tive physiological action of three elements, which are of equal valency and of approximately the same molecular weight, and whose chemical properties are closely related. The experiments were carried out *in vitro* and on unicellular organisms, bacteria and infusoria, frogs, pigeons, rats and guinea-pigs. The solutions used were the chlorids, isotonic with 0.6% sodium chlorid. In one case the propionate was used without any marked difference in the result being observed.

The chlorids coagulate egg and serum albumins, but neither the purified albumoses from Witte's peptone nor peptone are precipitated.

Dilute solutions delay the growth of bacteria and eventually kill. The solutions are not very toxic to spores. Opalina, paramecia, and vorticellæ are killed quickly, equivalent solutions of the chlorids acting in the following order of strength: Neodymium, præseodymium and lanthanum.

In frogs voluntary and involuntary muscle are quickly put out of action. This is particularly the case with perfused muscle. The solutions act in the same order as with unicellular organisms. Intravenous injection causes almost instant death, due to multiple embolism.

Attempted chronic poisoning was unsatisfactory. The solutions were introduced both subcutaneously and intraperitoneally. Some of the animals died with ill-defined symptoms. Others remained well, except for areas of induration at the seat of injection. Experiments with oral administration and on elimination will be conducted.

As all the solutions, owing to hydrolysis, are acid in reaction, the authors are inclined to attribute a large share of the acute effects to the acid present. The salts range themselves in their toxicity according to their molecular weights.

31 (77). **"The influence of bile upon blood-pressure": S. J. MELTZER** and **WILLIAM SALANT.**

There have not been very many studies regarding the influence of bile upon blood-pressure, and among these the statements are conflicting. Thus, Traube, who was the first to study it upon the kymograph, states that the intravenous injection of bile salts causes

a considerable fall of the blood-pressure, while Edmunds states, in a recent report from Halliburton's laboratory, that the effect is an insignificant one.

Nearly all of the investigators of this question within the last fifty years have employed bile salts in their experiments. The results of the authors' experiments were derived from intravenous injections of filtered ox bile into rabbits. Of the several reasons for employing bile and not its salts, one should be mentioned: It is the belief of the authors that for biological phenomena we have as yet no right to assume that the sum of the known parts is equal to the whole.

In these experiments all degrees of effects have been observed, from an insignificant one to a considerable and even a fatal fall of blood-pressure. But these different degrees could be produced at will. Besides the quantity and the concentration of the bile, it was found that the rate at which it is introduced into the circulation is the most effective factor in the result. A quantity of bile of a given concentration, which, when injected slowly, would cause only an insignificant depression, brought about a tremendous fall of the blood-pressure when injected rapidly. By injecting normal salt solution speedily the fact has been established that neither the mechanical influence of the rate of injection nor the temperature of the injected fluid can have anything to do with the pronounced effect which is invariably produced by the rapid injection of bile. Although the speed of introduction was known to be a factor in the results produced by injections of other substances, it was never taken into consideration in the studies of the effects of bile. Thus, there are also conflicting statements regarding the immediately fatal effect of intravenous injections of bile. These contradictions find their satisfactory explanation in variations in the rate of injection employed in different experiments. Thus, a quantity of bile which, when injected slowly would produce hardly any symptom, causes death within two minutes if injected rapidly.

As to the cause of the fall in pressure, or of the fatal outcome, it is generally assumed that it is due to the effect of the bile upon the heart, although opinions differ as to whether it is the heart muscle or the heart ganglia which present the points of attack. As to the manner of the injury, Traube, Leyden and other investi-

gators are of the opinion that it is caused by malnutrition of the heart, due to the hemolytic effect of the bile. This is *a priori* improbable, since the fall of blood-pressure sets in immediately at the beginning of the injection and the return to normal begins as soon as the injection is stopped. The authors have, however, disproved this theory by direct experiment. On quickly injecting bile, the blood-pressure fell rapidly and the animal died in less than two minutes. The blood which was obtained immediately from the right ventricle did not show a trace of hemolysis.

Autopsies of rabbits killed rapidly in the above-mentioned manner showed in most cases nothing but dilated flabby hearts. The failure of the heart can be caused either by the bile affecting anatomically the heart muscle or the ganglia, or by a functional process — by inhibiting the heart's action. It is known that bile produces structural changes in muscles, and in nerve fibers and nerve cells. But it is hardly conceivable that the structural changes could be induced so speedily and it is still less conceivable that structural restitution would occur with such rapidity as has been observed to take place in the return of the blood-pressure. It is therefore more probable that the bile exerts an inhibitory effect upon the heart.

In this connection the following experiments are of interest: (1) The inhibitory effects of a stimulation of the peripheral end of the vagus not only did not diminish during an effective injection of bile, but in a few instances were distinctly improved. (2) The inhibitory effect of the vagus was manifestly unimpaired shortly before the death of the animal, when the blood-pressure was not more than a few millimeters of mercury and the heart-beats were scarcely perceptible.

32 (78). **"A report of feeding and injection experiments on dogs after the establishment of the Eck fistula": P. B. HAWK.** (Presented by **ALFRED N. RICHARDS.**)

The fistulous opening between the portal vein and the inferior vena cava was made in six dogs by Dr. J. E. Sweet. Observations were made as to the behavior of the animals when fed on a diet of proteid food. One typical experiment may be summarized as follows: During eleven days on a mixed diet there were no abnormal symptoms. On the four succeeding days beef meal and milk