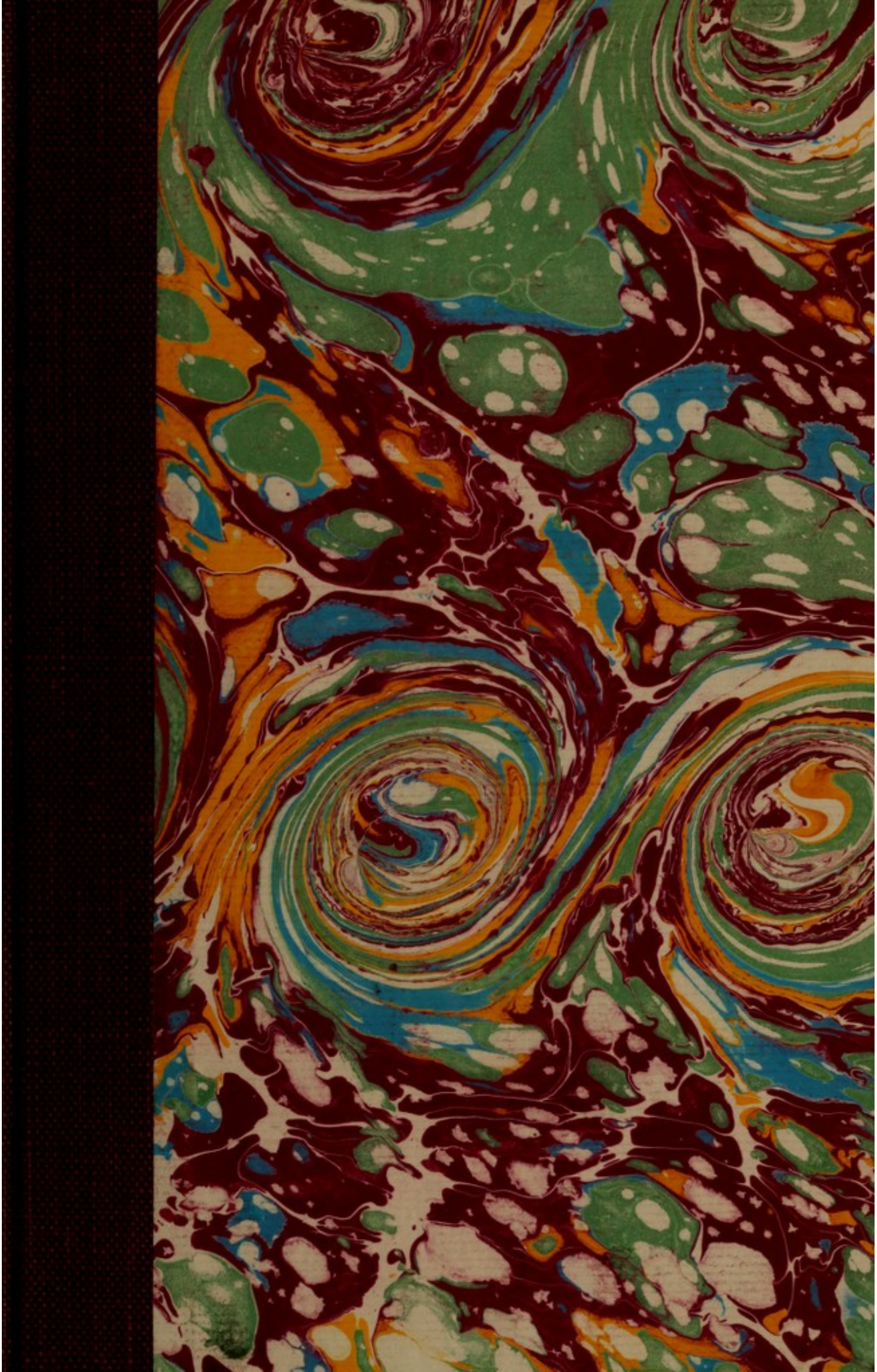
On the discovery of the metal thallium / by William Crookes, F.R.S.



