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## **Miguel Selga, 1879–1956: Priest and Scientist**

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## Miguel Selga, 1879-1956: Priest and Scientist

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ANGEL HIDALGO, S.J.

**F**ATHER Miguel Selga, S.J., whose name is well known among Philippine scientists, was born in Spain on November 25, 1879 in the little town of Rajadell, close to the river of the same name in the province of Barcelona, not far from Manresa. His parents were Pablo Selga and Francisca Trullas. He entered the Jesuit novitiate at Veruela in Aragon on March 30, 1895 at the age of fifteen, and was admitted to the First Vows of the Society of Jesus two years later.

At Veruela he continued his classical studies and then began the study of Philosophy, which he completed at Roquetas in Tortosa. Roquetas was destined to become a center of scientific research, for it was the future site of the famous Observatory of Ebro, founded by Father Ricardo Cirera, S.J., who had served his scientific apprenticeship in the Philippines at the Manila Observatory.

Having completed his study of Philosophy in 1902, and having taught for a brief period in the Jesuit colleges at Veruela and Sarriá, Selga went to the University of Zaragoza where he obtained the degree of Licentiate in Sciences in 1908.

The next four years were spent in the study of Theology, the first two in Tortosa, and the last two in the United States at Woodstock College in Maryland. The reason for this assign-

ment to the United States was to give him an opportunity to learn the English language, as well as to become acquainted with the latest advances in astronomy and other sciences, for Miguel Selga had been chosen to become a member of the staff of the Manila Observatory.

At Woodstock, at the end of his third year of Theology, he was ordained priest by James Cardinal Gibbons, Archbishop of Baltimore, on July 30, 1911. After one more year of Theology at Woodstock and one year of "tertianship" (the final year of Jesuit training) at Saint Andrew-on-Hudson in Poughkeepsie, New York, Father Selga pronounced the Solemn Profession in the Society of Jesus on February 2, 1914 in Chicago. This ended his training as a Jesuit, but at that time he was already embarked on his program of advanced studies in astronomy.<sup>1</sup>

#### ADVANCED STUDIES IN ASTRONOMY

The first year of his program was spent moving from one Observatory to another, observing their procedures and getting acquainted with the latest instruments. He spent the summer of 1913 (July to September) at the Georgetown University Observatory in Washington, D.C. The fall and winter term (October 1913 to March 1914) was spent at the Harvard Observatory in Boston. During the spring term (March to June 1914) he was at the Yerkes Observatory in Wisconsin. The summer months (July to August) were spent in Flagstaff, Arizona, at the Lowell Observatory. In August 1914 he moved on to the Lick Observatory in California where he was to spend a year.

While on these scientific peregrinations in the United States, Father Selga was guided by suggestions from Father

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<sup>1</sup> The letters and other documents upon which this article is based are among the Selga Papers in the Archives of the Manila Observatory. The notice of his admission to the Solemn Profession was made to Father Selga by Father James J. Carlin, S.J., Socius to the Maryland-New York Provincial, in a letter dated December 24, 1913. The notice was given on behalf of Selga's own Superior, Father Barrachina, Provincial of Aragón.

José Algué, Director of the Manila Observatory. Father Algué wanted him to become acquainted with photometric plates and with stellar photography. Algué also wanted Selga to avail himself of the experience and guidance of Dr. Slipher at the Lowell Observatory in the measurement by the use of spectral deviations of radical velocities and astral rotations.<sup>2</sup>

After that year of moving about, Father Selga settled down for a year of concentrated astronomical research at the Lick Observatory in Mount Hamilton, California. He was there from August 24, 1914 to July 30, 1915. He lived with the staff in the Observatory quarters, said Mass daily in the early mornings, and spent most of the day and a good deal of the night at his astronomical observations.

Under the direction of Drs. Campbell and Moore, he studied the spectrum of three stars, Gamma, Epsilon Orionis and Sigma Scorpii. Using a 36-inch telescope, he made thousands of observations of these three stars, and as a result was able to determine the period of rotation of Sigma Scorpii. This was a scientific discovery of some significance which he presented in a paper read at the conference of astronomers and astrophysicists held in San Francisco in August 1915.

At the same time, he was also beginning, under the direction of Dr. Aitken, the study of double stars, using for the purpose a 12-inch telescope.

Acting as agent for the Manila Observatory, he commissioned the construction of several scientific instruments. One such instrument was Abbot's pyrheliometer for the study of solar radiation. The one constructed for the Manila Observatory was the twenty-seventh to be made. It was constructed

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<sup>2</sup> Francisco Tena, S.J., Superior of the Philippine Mission, to Selga, from Manila, June 22, 1915. Comellas to Selga, from Manila, January 25, 1914. Selga to Algué, Lick Observatory, October 10, 1914. Selga to the Provincial of Aragón, Ramon Lloberola, S.J., September 8, 1915. This last letter, written aboard the "Sinyu Maru" [sic] has been published in *Cartas y noticias edificantes de la Provincia de Aragón*, (Barcelona, 1915) II, 191-99.

under Abbot's direction and was tested by him at Mount Wilson.

