Mem. S.A.It. Suppl. Vol. 9, 28

Memorie della
Supplementi

Pietro Tacchini (1838-1905), a key-figure in the post-Unitarian Italian astronomy

I. Chinnici[1]

INAF, Osservatorio Astronomico di Palermo Giuseppe S. Vaiana, Piazza del Parlamento 1, I-90134 Palermo, Italy
e-mail: chinnici@astropa.unipa.it

Abstract. A short scientific profile of the astronomer Pietro Tacchini is drafted in this paper, paying special attention to his contribution in the field of solar physics and his leading role in the establishment of the Società degli Spettroscopisti Italiani, forerunner of the Società Astronomica Italiana.

Key words. History, Sun, astrophysics, Italy

Pietro Tacchini (1838-1905) is one of the most important but less known figures in the context of the Italian XIX century science, after the political Unity of the nation. His activity concerned not only astronomy but also many other scientific disciplines, such as meteorology, seismology, etc. A complete and detailed description of his scientific works is out of the aim of this paper, whose main purpose is to draft his contribution to astronomy and especially to the development of solar physics, a field in which he played an important role in Italy.

Born in Modena on March 21st, 1838, he studied at first as engineer in the native town and then went to Padua to practise astronomy, as requested by Giuseppe Bianchi (1791-1866), Director of the small Modena Observatory, who needed him as assistant. Tacchini spent two years at the Padua Observatory under the direction of Giovanni Santini (1787-1877) and then he come back to Modena, where the situation was changed in the meantime: Bianchi has resigned as a consequence of the establishment of a revolutionary government and Tacchini applied for the position of director of the Modena Observatory - and obtained it. At that time, he was only 21 years-old and his activity at the Modena Observatory was no more than a continuation of his training in practical astronomy: actually, he published only a few works about positional astronomy and meteorology - the only kind of research he could carry out with the small instruments installed at the Modena Observatory.

An important opportunity was offered to Tacchini in 1863 by Giovanni Virginio Schiaparelli (1787-1877). The famous astronomer had been contacted by Michele Amari (1806-1889), Minister of the Public Instruction, who asked his advice about the situation of the Palermo Observatory, where "an assistant acting as a Director" was requested. The Palermo Observatory was a prestigious institution, thanks to the scientific activity of its first Director, Giuseppe Piazzi (1746-1826),

Send offprint requests to: I. Chinnici

Fig. 1. Pietro Tacchini (1838-1905).

whose main works were the discovery of the first asteroid, Ceres, and the publication of a stellar catalogue in 1803, re-edited in 1814. Moreover, at that time it was equipped with very good instruments, such as a Meridian Circle by Pistor & Martins and a 25-cm aperture Merz equatorial, the latter unfortunately still laying in the packing cases. The director Gaetano Cacciatore (1814-1889), an active supporter of the anti-borbonic party, better known for his political engagement than for his scientific activity, did not appear in a condition to manage properly the research at the Observatory. For this reason, it was decided to appoint a smart assistant who could give a new impulse to the scientific activity of the establishment.

Schiaparelli wrote to Tacchini asking him to accept the position of adjoint astronomer at the Palermo Observatory, explaining him all the advantages of this choice:

... Il Ministro della Pubblica Istruzione mi ordina di farle privatamente la seguente domanda: = Accetterebbe V. S. di andare 2° Astronomo all'Osservatorio di Palermo con un assegno annuo di L. 4000, e senz'altro obbligo che quello di attendere con zelo alle osservazioni astronomiche? = Mi premerebbe di avere una risposta pronta e decisiva. [...] Io non conosco altri che meglio di V. S. possa riempire questo ufficio. E d'altra parte preme, che i buoni strumenti, di cui in Italia non v'è troppa abbondanza, siano degnamente impiegati. Sono gli strumenti in parte forse nuovi per Lei; ma Ella non avrà difficoltà a renderseli famigliari: circa poi all'uso dei medesimi, norma eccellente avrà dal suo egregio maestro Santini; io pure mi presterò per via epistolare a servirla in tutto quello di cui sono capace [...] Ella stessa vedrà quali saranno i grandi lavori da intraprendersi con strumenti sì belli. [...] Non devo dimenticare di farle cognito, che a Palermo il vivere è a molto buon mercato; che la sua abitazione sarà gratuita, sotto l'Osservatorio, ampia, e bellissima; che coi Siciliani si può vivere molto bene; che con Cacciatore se l'intenderà facilmente; che il clima Palermitano è temperato in ogni stagione, e forse il più sano d'Italia; che le donne Palermitane infine sono belle oltre ogni dire.[1]

