

# ALEXANDER MARCET, CHEMIST, PHYSICIAN AND GEOLOGIST, A NEGLECTED FIGURE IN BRITISH SCIENCE FROM 1797 TO 1822

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G. J. Leigh, University of Sussex; jeffery.leigh@sky.com

Alexander Marcet, born in Geneva in 1770, was exiled from there in 1794 to Edinburgh where he studied medicine and chemistry. He then moved to London in 1797, and married Jane Haldimand in 1800. Apart from supporting her in writing her noted series of books of scientific conversations, especially *Conversations on Chemistry*, he established himself in society as a fever doctor, taught chemistry at Guy's Hospital, and assisted in several national emergencies including the treatment of Walcheren fever, vaccination against smallpox, and the threat of invasion by Napoleon. He tried to establish the chemical nature of medical stones, isolated xanthine and collaborated with Berzelius on carbon disulphide, and was acquainted with scientists such as Wollaston, Smithson Tennant, Davy, Roget, Yelloly and Faraday. He tried to use analysis to identify biological materials, encouraging the widespread application of medicine to protect the health of the public at large. He was influential in establishing The Geological Society and also the predecessor of the Royal Society of Medicine. Alexander died in 1822.

## Introduction

Alexander Marcet is remembered today, if at all, as the husband of Jane Marcet, who wrote several influential instructional books on science in the nineteenth century, particularly *Conversations on Chemistry* (1). Her *Conversations on Political Economy* was perhaps even more important, but it is unlikely that Alexander

contributed as much to this and her many other related volumes. However, his assistance to his wife was only a minor part of his own scientific activities, which were wide and influential. As well as researching in chemistry and medicine, he contributed to the development of medical and scientific societies in London around the turn of the eighteenth and nineteenth centuries. His contribution to the writing of Jane's *Conversations on Chemistry* has been well documented (2, 3). The current paper is a unique account of Alexander's scientific and public activities from about 1800 until his death in 1822.

## Early Life and Education

Alexander was born Alexandre in 1770 in Geneva, to a family which was part of the ruling elite. Genevan society at that time had an unusually liberal attitude, to universal education in particular. When the French Revolution reached Geneva in 1794, Alexander was exiled from the city as a consequence of his earlier activities in the Geneva voluntary militia. He moved to Edinburgh University to study medicine at what was then the leading medical school in Europe. He graduated in 1797, and still unable to return to Geneva, he moved to London. The contacts he made in Edinburgh, and the people there who had become his friends, exercised an important influence on his later life. He brought with him to London from Edinburgh fresh insights into medicine and particularly chemistry. He had been taught by Joseph Black who pioneered the teaching of the "French chemistry" before it

was widely established in Britain. In addition, his family and francophone connections gave him a direct link to scientific and political developments on the Continent. His background was more cosmopolitan than that of most of the circle with which he associated in London. From 1797 he worked in London in several areas of professional and public importance, at a time when science as a profession and a discipline was still becoming established. Several accounts of his life are available (4-6) but the current paper is more detailed than these, describing Alexander's significant contribution to the scientific and social development of his adopted country.

### Life in London

Alexander took up an appointment at the Carey Street Dispensary in 1797, moving to the City Dispensary in 1798. Fevers of various kinds were common at all social levels of the population, though the majority of sufferers were poor and forced to depend upon charities such as the dispensaries for any treatment. Alexander's appointments must have required a considerable amount of work for low reward. It seems to be a coincidence that Carey Street is close by St Mary Axe where his future wife, Jane Haldimand, lived with her father. The exiled Alexander needed to restore his financial and social position by acquiring wealthy private patients, and these he set out to find.

By 1802 Alexander was building a reputation as a fever doctor but was clearly dissatisfied with his work at the City Dispensary. A letter in the Alexandre Marcet archive in the Bibliothèque de Genève (designated BGE in this text) shows that in 1802 Alexander was mounting a campaign to support his election to the post of Assistant Physician at Guy's Hospital. Many of the individuals he enlisted for support, as well as their families, were already amongst his patients. Figure 1 lists the Governors of Guy's Hospital (7), and a hand-written accompanying note with further names lists people who were going to approach which Hospital Governor on Alexander's behalf (8). The breadth of his support is notable. His active supporters included Sir William Wickham, Sir Samuel Romilly, and Charles Abbott, later first Baron Colchester, one-time Speaker of the House of Commons. Abbott wrote from Eastbourne directly to Alexander at St Mary Axe about the election (9)

1. Sept. 1802

I fear I can serve you little upon your present canvas – but I have written to Sir Joseph Banks - M<sup>r</sup> [name illegible] Thornton – Mr Manning – & Sir Francis

Baring – & heartily wish you success.

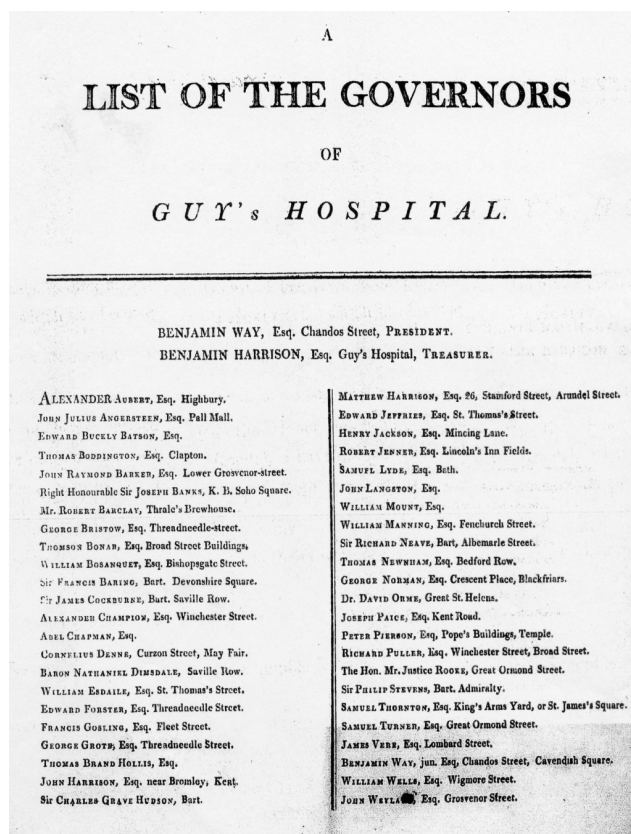
Mrs Wickham [who was of Genevan extraction and wife of William Wickham, the politician, civil servant and spy master] by all accounts rides on horseback & may be considered as nearly re-established