Father Selga's work at the Lick Observatory gained for him some recognition among his scientific colleagues. In January 1915 he was elected member of the Astronomical Society of the Pacific. In August of that year he was elected perpetual member of the American Astronomical Society. He also received word in April 1915 that he was being proposed for membership in the Astronomical Society of France, although it was not until 1923 that he was granted the diploma of perpetual membership in that society.<sup>3</sup>

In the meantime his scientific papers, the first in a long career of scientific publications, were beginning to appear in scientific journals in Europe and America. Those written in English were published in the *Lick Observatory Bulletin* and in the *Publications of the Astronomical Society of the Pacific*. Those written in Spanish appeared in the journals of the *Sociedad Astronómica de España y América* and the *Sociedad Astronómica de Barcelona*.

With his own work thus recognized, Father Selga was able, at the San Francisco Conference of 1915, to direct attention to the work of Father Algué, who was included by the Conference in the list of the one hundred outstanding men of science of the Pacific.

#### THE QUESTION OF CITIZENSHIP

It was Father Selga's intention, after the San Francisco Conference of 1915, to return to the Lick Observatory for further scientific work. He also had another end in view. He wanted to stay in the United States until November 1916, at which time he would be eligible for American citizenship.

These reasons he explained to the Jesuit Provincial in Barcelona, Father Ramon Lloberola, and to the Jesuit Superior in Manila, Father Francisco Tena, both of whom approved

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<sup>3</sup> This diploma carries the date of December 12, 1923. This and other diplomas and certificates of appointment, membership, or appreciation, are among the Selga Papers in the Manila Observatory.

of the plan but left the final decision to the Observatory Director, Father Algué. With the latter's approval, Father Selga filed naturalization papers in November 1914, which meant that he would be granted American citizenship in November 1916.

These plans miscarried. Father Algué's sickness and the departure from the Manila Observatory of the English Jesuit, Father Robert Brown, who was recalled to England by his superiors, made it necessary for Father Selga to proceed to Manila earlier than expected. A letter from the Superior in Manila, dated June 22, 1915, followed by an urgent cable on July 8, instructed Father Selga to report to Manila as soon as possible.

Despite efforts to get an earlier booking, he was not able to sail from San Francisco until September 4 aboard the "Shinyo Maru." He arrived in Manila on October 15, 1915.

The result of this sudden summons to Manila was unfortunate in two ways. On the one hand, he was not able to remain in American territory long enough to become an American citizen. The Philippine Islands, though an American possession, were not considered American territory for the purpose of acquiring American citizenship. On the other hand, having declared his intention in November 1914 to become an American citizen, he thereby forfeited his Spanish citizenship. He remained in this anomalous position of a man without a country until the outbreak of war in December 1941, when the Spanish consulate in Manila extended to him the rights of Spanish citizenship.<sup>5</sup>

#### AN AMBIGUOUS SITUATION

Upon his arrival in Manila Father Selga was immediately assigned to the work for which he had been urgently summoned to the Philippines, to assist Father Algué as Director and to take care of all the routine business of the Observatory.

<sup>4</sup> This date is mentioned in *Cartas y noticias edificantes*, (1915), II, 269.

<sup>5</sup> The cedula is dated December 31, 1941, on the eve of the Japanese Occupation of Manila.

Nominally, Selga was Algué's secretary, but in actual fact he was executive assistant, helping the Director when the latter was present, and acting as Director in his absence.

This arrangement lasted for five years, from 1916 to 1921. It was an unsatisfactory arrangement because, although Father Selga was in actual fact directing the Weather Bureau, he had to serve without pay. The Weather Bureau was a government entity, and it could not disburse salaries for a position not authorized by law. No provision in the budget had been made for a Secretary to the Director. This situation was remedied temporarily in January 1921, when the position of Secretary was finally provided for by the Philippine Legislature. Father Selga was then officially appointed to a position he had actually been holding for the past five years. No sooner appointed, however, than the position was suppressed as of February 23 of that year. In its place the legislature created the higher position of Assistant Director of the Weather Bureau, to which Father Selga was immediately recommended for appointment.

Although Father Selga was the obvious choice for the position of Assistant Director of the Weather Bureau, a position he had, in fact, been holding without pay for five years, there was political opposition to his appointment. Senator Lope K. Santos approached the Secretary of Commerce and Communications, Mr. Apacible, urging the appointment of a Filipino as an Assistant Director of the Weather Bureau. Senator Santos informed the Secretary that in working for the passage of the item in the legislature, he had been motivated by the hope that the position would go to a Filipino. The difficulty was that no Filipino was available who possessed the required technical and scientific training for the efficient running of an Observatory and Weather Bureau. Father Algué, in cooperation with the Department Secretary, had made several moves towards training Filipinos who could eventually take over important posts in the weather Bureau. Two of the technicians had been sent to the United States for advanced studies. For some reason, climate, health, or lack of scientific preparation, the two had not succeeded

in their studies. Neither these two nor anyone else could be immediately appointed to take over a position requiring highly technical qualifications.

There was another difficulty which complicated the matter. The Philippine Weather Bureau was a government entity, but it was staffed and directed by contract with the Jesuit Fathers of the Manila Observatory. The Jesuits had the responsibility of providing efficient administration and service. They could not exercise this responsibility if the Weather Bureau were to be directed by persons appointed for political rather than scientific reasons.