Tacchini consulted Santini in Padua and was encouraged by him to accept:

Palermo deve essere una bella, grande, e ricca città; [...] lo stipendio di Fr. 4000, il nome dell'Osservatorio di Palermo, di Piazzi; non che i lavori già illustri ... degli altri astronomi che vi figurarono, parmi che giustifichino la vostra disposizione ad accettare; ed io pure accetterei la esibizione, che vi viene fatta se fossi nella vostra posizione. [...] Costì in fine siete quasi solo, ed isolato in Astronomia, e colà avreste [...] occasioni di poter[v]i distinguere in un osservatorio ben montato, e già conosciuto.[2]

[1] Schiaparelli to Tacchini, Milan, 19-08-1863; in: Lugli, 2001, pp. 225-6.

[2] Santini to Tacchini, Padua, 22-08-1863 (Archives Ufficio Centrale di Ecologia Agraria, Fondo Tacchini).

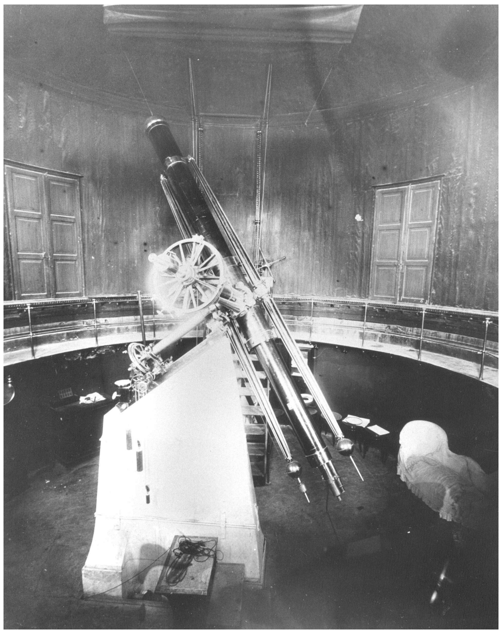

Fig. 2. The Merz telescope installed by Tacchini at the Palermo Observatory in 1865; he used it to start solar physics research in Palermo.

In October 1863 Tacchini therefore arrived in Palermo and immediately worked at the installation of the Merz Equatorial, last legacy of the Borbonic Government before its fall. Once set the instrument, he paid special attention to the solar observations. In those years, some controversies had arisen about the solar photospheric features; important contributions on this subject had been given by Angelo Secchi S. J. (1818-1878) in Rome, who used a Merz equatorial identical to the one in Palermo. Of course, it was very interesting for Tacchini to check Secchi's observations with his own instrument.

Tacchini started also spectroscopic observations of the solar limb in 1871, when he obtained a good spectroscope acquired for observing the total solar eclipse of 1870, visible from Sicily: he had been the most active organizer of the Italian expedition and the Editor of the Report of the Italian Committee.