Crookes on
the Metal Thallium

ON

THE DISCOVERY

OF

THE METAL THALLIUM.

BY

WILLIAM CROOKES, F.R.S.

EXTRACTED FROM THE PHILOSOPHICAL MAGAZINE FOR JULY 1863.

LONDON:

PRINTED BY TAYLOR AND FRANCIS,

RED LION COURT, FLEET STREET.

1863.

ON THE DISCOVERY

OF

THE METAL THALLIUM.

To the Editors of the Philosophical Magazine and Journal.

GENTLEMEN,

MAY I request you to give me an opportunity of replying to certain accusations recently made against me by M. Lamy in reference to this subject?

Chemists are doubtless aware that my title to the discovery of the metallic nature of thallium has been disputed by M. Lamy, and that he has been supported in this position by eminent scientific men in France. It has been stated, both in M. Dumas' report to the Académie des Sciences*, and even more pointedly in M. Lamy's recent memoir†, that I first obtained a knowledge of the metallic nature of thallium from M. Lamy, and that I appropriated that knowledge as my own. I should gladly have abstained from any controversy as to the mere question of priority in the discovery or publication of this fact, and am well content with the recognition of my claims which has been accorded to me by English chemists; but the purport of the above statements is of such a nature that it becomes necessary for me, both from regard for my own credit and from respect to those who have acknowledged my title to the original discovery of thallium and of its metallic nature, to show that the accusations above referred to are unfounded.

Your readers may remember that I published in this Journal, in April 1861, a paper "On the Existence of a new Element, probably of the Sulphur Group," and in May following, "Further Remarks on the supposed New Metalloid"‡. From that time my attention was almost exclusively directed to the further elucidation of the chemical history of the new element; and about the middle of April 1862 it was arranged that I should exhibit some specimens of thallium and its compounds in the International Exhibition §. My intention was to have exhibited a large

* *Comptes Rendus*, vol. lv. p. 866, Dec. 15, 1862.

† *Annales de Chimie et de Physique*, 3 sér. vol. lxvii. April 1863.

‡ Chemical News, May 18, 1861, vol. iii. p. 303.

§ "Exhibition Building, South Kensington, W.,
April 17, 1862.

"MY DEAR SIR,—I shall be greatly pleased to see a specimen of thallium in the Exhibition. Will you kindly call on me on Saturday the 19th inst. between 6½ A.M. and 7 P.M., and I will arrange the matter with you.

"In great haste,

"Yours very truly,

"*W. Crookes, Esq.*" "C. W. QUIN."

series of specimens; but as I had not been able to meet with any abundant source of thallium, my scanty store proved too limited for dividing into more than three portions. Consequently I was only able to prepare specimens of the metal itself, of its oxide and sulphide. These were displayed, at the opening of the Exhibition on May 1, 1862, in a case with the label "*Thallium, a new metallic element, discovered by means of spectrum analysis,*" and with a card on which was written "*Chemical reactions of thallium, by which it is distinguished from every other known element. It appears to have the character of a heavy metal, forming compounds which are volatile below a red heat. It is reduced from its acid solutions by zinc in the form of a dense black powder, difficultly soluble in hydrochloric acid, readily soluble in nitric acid,*" &c.

On the 7th of June following, being at the Exhibition, I learnt from Mr. Quin that a M. Lamy had just been to him, in company with M. Balard, and shown him an ingot of thallium. He had taken them to my case (Class II. No. 634) and translated to them the labels, whereupon M. Lamy remarked that the substance exhibited by me as thallium was not the metal but its sulphide*.

Two days afterwards, the 9th of June, I was introduced to M. Lamy at Dr. Hofmann's house, and on that occasion first saw the ingot of thallium described to me by Mr. Quin. Our intercourse was, however, confined to a few complimentary phrases, since M. Lamy could not speak a word of English, and my ability to converse in French was very limited. But it became evident to me that M. Lamy was working diligently on the same subject that had occupied my attention during the past year, and that it was necessary for me to take immediate steps to make known the results I had obtained, without waiting, as I had intended, until the investigation was complete.

