intracellular areas show freely dispersed antigen particles. Phase photomicrograph conditions as given in Fig. 1.

FIG. 3. Spread of loose connective tissue from non-immunized mouse plus *Sal. typhimurium antigen*. Note uniform dispersion of antigen and prominent fibroblast cytoplasm and nuclei. No agglutination. Light microscope, ×2000.

FIG. 4. Spread loose subcutaneous tissue from mouse immunized 6 days previously with *Sal. typhimurium* antigen plus homologous antigen. Note "cartwheel" agglutinated bacteria around lymphocytes which is lacking in adjacent polymorphonuclear leucocytes. Light photomicrograph same as Fig. 3.

FIG. 5. Spread of loose subcutaneous tissue from non-immunized mouse plus *Sal. typhosa* antigen. Observe sharply defined cell outlines exhibiting none of the polar "cartwheel" attraction noted in Fig. 4. Light photomicrograph same as Fig. 3.

FIG. 6. Spread loose connective tissue of mouse immunized 6 days previously with *Salmonella typhosa* with homologous antigen added. Note strong polar attraction for bacteria by large lymphocyte in center of field. This effect is not shown by smaller more mature lymphocyte seen directly above. Light photomicrograph same as Fig. 3.

phosa, S. typhimurium, Pseudomonas aeruginosa and sheep erythrocytes. Agglutinating antibody to these antigens was detected in the loose connective tissue at the site of injection before it appeared in the blood. No antibody was found in the livers or spleens of immunized mice and rabbits before it began to circulate.

Although the technic described here is not adapted to quantitative measurement of antibody, it has value in detecting the presence of antibody in tissues and cells. It can, therefore, be used in investigations designed to secure information concerning various problems of immunophysiology.

The findings reported here support the previous observations that antibodies can be formed locally and also that the lymphocytes contain specific homologous antibodies(2,3). It is possible that this method for detecting cellular antibody could be adapted to practical problems concerned with the diagnosis of certain diseases, *e.g.* brucellosis in which circulating antibody may be extremely low.

Summary. A direct slide agglutination technic is described for determining the presence of agglutinating antibody in air-dried films of tissues and cells. This method has proved to be of value in correlating the appearance of antibody with cytological changes occurring at the site of antibody production.

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Maintenance of Denervated Taste Organs in Adult *Triturus v. viridescens.* (18523)

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Contrary to the widespread belief(1-6) that taste organs are dependent upon the trophic action of the gustatory nerve for development and maintenance, it has been demonstrated that amphibian taste organs can develop independently(7,8) and denervated organs can be maintained for at least 6 months (9). The present experiments not only

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support this, but extend the investigations to show that denervated taste organs can exist for at least 12½ months.

To effect permanent removal of gustatory nerve influence, autoplastic grafts of tongue tip to orbit (eye and eyelids removed) were made in adult *Triturus v. viridescens* under light chloretone anesthesia. Before recovery from the anesthetic, the animals were wrapped in wet absorbent cotton and kept in moist chambers in the icebox for 48 hours to prevent accidental removal of the graft. They were then placed in aquaria where the graft would be bathed by water at all times. In 90% of the cases circulation was re-established within one week and the grafts "took." In the process of establishment, varying amounts of resorption occurred. Also during the progress of the experiment the grafts tended to decrease in size. Animals were sacrificed according to the following schedule: daily for 30 days; on the 46th day; each month for 11 months; and at 12½ months after operation. Histological sections of 64 heads were examined for taste buds on the grafts.

During the first week after operation the tongue graft epithelium became thin and flattened, and there was considerable edema and necrosis in the epithelium and underlying tissues. The extent of these reactions varied in the different grafts. Two days after operation, 26 taste organs were present in one graft. Other clumps of cells which may be distorted organs were also noted. Between the 2nd and the 14th day, no taste organs were visible in the specimens examined.

During the second week after operation there was a progressive thickening of the epithelium. Many mitotic figures were evident. By the 14th day it compared favorably in thickness with normal tongue epithelium. In a graft of 14 days, 98 taste organs of normal appearance were counted. This was a larger graft than the 2 day specimen previously mentioned.

Mintz and Stone(9) stated that they could find no taste organs in the few specimens killed from 18 to 28 days after similar operation, and queried whether these were exceptions or indications of a significant period in the history of post-operative changes. In the experiments reported here a somewhat similar set of circumstances was found in specimens of 15-23 days. Though taste organs were present in grafts of 15, 16, 18-22 days, many of these were poorly defined organs. No taste organs were found in specimens of 17 or 23 days. To illustrate, in a 23 day graft, with no visible taste organs, the epithelium was thin in some areas, resembling a much earlier stage. The graft was edematous and gave a pale staining reaction, though the rest of the head appeared normal. In a 25 day graft, 104 organs were counted. From the 24th day on, taste organs were present in all cases.

The interpretation offered here is that after thickening of the epithelium to normal proportions, there is a period of reorganization involving the reappearance of the taste organs. It seems reasonable to suspect that taste organ cells are present all of the time but not in the normal arrangement of organs. When the data from Mintz and Stone's work and the present experiments are compared, it is seen that there is a great variation between different animals regarding the time of reappearance of discrete organs, but that toward the end of the first month many taste organs are present. Perhaps a correlation might be found between the variation in the amount of edema and necrosis after transplantation and the length of time necessary for taste organ reorganization. That the reappearance of taste organs can have nothing to do with gustatory nerve induction is evident, since it is inconceivable that such nerve fibers could be present. No attempt has yet been made to determine the presence or absence of other types of nerve fibers.

After this period, taste organs existed for many months (51 organs in one 12½ month case). Mitoses in taste organ cells have been observed as late as 8 months after operation. Again it is evident that taste organs can persist for many months without gustatory nerve influence.

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