Thus at least 2 positive transmissions have resulted from 11 bites by only 7 flies, and it is possible that lesions will develop at the site of other bites.

We may conclude that transmission of oriental sore by means of stable flies is possible, and in view of the ease of transmission, it seems probable that transmission by this method frequently occurs under natural conditions. A complete report on our experiments using *S. calcitrans* and other insects will be published later. We believe that *S. calcitrans* and similar blood-sucking flies may be capable of transmitting visceral leishmaniasis under natural conditions, and experiments to test this hypothesis are included in our program.

9811 P

The Diagnosis of Venous-arterial Shunt by Ether Circulation Time Method.

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Recently McGuire and Goldman[1] showed that in certain types of congenital heart disease the arm to carotid sinus circulation time was considerably abbreviated. They regarded this apparent increase in the velocity of blood flow as characteristic of venous-arterial shunt. To their interesting observations we wish to add our findings with the ether[2] and saccharin[3] circulation time methods, which we believe offer conclusive evidence for the presence of right to left shunt.

Ether (5 minims) injected into an antecubital vein in normal individuals enters the right heart whence it reaches the pulmonary capillary bed and becomes volatilized. The time elapsing between the injection and the detection of the ether smell in the nose represents the arm to lung time, which in normal individuals and in those with circulatory failure is always a fraction of the arm to

1 McGuire, J., and Goldman, F., *Am. Heart J.*, 1937, **14**, 230.

2 Hitzig, W. M., PROC. SOC. EXP. BIOL. AND MED., 1934, **31**, 935; *Am. Heart J.*, 1935, **10**, 1080.

3 Fishberg, A. M., Hitzig, W. M., and King, F. H., PROC. SOC. EXP. BIOL. AND MED., 1933, **30**, 651.

tongue time as measured by the saccharin method. However, when a similar or lesser quantity of ether and the usual amount of saccharin were injected separately into cyanotic patients suffering from congenital heart disease, the following circulatory phenomena became manifest in 4 subjects in whom venous-arterial shunt existed (Table I).

TABLE I.
4 Cases with Tetralogy of Fallot.

Case No.	Date	Minims ether injected	Age	Sex	Arm to Lung Time in Seconds (Ether)	Arm to Tongue Time in Seconds (Saccharin)	Paraesthesias
1.	4/34	5	11	F.	7.5	3-4	Generalized Tingling ++++
2.	6/37	5	30	F.	11.0	11.8	Generalized Tingling ++++
3.	1/38	1	3½	M.	10	*	Marked Paraesthesia of face +++
4.†	2/38	3	9	M.	20	*	Marked Paraesthesia of scalp ++

*Because of the age and lack of cooperation of the patients the saccharin test was not performed.

†The authors are indebted to Dr. Betty Huse for her assistance in observing this case.

(1) Alteration of the usual relationship between the arm to lung and the arm to tongue circulation times from a fractional relationship to a ratio of 1 to 1, or 1+ to 1. (Cases 1 and 2.)

(2) Shortening of the arm to tongue time similar to the shortened arm to carotid sinus time of McGuire and Goldman[1] as in Case 1. In Case 2 the clinical picture was that of heart failure erroneously attributed to rheumatic heart disease and the relatively rapid saccharin time suggested venous-arterial shunt in congenital heart disease.

(3) Stinging and tingling sensations of a few seconds' duration which are either localized to the face and scalp or generalized extending in wave-like fashion to the more distant portions of the body. The severity of this cutaneous reaction was proportional to the quantity of ether injected, the most dramatic reaction being obtained when the full dose of 5 minims of ether was employed. These paræsthesias appeared simultaneously with the detection of ether

by smell in 3 instances, although in case (1) they definitely antedated the ether end-point and corresponded more closely to the shortened arm to tongue time.

Ordinarily when ether is injected it volatilizes and escapes almost completely from the lung during the first circuit of the blood. Only a negligible amount may remain and eventually reach the systemic capillaries. However, in the presence of a venous-arterial communication, ether in variable amount depending upon the anatomic defect, is shunted into the left side of the heart from where it is propelled into the systemic circuit setting up the above described irritative phenomena in the capillaries of the skin. The rapid saccharin time is similarly explained.

Circulatory studies with saccharin and ether have been performed by us in over 2,000 patients including 2 cases with acquired septal defect due to coronary thrombosis and other congenital cardiacs with and without cyanosis. In no other case have we encountered the above sensory and circulatory disturbances. The ether method is of definite value, therefore, in establishing with certainty the existence of venous-arterial shunt.

9812 P

Xylose, Inulin, and Creatinine Clearance in the Normal Frog.

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Hendrix, Westfall, and Richards[1] have shown from microanalyses of glomerular urine obtained directly from the exposed kidney of the frog, after intravenous injection of inulin, that it contained the same concentration of inulin as the plasma. Also, Richards and his coworkers[2] demonstrated in a double perfusion experiment that the frog's kidney was unable to excrete inulin when the fluid flowing through the intertubular capillaries contained inulin and that of the glomerular capillaries did not. Creatinine was found by them to undergo insufficient concentration in the frog renal tubules to suggest secretion.

1 Hendrix, J. P., Westfall, B. B., and Richards, A. N., *J. Biol. Chem.*, 1936, **116**, 735.

2 Richards, A. N., and Walker, A. M., *Am. J. Med. Sci.*, 1935, **190**, 727.