I am

Dear Sir

Yr Most obed Servt

Chas Abbot



*Figure 1. List of the Governors of Guy's Hospital who were eligible to vote in 1802 when Alexander Marcet was elected Assistant Physician. The list is in the Alexander Marcet Archive at the Bibliothèque de Genève (7).*

Several of the Governors promised to vote for Alexander. Another Governor, a judge, Justice Roope, wrote to William Wickham (10) saying that though he supported Alexander's election, he wouldn't bother to go to vote because the result was a foregone conclusion.

Dear Sir

Your Favor of the 6<sup>th</sup> Instant has been duly forwarded to me; I have delayed answering it in the Hope to be able to write decidedly to you on I [word illegible] of yr application: & I think myself peculiarly fortunate

in acquainting you that, tho' if it were necessary I wo<sup>d</sup> [word illegible] at Guy's Hospital to vote for Dr Marcet yet, I learn from a Letter from the Treasurer [Benjamin Harrison] that he is generally approved of by the Governors therefore my attendance is unnecessary there being no doubt of his success. I shall at all Times be ready to pay attention to your application & am with great esteem and respect, Dear Sir

Y<sup>r</sup> Obed<sup>t</sup> Serv<sup>t</sup>

G. Rooke

Not everyone Alexander approached responded to his entreaties for support, notably Sir Joseph Banks on 21 August 1802 (11). Banks was an eminent member of the Royal Society and long-time President.

Sir Jos: Banks presents his Comp<sup>ts</sup> to Dr Marcet & begs the Dr to be assured that far from having forgotten him he Remembers with pleasure some good offices he Receivd from the Dr Several years ago Sir Jos: will be happy if he Can be of Service to the Dr in this or any other occasion however he can not promise anything as the governors always Settle the affairs of Election in Private to prevent the unpleasant consequences of contested Elections.

What the good offices he had received from Alexander are not evident, but evidently Banks, a Governor of the Hospital at the time, did not wish to promise anything. His preference that matters should be settled between gentlemen in private was in character. Many years later, in a letter to Alexander now in the Banks Archive Project (12), dated 27 July 1816, Banks was regretfully again unable to help, though the context is again not evident.

My Dear Dr

I have received an answer from Clermont not very advantageous for the Present but which holds out some hope for futurity when Ever you Call here you Shall See it

Faithfully yours

Jos: Banks

A letter from this period to Alexander from John Yelloly, also a physician and a chemist, is held with many others exchanged between them in an archive at the History of Medicine Collections of Duke University, here designated HMLDU (13). Like Alexander, Yelloly was a graduate in medicine of Edinburgh University, and like him had moved to London. Unless otherwise stated, Yelloly's letters cited here are copied with permission from the Duke University archive. By 13 August 1802 Yelloly knew that Alexander was trying to obtain a position at Guy's, and he was attempting to help him to do so. He wrote to Alexander:

My Dear Sir

I think I may venture to assure you from pretty good authority of your success at Guy's, and tho' congratulations would be as yet premature, I hope to be able to present them in a month [word illegible] of this when we meet, and in the mean time I remain

Yours very truly

J. Yelloly

Wednesday morning

The election took place on 25 August 1802 and Alexander was successful. In 1804 when Dr Relph, a Physician to Guy's, died, Alexander applied to be appointed Physician in his stead. He mounted a similar campaign and was again elected.

### Early Chemical Work

Once established at Guy's Hospital, Alexander was required to teach chemistry to medical students. Chemists were reporting many new compounds and there was a desire amongst doctors to test them as drugs, though some evidently did more harm than good. Alexander's colleagues at Guy's included Allen and Babington who had published a syllabus for teaching chemistry to medical students as early as 1802. Similar syllabuses were published until at least 1822 and Alexander combined with Babington and Allen to update the syllabus in 1816 (14, 15). By 1822 some of the authors of the syllabus and Guy's Hospital staff had changed (16) but the teaching of chemistry to medical students continued. Two illustrations from these syllabuses, Figures 2 and 3, are shown below. The chemical laboratory of 1816 (Figure 2) contains some pieces of glassware that would be found in a chemistry laboratory today. Figure 3 dates from 1822 and the beginning of the quantitative study of chemistry, when the practical and compositional implications of the atomic theory were still being evaluated. Several of the numbers quoted in this table are clearly in error, even allowing that the weights are all standardized to O = 1 rather than to C = 12, as today. Another of Alexander's acquaintances, William Wollaston, was a principal researcher in establishing a quantitative approach to chemical composition (17, 18).

