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A depressor reaction obtainable by traction on the carotid artery.

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By pulling on the carotid artery, a very marked fall of blood-pressure (often of 50 to 90 mm. Hg) and increase of respiration can be produced. Our attention was directed mainly to the fall of pressure, but most of the remarks below apply also to the respiratory phenomenon. If the carotid is divided, the phenomena can only be elicited by traction of the cephalic, but not of the cardiac end. It is therefore not due to kinkage of the aorta. It occurs after both carotids are tied, so that it is not due to cerebral anemia. It does not occur on traction of either end of the cervical vagus, depressor, or sympathetic, so that it is not produced by accidental stimulation of these nerves. It does occur after all of these nerves are divided on both sides (in dogs, cats and rabbits) so that these nerves are not concerned in the phenomena.

The following remarks apply to dogs in which both vagi were divided. Oncometric observations show that the volume of the abdominal organs decreases with the fall of blood-pressure, so that this fall cannot be vascular. In further support of this conclusion, it was found that the fall occurs after section of both splanchnics, and after clamping the aorta at the diaphragm. The fall must therefore be cardiac. The heart rate is commonly somewhat slowed, but this is neither constant nor pronounced. Myocardiographic tracings show that the fall of pressure is indeed due to weakening of the cardiac contractions. We have tried to trace out the path which is taken by this highly peculiar and novel reflex. By following the carotid upward, we found that the reaction could be obtained from the region of the common carotid containing the origin of the internal carotid, but from none of the other branches, or at least only to a very slight extent. It could also be elicited by electric stimulation of this region. The internal carotid at this point is surrounded by a rich plexus of nerve fibers.

In trying to separate these from the artery, we were confronted by the peculiar difficulty that the reaction often disappeared suddenly —a good reaction would be obtained by pulling a bit of tissue, but on tying and dividing this, traction on either end would become ineffectual. We have here apparently a very peculiar condition of localized shock. This did not occur to the same extent in all animals, and furthermore, the reaction often reappeared after an hour. In this way we were able to show that it is localized in the nerve plexus rather than in the artery (we thought that the traction was perhaps transmitted by the artery to some intracranial structure but this is evidently not the case). When the carotid is pulled this nerve plexus is stretched and thus stimulated. We are wholly ignorant of the peripheral connection of these afferent fibers, of the conditions under which they are stimulated in the intact body, and of the functions which they subserve. As to the efferent path, our evidence so far is mainly negative.

As already stated, none of the cervical nerves are concerned, and the splanchnics are also excluded. The fall occurs equally well when the annulus of Vieussens and the inferior (middle) cervical ganglion with all its branches are excised on both sides. It therefore does not take the path of the ordinary accelerator or augmentor fibers. It occurs even after the greater part of both stellate ganglia are excised; but then the effect is diminished. However, we cannot yet state positively whether this diminution is due to the elimination of a part of the afferent path, or merely to the general shock attending the excision of these ganglia. We must conclude, however, that the depressing impulse reaches the heart by none of the known cardiac nerves. We do not know whether it acts by inhibiting some unknown augmentor nerves, or by stimulating some unknown depressor nerves. We are actively engaged in further investigation of this problem.

Other points worthy of mention are the following: The maximum fall varies with different animals; in some there is no fall, or there may even be a rise, but, on the whole, fall is the rule, especially in vigorous animals. When traction is applied, there is a latent period of several seconds, then a pretty abrupt fall, then a slight recovery, and then the pressure runs at a constant low level, so long as the traction is maintained or for at least ten min-

utes. When the traction is removed, there is again a latent period of several seconds, and then the pressure assumes its original level. Up to a certain point, the extent of the fall varies with the force of the traction; in most animals the maximal fall is reached when a weight of about 200 gm. is suspended from the divided carotid artery. A larger weight causes dyspneic convulsive respiration and may raise the blood pressure, probably by vaso-constriction.

The reflex is fairly resistant to most forms of shock. It occurs after curare, atropin, suprarenal, strychynin and phenol, and during depressor, splanchnic, and accelerator stimulation. When moderate doses of nicotin are injected, it is temporarily abolished, but reappears in a few minutes, whilst the vagus ganglia are still paralysed. This phenomenon can be reproduced by repeating the nicotin treatment.

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A modification of Teichmann's method for obtaining hemin crystals, with a demonstration of specimens.

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This modification consists in heating suspected blood in a tightly plugged or sealed tube. Heating is best carried out by immersing the tube in boiling water. The reagents are those usually employed, *i. e.*, sodium chloride and glacial acetic acid. Heating is continued for fifteen minutes, at the end of which time the tubes are removed from the water bath and allowed to cool slowly at room temperature. After cooling, the tubes are broken open and the liquid poured into a watch glass or small evaporation dish and concentrated over the water bath. When the volume of the liquid has thus been reduced to a few drops, it is poured on a glass slide and covered with a cover glass. If sodium chloride crystals appear under the microscope a drop of water will dissolve them and leave the observation of the hemin crystals unobstructed. The treatment with the hot glacial acetic acid in the closed tube completely decolorizes the material on which the stain occurs. Heating in the closed tube keeps the condition of temperature and