

MEMOIRS  
OF  
DR. SAMUEL GUTHRIE

AND THE HISTORY OF THE

Discovery of  
Chloroform

BY  
O. GUTHRIE

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REPRINTED FROM 1887 EDITION WITH ADDITIONS BY

T. S. CHAMBERLIN

615 N. SAWYER AVE., CHICAGO, ILL.

JUNE 1, 1919

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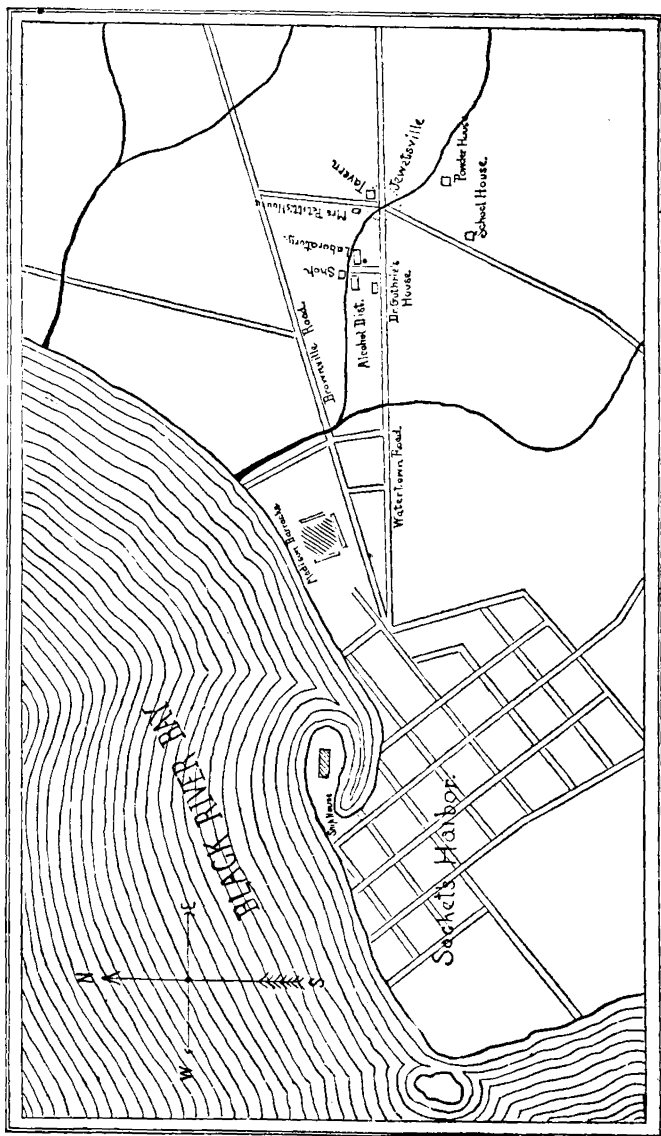
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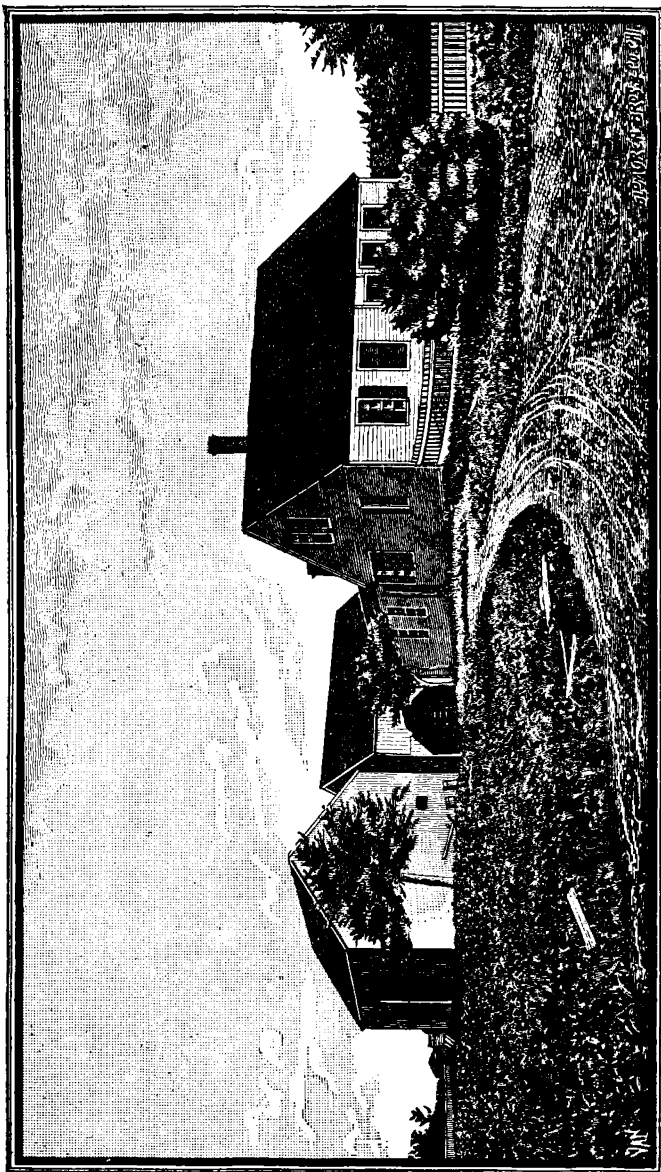
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*Truly Yours  
O. Luthrie*



Sacket's Harbor and vicinity, showing location of Dr. Guthrie's Home.



HOUSE AT BRIMFIELD, MASS., WHERE DR. GUTHRIE WAS BORN, 1782—SEE APPENDIX, PAGE 33

## A Request and its Fulfillment

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SACKET'S HARBOR, N. Y., January 25th, 1887.

*Mr. O. Guthrie, Chicago.*

MY DEAR SIR:—The Jefferson County Historical Society is gathering material for record and preservation, and at the very outset finds most important matter demanding its attention.

The fact that chloroform was discovered here is not generally known.

Last summer I had the satisfaction of securing the battlefield of 1812 for our Historical Society, and it is the intention to erect there a monument in honor of Dr. Samuel Guthrie, the discoverer of chloroform, and also secure national aid in erecting a monument in honor of the 1,700 buried there in 1812.

Knowing that your relations with your grandfather were more intimate than those of any other person now living, and feeling assured of your cordial co-operation, it seems timely and appropriate that I should now ask you to write his memoirs and aid the society in such manner as you can in this commendable work.

Please show this letter to the Hon. Geo. H. Harlow, and give him my respects. I am sure he will be proud of a good deed in honor of his native town, and cheerfully aid our undertaking.

With kind regards, sincerely yours,

W. B. CAMP,

V. P. Jeff. Co. H. S.

The following pages, as will readily be inferred, were written in response to the above letter; hence the references of a local character.

Considering the fact that there are but two persons now living who inhaled, in Dr. Guthrie's laboratory, the odor of the first chloroform ever produced, it indeed "seems timely" that the memoirs of Dr. Samuel Guthrie should be written; and it also, "seems appropriate," that this work should be allotted to one whose presence, when a child, was

not only tolerated but encouraged in the Doctor's laboratory, who there learned, and still retains a vivid recollection of, the effect of caustic potash upon the sensitive finger of a child, and whose first mechanical effort was made in the Doctor's workshop, aided by his advice and encouragement. It indeed "seems timely and appropriate" under these circumstances, that this work should be done by one whose privilege it is to bear, and whose chief aim shall be, to honor his name.



# DR. SAMUEL GUTHRIE

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The subject of this memoir was born in Brimfield, Hampden, Co., Mass., in the year 1782. His father, Dr. Samuel Guthrie, Sr., was a practicing physician and surgeon in that village, and died there in 1808.

Dr. Guthrie had two sons, James and Samuel, whose educational advantages were such as were naturally available at that time to the sons of a well to do village physician.