* "9 Cowley Place, Cowley Road, North Brixton, S.,
May 13, 1863.

"My dear Sir,—The circumstances of my interview with M. Lamy are as follow :—

"M. Lamy, in company with M. Balard, called on me at my office at the Exhibition on the 7th of June last and showed me an ingot of thallium. I took them both to your case and showed them your specimens, particularly pointing out the one marked *metallic thallium*, and translating the label to them. There can be therefore no possible doubt of M. Lamy having seen your case containing thallium described as a metallic body long before you could have been aware either of his presence in England, or of his having made the same discovery as yourself.

"I am, dear Sir,

"Yours very faithfully,

"C. W. Quin,

"Ex-Superintendent of Classes 2, 3, and 4,
International Exhibition, 1862."

"*W. Crookes, Esq.,*
&c. &c."

With this view I communicated with Dr. Wm. Allen Miller*, and, acting on his recommendation, sent in to the Royal Society a statement of my results, under the title "Preliminary Researches on Thallium." This paper was read on the 19th of June, 1862.

On the 23rd of June a paper was read at the Académie des Sciences by M. Lamy, "On the Existence of a New Metal, Thallium," in which he stated that three months previously he

* "20 Mornington Road, N.W.,
June 12, 1862.

"DEAR SIR,—I called upon you yesterday, but was unfortunate enough to find you away. My object was to ask your advice about 'thallium.' I have been hard at work on the subject for six or eight months past, and have found out a great deal about it, and, indeed, have a 'Preliminary Note on Thallium' nearly finished, which I was going to send to the Royal Society in a week or so. Not suspecting that anyone else was working on the same subject, I purposely avoided publishing any of my recent results, in the hope of giving the Royal Society paper more importance; and for the same reason I have not spoken much about them. I can, however, prove by witnesses that I obtained thallium in the pure metallic state as early as January in this year, and several other salts of it soon after. I was therefore much astonished to find, on Monday last, that M. Lamy had been working on the same subject; and from the much larger quantity of material at his disposal, I am pretty certain that in his memoir recently sent to the Society at Lille, he has anticipated most, if not all, of my results, and most likely has gone much further than I have. I therefore wish to ask you, both as a friend as well as in your official connexion with the Royal Society, what I had better do under these circumstances. Shall I still send in my imperfect note with the knowledge that a more perfect paper on the same subject has already been communicated to another Society, or shall I withhold my present paper until M. Lamy's is published, and then see if I can supply any fact which he may not have found out? I have worked long and hard on this subject, and cannot help feeling annoyed at the prospect of losing the greater part of the credit of the discovery.

"Pray excuse my thus troubling you, and believe me

"Very truly yours,

"*Dr. W. A. Miller, F.R.S.*
&c. &c. &c."

"WILLIAM CROOKES."

"King's College,
Friday, June 13, 1862.

"MY DEAR SIR,—Send in your note on thallium to the Royal Society *at once* by all means. Though much pleased to see a lump of thallium, I must own I was not a little disappointed to find you had been so far forestalled; but your exhibits at Kensington have quite established your priority even in securing a tangible quantity. You must, however, send in your note before Thursday next, which is the last day of meeting. It will only be announced, I dare say, but will no doubt appear at full in the 'Proceedings.' I think you had better head it 'Note for the Proceedings.' It will not prevent you from giving a full paper if afterwards it should seem desirable. A foot-note stating why you are thus induced to publish might be desirable.

"Very truly yours,

"*W. Crookes, Esq.*"

"WM. ALLEN MILLER."

had discovered a green band in the spectrum without knowing that I had observed the same fact fifteen months before. He mentioned that I had shown this green band to be due to the presence of a new element, to which I had given the name of thallium, and added that the small quantity of material on which I operated did not admit of my isolating the element and ascertaining its true nature.

