the body, and, with that object, to guide and assist Nature, but never to thwart her operations"—if we believe this—where, I would ask, is our self-respect, if we do not search out the causes, or, suspecting them, do not set ourselves to remove them? How do we stand in relation to our patients, when called in to assist them in their distress and in their dependence on us, if we allow them to continue to suffer in person and in pocket while professing to heal them? While, year by year, our knowledge of medicines is more exact and definite—of their actions, more physiological and scientific—at the same time, our view of Medicine is larger and broader. It is not enough, by the administration of an appropriate remedy, to seek to cure; we must, by foresight and circumspection, seek to prevent. This we shall not thoroughly do until we come to realise, in spite of the slight apparent contradiction, that to study the best interests of the patient and of the public is eventually to secure our own best interests and those of our profession.

When we consider how vast are the interests committed to the medical profession, how intimately the wellbeing of the nation is connected with the faithful discharge of our duty; that the health of the army and navy is entrusted to our care; that we have a part in the selection of all candidates for civil posts; that all hospitals, dispensaries, workhouses, asylums, and prisons are virtually directed by us; and, finally, when we consider the intimate relation in which we stand to our private patients, how often the medical man's advice is sought, not only on questions of health and disease, but in questions of domestic and social difficulty, in questions of education, in legislative questions of national importance; when we feel how often counsel and assistance are called for by all, from the highest to the lowest—then we feel the importance of a great Association such as the British Medical, which endeavours to stimulate in each of us our sense of duty and responsibility, which keeps us together with unity of purpose, and encourages us with mutual help to work for a common object. While thankful to belong to so noble a Profession, and for the advantages of so great an Association, let us each for ourselves remember that it is not by the pursuit of wealth, nor of social distinction, nor of personal power or exaltation, but it is by a self-sacrificing spirit and self-sacrificing labour that our Profession seeks to realise its lofty ideal; and that it must be by largeness of heart and breadth and earnestness of purpose that we must each carry out the work confided to us, and thus, humbly and at infinite distance, shall we be following in the steps of Him who "went about doing good."

REMARKS

ON

DEATH FROM METHYLENE AND ON THE USE OF OTHER ANÆSTHETICS.

By F. JUNKER, M.D., M.R.C.S.

PROFESSOR BREISKY of Prague, in the *Prager Medicinische Wochen schrift*, 1883, No. 22, reports a case of death during the administration of chloride of methylene,¹ which, being the tenth fatal case from this anæsthetic, must considerably shake the confidence of the profession in its perfect safety. The patient, a married woman, aged 27, suffered from a cyst of the right parovarium, for the removal of which ovariectomy was to be performed on May 2nd, 1883. Dr. Breisky points out, in his paper, that particular precautions and care were considered necessary in administering the narcotic, on account of the anæmic and weak condition of the patient. One of the clinical assistants watched the pulse, whilst another, who possessed great experience in the administration of anæsthetics, gave chloride of methylene in my apparatus. After ten minutes, during which four drachms were inhaled without producing complete anæsthesia, the radial pulse suddenly stopped; respiration, however, continued three minutes after the heart had ceased to beat. The patient was pale and slightly livid. The head was immediately lowered, the tongue was drawn forward, Sylvester's artificial respiration induced, with free admission of fresh air from the open window; the lower limbs were rubbed with hot flannel; ammonia was applied to the nose, and subcutaneous injections of solution of musk were resorted to, but they were of no avail. Life had fled. The remainder of the narcotic fluid, which the dispenser of the hos-

pital had obtained direct from London, was handed to Professor Dr. Hofmeister for chemical analysis. I literally transcribe his report.

"The fluid, which I received in the original bottle, with the label —'Bichloride of methylene, CH_2Cl_2 , manufactured by J. Robbins and Co., Manufacturing and Pharmaceutical Chemists, 147, Oxford Street, London'—was found, on examination, to be a mixture of chloroform and alcohol. This result is identical with the examination of a preparation supposed to be obtained from Robinson and Co., 372, Oxford Street, London,² and analysed by M. C. Traub (*Pharmaceutische Centralblatt*, 1882, p. 461). The fluid under examination resembled chloroform in colour and odour; its density, found by the pyknometric method at 17.1° Cent. (68.78° Fahr.), was 1.3495, which comes very near to the density of pure chloride of methylene.