James removed to Dayton, Ohio, where he became a farmer, and was known for religious zeal, and his effort to prevent litigation; he was well read in the Bible, and accepted every word as of Divine origin. Samuel studied medicine with his father, and shortly after attaining to the dignity of M. D., removed to Smyrna, Chenango, Co., N. Y., where he began the practice of his profession.

The years of Jenner's struggle, from the conception to the successful demonstration of the great principle of inoculation, 1790 to 1803, were contemporaneous with the student years of our embryo doctor. Inspired with confidence in Jenner's discovery, he carried it with him to his first professional home. Dr. Waterhouse, of Cambridge, Mass., who in 1803 had introduced it into this country, had no more enthusiastic or daring disciple than he. His first subject was Sarah Guthrie, his cousin.

A fortuitous case of small-pox afforded the doctor the coveted opportunity, in which his zeal was eclipsed by the fortitude of his subject. Sarah Guthrie volunteered to act as nurse and both she and the doctor passed successfully and triumphantly through the ordeal; and thenceforth his advance to distinction was rapid.

He also became somewhat noted for the manufacture of powder.

At Smyrna the doctor married Sibyl Sexton, by whom he had four children, two sons and two daughters.

## HIS EDUCATIONAL ADVANTAGES

During the winter of 1810-11 Dr. Guthrie attended a course of medical lectures in New York, and again during the month of January, 1815, he attended lectures at the University of Pennsylvania in Philadelphia. These advantages seem to have been all he enjoyed except those with which a bountiful nature endowed him.

His diary, kept while at Philadelphia (31 days), shows 275 closely written or illustrated pages; some of the pages,



where no illustrations occur, contain about 200 words.

He found time even then, to criticise or commend his professor according to the impressions made upon his mind by the lecture.

During the war of 1812, Dr. Guthrie was examining surgeon in the army.

### **MILL CREEK SUPPLIES WATER POWER**

In the year 1817 he removed with his family to Sacket's Harbor, Jefferson Co., N. Y., where, after the war he had established a vinegar manufactory for supplying Madison Barracks, a military post established in 1812; here he also continued his experiments in the manufacture of powder. Dr. Guthrie's worldly effects were easily transported to his new, and at that time, almost wilderness home at Jewettsville, a crossroads on "Mill Creek," about one mile from Sacket's Harbor. Mill Creek at that time afforded a tolerably reliable, but quite limited water power; sufficient, however, for grinding the material for, and graining his powder. It also furnished ample water for his laboratory, vinegar-house and alcohol distillery.

This group of buildings (the powder house being a short distance away), about 1830 had attained to considerable magnitude and importance. Here alcohol, vinegar, chemicals and percussion priming powder were manufactured in the greatest perfection, and shipped to New York for distribution.

### **WILDERNESS DISPLACED BY GARDEN AND VINEYARD**

The versatility of Dr. Guthrie's genius and his indomitable energy were not circumscribed by the walls of his laboratory. The wilderness in which he located, soon disappeared, and clay from a neighboring bank was transformed into a comfortable dwelling, to which, the "penstock" conveyed a never failing stream of pure water from the "sand hill" perhaps a quarter of a mile distant. His highly cultivated garden supplied every fruit and vegetable indigenous to the climate, and his vineyard was hardly second to any in the state.

Stones which impeded the plow were utilized in making not only substantial but ornamental walls around his well cultivated fields, and his barns and out-buildings indicated the well to do farmer.

In his fields a few years later (1835 to 1840), the suggestions, of the "Boston Cultivator" were put to practical

tests and new seeds like the "Chinese tree corn" and "Roan potato" were tried, and their values determined. Here under his personal supervision the "French sugar beet," from seed planting to the finished product in the laboratory, underwent the most thorough trial, and upon a scale so far as the beet product was concerned, of great magnitude; but the quantity of sugar was in an inverse ratio. He raised but one crop of the French sugar beet.

### THE MANUFACTURING BUILDINGS

Let us now make a retrospective visit to Dr. Guthrie's manufacturing buildings. In doing this we pass through the vineyard before mentioned. A short distance and we reach a group of buildings; the large one on the bank of the creek at our left is the alcohol distillery. Some of these casks (a term commonly used instead of barrel) contain high wine, some alcohol, and a few caustic potash, which was then much used as an absorbent in the manufacture of high alcohol. The small building across the creek is his shop. In this we find a forge, bellows, anvil, and other tools pertaining to the blacksmith shop. We also find sheet-copper, spelter and borax, solder and rosin. We also find a fairly complete set of gunsmith tools, crucibles, melting ladles, etc., for in this shop the coppersmith, gunsmith, and tinker are represented in the person of the Doctor.

The large building which we passed on our right as we came in, is his laboratory. In passing through this, we encounter a labyrinth of apparatus, chemicals, chemical compounds and odors. The small still in yonder corner with its condensing worm immersed in a barrel of water, is where chloroform was first produced. The observer will doubtless notice a pine plug answering the purpose of a brass faucet. This is characteristic. The Doctor has a remarkable faculty of utilizing anything which comes to hand.

The dome-shaped structure you noticed as we passed into the laboratory is his charcoal oven for re-burning charcoal for purifying and other purposes.

It is in this, now "historic laboratory," located almost in the wilds of the State of New York, away from the seats of learning and remote from arteries of commerce, that we shall endeavor to establish beyond doubt, the priority of discovery of chloroform by several months: And where, as the *Encyclopædia Britannica* expresses it, "Samuel Guthrie, of America," produced chloroform.

### DANGEROUS GROUND

The powder house is situated a short distance up the creek. This is a place of much interest, for here by far the

larger part of the priming powder of the United States and Canada is made, and we will not fail to investigate its interior.

This is dangerous ground, and we must disrobe our feet, or at least remove our boots; whoever enters here must either go barefoot or in his stockings.

We now cautiously investigate, for we must not move any hard substance which would cause friction or percussion. When the works are in operation, everything is necessarily kept damp. Of the apparatus we find the grinding tub with small burr stones at the bottom. In this tub the ingredients (antimony and chlorate of potash equal parts) are ground together in water. That peculiar structure having four vertical shafts with cranks of equal length, upon which rests a small tub, is the graining apparatus. This has a double motion similar to that of a dish held with both hands and moved so as to describe a circle without the dish revolving.

In this, the compound in a plastic condition is violently shaken after it has been pressed through a sieve of a mesh suitable for forming the grain of the size desired. (usually about the size of a mustard seed.)

Of ingredients we find chlorate of potash, antimony, gum shellac, alcohol, prepared shellac varnish and bronze; and also numerous other articles and apparatus for experimental purposes.

#### **THE "PERCUSSION PILL"**

The priming powder ("Percussion Pill") made here, is the invention of Dr. Guthrie, and this is the only place where it is manufactured. It is put in tin cannisters of one ounce, labelled "Water Proof, Percussion Priming, S. Guthrie, Sacket's Harbor." Agents—Van Buren, Wardell & Co., N. Y. All old sportsmen will readily recognize this cannister and label.

#### **RECEIVED NEARLY FATAL INJURIES**

Dr. Guthrie's experiments with explosives, especially fulminating preparations, were, perhaps more extensive than those of any other man of his day, extending over a period of nearly forty years, during which time, he experienced many serious explosions; in one of these, where twenty-five pounds of half-dried powder was burned, the writer participated. This powder burned with such energy as to lift the roof, and spread the heavy stone walls of the building; and doubtless, but for the fact that one door opened outward, would have been attended with serious results.

In some of these explosions Dr. Guthrie sustained lasting and almost fatal injuries.

Thirteen years have now elapsed since Dr. Guthrie with his family settled in Jewettsville; and his home and its surroundings as above described, are among the earliest recollections of the writer.

