

Collection:	The Clover/Snow Collection
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Names:	Clover, Joseph Thomas, 1825-1882 Snow, John, 1813-1858 MacIntosh, Robert, Sir, 1897-1989
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Description:	<p>This manuscript collection relating to Joseph Thomas Clover and John Snow was acquired in 1964 from Sir Robert Reynolds Macintosh, Nuffield Professor of Anaesthetics, Radcliffe Infirmary, Oxford. The collection was catalogued and annotated by K. Bryn Thomas (completed in 1971). Items are grouped under eight main headings.</p> <p>The original manuscripts were handled by Dr. Thomas during the course of arranging and cataloguing the collection. About that time, groups of them were placed in acid-free envelopes. No attempt has been made to transcribe or to provide full cataloguing of the materials but all photocopies have been collated with the originals for completeness and arranged in categories to correspond with Dr. Thomas' outline. Each item is now in its own acid-free envelope.</p>
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Dates:	1840-1882
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Location:	Memorial Room Rare Cabinet 27
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Items:	20 cm of textual records; photographs
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Inventory:

Section I. Printed Cloveriana and other items

- I. 1-13 Obituaries and eulogies

Section II. Photographs

- II. 1-3 J.T. Clover and Mrs. Clover

Section III. MSS Cloveriana

- III. A. 1-6 Patients' case notes, J.T.C.
III. B. 1-5 Student notes and lectures, J.T.C.
III. C. 1-3 Journals and note-books, J.T.C.
III. D. 1 Articles of agreement and indenture, J.T.C.
III. E. 1-2 Testimonials

Section IV. Correspondence

- IV. 1. i-vii Anaesthetic matters
IV. 2. i-vi Requests re: anaesthetics and apparatus
IV. 3. i-xiv Requests re: patients
IV. 4. i-iv Notes from patients
IV. 5. i Miscellaneous. A. Vernon-Harcourt (non-Cloverian)
IV. 6. i J.T. Clover to Rev. M. Hall
IV. 7. i-ii Apparatus -- surgical, invented by J.T.C.
IV. 8. i-vii Various correspondents to J.T.C.
IV. 9. i-ix Condolences to Mrs. Clover, 1882
IV. 10. i-iii Re: presentation of Clover photograph at Royal Society of Medicine, London
IV. 11. i-vii Typescripts, 1913-1947

Section V. Miscellanea

- V. 1-6 Cards by J.W. Clover (J.T.C.'s father)
V. 7 Rough notes on texts, J.T.C.
V. 8 Pressed plants

Section VI. Surgical Instruments

- VI. 1-6 Clover's drawings, lithotomy, extractor, lithotripsy instruments

Section VII. Anaesthesia

- VII. 1. i-v Ether
VII. 2. i-iv Nitrous oxide and ether
VII. 3. i-xv Chloroform
VII. 4. i-ii Nitrous oxide
VII. 5. i-viii Miscellaneous notes
VII. 6. i-vi (and two unnumbered fragments) Deaths from chloroform
VII. 7. i-iii Resuscitation

VII. 8. i-x Apparatus and experiments

Section VIII. John Snow

- VIII. 1. Biographical notes and photographs
- VIII. 2. Exhibition of Niviana, May 1955
- VIII. 3. i-vii Letters from Snow's descendants to Sir Robert Macintosh
- VIII. 4. i-ii Correspondence to John Snow
- VIII. 5. i-iii Certificates and Will of John Snow
- VIII. 6. John Snow. On Asphyxia ... of Still-born (typescript COPY)
- VIII. 7. Letters from Sir Benjamin Ward Richardson, 1896
- VIII. 8. Correspondence relating to restoration of John Snow Memorial, 1939-1950
- VIII. 9. John Snow's memorial tombstone – drawing
- VIII. 10. Correspondence relating to publication of John Snow's books, 1938-1951
- VIII. 11. i-iii Published items relating to John Snow