Both Secretary Apacible and Governor General Harrison appeared to concur in this reasoning, a fact communicated by Father Algué to the Acting Governor General, Charles Yeater.<sup>6</sup> Nevertheless, Father Selga's position remained ambiguous until December 22, 1921, when the new Governor General, Leonard Wood, signed Father Selga's appointment as Assistant Director of the Weather Bureau, effective retroactively to May 27 of the same year.

Among those who congratulated Father Selga on his formal appointment to a position he had long held was the Director of the Philippine Air Service, Carlos A. Barretto.

In this official position as Assistant Director, Father Selga continued to serve the Observatory and Weather Bureau for three more years. He was in fact Acting Director during Father Algué's absence in Europe and América.

#### FATHER ALGUE RESIGNS

Taking advantage of his accumulated vacation-time, Father Algué accepted an assignment to go to Rome to prepare the Jesuit Exhibit in the Vatican Mission Exposition. On his way thither he passed through Spain in October 1924 and had his eyes examined. It was decided to have an operation for cataracts in the spring of 1925. In the meantime, how-

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<sup>6</sup> Memorandum of Father Jose Algué to Governor Francis Burton Harrison, Manila, February 23, 1921. Algué to Yeater, Manila, March 6, 1921.



ever, he spent the winter months in Rome, preparing for the Exposition, returning to Spain for the operation in May. He never completely lost his sight, but the operation did not restore full use of his eyes. This fact decided him to offer his resignation as Director of the Manila Observatory and of the Philippine Weather Bureau.

His letter of resignation was addressed to Governor General Leonard Wood, dated August 21, 1925. Wood's reply was dated November 16. The Governor General accepted the resignation with regret, praising Father Algué for his 32 years of scientific service in the Philippines, during which he had been instrumental in the saving of many lives and of much property. In that same letter, Governor General Wood gave assurance that, in accordance with Father Algué's recommendation, Father Miguel Selga would be appointed Director of the Weather Bureau.

Father Algué's resignation was accepted effective January 1, 1926, the day on which Father Selga was appointed his successor. Seven years later, Governor General Theodore Roosevelt, Jr. renewed the appointment. The appointment was dated January 27, 1933, but with retroactive effect to the first of January of that year.

Father Selga thus remained Director of the Observatory for twenty-two years, from 1926 until his successor, Father Charles E. Deppermann, S.J., was appointed on February 23, 1948.<sup>7</sup>

#### THE MANILA OBSERVATORY

In 1915 the year of Father Selga's arrival in Manila, the Manila Observatory was celebrating its Golden Jubilee. Be-

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<sup>7</sup> The appointment was signed by Wood on December 22, 1921. Father Selga was Director of the Manila Observatory for 22 years, as mentioned in the text, but he was Director of the Philippine Weather Bureau for only sixteen years, until the Japanese occupation of Manila, when the Japanese Imperial Army removed him from office. A distinction should be made between the government entity, (the Weather Bureau) and the Manila Observatory, a corporation for scientific research organized and staffed by Jesuit scientists.

gun in 1865 as a small station for meteorological observations by the Jesuit Fathers of the Ateneo Municipal de Manila, it became in time a separate corporation with its own staff, its own funds, and its own buildings. The street on which those buildings were located now bears the name of the Observatory's first director, Father Federico Faura, S.J. By royal decree of the Spanish Crown in 1884, the Observatory became the official Philippine Weather Bureau, an arrangement that was renewed by the Insular Government after the American occupation of the Islands.<sup>8</sup>

By 1915 the Philippine Weather Bureau had become a very complex organization, with central offices in Manila staffed by 34 persons, and a network of stations and substations throughout the Islands and in Guam. In 1915, these outlying stations and substations were staffed by 66 persons. The Weather Bureau, therefore, in that year, had a total personnel of 100. The total budget amounted to ₱193,905 of which ₱87,880 were for salaries.<sup>9</sup>

By 1941, at the outbreak of the Pacific War, the number of employees had doubled, and the number of stations and substations had risen to 300.<sup>10</sup>

In view of the foregoing, it may be readily seen that the Director of the Observatory must have been an extremely busy man, whose functions were not only technical and scientific, but also governmental, administrative, and social. This being the case, it is all the more amazing that during all these years Father Selga should have been able to find time for so much scientific and historical research, embodied in his articles and monographs.

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<sup>8</sup> For a history of the Observatory, see J. J. Hennessey, "The Manila Observatory", *Philippine Studies*, VIII (1960) 99-120.

<sup>9</sup> Miguel Saderrá Masó, S.J., *El Observatorio de Manila* (Manila, 1915). Personal y fondos apropiados para 1915, pp. 190-94.

For the golden jubilee of the Observatory, see "Bodas de Oro del Observatorio", *Cartas y noticias edificantes* (Barcelona, 1915), II, 149.

<sup>10</sup> Miguel Selga, S.J., "Trágico fin del Observatorio": second installment (see Bibliography, no. 239).

