

A weak heart, from whatever cause, organic or functional, is the only valid objection to the use of chloroform.

Both chloroform and ether, properly administered, are invaluable and useful anæsthetics; each of them has its proper and legitimate sphere and limitations; the modern surgeon is in need of both of them; the unqualified condemnation of chloroform in surgical practice is unjustified by the facts.

The intelligent selection and use of either anæsthetic is the right and duty of every conscientious physician and fatal accidents occurring, in spite of proper safeguards, are not incriminating to the medical attendant.

BACTERIOLOGY.

Ptomaines.

A great amount of interest is at present being manifested among scientific observers in regard to these most interesting bodies, ptomaines, leucomaines, etc.; and perhaps a greater stimulation has been given to it from its important bearings on the testimony of forensic experts in medico-legal matters.

These bodies are organic compounds obtained from putrefying matter of different kinds, and as previously prepared they resembled so closely a great number of our well known alkaloids that in three poison cases particularly Selmi proved that the reactions, which the experts in the first case took to be indicative of delphinine, in the second of morphine, and in the third of strychnine, were really due to the presence of certain cadaveric bases. The prolificacy of these discoveries has been such that we have ptomaines resembling morphine, strychnine, conrine, cuiarine, collidine, etc., and they have in the majority of instances been named from sources in which they occur as neurine, neuridine, etc., from putrefying nervous matter.

These bases as obtained by the earlier investigators were generally impure and it has more recently been found that the pure bases do not give reactions similar to the alkaloids above mentioned, this having been due to the presence of peptones and other bodies in the syrupy extract which was supposed to represent the pure ptomaine.

The first to obtain a chemically pure double salt was Nencki of Berne. He obtained it from putrid gelatine and on analysis it proved to be colli-

dine $C_8H_{11}N$ a member of the pyridine series.

Next comes Gautier and Etard with parvoline $C_8H_{13}N$ from putrefying mackerel.

Since 1883, however, the most prominent investigator in this field has been Prof. Brieger of Berlin, who has elaborated methods for the isolation of the greater number of ptomaines in a state of absolute purity by obtaining the gold and platinum double salts and also the picrates of the ptomaines. An accurate knowledge of their chemical constitution having been made possible, it is found that they do not come under the classification of true alkaloids in the present sense which restricts the term derivatives of the pyridine series, but prove to be amines, ammonio-bases and amido compounds of various composition. A number were closely related to *glycine* or, properly speaking, *amido acetic acid*; among these are *betaine* from beet, *choline* of bile non-poisonous, the poisonous *neurine* and non-poisonous *neuridine*, also di-amines as *cadaverine* identical with pentamethylenediamine and *putrescine* a di-methyl-ethylene-diamine. In Brieger's second report published in 1885, he enumerates the following ptomaines discovered by him in human cadavers most of them being di-amines of the fatty series:—

Choline, $C_5H_{15}NO_2$, a non-poisonous ethylene base; neuridine, $C_6H_{14}N_2$, non-poisonous; cadaverine, $C_5H_{16}N_2$, a strong reductant; putrescine, $C_7H_{12}N_2$; saprine, $C_6H_{16}N_2$, strong reductant; trimethylamine, $(CH_3)_3N$; mydaleine, —, a strong reductant.

Besides these there were bodies belonging to the aromatic series. It would appear from the results of investigation that the *ptomaines* formed during the first few days of putrefaction are non-poisonous, and after the disappearance of these the poisonous ones are formed; thus choline disappears and strongly toxic bodies formed especially neurine. On injection of small quantities into cats there is copious salivation, lachrymation, accelerated respiration, dyspnoea and death. The pulse is at first more frequent, then sinks, and death occurs in diastole. There is also increased peristaltic action during the symptoms and contraction of the pupils. Atropine appears to be an effective antidote.

There is every probability that these bodies are produced by the action of putrefaction bacteria on various protein bodies as we find micro-