

# The meteorite fall at L'Aigle and the Biot report: exploring the cradle of meteoritics

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**Abstract:** 'Stones fell around L'Aigle, July 26th 1803'. Thus ends the results section of the Biot report read in front of the Institut de France, the 29 Messidor an 11 (17 July 1803) after his 9 days trip to L'Aigle, 140 km NW of Paris. At the time of the L'Aigle fall, the mere existence of meteorites was harshly debated. Chladni's book on iron masses had been published in 1794, but his ideas had not yet convinced the savants or the educated laymen of the time. Meteorite falls were anomalous events in the order of things.

In this paper, I argue that Biot's report on the visit he made to L'Aigle is a key event in establishing the extraterrestrial origin of meteorites. Biot was able to build the proof outside the laboratory and the library, solving the central problem of the distrust granted to the eyewitnesses of the falls, usually peasants. The reason why Biot was sent to L'Aigle by the Minister of Interior Chaptal was the establishment, in the early 19th century, of a centralized politico-administrative structure whose aim was to know, classify and organize France. While Chaptal was trying to bring every social and economic reality into a new social order, Biot brought back the L'Aigle meteorites, and thereby *all* meteorites, within the order of things.

At a time when we were most concerned with that new problem of physics, while still uncertain about its existence, we were discussing the degree of authenticity of ancient and modern stories, L'Aigle's inhabitants and from a large area thereabout witnessed the phenomenon; it took place over their heads Floréal 6th, with circumstances most appropriate to strike them with wonder and bewilderment.<sup>1,1</sup>

Stones that fall from the heavens have always been a subject of wonder and bewilderment. Betyl stones (from the Hebrew Beth-el, abode of God) were revered in the Orient and even

<sup>1</sup>'À l'époque où nous nous occupions le plus de ce nouveau problème de physique; tandis qu'incertains encore sur son existence, nous discutons le degré d'authenticité des récits anciens et modernes, les habitants de l'Aigle et d'une vaste étendue de terrain environnant étaient témoins du phénomène; il eut lieu sur leur tête le 6 floréal, avec les circonstances les plus propres à les frapper d'étonnement et d'épouvante' (Citoyen Fourcroy, *Gazette Nationale*, le 25 Thermidor an XI – 13 August 1803).

made their way into Rome as a god, part of the suite of the roman emperor Heliogabalus (204–222) (Artaud 1934). The Ensisheim stone, which fell on 7 November 1492 in Alsace, was considered by the Holy Roman Emperor's son Maximilian to be a good omen in his war against the French (Marvin 1992, 2006). Being heavenly signs, meteorites were not considered as scientific objects during the Renaissance, Classical age nor the Enlightenment. Despite the occurrence of numerous meteorite falls (Burke 1986), it was only in the late 18th century that the European scientific community envisioned the nature and origin of fallen stones as a scientific question.

In 1794 the German physicist Ernst Florenz Friedrich Chladni (1756–1827), later renowned for his contributions in acoustics, published a provocative pamphlet, *On the Origin of the Mass of Iron found by Pallas and of other similar Iron-masses, and on a Few Natural Phenomena Connected Therewith*,<sup>2</sup> proposing an extraterrestrial

<sup>2</sup>Über den Ursprung der von Pallas gefundenen und anderer ihr ähnlicher Eisenmassen, und über einige damit in Verbindung stehende Naturerscheinungen.



origin for meteorites. During the last decade of the 18th century, Chladni's ideas, helped by a few spectacular meteorite falls, made their way into the *Europe des Savants* community of knowledge. The early years of the 19th century saw a blooming of scientific papers concerning the origin of meteorites. The harsh controversy between supporters and opponents of Chladni's views reached a peak in 1802–1803 (Marvin 1996, 2006), when chemical analyses made by the English chemist Edward Howard (1774–1816) established, from the modern point of view (Sears 1976), the commonality of origin of all meteorites, and their difference from terrestrial stones.

While meteorites were invading scientific journals and laboratories, on Floréal 6th an XI (26 April 1803) numerous stones fell at L'Aigle, France. Following the fall Jean-Baptiste Biot (1774–1862) travelled to the spot and wrote a detailed report on the spectacular event witnessed by the inhabitants of L'Aigle. The 'Biot report' is usually considered to be a landmark in the gradual recognition of the existence of meteorites. In the present paper<sup>2</sup> I want to analyse how and why Biot's report contributed to the recognition of meteorites as scientific objects, thereby revealing the complexity of the birth of the science of meteorites, or the meteoritics' cradle.

### The L'Aigle fall and Biot's trip to Basse-Normandie: a brief chronology

On Floréal 6th an XI (26 April 1803), in a serene spring sky, numerous stones fell at L'Aigle, a small city of Basse-Normandie, in the department of Orne. The first mention of the meteorite fall appeared on Floréal 19th (9 May 1803) in the *Compte-rendus de la Classe de Sciences Mathématiques et Physiques de l'Institut National*:<sup>3</sup> 'Citizen<sup>4</sup> Fourcroy communicates an account of stones fallen nearby L'Aigle Floréal 6th of the present month<sup>3</sup> (Fig. 1). Antoine-François de Fourcroy (1755–1809) was a chemist, a collaborator of Lavoisier's during the Ancien Régime and was later charged by Bonaparte to reorganize the university (see below). The main national daily newspapers, such as *La Gazette Nationale* or *Le Journal des Débats*, did not mention the meteorite fall at this point.

On Messidor 7th (26 June 1803) a young scientist, Jean-Baptiste Biot (Fig. 2), an admirer

of Laplace (1749–1827) and recently elected at the Institut, left Paris to enquire about the fall. Three days later, Messidor 10th, Biot arrived at L'Aigle, 142 km from Paris. The same day, some of the stones that had fallen there were displayed to the Classe des Sciences: 'Citizen Lambotin presents to the Class stones fallen from the atmosphere in the neighbourhood of L'Aigle'.<sup>4</sup> Lambotin was a student of mineralogy and a natural history dealer in Paris, who had been able to obtain fresh stones from Basse-Normandie, probably from a local correspondent, Citoyen Marais (Lambotin 1803). On Messidor 16th (5 July) Biot left L'Aigle and went back to Paris. Only 13 days later (Messidor 29th – 18 July) he read the report he had written about his trip and the meteorite fall in front of the Classe des Sciences: 'Citizen Biot reads a relation of the trip he just made at L'Aigle to gather informations on the stones fallen from the atmosphere. The class decides for the impression of the report'.<sup>5</sup> A month later, Biot's report *Account of a trip made in the Orne Department to assess the reality of a meteor fallen at L'Aigle the 26 Floréal an XI*<sup>6</sup> was published by the Institut (Fig. 3), and printed by Baudouin (Biot 1803c).

It was only after Biot had published his report that news of the meteorite appeared in daily newspapers. On Thermidor 1st (20 July) and Thermidor 3rd the main newspapers of the time, the *Moniteur Universel* (2450 subscribers) and the *Journal des Débats* (8150 subscribers), mentioned the reading of Biot's report at the Institut. From Thermidor 7th, an advertisement appeared every week in the *Journal des Débats* emanating from citizen Lambotin: he proposed that visitors could see stones fallen from the