Dr. Guthrie practiced medicine and surgery for a short time after locating at Sacket's Harbor, and there, as at Smyrna, gained distinction; but the fascinations of the laboratory and the demands of business soon led him to abandon the practice of his profession.

### HIS TWO SONS RELIEVE HIS LABORS

Heretofore, Dr. Guthrie had not been very widely known except by sportsmen, who almost universally throughout the United States and Canada used his priming powder, the manufacture of which he began in 1826. Dr. Guthrie's two sons, Alfred and Edwin, had now each an age to relieve him of many cares. Taking advantage of this, he devoted his time largely during the years of 1830 and 1831 (see appendix) to experimenting in his laboratory, the results of which were quite fully given in Vols. xxi. and xxii. *American Journal of Science and Arts*. As a contributor to this journal, judging from the frequent and complimentary notices by the editor, Prof. Silliman, he was among those most highly esteemed. About one-eighth of Vol. xxi was devoted to his work.

Under the head of "Chemical Products formed by Mr. Guthrie," the editor says, p. 92, v. xxi:

"I add a notice of the following facts, communicated by Mr. Guthrie in his letters, not for publication, but which I conceive are honorable to the rising chemical arts of this country. I presume it was little suspected that such things were doing in a remote region on the shore of Lake Ontario."

"Mr. Guthrie's method of preparing it (chloric éther) is ingenious, economical and original." Ibid., p. 69.

"The above notices, (Pure Oil of Turpentine and the manufacture of Chlorate of Potassa), as matters of fact, will probably be interesting to the chemical public of this country." Ibid., p. 93.

"Mr. Guthrie's preparations have all arrived, and although I reserve the trial of most of them, to my winter course of experiments, I am impressed with admiration both at his skill and intrepidity." P. 295. *ibid*.

"Referring to the important communication of Mr.

Guthrie, upon chloric éther (p. 64 of this vol.) I proceed to quote, etc. I am not aware, however, that this trial had been anywhere made, and probably the subject would have slumbered, had it not been for the very ingenious, and as far as I know, original process of Mr. Guthrie, etc.

"Dr. Guthrie's liberality having placed it in my power, I have recently distributed several bottles among medical friends, and the report as far it has been received, is highly satisfactory." *Ibid.*, p. 405.

An interesting fact in this connection, is, that Prof. O. P. Hubbard, Professor of Chemistry at Dartmouth from 1836 to 1883, was Prof. Silliman's assistant at Yale in 1831, and received and opened the packages containing the chemical products above referred to. Prof. Hubbard, now after a lapse of fifty-six years, furnishes the writer a small quantity each of the "chlorate of potassa," "potato molasses" and "gun-powder," mentioned on pages 92 and 93, (*Silliman's Journal*) the labels on the original packages, having been written and placed upon them by him in 1831.

### HIS PERSONAL APPEARANCE

A personal description of Dr. Guthrie at this time will doubtless add to the interest of these memoirs.

Dr. Guthrie was of dark complexion, medium stature, slender build, slightly stooping figure, and thoughtful mien; his head was well-formed and of full medium size, features slightly oval, nose prominent and a little irregular in shape. The features of the lower part of the face and neck were regular and in no manner concealed by beard. His neck was, perhaps, rather small. The distinguishing features of the whole, however, were his expressive eyes, their range between the expression of pleasure and disapprobation being rarely exceeded. Later in life, the *tic douloureux*, with which he was afflicted, contracted the muscles of the left side of his face; this affected one corner of the eye and of the mouth on that side. To this, doubtless, is due the fact that his daguerrotype was never taken. (See Note a.)

Note a.—Always upon his return from New York, a description of something new and wonderful was expected. The writer recalls vividly his narration of the discovery of Daguerre, the Morse telegraph, and the year running clock. Upon the occasion when he saw the latter, his highly appreciated friend, Joshua Harlow (an uncle of the Hon. Geo. H. Harlow, ex-Secretary of State of Illinois), was with him. Mr. Harlow was a man of great mechanical skill and ingenuity, and but few days elapsed after their return, before Sacket's Harbor had a year running clock of Mr. Harlow's make.

Dr. Guthrie was very plain, perhaps, careless, in dress, and unostentatious in demeanor; even the close observer of the throng in New York, in which he frequently mingled, would fail to detect in his simplicity in these respects, anything to attract his attention, much less to lead him to think he had jostled a man whose fame was so soon to become world-wide as the discoverer of chloroform, and whose work, already accomplished, in original scientific investigation, gave him rank among the eminent men of his time.

#### HIS UP-TO-DATE LIBRARY

As would naturally be inferred, the Doctor's library received much attention. In it were to be found the standard medical and chemical works, the scientific journals, the Edinburgh Encyclopædia, Shakespeare, and some novels; Rasselas, Gil Blas, Don Quixote, etc., and, last but not least, the Bible, in which he was well read. These he contemplated with the most profound admiration and reverence.



Dr. Samuel Guthrie united with the First Congregational Church of Brimfield, Mass., at the age of 18. And then when he moved to Sherburn, N. Y., he joined the First Calvinistic Congregational Church in Sherburn, N. Y.

This church was organized at the house of his grandfather, James Guthrie, Tuesday, Nov. 25, 1800, and both he and his grandfather were charter members.

### **HIS LOVE OF MUSIC**

In the possession of so busy a man, we would hardly expect to find a violin, but such was the case. While the writer would not feel competent to judge of the merits of either the instrument, or the skill of the performer, persons supposed to be competent, pronounced them both superb. Many a time in his childhood, he has listened to the Doctor's music with wonder and delight, and his recollection of the animation which inspired it can never be forgotten.

Dr. Guthrie enjoyed hunting and fishing, and in such recreation he was always found a pleasant companion; he also enjoyed a social game of whist, but in gossipy, or aimless conversation, his presence was undesirable.

### **HIS DEVOTED FRIENDSHIP**

Dr. Guthrie's close friendship were few but very devoted. He had good control of the two little words of opposite import, yes and no, but he was sympathetic and forgiving almost to the point of weakness. The Doctor, when his health permitted, rarely failed to make a daily visit to the postoffice at the "Harbor," but his bay mare, which for seventeen years performed her part of this service, never failed. This faithful animal was scarcely less known in Jefferson county than her owner, and had during all these years, been able to throw dust in the faces of most of her fleet competitors, a service rendered alike for sire, son and grandson, up to the twenty-fourth year of her age, when accident ended her career.

### **EXTRAVAGANCE**

Extravagance in the Doctor's view, was almost a crime, but expending money in scientific investigation was like loaning on bond and mortgage; and while in practical life, ordinarily, such methods are not well calculated to increase the bank account, he at one time was rated among the wealthy men at Sacket's Harbor, but changes which time wrought in the place and its industrial and commercial affairs, reduced property to a nominal value. This with years of ill-health, diminished Dr. Guthrie's accumulations, until, at his death, the fingers of one hand would more than indicate his thousands.

From the serious injuries received from explosions and the tic douloureux with which, as before stated, he had been afflicted, he at times endured great suffering, and may be said to have been an invalid during the last ten years of his life; but his indomitable will maintained the struggle



with varying success to the end. He died at Sacket's Harbor on the 19th of October, 1848, aged 66 years.

#### KINDNESS AND GENEROSITY

Many who knew him, can bear testimony to the kindness of his disposition, and the generosity of his nature.—*Sacket's Harbor Observer*.

#### THE DISCOVERY OF CHLOROFORM

Memoirs of Dr. Guthrie could hardly be written without a history of the discovery of chloroform, a discovery which has immortalized the names of three men throughout the civilized world. But he, as we shall endeavor to show, was preeminent, by reason of several months priority of publication, and also by reason of a bountiful and free distribution of chloroform to promote investigation in relation to its medicinal value. See Vol. XXI American Journal Science and Arts, page 65, date of July (assumed); 295 of September 12, and 407 of December 24, 1831; and Vol. XXII, February 15, 1832.