Summary description by K. Bryn Thomas

Joseph Thomas Clover and John Snow, Anaesthetist-physicians

Joseph Thomas Clover

Joseph Thomas Clover was born at Aylsham, Norfolk, on 28 February, 1825 and he died in London 27 September, 1882. At the age of 16, he was apprenticed to Charles Mends Gibson, surgeon and apothecary of the city of Norwich. The article of indenture, dated 18 September, 1841, is in the Macintosh Collection, (III.D.1), the indenture fee being £240. The document is signed by Gibson, the young Clover and his father, John Wright Clover. As a pupil of Gibson, Clover was also allowed to attend the Norfolk and Norwich Hospital, a mid-eighteenth century foundation with a first-class reputation. Clover's diary commencing 1 January, 1846 (III.C.1) and his notebook (III.A.1) of operation case notes cover his time as a student. The latter is of particular interest and should be further analysed.

Before he became articled, Clover had already attended operations by Dr. Lubbock and Mr. Crosse of Norwich, as his case book shows. From 1841 to 1844 he attended the Norwich Hospital, and from 30 September, 1844 to 17 May, 1845 he was at University College Hospital, London, attending upon Robert Liston, Richard Quain and other notable surgeons. On 27 January, 1845 he watched Mr. Stanley at St. Bartholemew's; on 1 March, Mr. Fergusson at King's College Hospital; and on 13 April, Mr. Key performed an amputation and removed a "schirrous tumour" from a breast. Mr. Fergusson's operation was the excision of the head and trochanters of the femur of a boy of 13 years on account of caries. "Mr. F. tried to use a chain saw but he was unable to work it." The result of this case is not told, probably because it was not at Clover's hospital. Mr. Stanley's case was even more drastic, the tying of the common iliac artery for a "pulsating tumour" in the groin. "It was not known whether the tumour commenced from the internal or external iliac artery. The patient died four days after from peritonitis. Disease was a malignant tumour." Analysis of these notes would provide very useful information as to the practice of Liston and others at University College Hospital, and the comparable and contemporary practice at Norwich in the hands of John Green, Crosse (1790-1850) and his colleagues. Clover did not forget his Norwich friends. He left a box of Liston's catheters to his Norwich student contemporary and surgeon, W. Cadge (IV.9.vii). Clover's diary has an entry for 1 January, 1847, "Saw Mr. Liston amputate the forearm....Mr. Squire, the celebrated chemist, administered the aether vapour, but the woman did not inhale it properly or else was not susceptible to the action of the ether so that the experiment completely failed with her. Mr. Liston also tried the remedy on a man from whose enlarged and indurated prepuce a piece was cut....This also failed from the man not inhaling the aether, but merely sucking it." These are the earliest notes made by Clover on the use of ether, and one wonders what effect the two failures had upon the

future anaesthetist. None of his operation notes make any comment about the condition or reaction of the patient to a pre-anaesthetic operation, and it is interesting to note in the diary that, as late as 9 September, 1848, "Mr. Marshall operated for the first time for femoral hernia, ... no chloroform given..." The patient recovered after "debility for a time". These seem to be the only notes on anaesthesia in the diary.

With regard to Liston's first operation under ether anaesthesia, 21 December, 1847, when William Squire administered the anaesthetic, Clover has the following to say in 1874 (VII. 1. i) . "I was a junior student at University College when Liston amputated a man's thigh under the influence of ether." This sentence is amended by deletion thus, "I was a junior student at University College when ether was first used there and saw Liston amputate a man's thigh under its influence." This was written in 1874, i.e. 27 years after the event, and the latter sentence is similar to that which appeared in a letter from Clover to the *British Medical Journal*, 1874, i, 200. "I was a junior student at University College, and saw Liston perform the first capital operation under ether that was done in this country." The statement has often been published that the young student Clover was present on this historic occasion (see Duncum, p. 132). The alterations in nuance of Clover's statements above at least cast doubt upon his being there, particularly since at the date in question he was assistant to the physician, Dr. Williams, to which post he had been appointed on 2 November, 1846. Unfortunately we do not know whether Frederick Churchill, the coachman whose leg was amputated, was a patient of Dr. Williams. There is no mention of the occurrence in Clover's diary, the previous entry being for 19 November, 1846 when he was recovering from an attack of intermittent neuralgia. On the 12th he had been forced "to discontinue my attendance in the wards...". On the 19th, "I have been to Newman St. and find uncle as usual. He lent me £5." Had he attended the famous operation, he would surely have noted it in his diary.