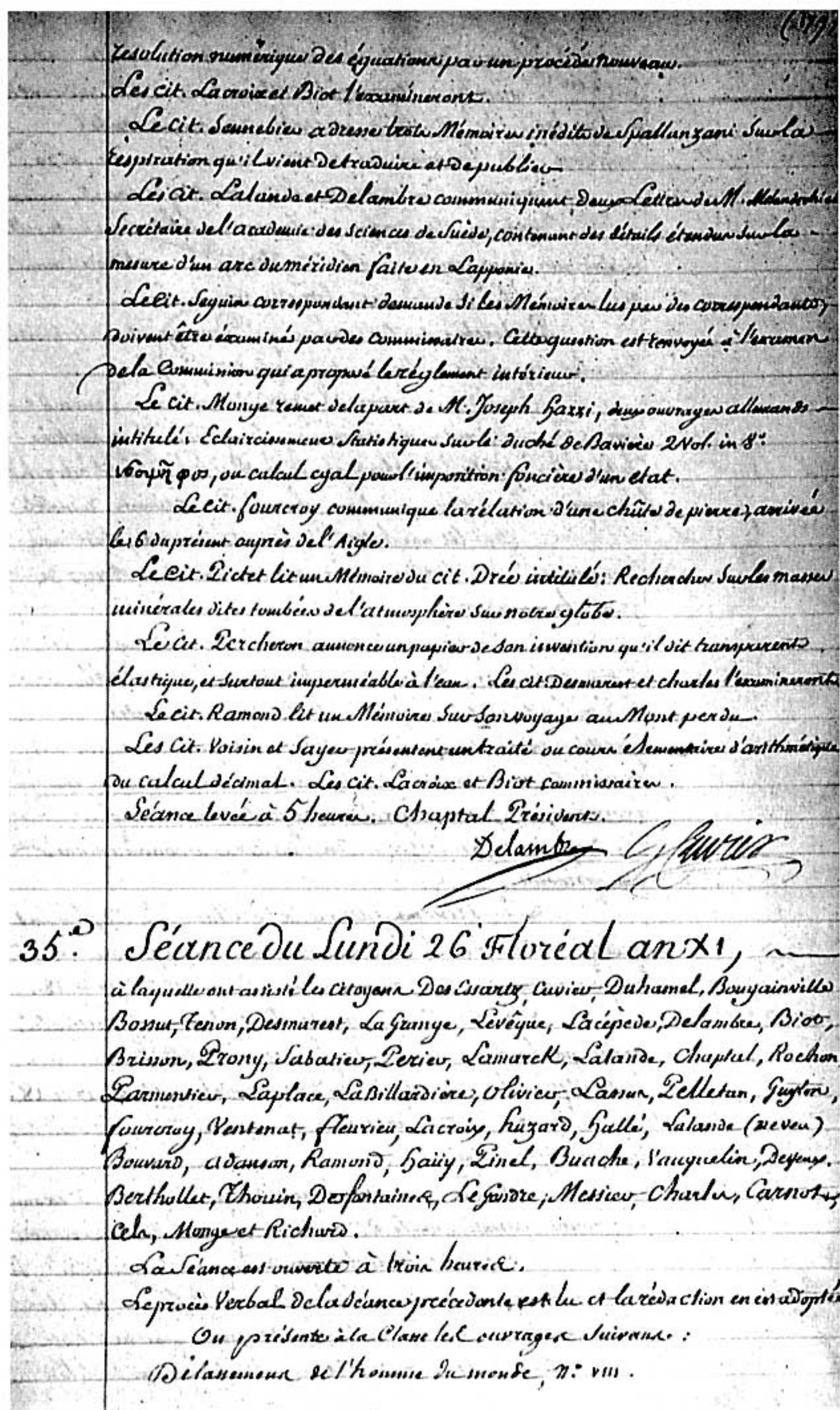
<sup>3</sup>'Le citoyen Fourcroy communique la relation d'une chute de pierres arrivée le 6 du présent auprès de L'Aigle' (in *Procès-verbaux de la Classe de Sciences Mathématiques et Physiques de l'Institut National, Archives de l'Académie des Sciences*).

<sup>4</sup>'Le citoyen Lambotin présente à la classe des pierres tombées de l'atmosphère dans les environs de L'Aigle' (in *Procès-verbaux de la Classe de Sciences Mathématiques et Physiques de l'Institut National, Archives de l'Académie des Sciences*).

<sup>5</sup>'Le citoyen Biot lit une notice du voyage qu'il vient de faire à L'Aigle pour recueillir des renseignements sur les pierres tombées de l'atmosphère. La classe arrête l'impression de ce mémoire (in *Procès-verbaux de la Classe de Sciences Mathématiques et Physiques de l'Institut National, Archives de l'Académie des Sciences*).

<sup>6</sup>*Relation d'un voyage fait dans le département de l'Orne, pour constater la réalité d'un météore observé à l'Aigle le 6 floréal an XI*. In the following quotes, I use the pagination from the copy of the Biot report (Biot 1803c) available at the Bibliothèque Centrale du Muséum National d'Histoire Naturelle (Paris).





**Fig. 1.** Facsimile of the first mention of the L'Aigle meteorite in *Procès-verbaux de la Classe de Sciences Mathématiques et Physiques de l'Institut National* (Floréal 19 an XI – 9 May 1803). One can read (14th line from the top) 'Le citoyen Fourcroy communique la relation d'une chute de pierres, arrivée le 6 du présent, auprès de L'Aigles (sic)'. The same day 'un mémoire du Cit Drée intitulé: Recherche sur les masses minérales dites tombées de l'atmosphère sur notre globe' is read in front of the class. © Archives de l'Académie des Sciences.





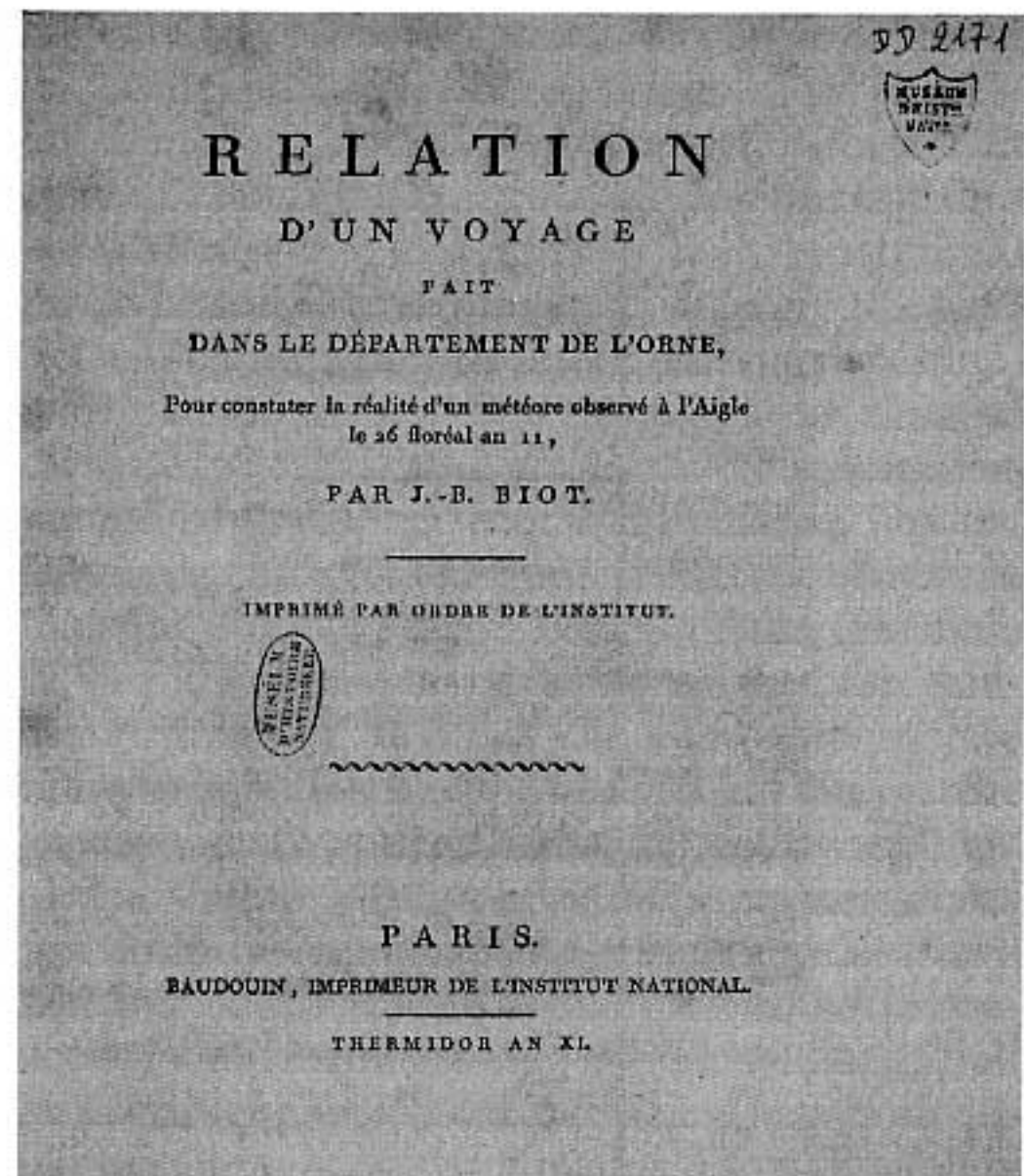
**Fig. 2.** Jean-Baptiste Biot (1774–1862). After a classical education at the Lycée Louis-le-Grand, he was sent by his father to a merchant who employed him to copy letters by the thousands in le Havre. At 18, as soon as he reached the legal age, he volunteered for the army. He took part of the Hondschoote battle in 1793 as an artilleryman. In September 1793, he returned to Paris, and soon joined the École des Ponts et Chaussées and the École Polytechnique. He was membre associé of the Institut in 1800, and full member in 1803. In 1806 he was appointed astronome-adjoint at the Bureau des Longitudes, and in 1809 professor of astronomy at the Faculté des sciences de Paris. Biot was elected foreign member of the Royal Society in 1815. He is mostly known for his discovery of the rotating power of light (light polarization) and his studies in magnetism (Biot and Savart law). © Archives de l'Académie des Sciences.

sky in his *Cabinet d'Histoire Naturelle* (172 rue de la Harpe at a quincailler, i.e. hardware dealer) for the sum of 75 centimes.<sup>5</sup> His advertising lasted for a few months. A week after the first advertisement was published, Lambotin moved the display to a larger place, le Jardin des Capucines,<sup>6</sup> probably because of the success of the L'Aigle stones.

