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RESEARCH PAPER

The Perrey Archive: a story about collecting earthquakes and eruptions

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Abstract
The Perrey Archive, a unique historical collection of texts and manuscripts on earthquakes and volcanic eruptions of the past, is preserved in the *Fondo Sismico* of the library of the Società Napoletana di Storia Patria. This collection is the result of the tireless research of French scientist Alexis Perrey (1807–1882), who is regarded as one of the founders of seismology. The article illustrates what it means to "collect" earthquakes and eruptions, as well as other extreme events and how Perrey built his collection over the course of roughly 40 years, and it describes the role that the catalogs created by Perrey played for historical seismology. Finally, in addition to the value and significance of Perrey's intellectual enterprise for the history of science, the article discusses the different aspects of archives and archiving for sciences.

Graphical abstract
Photographic composition of some volumes from the Seismic Collection of the Società Napoletana di Storia Patria, photo by Claudio Novelli.

Keywords History of science · Historical seismology · Natural disasters · Scientific books collections · Nineteenth-century science · Earth archives

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1 Archives: at the crossroads between social sciences, natural sciences, and the humanities

Vivre et ne pas travailler, ne pas s'occuper de ces chers tremblements, n'est pas vivre. Perrey to Lemercier, 10 December 1854[1]

Professional historians are very familiar with the verb "to archive". History is written on the basis of archived documents and it is only on the basis of the history known to us that we can imagine the future (Donato 2019; Bret 2011; Bret et al. 2000, 13–24).[2] Although it is generally assumed that archiving something means putting it permanently aside, in reality the act of archiving preserves documents, making them endlessly accessible for perusal. An archive is not a mere collection of documents, as it presents a sort of natural bond between its documents that makes it an organic and indivisible whole (Venezia 2015). As we will see with regard to Alexis Perrey's archive, another of its characteristics is that to be exhaustive, it must necessarily be selective.

In libraries, research centers, administrative offices, and private homes around the world, we find archives of different kinds, because the documentation collected can vary enormously. Often, however, the relevance of the material is linked to the antiquity of the "original sources" collected. If several generations have contributed to an archive, researchers will find information in it that is continuous over time. By archiving something, we record it and set it aside in the repository of that "which will not go away" (Seedman 2002). When we think of an archive, we often imagine it as a dusty repository, superimposing upon it the nineteenth-century idea of archival research as historical research, although even geneticists' data banks, for example, can certainly be regarded as archives (Daston 2017, 2).

Preserving things in orderly fashion is an archival procedure that is also applied to the natural sciences. In certain places, for example, seeds are collected via *storage, organization, and cataloging*. Another form of plant archiving is the herbarium: since the Middle Ages, specimens have been collected, organized according to certain criteria, and cataloged so as to make them available to botanists, although the methods involved have varied substantially over the centuries (Guerra, De Ceglie forthcoming).

Fig. 1 A folder of the perrey archive at the Società Napoletana di Storia Patria

Today, in the wake of the climate change debate, the use of the metaphorical concept of "nature's archive" is very much in vogue—let us think of the ice cores taken in the polar ice cap. To all intents and purposes, the ice cores obtained in Antarctica are treated by researchers as archives, in the sense of conservation or preservation sites: in the specific case of gas molecules, we may speak of "testimonies" of climatic conditions of the past—even a very distant past—"trapped" in the ice (Barbante 2022). These samples that present layers, even clearly distinguishable layers, of gas, atmospheric dust, and volcanic ash, are highly reminiscent of the series of stacked folders in an archive (Fig. 1).

A natural archive like an ice core can be read from top to bottom or vice versa, just like the sheets available for perusal in a well-ordered paper archive. These examples are just the most recent application of a metaphor that has been dear to geologists since the dawn of geology as a scientific discipline, namely *the archive of nature*, which unraveled before the eyes of the scholars dealing with the first stratigraphic excavations. Just as tree rings[3] can be read as rainfall records, providing a kind of meteorological archive, so each geological layer seemed to provide a snapshot of a given era,

[1] " To live and not work, not to deal with these dear earthquakes, is not to live." Bibliothèque du Muséum d'Histoire naturelle, *lettres d'Alexis Perrey adressées à Jean-Casimir Lemercier*, 10 December 1854, (Ms 2675 / 124-135), 135v.

[2] Napoleon wanted to transfer all possible archives to Paris, starting in 1809, to create a kind of archive of civilisations there (Donato 2019).

[3] They are also useful today for dendrochronology, to determine when large paleoearthquakes altered the level of the land (Wald and Scharer).

with its characteristics and biodiversity, clearly witnessed by the fossils preserved in an orderly sequence, awaiting to be cataloged.

The archive metaphor is well suited to the research method of early geologists, who were in fact historians, as is suggested by the title of Rappaport's well-known volume (Rappaport 1997). Just as historians strive to find new, unpublished sources among archival documents preserved against the ravages of time and weather, to develop a historiographical theory, so geologists, paleontologists, and glaciologist search through sedimentary layers for elements that might enable them to interpret or re-interpret natural phenomena. Indeed, one of the characteristics of archives is their flexibility: the same document may serve different historical narratives (Daston 2017, 6), but the document is stored there so that it may be used indefinitely even to support opposite interpretations. Conversely, a scientific discipline which lacks some way of archiving its sources may find itself in a state of inferiority compared to the other disciplines, insofar as what characterizes all historical explanations related to them is the contingency of the discovery or preservation of individual sources (Sepkoski 2017, 53).