## ASTRONOMICAL PUBLICATIONS

Appended to this article is a bibliography of Father Selga's writings, as complete as the present writer could make it. This list is based partly on Father Selga's own compilations, included in the brochure containing the list of the publications of the Fathers of the Manila Observatory. That brochure was published in 1928, and updated in a revised edition eight years later.<sup>11</sup>

Altogether Father Selga's articles and monographs amounted to 254. Of these, 42 were issued as separate monographs by the Bureau of Printing in Manila. These included 38 that were published and 4 that had been sent to the press in 1941, which may or may not have been issued by the time the war broke out in December of that year.

Of the remaining 212 articles, the majority (143) appeared in the *Revista de la Sociedad Astronómica de España y América*, published in Barcelona. Five articles were ready for the press, but as far as we can ascertain, they had not been published at the time of Father Selga's death.

An inspection of these 254 titles shows that Father Selga's interests embraced a wide field. Those interests were at first chiefly astronomical. Besides the 13 articles that he had written during his stay at the Observatories of Lick, Yerkes, and Lowell, he published several others after his arrival in Manila. They were chiefly concerned with the spectrum of stars and the nebulae, with radial velocities, magnitude, luminosity, and distance. He was also interested in the phenomenon of binary stars. (See Bibliography, nos. 55-84.)

In 1919 he conducted five series of photometric observations of the stars "Nova Aquilae 3". The results were published in six articles. (See nos. 69, 71, 75, 76, 77 and 106 of the Bibliography.)

Several articles were devoted to comets (see nos. 89 and 91). Other articles dealt with lunar eclipses, the lunar

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<sup>11</sup> *Publications of the Manila Observatory*, 1928; second revised edition, 1936.

halo, the transit of Mercury, and in particular with solar eclipses, to which we now turn.

#### SOLAR ECLIPSES

The solar eclipse of 1929 was the subject of several articles, of which some appeared in Barcelona and some in Manila. (See nos. 136, 223, 225.) One monograph (no. 18) dealt with an eclipse that occurred in the seventeenth century. And one article which appeared in five installments dealt with the total eclipse of 1868.

Father Selga's interest in the last-mentioned phenomenon arose from the fact that three Jesuits of the Manila Observatory had gone on an expedition to observe the eclipse on the island of Matawalok, near Celebes, just below the Equator (at 0° 32' South, and 122° 20' East). The three were Fathers Federico Faura, Jaime Nonell, and Juan Ricart. Another Jesuit, the well-known astronomer Father Secchi, was also present at Matawalok. This eclipse was important in astronomical history as a turning point in the study of solar protuberances.

#### METEOROLOGICAL STUDIES

Understandably, the bulk of Father Selga's writings was concerned with the chief field of research and observation of the Observatory of which he was the head, namely meteorology. There were studies on rainfall, mean temperatures, wind velocities, and the effects of these upon agriculture. Naturally, in a Weather Bureau whose main task was to forecast the weather, a good deal of attention was given by Father Selga to typhoons.

In this he adopted an historical approach. His research led him to study the unpublished manuscript of Father Francisco Alzina, S.J., and he edited Alzina's account of Philippine typhoons, earthquakes, and tides. He also edited an unpublished account of a typhoon which had hit the Philippines from the 8th to the 10th of September 1768.

But his most important work in this field was his atlas of Philippine typhoons, which he entitled *Charts of Remarkable*

*Typhoons in the Philippines: 1902-1934.* This was published in Manila in 1935, and it included a Catalogue of Typhoons covering a period of six centuries, from 1348 to 1934. Despite the enormous amount of scholarship that had gone into the preparation of that monograph, it was all compressed into 55 pages and 12 plates. In 1965 one French writer, who had published a work on typhoons, showed great interest in Selga's Catalogue and Charts.<sup>12</sup>

#### OTHER HISTORICAL AND SCIENTIFIC WORKS

Father Selga's other writings were on a great variety of topics: on earthquakes, volcanoes, tectites, on the scientific equipment aboard Magellan's fleet, on the clocks and timepieces used by the early Jesuit missionaries in the Philippines, on the Philippine maps of Father Murillo Velarde, on Philippine printing incunabula, etc.

One very touching work was among the last to be published. It was his account of the destruction of the Observatory during the Japanese occupation and in the Battle of Manila. The account, under the general heading of "The Tragic Ending of the Manila Observatory", appeared in six installments in the Spanish journal *Ibérica*. (See Bibliography, nos. 243-48.) In it he wrote: "The destruction of the Observatory could not have been more complete. Of the instruments, not one was left. The records and observations were all destroyed in the flames...."

#### UNPUBLISHED WORKS

Of Father Selga's completed manuscripts, five remained, as far as we know, unpublished. As it happens they were all about Jesuit scientists, and all but one were Jesuits in the Philippines. One article is on three Jesuit botanists, another on three Jesuit architects, another on a Jesuit botanist, pharmacist and historian, and another on the dispensaries in the old Jesuit missions in the Philippines. (See nos. 249-53.)

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<sup>12</sup> This was Pierre André Moléne, author of the book, *Chasseurs des Typhoons* (Paris, 1964).

## CONTACT WITH OTHER OBSERVATORIES AND SCIENTISTS

Despite the amount of writing that he did and of the administrative detail that he had to attend to, Father Selga found time to keep up a correspondence with scientists abroad. In particular he maintained cordial relations and in some cases established cooperation with other Observatories.