### The trip to L'Aigle: building scientific proof outside the laboratory

#### *Skeptics in 1803*

In 1803 some prominent scientists, such as Pierre-Simon Laplace, were convinced of the reality of meteorite falls, and of the extraterrestrial origin of the stones. The first *scientific proof* of the extraterrestrial origin of meteorites (see Sears 1975, 1976) was provided by the



**Fig. 3.** Front page of the Biot report. © Bibliothèque Centrale du Muséum National d'Histoire Naturelle.

chemical analyses of the Englishman Edward Howard (1774–1816) (Howard 1802), confirmed by those of the French and German chemists Louis-Nicolas Vauquelin (1763–1829) (Vauquelin 1803) and Martin Heinrich Klaproth (1743–1817) (see Greshake 2006), almost 20 years after Chladni had boldly formulated his hypothesis (Chladni 1794). These chemists found nickel, an element virtually absent from terrestrial rocks, in all the meteorites they analysed, demonstrating thereby the common origin of meteorites and their dissimilarity to terrestrial rocks. However, not everyone was yet convinced, and controversy about the origin of meteorites raged across Europe.

For example, in 1803 Joseph Izarn published a lengthy (422 pages) book, *On Stones Fallen From the Sky – Atmospheric lithology presenting the advance of science on the phenomena of lightning stones, showers of stones, stones fallen from the sky, etc.; with many unedited observations communicated by MM. Pictet, Sage, Darcet, and Vauquelin; with an essay on the theory of the formation of these stones*<sup>7</sup>

<sup>7</sup>*Des Pierres tombées du Ciel – Lithologie atmosphérique présentant la Marche et l'Etat actuel de la Science, sur le Phénomène des Pierres de foudre, Pluies de pierres, Pierres tombées du ciel, etc.; plusieurs Observations inédites, communiquées par MM. Pictet, Sage, Darcet et Vauquelin; avec un Essai de Théorie sur la formation de ces Pierres* (Izarn 1803).



T A B L E A U  
DES PRINCIPALES OPINIONS

*Émises jusqu'à ce jour, sur les Substances solides tombées sur notre Globe.*

NOMS DES PHYSICIENS QUI LES ONT REGARDÉES COMME			
DES PRODUITS LANGÉS DE LA TERRE PAR LES VOLCANS OU LES OURAGANS.	DESSUBSTANCES MINÉRALES FONDUES PAR LA Foudre, à l'endroit même où on les a trouvées.	DES CONCRÉTIONS FORMÉES DANS L'ATMOSPHÈRE.	DES MASSES ÉTRANGÈRES A NOTRE PLANÈTE.
<i>Pages.</i>	<i>Pages.</i>	<i>Pages.</i>	<i>Pages.</i>
Fréret . . . . . 15 et 16	Lemery . . . . . 7	Descartes. . . . . 72	Chladni . . . . . 113
Gassendi . . . . . 24	Les Académiciens . . . . . 61	Lesser . . . . . 73	Biot . . . . . 234
Muschbroek . . . . . 54 et 292	Agricola . . . . . 75	Goyon-d'Arzas . . . . . 92	Poisson . . . . . 238
Barthold . . . . . 72	Sihl . . . . . 77	Sir Williams Hamilton . . . . . 97	<i>Bibliothèque Britannique, n°. 174</i>
G. A. Deluc . . . . . 145	Gronberg . . . . . 79	Edward King . . . . . 100	
	Patrin . . . . . 165	Eusebe Salverte . . . . . 408	

Fig. 4. Table published by Izarn (1803) summarizing the current opinions on the origin of meteorites.

summarizing the current knowledge about fallen stones, and defending an atmospheric origin for meteorites (Izarn 1803). Izarn was aware of the chemical analyses of Howard, but did not see any problem with atmospheric products being nickel-rich (see Marvin 1996 and 2006 for a detailed account of the 1802–1803 controversy). The table published by Izarn (1803) as a supplement to his book (Fig. 4) illustrates the diversity of opinions at the time of the L'Aigle fall, and underscores the importance of the views of the skeptics, who believed in a volcanic or atmospheric source, or origin by thunder.

In addition to skeptical scientists, the educated public<sup>7</sup> was far from convinced as to the extraterrestrial origin of meteorites, as the attitude of Jondot, a journalist at the *Journal des Débats*, demonstrates. On Floréal 9th (29 April), only 3 days after the fall, news of which had probably not reached Paris yet, Jondot reviewed the article by Eugène Patrin<sup>8</sup> on 'Globes-de-Feu' ('Fiery Globes') belonging to the *Dictionnaire d'Histoire Naturelle* published by Déterville (Paris): 'Its last article, Fiery Globes, will excite the reader's curiosity, but will not fully satisfy him; the author does not fight with good enough reasons the opinion defended by some about stones that are believed to fall from the heavens'.<sup>8</sup> A few months later (Fructidor 10th – 29 August), in the *Journal des Débats*, Jondot agreed with Izarn regarding the

atmospheric origin of the stones fallen from the sky: 'The opinion of M. Izarn is most fitted to the one already presented in the journal, that these stony masses should not fall from the sky, since they form in the atmosphere (...) One should not worry; we are not at war with the moon, and it is our planet only that performs hostilities on earth, and mars its happiness. Everything happens in the air, within that immense laboratory where lightning, hail and storms gather. When one has read M. Izarn's work, it is tempting to say when closing the book: the phenomenon is explained; its cause is extremely simple, and there is nothing new under the sun'.<sup>9</sup> The opinion of Jondot might not be that of all the readers of the *Journal des Débats*, but, strong and ironic as it was, it demonstrated that the educated public, who did not want to be thought fools, did not yet believe in the extra-atmospheric origin of meteorites.

It was not until the L'Aigle fall, and the Biot report, that the scientific community and the

<sup>8</sup>'Son dernier article, Globe de Feu, piquera la curiosité des lecteurs, mais ne le satisfera pas pleinement; l'auteur ne nous paroît pas combattre avec de bonnes raisons l'opinion que l'on s'est formée au sujet des pierres que l'on croit tombées du ciel.'

<sup>9</sup>'L'opinion de M. Izarn s'adapte parfaitement à celle qui a déjà été émise dans ce journal, c'est-à-dire que ces masses pierreuses ne sauraient tomber du ciel, puisque leur formation a lieu dans l'atmosphère (...) Que l'on se rassure donc; nous ne sommes pas en guerre avec la lune, et ce n'est que notre planète (*sic*) qui commet des hostilités sur la terre, et en trouble le bonheur. Tout se passe dans l'air, dans cet immense laboratoire où se rassemblent la foudre, la grêle et les orages. Quand on a lu l'ouvrage de M. Izarn, on seroit tenté de dire en fermant le livre: le phénomène est expliqué; la cause en est extrêmement simple, et il n'y a rien de nouveau sous le soleil.'



educated public accepted without reservation the extraterrestrial origin of fallen stones. Only 1 month after the publication of Biot's report, Professor Prevost wrote: 'Few facts are more established in physics than the fall of meteoritic stones. And within a few months, we moved from doubt to certainty. The report of C. Biot on the meteor of Floréal 6th an XI and on the fall of stones that happened at the north of Laigle (*sic*) leaves nothing to be desired in that respect'<sup>10</sup> (Prevost 1803). Indeed, when the next meteorite fall happened in France in 1806 (at Alais, Gard), its extraterrestrial origin was not even discussed, although the stone (a carbonaceous chondrite) differed significantly from all previous meteorites (Monge *et al.* 1806, Thénard 1806). In 1824, when Déterville published the new edition of the *Dictionnaire d'Histoire Naturelle*, one could read in a revised entry 'Pierres Météoritiques', 46 pages long,<sup>9</sup> the following statement: 'It has been only since a few years that physicists and naturalists have been forced to accept that nothing was less fabulous than the fall of stony bodies of the atmosphere (...) there was even some sort of stubbornness from savants to support the refutation (of meteoritic stones), and to ridicule those who were defending their existence (...) The same spirit dominated until the famous falls of Bénarès, in India, November 19th 1796; Sienna in Tuscany, June 16th 1794 took place; it disappeared in 1803, the year of the fall of stones in 1803 at L'Aigle, April 26th'.<sup>11</sup>

In the early years of the 19th century the idea that meteorites originated from outside the atmosphere, and therefore were extraterrestrial, was not fully endorsed by the European scientific community. In the years following the L'Aigle

fall and the Biot report, the idea was not discussed: meteorites had become scientific objects. Why was the Biot report a turning point in the history of meteoritics? I show below that its importance stems from the fact that Biot went outside the laboratory (and the library) to build the proof for the extraterrestrial origin of meteorites. He went outside of the laboratory both physically (travelling to L'Aigle) and symbolically (making use of a literary style, rather than solely a scientific style).