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## Discovery of Chloroform

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The honor of priority of discovery of chloroform has become a matter of National interest, and has been variously awarded to "Guthrie, in America," "Soubeyran, in France," and "Liebig, the celebrated German chemist," (see Encyclopædia Britannica) and generally according to the nativity of the writer, until, with the writers of disinterested nationality, in their order of crediting the discovery, the possibilities of permutation have been nearly or quite exhausted.

In this instance, a double motive may lead the writer to search thoroughly for facts to establish priority in America; an effort will be made, however, to place before the reader a history of the discovery of chloroform.

#### GUTHRIE'S CLAIM.

Art. VI, page 64, Vol. XXI, American Journal of Science and Arts—"New mode of preparing a spirituous solution of chloric ether, by Samuel Guthrie, of Sacket's Harbor, N. Y."

"MR. EDITOR:—As the usual process for obtaining chloric ether for solution in alcohol is both troublesome and expensive and from its lively and invigorating effect may become an article of some value in the *Materia Medica*, I have

thought a portion of your readers might be gratified with a communication of a cheap and easy process for preparing it. I have therefore given one below, combining these advantages with unerring certainty in the result.

"Into a clean copper still, put three pounds of chloride of lime and two gallons of well flavored alcohol of sp. gr. .844 and distil.

Watch the process and when the product ceases to come highly sweet and aromatic, remove and cork it up closely in glass vessels. The remainder of the spirit should be distilled off for a new operation.

"These proportions are not essential; if more chloride of lime be used, the ethereal product will be increased, nor is it necessary that the proof of the spirit should be very high, but I have commonly used the above proportions and proof and have every reason to be satisfied with them.

"From the above quantity I have usually obtained about one gallon of ethereal spirit. (See note A.)"

"Note A. The affinity of chlorine to lime is so weak, and to alcohol so strong, that the chlorine is all taken up, long before the distillation is over; hence, the absolute necessity of watching the process, so as to know when to set aside the ethereal portion.

By re-distilling the product from a great excess of chloride of lime, in a glass retort in a water bath, a greatly concentrated solution will be obtained. The new product is caustic and intensely sweet and aromatic.

"By distilling solution of chloric ether from carbonate of potash, the product is concentrated and refined. By distilling it from caustic potash, the ether is decomposed, and muriate of potash is thrown down, while the distilled product consists of alcohol."

Unfortunately Art. VI is without date, but is preceded by Art. V, bearing date July, 1831 and followed by another dated July 2, 1831. (See page 69 same Vol.) Hence, may we not reasonably assume the date to be about July 1st? Let it be also understood that Vol. XXI contains two parts, numbers one and two. Number one containing eighteen articles and sixty pages of miscellanies—200 pages in all, page 200 bearing date October 2nd.

Dr. Guthrie says, page 65: "*During the last six months a great number of persons have drunk of the solution of chloric ether in my laboratory, not only very freely, but frequently to the point of intoxication; and so far as I have*

observed, it has appeared to be singularly grateful, both to the palate and stomach, producing promptly a lively flow of animal spirit and consequent loquacity, and leaving after its operation, little of that depression consequent to the use of ardent spirits.

"This free use of the article has been permitted, in order to ascertain the effect of it in full doses on the healthy subject; and thus to discover as far as such trials would do, its probable value as a medicine.

From the avariably agreeable effect of it on persons in health, and the deliciousness of its flavor, it would seem to promise much as a safe, quick, energetic and palatable stimulus."

Thus, if our assumption of date be admissible, we get back close to the year 1830 as the date of Dr. Guthrie's discovery of chloroform.

In Art. VI. No. 2, page 295, same Vol., under date of September 12, 1831, Dr. Guthrie says: "A bottle and phial contain alcoholic solution of chloric ether. The contents of the phial are as strong as I could conveniently prepare them, but not equal to some which I made not long ago." This shows, conclusively, that Prof. Silliman was familiar with chloric ether prior to September 12, 1831, and in a measure, vindicates our assumption of July first as the date of Art. VI, page 64. Again, Prof. Silliman on page 407 says: "Having been requested by some of our physicians to obtain a supply for *regular* use, I have written to Mr. Guthrie and received from him an answer dated Sacket's Harbor, December 24, 1831, from which the following is an extract: I have been confined by sickness most of the time since the 7th of October, but am now, recovering rapidly, and hope within a very few days to be able to go into my laboratory, when I shall prepare, and forward to the care of Van Buren, Wardell & Co., New York, the chloric ether you advised me to send, and they will immediately forward it to the gentlemen you designated. The price of chloric ether, you must be aware, will form no objection to its general use as a medicine." Note by the Ed. "Mr. Guthrie even names a price at which it may probably be afforded, and although it might be premature to mention it now, I may remark it is very low." It is clear that the distribution, to this time, had been gratuitous.

Journal of the Philadelphia College of Pharmacy, Vol. 4, p. 116, 1832.

"A third species of chloric ether is formed by distilling alcohol from chloride of lime. It resembles the first species.

but has been analyzed by its discover, Soubeiran, who has ascertained it to be a compound of two proportions of chlorine, two of hydrogen, and one of carbon; or two atoms of chlorine and one of bi-hydroguret of carbon.

"A self-taught American chemist on the shores of Lake Erie, has the credit of first isolating this very curious and interesting species of ether.

"Soubeiran obtained, etc.

"While Soubeiran was making these researches in Europe, the subject was engaging attention, in a ruder manner to be sure, of Guthrie, in this country."

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[United States Dispensatory.]

Chloroform was discovered by Samuel Guthrie, of Sacket's Harbor, N. Y., in 1831, and about the same time by Soubeiran, in France, and Liebig, in Germany.

Guthrie obtained it, etc., elsewhere quoted.

In a subsequent letter to Prof. Silliman, dated Feb. 15, 1832, Mr. Guthrie states that the substance which he had obtained, "distilled off sulphuric acid, has a specific gravity of 1.486, or a little greater, and may then be regarded as free from alcohol; and if a little sulphuric acid, which sometimes contaminates it, be removed by washing it with a strong solution of carbonate of potassa, it may then be regarded as ABSOLUTELY PURE.

It is thus evident that Mr. Guthrie obtained, in a pure state, the substance now called chloroform."

In relation to the priority of discovery of chloroform, it is important to note, that Dr. Guthrie's process of obtaining it, was in the publishers hands, and the substance itself in the hands of Prof. Silliman for distribution among the medical profession before Sept. 12, 1831 (probably as early as July 1st), and as early as February 15, 1832, a month earlier than Liebig's publication, he had obtained it in a pure state (see U. S. Dispensatory above quoted), which neither Soubeiran nor Liebig had then done. Not only this, but Dr. Guthrie's process was repeated and verified by Prof. Silliman, at Yale, before the close of the year 1831, while Soubeiran's publication in the *Journal de Pharmacie* appeared in January, 1832, and that in the *Annales de Chimie et de Physique*, the one upon which his claim to priority over Liebig is based, did not reach the public until February.

See Liebig's History of the Discovery of Chloroform.

In relation to its introduction as a medicine, the Drs. Ives and others, through his instrumentality, had been enabled to

experiment during the last half of the year 1831, and in the language of Dr. Bourbaugh, elsewhere quoted, "they rested under the shade of the tree, but neglected to pluck its fruits."

"So near and yet so far!" Dr. Eli Ives, in 1831, in a case of pulmonic disease, administered chloroform by inhalation, and the writer, in his childhood, had free access to Dr. Guthrie's laboratory, where he was frequently attracted by the agreeable and never to be forgotten odor of chloroform.

#### SOUBEIRAN'S CLAIM

Soubeiran's claim to priority of discovery of chloroform is based upon the publication in Vol. 48, p. 113. (*Annales de Chimie et de Physique*), October, 1831, translated by Prof. Griscom, and published in Vol. XXIII, first series *American Journal of Science and Arts*.

