

This method, though entirely unattended by danger, has the disadvantage of not inducing sufficiently-deep anaesthesia in many patients, especially in males and others of an excitable temperament. It cannot be maintained that "ether-intoxication" produces anaesthesia when the patient is only enjoying pleasant dreams and when he makes vigorous ejaculations. Witzel and other surgeons who favour the drop-method employ, as a matter of fact, a mixed anaesthesia.

Witzel and Hofmann administer an injection of morphia ($\frac{1}{8}$ to $\frac{1}{2}$ grain) one hour previous to the operation, and a larger dose if the patient has become inured to the drug. Witzel's uniformly-good results have to be attributed to the addition of the morphia. Kuttner¹ also, who is accustomed with success to operate under simple ether-intoxication (in Braun's clinic), regards "the combination of ether and morphia" as essential. As Witzel very properly remarks, Nussbaum's method of producing morphia-chloroform anaesthesia does not correspond with his own method since he (Witzel) gives the morphia one hour previous to operation, as recommended by Riedel and practised by Juillard.

A mixture of chloroform and ether can also be employed. Whenever it is evident that the necessary degree of anaesthesia cannot be obtained by means of ether alone chloroform should be administered in drops. Kionka² refers to the experiments of Honigmann and Kochmann, which show that the anæsthetic properties are materially raised when the two anæsthetics—chloroform and ether—are combined. Willy Meyer,³ on Weidig's authority, asserts that when ether and chloroform are mixed, a new chemical compound is produced which has a special molecular weight of its own. The addition of 25 to 30 drops of chloroform is sufficient to induce sleep during the administration of the ether. After a single experience of the method, we cannot recommend it as entirely free from danger. The only fatality attributable to administration of the anæsthetic which we have had in the course of private practice during thirty-five years occurred when chloroform was used because the anaesthesia produced by ether was not sufficiently deep.

When the combination of chloroform and ether is to be employed, it is necessary to follow Braun's advice and use either his own or the Roth-Dräger oxygen apparatus (Fig. 3), which prevents the administration of the anæsthetic in too concentrated a form. In a review of Dumont's handbook on anaesthesia,⁴ Rose declares that the introduction of Junker's apparatus is the most important advance that has been made in the matter of anæsthetics.

On the authority of Honigmann's preliminary work, Braun emphasises the fact that dilute ether vapour does not produce cyanosis or stimulate the secretion of saliva or mucus. The latter results only occur when concentrated ether is used. With his apparatus, which is adapted for the alternate or simultaneous administration of ether and chloroform, Braun estimates that on every occasion on which the bag (which holds 500 c.cm. of air) is emptied on inspiration the air the patient breathes contains 1.7 per cent of chloroform or 6 per cent of ether.

A great advantage of Braun's apparatus (Fig. 3) is, that by the addition of a catheter it can be used at once in all operations connected with the nose, mouth, jaw, and pharynx. Both Rose and the author (with Arnd's apparatus) drew attention to this fact so far back as 1878.

Finally, there is another anæsthetic of a mixed nature to be considered, viz. that in which ethyl bromide is used as a preliminary to the administration of ether. We are well aware that deaths have occurred from the use of ethyl bromide, but they scarcely outnumber the fatalities for which ether is responsible. Witzel has described in full detail a fatal case which occurred in the practice of one of his colleagues. It is a significant fact, however, that we have never had a single accident in the thousands of cases in which ethyl bromide was used to induce the anaesthesia. We will certainly never desist with its use, and we regard it as a less dangerous

¹ "Operation in Atherintoxication," *Beitr. z. klin. Chir.* Bd. 35.

² *Deutsche Klinik*, v. Leyden and Klemperer, 1903.

³ *Journal of the American Med. Association*, Feb. 1903.

⁴ "On Mixed Anaesthesia with Ether and Chloroform," *Munch. med. Wochenschr.* Bd. 20, 1901.