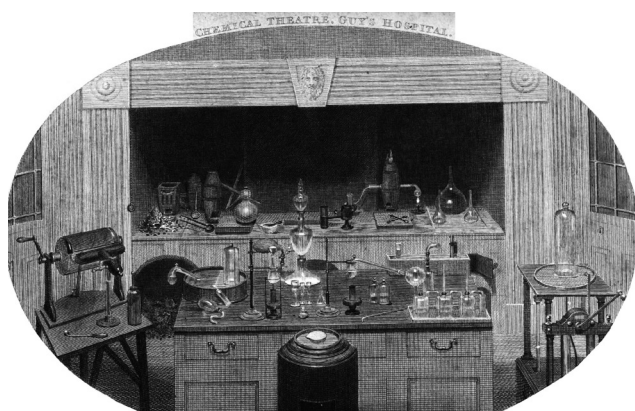


Figure 2. A well-found chemical laboratory in 1816 (15).

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*Table of Proportions, according to which the following Bodies combine.*

Oxygen 1.	Iodic Acid 20.5
Nitrogen 1.75	Alumina 3.2
Carbon 0.75	Platina 23.73
Carbonic Acid 2.75	Gold 25.
Hydrogen 0.125	Silver 13.7
Water 1.125	Mercury 20.5
Potassium 4.97	Prot. Merc. 21.5
Potash 5.97	Perox. Do. 22.5
Sodium 2.95	Lead 12.95
Soda 3.95	Prot. Lead 13.95
Barytes 9.7	Copper 6.
Strontia 6.5	Perox. Copper 10.
Lime 3.54	Iron 3.5
Magnesia 2.47	Perox. Iron 5.
Ammonia 2.125	Tin 7.35
Nitric Acid 6.75	Bismuth 8.87
Sulphur 2.	Nickel 3.6
Sulphuric Acid 5.	Arsenic 9.5
Sulphurous Acid 4.	Arsenious Acid 12.5
Hypo-sulphurous Acid 3.	Arsenic Acid 14.5
Sulphuretted Hydrogen 2.125	Cobalt 5.4
Phosphorus 1.5	Zinc 4.4 or 4.1
Phosphoric Acid 3.5	Manganese 7.53
Chlorine 4.45	Perox. Mang. 10.53
Chloric Acid 9.45	Oxalic Acid (2 carbon + 3 oxygen)
Dry Muriatic Acid 4.575	4.5
Iodine 15.5	Tartaric Acid (3 hydrogen + 4 carbon
Hydriodic Acid 15.625	+ 5 oxygen) 8.375

THE END.

Figure 3. The last page of the 1822 Guy's Hospital chemistry syllabus (16).

### Service for the British Army

After the French Revolution of 1789 the British establishment was very suspicious of political and philosophic ideas emanating from France, but the treaties of

London (1801) and Amiens (1802), which attempted to establish a world-wide settlement between Britain and the newly established French Republic were greeted by the Marcets in London with enthusiasm, as their correspondence shows. The treaties did not hold for more than about a year, when Britain and France renewed their war. By mid-1803 Britain was again threatened by invasion, and Alexander clearly felt he should do something to protect his adopted country against the French threat. Alexander joined the Light Horse Volunteers. He seems to have had some social contact with its Colonel, Charles Herries, and three letters from the colonel concern an accident suffered by Alexander, apparently a fall from his horse, during a journey to an inn called The George (19). The Volunteers seem to have been a rather stuffy upper-class English (rather than British) organization. Parading and playing military games seem to have been a major occupation, although the Volunteers elected to place themselves under national command if there were an invasion. Alexander was informed of his election by a letter from the Secretary dated 30 June 1803 (20).

Sir

I am directed by the Committee of the Light Horse Volunteers to acquaint you that you are elected as Honorary Member of the Corps and that you may enjoy the following privileges

Wearing the undress Uniform of the Corps, and being present if you chuse it at all general meetings but not entitled to vote,

Learning Chasing[?] Fencing, & the use of the Broad Sword, gratis,

Keeping a Horse at the Corps Stables provided they are not filled by those of effective Members—

Having the option of joining the Corps, provided there is a Vacancy, upon giving Notice to the Commanding Officer that he may apply for His Majesty's approbation.—

And lastly you are subject to no other Expencc until you join than the Annual Subscription of Eight Guineas towards the General Charges of the Establishment.

I have the honor to be

Sir

Your most Obedt Servt

Ed. Hughes, Sec.

N. B. The Exemptions enjoyed by the Light Horse Volunteers, such as from serving in the Militia Tax for one House, Powder Tax &c cannot be availed of by any one till he is enrolled, approved by his Majesty and has joined the Corps.

On 23 July 1803 Alexander received another letter asking him to make himself [physically?] fit, and with a request for £43/18/9 (about £43.93) to pay for his “Arms and Accoutrements” and his annual subscription of eight guineas (£8/8/0 or £8.40). Service in the Light Horse Volunteers was not a poor man’s pastime. Alexander was provided with a list of tradesmen who would supply him with the necessary equipment, and he was assigned to First Troop, provided he had a horse of the proper color. Presumably this was so that they would not offend the artistic sensibilities of the opposing French, should they invade. When he resigned in 1806, Alexander offered his services as Physician to the Light Horse Volunteers, who seem already to have had an official Surgeon. His generous offer was gracefully refused by Colonel Herries, since it was not deemed appropriate for a regiment of cavalry to have an official physician (21).

Orderly Office 24 Oct 1806

Dear Sir

I have the pleasure of informing you that the Light Horse Volunteers in accepting of your Resignation as an honorary effective have been elected as an honorary Member, and resolved by joining your name to that of Dr Saunders, to avail themselves of your handsome offer to give your advice in a medical capacity when necessary to any of the dependants of the Corps; but as we already had the honor of informing you, they cannot regularly propose the appointment of a Physician to a Reg<sup>t</sup> of Cavalry

I am with great regard

Dear Sir

Your faithful humb. ser<sup>t</sup>

Charles Herries

Col L. H. V.

Dr Marcet &. &. &.