When the Nationalist Government at Nanking decided to establish a Meteorological Institute, they requested the Manila Observatory to undertake the training of its personnel. Father Selga consented to undertake the technical training, but declined to give theoretical classes, as the Manila Observatory was not then geared to give classes which were best taken at a university.<sup>13</sup>

With the Royal Observatory of Hong Kong a considerable correspondence was carried on. A conference was held in Hong Kong in 1930, and cooperation was established between Hong Kong, Zikawei, and Manila for the interchange of weather information for the benefit of ships at sea.

In preparation for the solar eclipse of 1929, the National Astronomical Observatory in Tacuyaba, México, requested pertinent data from the Manila Observatory.<sup>14</sup> The Observatory likewise cooperated with the Spanish authorities in supplying weather information for the benefit of the Spanish flyer, Rein Loring, on the last leg of his flight to the Philippines in 1932. Loring has left a statement, recording his gratitude to the Observatory.<sup>15</sup>

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<sup>13</sup> Father Selga's reply to Dr. Co Ching Chu was dated March 8, 1928.

<sup>14</sup> Joaquin Gallo to Selga, from Tacuyaba, Mexico, April 17, 1928.

<sup>15</sup> Loring's statement reads: "La aviación va inseparablemente unida a la Meteorología, como a Maestra segura que señala el rumbo acertado de la nave. Hago votos para que el Observatorio de Manila, así como ha prestado valiosos servicios a la navegación marítima con el pronóstico de temporales así conquiste nuevos laurels en el campo inmenso de la navegación aérea, haciéndole acreedor al respeto y gratitud de cuantos marinos han surcado los mares y cuantos pilotos han hendido los espacios." The Spanish Consulate's request for cooperation was contained in a letter of the Commercial Attache, González de Bernedo from Hong Kong, March 31, 1932.

From Paris in 1935 Father Selga received a request for a copy of his monograph on the maps of Murillo Velarde. The request came from Mr. Aldo Nieli, who likewise proposed the creation in the Philippines of a section of the Academy of the History of the Sciences. Father Selga replied by sending the copy of the work requested, and of other works as well. The idea of an Academy did not seem to him feasible at the time, but he took sufficient interest in the idea to endorse it to Filipino scientists, among them, Dr. Patrocinio Valenzuela, Dr. Quisumbing, and Dr. Jose Bantug.<sup>16</sup>

As was natural, however, Father Selga's closest contacts were with the Observatories under Jesuit direction, in particular those at the Vatican, at Belén in Cuba, at Zikawei in Shanghai, at the Ebro in Spain, and at the Charterhouse (Cartuja) in Granada.<sup>17</sup>

Father Selga likewise attended some international conferences for scientists. One was the Third Pan Pacific Conference to which he contributed several papers. (See Bibliography, nos. 202-205.) Another was a meteorological conference in Warsaw in 1935.

Returning from this last-mentioned conference, he stopped over both at Vienna and at Rome. In Rome he was received in private audience by Pope Pius XI, who autographed ("peramanter perque libenter in Domino") a souvenir card imparting a blessing to the Manila Observatory.

To the Vienna visit we shall return presently.

#### SPIRITUAL MINISTRY

With all this scientific activity, Father Selga still found time to exercise his ministry as a priest. He was available for confessions, for sermons, and conferences. He readily obliged

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<sup>16</sup> In the Selga Papers is a copy of a letter to Dr. Valenzuela, dated December 9, 1935, as well as of Father Selga's reply to Nieli.

<sup>17</sup> Among the letters in the Selga Papers are those from the following: Antonio Galán, S.J., Havana, September 4, 1920; Manuel Sanchez Navarro, S.J., Naples, September 8, 1932; Luis Rodés, S.J., Tortosa, March 21, 1934; Joaquin Vilallonga, S.J., Ahmedabad, India, January 15, 1939; J. Killeen, S.J., Rome, August 25, 1936.

his friends by performing, with the permission of the parish priests, their weddings or by administering baptism to their children. In particular because of his kindly manner and his deep understanding of human problems, he was much sought after as a confessor. His confessional in the Chapel of San José Seminary on Padre Faura Street was often crowded with penitents awaiting their turn. It was noted, however, that while the women went to other confessors, it was the men who stood in line at Father Selga's confessional-box.

#### THE VIENNA COPY OF A PHILIPPINE RARE BOOK

It was well known to bibliographers, and mentioned in Retana's work, that there was a copy in the Imperial Library in Vienna of an early Philippine imprint. It was the *Memorial de la Vida Cristiana*, written in Chinese by the Dominican, Fray Domingo Nieva. In connection with his trip to Warsaw, Father Selga stopped over in Vienna for the precise purpose of examining the book. He had been commissioned by the National Library in Manila, and by its Director, Eulogio Rodriguez, to obtain photostatic copies of the book.

Father Selga has left an account of the incident. After an hour and a half of search, he was informed that the book was not in the Library. He insisted, and a search was instituted anew. This time they found the book. Since it was in Chinese it had been included among the Chinese manuscripts. Father Selga could not photograph the entire book, but he had photographs taken of the title page, four double pages which contained the entire Spanish text, and six double pages of the Chinese text taken from the end of the book. He noted that the book had 272 double pages. These photographs he brought back with him and presented to the National Library.

