A STUDY OF THE ANESTHETIC PROPERTIES OF TRICHLORETHYLENE.*,[1]

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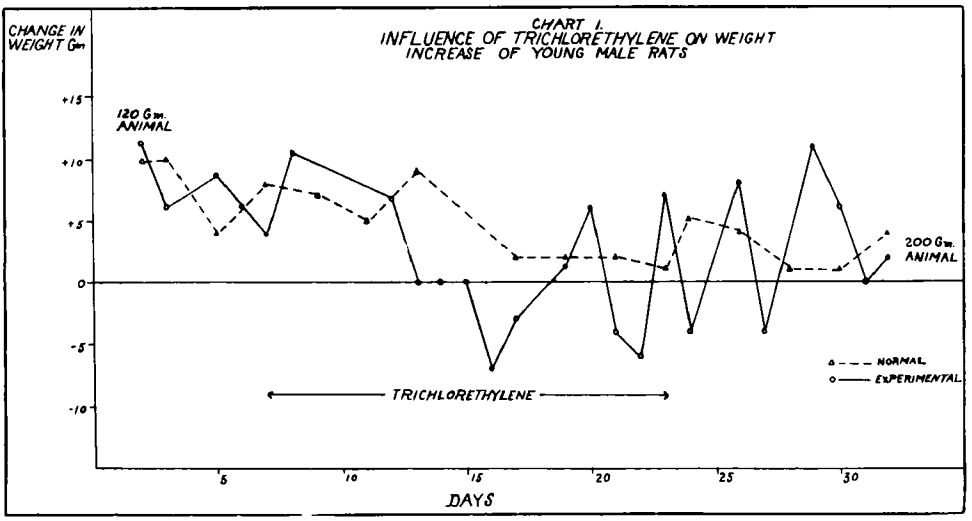
INTRODUCTION.

Since the work of Plessner (1) trichlorethylene has had a rather extensive use in the treatment of trigeminal neuralgia. The pharmacology of trichlorethylene was studied extensively along with other chlorinated ethylene compounds by Joachimaglu (2). Owing to the fact that this compound was used by Love (3) in the treatment of angina pectoris, its action on the coronary vessels (4) and on the perfused leg vessels of the frog (5) was studied by the authors. During these investigations, the anesthetic properties of the drug were investigated and are reported in this communication.

EXPERIMENTAL.

Material Employed.—The trichlorethylene used in these experiments was supplied through the courtesy of David A. Bryce of the Calco Chemical Co. and met the requirements set forth by Tschentke (6).

Inhalation Anesthesia in the Albino Rat.—Rats weighing 120–175 Gm. were placed under a bell jar and 1 cc. of trichlorethylene was permitted to volatilize



in the atmosphere of the jar. Within 4 to 5 minutes, the rats were usually under surgical anesthesia. The animals were then removed from the jar and allowed to recover. The recovery was prompt, generally occurring within 10 minutes. The treatment was repeated six times weekly over a period of five weeks. A summary of the effect of this treatment on 4 rats along with a control growth curve is shown in Chart 1.

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Four additional experiments were conducted with mature male rats weighing between 200 and 250 Gm. In these experiments, the animals did not suffer a loss in weight after 19 consecutive daily anesthesias.

On the twentieth day, the four larger rats were killed by decapitation and the parenchymatous viscera were examined by C. G. Warner of the Department of Pathology. In gross, the appearance of the rats was normal. There were some histological changes in the kidneys that were fairly constant in the exposed animals and practically absent in the controls. These were congestion and dilatation of the glomerular tufts with occasional hemorrhage in the proximal tubules. Granular changes in the cytoplasm of liver cells were inconstant and not conclusive. The lungs of the exposed animals showed some emphysema and intraalveolar hemorrhage.

Rectal Anesthesia in the Rabbit.—Trichlorethylene was dissolved in various concentrations in mixtures of ethyl alcohol, glycerin and castor oil. These solutions were administered to rabbits (24 animals) by high rectal injections in amounts to provide 3.7 cc. of the drug per kilo. By this avenue of entrance, the trichlorethylene was ineffective in producing anesthesia. The drug was exceedingly irritating to the colonic mucosa.

