non-pregnant animals.

Localized infection of the graft with ordinary bacteria does not call forth a lymphocytic reaction in case of autotransplantation and it does not prevent its appearance in the case of homoiotransplantation. It may, however, interfere with the other variable factors and call forth a greater production of fibrous tissue. This may be associated with retardation in the organization of the necrotic center and with partial destruction of the parenchyma. Sex does not influence the four variables in the case of thyroid transplantation in the guinea pig. Whether the inferiority in results obtained after transplantation from child to mother which we found previously, is due to the action of a constitutional or of an extraneous factor remains still to be determined.

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The vasomotor response in anemia of the medulla oblongata:

- (1) **The splanchnic vaso-constrictor fibers.**
- (2) **The relation of the splanchnic constrictor fibers to the secretion of adrenalin.**

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The experiments here reported deal with a series of studies on the analysis of the vasomotor response in asphyxia. The first of this series had particular reference to the part played by the splanchnic constrictor fibers in the response. The second series was concerned with the relation of the activity of these fibers to the secretion of adrenalin. The procedure throughout was the infliction of a complete but temporary anemia on the entire brain, according to the technique of Stewart et al.,¹ by clamping off

¹ Stewart, Guthrie, Burns and Pike, *Journ. Exp. Med.*, 1906, viii, 289.

the arterial circulation of the head. Occlusion in these experiments was used essentially as a constant and powerful stimulus for setting off a vasomotor response which was known to be aroused by the medullary centers. The experiments were all done on cats. Certain additional controls had to be obtained for the work on the adrenals which will be described below. These experiments were undertaken in connection with the studies on the functional organization of the nervous system carried on by Professor F. H. Pike and his collaborators.

THE SPLANCHNIC EFFECT

The evidence on the particular nervous channels involved in the vasomotor response to asphyxia was obtained by testing the response after the infliction of given nervous lesions. The response was found to depend almost entirely on the constrictor fibers of the splanchnic nerves. No lesion of the extrinsic cardiac nerves significantly altered the response to occlusion. Injection of curare, with the elimination of the pressor effect produced indirectly by the skeletal innervation also did not modify the response appreciably. However, section of the splanchnic nerves immediately below the diaphragm abolished all vasomotor response to asphyxia.

It was possible to work out the pathway of the splanchnic fibers with more precision. Section of the spinal cord in the upper thoracic region was found to give the same effect as section of the splanchnic in the region of the diaphragm; it also achieved a complete interference with the vasomotor response on occlusion. No other lesion within the splanchnic outflow, however, removed the response. Section in the upper lengths of the sympathetic chain, or section of the cord in any segment below the upper thoracic, allowed the response to persist with only partial diminution. Since the two lesions which abolish completely the asphyxial response are such as must definitely intercept all impulses from the brain to the periphery, it seems that the splanchnic outflow is normally in intimate functional continuity with the brain, and that all impulses for its release must arise physiologically within the medulla. The inability to abolish the response completely by sections in the sympathetic chain only a segment

or two above the diaphragm or in the cord below the level at which the highest fibers to the splanchnics leave the cord, argues for the existence of a double functional pathway outside and within the cord down which constrictor impulses may travel. The level at which the highest fibers leave the cord is somewhat higher than that given by the anatomical investigations of Langley, Ranson, etc. While it varies from animal to animal it may run as high as the second or third thoracic.

THE EFFECT OF ADRENALIN

The work on adrenalin was preceded by a series of control experiments in which the effect on the vasomotor response of repeated occlusion in the same animal was worked out. It was found that in intact animals, or in animals in which lesion of the cardiac nerves had been inflicted, the constrictor effect could be obtained practically indefinitely, the animal responding as often as fifteen or twenty times in succession. Whereas neither the intensity nor the time occupied by the response was greatly affected, the contour of the blood pressure curve showed a considerable change as the number of occlusions was increased. Beginning with about the eighth or tenth occlusion, the curve was found to dissociate into two essentially distinct constrictor effects, each occupying about one half the time of the total effect.

It was found that on tying off the adrenal glands in other animals, no such number of repeated occlusions could be obtained. These cats failed before the tenth occlusion, often much earlier. Furthermore, after one or two responses following the tying off of the glands, the response was much shortened and soon came to occupy only about half the time of the normal response, or less. It seemed to approximate the first half of the dissociated curve of the exhausted, but otherwise anatomically intact animals.

According to these data, adrenalin is involved in a double relation to the splanchnic constrictor fibers. In the first place, its increased secretion, which is thrown out after a considerable latent period into the blood stream, is the agency that makes possible the maintenance of the effect initiated by the splanchnic fibers. These experiments seem therefore to demonstrate the adjuvant nature of the emergency action of adrenalin long postu-

lated by Cannon.¹ In the second place, however, the existence of adrenalin in the blood stream is apparently necessary for the maintenance of vasomotor tone itself. The rapid exhaustion of the available supply of adrenalin in the blood stream, obtainable in these experiments appears the factor responsible for the early breakdown of the vasomotor system. Elliott² has argued for such a function of adrenalin from evidence of a different character.

Finally the entire evidence of these studies points to a complete dependence on the functional conductivity in the brain stem of both the initiation of the vasomotor effects by the splanchnics, and the increased secretion of adrenalin through which it is maintained. In conditions of the animal when no other responses of the brain stem are being conducted, the vasomotor response also fails to appear.

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Preliminary report on a typhoid bacteriophage.

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I would like to report briefly on a lytic principle isolated by the d'Herelle technique from the stool of a typhoid convalescent, kindly sent to me by the Research Laboratory of the Health Department. A small particle of feces was emulsified in broth and incubated overnight. The next day about twice the volume of broth was added and the emulsion was centrifuged and filtered through a Berkefeld. The original filtrate was both inhibitory and lytic, that is, a small amount of the filtrate added to a tube of broth would, in spite of heavy inoculation with the homologous typhoid strain, prevent growth, and young turbid broth cultures became transparent on the addition of small quantities of the filtrate. The lytic principle could then be transmitted in series from both the inhibited and the dissolved cultures.

¹ Cannon, W. B., 1915, "Bodily Changes in Pain, Hunger, Fear and Rage," pp. 38 and 40.

² Elliott, T. R., *Journ. Physiol.*, 1914, xvix, 38.