The metaphor of the "nature's archive" is a special case of the use of the archive in scientific research, for scientists indeed have their own repositories. These are what Daston calls "Third nature", after the Second nature that makes the "indigestible First nature" intelligible in laboratories or on the basis of field observations (Daston 2017, 1). Archiving is the creation of a continuous, usable past (Bowker 2005, 9); in this sense, it is a long-standing practice shared by the natural sciences and the humanities. When it comes to the practice of archiving data, documents, or samples, the distinction between the humanities, social sciences, and pure science becomes meaningless. In the case of archives used by scientists (Bru 2017), moreover, the boundaries between collection and archive have historically been more fluid, as have the boundaries between accidentally and intentionally assembled collections. Of course, this does not mean that the purpose for which an archive is intentionally created cannot change over time according to the different scientific traditions that have used it (Daston 2017, 7). What has really proved to be immutable over the centuries are the practices associated with the world of archives, whether we are discussing sixteenth-century humanists, nineteenth-century architectural historians (De Ceglie and Guerra forthcoming XXXX), or twentieth-century naturalists. Daston identifies four categories of recurring practices: acquisition, retrieval, reconfiguration, and transcription (Daston 2017, 9). As a result, disciplinary archives are a prime example of practices that cut across different fields of knowledge.

2 Can earthquakes and eruptions be archived?

The Earth itself is an archive: an archive organized according to the rock strata that preserve the temporal and ecological relationships between once-living organisms. Fossils are not really archives in themselves, although we find them in the Earth's archive; rather, they become archival material when they are archived and classified in paleontologists' archives, turning them into catalogs that preserve the historicity of phenomena, their location in time (Sepkoski 2017, 56).

If geological layers are the Earth's archives, within them we should find traces of two natural phenomena closely linked to the Earth's history: earthquakes and volcanic eruptions. In a given geological layer, however, we might find no traces that can be connected to earthquake X, and the same happens with ice cores. This sentence should not be seen in contrast with the field of Paleoseismology, where "primary evidence includes clues that are created by the movement on the fault during the earthquake such as fault scarps, offset or folded layers of sediment and soil", as paleoseismologists only see evidence for the larger earthquakes, magnitude above 6, because below that magnitude they are too small to leave a mark on the landscape that is likely to be preserved. This means that paleoseismology mostly provides data on prehistoric events and improvements in the field arrived by the use of accelerator mass spectrometry (AMS), which allows measurements of the number of radiogenic carbon isotopes in a sample and the LiDAR[4] technology (Wald and Scharer). So now paleoseismologists can identify individual earthquakes in the shallow subsurface structure of a fault (Ishimura et al. 2022), but it is a different object of research than the one studied by historical seismology, above all around 200 years ago, when the Elastic Rebound Theory did not exist (Reid 1910) and Plate Tectonics was very far from being formulated (Oreskes and Le Grand 2001).

The situation is slightly different in the case of volcanic eruptions, insofar as it is possible to find volcanic ash, or the gases from an eruption, trapped at a certain depth of an ice core. This tangible trace presents itself to our eyes and analysis as coming directly from the past, without any intermediaries—a kind of epiphany. Nevertheless, it can only constitute inverse evidence of the eruptive event. This means that the researcher must first be aware of the fact that an eruption took place somewhere on the planet within a certain time interval; the presence of the products of an eruption in ice may then provide confirmation that this eruptive event indeed took place. The reverse, i.e., finding ash in the ice and tracing it back to the volcano responsible, is a

[4] Light Detection and Ranging: provides material data on an object and its distance.

very difficult task that requires evidence of a different kind, namely accounts, as we will see later in the text.

Fairly recent research in the field of geosciences has identified a rock called pseudotachylite, which is the product of frictional melting during coseismic faulting. These rocks trapped inside mountain have been proposed to be the fossil remains of ancient earthquakes (Pennacchioni 2023; Scambelluri et al. 2017). The evidence for correlation with earthquakes is based on the reasoning that, in order for a rock to melt by friction, the fault needs to move with seismic velocity—while slover motions would allow time for heat to dissipate. By means of transmission or scanning electron microscopes, researchers were able to identify that these rocks contain very tiny crystals, rather than large ones, a sign of sudden cooling. This led to a series of laboratory experiments on the elastic distortion fields of the crystals using the Electron BackScattered Diffraction[5] (EBSD) technique to learn more about the physical phenomena that occurred on the site where the pseudotachylite was found.

This indirect information certainly contributes to our understanding of the Earth's dynamics. However, it also helps us to date phenomena and learn more about the history of our planet, especially since earthquakes always occur where they have already occurred in the past. But how and where could traces of past earthquakes be found before pseudotachylite, before electron microscopes, before the LiDAR, before seismology itself?

The earthquakes of the past can be found in written accounts or ones passed down orally in a variety of ways: the oft-repeated tale about an event that caused all the buildings in a village to collapse, someone who noted in a diary that he felt the ground shake beneath his feet, or a scholar who passed on to a colleague some observations about the cracks that appeared in a building after a loud bang. The reference may come to us through a manuscript contemporary with the catastrophic event or a later one reporting it; from a scientific publication, a journalistic account, a private letter, and so on. Above all, as we go back in time and it becomes increasingly difficult to find specific mentions of the word "earthquake", we must interpret the contents of our sources in order to determine what calamitous event we are reading about.