In a communication made to the Société Impériale at Lille on the 16th of May, 1862*, he also described thallium to be a metal, and, referring to my papers of 1861, stated that the black powder which I regarded as thallium was nothing but sulphide of thallium.

In regard to this statement, I must, in the first place, point out that M. Lamy entirely ignores the fact of my having exhibited thallium as a metal on the 1st of May, 1862, and of having then described it as a "heavy metal, reduced from its acid solutions by zinc in the form of a dense black powder." The labels in my case were unmistakeably clear and definite in their wording; the metallic nature of thallium was both stated and implied by all of them; they did not leave the least possibility for the supposition that I considered thallium to be a metalloid; and the publication was in every respect as full as the reading of a paper at a provincial scientific society.

These, then, are the real facts of the case. As to the question of priority, I would submit that there can be no doubt. Even on the showing of M. Lamy and his friends, I was prior to him in every step of the discovery. M. Lamy claims to have first noticed the presence of the green band in the spectrum in April 1862; whilst I had discovered it thirteen months previously, and published a description of the substance by which it was produced.

M. Lamy claims to have isolated thallium in the interval between the 2nd and the 16th of May, 1862, and states that he for the first time exhibited the metal at Lille on the latter date†; whilst I isolated thallium in September 1861, and exhibited it as a metal on the 1st of May, 1862.

Still, M. Dumas, in reporting on the subject to the Academy, has stated that the history of the discovery of thallium presents two authentic dates—the 30th of March 1861, when Mr. Crookes announced the existence of a new elementary substance, and the

* *Ann. de Chim. et de Phys.* before quoted.

† The following extract from the register of the *procès-verbaux* of the Société Impériale des Sciences, de l'Agriculture et des Arts, at Lille, is given by M. Lamy as the earliest notice of his discovery:—

"At the meeting of the 16th of May, 1862, under the presidency of M. Lamy, M. Lamy announced to the Society that he had succeeded in isolating thallium by decomposing with a voltaic battery the yellow crystalline compound of which he had spoken at the meeting on the 2nd of May."

16th of May, 1862, when M. Lamy made known the new metal.

Here, again, the publication of this fact by myself on the 1st of May, 1862, is ignored, and M. Dumas remarks, "No one could dispute that M. Lamy was the first to isolate thallium, and so to demonstrate that it is a true metal, and not a metalloid, as supposed by Mr. Crookes, who never obtained it uncombined and pure."

But notwithstanding these facts, M. Lamy has since stated that the first time I described thallium as a metal was in my communication to the Royal Society in June; and still ignoring my publication of that fact on the 1st of May, he repeats the statement that I was ignorant of this fact until June, and then he declares it was communicated to me by himself.

It may be that, when M. Lamy read his paper to the Société Impériale at Lille on the 16th of May, he was ignorant that I regarded thallium as a metal; but he must have been aware of this when he read his paper to the Academy in June, after having visited the Exhibition and seen the labels attached to my specimens, for Mr. Quin took the trouble to explain them to him. In proof of this, I may also refer to the account M. Lamy gives of his motive for coming to London in June 1862, viz., "to ascertain for himself what results I had obtained, before announcing to the Academy a discovery he was no longer certain of having made." Why this doubt, I may ask? He says he had heard my thallium was in the Exhibition. M. Lamy has not claimed the discovery of thallium itself; he only claims to have been the first to isolate it, and to ascertain it to be a metal. This is the discovery as to which he was in doubt whether he had not been anticipated; and his visit to the Exhibition gave him ample opportunity for learning that he had been anticipated both in the discovery and in the publication of it. And yet, with the full knowledge of what he saw there written, he now has the hardihood to assert that I was ignorant of the metallic nature of thallium until he told me.