"Its boiling-point, moreover, proved that the fluid contained either no chloride of methylene at all, or merely traces of it. The boiling-point of chloride of methylene being 41° Cent. (105.8° Fahr.),³ the preparation under examination, on the contrary, commenced distilling in the water-bath and Glinsky's boiling-tube, at 47° Cent. (116.6° Fahr.), and continued so between 49° and 53° Cent. (120.2° and 127.4° Fahr.), without leaving a residue. When shaken with water, the components separated. About one-fifth of its volume mixed readily with the water, whilst the volume of the portion insoluble in water underwent no alteration after continued shaking. The clear aqueous solution gave Liebig's iodoform-reaction; treated with chloride of benzoyl and concentrated solution of soda, it manifested, in an unmistakable manner, the smell of benzoic ether (Berthelot's alcohol test), a proof that considerable quantities of alcohol had been taken up from the preparation by the water.

"The residue, which was not dissolved in water, was dehydrated by chloride of calcium, and distilled completely, at a temperature of 59.5° to 60.5° Cent. (139.5° to 140.45° Fahr.), which corresponds to the boiling-point of chloroform (at 737 mm. pressure), which Liebig and Regnaud found at 61° Cent. (141.8° Fahr.) This distilled fluid had the density of chloroform (1.4885 at 17.1°, or 1.5252 at 0° Cent. (Watts), and gave, when treated with anilin and alcoholic solution of potash, the smell of isocyan-phenyl, characteristic of chloroform.

"Therefore there can be no doubt that the so-called chloride of methylene under examination was chloroform diluted with absolute alcohol. The proportions calculated from the density, the diminution of volume when shaken with water, and the quantity of the pure chloroform, were one volume (of alcohol) to four of chloroform. That the boiling-point of this mixture was found lower (51° Cent. = 123.8° Fahr.) than the boiling point of either compound (chloroform boils at 61° Cent. = 141.8° Fahr.; alcohol at 78° Cent. = 141.8° Fahr.), is no contradiction with the result of the examination. It is a well-known fact, that a mixture of two fluids may possess a boiling point below that of the most volatile of its components. It can be easily proved by experiment, that the boiling point of chloroform is considerably lowered by addition of absolute alcohol. No decomposition of the constituent chloroform of the preparation could be discovered. An explanation of the fatal effect from this cause must therefore be refuted."

Such is the evidence of the analytical chemist. The necropsy proved highly interesting as regards the complaint of the deceased, but gave no information as to the cause of death.

The dura mater was normal; the meninges and the substance of the brain were pale, anæmic and cedematous. There was a small quantity of mucus in the trachea, the mucous membrane of which, as well as of the larynx and the pharynx, were pale. Both lungs were free, their anterior portions pale, the posterior regions contained a moderate quantity of blood, both were cedema-

² M. C. Traub, in stating that the preparation he analysed was supplied by Robinson, 372, Oxford Street, mistakes the name of the firm; 372 being the old number of the house in which Mr. Robbins's business is carried on, prior to altering the numbers in 1881. Its present number is 147. Traub reports: "Its specific gravity was 1.326 at 15° Cent. (59° Fahr.), which corresponds to that of pure bichloride of methylene, mixed with a small percentage of alcohol to improve its keeping quality. On shaking 50 c.c. of the bichloride with 50 c.c. of water, the volume of the water increases by 7 c.c., which is abnormal. The aqueous layer was indifferent to litmus and nitrate of silver. After having been washed with water several times, and dried over chloride of calcium, it was distilled from a water-bath, and almost the entire liquid distilled over at a temperature of 60.5° Cent. (140.9° Fahr.), without varying. The specific gravity of the distillate was 1.489 at 15° Cent. (59° Fahr.), corresponding to that of bichloride of methylene containing a trace of alcohol. Traub therefore concludes that the supposed bichloride of methylene was merely chloroform reduced by alcohol to the specific gravity of bichloride of methylene.

¹ Chloride of methylene is the scientific term for the preparation usually called bichloride of methylene.