But his interest in the book did not end there. In two subsequent notes he raised several questions, some of which are extremely interesting to bibliographers.

One of them concerned the name of the printer. He noted that the book had been printed in 1606, and the printer was Pedro Vera. On the other hand, in 1607 a book had been printed in Binondo, written by Fray Tomas Mayor, and the



printer's name was Juan Vera. Father Selga asked: "Were these one and the same person, or were there two printers whose surnames were both Vera?"

Another question concerned the place of publication and the author's first name. Father Selga noted that the book he examined in Vienna was written by Father Domingo Nieva and was printed in Binondo. But Retana, in Volume One of his *Aparato bibliográfico*, had quoted a passage from the work of the Dominican annalist, Fernández Alonso, (published in Toledo in 1611.) According to that source, the *Memorial de la vida cristiana* was written in Chinese by Fray Raymundo Nieva, and that work was printed in Bataan. Father Selga was curious to know if the Dominican annalist had simply been mistaken, because if he had not been, then there must have been two editions of the work, one printed in Bataan, the other in Binondo.<sup>18</sup>

#### ENFORCED LEISURE: 1942-1943

With the Japanese occupation of Manila and the seizure of the Manila Observatory and Weather Bureau by the Japanese Army, Father Selga found himself, for a change, with time on his hands.

For the first year of the war, however, he managed to keep himself busy by putting his notes in order, getting many of his published articles copied by a typist. He also worked intensely at some projects which he had previously begun.

#### HISTORY OF TYPHOONS

One of the more ambitious was his project to publish a complete bibliography on Philippine typhoons, an outgrowth of his earlier Catalogue of Typhoons. He had been gathering material for many years. He had for this purpose visited libraries in Tokyo, Shanghai, Hong Kong, Canton, Macao, Singapore, Madras, and Bombay. He copied out the material, or had it copied, in Spanish, French, German, Portuguese, Chinese, and Japanese.

<sup>18</sup> Father Selga's notes on the Nieva book are extant in the Selga Papers.

By the time the war broke out he had enough material for a book, the material being in a filing box containing 4,676 cards, citing the source and giving a resumé of the contents. He had used this material for his Catalogue of Typhoons published in 1934, but it was obviously his intention to compile a more complete history of typhoons. This he never completed.

#### CATALOGUE OF EARTHQUAKES

Another project that he was engaged in was the compilation of a complete catalogue of Philippine earthquakes, similar to his catalogue of typhoons. For this he read history books and historical accounts particularly those by missionaries who often gave accounts of such events.

In this project Father Selga was trying to complete the work already done by his predecessor in the Observatory, Father Miguel Saderrá Masó, who in 1895 had published a monograph on Philippine earthquakes. (*La Seismología en Filipinas*. Manila. 1895.)

The material for this catalogue of Philippine earthquakes was contained on 1,825 filing cards, covering a period of 310 years. This material was saved from the fire that overtook the Observatory, and after the liberation of Manila, a Filipino Jesuit scholastic on his way to theological studies in the United States brought the material along and entrusted it to Father William C. Repetti, S.J., formerly Director of the Seismic Department of the Manila Observatory and subsequently Archivist of Georgetown University. Father Repetti had the work published under the title *Catalogue of Philippine Earthquakes: 1589-1899*.

Father Repetti himself deserves our gratitude for the publication of the Catalogue of Earthquakes and for his contribution to it, during his incumbency as Director of the Seismic Department, from 1928 to 1942, while Father Selga was Director of the Observatory.

Besides Father Repetti, there were two other Jesuit scientists who, previous to Father Selga's time, had devoted much of their attention to the Observatory's seismic work.

One of these was Father Federico Faura, the first Director of the Observatory (1879-1890). The other was Father Saderrá Masó who worked in the Observatory from 1890 to 1928, except for four years between 1896 and 1901.

Father Repetti, in his introduction to the work, gives credit to Mr. Fidel Millanes, an employee of the Observatory, who gathered a good deal of the material from the files of old newspapers.

#### SCIENTIFIC GLOSSARY

Father Selga was also engaged in another hobby, the compilation of a technical glossary, explaining terms used in certain sciences, especially astronomy, meteorology, seismology, and magnetism. For each term he gives the etymology of the word, the technical meaning of the word, and a brief explanation of the phenomenon involved. He concludes by giving references for further study.

#### FOLKLORE

Father Selga had also for several years been engaged in collecting folklore material concerning the weather, the heavens, lunar and solar eclipses, and other phenomena. It was his belief that even primitive peoples have a way of forecasting the weather, and that their method of forecasting may perhaps be discovered by examining their folk tales and songs and proverbs. Father Selga's material reached considerable proportions. He collected a total of 6,870 items divided as follows: 2,567 items contained popular astronomical notions; 3,457 were meteorological; and 846 were seismic. (See Bibliography no. 254.)

#### PROPOSED EDITION OF BENCUCHILLO

In the Observatory Archives is another unpublished work of Father Selga. It is his edition of a manuscript account written by the Augustinian, Father Bencuchillo, concerning the eruption of Taal Volcano in 1754. The original of the Bencuchillo manuscript was kept before the war in the Augustinian priory in Manila. Father Selga examined a copy of the manuscript and had it transcribed for publication.

