sulphate or acetone, the latter by extracting the castor bean preparation with 1.5 normal sodium chloride solution and removing the salt by dialysis.

It is interesting to note that the different lipases found in extracts of animal organs, are present in the duodenal contents of human beings and may also be obtained from a vegetable substance such as castor beans.

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Modifications of the Abel vividiffusion apparatus.

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The apparatus for the study of the circulating blood by a process of diffusion devised by Drs. Abel, Rowntree and Turner has impressed us as such a brilliant stroke of inventive genius that we have hastened to imitate it and apply it. The scope of this method is perhaps not yet fully appreciated, but it has interested us particularly in affording a hopeful way of studying the inorganic constituents of the blood, especially in connection with tetany where we think that calcium plays a considerable rôle. The results of these experiments are as yet entirely incomplete but we wish to describe several modifications in the technique which may have been tried and discarded by Dr. Abel but which seem to us to be helpful.

The branched glass end pieces which allow the current of blood a choice of several paths are extremely difficult to make and are very fragile. Unless they are made very precisely, one path becomes easier than another in which blood may circulate slowly or stagnate. With this arrangement blood passes once only through the length of the apparatus and back again, but since the stream bed, with these many possible channels, is very wide, the current must be relatively slow.

We have constructed two or three machines in which the blood circulates back and forth eight or ten times before returning to the vein. In the first model the connections were made as in a

steam radiator with "U" tubes of glass set in discs of hard rubber fixed on a central glass rod. All this was enclosed in a water jacket. In spite of our fear that the blood pressure might be insufficient to force the blood through this long course (about 80 inches) it works well, and we have carried on an experiment for five hours. The difficulty in preventing leaks where the celloidin tube is tied on the glass we have obviated by first wrapping the joint with rubber adhesive plaster and then tying. The difficulty in tying on the tubes of the inner row when the "U" tubes are ranged round a disc, we have removed by spreading out the "U" tubes flat in a square frame made of rubber and glass which can be turned over when it is necessary to tie the lower row. When the sheaf of tubes is enclosed in a water cylinder plugged at both ends, it is impossible to remedy a leak except by stopping the experiment, but we have simply laid our square frame in an enamel pan of the fluid covered with a glass lid and can reach any part of it at any time without disturbing the circulation.

Hirudin is very expensive and we have therefore defibrinated the blood of our animals realizing the possible objections to this. Instead of starting with the celloidin tubes full of salt solution they are filled with defibrinated blood of another normal dog and enough of this is kept in a funnel or tank connected with the inlet tube to allow some blood from the machine to run through the outlet tube into the vein while a similar amount is bled from the carotid and defibrinated. This is poured into the funnel and the process repeated till the blood no longer clots when the inlet tube is connected with the carotid canula and circulation proceeds. So rapid is the torrent of blood through such a continuous channel that we have twice connected the inlet and outlet tubes directly with artery and vein without defibrinating and kept up the circulation for an hour without the formation of any clot. If the blood pressure sinks, through faulty etherization or other reason the blood clots, as happened in another experiment.

The most important and difficult part of the problem is the calculation of the proper fluid in which to immerse the apparatus. In our effort to abstract calcium we have tried several and are at present using a fluid calculated to correspond as closely as possible with Abderhalden's published analysis of the inorganic constituents of the dog's blood with the omission of the calcium.

With this apparatus dialysis, at least in so far as the inorganic substances are concerned, is rapid and satisfactory.

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On the alleged rôle of hematin in the production of the malarial paroxysm.

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The view has been advanced that the symptoms of the malarial paroxysm are due to the toxic action of hematin[1]. The basis for this view rests, (1) in the alleged identity of hematin and malarial pigment, and (2) in the effect produced by intravenous injections of hematin solutions in rabbits. Inasmuch as hematin has not yet been isolated from the fresh organs of an undoubted case of malaria, malarial pigment cannot be justly identified with hematin. The present communication deals chiefly with the temperature curve in rabbits after intravenous injection of from 0.0023 g. to 0.0370 g. of hematin per kilo body weight.

The hematin was prepared from hemin by the method of Piloty.[2] The hemin was prepared from ox blood by the Piloty modification[3] of the Schalfejeff method and recrystallized from pyridin. The hematin was dissolved in 0.9 per cent. NaCl solution containing 1.5 per cent. $NaHCO_3$. All solutions used contained 0.5 g. hematin in 100 c.c., were microscopically clear, and were sterile.

The rectal temperatures of the rabbits were taken every 30 minutes after injection, with a clinical thermometer which had been checked against a P. T. R. thermometer. Two minutes was allowed for the registration of the maximum temperature. Fresh rabbits were used for each series of experiments; no animals were reinoculated.

Twelve rabbits received hematin solution, eight rabbits received the solvent (0.9 per cent. NaCl solution containing 1.5 per cent.

[1] W. H. Brown, *Journal of Exp. Med.*, XV, p. 579, 1912.

[2] Piloty, *Ann. d. Chemie*, CCCLXXVII, p. 358, 1910.

[3] Piloty, *l. c.*, p. 344.