³ According to Watts (*Dictionary of Chemistry*), the boiling-point of chloride of methylene is 40° Cent. (104° Fahr.). Mr. Robbins showed me, lately, an apparatus in action, where bichloride of methylene distilled at a temperature of 37° Fahr. (52.4° Cent.)

tous. There was a tablespoonful of clear serum in the pleural cavity, and about 100 centimètres of similar serum in the pericardiac cavity. The heart was flaccid, of proportionate size to the body, the valves and the endocardium were normal. Fluid bright coloured blood mixed with air-bubbles, was contained in the ventricles, a few small soft clots of fibrine in the auricles; the lining membrane of the aorta was delicate and normal. There was no evidence of any pathological alteration of the heart, which was normal in its structures. The air-bubbles in the blood of the ventricles were a *post mortem* production.

Professor Breisky guards himself against the imputation of ascribing the fatal accident to impurities of the anæsthetic fluid. However, he does not consider chloride of methylene to be a safer preparation than chloroform, although he admits preferring it to the latter in laparotomies, as being less liable to provoke vomiting after the operation; an advantage on which also those agree who otherwise are no advocates of methylene.

Sir Spencer Wells, who has used it in nearly all his operations ever since it was introduced by Dr. Richardson in 1867, in my apparatus, and accords to it a decided preference, when given has had, in more than 1,200 serious operations, no fatal accident. He particularly corroborates the statement that less sickness follows its administration than after chloroform. I have given it more than four hundred times to Sir Spencer's patients up to September 1870, and never met with any disturbance of alarming character. When there was uncontrollable sickness after the operation, it was due to incidental pathological processes. Dr. Day, whose personal experience in the administration of methylene extends over more than ten years, and who uses my apparatus, has been equally fortunate. The opinions on the general superiority of this preparation, however, differ. Messrs. Marshall, Gamgee, Gaine, Hird, and Rendle, speak in its favour. Dawson considers its less dangerous than chloroform. Miall, who in one hundred cases produced perfect anæsthesia in the average time of 3 minutes and 20 seconds, never used more than $3\frac{1}{2}$ drachms. There was vomiting in 40 cases, nausea in 6, the pulse remained unaltered in 4 cases, was accelerated in 1 and retarded in 23. In 5 cases the respiration became alarmingly accelerated. Barnes and Taylor consider chloride of methylene a dangerous anæsthetic. One of Mr. Barnes's patients did not recover consciousness until after four hours, which took place under violent vomiting. The pupils did not act until half an hour after the operation. Taylor's patient, a youth, aged 17, turned pale after the operation (extirpation of the eye) deeply sighing, respiration and the pulsation of heart and the carotids suddenly ceased. He rallied, however, after inversion, artificial respiration, and pressing forward of the tongue.

Nussbaum (Munich) objects to methylene. He observed great excitability, muscular rigidity, nausea, and finds fault with the inflammability of the preparation. Hegar and Kaltenbach, who use my apparatus, do not consider it safer than chloroform; they observed alarming asphyctic fits, and object that the patients too quickly and unexpectedly awake; but acknowledge that they had less vomiting and retching, and fewer unpleasant after-symptoms.

Kocher (Bern), who exclusively uses chloride of methylene in my apparatus, in ovariectomies and hysterectomies, ascribes the good effects less to the anæsthetic itself than to the careful preparation of the patient, and the small loss of blood. When there was vomiting it could be easily stopped. He never observed collapse.

C. Kappeler, in his work *Anæsthetica*, which forms the twentieth volume of Billroth and Luecke's *Deutsche Chirurgie* (Stuttgart, 1880), admits that chloride of methylene is less liable to cause sickness than chloroform; but he denies other advantages. He considers it equally dangerous with chloroform, if not more so. Death from methylene is similar to that from chloroform, and the *post mortem* appearances are always negative.

Its specific gravity is 1346. It decomposes like chloroform when exposed to light or air, and requires, like the latter, an addition of absolute alcohol for keeping. It is very inflammable, but less so than amylene and sulphuric ether. Its flame extinguishes in the gases of its own combustion. The breath, after inhalation, is not inflammable. Its low boiling-point causes its rapid evaporation, therefore its vapours will be more quickly diffused in the lungs than those of chloroform, and also more quickly eliminated from the blood; therefore, its effect is more rapid but less lasting: it causes less muscular excitement than chloroform. I frequently missed it altogether. Fourdes and Kopp observed immediate muscular rigidity after injecting methylene into the arteries. It occasionally produces vomiting, but not so frequent and persevering sickness as chloroform.

