ETHER USED TO PRODUCE INSENSIBILITY IN 1821

BY

K. BRYN THOMAS

Royal Berkshire Hospital, Reading, England

SUMMARY

Lecture notes made by Benjamin Collins Brodie (1783–1862) reveal that he carried out experiments with ether in 1821. A guineapig inside a bell jar subjected to the influence of ether was revived by artificial respiration.

Brodie ascribes the effect to the ether and not to suffocation and says “narcotic poisons destroy the function of the brain”.

Fear of the drug may therefore have been one reason why its introduction into clinical use was delayed until 1846. Brodie’s note shows that he knew of its potentialities twenty-five years earlier and realized that the effect was reversible.

In 1820/21, Benjamin Collins Brodie, 1783–1862, gave a series of lecture demonstrations at the Royal College of Surgeons. His lecture notes survive unbound, in two large boxes, at the College,* as a testimony to an industrious and talented experimental physiologist, though Brodie lived to become more widely known for great surgical gifts.

The following extracts from a lecture given on February 5, 1821, and written in his own hand, are quoted in full to demonstrate a method of experiment in his time, and to show that ether was at this time accepted and used as an experimental narcotic, twenty-five years before its introduction as an anaesthetic. The notes also show a very good reason why the drug failed to enter general medical practice—fear. The words of an authority such as Brodie, “ether operated like a narcotic poison”, would not be offset in the general mind by his more optimistic reasoning later in the same paragraph. It required a Morton (who, in any case, had not heard Brodie) to press the experiments to a successful conclusion.

Brodie wrote:

1821. Expts. with poisonous gases.

Expt. Guinea-pig placed under the bell glass. 3 iss of sulphuric ether made to boil in a retort,† and the vapor conveyed into the bell glass. The ether deposited on the inner surface of the apparatus—it being inclement weather. Of course there was a mixture of ether with atmospheric air—the upper stopcock opened. In 2 min sudden motions as if from [word illegible] intoxication. In 2 min more insensible on one side—motionless. The boiling of the ether was soon over—so fresh ether was added to that already in the bell glass. He lay in this state 8 min then appeared dead. Was taken out. Heart felt acting. Artificial respiration and the action of the heart became more vigorous. In 3 min began to make efforts to breathe: and in 2 min more the artificial respiration left off—respired now 80 times in a minute; and gave some slight signs of sensibility when touched. Irregular motion of hind legs. 15 min after having removed from the bell glass is attempting to rise [two words illegible] and rolled over in 5 min more. A chattering of the teeth and tremulous action of all the muscles as if there was a rigor: which lasted a few minutes and then he recovered.

I attribute these effects to the specific action of the ether—not to suffocation.

1. The animal became affected although there must have been plenty of atmospheric air in the bell glass.

2. The symptoms in the beginning were different from those of simple suffocation—like intoxication—and the symptoms on recovery were different also. Narcotic poisons act destroying the functions of the brain: and ether operated like a narcotic poison: and as the effects of a narcotic poison go off after a certain term, so did the effects of the ether subside: the artificial respiration keeping up the heart’s action until the poison had ceased to operate.

Beddoes (1796, p. 144) that the “vapour of ether is inflammable in air”. Frobenius wrote “beware of approaching a lighted candle with your hand thus wet (with ether) lest it take fire and burn you”.

* The extract is reproduced by kind permission of the librarian, Mr. W. R. Le Fanu.

† What risks will the true scientist take! Brodie should have known of the warnings of Frobenius (1730) and
I have made no experiments on the nitrous oxide myself—to ascertain whether the heart continues to act after death—but probably it does—this produces intoxication.

There are, I don’t doubt, many other gases which may operate like ether by destroying the functions of the brain, e.g. our observations on the breathing of hydrocyanic acid.