The Dr. Saunders mentioned in this letter was a Scottish physician, William Saunders, who had studied medicine at Edinburgh University and was a colleague of Alexander (22). He was elected Physician at Guy’s in 1770, and retired in 1802, and had been a Fellow of the Royal College of Physicians since 1790. One of his patients was the Prince Regent. Although William Saunders was considerably older than Alexander, the Saunders and the Marcet families were friends. Saunders, like Alexander, was distressed by the rigid boundaries that seem to have existed in England between Surgeons, Physicians, and Apothecaries, and he tried to overcome them. In 1805 Alexander chaired the inaugural meeting of the Medical and Chirurgical Society, later a founding partner of the Royal Society of Medicine (23).

## The Medical and Chirurgical Society

The Medical Society of London had been founded in 1773, in part with the aim of enhancing cooperation between the medical professions. Many members had become dissatisfied with the way it was run, and they met together at The Freemasons’ Tavern on 22 May 1805 to form the Medical and Chirurgical Society. Its purpose was “conversation on professional subjects, for the reception of communications and the formation of a library” in the service of various branches of the medical profession. William Saunders was the first President, John Yelloly an Honorary Secretary, Astley Cooper the Treasurer, and Alexander Marcet the Foreign Secretary. Peter Mark Roget eventually ran the Library, and he became President in 1829. There was a considerable struggle, aided by such as Sir Samuel Romilly, to obtain a Royal Charter, because of resistance from the medical establishment and Royal Colleges, but this was finally achieved in 1834. In 1907 the Society was united with various other specialist societies to form the Royal Society of Medicine.

Yelloly and Alexander were principal actors in all these early developments, and Alexander also introduced eminent foreigners to the Society. Banks and Davy were members, and Berzelius, de Carro, Corvisart (Napoleon’s personal physician), Odier, and Sabatier became Honorary or Honorary Foreign members. Peter Mark Roget also appreciated his activities greatly, exemplified by an obituary he wrote for Alexander and discussed below.

John Yelloly was also keen to retain Alexander’s support for the new society and he wrote to him on 13 June 1805 as follows (24):

It is really quite impossible that you can think of the possibility of being absent tomorrow from the meeting; and indeed considering the many little arrangements it may be proper to think of, it would be much more convenient if you were at home in the forenoon, that we may confer together...Nothing I assure you would be as mortifying to me as not to have you sitting next to me at the meeting, and I should not even like to be there before you, as you may readily conceive that to be there unsupported (for all our committee felt less interest than we do) must be particularly disagreeable – I request you will give me your assurance before you leave Town that you will be at the meeting at two o’clock. I would if I could for an instant have imagined the possibility of you being absent from the 1<sup>st</sup> general meeting I should certainly for my part have taken no stake in the interprise [*sic*] in which we are engaged at all.

## Smallpox Inoculation

As well as his work with the Medical and Chirurgical Society, Alexander was active in matters related to public health, and his wife Jane supported him in this work. One of the diseases which Alexander met in his work in the public dispensaries was smallpox, a cure for which was not known. However, prevention of smallpox by inoculation was gradually being practiced in some circles, including many of the royals and upper classes, and it was becoming more common.

The idea of inoculation was considered bizarre in some circles, and the eccentric behavior of the English upper classes in this context had earlier been recorded by Voltaire (25) but many people and organizations were beginning to accept that this surprising method of smallpox prevention, which had originated in the Middle East, was better than suffering from the disease. For example, the members of the British fleet which isolated Napoleon's army in Egypt in 1798 by cutting its supply lines at the battle of Abukir, and also the men of Napoleon's army in Egypt, were inoculated against smallpox (26). However, it was only with the wider recognition of the possibilities of vaccination that doctors began to think that it might be possible to eradicate smallpox entirely.

The person most often identified with smallpox vaccination is Edward Jenner (1749-1823), whose work had been recognized by his neighbors in Gloucestershire by the award of a testimonial (27, 28). He vaccinated many people for free, especially around his Gloucestershire home. Though a country doctor, he had worked for Sir Joseph Banks on the material brought back from Cook's first voyage of discovery, and his background was in natural history and geology. He graduated at St Andrew's in Scotland as doctor of medicine in 1792, so he came to medicine in his forties, rather later in his life than Alexander and his colleagues. However, he clearly influenced them, and also people such as de Carro and Odier, who spread the vaccination gospel across Europe. Alexander had also recommended inoculation to some of his patients, including Sir William Wickham and his wife, Eléanore, who was also of Swiss origin.

In 1801 Jenner spent a year to try to establish himself as a physician in London, but he was not successful, and returned to Gloucestershire in 1802. Jenner had been in favor of setting up an Institution for Gratuitous Vaccination, and in 1802 the Jennerian Society (soon to be the Royal Jennerian Society) was formed in London. A meeting of three hundred people chaired by the Lord

Mayor of London was held at the London Tavern in Bishopsgate on 19 January 1802. The intent was to abolish smallpox and the meeting appointed an organizing committee of 54 members, supported by the Dukes of Bedford and of Clarence. Royal Patronage was rapidly achieved, and the first meeting of the Royal Jennerian Society was held early in February 1802. The campaign to eradicate smallpox from the world which started in 1802 took nearly two hundred years to complete (29).

Alexander's important part in supporting Jenner and encouraging universal inoculation against smallpox has not been generally recognized. It is exemplified by an entry in the *London Times* of 12 January 1803 which announced a public meeting to consider the best means to exterminate smallpox using Dr. Jenner's techniques. The Chair was to be taken by the Lord Mayor of London, and amongst those listed as supporters of the project were William Wilberforce, William Babington, Astley Cooper, C. R. Aikin, and Alexander Marcet M.D.