Art. XXI "Action of Chloride of Lime on Alcohol by M. E. Soubeiran." "When chlorine is passed through alcohol, the products are hydro-chloric acid, a little carbonic acid, a small quantity rich in carbon, and a peculiar ethereal fluid constituted agreeably to Depretz, of one atom of chlorine, two atoms of pecarburetted hydrogen.

"In the supposition that the compounds called chlorures d'oxides are combinations of chlorine with oxygenated bases, the same products ought to be obtained by bringing them into contact with alcohol, the acids being satural as fast as they are formed.

"To be certain of this, I mixed a solution of chloride of lime, very concentrated, with alcohol; the mixture grew warm and an odor of chlorine was manifest; in raising it to ebullition, an abundant white precipitate was formed and a liquid passed over, of a very sweet odor and a sugary taste." Omitting that part of the article not essential to this investigation, we will proceed to quote: "The bi-chlorice ether is an ethereal liquid, very limp and colorless, with a penetrating and a very sweet odor. When breathed, the vapors which penetrate to the palate develop a taste decidedly saccharine. It may almost be said to have saccharine odor." investigation, we will proceed to quote: The bi-chloric On account of the revolution then prevailing, the publication date *Jan., 1832*.

In the *Journal of Pharmacie*, of which Soubeiran was one of the editors (Vol. 16, pp. 657, 672, No. XII, Dec., 1831), appears an article entitled, "Some Combinations of Chlorine, by M. E. Soubeiran." No mention is made of the

action of chlorine on alcohol, but the article is "to be continued." In the Jan. No., 1832, the article is continued, and the action of chloride of lime on alcohol is treated, and the results given as in the *Ann. de Chim. et de Phys.*, already quoted. Thus we show Soubeiran's claim, in his own language, in two different publications, of one of which he was one of the editors, that chloroform was the last of a number of products from chlorine combinations, and was not made public before January, 1832.

The following—for the translation the writer is indebted to W. R. Orndorf, of Johns Hopkins University of Baltimore—is given without comment, except to call attention to the fact that the article in the *Journal de Pharmacie*, to which reference is made, was to be continued, and was continued in the next number, and the action of chlorine on alcohol treated, as before stated by the writer.

[Liebig's *Annalen*, Vol. 162, page 161. (1872).]

It is perhaps useful to note the fact, that the *Paris Annales de Chimie et de Physique*, in consequence of the political condition in the years 1870-1871, appeared very late; so that the double number, September and October, 1871, of this journal first reached us in Munich in the middle of February, 1872.

It is easy to see that, of two works, on the same subject by a French and a German chemist, which were printed at the same time, the one in the *Paris journal*, the other in this *Annalen*, the first; e. g., in the November number, 1871, of the *Annales de Chimie et de Physique*, the other in the March number, 1872, of this *Annalen*—it is easy to see, how, under these circumstances, the author of a handbook would ascribe a priority of three months to the work of the French chemist.

The history of the discovery of chloroform affords an example of the influence of such a shifting of the dates of publication.

In the description of chloroform L. Gmelin says (*Handbook* 1848, 4, 275): "Described by Soubeiran in 1831 as 'éther bichlorique,' by Liebig in 1832 as 'chlorkohlenstoff' (carbon chloride)." In fact the work of Soubeiran, on éther bichlorique," did appear in the October number of the *Annales de Chimie et de Physique*, 1831, while mine on chloral was published in the February number of this *Annalen* 1832, (*Annalen* 1, 182), and it hence appears to be a fact beyond dispute, that Soubeiran's work was completed four months before mine.

But in the year 1831, in consequence of the July revolu-

tion a political condition, resembling that of the years 1870-1871 had arisen in France, and which, in relation to the publication of the *Annales de Chimie et de Physique*, acted in precisely the same way. In the postscript to my work on chloral, in the February number 1832, of the *Annalen der Physik*, (published by Poggendorff), I said: "When I was about to send the above work to Prof. Poggendorff, I received the October number, 1831, of the *Annales de Chimie et de Physique*. This contains two articles, one by Soubeiran, the other by Dumas, which are very closely connected with my work.—But in relation to the body, which I have described as a new chloride of carbon, one finds in its method of preparation with bleaching powder a great resemblance to the method, which Soubeiran has given for his 'ether bichlorique.' But Dumas has convinced me that I communicated to him the discovery of this body six weeks before Soubeiran made known his work."

The correct date of this discovery may be easily confirmed by the fact that Soubeiran's work on the salts of chlorous acid was published in the *Journal de Pharmacie*, of which Soubeiran was the co-editor.

In the *Journal de Pharmacie*, the article of Soubeiran is NOT published in the OCTOBER NUMBER, 1831, as in the *Annales de Chimie et de Physique*, but in the JANUARY NUMBER, 1832, and it may be proved from the proceedings of the Pharmaceutical Society that Soubeiran, in November, 1831, still had no knowledge of the "ether bichlorique." In the proceedings of the meeting of the Pharmaceutical Society of November 9, 1831, it is mentioned that Soubeiran communicated some detailed statements on the lower compounds of chlorine and oxygen, (published in detail in the December number of the *Journal de Pharmacie*, 1831) but of the discovery of "either bichlorique" no mention is made in this communication. In Soubeiran's presence, Serullas remarked in the same meeting, that he (Serullas) had again confirmed the formation of acetic acid from alcohol by the action of chlorine, without Soubeiran contradicting him. But Soubeiran begins his article upon "ether bichlorique" in the *Journal de Pharmacie*, (January, 1832), with the DESCRIPTION OF THE ACTION OF CHLORINE UPON ALCOHOL. He says, "that hydrochloric acid, a little carbonic acid, a small quantity of a material rich in carbon, and a peculiar ethereal fluid are formed. The last according to Despretz consists of one atom of chlorine and two atoms of carbon." It is certainly evident that had Soubeiran made this experiment before the November meeting in 1831, above mentioned, he would hardly have let Serullas' statement of the formation of acetic



acid by the action of chlorine upon alcohol pass uncorrected, since he, (Soubeiran), himself had not proved this formation. But I had already communicated, in the November number, 1831, of Poggendorff's *Annalen* (23,444), in a note, which escaped L. Gmelin, the result of my work upon the decomposition of alcohol by chlorine, and said among other things:

5. By aqueous alkalies chloral is changed into a new chloride of carbon (chloroform) and formic acid.

6. The new chloride of carbon may also be easily obtained by distillation of alcohol with excess of bleaching powder.

It is also formed by distillation of bleaching powder with acetone."

It is hence very plain that my work on chloral was already completed in *November, 1831*; but it comprised the investigation of the action of chlorine upon several other bodies so that thereby its publication was delayed.

JUSTUS VON LIEBIG.

Dumas, in 1834, determined the constituents of the liquid theretofore variously known as "Chloric Ether," "Ether Bichlorique," and "Chlorkohlenstoff" (Chloride of Carbon), which had erroneously been supposed to be an ether, and gave it the name of chloroform.

[U. S. Service Magazine, Vo. 3, page 323.]

# Anaesthesia

BY DR. CHARLES C. BOURBAUGH.

"There is  
No danger in what show of death it makes,  
More than the locking up the spirits a time,  
To be more fresh, reviving."

SHAKESPEARE, CYMBELINE.

Burton quaintly says in his 'Anatomy of Melancholy': Though there were many giants of old in physic and philosophy, yet I say with Didacus Stella, "a dwarf standing on the shoulders of a giant may see further than a giant himself." What, then, is the likelihood, if the mounted individual happens to be another intellectual giant? One, for instance, of the calibre of James Y. Simpson of Edinburg? Will not the range of vision be proportionately increased?

