kinds of cells *in vitro*. Definite quantities of organ pulp were placed in specially constructed tubes and anærobic conditions were established by the passage of nitrous oxid gas. Definite quantities of methylene blue of known strength were then added. The rate of reduction was indicated by the disappearance of the blue color owing to the reduction of the animal cells. It was shown that *in vitro* the influence of temperature is the same as that observed in the living organism. The influence of alkali in accelerating reduction was also shown. The action of salts and various poisons is at present the subject of investigation.

14 (60). **"Some medical applications of the naphthoquinon sodium mono-sulfonate reactions,"** with demonstrations: **C. A. HERTER.**

The author demonstrated a substance of singularly great powers of condensation with other organic substances, this condensation resulting in the formation of colored bodies. He demonstrated especially the reactions of naphthoquinon sodium mono-sulfonate with anilin and various amins, with nicotin, conin, piperidin, and finally with indol, skatol and pyrrol. The reactions with indol, skatol and pyrrol possess unusual physiological and chemical interest and will form the subjects of future publications.

The reaction with pyrrol occurs in the cold and is evidenced by the deepening red which on the addition of alkali changes to purple, violet, blue and finally reddish-brown. The addition of acid to the red solution obtained without alkali is followed by the development of a green and finally brown color. These color reactions (and particularly the one dependent on acids) occur with such rapidity if one uses concentrated heated solutions of pyrrol, that the characteristic color stages may be of extremely short duration. This reaction with pyrrol is a highly characteristic one, and should prove of service to chemists.

Among the biological and medical applications of the naphthoquinon sodium mono-sulfonate reactions, the author mentioned the study of various aromatic compounds in the organism, the occurrence of certain intravital syntheses, the detection in the urine of organic compounds, such as para-amidophenol, and the development of a method of staining the bile capillaries by means of intravenous infusion of the derivatives of the naphthoquinon

compound. The author also stated that these substances facilitate the study of the relation between the chemical constitution and distribution of poisons in the body.

15 (61). **"On the rate of absorption from intramuscular tissue,"** with demonstrations: **S. J. MELTZER** and **JOHN AUER.**

In physiology no distinction is made between absorption from the subcutaneous tissue and absorption from muscles. In experimental infection and immunity, injections of virulent toxic and antitoxic materials are being extensively employed, but intramuscular injection has not yet even been thought of. In therapeutics it is practised promiscuously, and for the reason, as pharmacologists and clinicians expressly state, that it gives less pain and causes less frequently the formation of abscesses.

The authors came upon the observation that absorption from the muscles is incomparably more rapid and efficient than from the subcutaneous tissue and tested the matter with several substances. With *suprarenal extract*, it was tested in three ways.

1. *By the effect upon blood-pressure.* — A subcutaneous dose of 0.6 c.c. adrenalin or less per kilo (rabbit) exerts no effect, and the variable effects of larger doses consist in a rise of pressure of from about 10 mm. to 20 mm. of mercury, which sets in late and develops slowly. An intramuscular injection of 0.5 c.c. or 0.4 c.c. per kilo, or even less, invariably causes, on the other hand, a considerable rise of pressure, which sets in after a very short latent period and reaches its maximum in a few seconds. The curve obtained after intramuscular injection is very similar to that after an intravenous injection. The increase has been as high as 50 mm. or 60 mm. of mercury and may go even higher. The course of the curve is frequently interrupted by "vagus pulses."

2. *By the effect upon the pupil on the side from which the superior cervical ganglion had been previously removed.* — An intramuscular dose of 0.5 c.c. or 0.4 c.c. of adrenalin per kilo causes dilation of the pupil in less than a minute, while such a dose given subcutaneously rarely produces any effect. The effect of a larger subcutaneous dose sets in only after 10 or 15 minutes.

3. *By prostration effects.* — A dose of 0.5 c.c. per kilo will prostrate a rabbit in a minute or two, after intramuscular injection.