#### *On the importance of travelling*

I contend that the key point in Biot's report stems from the *trip* made by the young physicist to L'Aigle. Chladni never travelled to the place of a meteorite fall. He elaborated his theories on the origin of iron masses in a library at Göttingen (Germany), compiling information from ancient and modern sources on fireballs and fallen stones. In 1794 Chladni visited St Petersburg (Russia) a month after the publication of his landmark book, *On the Origin of the Mass of Iron Found by Pallas and of Other Similar Ironmasses, and on a Few Natural Phenomena Connected Therewith*. Although the famous Pallas iron, which gave Chladni's book its title, was kept in St Petersburg, it is likely that Chladni never paid a visit to that venerable meteorite (see Marvin 1996, 2006). Similarly, none of the English scientists involved in controversy regarding the fallen stones, and in the chemical analyses of meteorites, travelled to Yorkshire where a meteorite fell in 1795 at Wold Cottage (Pillinger & Pillinger 1996). They were happy enough to see the stone at Piccadilly where it could be viewed for the sum of 1 shilling.

It is, however, crucial in such a matter as a meteorite fall to deal not only with ancient meteorites, describing their mineralogy, establishing their chemical composition and eventually demonstrating their identity of origin, but also to visit the place of a fresh fall. Always central to the debates on the origin of meteorites has been the trust granted to the eyewitnesses of the falls, usually peasants (Westrum 1978). The attitude of the French academists, rejecting meteorites after determining the chemical composition of the Lucé stone because the fall had been reported by illiterate peasants, instead of trustworthy aristocratic scientists, has been pleasantly caricatured over the years, and has become a cliché of the history of science: 'During the eighteenth century the French Academy of Science stubbornly denied the evidence for the fall of meteorites, which seemed massively

<sup>10</sup>'Peu de faits sont mieux prouvés en physique que la chute des pierres météoritiques. Et dans l'espace de quelques mois, on est passé du doute à la certitude. Le rapport du C. Biot sur le météore du 6 floréal an XI et sur la pluie de pierres qui a eu lieu au nord de Laigle (*sic*) ne laisse rien à désirer à cet égard.'

<sup>11</sup>'Ce n'est que depuis quelques années que les physiciens et les naturalistes ont été forcés de convenir que rien n'étoit moins fabuleux que les chutes de corps pierreux de l'atmosphère. (...) il y eut même une sorte d'obstination de la part des savants à soutenir cette réfutation (des pierres météoritiques), et à tourner en ridicule ceux qui la leur attribuoient. (...) Ce même esprit régna jusqu'à ce que les fameuses chutes de Bénarès, dans l'Inde, le 19 novembre 1796; celles de Sienna en Toscane, le 16 juin 1794 eurent lieu; et il cessa en 1803, année de la chute des pierres en 1803, à L'Aigle, le 26 avril.'



obvious to everybody else (*sic*). Their opposition to the superstitious beliefs which a popular tradition attached to such heavenly intervention blinded them to the facts in question' (Polyani 1958, p. 138). There is, however, no clear evidence in the text<sup>10</sup> written by Fougereux, Cadet and Lavoisier of such aristocratic scorn (Fougereux *et al.* 1777). Superstition is in any case what scientists fear most, as the English scientist John Lloyd Williams, member of the Royal Society of Calcutta, explained about the fall of the Benares stone in India: 'Among a superstitious people, any preternatural appearance is viewed with silent awe and reverence; attributing the causes to the will of the Supreme Being, they do not presume to judge the means by which they were produced, nor the purposes for which they were ordered; and we are naturally led to suspect the influence of prejudice and superstition, in their descriptions of such phenomena; my inquiries were therefore chiefly directed to the Europeans, who were but thinly dispersed about that part of the country' (Williams 1802). In his article 'Globes-de-Feu' (see above), Patrin used the fact that Howard had not directly interviewed the witnesses to discredit his views: 'But one must observe that of all persons named by M. Howard, none speaks as a witness; they only report what they heard by hearsay from people who are not named, and whose testimony seems at the very least insignificant'<sup>12</sup> (Patrin 1803). The key question for Biot was therefore to eventually establish the trustworthiness of the witnesses to the meteorite falls: 'It was much to be desired that the phenomenon should be once observed irrefutably, and that all its particularities be recorded with fidelity'.<sup>13</sup>

Biot took great pains to interview a wide variety of witnesses, having no connections with one another, and coming from a large diversity of social and professional backgrounds. Although he emphasized the moral qualities of some of his witnesses: 'Let us notice that the testimonies gain here a considerable strength from the state and the moral qualities of the witnesses.

<sup>12</sup>'Mais il faut d'abord observer que de toutes les personnes qui sont nommées par M. Howard, il n'y en a pas une seule qui parle comme *témoin*; elles ne font que rapporter ce qu'elles ont *ouï-dire* à des individus qu'on ne nomme point, et dont le témoignage paroît tout au moins insignifiant.'

<sup>13</sup>'Cependant il étoit fort à désirer que le phénomène fût une fois constaté d'une manière irrécusable, et que toutes ses particularités fussent recueillies avec fidélité (...)' (Biot 1803c, p. 8).

To start with, it is a very respectable dame, that has no interest to impress anybody; it is two clergymen (...); finally an elderly lady',<sup>14</sup> he gathered most of his testimonies from peasants, his 'laboueurs éclairés' (enlightened cultivators) or workers such as this 'Concierge that seemed to be a very intelligent man'.<sup>15</sup> It is 'Bringing together these stories, made by enlightened men, with those we gathered in the countryside (...)'<sup>16</sup> that Biot convinced himself and the reader that stones fell from the sky at L'Aigle. Moreover, the very diversity of social origin was exactly what made the phenomenon absolutely certain: 'All these persons, so diverse in professions, customs and opinions, having little or no relations one with another, agree all of a sudden to testify a same fact that they have no interest to suppose'.<sup>17</sup> What Biot shrewdly demonstrated, by placing everyone (almost) on the same footing, was that one can trust the reports peasants made on the L'Aigle fall. He established, therefore, the general reliability of peasant's testimonies about meteorite falls, and solved the problem of the witnesses trustworthiness. This would have been impossible had not Biot himself visited the spot where the meteorite fell.

Aside from these 'preuves morales' (moral proofs), Biot presented some 'preuves physiques' (physical proofs) for the reality of stones fallen from the atmosphere at L'Aigle. These were mainly the observed differences between the stones that had appeared at L'Aigle on Floréal 6th and local stones studied by Biot in the mineralogy collections at Alençon kindly provided to him by M. Barthélémy, chief engineer. Furthermore, said Biot, 'The foundries, the factories, the mines of the surroundings I have visited, have nothing in their products, nor in their slag that have with these substances any relation. No trace of a volcano, can be seen in

<sup>14</sup>'Remarquons que les témoignages acquièrent ici une grande force par l'état et les qualités morales des témoins. C'est d'abord une dame très respectable, qui ne peut avoir aucun intérêt d'en imposer; ce sont deux ecclésiastiques (...); enfin c'est une femme âgée (...)' (Biot 1803c, p. 28).

<sup>15</sup>'Concierge qui lui parut un homme fort intelligent' (Biot 1803c, p. 37).

<sup>16</sup>'En rapprochant ces récits, faits par des hommes éclairés, de ceux que nous avons recueillis dans les campagnes (...)' (Biot 1803c, p. 18).

<sup>17</sup>'Toutes ces personnes, de professions, de moeurs, d'opinions si différentes, n'ayant que peu ou point de relations entre elles, sont tout-à-coup d'accord pour attester un même fait qu'elles n'ont aucun intérêt à supposer' (Biot 1803c, p. 41).



the region'.<sup>18</sup> Biot had observed the geography of the Orne district, and had visited smelters, mines and factories to build up definitive proof of the extraterrestrial origin of meteorites; this would have been impossible had he not travelled to L'Aigle.

Biot, himself was very much aware of the importance of travelling. Indeed, the very report's title, 'Relation of a trip...', emphasized the visit rather than the scientific question, the possible extraterrestrial origin of meteorites. The very report is a detailed account not only of scientific arguments and observations, but of a naturalist's expedition. One can follow Biot's enquiry, village after village, step by step: 'On my way... we stopped first at Nonant... at the village of Merleraut'<sup>19</sup> are a few of the many expressions Biot used to give rhythm to his report. His travels were as much the subject of his report as the circumstances of the meteorite fall: he knows that it is his travelling that will eventually build the proof in favour of an extraterrestrial origin of meteorites. Some 50 years later, when publishing a compilation of his most significant scientific and literary work (Biot 1858a), he classified this early work under the heading 'Voyages' (journeys), rather than astronomy, designating to posterity the importance of his *trip* to L'Aigle. Although Biot did not invent the scientific trip,<sup>11</sup> which had been exemplified a few years before the L'Aigle expedition by the Egypt expedition, his journey from Paris to L'Aigle was necessary to establish the extraterrestrial origin of meteorites.