Litholapaxy

The Clover manuscripts. consist largely of notes made by Clover himself upon the topics of anaesthesia and litholapaxy. The latter subject occupies a small section (VI.1-6) in which there are a few rough drawings of instruments, e.g. a fragment extractor in VI.2, and ideas for lithotrity and extraction in VI.6. Some of these are dated 1880.

Clover's ideas for these subjects appear to have arisen from his having worked as anaesthetist for many years for Sir Henry Thompson and Buckston Browne, and other lithotomists. It is not known whether these instruments were ever made, but similar patterns were certainly produced and it is very likely that Thompson and Buckston Browne discussed these drawings with Clover in their attempts to improve the instrumentation for lithotrity and litholapaxy. Equally important was Clover's extractor, which consisted of a rubber bulb attached to a glass bottle which fitted to the urethral catheter and by means of which the broken-up calculus could be sucked out of the bladder. This apparatus was in production and an example may be seen at the Royal College of Surgeons in London. Whether this design pre-dated the similar idea of Jacob

Bigelow of Boston is not clear. Clover himself says, "I don't want to claim credit for myself merely but I may observe that my aspirator was designed to diminish the number of sittings if possible to a single one - and if I had thought of calling it a litholapaxor I should have had as much right to do so as Dr. Bigelow to call his method of lithotrity - litholapaxy. Before litholapaxy was heard of Sir Henry Thompson occasionally crushed a small stone and removed all the fragments with it at one sitting ..." (VI. 4. Notes on lithotrity). Modern lithotrity is performed with Ellich's extractor, a direct descendant of the Clover/Bigelow pattern.

Other instruments suggested by Clover include an "ebb and flow" catheter (VI.3), probably for use with his extractor, and various forms of chisel and crusher for the stone. Sir Henry Thompson, 1820-1904, a noted and early lithotomist and expert with the lithotrite, had an extensive practice in the West End of London. His experience in catheter, bougie and sound-passing was enormous. He operated upon King Leopold of the Belgians in 1863 and the Emperor Napoleon III in 1872. In both these instances, Clover was asked to anaesthetize, and there are notes from Thompson in Belgium about Leopold, who had a large prostate with calculi (correspondence IV.3.i) and about Napoleon 24 July, 1872 (IV.3.ii). Clover gave chloroform to the Emperor (from his own bag apparatus) on 2 January, 1873 and was present on 9 January when the uraemic Emperor expired two and a half hours before a further operation was timed.

Surgical Instruments

Other surgical instruments invented by Clover are referred to in a letter dated 24 August, 1870 from a Leeds surgeon (name at present undecipherable) (IV. 7. i) . This refers to the return of a "gas cautery" loaned by Clover, and adds "the great difficulty is to manage the lights, as the jets are so invisible that it is difficult to know without great attention whether it is working and in the press of our work we find it difficult to withdraw from the operation the attention required by the cautery". The letter continues with an interesting reference, "we are now trying Lister's carbolic catgut, cutting short, and leaving in", and goes on "the penal clamp answers perfectly smooth and easy - and enables one to do with at least one assistant less." Lister's catgut had but recently been introduced and the idea of leaving it short to be absorbed was a step forward from the older technique of leaving the ends long to protrude from the wound until they detached themselves. The "penal" (?penile) clamp may be similar to the present instrument used by urologist, but its purpose at that time is not clear.

Correspondence

Among the other correspondence in Section IV are letters from many well-known surgeons and others requesting help and, in some cases, offering payment! Thus Spencer Wells asks Clover to demonstrate his nitrous oxide/ether apparatus to Dr. Howard of New York. This Dr. Howard introduced the standard method of artificial respiration which

superceded those of Marshall Hall and Sylvester, and was known to Clover for this manoeuvre.