Thanks to his excellent ability in observing and drawing, Tacchini drafted one of the first classifications of the solar prominences:

Fin dalle prime osservazioni da me fatte nel marzo 1871 io fui subito condotto alla distinzione generale delle protuberanze in due grandi categorie, cioè nebulose e filamentose ... e notai inoltre diversi casi di forma radiate a punte dritte distintissime.[3]

Tacchini and Secchi shared the same conviction that the future of astronomy was in astrophysics, a borning discipline which applied spectral analysis to starlight. Many astronomers did not accept this view and preferred to confine astronomy simply in the range of celestial mechanics, showing a sort of hostility towards astrophysics, as Tacchini wrote to Secchi:

... in tutti gli uomini avvezzi alle formole si trova una ripugnanza eccessiva per l'astronomia fisica: mentre per la scienza a me pare che sia di eguale interesse l'arrivare a conoscere la composizione di una protuberanza come l'orbita di un pianeta o di una stella ...[4]

Because of the same scientific interests, Tacchini's contacts with Secchi became more and more frequent; the two astronomers started a fruitful cooperation which led to the birth of a scientific society, especially devoted to the spectroscopic observations of the Sun. The Società degli Spettroscopisti Italiani was established in October 1871 by Secchi and Tacchini with the aim to coordinate the solar spectroscopic research in Italy:

... il Secchi mi comunicava l'idea di formare una società di Spettroscopisti Italiani, i quali lavorando di comune accordo e secondo un programma stabilito, avrebbero dato in poco tempo la richiesta serie di regolari e continue osservazioni per la sicura ed accelerata soluzione di importanti problemi relativi alla fisica solare. [5]

They involved in their programme other Italian astronomers working in the field of solar spectroscopy, such as Giuseppe Lorenzoni (1843-1914) in Padua and Lorenzo Respighi

[3] Tacchini, 1871, pp. 93-94.

[4] Tacchini to Secchi, 08-02-1873 (Archives P. Universit Gregoriana, Fondo Angelo Secchi S. J., 20, 88).

[5] Tacchini, 1872, p. 3.

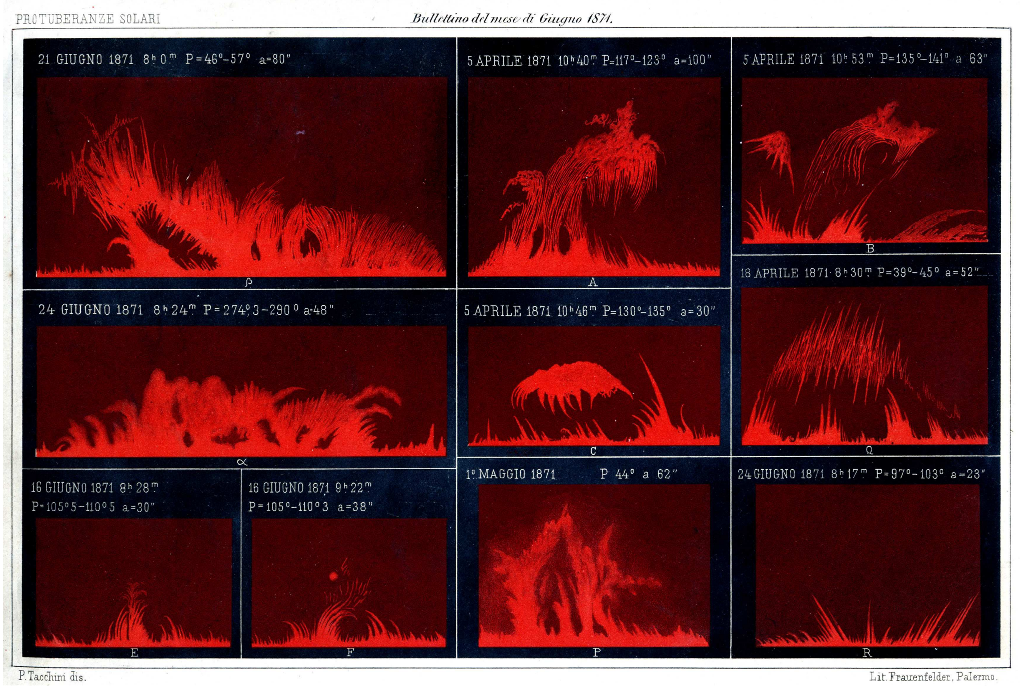

Fig. 3. Solar prominences observed by Tacchini in 1871.