The gathering of such sources is clearly an ambitious project, and one which is quite difficult to carry out even for supranational research groups relying on modern technologies. Nevertheless, it was begun as early as the mid-nineteenth century by a man in Dijon, in the French province. The mathematician Alexis Perrey (1807–1882) drew up seismic bibliographies on the basis of the documentary sources he collected in forty-odd years of research. For more than a century, these bibliographies have served as a point of reference for the compilation of parametric catalogs of (strong) earthquakes: crucial tools in historical seismology.

Perrey decided to record all the earthquakes and volcanic eruptions of the past, a bold endeavor he pursued in an increasingly systematic way. He was born on 6 July 1807 in a small village in Haute Marne, Sexfontaines, which had 127 inhabitants at the time. In Dijon, a street bears his name today.[6] While Perrey can be credited with introducing the word "*séisme*" in today's sense, he came from a rather humble background: the youngest son of a forest ranger, he had to take minor orders in order to have the opportunity to study (Rothé and Godron 1924). Perrey soon began a career as a tutor, working first for a shopkeeper in Nancy and then in the Parisian home of F. B. de Villèle (Antonetti 2007), the brother of one of the ministers of King Charles X (1757–1836).[7] When the revolution broke out in 1830 (Pilbeam 1983), Perrey cast off his cassock and married Henriette Belot. He went on to work as a tutor for the de Charnacé family, before settling down as a high school science teacher. At the same time, he continued his studies and eventually graduated in mathematical sciences in 1838.[8] Six years later he was appointed director of the Municipal Observatory and finally professor of "Special Mathematics" (Huguet and Noguès 2011), i.e., astronomy, at the Faculty of Science in Dijon. Perrey's career was certainly a rather distinguished one for a scholar dwelling outside the Parisian capital, but it hardly warrants the Legion of Honor bestowed on him in 1854.[9] What did this mathematician achieve to deserve such recognition?

When Alexis Perrey arrived at the Astronomical and Meteorological Observatory on 2 May 1844, this institute had already endured eleven years of neglect, on top of various unfortunate events that had occurred since its founding within the local Académie des Sciences, Arts et Belles-Lettres de Dijon.[10] The Observatory had been established on the initiative of Abbots Jean Fabarel (1707–1793) and

[5] It provides information related to the grain, texture, and orientation of the crystals and to the phase analysis.

[6] Coordinates: 47.30797559105013, 5.050273126629304. The request to name a street after Perrey came from his nephew Henri Chabeuf, the son of his wife's sister, whose husband was a notary, also mentioned in the registers of the Dijon Observatory (Chabeuf 1924, 3). Perrey is buried at the Montparnasse Cemetery in Paris, but not mentioned among the famous residents of that place (Fig 2).

[7] Jean Baptiste Guillaume Joseph Marie Anne Séraphin, Comte de Villèle (1773-1854): ultra-royalist French statesman. Minister of Finances in 1821 and Président du Conseil (Prime Minister) in 1822-28. Unpopular and beaten at the elections of 1827, he resigned in 1828.

[8] With the thesis: Perrey, A. (1838). Théorie du mouvement d'un corps solide autour d'un point fixe. Douillier, Dijon.

[9] For a list of the academies of which he was a member, see Rothé and Godron (1924, 171-172); for a complete list of his publications, see Rothé and Godron (1924, 184).

[10] Note that Guyton de Morveau served as Chancellor of the Academy from 1781 (Bret 2016).

Fig. 2 Braun, Adolphe A. Perrey, Source gallica.bnf.fr / Bibliothèque nationale de France, département Société de Géographie, SG PORTRAIT-1019. Perrey's grave in the Godron's one at the Montparnasse Cemetery in Paris, photo by the author, October 2023

Claude-Philippe Bertrand (1753–1792) in the upper hall of today's Philippe-le-Bon tower in 1783 (Bidault de L'Isle 1928). After the Revolution, the Academy was closed down for a few years (1793–1798) and the Observatory was brought under the tutelage of the Department, only to end up being run by the Municipality. Its misadventures did not end there: on 14 July 1800, fireworks for the anniversary of the storming of the Bastille started a serious fire that caused extensive damage to the Observatory's instruments. Prominent figures, such as Pierre Jacotot (Barbier 1999), took over its direction. On Jacotot's death in 1821, however, the role of director of the Observatory was replaced by that of supervisor, which until 1833 was filled by Louis Gueneau d'Aumont (1791–1868), the secretary of the Académie des Sciences in Dijon and a pupil of Jean-Baptiste Biot (1774–1862) and Daubenton (1716–1800) (Fig. 2).

The period of Perrey's directorship from 1844 to 1867 was a time of prosperity and great international visibility for the Observatory. Perrey was succeeded by Charles-Raymond de Coynard (1806–1880). After the latter passed away in 1880, the *Observatoire* was once again abandoned and its instruments were eventually deposited at the Faculty of Science. This occurred despite the fact that both L.J. Gruey, future director of the Beçanson Observatory, and François Felix Tisserad (1845–1896), later director of the Paris Observatory (Gasser 1924), had also received some training at the *Observatoire* during Perrey's directorship.

