

entering air found an obstruction or stenosis shortly after the injection of the toxic dose.

Autopsy showed the typical picture of the lungs: trachea is clear, lungs are well distended, almost forming a cast of the thoracic cavity; there is failure to collapse upon opening the chest and excising the lungs; pieces cut off from the lung do not collapse, but show on pressure a good amount of air and practically no fluid; blood in lungs and heart is black.

20 (430)

### Anaphylactic "shock" in the dog.<sup>1</sup>

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The observation concerning the blood pressure here offered is not original in that the condition of low blood pressure in anaphylactic shock has previously been described by Biedl and Kraus.<sup>2</sup> The phenomena of anaphylactic "shock" in the dog are, however, so different from anaphylactic death in the guinea pig that it seemed to Drs. Auer and Lewis<sup>3</sup> and ourselves desirable, that our work, though as yet incomplete, should be presented at this time. In the dog the chief disturbance which can be demonstrated by physiological methods is a sharp fall in blood pressure (50 to 70 mm. Hg) which continues for hours, resembling in this respect shock due to other conditions. This is unaccompanied by disturbance in heart rate or by respiratory disturbance, other than that due to the medullary anemia consequent upon the low arterial pressure. From this condition the dog eventually recovers. Death has not been observed in our experiments and Biedl and Kraus state that the animals recover. The recovery from the low level of pressure is very slow, frequently no change being observed in half an hour; at other times the upward trend begins in less time.

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<sup>2</sup> Biedl, A., and Kraus, R., Experimentelle Studien über Anaphylaxie, *Wiener klin. Woch.*, 1909, xxii, 363.

<sup>3</sup> Auer, J., and Lewis, P. A., Acute Anaphylactic Death in Guinea Pigs. Its Cause and Possible Prevention; a Preliminary Note. *Jour. of the American Med. Assn.*, 1909, liii, 458.

The increased rapidity of respiration, sometimes spasmodic in character, is transient and occurs after the fall in blood pressure begins. It is thus secondary to the change in blood pressure and possibly to be explained by the effect of the latter on the respiratory center. After the adjustment to low pressure is reached, the respirations are of normal rhythm though shallow. No changes in the lungs, which collapse upon opening the thorax, have been found.

Oncometric studies of the kidney, spleen and intestine have shown that the volume of these organs is diminished. This decrease in volume corresponds sharply in time and extent to the fall of blood pressure. A cannula in the iliac vein shows a slight increase in venous pressure (6 to 10 mm. of water). It is evident therefore that the accumulation of blood occurs in the large venous trunks of the abdomen and in the liver which at autopsy shows intense congestion.

Although our study is not complete, we consider the essential feature of this vascular disturbance, as did Biedl and Kraus, to be a loss of tone of the veins of the splanchnic area. It is of great interest that Drs. Auer and Lewis explain the respiratory disturbance in the guinea pig as due to a constriction of the smooth muscle of the bronchioles while, in the ultimate analysis, the disturbance in the dog is characterized by a paralysis of the smooth muscle of the blood vessels. Although in the two animals, different sets of smooth muscle are affected and affected in different ways, it is significant that the phenomena of anaphylaxis which are most readily studied by physiological methods are both characterized by a disturbance of the functions of smooth muscle.

Incidentally we have confirmed the observations of Biedl and Kraus that anaphylactic shock closely resembles the blood pressure changes following the injection of Witte's peptone and also that, in the dog, the blood after the administration of the toxic dose has lost its power of coagulation.

All experiments were made upon animals sensitized to normal horse serum injected in dose of five cubic centimeters subcutaneously. The toxic dose was given intravenously after about twenty-one days in amounts ranging from two to six cubic centimeters.