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# Итальянская научная экспедиция в Россию (1887)<sup>1</sup>

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Полоса полной фазы солнечного затмения 19 августа 1887 г. проходила по территории России. Каждый раз в район полосы полной фазы выезжают многочисленные экспедиции с большими сложными инструментами. Затрачивается много сил и средств для того, чтобы в течение нескольких минут иметь возможность наблюдать полное солнечное затмение. Детальное изучение атмосферы и короны Солнца в XIX веке возможно было только во время полного затмения. Коронграф, позволяющий проводить такие исследования вне фазы затмения был изобретен только в начале XX века. В 1887 г. для наблюдения за этим феноменом было организовано множество международных научных экспедиций. Итальянский астроном Пьетро Такчини (1838–1905), директор обсерватории Коллегио Романо в Риме, обратился к национальному правительству с просьбой профинансировать небольшую научную экспедицию в Россию, которая и была поддержана. Статья посвящена описанию этой экспедиции.

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## An Italian scientific expedition to Russia (1887)

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The zone of the total phase of the solar eclipse of August 19, 1887 passed through the territory of Russia. Every time numerous expeditions with large complex instruments go to the area of the full phase zone. It takes a lot of effort and money to be able to observe a total solar eclipse for a few minutes. A detailed study of the atmosphere and the corona of the Sun in the XIX century was possible only during a total eclipse. The coronagraph, which allows such studies to be carried out outside the eclipse phase, was invented only at the beginning of the XX century. In 1887, many international scientific expeditions were organized to observe this phenomenon. Italian astronomer Pietro Tacchini (1838–1905), director of the Collegio Romano Observatory in Rome, appealed to the national government with a request to finance a small scientific expedition to Russia, which was supported. The article is devoted to the description of this expedition.

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A total eclipse of the Sun occurred on August 19th, 1887 and it was visible from Russia. Many international scientific expeditions were organized to observe the phenomenon. The importance of observing the eclipses was mainly due to the opportunity to observe the solar corona, a feature which could be observed only when the sun is eclipsed until the coronagraph was invented at the beginnings of the XX<sup>th</sup> century.

The study of the corona was very puzzling for the astronomers of that time because of the discrepancies in the results of both the spectroscopic and polariscopic observations. In 1869, during a total eclipse, a bright emission line was observed in the spectrum of the corona. It opened a long debate on its position and, as a consequence, on its identification, a debate which was still active in 1887. Moreover, the measurements of the polarization of the coronal light seemed to reveal the presence of reflected light, a result which was clearly in opposition to the spectroscopic observations.

The Italian astronomer Pietro Tacchini (1838–1905) asked to the national Government to finance a little scientific expedition in Russia. The financial situation of the Kingdom of Italy was not very flourishing and the Minister gave the permission to send only two scientists.

At that time Tacchini was Director of the Collegio Romano Observatory in Rome; he was an eminent personality, very renowned over the international community thanks to his studies in solar physics, carried out since 1865 when he was astronomer at the Palermo Observatory. He was also the co-founder, with Angelo Secchi (1818–1878), of the Società degli Spettroscopisti Italiani, the first international scientific society especially devoted to astrophysics and the editor of the Memorie, the official journal of the society which can be considered as the first astrophysical journal.

Tacchini chose as fellow traveller his friend Annibale Riccò (1844–1919). Riccò was, at that time, astronomer at the Palermo Observatory; there, he has taken the place of Tacchini and shared with him the same interests in the solar spectroscopic research.

<sup>1</sup>Статья основана на материалах, представленных на VII Бредихинских чтениях/This paper is based on a talk presented at VII Bredikhin conference.

The President of the Russian Society of Physics and Chemistry in St. Petersburg, Nikolaj Grigorievitch Egoroff (1849–1919) was informed of the intention of the Italian Government to send Tacchini and Riccò in Russia; he contacted Tacchini to give him information and placed a translator at the Italians' disposal.

Tacchini intended to reach one of the most oriental stations; Egoroff indicated a place near the Urals as the most appropriate for observations; in fact, it was located at the intersection between the path of totality and the river Viatka and, according to the Russian meteorologists, it presented the greatest probability to have good weather in the period of the eclipse.

Prof. G. Kleiber, member of the Society, was charged by Egoroff to accompany the little Italian scientific expedition.

A month before the date of the eclipse, Tacchini and Riccò left Italy. They travelled to Vienna, where they visited the Observatory, then to Warsaw, where they visited the University and the Observatory. A week after the departure from Italy they reached St. Petersburg, where they stayed three days, just the time to visit the University and other scientific establishments, such as the Pawlowsk Magnetic Institute and the Poulkova Observatory, directed respectively by Heinrich von Wild (1833–1902) and Otto W. Struve (1819–1905). As it will be expected, at Poulkova, the Italian astronomers were strongly impressed by the great 86 cm refractor. At that time, the greatest refractor in Italy was the 50 cm telescope by Merz at the Milan Observatory, bought in 1878 and installed in 1886, which appeared as a minor instrument in front of the giant telescopes constructed in that period in the rest of Europe and in the United States. At the Poulkova Observatory, Tacchini and Riccò met Klaus Bernhard Hasselberg (1848–1922), an active member of the Società degli Spettroscopisti and visited the spectroscopical and photographic laboratory which Struve wanted to be built for him. Struve and Hasselberg made a present of some photographs on glass and paper to Tacchini and Riccò; these photographs were later given by Tacchini to the Museo Astronomico Copernicano, which was annexed to the Collegio Romano Observatory and which he directed at the same time.