But M. Lamy will not recognize the evidence which he saw in the Exhibition, that I regarded thallium as a metal, and had so described it since the 1st of May, 1862. He still maintains that, before he showed his piece of thallium in June, no one in England had seen thallium; that the substance I exhibited "was not thallium, and could not be thallium," but only a black powder to which I gave that name. He says, no one knew it was a metal; that chemists even doubted its existence as an elementary substance; that I first learnt from him that it was a metal, and that having done so I hastened to communicate to the Royal Society a statement of nearly all the properties of thallium he had described to me.

The question now, therefore, is scarcely one of mere priority in the discovery or the publication of a fact, but a question of common honesty. It is not so much whether I knew thallium to be a metal in May, but whether I stole that knowledge from M. Lamy in June.

The fact that M. Lamy dates his first publication of the metallic nature of thallium as having been made on the 16th of May, would be in itself a sufficient proof that this accusation is unfounded, since I had publicly described thallium as a metal on the 1st of May, before having heard of M. Lamy's existence, or having the most remote suspicion that any one but myself was working on the same subject. M. Lamy, however, not only ignores this fact, but also asserts that the substance then exhibited by me was not thallium. By what authority he does so is not stated. If it be for the same reason that in his paper of the 16th of May he declared the substance which I regarded as thallium to be nothing but sulphide, he makes the statement now, as he made it then, upon very insufficient grounds. I am unable to perceive why M. Lamy should assume that the powder exhibited as thallium on the 1st of May, 1862, was obtained by precipitation with sulphuretted hydrogen, and not the powder precipitated by zinc, and actually so described on the label in the case as well as in my first paper in 1861*. It is only by means of this assumption that M. Lamy's assertion can be of any value; and that this assumption is totally gratuitous and unfounded will, I trust, be apparent to any one who compares the reactions of thallium described by me in this Journal in April 1861, with the brief account written on my labels in the Exhibition.

But really this has little to do with the question at issue. It is of no importance whether the body which I had ticketed "thallium, a new *metallic* element," was in the state of powder or lump, pure or impure, or, indeed, whether or not there was any thallium at all in it. M. Lamy cannot deny that the *label*, at all events, was there publicly exhibited from the 1st of May; and that, I maintain, is ample publication of the fact that I knew thallium to be a "metallic element" from my own independent researches.

Fortunately I am able to bring forward positive evidence that long before May 1862 I knew thallium to be a metal, and had obtained it in a melted metallic state, and by electrolysis so far back as January 1862, even before M. Lamy had seen the green band in the spectrum.

When it was first suggested that I should exhibit illustrations of thallium, I prepared a set of labels for the purpose; and

* See note, p. 10.

though these labels and their history, as given below*, might not be worth much in a question of mere priority, I do not doubt that they will be useful in regard to the question whether the metallic nature of thallium was known to me before M. Lamy came to London in June, or whether that knowledge was then first obtained by me from M. Lamy. I may appeal to any chemist to say whether these labels do not prove that the writer had a perfect knowledge of the metallic nature of thallium at the time the order for them was given to Messrs. Silverlock.

I can also refer to the testimony of persons who saw metallic thallium in my laboratory in January 1862, long before M. Lamy appeared in the matter †.

*

Thallium.	Oxide of Thallium.	Sulphide of Thallium.	Basic Chloride of Thallium.
Iodide of Thallium.	Sulphate of Thallium.	Chloride of Thallium.	Nitrate of Thallium.
Ferrocyanide of Thallium.	Cyanide of Thallium.	Phosphate of Thallium.	Carbonate of Thallium.
Thallium (*θαλλος*).	Chromate of Thallium.	Thallium, Sublimed.	Oxalate of Thallium.

"Printing Office,
Wardrobe Terrace, Doctor's Commons,
London, 18th May, 1863.

"Sir,—In reply to your request, I beg to inform you that I have examined the books of this firm, and find that 50 sheets of labels (Thallium, Sulphate of Thallium, Nitrate of Thallium, &c.) were printed here and delivered on or about April 25, 1862; the order having been given a few days prior to that date. The original manuscript of the labels is still in my possession.

"I am, Sir,
"Yours obediently,
"Pro H. Silverlock,
"P. Perkins."