It would be idle and unprofitable to indulge in speculations as to the probable adoption of chloroform for purposes of anæsthesia if the way had not been paved for Dr. Simpson by the American discoveries of the anæsthetic properties of sulphuric ether, or, at least, of the practical application of those properties. Suffice it for us to know that he had that illustrious tripod, Morton, Wells and Jackson, to stand upon, and that it was from an observatory built by their hands that he peered far into the dim and shadowy distance for some volatile agent, which, while it should wrap the sufferer in slumber more profound than that of Poppy or Mandragora, or all the drowsy syrups of this world, should be more energetic in its action, more speedy in its effects, and more in harmony with physiological requirements, than the process of etherization.

The adoption of chloroform in the army was based upon considerations which give it undoubted claim to preference. In all cases a far less quantity is required to produce the desired effect. It therefore presents the advantage of economy, and also of portability, which, on a march or during an engagement, is of no small moment. Its action is likewise more rapid and decisive and its effect is more complete and persistent. Fewer inspirations suffice, and the preliminary stage of excitement is curtailed. The value of the time thus saved to the surgeon during and after battle, when the wounded are crowding upon him, when the need of his active service is most pressing, when every moment is precious, and delay involves the life that is steadily ebbing away around him is inestimable.

In thousands of instances, as every army surgeon can testify, the sufferer has been narcotized, subjected to the amputation of a limb, the vessels tied and the stump dressed within the time usually requisite for the full effect of ether.

On the other hand, it is contended by the advocates of ether that the inhalation of chloroform is inherently more dangerous. The records of the war prove abundantly that their allegations are unfounded in fact. They show that the use of a preparation which is perfectly pure and uncontaminated by the presence of aldehyde, or any other of the poisonous principles to whose admixture an improperly prepared article is liable, is absolutely safe in all cases in which its use is clearly not contra-indicated, and that fears in reference to its undue activity are unfounded. In all cases of maladministration, etc., is as certain in the use of one as of the other.

These facts having been established, the importance of employing chloroform of undoubted quality cannot be overestimated. Fortunately for the honor of the service and the cause of humanity, the chloroform so far supplied to the medical officers of the army has been free from the taint of suspicion. The criminal avarice which risked the lives of our brave soldiers by the transmission to the camps and hospitals of adulterated and fictitious medicines, stimulants and nutriments, seems to have passed over, or, at least lightly touched this matchless anodyne.

The experience of the writer, as well as that of his fellow-associates in the service, with whom he has carefully compared notes, shows that among many thousand cases in field and hospital practice, they have not witnessed one case of fatal chloroformization.

Often in the heat and hurry of operations in time of battle, the anæsthetic was fairly crammed—if the expression may be admissible—into the wounded sufferers, in a manner that would be totally unwarrantable in other situations, and when the operation was concluded he would be hastily laid aside to recover his consciousness at his leisure.

But they did recover invariably; and if in other hands, of which the writer has not become cognizant, the vital spirit quietly flitted away, if death ensued as the direct effect of the administration of chloroform and not of hemorrhage or nervous shock, be this our answer to the doubting or querulous: Thousands of useful lives have been saved to the country by submission to severe operations in a state of unconsciousness which otherwise could not have survived the

shock upon the sensorium. Where chloroform has wrought, in a single instance, a transition to that dreamless state from which there is no awakening this side the grave, it has prevented a thousand others.

Every year numbers of passengers are killed by railway accidents, but millions are safely transported by the same conveyance.

Many a shattered hulk of humanity which would have expired under the withering and consuming pain of an operation where susceptibility was exalted and sensibility intensified, have, with the aid of this sustaining staff, come back from the very verge of the death-shadowed valley. A fact so convincing is approved by reason and confirmed by experience.

One of the happiest uses to which chloroform has been applied during the war, is in the suppression of malingering. Cases of simulated disability almost daily attract the attention of the medical officers.

So well feigned, sometimes, are these disqualifying defects or infirmities, and so pertinaciously adhered to, as to deceive old army surgeons accustomed to trickery. But through the involuntary revelations of this agency the exposure is complete. The mute have been betrayed into vociferous speech, and the deaf been made to hear.

Anchylosed joints and binding cicatrices, which had stubbornly resisted flexion, have suddenly unfolded of their own accord. Rheumatism disappears as if by magic, and old adhesions break up before an exploration is made.

Numerous cases of imposture thus detected have been restored to the service, which otherwise, by continuance in deception, might have succeeded in obtaining discharge.

*Dr. Benjamin Rush*, in 1803 expressed the hope that a medicine would be discovered that should suspend sensibility altogether, and leave irritability or the powers of motion unimpaired, and thereby destroy the pains of parturition. Chloroform has nearly rendered this an accomplished fact.

Ether inhalations were prescribed by eminent medical practitioners seventy years ago, in the treatment of catarrhal affections, spasmodic asthma and whooping cough. But all these investigators stopped at the threshold, instead of crossing over; they rested under the shade of the tree, but neglected to pluck its fruit. The means had been provided, the instruments were within reach. Chance accomplished that which human sagacity failed to perceive. It was with anæsthesia as with nearly all the great facts and discoveries of natural science.

They have been the result of a fortuitous chain of circumstances.

Only eighteen years have elapsed since etherization startled the civilized world by the novelty of its claims. Its twin minister, more potent in the subdual of pain, loitered behind, that the public mind might be better prepared for the comprehension and realization of its heaven-born mission. Who can measure the aggregate of suffering that has been averted within that brief period? and what an untold amount of human anguish might have been spared in the ages that have been entombed forever! It was not until 1831 that chloroform was simultaneously discovered by Guthrie, of Sacket's Harbor, and Soubeiran, of Paris, but the preparation and qualities of ether were described by Basil Valentine and others more than three centuries ago. Many of the narcotizing inhalations of the ancients were undoubtedly superior to nitrous oxide in anæsthetic power. The "*spongia somnifera*," of Theodoric, is quite as worthy a place in the pharmacopœia of 1860 as is much of the lumber with which it is encumbered. Yet they all "died and left no sign."

Why so peerless and priceless a mode of assuaging pain was so long withheld, is not within our province to enquire.

It seems to be a part of that inscrutable economy whose ways are past finding out. If the boon is for the present and future, it is for us and the myriads that are to follow to acknowledge its blessings reverently and humbly, and to experience that devout sense of gratitude which is due to the Good Giver for this sweet, oblivious antidote, this child of Night and Lethe, this

#### GIFT OF CHLOROFORM

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[Bentley's Miscellany, Vol. 34, page 33.]

We have seen a fine child brought in, laid down with its hands gently folded across its body, have chloroform administered, undergo a severe operation, and be carried to bed, without once changing its attitude or its countenance altering from the expression of the calm sweet sleep of infancy.

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[Chambers, Edinburgh Journal, Vol. 8, page 394.]

The means now undoubtedly exist in perfection, of extinguishing pain in all circumstances. Such is the announcement, and no less, which we must make to our readers. A soldier may now take a phial of chloroform to the field with him, and if it be his fate to be wounded, and to lie a night without relief, he may inhale the vapor and be at ease. A

delicate patient, about to submit to an operation feared to be too great for the nervous energy to sustain may take this inhalation and his life is safe from at least the shock of pain.

A peculiar class of female suffering may be said to be abolished from the earth by this simple fluid. How the heart throbs responsive to the expression used by Dr. Simpson in his pamphlet: "I most conscientiously believe that the proud mission of the physician is two fold—namely, to alleviate human suffering, as well as preserve human life."

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CHICAGO, June 1st, 1887.

*O. Guthrie, Esq.,*

DEAR SIR:—In reply to your note of inquiry in regard to my experience in the use of chloroform as an anæsthetic, etc., I would say, after using it in my practice for more than thirty-six years, it stands without a peer as a safe and efficient anæsthetic, when properly administered. Samuel Guthrie, its discoverer, and Prof. Eli Ives, who first used it as an inhalent (who was a distant relative of mine), deserve the gratitude of this and all coming generations. Let their memories be preserved.