Perrey's ambition to go beyond the mere recording of meteorological and astronomical data is already evident from one of the first initiatives he took at the Observatory: he decided to try to follow Martins, Bravais, and Lepileure's famous ascent of Mont Blanc from its terrace (Bidault de L'Isle 1928, 156).[11]

[11] This was the second scientific ascent of Mont Blanc after Horace-Benedict de Saussure's famous one in 1786 (de Beer and Hey 1955). According to Slatter (1986, 150), Pierre Martel claimed that the summit of Mont Blanc was visible from Dijon. Martins (Martins 1865; 1866) was professor of natural history in Montpellier, director of the local botanical gardens, and corresponding member of the Institut de France. Flag Lieutenant August Bravais was professor of physics at the École polytechnique, a member of the Institut de France, and a former correspondent of Perrey's (Gasser 1924, 156). August Lepileur was a physician.

One of the director's tasks was to compile the *Journal de l'Observatoire* on a daily basis. The Dijon Municipal Library preserves Perrey's registers from 1 January 1845 to 31 March 1869, even though he resigned on 14 December 1867. These registers include: the meteorological annotations made each day; a comparison of the various instruments; a monthly summary of meteorological observations; details about astronomical observations; and, finally, records of anything pertaining to the Observatory, meteorology, and the physics of the globe.

Register no. 1,[12] which ends on 31 December 1846, has pages divided by a vertical line: in the left-hand column are "extreme" events that occurred on the same date around the world, in the right-hand one are local meteorological observations.[13] This is followed by tables of barometric averages[14] and, most notably, by a summary list of the phenomena mentioned in the *Journal* during each quarter.[15] Day after day, Perrey noted down all kinds of events that had come to his attention from around the world: comets, floods, avalanches, landslides, tornadoes, storms, lightning, northern lights, eruptions, meteors and fireballs, tides, hailstorms, sirocco, and earthquakes, as well as anomalous heat waves and 22° halos. However, scrolling through the pages of the register, it becomes evident that Perrey gradually came to focus exclusively on earthquakes and volcanic eruptions, indicating for each reference the source from which he had learned of the event. The fact that Perrey was focusing[16] on the planet's endogenous phenomena is also revealed by the new direction he suddenly gave the *Journal de l'Observatoire.* On the 13 April 1845 page, he wrote:

Phenomena observed since 1 January

And which I have learned about from newspapers or through trusted correspondence

As of today, I am changing the plan of this register.

The recto will only be set aside for any observations I will make, the verso will be reserved for the description of phenomena that have been observed elsewhere and have come to my knowledge.

To fill in this box, I will here reserve six sheets for the first quarter. The new plan will start tomorrow, 14 April.[17]

As mentions of other phenomena, such as the "red rain" of 17 October 1846,[18] dwindled in the daily register, the number of sources cited for each seismic event noted by Perrey increased. For example, for the earthquake in Orciano Pisano of 14 August 1846,[19] he referred to several accounts, including those by Pistolesi and Leopoldo Pilla[20] (1805–1848), a Neapolitan mineralogist and Italian patriot.

Given their daily frequency, the registers of the Dijon observatory also serve as an important historical source concerning the years of political upheaval, which brought out Perrey's somewhat revolutionary temperament, already detectable at the time of the 1830 events. For instance, on 25 February 1848, the French scientist jutted down "Proclamation de la République!"[21] alongside some notes on events more directly related to scientific research, such as the aerostatic ascent that Jean-Eugène and Rosalie Poitevin made on horseback on 28 March 1852 (Boffito 1927, 136).[22]

As regards the recording of seismic and eruptive events, around 1854 Perrey began inserting paper notes with references to earthquakes into his register. Apparently, he became aware of these events sometime after compiling his

[12] Bibliothèque municipale de Dijon, *Fonds de l'Observatoire de Dijon*, shelf mark : Ms 3782.

[13] Bibliothèque municipale de Dijon, *Fonds de l'Observatoire de Dijon*, shelf mark : Ms 3782, f. 9r.

[14] Bibliothèque municipale de Dijon, *Fonds de l'Observatoire de Dijon*, shelf mark : Ms 3782, f. 5v

[15] Bibliothèque municipale de Dijon, *Fonds de l'Observatoire de Dijon*, shelf mark : Ms 3782, f. 8v.

[16] We know that Perrey took an interest in past earthquakes as early as 1841, but his idea of creating a collection can be traced back to his time at the Observatory. "M. Alexis Perrey, agrégé à la Faculté des Sciences de Dijon, annonce, dans une lettre adressée à M. Arago, qu'il s'occupe de recherches historiques sur les tremblements de terre. À la Lettre est joint un spécimen de ce travail, que l'auteur donne dans le but de provoquer des remarques sur le plan qu'il a suivi et qu'il modifierait au besoin. M. Perrey exprime le regret de n'avoir pas à sa disposition plusieurs grandes collections de chroniques, dans lesquelles il trouverait probablement enregistrés un bon nombre des faits dont il s'occupe. Cependant les sources qu'il a pu constituer jusqu'ici lui ont donné pour 13 siècles (de 306 à 1583) un nombre de 262 tremblements de terre qui, répartis les uns par mois et les autres par saisons, semblent déjà faire pressentir l'existence d'une inégalité dans le degré de fréquence de ces sortes de phénomènes aux différentes époques de l'année." This is followed by a synoptic table (Perrey 1841).