In Germany, at present, preference is given to chloroform made from chloral after Professor Oscar Liebreich's method (made by Schering and Co., Wedding, Berlin, N.), which is generally considered safer, and very exceptionally causes vomiting. I saw it given, mostly with my apparatus, several hundred times in the principal hospitals of Berlin on my visit there during last winter's term, and observed vomiting, or retching, only on very few occasions, and can corroborate that after-sickness occurred very seldom.

The sleep produced by methylene, like that of chloroform, lasts longer than the inhalation, therefore its administration may be occasionally interrupted during the operation, whereby the danger of the narcosis is considerably diminished. Ether, on the contrary, must be continued. The patient generally awakes sooner, and recovers his full consciousness more readily than after chloroform, which I rather consider an advantage than a drawback (see above), disagreeing, in this respect, with Hegar and Kaltenbach. I subjoin the nine published cases of death from methylene which occurred, to my knowledge, up to 1880.

1. (*Lancet*, October 23rd, 1869.) A patient, aged 39, at Charing Cross Hospital, suffered from a malignant tumour in the left antrum of Highmore, which had already caused several very profuse hæmorrhages. He looked pale and anxious, but had a normal, not too frequent, pulse. He was narcotised in the sitting posture, and inhaled, first four, and later, two more drachms of chloride of methylene. The pupils were, at the time, slightly dilated. During the administration of the second portion of the anæsthetic, his head suddenly dropped, the pulse flagged, and soon ceased altogether. There was neither stertor nor lividity. All attempts to save life failed.

2. (*BRITISH MEDICAL JOURNAL*, May 7th, 1870.) A healthy looking man, aged 40, had iridectomy of both eyes performed at Guy's Hospital. He inhaled one drachm of chloride of methylene in the recumbent position. He was very excited at the commencement, tried to free his head, struggled with his arms and legs, and turned livid; he became, however, quiet soon afterwards. He evidenced sensation of pain during the second operation, but looked well. About three minutes after bandaging the eyes, the respiration became superficial and gasping, and the radial pulse could no longer be felt. The angles of the mouth were livid. The patient was at once turned on the left side, but he became pale and died after a few gasping inspirations. Electricity and artificial respiration during one hour were without result. At the necropsy, the blood was found fluid and dark. All over the right ventricle were numerous ecchymoses of the size of a pin's head. The left ventricle was empty, and contracted; the right ventricle contained a small quantity of fluid blood. The lungs were congested.

3. (*BRITISH MEDICAL JOURNAL*, April 29th, 1871.) A male patient of the Charing Cross Hospital had a very small quantity of chloride of methylene given. After full narcosis had taken place, a finger was removed within one minute. After the operation was finished, the patient was discovered with the head rolled sideways; the eyes were rotated upwards; pulse and respiration had ceased. The *post mortem* examination gave no information about the cause of the death.

4. (*BRITISH MEDICAL JOURNAL*, September 16th, 1871.) A woman, aged 44, suffering from carcinoma mammae, had a very small quantity of chloride of methylene given with a flannel bag in the Radcliffe Infirmary, Oxford, and died after two or three convulsive gasps. Artificial respiration, etc., failed.

5. (*BRITISH MEDICAL JOURNAL*, August 31st, 1872.) A man, aged 52, had chloride of methylene administered in the Bath United Hospital, in order to have his dislocated shoulder set. He became insensible after two or three minutes, and turned livid; the respiration and pulse ceased at the same moment. The tongue was drawn forward, and ammonia and electricity applied during three-fourths of an hour without effect. His heart was found enlarged and flaccid, but there was no other sign of disease. Chloride of methylene had been used in 250 cases in this hospital previously to this fatal accident.

6. (*BRITISH MEDICAL JOURNAL*, October 12th, 1872.) A male patient, aged 48, who had an abscess to be opened at the Middlesex Hospital, became insensible after the inhalation of two drachms of chloride of methylene. After the narcosis had been stopped already one minute, and the operation was going to be performed, the patient was discovered breathless and livid. During Sylvester's artificial respiration, he gasped once or twice, and expired. There was no other abnormal condition found, but a large flabby heart.

