

XIX.—*On the Physiological Action of Brucine and Bromostychnine.*

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THERE has been a considerable difference of opinion regarding the action of brucine, some saying that its action is like that of strychnine but weaker; others that it was a bitter tonic, with little or no convulsive power. The reason of this difference of opinion is, I think, shown by some experiments which I have made with pure brucine, kindly given to me by Mr. Shenstone. From these experiments, it appears that brucine has a convulsant action resembling that of strychnine, but the action is not only weaker in itself, but is so much lessened in the case of mammals by the rapid elimination of the poison, as to give rise to no symptoms when the brucine is taken by the mouth. Its convulsant action is shown very distinctly when the brucine is injected in solution into the abdominal cavity, so that it is rapidly absorbed, and the whole or nearly the whole of the quantity administered is able to act upon the organism, there being no time allowed for its excretion. When it is taken into the stomach, on the other hand, excretion appears to go on *pari passu* with absorption; there is thus no large quantity of brucine at any one time in the blood, and the animal does not suffer. A decigramme of the hydrochloride of brucine dissolved in 3 c.c. of water, and injected into the abdominal cavity of a white rat, began to act almost immediately. The animal cowered and shivered after the injection; in three minutes it was seized with an emprosthotonic convulsion, and died. A similar quantity given to another rat, mixed with suet so that the animal ate it readily, produced no symptoms whatever. The symptoms produced in a rabbit were peculiar. For a number of minutes after the injection, the animal seemed quite unaffected, then all at once it took a sudden run of a few steps, leapt into the air, and fell dead.

The difference between the effect of brucine and strychnine appears rather to be one of degree than of kind, and to be chiefly dependent on the more ready elimination of brucine. Brucine, like strychnine, produces death by convulsions and not by paralysis, but, like curara, which is also a product of a species of *strychnos*, it is innocuous when taken into the stomach, though fatal when injected under the skin. I have not yet made comparative experiments between the action of brucine and iodide of methylstrychnine, but on comparing the result of my experiments with brucine and those of Fraser and Crum-Brown on iodide of methylstrychnine, it appears that the two have a different action, the brucine causing convulsions,

whilst the iodide of methylstrychnine produces paralysis. This is a curious point, and is well worthy of investigation, inasmuch as it may throw some light on the chemical constitution of the alkaloid. We find apparently a somewhat similar condition in the alkaloids of opium. By the introduction of alcohol radicles into morphine, substances are produced to which the name of *codeïnes* has been given. In some of these, such as codethyline,  $C_{17}H_{18}NO_2.O C_2H_5$ , obtained from morphine by the introduction of ethyl, the narcotic action is diminished, whilst according to Von Schroeder, the convulsant action is increased in proportion to the number of atoms of hydrogen substituted by alcoholic radicles. If such be the case, it is remarkable that by the addition of alcohol radicles to codeïne or thebaïne, their tetanising action should be altered into a paralysing action, methyl-thebaïne producing paralysis, like methylstrychnine.

Bromostrychnine has an action very much like that of strychnine. In the pithed frog it causes clonic convulsions, which, like those of strychnine, may be brought on by a slight touch, jar, or external irritation. Like the convulsions of strychnine they depend on alterations in the function of the spinal cord, and not on any action of the drug on the higher centres in the brain or medulla, as the effects occur when the brain is completely destroyed, or when the head is cut off.

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