In preparing this manuscript for publication, Father Selga added valuable notes, culled from the parochial records in Bauan and Taal, and from another account of the same eruption which had been sent to México (see Bibliography nos. 39-42).

#### OTHER VOLCANOES

Father Selga was interested in the eruptions of two other volcanoes besides Taal. One was Mayon, the other Canlaon. In September 1842 he completed his notes on Canlaon, a mountain which he himself had climbed several years before with a large expedition from the island of Negros.

On Mayon he prepared a work divided into two parts. The first part consisted of eight unpublished accounts of the eruption of 1814. He found these documents in the Government records, and he had them transcribed ready for publication by March, 1942. The second part of the work consisted of notes on the eruption of 1928. These were gathered from the testimony of numerous tourists, observers, pilots, and others who watched the phenomenon from the highway between Legaspi and Libog. Had this work been printed, it would have filled 500 pages, copiously illustrated with photographs and charts.

#### REFUGE IN THE AUGUSTINIAN PRIORY

In June 1943 the Japanese troops seized the buildings of the Ateneo de Manila. They had previously seized those parts of the buildings which had been occupied by the Manila Observatory. The community of over 400 persons that had been gathered in the Ateneo campus in wartime concentration, consisting of priests, scholastics, seminarians, employees, and the many persons who had lost their homes during the bombing, were all dispersed to diverse houses. Father Selga sought refuge in the Augustinian priory, where he was to reside for a year.

Father Selga's companion, an 84-year-old Spanish lay-brother who had just risen from a sick bed, remarked on the way to the priory: "I have no other pair of shoes than the ones I have on; but this will last me until I die." The prediction

was soon fulfilled. The lay brother had a relapse and was taken to the Spanish Hospital of Santiago in San Pedro Makati, where he died not long after.

But Father Selga remained in the Augustinian priory, very much at home among his fellow Spaniards. He was particularly happy to be in a house which contained a remarkable library of old and valuable books. He has left behind an account of the peace and joy he felt in that quiet haven in the enemy-occupied city. "What peace and what comfort in entering the Augustinian house, and saluting those venerable men whose lips were incapable of saying anything other than kindly words..."<sup>19</sup>

He busied himself in the Augustinian library, and likewise visited the Archives of the Manila Cathedral nearby, where he took note of the burial records of those who died during the earthquakes of 1645, 1771, and 1863. He likewise examined the records at the time of the Chinese uprising of 1640. He examined documents pertinent to the Corcuerra expedition to Mindanao and Jolo. He was also interested in records of the visit to the Philippines of the Apostolic Delegate Tournon, who was on his way to China.

Into this tranquility the Japanese burst one day, suggesting that the Augustinian priory would serve the Japanese troops very well for barracks. Father Selga saved the situation for the Augustinians by suggesting to the Japanese various considerations: 1) the priory was a religious house, a house of God, which the Japanese would be violating if they took it over. 2) The priory was owned by Spaniards, who were neutrals in the war. 3) The house and its cells were dark and humid, and therefore not suitable for soldiers.

#### THE TRANSFER TO SANTA ANA

On the 8th of July 1944 the Japanese Army rounded up all the remaining Americans in the city and herded them into the concentration camp in Los Baños. Among these were the Jesuit Fathers and Scholastics.

<sup>19</sup> Selga, "Trágico fin del Observatorio", third installment, "El Observatorio de Manila durante el período 1º de Julio de 1943 al 21 de Septiembre de 1944," pp. 16-17. (Bibliography, no. 245.)

Already, there were American Jesuits in the concentration camp at Santo Tomas University. Included among these was Father John F. Hurley, Superior of the Philippine Mission of the Society of Jesus. He was interned in 1943. Also interned in 1943, after several months of imprisonment in Fort Santiago, were Father Bernard Doucette of the Manila Observatory and two American lay brothers, Brother Abrams and Brother Bauerlein. Also interned at Santo Tomas was Father Vincent I. Kennally, now Bishop in the Marianas Islands, who at the time was Rector of the Sacred Heart Novitiate community and Master of Novices.

This community had to be evacuated from Novaliches at the outbreak of war, and after several peregrinations in Manila, was finally settled in relative peace in the retreat house called "La Ignaciana" in the district of Santa Ana in Manila.

When Father Kennally was imprisoned, his place was taken by Father Carroll I. Fasy, who filled the role of both Rector and Master of Novices. Assisting him as Minister of the House and as Socius (assistant) to the Master of Novices was Father Thomas Tuite. The education of the Jesuit junior scholastics was supervised by Father Joseph A. Mulry as Prefect of Studies.

In the round-up of July 8, 1944, Fathers Fasy, Tuite, and Mulry and all the other American Fathers at La Ignaciana were imprisoned and taken to Los Baños where they remained in concentration camp until liberated in 1945.

Before going into imprisonment in 1943, Father Hurley, the Mission Superior, had left sealed orders which were to be opened and to take effect in precisely such an eventuality as occurred on July 8, 1944.