Yours truly,

F. B. IVES, M. D.

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CHICAGO, ILL., June 9th, 1887.

*O. Guthrie:*

DEAR SIR:—In calling up incidents illustrating the interest in the introduction of chloroform for surgical purposes, I remember that in the winter of 1849-50 Dr. Valentine Mott while lecturing to his class in the University of the city of New York, referred to his first trial of chloroform in a surgical operation.

He said, after he had completed his operation, his patient awoke as from a refreshing sleep, no complaint of suffering, no exhaustion, no shock from the operation; he for a moment contemplated the amount of pain, suffering and torture he had inflicted in previous operations, and the groans and wailing he had heard; he was at a loss for an expression suitable for the occasion, and could only say, "Now lettest thou thy servant depart in peace for mine eyes have seen thy salvation."

Respectfully, J. R. GORE, M. D.

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GALESBURG, ILL., July 6th, 1887.

*O. Guthrie, Esq.*

DEAR SIR:—I have very carefully read Dr. Charles C. Bourbaugh's article on chloroform and having myself while

in the U. S. Army and since, used several hundred pounds of chloroform and carefully watched its effects, without a single case of failure and without a single fatal ending which could be attributed to chloroform, I cheerfully subscribe to every assertion mentioned in his very able article.

E. S. COOPER, A. M., M. D.

Late Surgeon of 84rd Regiment of Illinois Vols.

The subscribers to the *Chemist and Druggist*, London, having been asked to send to the editor 10,000 prescriptions, a digest of the answers received shows that spirits of chloroform, sal volatile, glycerine, and sirup of orange peel take high place as drugs most frequently prescribed.

The following is from Haydn's Dictionary of Dates: Chloroform (the ter-chloride of hypothetical radical formyl) is a compound of carbon, hydrogen and chlorine, and was made from alcohol, water and bleaching powder. It was discovered by Mr. Samuel Guthrie, of Sacket's Harbor, New York, in 1831, and independently by Liebig in 1832. Its composition was determined by Dumas in 1834. A committee of the Royal Medical and Chirurgical Society reported that the rate of mortality had in no degree increased by the use of anæsthetics, July, 1864.

WAR DEPARTMENT,  
SURGEON GENERAL'S OFFICE,  
WASHINGTON, May 24, 1887. }

*Mr. Guthrie:*

DEAR SIR:—The quantity of chloroform used during the four years of the late war was something more than one million and a half of pounds; and since the war 8,500 pounds.

Very respectfully,  
JOHN MOORE,  
Surgeon General, U. S. A.



## APPENDIX

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Dr. Guthrie's experimenting, so auspiciously begun, was doomed to be of short duration. The restless ambition of his sons deprived him of their assistance early in the year 1832, and he was compelled to exchange his favorite pursuit for the cares of business; for, notwithstanding his devotion to the laboratory, he never overlooked the necessity of strict business methods.

In this connection, some account of Dr. Guthrie's sons may, perhaps, be properly introduced. They were among the first victims of the "western fever," Alfred going to Illinois, and Edwin to Iowa, where he soon identified himself with the political affairs of the State, and was for a time Warden of the Penitentiary at Fort Madison.

In 1846 he was commissioned Captain of Co. K. 15th U. S. Infantry, and went to Mexico. Just before that time, Capt. John Page, of the 4th U. S. Infantry, was killed at the battle of Palo Alto, by having his under jaw shot away.

Alfred, upon learning of his brother's intention to join the army, wrote him, calling his attention to the fate of Page, and urging him to abandon the idea. The following letter, dictated by Edwin and written by his son, tells the rest.

"Well, brother Alfred, I have indeed met the fate of Page. I have been wounded, and am to die in the Castle of Perote———  
A few hours closes my earthly career."

EDWIN GUTHRIE.

He was wounded in the knee by a guerilla on the 20th of June, and after suffering two amputations, died on the 20th of July, 1847, a few hours after dictating the above letter, the signing of this being about the last act of his life.

Guthrie County, Iowa, was named in his honor.

Alfred finally took up his residence in Chicago in 1845. Here he designed the "Hydraulic Works" of the Illinois and Michigan Canal, for supplying the summit level (30 miles long), with water from Lake Michigan. This was the first work ever erected for such a purpose, and was capable of raising a larger quantity of water than any other establishment then in existence, and for twenty-three years, and until 1871, when the canal deepening was completed, never failed to perform the duties required.

These works, in point of economy of construction and

efficiency of operation, were among the most successful public works of the time.

The terrible steam-boat disasters of 1851 so impressed Mr. Guthrie, that he conceived the idea of laying the foundation for National legislation to control the construction and management of steam-vessels. To this end, and at his own expense, he examined about two hundred steam-boats.

By various devices he secured opportunities to note unskilful and dangerous management, and take notes and measurements of defective parts. He made drawings of faulty boiler connections, safety valves, feeding apparatus, &c., and gave particular attention to the methods of engineers during exciting races.

The results of these investigations were embodied in a memorial to Congress, accompanied by the data he had collected, and drawings he had made. He drafted a bill which was substantially the "United States Steamboat Law" of to-day; it included also the life-saving service. Mr. Guthrie's efforts were met by strong opposition from steam-boat owners, and delegations were sent by them to Washington to defeat the passage of the bill, but his work had been so thoroughly done as to leave no doubt of the necessity for a law, and the bill he had prepared was passed without material change. Attention is called to the following:

Annual Report of the Supervising Inspector General of Steam-vessels to the Secretary of the Treasury, 1880.

"In the valley of the Mississippi, and in the Gulf of Mexico, up to the year, 1849, there were 1,656 steam-boats, of which number there were lost by sinking, 419; fire, 104; explosions, 168; collisions, 45. Total, 736.

From this statement it will be seen that nearly 45 per cent. of steamers built up to the time given, were lost from causes here enumerated. There were killed and wounded during the same period, from explosions alone, 4,660 persons. No data are given of casualties by burning, sinking, wrecks or collisions.

The report of the same official in 1882, referring to a table of statistics here omitted, says:

"Of the foregoing lives lost but fifty-six are reported as those of passengers, the remainder being employes of the steamers, many such losing their lives through carelessness begot by familiarity with dangerous duties. In 1882, number passengers carried, 354,000,000; number of lives lost, including passengers and crew, 205; number of steamers running, 5,117; loss of life, only one to each 1,726,287 persons carried. That the steamboat laws have been as beneficial as the framers of them anticipated, may be justly claimed by comparing the percentage of loss of the present year with that of the year 1851, the year preceding the enactment of the first really efficient law for the protection of life on steam

vessels. In that year the number of passengers carried was 39,204,691; number of lives lost, 700; number of steamers running, 1,390; loss of life, one to each 55,714 persons carried."

How small a proportion of the vast number of passengers transported upon steamers in 1882, knew to whom they were indebted, or who it was who conceived the idea and laid the foundation for the unparalleled immunity from danger which they enjoyed.

So grand an opportunity to benefit his fellow-men as that which presented itself to Alfred Guthrie in the creation of the United States Steam-boat Law, falls to the lot, and lies within the scope of but few men. Not many men are endowed with ability and courage to establish precedents, or with the courage to disregard erroneous ones already established. The old precept, "Spare the rod and spoil the child," notwithstanding its source, and the halo of antiquity by which it was surrounded, he spurned from his household; and at school, the brutal argument, the whip, was never applied to his children. In this respect may we not claim for him that he was among those who more than half a century ago set the example for the enlightened government now prevailing in our public schools.

Alfred Guthrie died at Chicago on the 17th of August, 1882, in the seventy-eighth year of his age.

The reader's attention is called to the following explanations:

The picture of the house in which Dr. Guthrie was born, is from a photograph recently taken, and which has been kindly furnished by Henry F. Brown, of Brimfield, a gentleman now seventy years of age, who has known the premises from childhood, and whose grandfather occupied the house from 1820 to 1822. Until within a few years a majestic elm adorned the front yard; the present owner cut it down.

