

The Bendegó Meteorite: A Key for Science Communication with Society in Brazil

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Summary

New and innovative educational tools are needed to stimulate geoscience education and the dissemination of meteoritic science in Brazil. Bendegó, the first of the Brazilian meteorites, has been used as a geohéritage to stimulate elementary and secondary students to sciences. Bendegó comics is the first step from ProMete program in this direction.

Introduction

Geology, as a body of knowledge which should be accessible to any person interested in the Earth sciences, is almost nonexistent in Brazil outside the 19 universities who offer graduation and post-graduation courses.

There are no disciplines to teach geology in the elementary and secondary schools and meteoritics is almost unknown among undergraduate students and even among the graduate ones. Such an educational environment is by all means not favorable to the meteorite research and does not contribute to the geohéritage and conservation of geological sites.

The low amount of meteorites in the Brazilian collection, only 57 pieces for an area of 8.5 million km², is a fact that demonstrates the need for actions to help students and the people in general to understand the importance that meteorites have for the sciences and what to do if they witness a fall or find a space rock.

Such a situation would be better off by actions from a program designed to recover and identify meteorites, comprehensible to the general public, which may reach the great public and enhance the recovery of meteorites in Brazil through written articles and news for the popular press in plain non-technical language, along with public expositions and short term courses on meteoritics.

This is the objective of ProMete, Program for Recovery, Identification and Register of Meteorites, implemented at the Geochemical Department of the Federal University of Bahia. The ProMete word is a Portuguese analogy to the verb promise, as we hope it can be able to disseminate geoscience education in the country. The first step was to recover and spread the history and importance of the Bendegó meteorite, in the past and nowadays, as a basic source to plan and execute actions to spread out knowledge and news regarding meteoritic science in Brazil.

The Bendego Iron

The Bendegó iron meteorite, found in 1784, became almost a celebrity for the Brazilian people during its transportation from Bahia to Rio de Janeiro in 1887/1888, creating opportunities to spread out news and information regarding space rocks among the lay men, the royal family and nobles of the II Brazilian Emperor. After that, the meteorite and meteoritic science in Brazil just were left quiet for a long time.

Bendegó is the largest meteorite in the Brazilian 57-specimen collection. It holds the 16th place among the largest iron masses found so far on Earth. Its finding in 1784 is a well documented fact which happened only ten years before Ernst Chladni's book publication (Chladni 1794), the first scientific work regarding space iron masses found around the world.

The man who found the meteorite was looking after a lost cow in a very arid region in the Northeast of the Bahia State. Historic documents mention three different persons, all from the same family, as the finder: Bernardino da Mota Botelho, Domingos da Mota Botelho, and Joaquim da Mota Botelho. Recent research however acknowledges the first, Bernardino, as the founder since he figures in three historic sources, while the other two are mentioned only in one document.

In 1784 Brazil was a colony of Portugal and the Governor of the Bahia Province made plans to send that 5,360 kg iron mass to Lisbon. He was thinking of a large iron deposit to be mining, and promptly sent orders to his representative in the hinterland to haul the strange object to Salvador, the capital of the Province (Menezes 1784).

Due to its huge weight and lack of means to lift and haul large objects, the meteorite was not removed according to the Governor's plan. At least three expeditions were carried out without success and the meteorite stood in the hinterland for more than 100 years after its finding (Cunha 1784, 1786). Probably, the political environment in Lisbon, which was under Napoleon's treat of an invasion by the end of 1807 explains the why no more efforts were done by Portuguese officers to send the meteorite to Portugal. It is a fact that in 1808 a French army seized Lisbon and forced the Portuguese monarchy to migrate to Brazil (Pedreira and Costa 2008).

As early as 1811 the Bendegó was recognized as a meteorite by Aristides Mornay (Mornay 1816), a British mineralogist commissioned by Brazilian colonial authorities to investigate some hot springs in the Bahia province. Mr. Mornay wrote a letter to the Royal Society of London reporting his impressions, sending some sketches representing the iron mass, along with samples extracted from it and pieces of iron oxide collected on the place where the meteorite was resting since its fall. Only in 1816 the Royal Society discussed the issue, publishing in the Philosophical Transaction a short report written by Wollaston regarding results of chemical analysis and structural observations done on those samples (Wollaston 1816). Three years later (1819) the meteorite was visited by two German naturalist, the botanist von Martius and the physician von Spix, who set a fire under the mass for more than 24 hours, and using hammers and chisels to be able to extract about 4 kg of samples to send to Munich (Lahmeyer 1938).

After those bad experiences the Bendegó iron stood quiet on the river bed until 1887 where it was abandoned in 1785.

Next step in the rich history of such a meteorite was its effective transportation to Museu Nacional, in Rio de Janeiro, where it arrived in 1888 after a very long journey by oxen cart, train and ship. That successful expedition was set up to attend orders from the Brazilian Emperor D. Pedro II who decided to have such a geologic treasure displayed in the royal museum (Museu Nacional, in Rio de Janeiro) according to the advice he received from some members of the French scientific community. By the way, D. Pedro II was the grandson of D.

João VI, the Portugal king who fled to Brazil when Napoleon took over his country in 1808, fact which is supposed to be responsible for keeping the meteorite in the Brazilian territory.