"*Mr. W. Crookes, 20 Mornington Road.*"

†

"5 New Cavendish Street, London, W.,
June 16, 1862.

"My dear Sir,—I well remember paying you a visit in January last to see the 'thallium' you had then got into a more definite shape. As I had seen its reaction in the spectroscope many months before, and was much interested in the remarkable discovery, I felt great pleasure in watching the progress you had then made in the investigation.

"You had several compounds of the body, including, if I remember rightly, the sulphide (of which I possess a specimen), and the oxide which you had obtained in crystals. The quantity of material you had, however, was but small; and it was only by exercising the greatest amount of ingenuity that you were able to demonstrate the nature of its compounds.

"The most interesting point, I well remember, was the metal itself, deposited by means of a weak galvanic current,—first on a bar of copper,

In addition to this positive evidence, I will also refer to the probabilities of the case. Though M. Lamy's results were said to be obtained within the short space of one month, both he and his friends assume that, during the whole year that elapsed between my first publications on thallium and the exhibition of the specimens in 1862, I had either ceased to work on the subject, or that my knowledge of the element had not advanced one step between May 1861 and May 1862; that the black powder I exhibited as thallium was obtained by precipitating with hydrosulphuric acid, not the black powder described as precipitated by zinc*. They assume that because at the former date I was, though doubtful as to the point, inclined to class thallium with the semimetals, therefore at the latter date I was ignorant that it possessed true metallic properties.

I trust the improbability, nay, the impossibility of this being the case, will be recognized by every chemist who has examined thallium. It is an element as easily reduced to and preserved in a metallic state as lead: can it, then, be imagined that I, who was so much interested in determining its characters—who had been for twelve months leaving no means untried to obtain a more copious source of thallium—who during that time had scarcely for a day relaxed working on this subject exclusively—is it likely, I say, that I should have been such an egregious blunderer as not to find out that it was a metal? Why, as soon as I had obtained a dozen grains of one of its compounds fairly pure, I could scarcely try the simplest experiment without having the fact of its metallic character forced upon me in too positive a manner to admit of doubt. Consistent with this probability that I considered thallium to be a metal, is the fact that it was exhibited as being a metal.

Having thus stated the grounds on which I claim the dis-

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where it presented a coherent metallic appearance, of dark colour, but which, when freshly scraped with a knife, gave a coloured metal similar to lead. You also had a larger quantity precipitating on platinum in the spongy form, which, compressed, gave metallic lustre, and when tried in the spectroscope, gave the green line magnificently.

* * * * * *

"I remain yours very truly,

"*W. Crookes, Esq., F.C.S.*" "JOHN WILLIAMS."

"· · · · · having ourselves been shown by Mr. Crookes the wonderful green line in the spectrum in 1861, and a small disc of the metal itself in January 1862,—dates earlier than any referred to by Lamy in the late controversy."—*The London Review*, April 4, 1863.

* In my first paper in this Journal for April 1861, I wrote, "From its hydrochloric acid solution it is readily precipitated by metallic zinc in the form of a heavy black powder, insoluble in the acid liquid."

covery of this metal, I may leave your readers to form their own opinion as to the justice with which my right to that discovery has been disputed, and as to the sufficiency of the argument that I could not be aware of the metallic nature of thallium, because I had not enough of it to melt into an ingot.

But besides these points involving merely scientific credit, M. Lamy and his friends have unmistakeably implied that I have acted dishonourably in regard to him. I am accused of having met him in company, of having gathered from him a knowledge of the properties of thallium, and of having hastened to publish that knowledge as the result of my own researches.

