

## VALORISING THE SCIENTIFIC HERITAGE OF ABBADIA OBSERVATORY CASTLE

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**Abstract.** We present a peculiar place in the French astronomical landscape: the Château Observatoire (literally observatory castle) Abbadia, home of Antoine d'Abbadie in the XIX<sup>th</sup> century. This place is particularly interesting because of the historical instruments it contains and Antoine d'Abbadie corresponded with many scientists and personalities of his time. Our goal is to preserve and promote the heritage of Abbadia and of his past owner. To do so, we have searched interesting old books in the castle's library, we have gone through the correspondence of Antoine d'Abbadie, archived in Bayonne, and we have designed activities based on this heritage. In addition, we organise teacher training sessions at Abbadia, mixing heritage and modern knowledge.

Keywords: astronomical heritage, instruments, correspondence

### 1 Introduction

Antoine d'Abbadie d'Arrast (1810-1897) was born in a very wealthy family, inherited quite young a fortune, and lived on unearned incomes his whole life. He had therefore all the time in the world to indulge his passions : travels, languages (he wrote French-Basque and French-Amharic dictionaries) and science (especially astronomy, geodesy, and geomagnetism). He had his house built in Hendaye in the Basque Country, in the south west of France. The Château Observatoire Abbadia, building of neogothic style (figure 1), was both his residence and his place of work (Delpech 2012; Briot 2016). During his life, Abbadie acquired many scientific books and journals which he kept in the castle library. In addition, he equipped his home and the surroundings with instruments. Astronomical and geomagnetic measurements were made and the results recorded in notebooks. Most of these documents are still at Abbadia and in a good general state of conservation, but they are not accessible to the public; worse: they were not all inventoried. We carried out this inventory work and set out to select the works that were of particular interest. In addition, Antoine d'Abbadie had epistolary exchanges with many scientists of his time. This rich correspondence, kept at the Bayonne Departmental Archives, has also been the subject of a selection which will be digitized. Finally, the instruments in the Observatory Castle have a heritage interest that should be enhanced. The final objective of the presented work is threefold: to bring a new perspective to Antoine d'Abbadie and his fascinating observatory castle; make this rich heritage accessible to the public; offer educational activities and resources for education and outreach (Primout 2018).

### 2 Instruments at Abbadia

#### 2.1 Antoine d'Abbadie and the metric system

First of all, let us emphasize that Antoine d'Abbadie was convinced that the metric system, created shortly after the French revolution, should be adopted. Clocks in metric system can still be found at Abbadia (figure 2).

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**Fig. 1.** Abbadia seen from the North (Wikimedia)



**Fig. 2.** Decimal clock with 100 "minutes", 100 "seconds" and 4 quarters of a day (or "quadrants").

## 2.2 *Astronomical instruments*

Abbadie acquired several portable refractors he used during his trips but the main instrument of Abbadia is a so-called meridian telescope; the same model as those used for the "Carte du Ciel" project, an international endeavour to map the celestial vault. Abbadia's meridian telescope is the only of its kind as it is graduated in grads, not in degrees (figure 3). It is still used now and then for pro-am projects (Arlot et al. 2018).

Abbadia was also bored through to act as a structure for a huge refractor pointing towards the top of La Rune, the highest mountain in the Basque Country. Antoine d'Abbadie wanted to study the refraction properties of the atmosphere but he failed to obtain convincing results.



**Fig. 3.** Meridian telescope's circle graduated from 0 to 400 grads

His correspondence reveals that he was not only a user of his instruments, he was able to design them as well. He was in regular contact with opticians and other skilled and renowned makers across Europe who built lenses and other parts for him.

### 2.3 Geophysical instruments

Antoine d'Abbadie was also very interested in geophysics. He made countless magnetic measurements everywhere he went. He even invented and made built a brand new instrument capable of measuring both the magnetic inclination and declination. In the park around Abbadia, he set a few stones to which he installed his instruments, far away from metallic structures that could possibly interfere with his magnetic measurements.

He was also interested in the variations of the local gravity field. He installed a so-called "nadirane" in his lab: a device that consists of a long still pendulum able to detect variations of the vertical direction, mainly due to oceanic tides and seismic activity.

## 3 Books and correspondence

In his library (figure 4), Abbadie collated thousands of books from the XVIII<sup>th</sup> and the XIX<sup>th</sup> centuries. Astronomers who were on duty after Antoine d'Abbadie completed the collection with more recent books, up to the middle of the XX<sup>th</sup> century. Besides, Antoine d'Abbadie corresponded with about 800 persons: astronomers, physicists, opticians, linguists, etc. All of this correspondence is kept in the local archive in Bayonne.

One of our main goal has been to go through all of this books and correspondence so as to identify what could be of interest for the public, for teachers, and for scientists. As a first step, we have selected 40 correspondents related to physics and astronomy. The corresponding letters were read and scanned; they teach us a lot on several matters. First, they tell us how scientists exchanged at this time: there were no international meetings to exchange ideas, very few journals in which to publish results, so scientist wrote letters to their peers. Second, they allow us to trace back the evolution of ideas and techniques. this is of particular interest for history of science. Last and incidentally, they are testament to the way people lived back then, the trouble and worries they could have, such as health and well-being.





Fig. 4. Abbazia's library (credit: B. Blanc)

#### 4 Activities and teacher training sessions

To promote the heritage of Abbazia, we have imagined activities that can be done with the public or with students. Through those activities, the building of Abbazia can be discovered or the instruments and their use can be explained. Through the correspondence, astronomical notions can be tackled like the Polaris star and its "companion" which are evoked in a letter by the French astronomer Felix Tisserand.

#### 5 Summary and perspectives

We have presented Abbazia and a glimpse of what can be found inside: the scientific instruments, the old books in the library, etc. We have also set path for (future) activities with students and the public. But, the heritage of Antoine d'Abbadie is not only his incredible home and the instruments he left behind him. It also resides in his writings, personal notes or correspondence. Not only do his writings reflect the exchanges he had with brilliant researchers of the XIX<sup>th</sup> century, which can be used as a starting point of many activities, but they also reveal the everyday life back in those days. So sociologically speaking, it is very rich as well.

As we were working on disseminating resources about Antoine d'Abbadie and Abbazia, we were approached by the University of Bordeaux to join a project aiming at scanning and valorising written heritage. This still is on-going and will lead to resources available at Gallica, the digital service of the French National Library in Paris.

We would like to thank the people in charge of the Archives in Bayonne who granted us access to the correspondence of Antoine d'Abbadie.

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