The expedition of 1887/1888 was epic (Fig. 1). The meteorite was far away from any road and it was necessary to build tracks and to embank many creeks. Difficulties were so big that it took 126 days to cover a distance of only 116 km from the Bendego creek until the nearest rail spot. That expedition success was chiefly due to a new conception applied to a four-wheel cart specially built to transport the meteorite. Besides four wheels made of wood to roll on a firm terrain, that cart had a peculiar arrangement: four flange wheels to roll on short rail sections, conveniently built to cross mud spots, rock outcrops and embankments. The cart and the meteorite weighted 6,554 kg together. It was pulled by two dozen oxen or by men using ropes and pulleys to move it on rails when necessary. The man in charge of that expedition was a Navy officer acquainted with a varied of tools do lift, pull and transport heavy objects.

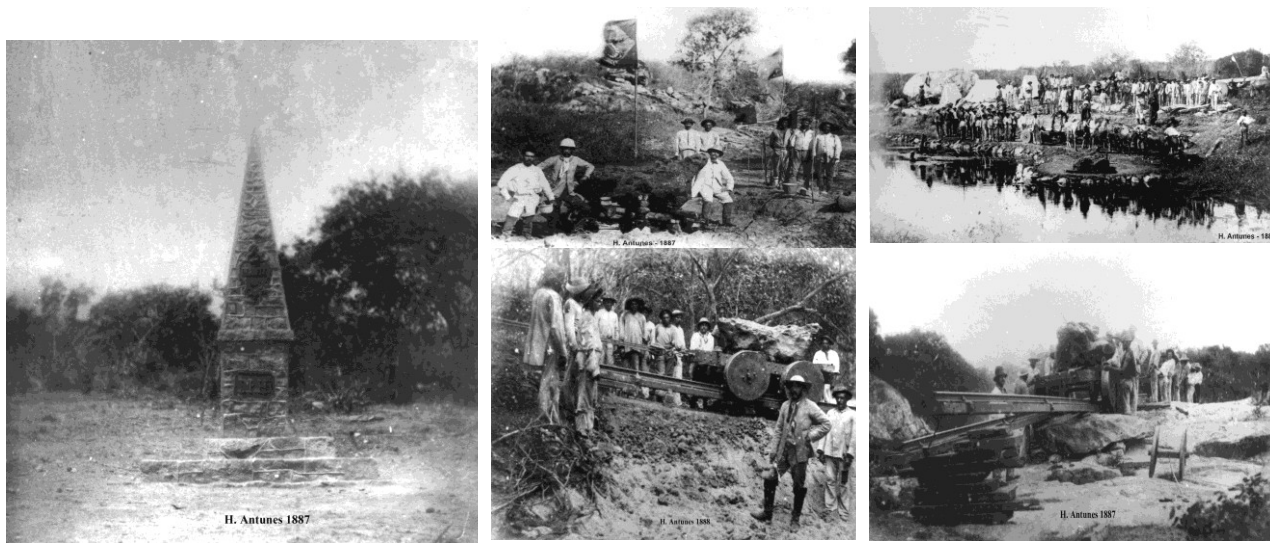


Figure 1: Meteorite Bendegó historic photos of its transport to Rio de Janeiro

Many other curious facts surround the removal and transportation of the Bendegó meteorite:

- 1) The difficulties and troubles faced to roll the meteorite from its original place to the nearest rail spot originates among the Brazilian population new meanings for the Bendegó word which currently figures in Portuguese dictionary such as: burden (trambolho) and clumsy (desajeitado).
- 2) Second, a legend was born: the stone was bewitched and wished not to leave the place where it felt. Incidentally the superstitious people who lived around that place just demolished a monument built (Fig. 1) as land mark in the spot where the meteorite was found. The reason for that was a big drought which chastised that region three years after the “sacred stone” had been removed.
- 3) Third, when the meteorite arrived at Salvador, the capital of the Bahia State, in May 20, 1888 in order to be hauled to Rio de Janeiro by ship, the Salvador House of Representatives voted a petition from one of its member to hold the iron in that city against the Emperor’s order who wanted the meteorite displayed in the Museu Nacional, in his Court. Only two out of 13 representatives were favorable to that proposal.
- 4) Fourth: upon its arrival at Rio de Janeiro the meteorite witnessed a very large audience lead by Princess Isabel, daughter of D. Pedro II, and in charge of the Empire.

- 5) Fifth: in that year (1888) many polkas (a popular Bohemian style of music and dance) were composed with the Bendegó theme and were performed in some musical theaters in Rio de Janeiro.
- 6) Sixth: A report about the 1887/1888 expedition was written in Portuguese and English, later translated into English and sent to many international scientific institutions.
- 7) A close reproduction of the original iron mass was made in wood and figured in the 1889 at the Universal Exposition held in Paris.

Conclusions

Despite Bendegó was one of the first rocks recognized as of spatial origin, the low incentive to geosciences studies in Brazil is still nowadays a barrier to the recover of meteoritic samples in Brazilian territory. His so rich history is now being used to spread out news and information regarding meteoritics, written as a comic, with the hope it can be use to stimulate geoconservation and geoeducation in the country.

By the end of the XIX century the Bendegó meteorite figured in many newspapers, theater plays and lectures making the Brazilian population aware of the importance of space rocks for the sciences. It must be used again to disseminate geosciences. Nowadays the same meteorite is a cornerstone of the ProMete and we hope this will help the development of meteoritic in Brazil.

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