On August, 1st the little expedition left St. Petersburg and, three days after, they arrived in Nijny Novgorod, at the terminal of the railway. Two days later they shipped on a steamboat and sailed the Volga and the Kama; they had to wait two days for another steamboat to sail up the river Viatka and, the day after, they arrived in a little station, Miedvietka, where they met another scientific expedition coming from Kazan and consisting of the Director of the Kazan Observatory, prof. Dubiagio, an astronomer, Parietski and two more persons. They were directed to the north of the path of totality, to Mediany, near the town of Viatka; three other members have gone on the south, to Tsepotkino.

The Italian expedition sailed up the Viatka with a smaller steamboat and arrived on August 11th to the little village of Surwiskaja. They were welcomed by the local authorities, quartered in the public school and handled with all kindness.

The first work to do was the construction of three wooden buildings for the instruments on a hill nearby. The instruments carried by Tacchini and Riccò were two little equatorial telescopes; the first one belonged to the Collegio Romano Observatory and was a legacy of the private Italian astronomer Ercole Dembowski; the second one was lent by prof. Giuseppe Lorenzoni of the Padua Observatory. Both instruments were equipped with finders for the direct visual observations.

For the spectroscopic observations, prof. Riccò had designed a kind of spectroscope which he called a “recording spetroscope” (spettroscopio registratore); it was made by the French maker Duboscq and payed with the funds of the Società degli Spettroscopisti Italiani. The novelty in the design of this spectroscope is a simple device for recording the position of the spectral lines. In fact, the second prism could rotate through an axis which is connected to a lever by a cog-wheel; by moving the lever, the prism rotates and it is possible to adjust the instrument in such a way that a spectral line falls exactly on the intersection of the cross-wires. By pushing the button put on the lever, the position of the line was registered on a strip of paper, and repeating the registration with known lines, a comparison could be made among their positions.

It is obvious that this system is fast but not very accurate — photographic means permitted to obtain more exact results; this is probably the reason for which this device was never applied to the standard spectroscopes. Another spectroscope, direct-vision type, made by Duboscq, was used by Tacchini. This instrument is probably kept today at the Institute of Physics of the Rome University.

The main aim of the expedition was the observation of the “white prominences”, a feature which Tacchini had observed on the occasion of an eclipse in 1882. Tacchini and Riccò would carried out spectroscopic observations while Kleiber had to execute polariscopic observations in both the directions of the solar axis and the solar equator. The instrument used by Kleiber was made in the physics laboratory of the St. Petersburg University and was a modification of the polarimeter used by A. Wright in 1878 (see Publications of the U. S. Naval Observatory).

Unfortunately, a week before the day of the eclipse, the weather changed and became cloudy and rainy. The instruments were set all the same and on the 14th everything was ready. In spite of a little improvement of the weather on the eve, the night before the 19th, it rained. The astronomers were at the stations at 5 a.m. but the sky was cloudy and rainy. A strong wind flapped the Italian and the Russian flags hoisted beside the camp. At

about 7 a.m. the sky cleared up and it was possible to observe the sun partially eclipsed. Suddenly the clouds covered the sun and the totality was completely lost; its beginning and its end were only revealed by a change in the intensity of the daylight. It is easy to imagine the great disappointment of the astronomers as well as of all the people gathered nearby the camp to observe the phenomenon.

Immediately after, the instruments were unset and boxed and, the day after, the little expedition sailed to Kokarka, where they met prof. Dubiago, whose expedition suffered the same fate. The Italians accepted the invitation to visit the Kazan Observatory and University on the return from Ekaterinenburg, beyond the Urals, where they intend to go to visit the magnetic station established by Wild on the Monte Calvo. Finally, they arrived in Nijny Novgorod on September, 2nd and they visited the laboratory of the photographer Karelin, who had been member of the expedition headed by the German astrophysicist H. C. Vogel (1842–1907) in Iuriewitz. This expedition too had not been successful. Karelin had obtained some photographs of solar prominences and presented Tacchini with a copy of them. During the visit to his laboratory, Karelin showed to Tacchini, Riccò and Kleiber a new chemical process to increase the sensitivity of the plates.

On September 4th, Tacchini, Riccò and Kleiber arrived in Moscow and visited the Observatory, where they were welcomed by prof. Ceraski. They stayed in Moscow four days, then they took Kleiber's leave: Kleiber left to St. Petersburg, Tacchini and Riccò left for Venice.

All scientific expeditions whose stations were located on the west of the Urals were unsuccessful because of bad weather conditions. On the contrary, the russian Handrikov, professor of astronomy at the Kiev University, who went beyond the Urals, on the mount Blagodat, to observe the eclipse was quite successful and he reported the results of his observations in a memoir. Handrikov had recorded five great prominences and a great red arc on the solar limb during the eclipse. Tacchini immediately contacted Handrikov to know the exact positions of the solar prominences in order to compare their positions with those observed the same day in Rome and Palermo by two assistants, respectively, Ciro Chistoni (1852–1927) and Antonio Mascari (1862–1906). He found a good agreement in the comparison of the results. These ones were compared also with some photographs obtained in Japan by the photographer Sugiyama, reproducing the inner corona and showing the same agreement.

A report of the scientific expedition to Russia was published by Tacchini in 1888 in a book collecting all the observations of eclipses made by Tacchini in his scientific career, "Eclissi totali di sole del 1870, 1882, 1886 e 1887", not containing therefore the observations of the transit of Venus on the Sun of 1874, which he had observed in India. Tacchini will observe another eclipse in 1900 in Algeria and that was the last one. He was preparing to leave for observing another eclipse when he died in 1905.