7. (*BRITISH MEDICAL JOURNAL*, October 19th, 1872.) The patient, aged 48, a brewer's drayman, suffering from an abscess in the ischio-rectal fossa, which burst, leaving a fistula, was admitted into the

Middlesex Hospital for the purpose of an operation. He was first very nervous about taking chloroform, saying that he would die under its administration; but, as he refused to have the operation performed without narcosis, two drachms of chloride of methylene were given in a perforated leather-cone. After a few inhalations, the patient became excited, and his body rigid to the degree of complete opisthotonos; but, as there was no lividity, the narcosis was continued. After two minutes he appeared to be under the full effect of the anæsthetic, and the cone was removed. But, whilst turning him to the side, he suddenly became livid, and both respiration and pulse ceased. He was placed on the back, and artificial respiration, faradisation of the phrenic nerve, and enemata of brandy, were tried without success. His pupils were contracted at the onset of the dangerous symptoms, but soon dilated, and remained so after death. At the necropsy, the body was found livid, the brain healthy, slightly congested. The lining membrane of the trachea and the bronchi was studded with ecchymoses. The right pleura was adherent to the ribs, the left free. The lungs were much congested. The heart was very large and flabby, its surface covered with a quantity of fat. The valves were healthy. Under the microscope, some of the fibres of the heart showed commencing degeneration, but no distinct fat-globules. The heart was empty. The blood was fluid and very dark. There were some patches of atheroma in the aorta. The liver was large, weighing 82 ounces, fatty. The kidneys were very congested.

8. (*Lancet*, December 1874.) A female patient, aged 25, of the Royal London Ophthalmic Hospital, who, on a previous occasion, had already had chloride of methylene given without any alarming consequences, had to undergo an operation on the lacrymal duct. Three drachms of the anæsthetic were administered by means of a perforated leather cone, lined with flannel. Two minutes after the commencement of the narcosis, the respiration became suddenly noisy and stertorous. The apparatus was removed, and the operation commenced. No alarming symptoms were then discovered, except an unusual paleness of the wings of the nose and of the skin around the mouth, whilst the cheeks and lips were red. The respiration was deep, full, somewhat accelerated; the inspirations were accompanied by palatal stertor. The nostrils appeared flaccid. A few seconds later, the radial pulse became feeble, and soon suddenly ceased; respiration, however, continued, but commenced failing shortly afterwards. Drawing forward of the tongue, Sylvester's artificial respiration, inversion of the body, flapping the face and chest with towels, ammonia, and enemata of brandy, produced only a few sighing inspirations, and death took place shortly afterwards.

9. (BRITISH MEDICAL JOURNAL, July 24th, 1875.) A healthy-looking sailor, aged 27, had iridectomy to be performed in the Central London Ophthalmic Hospital. He was carefully examined before the operation. His pulse was quiet; the action of the heart normal, regular. He was composed, and free from anxiety. At first half a drachm, and afterwards two drachms, of chloride of methylene were given in a perforated leather cone. He struggled violently at the commencement, but soon sank backwards and breathed quietly. (It appears that he was narcotised in sitting posture.) Four or five minutes afterwards, when about to be brought into the proper position for the operation, his face was found flushed and livid; the respiration slow, stertorous; the pulse was barely felt. Notwithstanding immediate application of electricity, artificial respiration, etc., the respiration remained irregular, the face livid, until death took place. *Necropsy*.—Heart healthy, containing a very minute quantity of blood. Blood fluid, almost black. All other organs normal.

There are a few more fatal cases recorded, in which, however, chloride of methylene was not given alone, but with other narcotics, mostly with ether. In reviewing these fatal cases, I can barely ascribe them to the effects of the chloride of methylene, whatever the real merits or demerits of this anæsthetic may be. The majority of them appear to me simply cases of suffocation by carbonic acid. The narcotic was given in a solid cone or bag, which, although perforated, surely could not admit sufficient fresh air, and the patient was forced to re-inspire the air already contaminated by his own breathing. Nor does it appear that the apparatus was lifted during the narcotisation, whereby air would have gained access. In several of these fatal cases, the alarming symptoms, yea, the death, were only discovered after the removal of the apparatus! Besides, many may justly object to the administration of any narcotic in the sitting position. It should be the general rule to place the patient on the back, with the head but slightly raised at first; but it may be afterwards turned and kept low during the whole operation.

