

dichlor-ether on anilin. I believe that pure indol is more easily secured in this way than from putresying fibrin. I have found that when injected in doses of 0.1 gramme into the jugular vein of the dog it produces no effect on arterial pressure. In frogs, as pointed out by Christiani* it produces convulsions similar to those caused by phenol. What has been said of indol holds also for the skatol, which has been fed to a dog weighing fifty-five kilos at the rate of 30 grammes in twenty-one days without any serious effect.† In my experiments no change of arterial pressure was produced by jugular injections of 0.1 gramme. In fact, I am satisfied that twenty times as much of either of these substances as are excreted daily by a man of seventy kilos weight may be injected at one time into the jugular vein of a dog of four kilos without producing an appreciable effect on the circulation or respiration. Indol, however, is much the more important of the two, as skatol, though formed in larger quantities, is absorbed only in traces.‡

When we consider, therefore, the amounts in which any of these substances could probably be formed under the most favorable circumstances, and compare these with the quantities which have been administered empirically or experimentally, we cannot but feel that to account for the symptoms in acute cases of intoxication something more active is necessary.

The third class of substances comprises putrescin, cadaverin and ethylenediamin, all belonging to the diamins. Udransky and Baumann§ have fed both putrescin and cadaverin to dogs in large doses without effect. Grawitz|| has shown that they are both capable, in 2.5 per cent. solution, of producing severe inflammation and necrosis, while Behring¶ has found cadaverin, taken in large doses, poisonous to mice, guinea-pigs and rabbits. The substance found by Kulneff** in a case of gastroptosis is probably ethylenediamin. It is more poisonous to mice and guinea-pigs than to frogs. In the former it causes lachrymation and salivation followed by violent dyspnea, lasting until death, which follows in twenty-four hours or more. So of these substances it may be said that the first two are extremely toxic and the chemical position of the last is still uncertain.

Of the various toxins which are known to be formed by the action of bacteria, we have not definite knowledge enough to speak until their principles are more completely isolated so that

* Loc. cit.

† Mester, *Zeitschr. f. physiol. Chem.*, xii, 130; Brieger, *ibid.*, iv, 414.

‡ Brieger, *ibid.*, ii, 241.

§ *Ibid.*, xv, 77.

|| *Virehow's Archiv*, cx, 1.

¶ *Deutsch. med. Wochenschr.*, 1888, No. 24.

** *Berl. klin. Wochenschr.*, 1891, p. 1071.