An early job of the organizing committee of the Jennerian Society was to appoint a "resident vaccinator." Alexander was deeply involved in all this, and the Geneva archive contains many papers, generally formally printed, recommending two particular candidates, a Dr. Domeier and a Dr. Walker. Each candidate was running a campaign, pulling as many strings as he could, exactly as Alexander had done when he applied for positions at Guy's in 1802 and 1804. A letter of 4 April 1803 from Anne Romilly, the wife of Sir Samuel Romilly, to Jane Marcet (30) reveals that Alexander was one of a large number of people involved in selecting the vaccinator. The Romillys then lived in Gower Street whereas Jane and Alexander still lived at St Mary Axe. Later the two families were neighbors and friends in Russell Square.

My dear Mrs Marcet

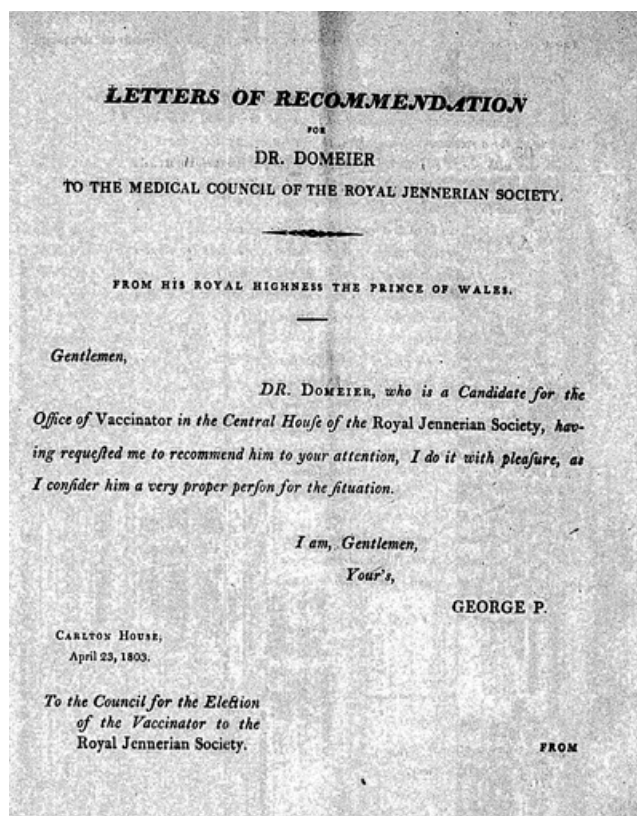
Understanding that Dr Marcet is one of the Council of fifty appointed to nominate a Resident Physician to the Jennerian Society Mr Romilly and I wish to mention a gentleman whom we believe to be extremely well qualified for the situation Dr Domeier has been ten years Physician to the Duke of Sussex and is an uncommonly clever man, at Lisbon he introduced the vaccine with the greatest success and had the children of the first families under his care,..... he is remarkably well informed and clever in his profession to which he is devoted; His merits as a Physician are well known to all the Royal family .....we cannot presume to do more than mention Dr Domeier's name as a candidate of very great talents I hope you and

Dr Marcet will excuse the Liberty I have taken and believe me to be

Very sincerely yours

A. Romilly

One of several further recommendations on behalf of Dr. Domeier, who had been the royal physician in Hanover, are in the Marcet archive (31). One of these, from the Prince Regent, is shown in Figure 4. The Royal Family were evidently not too worried about publicly exerting influence in favor of Domeier, though the nautical Duke of Cumberland and another writer expressed a surprising anti-foreign feeling (27, 32). The other candidate was a Dr. Walker, who had distinguished himself as a vaccinator in several different places, and he submitted several references, including some from the commanders of the British Fleet referring to his work with the Fleet in Egypt (33). Dr. Walker was elected, and during about three years performed thousands of vaccinations annually (33)



**Figure 4.** Letter of recommendation for Dr. Domeier from the Prince Regent. This printed letter is in the Alexandre Marcet Archive of the Bibliothèque de Genève (31).

Some of the letters in the Alexandre Marcet archive of the BGE and concerned with inoculation and inocula-

tors were addressed directly to The Board of Directors of the Society, so it would appear that Alexander was also a member of the Board. The direction of the Society was weak, and Dr. Walker was too opinionated for Jenner's taste. Walker had, after all, carried out some fifty thousand vaccinations in all, and he thought himself well qualified to advise and recommend. After a series of unseemly public discussions, Walker was dismissed. There was the usual public exchange of letters, some of these dating to 1806, and they again found their way to Alexander. Dr. Walker set up his own Institution for vaccinating the populace, and the Jennerian Society gradually dissolved, finally expiring in 1808, to be replaced by a publicly funded National Vaccine Institution.

Jenner and Alexander were good friends. Between 1801 and 1814 Jenner wrote Alexander nineteen letters, which are now in the possession of the Royal Society of Medicine. A further letter from Jenner to Alexander dated 2 July 1814 bears witness to their friendship (34).

My dear Doctor

Never shall I forget the jewel of a day when we journeyed together into Essex. I feel as if I am now united to the highest pitch of saturation, bidding defiance to the powers of all decomposition save one which we must all submit to.

This letter continues with an invitation to Dr. and Mrs. Marcet to visit him at his home in Cheltenham, and with a discussion of problems with papers for publication. Apparently the Marcets did not take up Jenner's invitation before 1822 when Alexander died. Jenner himself died in 1823.

Alexander continued his association with de Carro in the context of vaccination. An unsigned letter in the HM-*DLU* archive (35) to Alexander from Vienna and dated 14 January 1804 was almost certainly written by de Carro. This letter asks whether Alexander has received his work on oriental vaccination and also a packet he wished to send to a Dr. Waterhouse of New Cambridge in America. The work was almost certainly a book, *Histoire de la vaccination en Turquie etc.* De Carro refers to his new son in jocular fashion: "Mme De Carro vient de mettre au monde un candidat pour la vaccination." Alexander had arranged for diplomas of the London Societies to be sent to de Carro but at that time they had not yet arrived.