[17] "Phénomènes observés depuis le 1er Janvier

Et que j'ai connu par les journaux ou par correspondance particulière

A partir de ce jour, je change le plan de ce journal.

Le recto sera seul affecté aux observations que je ferai, le verso sera réservé à la description des phénomènes observés ailleurs et qui parviendront à ma connaissance.

Pour remplir ce cadre, je réserve ici 6 feuillets pour le 1er trimestre. Le nouveau plan commencera demain le 14 Avril." Bibliothèque municipale de *Dijon, Fonds de l'Observatoire de Dijon*, shelf mark : Ms 3782, f. 11r.

[18] Bibliothèque municipale de Dijon, *Fonds de l'Observatoire de Dijon*, shelf mark: Ms 3782, f. 87v.

[19] Bibliothèque municipale de Dijon, *Fonds de l'Observatoire de Dijon*, shelf mark: Ms 3782, f. 79v. This was the highest magnitude for the entire Tyrrhenian coast (Meletti et al. 2015).

[20] A professor of geology in Pisa from 1841, he died two years after the earthquake while leading the battalion of students from Pisa University in the Battle of Curtatone during the First War of Italian Independence.

[21] Bibliothèque municipale de Dijon, *Fonds de l'Observatoire de Dijon*, shelf mark: MS 3783, f. 37r.

[22] Bibliothèque municipale de Dijon, *Fonds de l'Observatoire de Dijon*, shelf mark : MS 3784, f. 6r.

daily register and chose to supplement the corresponding pages with notes or bibliographical references to additional sources.

Moving on to register no. 3, covering the years from 1852 to 1858, we find that by this time Perrey was exclusively committed to "collecting" earthquakes and eruptions on the Observatory's sheets, so much so that there was no longer any need for him to note the type of phenomenon he was recording on the left-hand side of the page (Fig. 3).[23]

At this point, Perrey must have realized that other astronomical and/or meteorological observatory directors were probably recording seismic and volcanic events throughout their assignments, which could extend to over twenty years, just as in his case. However, this kind of information gathering did not allow one to go back in time and write a history of the Earth's internal phenomena. Since, as already mentioned, the only way to know about past earthquakes is to read either direct or indirect accounts about them, Perrey began systematically collecting any written or oral sources he could find about seismic and volcanic events in earlier periods. What this provincial mathematician began to do sporadically, out of intellectual curiosity, gradually developed into a research program, which eventually became his life purpose.

Partly through the network of colleagues and scholars associated with meteorological observatories, academies, and other such institutions, Perrey began building his unique collection. His great skill in carrying out what we might call his "mission" lay in his ability to create an integrated international network of collaborators, ultimately converging in Dijon.

What, then, was Perrey's method for obtaining as much information about the world's seismic and eruptive phenomena as possible? With dedication, diligence, and even insistence, he would contact all those he knew were about to leave on a trip, as well as any diplomats or officers who had been assigned to areas far away from France. In other words, in addition to individual scholars and local amateurs, librarians, book collectors, and antiquarian manuscripts, Perrey relied on anyone who was traveling to another country and could either gather information on seismic events there or find rare books for him. As a result, through his decades-long archive, consisting of his correspondence and seismic library, Alexis Perrey brought together an unwitting community of people who variously contributed to the advancement of geological disciplines—what in the *Circulaire aux voyageurs* he calls *les amis de la science* (Perrey 1854). Perrey never describes their work as that of scientists, but sees it more as a collective scientific endeavor to ensure a better future, free from the fear of earthquakes and volcanic eruptions—*une petite croisade scientifique*, indeed. While it is true that the collection of information about past earthquakes could only proceed effectively if "everyone" relayed what they had heard, read, or copied to Dijon, it is equally true that Perrey's correspondents included practically all the geologists of his time and most of the leading scientists.

Engaging in this correspondence entailed a great expenditure not only of energy in gathering clues and seeking contacts or intermediaries, but also of money for postage as well as the purchase of often rare booklets around the world. In 1854, the Institut de France acknowledged the value of Perrey's research and economic effort—for it was his personal money he used—by awarding him a prize of 2000 francs,[24] in perfect accordance with the new post-revolutionary course of the Parisian institution, which urged members to devote themselves more to collecting discoveries than making them.[25] Indeed, the leading figure and elected secretary (from 1835) of the Mineralogy Division, in charge of geology and paleontology, was Élie de Beaumont (Greffe and Griset 2016, 103), an important and long-time associate of Perrey's.

As he gathered information, Perrey would draw up catalogs of earthquake on a regional basis or by year. He would mainly publish them through the Science Academy of Dijon, often updating this material with supplements when he discovered new sources. He would then send these catalogs to other scholars to compare dates and descriptions and, thus, obtain new sources or details. For example, in a 1845 letter to Arnold Escher von der Linth (1807–1872),[26] he writes that Joseph-Jean-Baptiste Fournet (1801–1869)—one of the most distinguished scholars of that time and the founder of geology in Lyon (Rémy 2017; Chermette 1983)—had urged

[23] Perrey often cites the German geologist Bernhard von Cotta (1808-1879) as a source of information. Nature, September 15th, 1879, p. 505.