The above analyses by Dr. Hoffmeister and by Traub are borne

out by Regnaud, who lately stated, at a meeting of the Paris Academy of Medicine, that "the bichloride of methylene, so much used as an anæsthetic in England, is composed simply of a mixture of four parts of chloroform and one part of spirit of wood. By adding this spirit of wood to the chloroform, the costs of manufacture are increased to 47 francs 75 centimes (38s.), instead of 10 francs (8s.)." It ought, however, as he asserts, to be cheaper, the spirit of wood being of little value. When the wood is subjected to destructive distillation, there is formed, besides acetic acid, tar, creasote, and other products, one per cent. of an inflammable volatile liquid, which, when separated and purified, is the methylic alcohol or spirit of wood ($\text{CH}_3 \text{HO}$). It represents an anhydrous, mobile, colourless liquid, possessing a hot, pungent taste, and a peculiar aromatic smell, recalling that of acetic acid. It mixes in all proportions with water, alcohol, ether, and chloroform, without losing its transparency. It burns like alcohol, but is less luminous. One ninth part of spirit of wood added to alcohol renders the latter unfit for consumption, but still serviceable for any other purpose, and thus forms the methylated spirit of trade. Methylic alcohol was introduced into practice some years ago by Dr. John Hastings, of London, as a narcotic, sedative, and anti-emetic. It was proposed as a remedy in consumption, in which, however, it exerts no curative power, but appears to palliate the cough and to lessen the febrile excitement. Dr. William Yandell, United States, prescribes it in diarrhoea and dysentery. Dr. Christison recommends it for its anti-emetic properties in chronic vomiting, whether depending upon functional or organic disease. To this quality of the methylic alcohol, I am inclined to believe, the preparation sold as bichloride of methylene owes its property of causing vomiting or sickness less frequently than pure chloroform, whereon the opinions of most surgeons agree.

Messrs. Squire of 413, Oxford Street, prepared for me, according to Regnaud's analysis, a mixture of four parts of Duncan's chloroform, and one part of methylic alcohol. The specific gravity of this preparation is 1.281; that of Duncan's chloroform, 1.281, 1.492; and that of Robbins's bichloride of methylene, 1.320; at 15° Cent. (59° Fahr.), according to Messrs. Squire's testing.

I have had the opportunity of trying the anæsthetic properties of this preparation, which may be called "Regnaud's anæsthetic mixture," in seven cases within the last week, and as far as my present limited experience proves, it answered admirably, and in its effects is very much like chloride of methylene.

CASE I. A woman, aged 40, had a large fibrous tumour of the uterus removed by Dr. Bantock at the Samaritan Hospital. Her heart and lungs were healthy. She was very nervous; pulse at the beginning of the narcosis 100. After inhaling two drachms of the mixture, given in my apparatus, she was in deep narcosis in four and a half minutes, without muscular excitement or struggling. The pulse had risen to 120, the pupils were dilated, strabismus, divergens. When I stopped the administration of the anæsthetic mixture twenty-seven minutes after its commencement, she had inhaled six drachms. The pulse was then 108, the pupils normal. She was in a deep, quiet sleep during the whole of the operation, the face slightly flushed, perspiring, the breathing normal. No retching or nausea during or after the operation.

CASE II. The patient, aged 72, had an epithelioma of the labium removed by Dr. Bantock in the Samaritan Hospital. Heart and lungs healthy; pulse, 100. Deep, quiet narcosis without muscular excitement followed in four minutes, after inhaling one drachm and one-third of the mixture; pulse rose to 120; the face was slightly flushed and perspiring as in normal sleep. She had six drachms in thirty-four minutes; during which time, however, as in the former case, the administration was discontinued; several times for about five minutes, the patient being under the full influence of the narcotic. No retching or sickness took place.

