From the table it is seen that a much larger percentage of the rats kept at the lower humidity survived. Also, the rats which were supplied with air from outside the building withstood the infection slightly better, especially when the humidity was high, but whether this difference is of real significance will be further investigated.

In a similar preliminary experiment, the details of which are not given, too small a dose of the bacterial culture was fed, with the result that the organism was recovered from the cardiac blood of only one-third of the dead rats, and the mortality throughout was lower, but the deleterious effect of the high humidity was again evident, as 74% of 18 rats kept in the dry air, and 52% of 21 rats kept in the moist air survived.

Conclusions. When kept at a high external temperature (83°F.), young rachitic rats exposed to a relative humidity of 22% for 4 weeks survive a subsequent oral enteritidis infection in much larger numbers than litter mates exposed to a relative humidity of 90%.

These findings are similar to those reported by McDowell and Kligler.

6348

I. Penetration Through Tissue of Iodine in Different Solvents.*

M. S. BISKIND. (Introduced by W. F. Von Oettingen.)

From the Department of Pharmacology, Western Reserve University.

It has been shown by Karns[1] and by Karns, Cretcher and Beal,[2] that certain aqueous solvents for antiseptic iodine preparations are superior to those commonly in use, with respect to the iodine adsorption behavior at surfaces. This controls surface dosage, and hence becomes a very important factor in germicidal effectiveness[3] and in penetration through tissues. It has been further demonstrated by Karns[4] that the quantity of iodine absorbed on a treated surface is not a necessary function of the concentration of the iodine in the solvent used, and that surface tension plays no important rôle

* Contribution from the Mellon Institute Fellowship for Research in the Pharmacology of Iodine.

[1] Karns, G. M., *J. Am. Pharm. Assn.*, 1932, **21**, 779.

[2] Karns, G. M., Cretcher, L. H., and Beal, G. D., *J. Am. Pharm. Assn.*, 1932, **21**, 783.

[3] Gershenfeld and Miller, *J. Am. Pharm. Assn.*, 1932, **21**, 894.

[4] Karns, G. M., *loc. cit.*

in this reaction. Changes in the iodine-iodide ratio of the aqueous solutions were found considerably to affect the iodine deposition.

In the work presented here, a series of iodine solutions of different concentrations and in various solvents were compared under standard conditions with respect to their rates of penetration through frog skin.

Only the fresh non-pigmented skin from the ventral body surface of large frogs between the pectoral and pelvic girdles was used, in segments about 2 cm. square, as this was found to be more nearly uniform in texture and thickness than skin from any other part of the body. It was found that any attempt to tie the skin onto containers resulted in areas of increased permeability at the sites of greatest tension, thus materially modifying the results. However, merely laying the skin, outside in, over the end of a half-inch glass tube sufficed, in the majority of cases, to seal it when inverted. Stretching was carefully avoided. The end of the tube closed with the skin was dipped in starch-iodide solution containing 0.65% of sodium chloride, a drop of the latter remaining suspended therefrom. Just enough iodine solution was placed in the tube to cover the skin and the time required for the first appearance of a blue color in the starch solution was recorded. If the stain on the skin was later found to have extended beyond the inside margin of the tube, that observation was discarded.

To minimize errors due to differences in various skins, segments of the same skin were at first used with 2 or 3 different solutions simultaneously. It was found, however, that the range of variation with different skins was no greater than that on the same skin, so that later observations were made without regard to this factor.

The solutions tested and the results obtained are given in the tabulation. The 1.85% aqueous iodine solutions were supplied by

TABLE I.

	Solutions	Mean Time for Penetration in Seconds/100†		No. Observations
1.	I_2 5.0%, NaI 10.0%, in water	0.9	±0.05	15
2.	1.85%, NaI 2.20%, in water	2.1	0.15	15
3.	1.85%, KI 2.42%, in water	2.7	0.039	15
	1.85%, NaI 2.05%, KI 0.089%, $CaI.6H_2O$ 0.081%, in water	2.8	0.28	15
4.	3.5%, KI 2.5%, in 92.5% alcohol	3.6	0.19	15
5.	7.00%, KI 5.0% in 90% alcohol (U.S.P. Tinc.)	4.5	0.094	15
6.	1.85%, KI 1.33%, in 93.3% alcohol	11.3	0.52	9

† In this, as in the subsequent report, I am greatly indebted to Dr. Norman Reider for assistance with the statistical analysis of the data.

Dr. G. M. Karns. These are approximately isotonic for mammalian and hence somewhat hypertonic for frog tissue.

It will be seen that the aqueous solutions are all superior in speed of penetration to the tinctures. This holds true even in comparing the 1.85% aqueous solutions with the U. S. P. Tincture containing 3.8 times as much iodine. When the U. S. P. Tincture is diluted with 95% alcohol to an equal iodine content, the tremendous rôle played by the solvent immediately becomes evident. The greater iodine content and the marked hypertonicity of the 5% aqueous solution are undoubtedly involved in its greater speed of penetration as compared with the other aqueous solutions.

6349

II. Effect of Iodine in Different Solvents on Permeability of Frog Skin to Ringer's Solution.*

M. S. BISKIND. (Introduced by W. F. Von Oettingen.)

From the Department of Pharmacology, Western Reserve University.

In the previous report,[1] a series of iodine solutions were compared with respect to their rate of penetration through frog skin. In this study an attempt was made to compare some of these solutions, and others, as to their relative effects on the ultrafiltration permeability of frog skin to Ringer's solution, with a view to obtaining some information as to the tanning properties of these solutions.

The method used is a modification of that described by Sollmann[2]: The skin was stripped off the hind limbs of large frogs, separated, tied off at the ankles, reinverted and tied onto the lower ends of filtration tubes, each consisting of a stoppered burette connected by means of a T-tube containing a Mariotte stopper, with a glass tube, one-half inch in diameter and of sufficient length that filtration could be carried out for several hours under a constant pressure of 31 cm. of water. The outside of the skin was exposed to the air.

The outside surface of the skin was treated by immersion in one of the various solutions for exactly 5 minutes after which it was

* Contribution from the Mellon Institute Fellowship for Research in the Pharmacology of Iodine.

[1] Biskind, M. S., this journal

[2] Sollmann, T., *J. Pharmacol. Exp. Therap.*, 1922, **21**, 200.