## Walcheren Fever

Alexander was involved with the Royal Jennerian Society throughout its existence from 1802 until 1808,

when he was also establishing himself professionally and socially, and whilst *Conversations in Chemistry* was being written and Jane was starting the family. His activity as a fever doctor, as well as his increasing connections with the higher ranks of society, doubtless contributed to him being asked to take over the running of the fever hospital at Gosport, which received thousands of sufferers of Walcheren fever.

In July 1809 a large British army expedition had been sent to the island of Walcheren in the Scheldt estuary to prevent the French fleet using the port of Antwerp as a base to support an invasion of England. As a later Government enquiry confirmed, the British force was inadequately supported and though it lost only 106 men in combat it lost over 4000 men to disease, probably typhoid, but termed Walcheren fever. The ill-fated expedition has been described by Howard (36). The survivors withdrew on December 9, 1809, and returned to England for treatment. Howard mentions the various places to which the survivors were sent for treatment.

Although omitted by Howard, a fever hospital established at Gosport with Alexander in charge also received survivors for treatment. This is evident from the correspondence exchanged between Jane and Alexander in 1809, and now held in Geneva. Treatment was rudimentary, though it seems to have involved the use of Peruvian bark, now known to contain quinine, so this may have helped some victims.

In 1809, whilst Alexander was deeply involved in the Walcheren medical emergency, he was also helping Jane who was revising *Conversations* in 1809 (37), and also advising private patients, such as the daughter of Baron C. P. de Arabet, Susan de Arabet, who wrote twenty four letters to him in 1809 (38) all concerning her own health. Few of his replies are to hand.

### Alexander and Berzelius

Alexander was also a friend of the eminent Swedish chemist Berzelius. He stayed with the Marcets in London in 1812 and collaborated with Alexander in chemistry research, principally on the "sulphuret of carbon," nowadays named carbon disulfide (39). The extensive correspondence (34, 40) between Alexander and Berzelius throws light on their social and scientific interests, as well as giving us a first clue as to the identities of the models for the two pupils used by Jane as students in the *Conversations* volumes (18). On 7 December 1812 Berzelius wrote to Alexander (as always, in French),

"Many compliments to all our friends and especially to the chemists of the fair sex." These chemists were not named. Less than a year later, in a letter of 14 September 1813 to Alexander, Berzelius discussed Davy and the controversy as to whether the substance we now recognize as elemental fluorine did, or did not, contain oxygen.

### The Geological Society and Related Interests

Alexander was also concerned with the genesis of The Geological Society. Geology was another of the scientific interests that were originally stimulated by the researchers in Edinburgh, who effectively laid the scientific basis for the discipline. Alexander receives only a brief mention in the official history of The Geological Society (41), which was founded in 1807. He was not one of the thirteen founder members who started the society, though Humphrey Davy was. Alexander had joined by 1808, and he served as a member of the Council for two periods, 1810-13 and 1814-17. One of the people who counted Alexander as friend and who joined the Geological Society in the same year was the economist David Ricardo. One account (42) of Ricardo's life mentions Alexander as husband of the author of *Conversations on Political Economy*. At about that time Alexander also acted as the Foreign Secretary of the Geological Society, though this would have been before 1810 when the organization of Council and Officers were first formalized (43).

Alexander's interest in geology must have been related to his interest in the beneficial properties of mineral waters, which he collected from many places, both from Britain and abroad, and submitted to chemical analysis. For example, Captain Basil Hall, the sailor and explorer, made a practice of sampling waters during his travels and returning them to Britain for Alexander to analyze. The eminent Brighton Quaker, John Glaisyer, also provided him with samples of mineral waters for analysis, particularly from Brighton. The Glaisyer family name still appears over a pharmacy in Hove, Sussex. Alexander's especial interest in calculi such as kidney stones, which he must have imagined were inorganic in nature, allowed him to produce a book in 1817 (44), the agreement to publish it being drawn up in 1815, as a letter of 4 December from Longmans at Paternoster Row (45) makes clear.

Agreement &c.

Dear Sir

We are favoured with your letter respecting your book on Calculi, which, we will undertake, with pleasure, on the Plan of dividing Profits similar to that of the



Conversations on Chemistry. It is understood that you are to have 36 copies for distribution. Pray refer M<sup>r</sup> Thompson to us for payment of his Account.

Believe us

Dear Sir

Y<sup>rs</sup> very truly

Longman & C<sup>o</sup>

reaction to the public disclosure of Joanna Stephens' supposed cure for kidney stones for which she received £5000 from Parliament in 1740. The award was conditional upon its efficacy being proved by many eminent men, including the Archbishop of Canterbury, the Lord President of the Council, and the Speaker of the House of Commons. These gentlemen apparently found that the cure worked, though one wonders why. In Stephens' entry (48) in the *Dictionary of National Biography*, the remedy is described as a powder (of calcined egg shells

Table 1 details his classification of calculi, which

**Table 1.** Alexander Marcet's characterization of urinary calculi, adapted from his *An Essay on the Chemical History and Medical Treatment of Calculous Disorders* of 1817, which was reviewed anonymously in the *Edinburgh Review* (46).