### *Beautiful style in science*

In his account of the origin of meteoritics, Derek Sears argues that 'in contrast to the papers of Howard, Vauquelin, Fourcroy and Klaproth, which are full of dry details of analytical techniques and tables or figures, [Biot's] report is dramatic and exciting. It is therefore not surprising that it is usually cited as the reason for the general acceptance of the idea that stones were falling from the sky' (Sears 1975). For Sears the importance of style is, however, minor compared to the seriousness of chemical analyses, and 'Biot's report may have played only a

minor role' (Sears 1975). For Sears, it is only *afterwards*, that the Biot report was given its importance, apparently playing no *real* role in the acceptance of the extraterrestrial origin of meteorites.

I will argue the reverse. The delicate style of Biot's report was the key to persuading other scientists and the educated public of the extraterrestrial origin of meteorites. Had it not been so dramatically and beautifully written, large extracts would not have been published, not only in most of the scientific journals of the time, but also in many of the daily and monthly newspapers. Numerous reprints were circulated, and several editions spread throughout Europe.<sup>12</sup> The wide circulation of the report, due in large part to its beautiful style, greatly contributed to the acceptance of the new ideas.

Establishing the beauty of Biot's style is not easy to accomplish, without entering lengthy literary considerations that might be out of place. I hope the long extracts that I have presented can help the reader to appreciate his elegance of expression and thought. Biot himself was relentless in defending the importance of literary knowledge for scientists. In his reception at the Académie Française,<sup>13</sup> he was exhorting young scientists to 'exercise, make supple your spirit as it springs through the study of letters. Do not listen to whom is scorning them. No one ever noticed that these are more savants for being less litterate. Only letters will be able to teach you the delicacy of thoughts, the subtlety of style, only letters will give you a full comprehension of the ideas you conceived, and will teach you the art to express them clearly with the most appropriate words. So prepared, your first initiation to the mysteries of science will become easy and smooth'.<sup>20</sup>

Moreover, Biot believed that without a literary education, a scientific nation would fall back into barbarism; that there is no strict separation between letters and sciences: 'The first (condition) is that sciences and letters are together

<sup>18</sup>'Les fonderies, les usines, les mines des environs que j'ai visitées, n'ont rien dans leurs produits, ni dans leurs scories qui ait avec ces substances le moindre rapport. On ne voit dans le pays la moindre trace de volcan' (Biot 1803c, p. 39).

<sup>19</sup>'Chemin faisant... Nous nous arrêtâmes d'abord à Nonant... Au bourg de Merleraut' (Biot 1803c, pp. 14,15).

<sup>20</sup>'(...) exercer, assouplir, perfectionner les ressorts de votre esprit par l'étude des lettres. N'écoutez pas ceux qui les dédaignent. On n'a jamais eu lieu de s'apercevoir qu'ils fussent plus savants pour être moins lettrés. Elles seules pourront vous apprendre les délicatesses de la pensée, les nuances du style, vous donner la pleine compréhension des idées que vous aurez conçues et vous enseigner l'art de les exprimer clairement, par des termes propres. Ainsi préparés, votre première initiation aux mystères des sciences deviendra facile.' In *Discours de réception à l'Académie française* (Biot 1858b).



and allied. These are letters that gave to sciences the glare they shine of today. Without sciences, the most literate nation would become weak and soon enslaved; without letters the most knowledgeable nation would fall back into barbarity'.<sup>21</sup> For Jean-Baptiste Biot, letters come first, and one can speculate from these words that the style of his report mattered as much to him as its content.

### *The nature of proof*

The nature of scientific proof has been the subject of many science studies (e.g. Shapin & Schaffer 1985). It is far beyond the scope of the present paper to discuss it from a general epistemological point of view. Here, I will simply summarize the different articulations of proof building in the case of the origin of meteorites and the Biot report.

In 1803 stones fallen from outside the atmosphere seemed such an unlikely event that even the positive evidence of chemical analyses was not enough to convince incredulous scientists and arrogant journalists. In fact, meteorites are not just *any* scientific object. Meteorites fall outside the laboratory environment, in cultivated fields, and the first witnesses of the fall belong to the public, who sometimes took great pains to alert scientists to their importance. When a meteorite fell in Barbotan (Agen, France) in 1790, a notarized deposition signed by the mayor certifying that 300 citizens had seen the fall was dismissed by the editors of a science divulgation journal, *Journal des Sciences Utiles* (see Marvin 1996, 2006). Falls are a public event, seen by numerous individuals *other than* scientists. It is only later that scientists pay attention to them, and bring specimens into the laboratory to examine them. For that reason, any conclusive proof of the extraterrestrial origin of meteorites must be built outside the laboratory and the library.

Jean-Baptiste Biot established the proof of the extraterrestrial origin of meteorites by going outside the laboratory. First, his trip to L'Aigle brought him to the 'scene of the crime', where he crucially established the reliability of the witnesses to the meteorite fall. Second, the precise and beautiful style he used was able to convince

both the educated public and the scientific community. In the next section, I want to place this visit in the more general context of Bonapartist politics.

## **Chaptal's invitation and the Bonapartist cradle of meteoritics**

### *Chaptal's invitation*

'Since the Ministry of Interior has invited me to go in the Orne Department to gather exact informations on the meteor that appeared close to L'Aigle the last Floréal 6th, I diligently met his intentions, and I am going to report to the class the observations I gathered'.<sup>22</sup> The Minister of Interior was Jean-Antoine Chaptal (1756–1832) (Fig. 5), a famous industrial chemist who gave his name to a widely used technique for increasing the alcoholic degree of wine (chaptalization). He had been Minister of Interior of the Premier Consul since Brumaire 15th an IX (6 November 1800), after Lucien Bonaparte (Napoléon's brother) stepped down to become ambassador at Madrid.<sup>14</sup> A key character in the Bonapartist state, Chaptal had been appointed Conseiller d'État in charge of the Interior,<sup>15</sup> Nivôse 4th an VIII (24 December 1799), only 2 months after Bonaparte's coup (Brumaire 18th an VIII – 9 November 1799).

From Biot's own words, it was Chaptal who sent the promising young scientist to enquire about the fall at L'Aigle. One might ask, however, whether it was the Minister of Interior, or the Institut who actually sent Biot to l'Orne? I have found no mention of the meteorite fall in the archives of the Ministry of Interior (Série F), nor any mission order in the archives at the Institut. We know that Chaptal was present at the Institut National when the first report of the fall was read by Fourcroy, and at the meeting when the *Classe* collectively decided to send Biot to L'Aigle (Fig. 6). Biot reported to the Classe des Sciences de l'Institut, that can therefore be considered as the mandating power. On the other hand, in his report Biot specifically referred to Chaptal as the Minister of Interior, and in later publications qualified his report as 'The letter he just wrote to the Minister

<sup>21</sup>'La première (condition) est que les sciences et les lettres s'y trouvent alliées et réunies. (...) Ce sont les lettres qui ont donné aux sciences l'éclat dont elles brillent aujourd'hui. Sans les sciences la nation la plus lettrée deviendrait faible et bientôt esclave; sans les lettres la nation la plus savante retomberait dans la barbarie' (Biot 1803a, p. 77).

<sup>22</sup>'Le ministre de l'intérieur m'ayant invité à me rendre dans le département de l'Orne pour prendre des renseignements (*sic*) exacts sur le météore qui a paru aux environs de L'Aigle le 6 floréal dernier, je me suis empressé de remplir ses intentions, et je vais rendre compte à la classe des observations que j'ai recueillies' (Biot 1803c, p. 5).