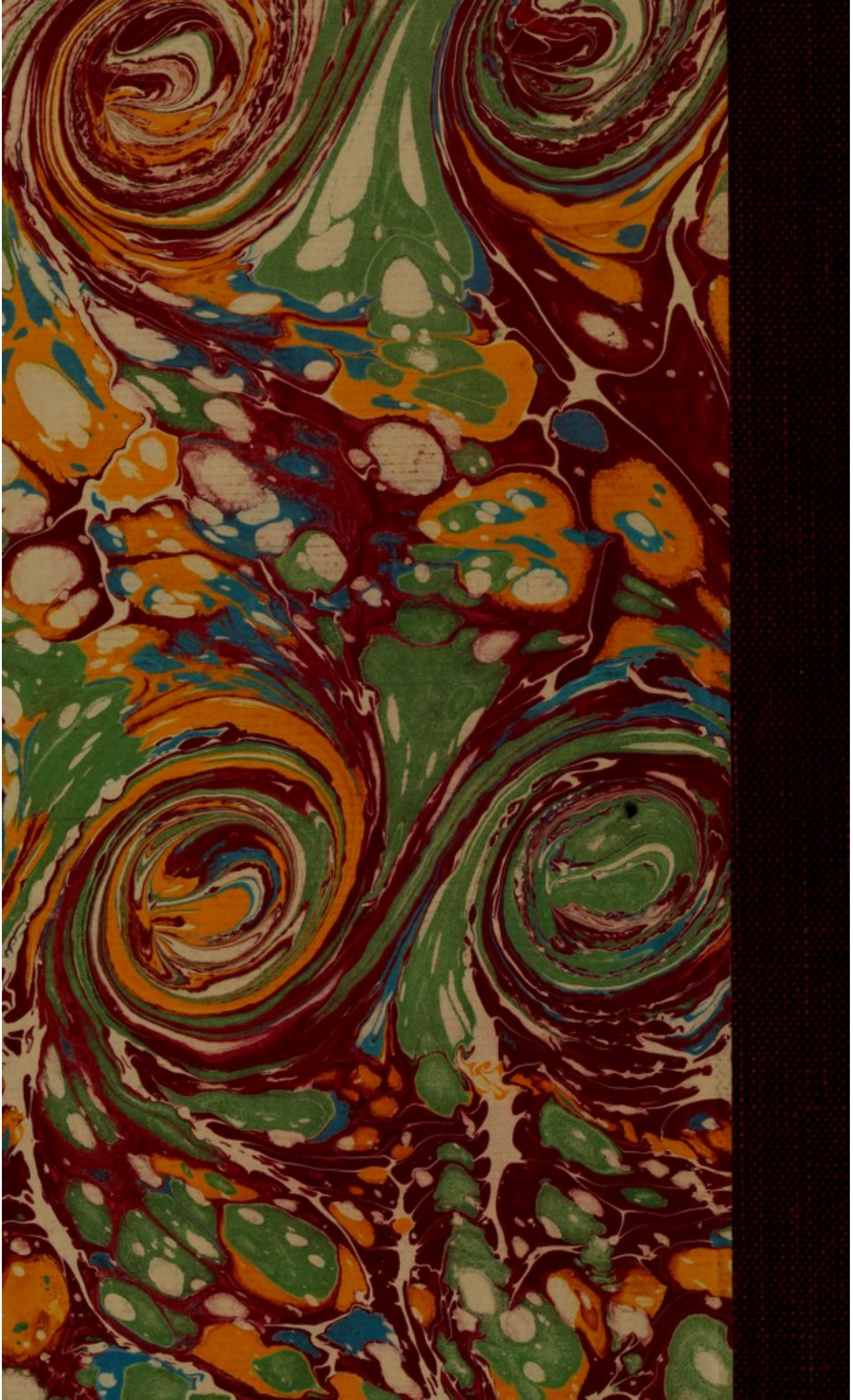
It is chiefly on account of this insinuation that I have requested you to allow me to make known a statement of the whole facts of the case, and to show that the claim put forward by M. Lamy rests on nothing but a partial statement of those facts, and upon assumptions that have no real foundation.

I have the honour to be, Gentlemen,

Your obedient Servant,

WILLIAM CROOKES.

20 Mornington Road, N.W.
May 21st, 1863.

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