CASE III. A patient, aged 60, in the Samaritan Hospital, was operated on by Mr. Meredith for carcinoma mammae. She was a very stout woman, and, as I was told, by no means a teetotaler. The thoracic viscera were healthy; pulse 100. She inhaled three drachms in seven minutes, when full narcosis took place. There was slight muscular excitement, which, however, soon subsided. Pulse 98; pupils normal.

Pulse after 15 minutes	60
" " 20 "	74
" " 30 "	120 (slight retching of froth).
" " 58 "	76 (end of narcosis).

During this time she had nine drachms of the mixture. Her behaviour during the anæsthetic was like that of the former patients. There was no sickness, except the slight retching of froth during the operation, nor afterwards.

CASE IV. A private patient, aged 27, had hysterotomy performed by Dr. Bantock. The heart and lungs were normal. She was rather nervous; pulse, 120. Full anaesthesia was produced after inhaling one drachm of the mixture in five minutes, without excitement or retching; pupils contracted, strabismus divergens; pulse, 108. After eighteen minutes, pulse, 78; pupils normal. After twenty-three minutes, pulse, 72. After fifty-six minutes, 92; when the narcosis was stopped, the patient having inhaled four and a half drachms of the mixture. No sickness; no nausea.

CASE V. In a case of exploratory laparotomy by Dr. Bantock, in the Samaritan Hospital, the patient, aged 47, whose heart and lungs were healthy, was in deep narcosis in six minutes, after inhaling one drachm of the mixture, and had altogether three drachms in twenty-two minutes. There was no muscular excitement nor retching. The pulse at the commencement was 120; sunk after fifteen minutes to 94; and after twenty-two minutes, when the narcosis was stopped, to 80.

CASE VI. Dr. Marion Sims removed several small fibrous growths from the uterine cavity of a patient, aged 48, highly anæmic from repeated hæmorrhages, in consequence of which also great nervousity and partial aphasia. Thoracic viscera normal; pulse, 108. She was much afraid of any narcotic, but when on the operating table, quietly inhaled the mixture given in my apparatus very slowly; so that half a drachm brought her in deep quiet sleep in seven minutes. Pulse, 98; after fifteen minutes, 84; after twenty minutes, 87, when the narcosis was stopped, only three drachms having been given. The patient was quietly sleeping during the operation; about half an hour after, a momentary slight retching of froth.

CASE VII. Another patient of Dr. Marion Sims, aged 40, suffering from a very high degree of vaginismus. Pulse, 100. Full narcosis in ten minutes, after inhaling two drachms of the mixture. Had seven drachms in thirty minutes, when the anaesthesia was stopped; pulse, 88. The patient was quietly breathing, and kept perfectly quiet, but the slightest touch of the genitals brought on a start like an electric shock. During the whole time of the operation (thirty minutes), the narcotic mixture was given without interruption, whilst in the other cases it was occasionally discontinued for five minutes and longer. When awaking, the patient said that she did not feel anything of the operation, but complained of local pain. She had no retching during the operation, but whilst removing her into her bed, she brought up about a mouthful of water. All these patients recovered full consciousness almost immediately after the operation, and looked as well as after a natural sleep. There was no struggling or muscular excitement, except very slightly in Case III, and the abnormal reflex movements in Case VI, which were due to the peculiar complaint of the patient.

Dr. Bantock had this mixture given since in two other cases in the Samaritan Hospital, in one of abdominal section, and in another of extirpation of a cyst from the leg, in neither of which sickness or nausea were caused by the narcotic.

STATISTICS OF ANÆSTHETICS IN RELATION TO AFTER-SICKNESS AND DEATH-RATE.

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The following statistics are based on my experience of anæsthetics at Moorfields Ophthalmic Hospital from November 1st, 1876, till January 17th, 1880. Notes were kept of the cases as to sex, age, the anæsthetic employed, and the hour when food was last taken, in reference to the occurrence of sickness. The condition of the weather as to barometric pressure, temperature, etc., was also noted, the weekly chart of the *Times* being used for this purpose.

Whenever any retching occurred during the operation or within the next two hours, the patient was described as having been sick. Sickness while on the operating-table was comparatively rare; but the proportion of cases in which it occurred afterwards seems large.¹ This latter fact is probably accounted for, partly by the profound anaesthesia necessary for eye-operations, and partly by the large number of young out-patients, who, notwithstanding all directions to the contrary, had eaten shortly before. What the usual percentage of sickness at other hospitals is would be interesting to know.

