viable. Those in the duodenum were excysted; most of those found were attached to the mucosa of the duodenum near the opening of the common duct. After 22 hours the larvæ found in the duodenum were all attached to the mucosa and were massed in the vicinity of the opening of the common duct.[3] After 48 hours larvæ had migrated into the common duct; none were found in the duodenum. From the 72nd hour they were found passing into the bile passages. Larvæ were never found in the jejunum, the gall bladder or the pancreatic duct.[4] Only a portion of the viable larvæ which entered the duodenum actually excysted, and from our experiments we conclude that neither encysted nor excysted larvæ which passed into the jejunum or ileum were able to survive but were digested along with the food mass. Even in the duodenum it was necessary for the excysted larvæ to secure attachment to the surface of the mucosa in order to migrate into the common duct. It seems highly probable that only about 20 per cent of the viable encysted larvæ entering the body with the food mass excysted and that only about 5 per cent actually reached the common duct and the bile passages. These data favor the view that the migration into the bile passages is direct and does not involve previous passage through the portal vein which Lutz (1892-93) claimed was involved in the case of *Fasciola hepatica*.

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The influence of chaulmoogra on sulphur metabolism.

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Further metabolism studies with Chaulmoogra oil have been undertaken with special reference to sulphur excretion. Estimations were made to find out whether the cyclic pentene nucleus of Chaulmoogric acid is excreted like phenol as the ethereal sulphate,

[3] It seems probable that this is a chemotactic reaction.

[4] As determined both by examination of the contents of these tracts and by scraping their epithelial linings.

and whether the findings concerning tissue breakdown, acidosis, and suboxidation could be further elucidated.

Rabbits and dogs placed upon standard diets, as previously described,[1] were treated with Chaulmoogra oil and by the ethyl esters of Chaulmoogra. The drugs were administered orally, subcutaneously, intraperitoneally, and intravenously. Estimations were made for the urinary excretion of inorganic sulphates and total sulphate's by Folin's method, and total sulphur by Benedict's method. From the results obtained there was calculated the amount of the ethereal sulphate and the amount of neutral sulphur excreted.

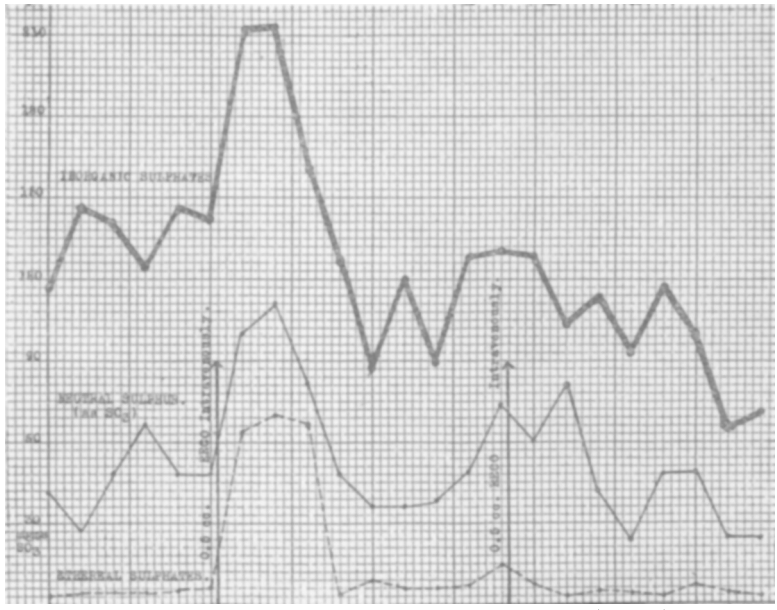
It was found that irrespective of the path of administration, large doses of the Chaulmoograte produce a great temporary increase in the excretion of all forms of sulphur. A rabbit upon a standard diet of 100 grams of cabbage and 80 grams of wheat normally excreting about 6 mg. of ethereal sulphate (SO_3), after receiving 5 cc. of oleum hydnocarpi J. P. by mouth, excreted in three subsequent days 186 mg. During the same time there was a hundred per cent increase in the neutral sulphur, and thirty-eight per cent increase in the inorganic sulphates.

Repeated administration of the drug fails to produce the same result. Amounts less than normal for all of the sulphur compounds excreted are obtained. There is no increase in the ethereal sulphate excretion. The amount of the neutral sulphur decreases far below normal. A second dose of 5 cc. of oil given in the experiment quoted showed a reduction in the excretion of neutral sulphur to 30 per cent of the normal, on the sixth day. The inorganic sulphates dropped to 60 per cent of the normal on the seventh day.

Relatively smaller doses of this drug given to dogs yield similar results. The total sulphur excretion followed closely the curve for nitrogen excretion. Estimations of the total excretions over a period of several days showed little absolute increase in the total amount of ethereal sulphates and of neutral sulphur excreted. The inorganic sulphates showed definite increase. After one month's rest, further introduction of the drug again produced an increase in the excretion of ethereal sulphates.

The results indicate that the cyclic pentene compounds of the Chaulmoogric acid series are excreted by the organism in the

[1] Read, B. E., *J. Biol. Chem.*, 1924, lxii, 515.



URINARY SULPHUR after ADMINISTRATION of CHAULMOOGRA, RABBIT. (Read).

form of ethereal sulphates. There is tissue destruction, as indicated by the nitrogen metabolism, which probably takes part in the formation of ethereal sulphates. It is doubtful if the ethereal sulphates are formed by the utilization of sulphur from the exogenous metabolism. The endogenous metabolism is greatly increased and subsequently decreased. Suboxidation in the tissues may account for the absence of an increase in the excretion of ethereal sulphates after repeated dosage.

It is possible that the sulphur excretion is directly related to the values obtained for creatinine. However, this may be related to the large increase of sulphates resulting from the increased exogenous metabolism. The results indicate that large doses of Chaulmoogra oil, after a preliminary stimulation of and detoxication by the system, produce a state of decreased endogenous and exogenous metabolism, following tissue destruction, and a condition of suboxidation in the tissues.