(1824-1889) in Rome. Tacchini became editor of the journal of the Society, the *Memorie della Società degli Spettroscopisti Italiani* (see paper by S. Serio) which can be rightfully considered the first astrophysical journal and had so a good welcome from the international astronomical community that they were awarded with a medal and a diploma in 1873 at the Universal Exhibition in Vienna.

In 1874 Tacchini was the promoter of an Italian scientific expedition to Bengala for observing the transit of Venus. Because of the scarce financial support received from the Government, the aim of the expedition was not to measure the solar parallax, as this would need many distant stations, but to determine the best method for observing the contacts - spectroscopic or visual. The expedition, headed by Tacchini himself, found a difference between the size of the solar disk observed with the visual method and that observed with the spectroscope; moreover, some spectral lines were found confirming the existence of Venus' atmosphere.

On that occasion, Tacchini had the opportunity to establish an astrophysical observatory in Calcutta, with the aim to have a winter station for the solar spectroscopic observations. The Observatory was located in the St. Xavier's College and was directed by the jesuit Eugène Lafont (1837-1908), who has been invited to join the Italian expedition for the transit of Venus. Unfortunately, the Observatory never gave a regular contribution to the programme of solar observations because of Lafont's health problems.

Before his departure for India, Tacchini published a report on the conditions of the Italian astronomical observatories. The Government had maintained all the Observatories existing in the pre-unitary States; Tacchini's analysis compared the budget of the Italian Observatories with that of the main foreign Observatories and concluded:

... la somma spesa per l'intero mantenimento delle dieci specole in Italia non vale quanto la spesa di mantenimento di un solo Osservatorio estero. [6]

He therefore proposed to divide the observatories into two classes: the first one, that of the research observatories, included those of Milan, Florence, Naples and Palermo; the second one included the University observatories, namely those of Padua, Turin and Rome - the other small observatories, such as Bologna, Parma and Modena, would be declassed to meteorological observatories. Tacchini's project was accepted by the Government (except for the Bologna Observatory, which was included among the University observatories) but unfortunately the decree signed in 1876 by the Minister Ruggiero Bonghi (1828-1895) was never applied because of a political change in the Government which actually stopped the procedure of the law.

Tacchini's activity as a promoter of the astrophysical research led also to the establishment of the Catania Observatory (see paper by C. Blanco) for solar observations on the Mount Aetna.

In 1879 Tacchini was appointed Director of the new Ufficio Centrale di Meteorologia in Rome with the task to coordinate the Italian meteorological network; he chose the building of the Collegio Romano to establish the Ufficio in order to preserve the Collegio Romano Observatory from shutting down - actually, after Secchi's death, the Observatory had been confiscated by the Italian Government which could not maintain it. Tacchini annexed the Observatory to the Ufficio: in his opinion, in fact, solar activity could influence terrestrial meteorology, as *fra noi ed il sole vi è una comunicazione continua ... sole e terra non sono né più né meno che una macchina elettrica e un elettroscopio a piccola distanza nel gabinetto di un professore di fisica.*[7]

Thanks to Tacchini's support, another astronomical and meteorological observatory was built in 1883 on the Mount Cimone in the Appennino Emiliano, but it never became a real astronomical observatory.

Fig. 4. Frontpage of the first volume of the *Memorie della Società degli Spettroscopisti Italiani* (1872), edited by Tacchini; it contained the report of the first coordinated observation of the solar limb.

Tacchini was well-known abroad and often invited by foreign astronomical societies to join their scientific expeditions. In 1875 he joined the English expedition headed by Norman J. Lockyer (1836-1920) to observe the total solar eclipse visible from the Nicobar Isles; in 1882 he went to Egypt, to observe another solar total eclipse, invited by the Director of the Cairo Observatory; in 1883 he joined the French expedition headed by Jules C. Janssen (1824-1907) to observe a total solar eclipse visible from Micronesia and in 1886 was invited by the Royal Astronomical Society to observe a total solar eclipse at the Antilles. In 1887 Tacchini went to Russia with his colleague Annibale Riccò (1844-1919) to observe

[6] Tacchini, 1875, p. 7.