An interesting letter came from Henry Maudsley (IV.8.iii), psychiatrist, who wrote, "I am inclined to think the need a hallucination of my wife's. I wish I could teach her the infinite wisdom of Lord Melbourne's saying 'Why the can't you let it alone!'" General Knollys (IV.4.i) wrote enclosing five guineas from the Prince of Wales, and there is a typical letter from Florence Nightingale written 31 March, 1871 (IV.4.ii) enclosing two guineas "with my admiration and gratitude for your skill and kind inventiveness which makes pain so painless without injuring the health." She had had dental extractions performed by Edwin Saunders (later Sir Edwin, the first dentist to be so honoured). Sir Erasmus Wilson (1809-84), anatomist and dermatologist, "begged acceptance of a cabinet as a slight expression of your great kindness and skill." (IV.4.iii) Correspondence requesting attendance on patients includes a note from one B.E. Broadhurst (IV.3.xiv). "Mr. Ward remained hysterical.... Ether and gas appear to poison him. What will you give him next time, viz. on Thursday next about 3:30?" All anaesthetists understand this quandary! Sir James Paget (IV.3.vii) requires "nitrous oxide at 1 exactly on Thursday" but in another note adds "pray remember that I owe you a guinea". The thirty Clover letters throw a useful and interesting sidelight upon the daily practice of a physician/anaesthetist of the mid-nineteenth century.

Anaesthesia

Clover's manuscripts. on anaesthesia are mainly in Section VII. (All pink cards refer to anaesthesia.)

Ether (VII.1.i-v)

Clover had described his "double-current ether inhaler" at the London meeting of the British Medical Association in 1873 and in the *British Medical Journal*, 1873, i, 283. A note in VII.2.ii adds that at the same meeting "I also described a way of giving ether which I was then adopting which excluded air much more effectually – namely by causing the patient to inhale laughing gas from a small thin bag supplied from a bottle of compressed gas, and after a few respirations, diverting the current of gas and making it pass over ether in a bottle. See BMJ Feb. 14/74. This plan was afterwards brought forward by Mr. Coleman who modified the stopcock and used a much smaller bottle – but I was not altogether satisfied with it and I afterwards continued the gas and ether apparatus described in the *British Medical Journal* of July 15 '76."

Clover had in fact demonstrated this apparatus in his home town of Norwich at the British Medical Association meeting of 1874 – "I had then used (it) in 400 cases including several capital operations". The paper of 1876 to the *British Medical Journal* is drafted in VII.2.i with a full description of its use, and an engraving (though this is not the same view as that finally used).

“The result”, he wrote, “has been on the whole so satisfactory that in the large proportion of surgical cases I should use it in preference to any other...”

A rough drawing is seen in VII.1.iii of the “double-current ether inhaler” mentioned above. This drawing is similar to that in the *British Medical Journal* 1873, i, 283 which was reproduced by Duncum, p. 324. It was also labeled a “self-warming ether inhaler”, a description which reflects the difficulties then current in preventing freezing of ether, probably containing a considerable proportion of water, when rapidly evaporated in the apparatus available. The “double current inhaler” consisted of a metal box, 7x5x3 inches, with bottles, through which passed an “undulating” tube 15 inches long, covered with gauze. The idea was that the exhaled vapours passed back through the tube which thus warmed the ether in the box. Valves were provided to control the flow, and a “sliding shutter can be opened or shut - to regulate the admission of fresh air for diluting the ether vapour”. The “double-current inhaler” does not appear to have been popular, but this cannot be said of the Portable Regulating Ether Inhaler, which was mentioned in VII.2.ii but described nowhere in the whole collection. This is the apparatus usually known as the Clover Inhaler. In a draft of a letter to the *British Medical Journal* (VII.1.iv) in answer to a paper by a Mr. Dawson, Clover made the well known statement that he preferred the sequential nitrous oxide ether apparatus to the portable regulating inhaler.