¹ In the Report on the Action of Anæsthetics by McKendrick, Coats, and Newman (BRITISH MEDICAL JOURNAL, 1880, II, p. 351), a still higher percentage is given—viz., 48 per cent.—in the case of ethidene dichloride, and chloroform.

Anæsthetics were given altogether 4,138 times; there was sickness in 1,902 cases, or in 45 per cent.

Sex.—From the following table, it appears that females have a decidedly greater tendency to this form of sickness than males.

Sex.	Total.	Sick.	Percentage of Sick.
Males	2,130	870	40
Females	1,982	1,027	51
Not stated	26	5	—

Age.—	Total.	Sick.	Percentage of Sick.
Under 1 year	119	5	4
Above 1 year and under 5 years	448	137	31
„ 5 years and under 10 years	558	349	63
„ 10 „ „	15	331	72
„ 15 „ „	20	445	60
„ 20 „ „	25	285	56
„ 25 „ „	30	182	52
„ 30 „ „	40	289	39
„ 40 „ „	50	319	31
„ 50 „ „	60	363	32
„ 60 „ „	70	433	31
„ 70 „ „	80	183	27
„ 80 „ „	90	17	29
Age not stated	40	23	—

The liability to sickness is thus at a maximum about the commencement of puberty, and decreases gradually towards each end of life. Under one year of age, there is very little sickness. There is a second slight increase in the percentage of sick in extreme old age; but the total number of cases observed at this period of life (above eighty years) was too small to draw any positive conclusion. The youngest patient I anæsthetised was aged fourteen days, and the oldest was eighty-six years. I consider *age* the most important factor in relation to after-sickness.

Anæsthetic.—Chloroform was frequently used for children under three, and for adults over sixty. Between these ages, ether, a mixture of ether and chloroform vapour, or the ACE mixture was employed. Until the introduction of Clover's inhaler, ether was always given in a hollow conical sponge, about four ounces being necessary for each case. The objections to this method were its extravagance, the choking sensation and struggling of the patient, and the disagreeable smell of ether that impregnated the air and the clothes of every one around. In March 1877, Clover's small ether-inhaler was first employed. The original form was found inconvenient, on account of the frequent necessity of removing the whole apparatus during the operation, whenever the bag became too highly charged with carbonic acid gas. To obviate this difficulty, I had a valve made on the brass tube leading to the bag, so that, by pressure on this, the bag could be emptied and fresh atmospheric air supplied without disturbing the face-piece. By placing over this valve a layer of lint, on which about half a drachm of chloroform had been poured, I found that the choking sensation and struggling during the early stages of ether inhalation were in great measure prevented, and the time necessary for anaesthesia considerably shortened. One great advantage of this form of apparatus is the ease with which the breathing can be watched, from its effect on the bag. The amount of ether can be graduated, too, and more or less chloroform or ether given, as symptoms may indicate. About half a drachm of chloroform and an ounce of ether were sufficient for anaesthesia, and the average time was about four minutes. This combination of the vapours corresponds to the heading "Ether and Chloroform" used below.

By "ACE" is meant the usual mixture of absolute alcohol, chloroform, and ether, in the respective proportions of one, two, and three parts.

	Total.	Sick.	Percentage.
Ether (by sponge)	263	128	48
Ether (Clover's inhaler)	1,072	574	53
Ether and Chloroform	2,306	1,089	47
Chloroform	320	61	19
ACE mixture	58	17	29
Not stated	83	33	—

One is at first struck with the small percentage of sickness after chloroform. But it must be borne in mind, as mentioned above, that it was chiefly given at the extremes of life, at periods which are naturally less liable to sickness after anæsthetics. It may be argued that these tables show a small percentage of sickness in the very young and old, because chloroform was used in such cases. As a fact, however, the ether and chloroform mixture was employed in the majority of them, and the result as to sickness was the same.

One of the arguments used in favour of ether, especially in cases of ovariectomy, is less liability to sickness than with chloroform. My impression is that, ages being equal, the tendency to after-sickness is about the same with each, but the nature of the sickness is different in the two cases. Ether-sickness seldom lasts long after