[24] "But in both cases, financial matters have become entangled with matters of science and erudition, since in order to collect observations, Mr Alexis Perrey must engage in correspondence that requires not only significant time, but also more considerable expenses than one would initially expect. Comprehensive research on past centuries in turn requires correspondence, the transportation of documents, and even more or less expensive trips" ("Mais, dans les deux cas, une question financière vient se mêler aux questions de science et d'érudition, car, pour recueillir les observations, M. Alexis Perrey doit entretenir une correspondance qui n'exige pas seulement l'emploi de beaucoup de temps, mais encore des dépenses plus considérables qu'on ne serait tenté de le croire au premier abord. Les recherches relatives aux siècles passés exigeraient elles-mêmes, pour devenir complètes, des correspondances, des transports de documents, et même des voyages plus ou moins dispendieux"). Rapport sur les travaux de M. Alexis Perrey, relatifs aux tremblements de terre de Lioville, Lamé, Elie de Beaumont, Comptes rendus hebdomadaires des séances de l'Académie des sciences, 12 June 1854 : 1046.

[25] Art. 298 (Greffe and Griset 2016, 94).

[26] First Professor of Geology at the University of Zurich and at the Swiss Federal Institute of Technology (ETH). Alexis Perrey to Arnold Escher von der Linth, Dijon, 13.12.1845. ETH-Bibliothek Zürich, Hs 4:1382 https://doi.org/10.7891/e-manuscripta-9043

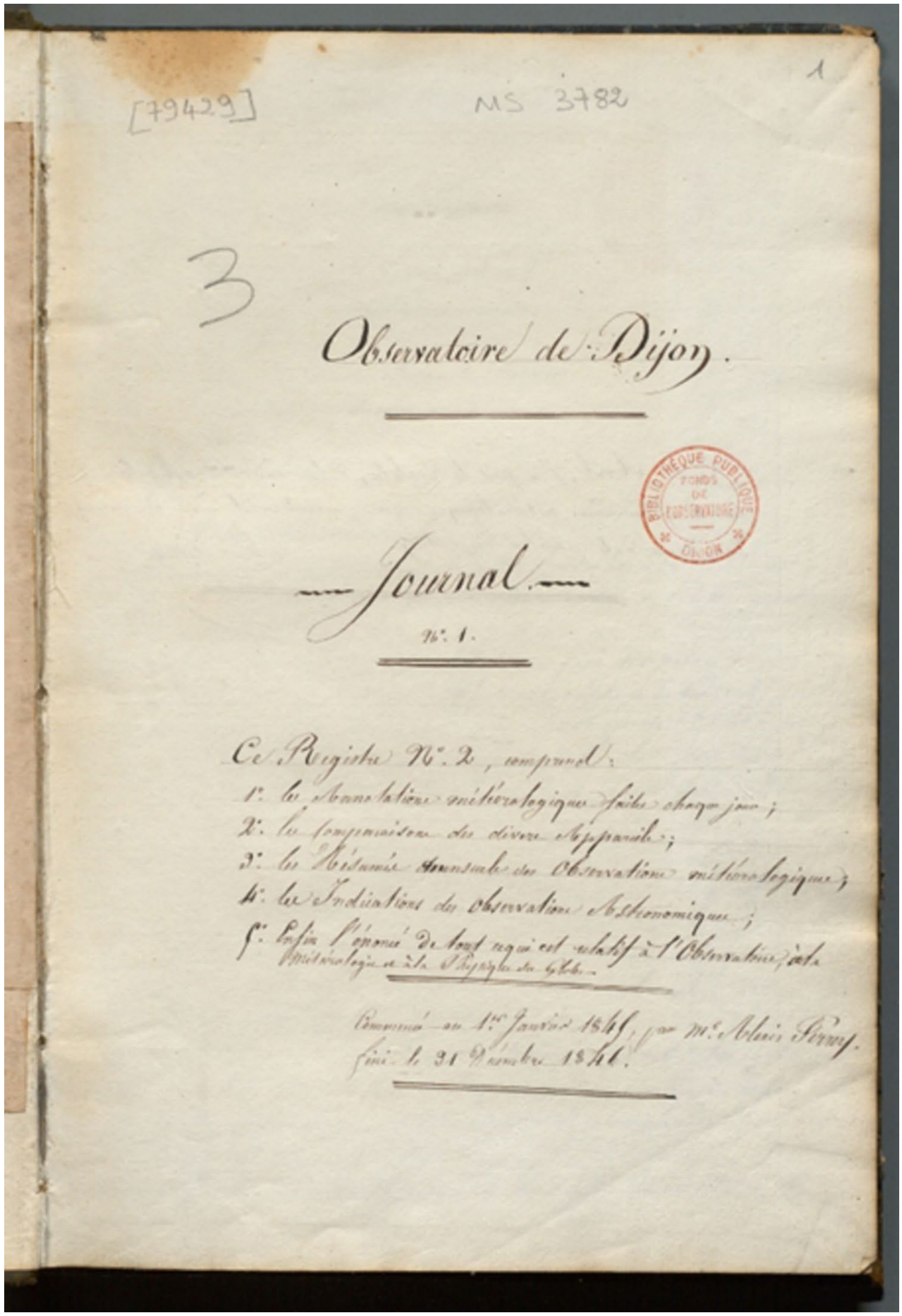
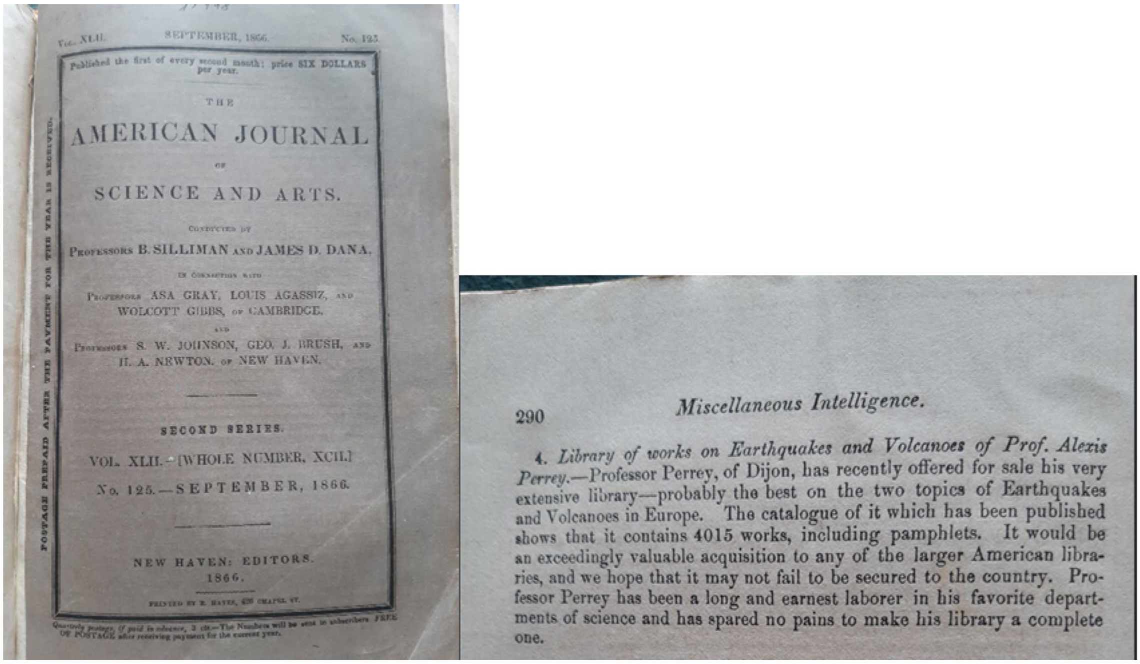