Influence of Inhalation Anesthesia on Blood Sugar Level.—Rabbits weighing about 2 kilos were anesthetized according to the technique set forth in the anesthesia experiments using 5 cc. of trichlorethylene. Prior to anesthetizing, the animals were fasted for 24 hours. Their fasting blood sugars were determined by the Folin method (7) and also determined subsequently as shown in Table I.

TABLE I.—INFLUENCE OF TRICHLORETHYLENE ANESTHESIA ON BLOOD SUGAR OF RABBITS.

Rabbit. No.	Mg. per 100 Cc. of Blood. Fasting.	Deep Anesthesia.	Recovery (20 Minutes).
1	107	126	118
2	105	112	125
3	91	116	118
4	104	93	119
5	111	121	137
6	91	131	121

TABLE II.—SHOWS RISE AND FALL OF BLOOD PRESSURE AND CHANGES IN RESPIRATION FOLLOWING STIMULATION OF THE SCIATIC NERVE BEFORE AND AFTER LOCAL APPLICATION OF TRICHLORETHYLENE TO THE SCIATIC NERVE. TWO EXPERIMENTS, SEPTEMBER 13 AND 15, 1934.

No.	Stimulation of the Sciatic Nerve.	Blood Pressure Measured by a Mercury Manometer. Before mm.	After mm.	Fall mm.	Rise mm.	Respirations per Minute. Before No.	After No.	Change No.
		Dog 1.						
1	Normal, before trichlorethylene	160	170		10	18	20	+ 2
2	Trichlorethylene peripherally	160	172		12	20	10	− 10
3	Trichlorethylene centrally	164	170		6	10	20	+ 10
4	Trichlorethylene, peripherally	164	170		6	18	22	+ 4
5	Trichlorethylene, centrally	164	172		8	18	22	+ 4
6	Trichlorethylene by tracheal inhalation	164	140	24		30	160	+130
7	Trichlorethylene by tracheal inhalation	164	152	12		90	70	− 20
		Dog 2.						
1	Normal, before trichlorethylene	130	136		6	15	20	+ 5
2	Trichlorethylene peripherally	130	136		6	15	20	+ 5
3	Trichlorethylene centrally	130	136		6	15	19	+ 4

Trichlorethylene on Nerve Conductivity.—To determine the capacity of trichlorethylene to block nerve conductivity, an area of the sciatic nerve of a dog anesthetized with ether was exposed and subjected to faradization and the respiratory and blood-pressure responses were noted. A sling of trichlorethylene was placed around the nerve for several minutes and the nerve stimulated peripheral to the sling. These experiments are also shown in Table II.

SUMMARY.

Trichlorethylene may be used by inhalation to produce anesthesia in the rat. The anesthesia in the rat and rabbit is accompanied by marked stimulation of the skeletal musculature. Repeated anesthetizing did not markedly influence the growth or important viscera of the rat. The compound was incapable of producing anesthesia when administered rectally. During inhalation anesthesia in the rabbit, a mild hyperglycemia results. Trichlorethylene applied to the sciatic nerve, was incapable of blocking the blood pressure and respiratory responses of faradization.

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A SIMPLIFIED ASSAY FOR THE OFFICIAL IODINE-IODIDE SOLUTIONS.*[1]

BY WILLIAM F. REINDOLLAR.[2]

Solutions of iodine, containing potassium iodide, have been employed as therapeutic agents since the recognition of the germicidal properties of the former substance. Two of the most important of these products are the tincture and the compound solution of iodine. The former is an alcoholic liquid containing 7 Gm. of iodine and 5 Gm. of potassium iodide in 100 cc.; the latter is an aqueous fluid having 5 Gm. and 10 Gm., respectively, of iodine and potassium iodide in each 100 cc. These two galenicals have enjoyed recognition in the last five Pharmacopœias, and have both been accepted by the Committee on Scope of the forthcoming Standard. Furthermore an Antiseptic Solution of Iodine (1), having a concentration of 2.0 Gm. of iodine and 2.4 Gm. of potassium iodide, respectively, in 100 cc. is being considered for admission.

The U. S. P. provides assays for the iodine and potassium iodide content of both of these agents. The respective assays are similar in each case and are herein briefly described:

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