Name of calculus	Appearance	Reaction with blowpipe	Acids	Alkalis	Chemical composition
Lithic	Smooth	Blackens and burns with characteristic smell	Insoluble, pink color with nitric acid	Soluble	Uric acid
Bone-earth	White friable	Infusible	Soluble if powdered. Calcium oxalate precipitate with ammonium oxalate	Insoluble	Calcium phosphate
Triple phosphate	White crystals	Yields ammonia and white residue	Insoluble	Soluble; ammonia evolved	Magnesium ammonium phosphate
Fusible	White crystals	Melts to form a near-white globule	Soluble in muriatic acid. Calcium oxalate precipitate with ammonium oxalate	Partially soluble; ammonia evolved	Mixture of phosphates
Mulberry	Rough brown as mulberry	Swells to leave calcium oxide	Slowly dissolves	Insoluble	Calcium oxalate
Cystic oxide	Waxy	Decomposes with characteristic smell	Readily soluble	Readily soluble	Cystic oxide (cytine)

shows a considerable advance upon a purely descriptive account, but which also emphasizes that Alexander considered them solely in an inorganic chemical fashion, which reflects the state of chemical understanding of the time. A contemporary review of this book was published in the *Edinburgh Review* (46). Study of correspondence reveals that MacCulloch and Leonard Horner apparently wrote this review, though it carries no authors' names.

During this period Alexander also isolated xanthine for the first time, though he could not then have recognized its true nature. Alexander's discovery of xanthine and the attempts to establish its nature have been fully described (47). Alexander had a chemistry laboratory built in his house in Russell Square, London, and it is evident that Jane used it for carrying out at least some of the experiments recounted in *Conversations in Chemistry*.

The continuing interest of society gentlemen, who were often afflicted by stones, was shown by their

and snails), a decoction (prepared by boiling herbs with soap), and pills (of calcined snails). Nevertheless, the interest that Alexander Marcet was to take in such stones shows that they were still a significant problem for gentlemen in 1820 and later.

Public recognition of Alexander's contributions came about with his election to the Royal Society as early as 1808. This is even before his service to the sufferers of Walcheren fever in 1809. The citation read as follows (49).

Alexander Marcet MD one of the Physicians to Guy's Hospital, a Gentleman eminent for his knowledge & acquirements in Chemistry & experimental Science, & author of a paper "on the Analysis of the waters of the Dead Sea & River Jordan" ... We ... recommend him as worthy of that honour...

The sixteen signatories of his nomination included Smithson Tennant, William Allen, Edward Jenner, and William Babington.

### The Scottish Connection

Alexander knew several eminent Scots from his time in Edinburgh (1794-1797). He retained connections with them almost until he died. Many of these persons evidently spent part of the year in London as well as in Edinburgh, and some of them eventually became Alexander's patients. Their mutual relationships can be disinterred to a degree from letters in the archive of the National Library of Scotland (NLS).

Among Alexander's contacts were the families of Sir James Hall, 4<sup>th</sup> Baronet Dunglass, and Thomas Douglas, 5<sup>th</sup> Earl Selkirk (50). Sir James Hall was born in 1761 and married the Earl Selkirk's sister, Lady Helen Douglas. He became a baronet on the death in 1776 of his father, who had been notable for his interest in geology and chemistry. Sir James went to school in London, where he was supervised by his uncle, Sir Robert Pringle, the king's physician. He then moved to Cambridge, and later made a grand tour of the Continent. He settled in Edinburgh, and attended classes at the University, including some in chemistry under Joseph Black, though there is no record of his graduation. On a second Continental tour he imbibed the basics of chemistry, geology and architecture. He also met Napoleon Bonaparte and many scientists, including Lavoisier. He returned to Edinburgh in about 1785, and in 1786 married the next Lord Selkirk's sister, with whom Alexander subsequently became acquainted.

Sir James eventually became President of the Royal Society of Edinburgh, and was actively involved in the Hutton/Werner geological controversies of the time. He carried out numerous experiments on the effects of heat upon rocks and rock-forming materials, which served to support the Huttonian geological theory. He was one of the first to use platinum vessels in his experiments. Amongst those who proposed him for Fellowship of the Royal Society of London were Henry Cavendish, Humphry Davy and William Herschel. He was losing his memory by about 1811, perhaps due to dementia, but he lived until 1832. He and his wife had five children, included the chemist and geologist John (1787-1860), the travel writer and sailor Basil (1788-1844), who like their father became Fellows of the Royal Society, the painter James (1800-1854), and a rather mysterious William, discussed below. No daughters were ever mentioned in any of this correspondence.

Hall's brother-in-law, Lord Selkirk was educated at Rochemont Barbauld's Unitarian school near Cambridge and then at Edinburgh, though he studied neither chemistry nor medicine, but philosophy, in which he was taught

by Dugald Stewart. The name Rochemont suggests a connection with Geneva (cf., Pictet de Rochemont). Selkirk went to Paris in 1791 with his brother-in-law, Sir James Hall, and the philosophical ferment there stimulated him greatly in the politics of reform. He ultimately became a proponent of the colonization of North America, and was the major activist in the establishment of the Red River colony in Western Canada. He envisaged such settlements as places where Highlanders, who had generally been small farmers living on large private estates in Scotland, could settle and safeguard their Gaelic language and culture. The Highlanders were expelled so that the large estates could be devoted to hunting for gentlemen (51). These expulsions are usually referred to as the Highland Clearances and correspondence shows that Jane disapproved of them. Sir James Hall's interest in the Clearances involved him in a lifetime of political and social turmoil (50). Jane Marcet's great uncle, Sir Frederick Haldimand, as British commander in the American colonies, had also been active in the disputes and politics of North America, so it is not surprising that Jane should have learned from these men and developed her own views on emigration to North America and on the Highland Clearances.