Fig. 3 Bibliothèque municipale de Dijon, Fonds de l'Observatoire de Dijon, Journal 1, shelf mark : Ms 3782, f. 1r

him to get in touch with him. Quételet (1796–1874),[27] the director of the Royal Observatory in Brussels, instead asked Perrey to draw up a catalog of earthquakes pertaining to the Upper Rhine, as his catalog on the Rhine basin seemed very meager for that area, something which Perrey explained as follows: “I attribute this lack of facts to the absence of sources to draw upon”.[28]

[27] Belgian astronomer Adolphe-Jacques-Lambert Quételet, director of the Royal Observatory in Brussels from 1828 until his death, perpetual secretary of the Belgian Academy of Sciences from 1834 (Galvani 1935). Quételet launched a kind of permanent enquiry into remarkable atmospheric and geophysical phenomena observed on the globe, which would appear to have inspired Perrey (Lancaster 1902, 452). On Perrey’s indebtedness to Quételet, see Davison (1927: 47-48).

[28] “j’attribue cette pénurie des faites au manque de sources où j’aurais pu puiser”. Perrey to Escher von der Linth, Dijon, 13.12.1845. ETH-Bibliothek Zürich, Hs 4:1382 https://doi.org/10.7891/e-manuscripta-9043 f. 1v.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POSTAGE PREPAID AFTER THE PAYMENT FOR THE YEAR IS RECEIVED.

290 *Miscellaneous Intelligence.*

4. *Library of works on Earthquakes and Volcanoes of Prof. Alexis Perrey.*—Professor Perrey, of Dijon, has recently offered for sale his very extensive library—probably the best on the two topics of Earthquakes and Volcanoes in Europe. The catalogue of it which has been published shows that it contains 4015 works, including pamphlets. It would be an exceedingly valuable acquisition to any of the larger American libraries, and we hope that it may not fail to be secured to the country. Professor Perrey has been a long and earnest laborer in his favorite departments of science and has spared no pains to make his library a complete one.