Nitrous Oxide and Ether (VII.2.i-iv)

In an undated note (VII.2.iii) on “gas and then gas with ether”, Clover wrote, “I have recently arranged an apparatus by which, after loss of consciousness is produced, the amount of nitrous oxide gas is made to pass over a surface of ether, and I find that by allowing the patient to breathe this for a period of 30 to 60 seconds enough ether is taken into the chest to sustain anaesthesia for sixty seconds without the combined use of the gas by means of a nose cap or tube for the mouth”. Inefficient though it may seem to modern eyes, this would have been Clover's method of anaesthesia for a rapid dental extraction.

Chloroform (VII.3.i-xv)

Chloroform appears in Section VII.3, where there is a short description of the Clover bag of 1862. Here one finds the only finished drawing in the collection, “the valves made of ivory plates supported by spiral springs”. Detailed instructions were given as to the filling of the 1000 cu. in. bag with no more than 30-40 minims of chloroform. Elsewhere (VII.3.iii), following his first death in 15,000 anaesthetics, Clover's main conclusion is that the amount of chloroform in the bag should be reduced from 36 to 34 minims!

In VII.3.ii are notes for a “down-draught inhaler”. These are brief and non-descriptive but there are some important conclusions. “The object of the apparatus is to keep up a uniform supply of any anaesthetic: the supply, however, to be under command...”

Advantages:

1. Enables us to diminish the supply of oxygen while permitting a free atmosphere for breathing. (N.B. the "free atmosphere" would not necessarily contain air or oxygen.*)
*note by K.B.I.
2. The stopcocks being near the face, the effect of changing them takes place immediately.
3. By keeping the atmosphere at a uniform strength, the lowest proportion of anaesthetic is made available and the danger of an overdose minimized.
4. No valves are used and the face piece is so simple as to be easily cleaned, and so soft it cannot hurt the face.
5. It leaves one hand free to feel the pulse... .”

These comments give clues to Clover's anaesthetic physiology. In VII.3.v we read “in very tranquil breathing the fresh air does not go beyond the bottom of the trachea but the oxygen enters and carbonic acid escapes imperfectly by diffusion – many air cells probably receive no chloroform at all and therefore the blood passing through them is unaffected and serves to dilute the blood which has taken up some chloroform from other parts. Contrast this with what happens in forced breathing. The contents of the air passages except a small quantity of residual air are expelled and fresh air containing chloroform is brought almost into the pulmonary cells.” Clover therefore regarded the forced breathing of excitement or early anaesthesia as a cause of “failure of the heart's action” – “the syncope is even here the result of the large proportion of chloroform which enters the blood”. His realisation of the “shunt” effect is an illuminating insight into his deep thought upon the subject.

Among the papers are many notes on chloroform deaths (VII.3.iv,vii etc.). Few of these were his own cases, but his conclusion was always the same – the pulse must be constantly observed. Referring to a paper by P. Budin on The state of the pupil in chloroform anaesthesia, *Le Progres Medical*, 5 September, 1874, Clover wrote “the pupil is not a good test, because not only are its indications variable according to the kind of anaesthetic but because it is apt to draw attention from the state of the patient” (VII.5.iv). The paper by Budin is in the Collection and is possibly the first in which the correlation of pulse and anaesthesia was determined.

In a reference to the dangers of anaesthetics (VII.2.iv), Clover wrote “the lividity of both gas and ether are alike the result of non-oxidation of blood and neither are dangerous so long as the pulse and breathing go on regularly and effectively”, a statement which the modern anaesthetist will find frightening in its simplicity.

Nitrous Oxide (VII.4.i-ii)

Nitrous oxide is represented by the paper which Clover read to the British Medical Association at Oxford in August, 1868 (VII.4.i). The gas had been re-introduced into Britain by Thomas Evans in March of that year, and many theories were held as to its action. Clover put forward no theories at this time, but described simply how he had

given it to 791 patients in the four months, using his own chloroform bag apparatus “which was well fitted for giving N.O.”. He found difficulty in making the face piece fit, and so added the “supplemental bag” and stopcock which permitted a steady supply of the gas and allowed anaesthesia “for 8 or 10 minutes by admitting a small quantity of air, carefully watching the effects and cutting off the air directly the lividity is lessened”. The difficulty of dental operation with an open mouth is stressed and this is an essentially practical paper on how to give nitrous oxide.