The Halls and the Selkirks were close, and they sought Alexander's advice as a physician, even after he moved to London. The earliest extant letters connecting both Lord Selkirk and Sir James Hall with Alexander are from 1803-1805, concerned with business, but Sir James was also interested in geological controversies, a visit of Mr. Davy, the loss of a child from measles (52), some experiments upon heat and compression, help for his wife from Jane (53), the composition of water from Brighton Chalybeate springs, the purchase of platinum tubes for his experiments (54), how he was going to use the new crucibles that Alexander had procured for him from Cary's in the Strand, and various geological theories (55). As might be expected of an exchange between learned gentlemen, there is little of a personal nature, apart from a ritual greeting to Jane at the end of each letter, and an unexplained sentence at the end of the last of Sir James's letters listed above: "What has become of my flame Miss Cleaver? I hope she is well."

### Alexander's Death

Alexander died of "gout of the stomach" in 1822, in the presence of his wife and of Roget, who was a lifelong friend and admirer, perhaps in part because of their common connections to Geneva. Their relationship is described in some detail by Rennison (56) who

describes Roget's distress at Alexander's passing. From an obituary which he does not specify but which he ascribes to Roget, he takes two quotations to illustrate the esteem in which Roget held Alexander: "the active zeal with which Marcet was animated for the advancement of knowledge and the interests of humanity" and "the variety of talents and rectitude of judgement which marked his progress in whatever he undertook." In fact, this obituary was published in the *Annual Biography and Obituary* for 1823 (57) as the following more extensive excerpt shows.

The great number of objects, both public and scientific, which had thus engaged his attention, alone afford strong testimony of the active zeal with which he was animated for the advancement of knowledge and the interests of humanity. The persevering energy with which he pursued those objects, and the variety of talents and rectitude of judgment which marked his progress in whatever he undertook, are evinced by the success with which his exertions have been attended. Endeared as he was to a wide circle of friends, by the excellence of his heart, the warmth of his affections, and his high sense of honour, his death has left a mournful and irreparable chasm in their society. Gifted by nature with that constitutional flow of cheerfulness which imparts the keenest relish for the enjoyments of life, he conjoined with it that expansive benevolence which seeks to render others participators in the same feelings...

The influence of his activity and public spirit extended itself to many other institutions. Besides the leading part he took in conducting the affairs of The Medical and Chirurgical Society, his valuable assistance was also given to the Royal Society, the Royal Institution and to the Northern Dispensary. He was principally instrumental, through the late Sir Samuel Romilly and the Hon. H. G. Rennet, in bringing the Institution for the Cure and Prevention of Contagious Fevers, now known by the name of the London Fever Hospital, to the notice of Parliament and thus obtaining a pecuniary grant for that useful establishment. Alexander's reputation as a physician may also be judged from a very flattering anonymous account which was published by the Royal College of Physicians of London and which described him as "a most ardent promoter of useful public institutions, especially of those more immediately connected with his profession" (58). Medical science when Alexander died was still descriptive, without a great deal of understanding of real causes, and exemplified by Alexander's classification of body stones, the true nature of which he could not have understood, though their study contributed to his isolation of xanthine.

Roget's obituary of Alexander (57) also contains a list of some 33 publications ascribed to Alexander, some of which appeared without the author's name.

What was probably a version of his graduation thesis in Edinburgh was published as "History and Dissection of a Diabetic Case," *London Medical and Physical Journal*, 1799, vol. ii. p 209. His purely medical publications included a discussion with Jenner on how to procure fluid vaccine, an account of a French hospice, the dissection of a "blue girl", accounts of cases of hydrophobia, nephritis and of erythema, and of the effects on humans of laudanum, stramonium (thorn apple?), and "oxyd of bismuth" and more theoretical and practical discussions of the natures of urine, alkali in blood, dropsical fluids, chyle and chime, and "calculous disorders." He also published an introductory clinical lecture and a paper in French on vaccination. Somewhat surprisingly he also published a paper about a man who lived ten years after having swallowed a number of clasp-knives and his body after death.

His purely chemical papers concerned the use of silver nitrate as a test for arsenic; potassium and platina; and the inorganic contents of artificial mineral waters and of natural waters, often collected for him from distant places by his acquaintances. Such sources included Brighton, the Isle of Wight, the Dead Sea, and a range of oceans and seas around the world. He was aware of the unreliability of analytical methods, and suggested ways to improve the analysis of sea waters. The paper he wrote with Berzelius was on "the sulphuret of carbon" (39). He was also interested in methods of producing extreme cold, mainly using evaporation and the air pump, and extreme heat. This reflected a wider interest in chemical circles at the time in the nature of caloric.

A single completely unrelated paper is an account of the public state schools of Geneva. This was written for Bishop Howley at a time when the Church of England was trying to expand public education to include the lower classes. An original version of this account is held in the library of the official London home of the Archbishop of Canterbury, Lambeth Palace.

In summary, the material cited here provides an outline of Alexander's professional life. He came to London from Edinburgh in 1797, married in 1800, established himself as a fever doctor and physician at Guy's Hospital, and became physician to many prominent people as well as assisting in several national emergencies including Walcheren fever, the need for vaccination against smallpox, and the threat of Napoleon. He developed a

lively interest in several activities within the vigorous and growing scientific community of his adopted country, including research in chemistry, the foundation of the Geological Society, and the initiation of what eventually became The Royal Society of Medicine. Perhaps his most valuable contributions were in the use of analyses to identify biological materials and to the beginning of the widespread application of medicine to protect the health of the public at large.

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### About the Author

G. J. (Jeff) Leigh is an Emeritus Professor at the University of Sussex. After a lectureship at the University of Manchester and a year working in Munich with E. O. Fischer, he spent the rest of his employed career at the Unit (later Laboratory) of Nitrogen Fixation in Sussex, from where he published over 200 papers on the chemistry of nitrogen fixation. He first came upon *Conversations on Chemistry* in 1964 in a second-hand bookshop, and was intrigued by the fact that this book had been written as early as 1806 by a woman who was not a recognized natural philosopher. He has since intensively researched her life and that of her husband.