TABLE I. *Effect on Rats in Circular Maze.*

Drug Used	Method of Administration	Running Time Expressed as % of Normal	No. of errors made as compared with Normal
	Intraperitoneal Inj.	%	%
Ethyl alcohol	2 cc. 4% sol.	108	105
Methyl alcohol	2 cc. 4% sol.	87	85
Ethanol-methanol mixture (1:1)	2 cc. 4% sol.	122	120

series of experiments in which the alcohols were studied in regard to their effect on *learning* the maze problem, also indicated that a mixture of ethanol and methanol in equal proportions was more toxic than a double dose of either one. A similar synergistic effect of ethanol-methanol mixtures was noted by the authors in other toxicological experiments, which will be reported elsewhere. The present findings are of obvious practical interest.

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Production of Monocytes and Epithelioid Cells in Subcutaneous Tissues by Injection of Various Irritants.*

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In the course of a study upon hepatic injury and the possible relationship of such injury to the white blood cells, Lawrence and Huffman[1, 2, 3] found that the subcutaneous injection of guinea pigs with yellow phosphorus (in oil) was followed by an elevation of the monocytes in the circulating blood. These findings suggested that the study of the subcutaneous tissues of animals injected with the

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[1] Huffman, M. M., Lawrence, John S., and Jones, Edgar. The effect on the white blood cells produced by the intraperitoneal injection of whole liver. In press.

[2] Lawrence, John S., and Huffman, M. M. An increase in monocytes in the blood following the subcutaneous administration of yellow phosphorus in oil. In press.

[3] Lawrence, John S., and Huffman, M. M. Fatty changes in the Kupffer cells of the liver of the guinea pig in phosphorus poisoning. In press.

same material might aid in determining the cause and site of the production of the monocytes.

It has been repeatedly demonstrated that the injection of many supposedly inert substances (*e. g.*, waxes, oils and various colloidal bodies) is followed by local reactions which are similar to those seen in fixed sections of tuberculous tissues. With the methods involving fixation and sectioning, it has been possible to locate groups of epithelioid cells in the tissues; but these methods have not given us any very satisfactory help in identifying epithelioid cells when occurring singly or scattered in the tissues. The use of the supra-vital method of staining[4, 5] has added certain criteria to those already known and has made possible the recognition of the epithelioid type of cell (including the epithelioid cell of tuberculosis) even when seen entirely alone in the connective tissues. The principal factor in this characteristic appearance is the presence of many fine droplets in the cytoplasm (granules or vacuoles) which stain with neutral red, and the later appearance of refractive droplets in the periphery of the cell.[6] The development of these characteristic cells (epithelioid) in tuberculous areas was demonstrated by Cunningham, Sabin, Sugiyama and Kindwall, but these observers did not pursue their studies into an analysis of the nature of the basic stimulus of this production or modification, or into the possible production of monocytes and epithelioid cells under other abnormal conditions.

The present studies have been made with the supra-vital technique referred to above, both neutral red and Janus green being used. Guinea pigs have been used throughout and all animals have been carefully autopsied at the end of the experiment to rule out intercurrent infection. Phosphorus dissolved in almond oil, olive oil, or a mixture of both; almond and olive oils alone; and mineral oil have been used for the subcutaneous injections. Very small amounts were given in the subcutaneous tissues of the anterior abdominal wall, the area was carefully marked and the animal kept for various intervals before final study. At the time of study, the animal was killed with chloroform and the area of the injection exposed. Scrapings were made and studied immediately on supra-vital slides.

The smears made in this way invariably revealed masses of monocytes which varied from the younger forms with very little neutral red, to large cells containing large numbers of vacuoles filled with the dye and often containing refractive droplets (probably lipoid)

[4] Sabin, F. R., *Johns Hopkins Hosp. Bull.*, 1921, xxxii, 314.

[5] Simpson, M. E., *Anat. Rec.*, 1921, xxi, 82.

[6] Cunningham, R. S., Sabin, F. R., Sugiyama, S., and Kindwall, J. A., *Johns Hopkins Hosp. Bull.*, 1925, xxxvii, 231.

in their periphery. They have likewise always revealed typical epithelioid cells with the characteristic arrangement of neutral red. These epithelioid cells have at times progressed to the stage of degeneration which is seen so commonly in tuberculosis and which is indicated by the decrease in the amount of the neutral red and by the accumulation of large numbers of refractive droplets. From time to time a moderate reaction on the part of the granulocytes has also been evident and typical clasmatocytes have been present, but always the striking observation has been the massive number of monocytes in all stages of development, modification and degeneration into epithelioid cells.

The element that time plays in these various changes, the determination of the variety of substances which are capable of producing these changes, the question as to whether such substances have a chemical similarity or only one of a physical nature (*i. e.*, in this specific action) are still being investigated. In brief, the essential aim of these studies is the determination of the character of the stimulus which brings about an increase in monocytes and the formation of epithelioid cells in disease processes.

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Production of Epithelioid Cells in Lymph Glands by Injection of Non-Tuberculous Substances.

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Until the introduction of certain dyes permitting the staining of cells in the living condition, the epithelioid cell was a rather vague cytological entity. However, it is now possible to define it morphologically (as seen supra-vitally stained with neutral red) as a relatively large cell having a great number of very fine granules or vacuoles, arranged in a rosette, which assume with this vital dye a salmon pink to a brownish red tint. Such an appearance furnishes neither definite nor conclusive evidence regarding the origin or function of this cell, but does, on the other hand, very clearly define it as a cell of distinctive characteristics. This specific characteristic staining quality was first noted by Sabin (1923) in cells obtained from tuberculous lymph nodes, and similar cells have since been observed by other investigators in tuberculous tissues generally. As it had been found that epithelioid cells are very numerous in tuber-