Fig. 4 Announcement of the sale of the library, American Journal of Science & Arts, II series, XLII (125), September 1866: 290, Shortly before, the same newspaper had published a text that he had been able to write thanks to his library (Perrey 1864). The photo reproduced is probably of Perrey's personal copy, SNSP, SISMICA Per. 077

Perrey also needed to keep an eye on the antiquarian book market, where a late request could result in the loss of a long sought-after rarity. Obtaining the right books often proved a challenging task, as Perrey told Libri in 1858, when he referred to it as a "task beyond my strength".[29] The Florentine bibliophile and mathematician Guglielmo Libri (1802–1869) is one of the many fascinating characters that fill Perrey's correspondence. Libri owned one of the largest private libraries in Europe,[30] which he later dispersed through various auctions. During his years in Paris and London, he also acquired a significant archive, which included scientists' manuscripts[31] and represented a point of reference for Perrey. Like him, Libri collected—sometimes unduly[32]—mathematical sources in order to demonstrate the Italian contribution to science and trace its historical development, in the belief that "the historian must always make known what the sciences have received from society and what they have given society"[33] In 1841, Libri's experience in chasing rarities earned him an appointment as secretary of the commission in charge of surveying the holdings of French libraries and archives[34] (Giacardi 2005). Perrey wrote to him that he had been studying earthquakes and volcanic phenomena for about fifteen years "in a provincial town, far from major scientific centers",[35] meaning that he had been forced to obtain the main works he needed by his own means. Perrey explained that he had gradually come to enjoy the process and had built up a small collection on the subject. Having turned into somewhat of a bibliophile, he was now also hunting for rarities. He, therefore, asked Guglielmo Libri for help with a collection that one day might be of some use to science.[36] We discover that Perrey had already purchased some booklets from Libri's auctions in the past, but had been beaten to the punch in trying to acquire

[29] « entreprise au-dessus de mes forces." Biblioteca Moreniana, *Carte Libri* 35, Perrey to Libri, Dijon, February 1858, cc. 1r-2r: c. 2r.

[30] Bruto Icilio Giuda Taddeo Libri Carrucci della Sommaja, Count of Bagnano, better known as Guglielmo Libri, a complex and controversial figure (Del Centina and Fiocca 2004, 3).

[31] Let us think of the famous "Parisian manuscript" by the Norwegian mathematician Niels Henrik Abel, a manuscript later rediscovered in the Biblioteca Moreniana in 1952 (Del Centina and Fiocca 2004, XV). Libri was a real hunter of manuscripts on the history of science (Del Centina and Fiocca 2004, 14), which he absolutely adored (Del Centina and Fiocca 2004, 13, note 20).

[32] He was tried in absentia and sentenced to ten years imprisonment on 22 July 1850 for the embezzlement of French books and manuscripts, but fled to London (Del Centina and Fiocca 2004, 18).

[33] ("[l]'historien doit toujours faire connaître ce que les sciences ont reçu de la société et ce qu'elles lui ont donné": Libri 1838, I, XIII; Giacardi 2005).

[34] *Catalogue général des manuscrits des bibliothèques publiques des départements* (Paris 1849).

[35] "[d]ans une ville de province et loin des grandes centres scientifiques." Biblioteca Moreniana, *Carte Libri 35*, Perrey to Libri, Dijon, February 1858, f. 1r.

[36] "pourrait rendre un jour quelque service à la Science." Biblioteca Moreniana, *Carte Libri 35*, Perrey to Libri, Dijon February 1858, f. 1r.

Buache's manuscripts[37] by the Libri's own agent. Perrey explained that he would be most grateful if Libri agreed to sell him some duplicates or if he could help him to acquire certain rare booklets through his connections.

By acting in such a way, in Dijon Perrey had succeeded in creating an important collection of printed texts and manuscripts pertaining to earthquakes and eruptions, including ones that had occurred many centuries earlier. This collection soon became known and admired throughout Europe, and allowed him to compile the earthquakes catalogs that are still consulted by scientists today when scientific theories can explain the dynamics of earthquakes, but they still need to know what happens in past times.

In 1866, for health reasons, Perrey decided that on the day after his retirement (18 January 1868: Rothé and Godron 1924, 178) he would move in with his only daughter,[38] whose house in Brittany, however, could not accommodate the seismic library he had assembled in over thirty years of tireless research. He was, therefore, forced to put his life's work up for sale—the one asset in which he had invested practically all of his savings, and which he regarded as his own personal contribution to the advancement of scientific knowledge (Fig. 4).

Perrey published and distributed a *Bibliographie seismique : catalogue des livres, mémoires et notes sur les tremblements de terre et les phénomènes volcaniques, collection de m. Alexis Perrey*,[39] (Perrey 1855-65) yet no French library agree to purchase it, probably because of the "non-dispersal" clause that came with the collection.

That is the last we hear of the Perrey archive in France.

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Data availability Not applicable.

Declarations

Conflict of interest The author declares no conflict of interest.

[37] A French geographer specialising in thematic maps, he advanced the idea that physical knowledge of the globe should begin with the mountains; hence the considerable importance of his work for Perrey's purposes (Broc Numa 1971, 225; Kish and Buache 1976).

[38] Lorient, Rue du port 78. Perrey's daughter was born in December 1839 and died in 1918. In 1865 she married Paul Godron, a marine engineer who died in 1906. When their son-in-law was transferred to Paris as Inspector General, Mr and Mrs Perrey followed him. There their 13-year-old granddaughter died, followed soon after by Perrey himself (Chabeuf 1924, 3).

[39] I am referring to the third one, published in 1865 and later as an excerpt.

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ETH-Bibliothek Zürich, Hs 4:1382 https://doi.org/10.7891/e-manuscripta-9043 Alexis Perrey to Arnold Escher von der Linth, Dijon, 13.12.1845

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