Other Anaesthetics (VII.5.i-viii)

Less common anaesthetics which are discussed include ethidene and methylene bichloride. Clover had used the latter in 100 cases and found it “very efficient and pleasant”, patients waking “with signs of hilarity”. He used his chloroform bag with about twice the amount of the substance, but he believed it to contain at least two substances “having similar properties to ether and chloroform” (VII.5.iii). Ethidene is discussed in the notes for a lecture at University College Hospital, May, 1880 (VII.5.vi). Clover gives a table of use in 1877 operations. All recovered satisfactorily according to p.1, but on p.5 is a record of a case which terminated fatally!

Artificial Respiration (VII.7.i-iii)

Finally, Clover's interest in resuscitation was unflagging. It was, of course, constantly being roused by the need to carry out the manoeuvre of artificial respiration. He favoured Sylvester's arm raising method, but in VII.7.iii he discussed comparatively the methods of Sylvester, Marshall Hall, who rolled the body, Bain, who raised the chest by pulling up the axillary folds (L) and Howard's method, which became standard, of kneeling over the body and using the weight to deflate the lungs. “Experiments with a tracheal tube in a dead body have shown that Sylvester's method drew in more air than did Marshall Hall's”. Although he mentions two cases where laryngotomy saved lives (VII.7.i) and suggests the passage of a catheter through the glottis, there is no evidence that he performed this obvious manoeuvre other than in the cadaver and in dogs.

We may sum up with the remark that the Clover papers give an excellent, if superficial, view of the practice of a physician-anaesthetist in the middle of the nineteenth century.

John Snow. 1813-1858 (VIII.1-11)

Section VIII is concerned with John Snow, the first scientific anaesthetist, and the investigator of cholera. Sir Robert Macintosh, in the 1940s, discovered the whereabouts of some of Snow's descendants and letters from his nephew, William Snow of Windermere, and grandnephews, T.W. Snow of Bedford and John Snow, Solicitor, of Oxford, are in VIII.3 and 4. The most interesting Snow relic is a letter from George Budd, 1808-1882, Professor of Medicine at King's College Hospital, acknowledging a copy of Snow's *On Cholera* (2nd edition, 1855) and saying “I believe that you have made out much that is true respecting the propagation of cholera and wish that our military commanders in the Crimea could be persuaded to act upon the suggestions made by you, and earnestly try to arrest the pestilence instead of folding their hands, as people did under similar circumstances in the dark ages” (VIII.4.i).

A few observations emerge regarding Snow personally. A.L. Simpson of York, whose mother was a Snow, relates (VIII.3.iii) that when Snow was presented at Court, following his anaesthesia for Queen Victoria, "the Prince Consort said who was that extraordinary man I must see him which resulted in a Conversation." (sic). Mr. William Snow of Windermere, a nephew, remarked (VIII.3.ii) that he remembers his father (John's brother) saying "that Dr. Snow was in advance of his time in either entirely dispensing with, or using very sparingly, alcohol in his practice". John Snow was noted for his abstinence and for vegetarianism. (See Richardson, B.W., in Snow, *On Chloroform* (1858), p.iii), but this is the only reference seen to Snow having carried his temperance principles into his practice. It is a curiously ironic fact that there now stands, close to the site of the pump in Broad Street, London (now Broadwick Street), a public-house named the John Snow.

John Snow's historic books (*On Ether*, 1847 and *On Chloroform*, 1858) were financial failures as is shown by correspondence between Sir Robert Macintosh and Churchill's, the publishers (VIII.10). They reported that *On Ether* sold 126 copies at three shillings and sixpence, on commission, while *On Chloroform* ran to 418 copies at half a guinea. These figures undoubtedly account for the present rarity of these little masterpieces. References to Duncum, Barbara, *Development of Inhalational Anaesthesia*, Oxford University Press, 1947, are given in text as Duncum with page reference.