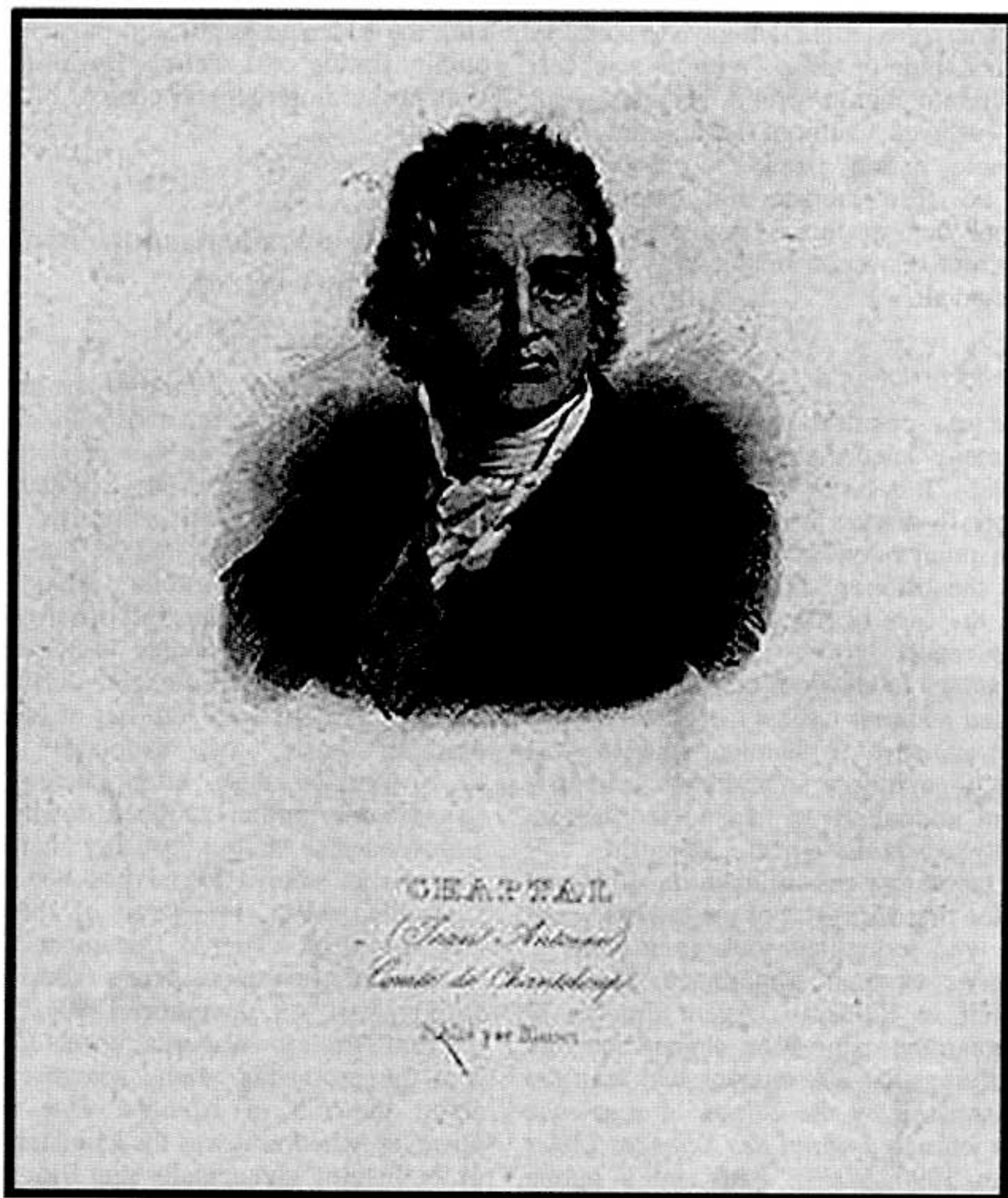


Fig. 5. Jean-Antoine Chaptal (1756–1832). © Archives de l'Académie des Sciences.

of Interior'<sup>23</sup> (Biot 1803*b*). Besides a purely formal attitude, this constant reference to the Minister of Interior stresses the importance of Chaptal's role in inspiring the decisions of the Institut, which he had thoroughly reformed the same year (Pigeire 1931, p. 362ff). In the next section I will emphasize some features of the Bonapartist state which might illuminate our understanding of Biot's trip to L'Aigle.

#### *Connaître et organiser*<sup>24</sup>

Chaptal's achievements during his mandates as Conseiller d'État (1799–1800) and subsequently Minister of Interior (1801–1804) were enormous.<sup>16</sup> He had been given by Bonaparte, soon

to be Napoléon (crowned emperor Floréal 28th an XIII – 18 May 1804), the important task of reorganizing the French administration, and he established key political reforms whose letter and spirit last until now (Thuillier & Tulard 1984).

On Brumaire 19th an IX (10 November 1800) the *Moniteur* published the integrality of the 'Report and bill on the public instruction presented to the Conseil d'État by Jean-Antoine Chaptal'<sup>25</sup> where Chaptal defended 'A system of internal organization that establishes everywhere order and harmony',<sup>26</sup> and such that 'There does not exist a single point of the

<sup>25</sup>*Rapport et Projet de Loi sur l'Instruction publique présentés au Conseil d'État par Jean-Antoine Chaptal.*

<sup>26</sup>'Un système d'organisation intérieure (...), établissant partout l'ordre et l'harmonie' (Chaptal quoted by Pigeire 1931, p. 251).

<sup>23</sup>La lettre qu'il vient d'écrire au Ministre de l'Intérieur.

<sup>24</sup>To know and to organize.



TABLEAU DE PRÉSENCE AN XI.

	GERMIN.				FLORÉAL				PRAIRIAL				MESSID.				THERM.				FRUCTID.			
	7	14	21	26	5	12	19	26	3	10	17	24	8	15	22	29	6	13	20	27	4	11	18	25
Adanson														o			o						o	
Berthollet															o									
Berthoud				o		o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
<u>Biot</u>								o						o	o									
<u>Bonaparte</u>	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
Bossut							o																	
Bougainville						o									o									
Bouvard	o	o	o	o	o													o						
Brisson													o	o		o			o	o	o	o		
Broussonet	o	o	o	o	o	o	o	o	o	o	o	o	o									o		
Buache																								
Carnot																						o		
Cassini	o	o	o	o	o	o	o	o	o	o	o	o	o		o	o	o	o	o	o	o	o	o	
Cels																								
<u>Chaptal</u>														o	o	o	o			o	o			
Charles																						o		
Coulomb	o	o	o	o	o	o	o	o	o	o	o	o										o		
Cuvier	o	o	o	o			o											o						
Delambre																								
Des Essartz											o												o	
Desfontaines																								
Desmarest																								
Deyeux	o	o																				o		
Duhamel																							o	
Fleurieu		o		o		o	o							o	o	o	o					o		
<u>Fourcroy</u>																								
Guyton					o			o																
Hallé		o			o		o	o						o						o				
<u>Haüy</u>																								
Huzard																							o	
Jussieu	o						o		o					o	o				o				o	
La Billardiére																								
Lacepède																								
Lacroix					o		o															o		
Lagrange																								
Lalande																						o		
La Lande Neveu																						o		
Lamarck							o	o															o	
<u>Laplace</u>								o																
Lassus																								
Lefèvre-Gineau				o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
Legendre																								
Lelièvre	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
Levêque					o																			
Méchain					o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
Messier																								
Monge																								
Olivier																								
Parmentier								o																
Pelletan																								
Périer	o	o																				o		
Pinel																								
Portal																								
Prony																								
Ramond																								
Richard	o																						o	
Rochon	o	o	o																				o	
Sabatier	o																							
Sage																								
Tenon																								
Tessier				o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o			
Thouin	o																							
<u>Vauquelin</u>																								
Ventenat																								

Fig. 6. Tableau de présence (attendance register) of the Classe des Sciences de l'Institut (an XI). Key characters in this story are underlined. © Archives de l'Académie des Sciences.



Republic's soil where every individual would not find an instruction sufficient and proportional to his needs'.<sup>27</sup> Although the law voted for on Fructidor 11th an X (29 August 1802) differed from Chaptal's views on education, the gigantic effort promoted by Chaptal and his fellow chemist Fourcroy resulted in a thorough organization of French territory, each department having a lycée (secondary school), while Parisian specialized schools such as École polytechnique or École des Mines attracted the best students. Chaptal created local museums in a large number of French towns. In Paris, he funded the Musée des Arts et Métiers (Prairial 5th an X – 26 May 1802) and reorganized the Jardin des Plantes (the botanical collections). The important point is that the Bonapartist state created institutions that ensured *everywhere* a control of both the territory of knowledge (schools) and the order of things (museums).