This house is situated on the east side of the road near Hitchcock's brook, about 300 rods up-stream from "Mill River," and about three-fourths of a mile south-east of the church in Brimfield Centre. A bridge spans Hitchcock's brook near the house, which is still known as Guthrie's bridge.

The map on page four will give the reader a very correct idea of the location of Dr. Guthrie's house and other buildings.

The Hon. John Pettit, a representative in Congress from Indiana about the year 1850, was a son of Mrs. Pettit, whose house is located on this map in Jewettsville, and this

was his boyhood home. In that school-house, the writer learned his letters.

When Dr. Guthrie had perfected his percussion priming powder, he asked the privilege of the officer in command of the garrison of exhibiting it by firing a cannon. His request being granted, he provided himself with hammer and punch, and made what he supposed was a successful exhibition; but the officer thought it would be impracticable "to carry hammers and punches around to fire cannon with." The Doctor returned home, removed the flint from the lock of his gun, substituted a piece of steel similar in shape, but provided with a beak, or small punch on one side, enlarged the original fire passage at the breech, screwed in a short plug which had a fire passage in its centre connecting with the bottom of the priming cup, and adjusted the improvised punch so as to strike into it. The "percussion pill" was placed in this cup, and the gun fired by pulling the trigger; thus the obstacle of "carrying around hammers and punches" was overcome.

This rude contrivance soon gave way to the regularly constructed "punch lock," the hammer of which, being provided with a punch about one-sixteenth of an inch in diameter at the end, the idea being to concentrate the force of the lock upon a small surface and thereby ensure ignition. This idea has been perpetuated, in various forms, in modern locks, and the "flash in the pan" and "picking the flint," soon became matters of history only.

The gun herewith presented to the society correctly illustrates the first "punch lock" gun.

There is a neighborhood tradition current at Sacket's Harbor that the French government at one time sent Dr. Guthrie a consignment of caps to be primed with his percussion powder, and that he in return for the compliment gave his formula for making it.

The still and worm in which Dr. Guthrie distilled the first chloroform, at his death, fell to the lot of his son, Alfred, and by him was stored away, as was supposed, in a place of safety, but from which it was stolen. The still herewith presented to the Society is a fac-simile of that still.

In relation to priority of discovery of chloroform, the writer has heretofore confined himself strictly to published documents, but now desires to present his recollections with some corroborative incidents bearing upon the subject.

Dr. Guthrie was induced to try the experiment which led

to the discovery of chloroform by reading an article published in vol. 2 Yale College Elements of Chemistry. Prof. O. P. Hubbard, who, from 1831, to 1836 was Prof. Silliman's assistant, informs the writer that it was possible for this publication to have reached Dr. Guthrie in March, 1830. In all probability, within a few hours of the time of reading this article that work was begun and pursued without intermission, to success.

Dr. Guthrie wrote Prof. Silliman three letters in 1831, in which he gave his methods of obtaining ten different chemical products therein named. These dates were May 8th, July —, and Sept. 12, 1831.

On page 288, v. xxi., A. J. S. & A., the letter of July —, 1831, ends, and that of Sept. 12 begins. In this letter, four of the ten chemical products, and the methods by which they were obtained, are detailed, and a "bottle and phial of chloric ether," are incidentally mentioned. The other six articles, among which is chloric ether, remain to be assigned to one of two dates, viz., May 8th, or July —, 1831, chloric ether having precedence over all, in position in the volume.

In the memory of the writer there is no intervening time between the production of chloroform and the manufacture of "potato molasses," and the latter occupied much of Dr. Guthrie's attention during the year 1830. See p. 93, May, 8, 1831, vol. xxi., A. J. S. and A. These considerations coupled with events of fixed date leave no doubt in the writer's mind but that Dr. Guthrie obtained his first chloroform as early as the summer of 1830. Shortly after the birth of a brother of the writer, April 29, 1831, the family removed from the immediate neighborhood of his grandfather, to the village of Sacket's Harbor. Previous to this he was in the laboratory daily, and has a distinct recollection of having inhaled the odor of chloroform before that date.

The five samples, of percussion powder herewith presented to the Society and heretofore mentioned, were sent to Prof. Silliman at Yale College in 1831. They have all been tried, and readily explode under the hammer of a gun. The chlorate of potash and phial of potato molasses are also the same as heretofore described.

When we understand that anæsthesia was practiced in surgery, to some extent, hundreds of years ago, and that Chinese tradition was more potent in its perpetuation than the art preservative, even in this, its native land, the curiosity which seeks the cause is not easily suppressed. Was

it the bigotry which impeded the progress of humanity to the middle of the nineteenth century and still exacted the suffering of parturition, such, for instance, as opposed the work of Simpson?

The idea had been entertained of giving, in connection with the history of the discovery of chloroform, an account of the discovery of anæsthesia, and all available data had been collected for that purpose; but the time and space required to give a complete history deterred the writer from making the effort; he will however, give some facts without references.

Dr. Crawford W. Long, of Athens, Ga., on the 30th day of March, 1842, administered sulphuric ether and performed, as is now believed, the first recorded and well authenticated surgical operation with the aid of re-discovered (if this designation be proper anæsthesia. In the result of this operation, Dr. Long's expectations were fully realized, and thenceforward sulphuric ether was administered in his surgical operations.

Unfortunately for humanity Dr. Long failed to publish his discovery to the world, although he made no secret of his agent or his method. The misfortune was in his environments.

On the 16th of October, 1846, a surgical operation was performed upon an anæsthetized subject in the Massachusetts General Hospital. The publication of the result of this operation was the first announcement to the world that painless surgical operations could be performed, and it created a most profound sensation. Although Dr. W. T. G. Morton, administered the sulphuric ether which produced insensibility, it must not be forgotten that Dr. Horace Wells and Dr. Charles T. Jackson had, before that time, contributed so largely to that great result, as to entitle them fully an equal share of the credit.

Sir James Y. Simpson, of Edinburg, in November, 1847, discovered the anæsthetic properties of chloroform and, says Dr. Dunster, "coined and introduced into our medical nomenclature the word 'anæsthesia'."

The writer wishes to acknowledge his obligations to the following named gentlemen for valuable assistance rendered him in collecting the data:

F. B. Powers, Ph. G., Ph. D., Madison University, Madison, Wis.; S. W. Hillyer, Ph. D., Madison University, Madison, Wis.; Dr. John E. Davies, Washburn Observatory, Madison, Wis.; W. R. Orndorff, Ph. D., Johns Hopkins University, Baltimore, Md.; Prof. O. P. Hubbard, New

York; Prof. Edw'd S. Dunster, Ann Arbor, Mich.; Col. W. B. Camp, V. P. Jeff. Co., H. S. Sacket's Harbor, N. Y.; Dr. James A. Gray, Editor *Atlanta Medical and Surgical Journal*, Atlanta, Ga.; Dr. Lamdon B. Edwards, Editor *Virginia Medical Monthly*, Richmond, Va.; Dr. Henry M. Lyman, Dr. John Bartlett and John C. Jackson, Chicago.

Shellac varnish was twice used in the manufacture of percussion powder, once as an ingredient added before the graining process, and again for coating; either with or without bronze, to protect against moisture. To the use of shellac varnish, is undoubtedly largely due, the apparent indestructibility of this percussion powder.

Where the word antimony occurs, it should be followed by sulphide.

April 10, 1827, Dr. Guthrie assisted in establishing the Houndsfield Library and was one of the trustees. This library contained about 500 volumes. He was also a stock holder in one of the first woolen mills established at Watertown.

Sarah Guthrie, mentioned in connection with the case of small pox on page nine, had been vaccinated by Dr. Guthrie, and, to demonstrate its efficacy, slept in the room with the patient she was nursing.