

coccus aceticus oxidizing alcohol into acetic acid, etc. This was abundantly proven by examining the products of the action of bacteria on thoroughly sterilized media. In addition to the substances already mentioned there were found in putrefying fish and horse flesh: gadinine, ethylene-diamine, tri-ethyl amine and other bases, and more recently Vaughan prepared from milk and cheese *tyrotoxine*. This explains much of what has been obscure of the action of pathogenic bacteria, as we readily see how organisms producing such substances would, when introduced into the body, give rise to the most untoward effects by the absorption of their effete material into the system. In discussing the effects of the different bacteria in producing poisonous substances we must also take cognizance of the different food materials supplied them; for we see produced, muscarine, putrescine and cadaverine according to the tissues invaded.

As regards pathogenic bacteria it may be stated that results in many respects similar to the above have been arrived at. In 1885 Villiers, according to Brieger's method, obtained a liquid ptomaine from bodies dead of cholera which had an odor of hawthorne flowers and produced in the animals experimented upon strong tremors, great disturbances of the heart and increased peristalsis. He also obtained ptomaines from pneumonia victims which bore close resemblance to those of diphtheria, but quantities were insufficient for definite results.

Brieger especially advocates a definite classification of these compounds which is as follows:—

To all basic substances produced by the action of bacteria, he relegates the generic name *ptomaine*, while he gives the name *toxines* to the poisonous ptomaines. The name *leucomaines* is reserved for those bases produced from the albumins during life processes.

Brieger, to avoid confusion, re-examined all the ptomaines formed by putrefactive bacteria (*B. termo* and *B. lineola*). He found in putrid horse flesh besides the ones already mentioned a very poisonous amido acid $C_7H_{17}NO_{21}$, which produced symptoms resembling curare in the animals experimented on also a more poisonous but slowly acting base, mydatoxine, $C_6H_{12}NO_2$; also the poisonous methyl-guanidine, $C_2H_7N_2$. In putrefying fish the non-poisonous bases, cadaverine and neuridine, and besides these di- and tri-methylamine, putrescine, etc.

As regards pathogenic bacteria the results were as follows:—*Staphylococcus pyogenes aureus* yielded no toxine, but only ammonium salts. *Streptococcus* produced tri-methylamine, which is not entirely free from poisonous properties.

The Koch-Eberth typhus bacillus produced small quantities of *typhotoxine*, $C_7H_{17}NO_2$, (isomeric, but not identical with toxine above mentioned) when introduced into animals it produced a lethargic condition and other symptoms similar to those of typhus in man.

The tetanus virus produced the toxine *tetanine*, $C_{12}H_{30}N_2O_4$, and much ammonia. When this was injected in experimental animals it produced clonic and tonic spasms of great violence, followed by death.

Besides these results Doleris and Butte found a crystalline toxine in the blood of eclamptic patients. Bocklisch confirms the absence of ptomaines in the pure cultures of the vibrio proteus, the Prior-Finkler bacillus of cholera nostras.

The moral of all this is that it is much easier to keep the bacteria out of the body by *preventive* medicine than it is to find antidotes for the poison they produce once they have gained admittance, and further, that the chemists may beat the biologists on their own ground, for is not the *chemist* Pasteur the father of bacteriology?

Diphtheria in Glasgow.

Dr. James H. Russell, Medical Officer of Health, in a letter to the editor says, *re* diphtheria:—"We have very little diphtheria in Glasgow, some 1% of all deaths. It is associated in my experience with sewerage derangements, e.g. perforations in the pan of the prevalent pan closet; choked soil-pipes, cistern overflows into soil-pipes. The first condition is conspicuous, and the feature is that it forms a larger proportion of the total deaths in houses of five apartments and upwards than in houses of one, two or three apartments. Indeed it constitutes the lowest percentage of the total deaths in one-apartment houses and the highest percentage in five apartments and upwards. Being connected with derangements in fittings, etc., it is most fatal where those most abound *inside* the house. A large proportion of one-apartment houses have no inside connections with the sewers as you may suppose. We treat cases of diphtheria in our infectious diseases hospital in a separate ward.