On Frimaire 1st an IX (22 November 1800) Chaptal created the Bureau de Statistique du Ministère de l'Intérieur, in charge of collecting an enormous dataset on all the aspects of French industrial and agricultural production, natural resources and infrastructures. This Bureau de Statistique made it possible for the government to classify the resources of the territory (for a detailed analysis of departmental statistics see Bourguet 1989): 'My correspondence told you, citizen prefect, how much I desire to gather all facts that can give the government exact and positive knowledge on the state of France'.<sup>28</sup> Not only should the government agents gather a positive, statistical knowledge, but the transmission of facts should be absolutely exact. Transparency of these agents was a necessary condition, for the Bonapartist state to work. Information should not be corrupted by the executive agent, so that the executive power can take, with full knowledge of the facts, opportune decisions: 'I want only facts, and I am far from forming theories in advance'.<sup>29</sup>

The creation of new institutions (schools, museums) and new political practices (Bureau des Statistiques) ensured a detailed knowledge

of France, on which further organization could be built. The main task of Chaptal was the establishment of the modern centralization of the French state.<sup>17</sup> He created 98 departments run by prefects, directly depending on the Minister of Interior. The prefects' role was to 'give to government's action unity, vigour, and celerity in blowing the will of a unique engine in each department ... so that the chain of execution goes down without interruption from the minister to the citizen, and transmit the law until the last ramifications of the social order with the rapidity of the electric fluid'.<sup>30</sup> This evocation of social order speaks for itself. A scientific metaphor (electric fluid) illuminates the meaning of centralization in the Bonapartist state: a dense network dedicated to carry the law down to every stratum of society. Prefects were the main agent of the government, the first cogwheel of the transmission of a unique will to the whole social body.

In the early 19th century, a new politico-administrative structure was established in France, whose goal was to shape the social order desired by Bonaparte. Statistical tools, schools and museums were used to know, classify and, in short, organize France. State agents such as teachers, engineers and prefects realized a thorough networking of the French territory, while unity was guaranteed by the will of Bonaparte. The transparency of the agents was crucial in building this new politico-administrative structure because it guaranteed that the right decision could be taken in full knowledge of the facts. In such a politico-administrative structure there was no room, spatially as well as in the order of knowledge, for the non-understood, the unclassified and the anomalous. In the next section I will show that the meteorite fall at L'Aigle, perceived as an anomalous event, was brought back by Biot into the known order of things.

### *Anomalous meteorites*<sup>18</sup>

What is more anomalous than a meteorite fall? It happens at any time, any place, without warning. It is a spectacular event whose descriptions, often evoking war and destruction, cannot be ignored. Not only is it sudden and unpredictable, but scientists who have recently understood so

<sup>27</sup>'Il n'existât pas un seul point du sol de la République où chaque individu ne trouvât une instruction suffisante et proportionnée à ses besoins' (Chaptal quoted by Pigeire 1931, p. 264).

<sup>28</sup>'Vous avez vu par la suite de ma correspondance, citoyen préfet, combien je désire recueillir tous les faits qui peuvent donner au gouvernement des connaissances exactes et positives sur l'état de la France' (Chaptal quoted by Sartori 2003, p. 71).

<sup>29</sup>'Je ne veux que des faits et suis loin de vouloir former une théorie d'avance' (Chaptal quoted by Péronnet 1988, p. 331).

<sup>30</sup>'Donner à l'action du gouvernement unité, vigueur et célérité en mettant en jeu la volonté d'un moteur unique dans chaque département ... de manière que la chaîne d'exécution descende sans interruption du ministre à l'administré et transmette la loi et les ordres du gouvernement jusqu'aux dernières ramifications de l'ordre social avec la rapidité du fluide électrique' (Chaptal quoted by Sartori 2003, p. 70).



much about the universe<sup>19</sup> are unable to provide any firm explanation for the phenomenon. One even had the deplorable taste to fall, not in the capital Paris, but in some remote province. Last but not least, although clearly different from any terrestrial stone, it is unclassified, an unbearable outlier in the order of things.

A popular song, written by Antignac and published on Thermidor 29th (17 August) in the *Journal des Débats*, called *Les miracles du jour*,<sup>20</sup> illustrates the wonder into which meteorites plunged people of the time:

Malheur à qui toujours s'afflige!  
Moi j'aime assez le temps présent;  
Chaque jour enfante un prodige,  
Et l'on s'instruit en s'amusant.

En plein midi comme à la brume,  
Tout ce qu'on voit est sans pareil;  
Les pierres tombent de la lune,  
Et la viande cuit au soleil.<sup>31</sup>

Stones fallen from the moon<sup>21</sup> were unlike anything else, they were the miracle of the time, a prodigious event. Biot went to L'Aigle to bring meteorites back into the order of things, using similar techniques to those used by Chaptal to build a new social order.

Biot very much insisted in his report on his objectivity, what I have called the transparency of the agents. Before the L'Aigle fall he was already a strong supporter of an extraterrestrial origin of meteorites, exploring through detailed calculations the possible lunar origin of these stones (Biot 1802). In the introduction of his report, he is very cautious to explain that: 'Convinced with that truth, I felt that only exactness and the most rigorous fidelity could make useful to sciences the mission I was charged of. I considered myself as a foreigner to any system; and for not risking anything that could decrease the trust into the facts I am going to report on, I will limit myself to relate the facts as I have gathered them, and in developing the most immediate consequences, I will not examine how they relate with the hypothesis recently imagined'.<sup>32</sup> As prefects were supposed

<sup>31</sup>'Woe to the afflicted one! / I quite like present time; / Every day gives birth to a wonder, / And instruction and fun walk together. / At midday and at midnight, / Everything you can see is second to none; / Stones fall from the moon, / And meat cooks in the sun.'

<sup>32</sup>'Convaincu de cette vérité, j'ai senti que l'exactitude et la fidélité la plus scrupuleuse pouvoient seules rendre utile aux sciences la mission dont j'étais chargé. Je me suis considéré comme un témoin étranger à tout système; et, pour ne rien hasarder de ce qui pourroit ôter quelque confiance aux faits que je vais

to gather exact information for Bonaparte to make political decisions, Biot is leaving to someone else the responsibility of reaching a conclusion about the origin of meteorites. Biot is a transparent scientific agent who wants only to gather facts, 'being a foreigner to any system'.

Biot made good use of the scientific-political network and of the new institutions designed by Chaptal. Before he left Paris, he was given a piece of the Barbotan meteorite (fall, 1790) collected by Georges Cuvier (1769-1832), while René Just Haüy (1743-1822) informed him about the mineralogy of the L'Aigle region, and Antoine de Fourcroy gave him copies of the letters he received from L'Aigle about the meteor apparition. Respectful of the administrative hierarchy, Biot started his enquiry at Alençon, chef-lieu du département de L'Orne.<sup>22</sup> There, he met the prefect M. Lamagdelaine, the chief engineer for road construction, and M. Barthélemy, the high school ('de l'école centrale') professor and librarian. As soon as Biot arrived in L'Aigle, despite the late hour (10 p.m.), he rushed to Citoyen Leblond's house, the correspondant of the Institut. Leblond's door was shut and Biot could hardly contain his impatience to meet him until the next morning.

I believe that the role played by these characters illustrates the embedding of Biot's trip within the Bonapartist state, and that their mention and that of their titles, all referring to the new political structures set up by Chaptal and Bonaparte, demonstrates Biot's acceptance of these. It is part of Biot's method to make extensive use of the thorough network built in the French state by the Minister of Interior (prefects, professors, engineers, scientists and so on).

Despite the importance given by Biot to his trip to the province, one should not forget that, mandated by Parisian power, he came back to Paris as soon as his mission was completed and it was there that he presented his report, and shared his conclusions with his colleagues at the Institut. After it had so brilliantly served to reveal to the world the true nature of fallen stones, the town of L'Aigle fell back into the oblivion from which the ambitious French capital never thought to remove it. Until 2003, and an exhibit that celebrated the 200 year anniversary of the fall, the city of L'Aigle did not

rappporter, je me bornerai dans ce mémoire à les exposer tels que je les ai recueillis, et en développant les conséquences immédiates de leurs rapports, je m'abstiendrai même d'examiner en quoi elles se rapprochent ou s'écartent des hypothèses que l'on a imaginées' (Biot 1803c, p. 8).



even have in its possession a piece of its famous meteorite. The 842 g sample now at the Musée de la météorite, was lent by the Parisian Muséum National d'Histoire Naturelle, emphasizing the continuing centralized nature of the French state. In a centralized country like France, everything departs from Paris and comes back to Paris. Local events and facts are always inserted into what is believed to be the universal. The meteorite at L'Aigle did not escape that rule.

As has been said before, Jean-Baptiste Biot was sent to L'Aigle to bring back meteorites within the order of things. Making use of political resources established by Chaptal, he realized in the realm of nature the socio-political programme enforced by the Minister of Interior of the Bonapartist state.