[7] *Rivista Sicula* vol. V, 1871, p. 420.

P. TACCHINI

ECLISSI TOTALI DI SOLE

DEL DICEMBRE 1870

DEL MAGGIO 1882 E 1883, E DELL'AGOSTO 1886 E 1887

RELAZIONI E NOTE

ROMA
TIPOGRAFIA EREDI BOTTA
1888

Fig. 5. Tacchini's book on eclipses (1888), which contains most reports and travel books of the scientific expeditions in which Tacchini took part.

a total solar eclipse at Surwiskaja and in 1900, with Riccò again, he went to Algeria for observing another total solar eclipse. Most reports and travel books of these expeditions were collected and published by Tacchini in 1888 in a volume, *Eclissi totali di Sole*; the book is full of remarks about ethnography, botanics, geology, etc. of the several regions visited and shows clearly the variety of interests and the scientific curiosity which marked Tacchini's activity.

Tacchini's reputation is confirmed also by his participation in many scientific international commissions; in particular, he was an active member of the *Carte du Ciel* Executive Committee, established in Paris in 1887 with the aim to produce a map and a catalogue of the whole sky by photographic means and heobtained that a part of the work was assigned to the Catania Observatory. Because of His renowned scientific activity, especially in the field of solar physics, in 1888 Tacchini was awarded by the Royal Society of London with the Rumford Medal and in 1892 by the Académie des Sciences of Paris with the Prix Janssen;it is interesting to read the reason of the first prestigious award, as it describes very well Tacchini's stature: *The Rumford Medal has been awarded to Professor Pietro Tacchini for important and long-continued investigations, which have largely advanced our knowledge of the physics of the sun. Professor Tacchini occupies a foremost place among those who have paid special attention to the physics of the sun. Since 1870 he has unceasingly observed, first at Palermo, and afterwards at Rome, the solar prominences. The information at our disposal at the present time, both as regards their distribution, their spectra, and the changes which take place in them, and their connexion with other solar phenomena, rests to a large extent upon his individual efforts. His memoirs on this subject are very numerous. He has been engaged in the observation of four total solar eclipses, and from some of the phenomena therein observed has drawn the important conclusion that many of the so-called prominences are really descending currents.*[8] It is to mention that, in the last years of his career, Tacchini paid attention also to seismology, establishing in 1895 the Società Sismologica Italiana and being the editor of the bulletin of the society; actually, in 1887 the Ufficio Centrale di Meteorologia directed by Tacchini had become Ufficio Centrale di Meteorologia e Geodinamica, in order to coordinate also the national network of seismic stations.

Tacchini was planning to observe another total solar eclipse in 1905 when he died suddenly on March 24th in Spilamberto, in his native land. He had retired from his position at the Ufficio Centrale in 1899 and then, in 1902, he had left the Collegio Romano Observatory,

[8] *Proceedings of the Royal Society*, vol. XLV, p. 55.

maybe deceived by the Italian policy of science, which did not give adequate support to the astrophysical research; as a consequence, Italian astronomy withdrew the spectroscopic studies and come back to the celestial mechanics - the golden era of the Italian spectroscopists, opened by Tacchini, was ended.

References

Foderà Serio G., Chinnici I. 1997, L'Osservatorio Astronomico di Palermo, Flaccovio Editore, Palermo

Lugli, M. U. 2001, Pietro Tacchini, Edizioni Il Fiorino, Modena

Tacchini, P. 1871, Bullettino Meteorologico del R. Osservatorio di Palermo, vol. VII, 49-62; 69-75; 85-99; 111-113; 121-132

Tacchini, P. 1872, Memorie della Società degli Spettroscopisti Italiani, vol. I, 3-6

Tacchini, P. 1875, Memorie della Società degli Spettroscopisti Italiani, Appendice al vol. IV, 1-20

Tacchini, P. 1888, Eclissi totali di sole del dicembre 1870, del maggio 1882 e 1883, e dell'agosto 1886 e 1887, Roma, Tipografia Eredi Botta