Though these lecture notes are a mine of sound physiological work of which the above is but one example, they do not seem to have been noted previously. This is the more odd because Brodie himself published a résumé of the ether experiment in his Physiological Researches of 1851. This book contains a reprint of his experiments on animal heat and vegetable poisons which he had originally given to the Royal Society between 1810 and 1812, and which had been published in the Philosophical Transactions (Brodie, 1811, 1812). In some additional notes, at the end of the 1851 edition (p. 144), he quotes these lecture notes under the date February 5, 1821, and suggests that the experiment “derives a peculiar interest from the circumstance of the use of ether and other anaesthetic drugs having been lately introduced into the practice of surgery”.

By 1851, both ether and chloroform had been in use for about four years, and much had already been written regarding the early deaths and disasters associated with their use. Artificial respiration had been resorted to from the earliest days, this being merely an extension of the techniques used for the resuscitation of the drowned (see Duncum, 1947, p. 566), while John Snow’s first paper to the Westminster Medical Society (October 16, 1841) included a section on artificial respiration in the newborn using a double-acting pump (Snow, 1841). Brodie, in an earlier lecture of the series (1820), had, however, remarked that “the double-acting bellows is by no means satisfactory”, and he regarded the elastic recoil of the chest as adequate for expiration. He describes the resuscitation of the guineapig thus (Brodie, 1851, p. 144): “An opening having been made in the trachea, the lungs were now artificially inflated. . . .” The inflation was probably performed by a “gum-bottle”.

Elsewhere in the lecture notes, and in the Physiological Researches, Brodie describes (p. 72) the resuscitation of a curarized rabbit by a tube introduced into one of the nostrils, the lungs being inflated 35 times a minute, probably by a “gum-bottle”, and the revival of another rabbit (p. 69) by inflation through a tracheotomy tube.

These were fundamental experiments in respiratory physiology, and were, incidentally, applied by Brodie himself in the well-known curare experiment of Charles Waterton’s, on the famous ass, Wouralia (Brodie, 1851, App. G, p. 142). Waterton does not refer to Brodie’s presence in his account of this experiment (Waterton, 1825, p. 81), nor is Brodie’s name associated with it, either in any of the Lives of Waterton, or in any of the histories of curare (e.g. McIntyre, 1947).

It seems appropriate to draw attention to a hitherto unnoticed use of ether to produce insensitivity, and to Brodie’s part in Waterton’s experiment in the year* in which will be commemorated the death of this great physiologist and surgeon.

REFERENCES


Brodie, B. C. (1811). Experiments and observations on the different modes in which death is produced by certain vegetable poisons. Phil. Trans., 101, 194.

—— (1812). Further observations and experiments on the action of poisons on the animal system. Phil. Trans., 102, 205.


Frobenius, A. S. (1730). An account of spiritus vini aethereus, with several experiments tried there-with. Phil. Trans., 36, 283.


SOMMARE


* Brodie died on October 21, 1862.
Pour ce motif la crainte de cet effet de la substance a peut-être été une raison pour que son introduction dans l'emploi en clinique soit retardé jusqu'en 1846. Mais la note consignée par Brodie montre qu'il en connaissait les possibilités vingt-cinq ans plus tôt et qu'il se rendait bien compte que l'effet était réversible.

ZUSAMMENFASSUNG
Vortragsnotizen von Benjamin Collins Brodie zeigen, dass er 1821 Experimente mit Aether ausführte. Ein Meerschweinchen in einem Glockenbehälter, dem man Aether gegeben hatte, wurde mit künstlicher Atmung wiederbelebt. Brodie schreibt die Wirkung dem Aether und nicht der Erstickung zu und sagt "narkotische Gifte zerstören die Hirnfunktion".


TRAINING OF ANAESTHETISTS

A training scheme has been initiated by the Sheffield Regional Hospital Board with the co-operation of the Board of Governors of the United Sheffield Hospitals for the purpose of giving practical instruction and training in Anaesthesia.

Four supernumerary appointments at SHO level have been authorized and for the first six months of the appointment the trainees will be seconded to the Sheffield Teaching Hospitals where, under the supervision of a tutor of consultant rank, they are given practical instruction and a course of lectures, tutorials and demonstrations dealing with anatomy, pharmacology, physics and physiology in relation to anaesthesia. On completion of the initial training the trainee proceeds to an approved hospital within the Sheffield region where his practical experience is developed.