### *Science and politics*

I have argued that Biot was suffused with the political ideology and practice of his time, and that was the reason why he travelled to L'Aigle to enquire about the meteorite fall. But, if one changes perspective, it seems obvious and vaguely ridiculous to emphasize that Biot wanted to gather 'exact information' and that he made use of a positive approach when investigating the meteorite fall. Are not these qualities (exactness, positivity, etc.) some of the characteristics of science? Does it not work in reverse: Biot used the methods of the Bonapartist state because this state itself was strongly influenced by the scientific method. Bonaparte, who had been elected a member of the Institute in 1798, said that he would have been a scientist, had he not been a general: 'Had I not become a general in chief, I would have dedicated myself to the study of exact sciences. I would have made my way in the road of Galileo, Newton'.<sup>33</sup> The influence of scientific thought in the Bonapartist, and later on the Napoleonic, state has previously been identified and discussed (e.g. Dhombres & Dhombres 1989). The presence of scientists at the highest state level is well noted (Sartori 2003). Before Chaptal, Laplace was Minister of Interior for a 6-week period and thereafter an influential member of the Senate. Joseph Fourier (1768–1830) was a prefect. Gaspard Monge (1746–1818), Claude-Louis Berthollet (1748–1822) and others were members of the Senate. So, does this mean that the story that I have just told is redundant at

best, circular at worst? I do not believe so, because I am interested in one peculiar event: the birth of meteoritics as a science, and more specifically in Jean-Baptiste Biot's trip to L'Aigle. This event can be, if not explained, at least enlightened efficiently, from the perspective of the nascent Bonapartist state. Had not the Bonapartist state existed, Biot would probably not have travelled to L'Aigle and made such an important contribution to the birth of meteoritics.

A more thorough study would have to disentangle the relationship between politics and science at the beginning of the 19th century, and would probably conclude that there is no such question as the precedence of science over politics, or the reverse. Possibly such a study would reach the conclusion of an *esprit du temps*<sup>34</sup> that illuminated both Bonaparte and the scientists. But, what produces *l'esprit du temps* if not the very actions of human beings, actions that are exactly what we want to explain? Distilling down to *l'esprit du temps* does not help us, and it seems difficult to escape partial enlightening of an historical event.

### **Summary**

In year XI of the French republic (1803), the extraterrestrial origin of meteorites, speculated by Chladni (1794), had been technically proven by the chemical analyses of meteorites performed by Howard (Sears 1975, 1976). However, many scientists, and a large part of the public, were not fully convinced by this scientific proof. It was not until the meteorite fall at L'Aigle and the report written by Jean-Baptiste Biot on his 9-day trip to the site of the fall that both *l'Europe des savants* and the well-read public accepted without reservation the extraterrestrial origin of meteorites, and consequently the birth of a new science (meteoritics).

I argued that Biot's report on the visit he made to L'Aigle is a key event in establishing the extraterrestrial origin of meteorites, because Biot was able to build the proof outside of the laboratory and the library. He went outside of the laboratory both physically (travelling to L'Aigle) and symbolically (making use of a literary style, rather than a scientific style).

The reason why Biot travelled was the establishment, in the early 19th century, of a centralized politico-administrative structure whose aim was to know, classify and organize France

<sup>33</sup>'Si je n'étais pas devenu général en chef, je me serais jeté dans l'étude des sciences exactes. J'aurais fait mon chemin dans la route des Galilée, des Newton.'

<sup>34</sup>'Spirit of the age.'



with the goal of designing a new social order. While the Minister of Interior, Chaptal, helped by prefects, was trying to bring every social and economic reality into the new social order, Jean-Baptiste Biot brought back the L'Aigle meteorites, and thereby *all* meteorites, within the order of things.

What I have presented is an important aspect of the cradle of meteoritics.<sup>23</sup> This young science was not born only in a library at Göttingen where Chladni carefully peeped at ancient and modern sources, nor in a chemistry laboratory in London, but also on a road to L'Aigle, maintained by Bonapartist engineers and evoked by the delicate words of Jean-Baptiste Biot.

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## Notes

<sup>1</sup>I have chosen to indicate the dates as they were in France in the early 19th century, i.e. using the revolutionary calendar (Day 1 being 22 September 1792, the abolition of royalty by the Convention). In the French original, given in the foot-note, the original spelling, slightly different from modern one, has been kept.

<sup>2</sup>This paper should be taken as an explorative work. A more detailed and comprehensive study is in preparation.

<sup>3</sup>The misleading word 'class' refers to the most prominent scientists of the time gathered in the Classe des Sciences de l'Institut National, created Fructidor 5th an III (22 August 1795). Minutes of weekly meetings can be consulted at the Archives of the Institut National.

<sup>4</sup>From 31 October 1793 (Brumaire 10th year II), the terms *Madame* and *Monsieur* were forbidden by the Convention (Parliament) and replaced by the term *Citoyen* (Citizen), whose abbreviation is C. or Cit.

<sup>5</sup>In comparison, entry to a fashionable dancing party at Tivoli, as advertised in the *Journal des Débats* was 3.3 francs (Thermidor 19th – 7 August), and the Izarn book on meteorites (see above) cost 5 francs. Chinese baths cost 3 francs, thus making meteorite viewing a rather cheap activity.

<sup>6</sup>In the same garden, one could admire a male elephant (17 Fructidor – 4 September, *Journal des Débats*). Interestingly enough, the elephant and the meteorite later followed the same way to the Jardin des Plantes, the meteorite to be incorporated in the nascent collection, the elephant to be united with a female fellow elephant in the presence of the Minister of Interior and a gathering of personalities (30 Fructidor – 17 September, *Journal des Débats*).

<sup>7</sup>The notion of educated public is quite vague and ill defined. I will here *assume* that the *opinions* of the educated public are reflected by the statements made in the journals of the time. This would be a matter of historical study in itself to establish the veracity of this assumption.

<sup>8</sup>The author is Eugène Patrin (1742–1815), mineralogist, who was, despite Jondot's concern, a strong opponent to Chladni's views on meteorites (see Marvin 1996). He favoured a thunderstorm origin for meteorites.

<sup>9</sup>The entry 'Globes de Feu' in the 1803 edition of the *Dictionnaire* was only 18 pages long.

<sup>10</sup>Although communicated to the Académie on 15 April 1769, the report was not published until 1777 (see Marvin 1996).

<sup>11</sup>On this question, see Spary (1998).

<sup>12</sup>In 1995 I found a copy of the original Biot report in a second-hand bookshop in Moscow (Russia). It is part of a larger volume entitled *Mémoires de la classe des sciences mathématiques et physiques de l'Institut National de France* published in 1806. This edition does not include a map of the strewn field. The Muséum National d'Histoire Naturelle in Paris owns a copy including the map of the strewn field, but the map is absent from the copy possessed by the Natural History Museum at London. Both copies seem to date back to 1803.

<sup>13</sup>Biot is one of the rare French savants ever to have been member of three Académies: Académie des Sciences (1803), Académie des Inscriptions et Belles Lettres (1841) for his work on ancient Egypt, and Académie Française (1856) for his numerous literary contributions, such as a life of Galileo (in Biot 1858a) or an essay '*De l'influence des idées exactes dans les ouvrages littéraires*' (in Biot 1858a).

<sup>14</sup>Until Pluviose 1st an X (21 January 1801), the position was only temporary (*intérimaire*).

<sup>15</sup>The *Conseil d'État* was a consultative assembly created by Bonaparte, who played a major role in orientating the politics of the Consulat and, later, the Empire (Fierro *et al.* 1995).

<sup>16</sup>The attributions of the Minister of Interior were extremely wide, ranging from the correspondence with prefects to the archives, including hospital, prison and harbour management, industry, and commerce, etc. The whole list would take more than a



page. (See Cérémonial de l'Empire français, par L.-I.P.\*\*\*\*. Paris, librairie économique, 1805, chap. IX, 'Du ministre de l'intérieur'.)

<sup>17</sup>Centralization in France obviously did not start with Chaptal. It was, however, a strong enough aspect of Bonaparte's politics that it can be considered as a key characteristic of that régime.

<sup>18</sup>The expression 'anomalous meteorites' is taken from Westrum (1978) who, however, uses it in a quite different sense.

<sup>19</sup>In 1799 Laplace published the first volume of his *Mécanique Céleste* which resulted in his being named the French Newton; it was considered a great improvement on the understanding of celestial mechanics.

<sup>20</sup>The tune is said to be that of: *J'ai vu partout dans mes voyages (I have seen everywhere in my trips)*. The score found at the Bibliothèque Nationale, Département de la Musique (classification mark Vmb.ms.71), as well as the complete lyrics, are available from the author.

<sup>21</sup>The reference to the moon is obviously ironic.

<sup>22</sup>The administrative division in France was (and is) the following: chef-lieu de département or prefecture (Alençon), chef-lieu de canton ou sous-préfecture (L'Aigle).

<sup>23</sup>The question of the origin always stimulates passion among researchers. I am sure my esteemed English colleagues, who like to believe Howard was *the* man who established first the extraterrestrial origin of meteorites (Sears 1975, 1976) will jump on their seats when reading: 'the bonapartist cradle of meteoritics'. This ironic note serves to remind the reader that the Franco-English war, revived when the Amiens peace was broken (30 Floréal an XI – 20 May 1803), might also have been one of the motives that brought Biot to L'Aigle.

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