ment. The nucleated half was stained and was shown to have had the mitotic figure intact. From these experiments no other conclusion can be drawn than that the centrosomes, with centrioles of the enucleated fragments, were formed *de novo*.

21 (67). **"Structure of vaccine bodies in isolated cells,"** with demonstrations: **JAMES EWING.**

One of the few points on which all observers of vaccine bodies are agreed is that these structures are extremely susceptible to artificial changes. The author has for some years endeavored to find a method of examination of these bodies by which artificial changes could be avoided; and this object seems to have been accomplished by the very simple procedure of making Klatsch preparations of corneal vaccine ulcers.

A glass slide is cleaned with soap and water, and thoroughly heated in a Bunsen flame. It is then found to be unusually adhesive. The cornea of an anesthetized rat or rabbit, presenting a vaccine ulcer at any stage, is exposed by holding back the eyelids and protruding the eyeball. The cooled slide is then lightly applied to the ulcer and quickly withdrawn without lateral motion. The slide carries away with it an impression of the ulcer in the form of isolated cells or groups of cells loosened by edema. In this way ten to twenty impressions may be taken in serial order and the minute ulcer may be completely excavated without sacrificing the animal. The isolated cells dry instantly and may be fixed by gentle heat, and afterward by methyl alcohol, and then stained by various methods, preferably by Nocht-Romanowsky for ten minutes. The vaccine bodies are then presented with a clearness equal to that of the malarial parasite in blood spreads.

In the Klatsch preparations stained by Nocht's method the following features of the vaccine bodies appear to be demonstrated. The vaccine body is a portion of the cytoreticulum, its reticular structure being continuous on the one hand with the cytoreticulum and on the other usually with the nuclear reticulum. The clear zone surrounding the vaccine body in sections of tissue is an artifact. The reticulum of the vaccine body takes the chromatin stain, indicating that it contains chromatin, and many of the bodies are so intimately connected with the nucleus, the meshes of one passing

insensibly into the other, as to force the conclusion that these particular bodies have arisen by recent extrusion of nuclear chromatin into the cytoreticulum. Other bodies are disconnected from the nucleus and these may have arisen partly from the chromatin of the cytoplasm, a possibility which is furnished by Hertwig's theory of the constitution of cell protoplasm. Many of the vaccine bodies closely resemble the chromidial substance described by Hertwig in some lower animal cells. In the meshes of the reticulum the author has been unable to demonstrate any organized structure, but the meshes sometimes present nodal points of an underlying reticulum. In the fresh condition the meshes contain homogeneous refractive globules which disappear on drying.

Two series of changes may be followed in the vaccine bodies in Klatsch preparations. Many of them develop basic staining areas with loss of the central reticulum, and this process may continue until the entire body is transformed into a homogeneous globule resembling mucous or colloid. In others, the reticulum breaks up into granules, with or without the development of a central basophile mass.

The author has been unable at any stage, or in any derivative of the vaccine body, to detect the slightest definite trace of a protozoön. Yet there are several hypotheses on which it may be claimed that this cytoplasmic and nuclear material harbors an organized virus of vaccinia: (1) The meshes of the reticulum may contain a submicroscopic organism, or one which disappears on drying; (2) the vaccine body may represent a fusion of the protoplasm of the host cell with that of the parasite, forming a mycoplasm, as is claimed to exist in some diseases of plants (wheat rust); (3) some other method of fixation and staining of isolated cells may succeed in demonstrating in the meshes of the vaccine body an organized structure. In any event, it must be claimed that if the vaccine body contains a parasite, it is one quite different from any recognized type of protozoön, or from any interpretation which has yet been placed upon the structure of vaccine bodies in sections of tissue.

Besides vaccine bodies, there are other structures resembling protozoa to be seen in Klatsch preparations. One of these is ½ to 1½ μ in diameter, ring-shaped and containing a chromatin granule.

Myriads of these bodies are sometimes visible on the flat corneal cells. They appear to be peculiar cell granules, and are present in normal animals.

22 (68). **"On the tetanic element in bile,"** with demonstrations: **S. J. MELTZER** and **WILLIAM SALANT.**

The toxic effects of bile are manifold, and have been the subject of numerous investigations. The authors referred only to the general effects: coma and convulsions. Of the early investigators of the effects of injection of bile into animals, some observed only coma, others convulsions, and still others stated that they observed both. The last work on this subject, the work which is now frequently quoted, was done by Rywosch about fourteen years ago. Rywosch claims that coma is the only effect of the two which the injection of bile or bile salts produces.

In their extensive series of experiments on frogs the authors established the fact that the injection of bile can produce coma as well as tetanus. Coma is the frequent and the more reliable result. By a certain device, however, they were able to demonstrate the presence of the tetanic element even in bile which infallibly produced coma; it was by the addition of a subminimum dose of strychnin. A frog of medium size will not respond, even with the slightest hyperesthesia, to an injection of a hundredth of a milligram of strychnin. When such a small dose, however, is injected into a frog which has received a certain quantity of bile, the animal reacts, sooner or later, with a distinct tetanus. The effective dose of bile varies with the animal from which it is obtained. For instance, of ox bile hardly more than 0.3 c.c. need be used, otherwise the coma will completely mask the tetanic element. Rabbit's bile, on the other hand, may be given sometimes even in doses of 2 c.c. or 3 c.c., without supressing any of the tetanic features. The setting in of complete coma usually masks the tetanic element, as already stated. A close observation, however, will reveal in many cases some distinct differences between the coma of animals which received a subminimum dose of strychnin and that of animals which had not received any strychnin.

The bile of rabbits, which thus far has been more extensively studied than that of other animals, produced in many instances