On the evening of July 7, 1944, at supper, Father Selga came to the Jesuit theological students, who themselves had, two weeks previously, been driven by the Japanese to take refuge in one wing of the Augustinian Priory, and read to them the orders which Father Hurley had left behind.

According to these orders, Father Selga was appointed acting Rector of the Sacred Heart Novitiate community at La

Ignaciana. He was also appointed acting Master of Novices. His community at La Ignaciana consisted at the time of close to forty persons: novices, juniors, and brothers.

Appointed to assist him as Minister of the House and as Socius to the Master of Novices was Father Miguel A. Bernad. Appointed Prefect of Studies of the juniors was Father Horacio de la Costa. Fathers Bernad and de la Costa were scholastics, who had finished two years of theology and were within one year of their priestly ordinations.

Concerning this period of Father Selga's life, which lasted about eight months, from July 1944 until the recapture of Manila by the American forces in March 1945, Father Bernad gives the following account:

This was a very difficult period for Father Selga and for those under him. He was a very sick man. His health had been declining during the first two and a half years of war.

He had been a robust man before the war, with a very wide girth; the lack of food and vitamins made him shrink to a shadow of his former self. He had been a very cheerful man: he now became gloomy—and this was understandable, because the seizure of the Observatory by the Japanese preyed on his mind. His eyes were bothering him: he suffered both from glaucoma and from cataracts.

Through God's mercy he survived the war, and with better food and without responsibilities preying on his mind, he mended gradually. He was eventually sent back to Spain where he became almost a new man, though he never recovered the full use of his eyes. Upon his return to the Philippines, he obtained an indult to say daily the Votive Mass of the Blessed Virgin, since he could no longer read the Missal. With his restored health, he recovered his old cheerfulness. I remember, at the time of his 60th anniversary as a Jesuit, he rose to give a speech which he was no longer physically able to deliver. He did manage, however, to draw cheers when he asked the Rector, as a Jubilee favor to him, to give the Seminarians an extra movie.

#### RETURN TO SPAIN

In August 1946 Father Selga received an invitation from the Jesuit Provincial of Aragon to return to Spain. Father Riera and Perez, and Brother Arola Sala, Spanish Jesuit missionaries from Mindanao, had already returned to Spain. Father Selga would be equally welcome. He could recover his

health, and, if he so desired, he could help out at the Jesuit Observatory of the Ebro, whose new Director was Father Antonio Romafia.<sup>20</sup>

It was, however, not until 1947 that Father Selga was able to travel to Spain. He brought with him a statement from Dr. Edmundo Reyes of Manila, describing in detail his eye ailment, glaucoma and cataracts.<sup>21</sup> These received treatment from Dr. Ignacio Barraquer of Barcelona.

With his improved eyesight and very much improved health, he was able, while in Spain, to write his last important articles. Appropriately enough, they were about the Manila Observatory, and may be considered his literary testament. In six articles he described his work in the Manila Observatory, its seizure by the Japanese, and its total destruction during the Battle of Manila in February 1945. The six articles were given the general title: *Trágico fin del Observatorio de Manila* (Tragic End of the Manila Observatory). The series was published in *Iberica*, the journal of the Jesuit Observatory of the Ebro. (See Bibliography, nos. 243-48.)

#### RETURN TO MANILA

On returning to the Philippines from Spain, his eyes improved somewhat and his health improved considerably, Father Selga was assigned to live in San Jose Seminary in Quezon City, where he was given the position of student counselor to the young seminarians. His life was normally quiet, interrupted by illness during which he had to stay in the hospital. One of these visits to the hospital in 1951 lasted 21 days. In 1954 he had to spend two months at Novaliches to recuperate from an illness.

But he still found time to write one final article: some notes on Pope St. Pius X, which were published in three installments in the Dominican publication, *Boletín eclesiástico*, (see Bibliography, no. 242.)

<sup>20</sup> Father Cándido Mazón, S.J., to Selga, from Sariá, Barcelona, August 27, 1946.

<sup>21</sup> Dr. Edmundo Reyes to Dr. Ignacio Barraquer, dated 1947 (no month or day).



In June 1955 he celebrated his Jubilee of 60 years as a Jesuit. The occasion was celebrated at San José Seminary, attended by the Seminarians and a large number of Jesuits. By the end of that year his health was rapidly declining. And on April 23, 1956 he rendered his soul to his Creator. After a requiem Mass at San José Seminary, his body was brought to the chapel of the Ateneo de Manila on Padre Faura Street where he had worked for so many years in the Observatory. Many friends came to view his remains, and many messages of condolence were received, including one from President Mag-saysay, another from the Philippine Historical Society, and another from the National Research Council.

He was buried at Novaliches in the little cemetery of the Jesuit Novitiate.

#### HONORS RECEIVED BY FATHER SELGA

During his lifetime Father Selga received many tokens of esteem and respect from his fellow scientists and from others in the academic and cultural world. Some of them may be listed here:

1. In 1929 the German Consul in Manila gave a banquet in his honor, at which the Medal from the Society of Arts and Sciences of Hamburg was conferred on Father Selga. This was given in recognition of the services rendered by Father Selga to the German Astronomical Delegation that had come to the Philippines in 1929 to observe the total eclipse of the sun.<sup>22</sup>

2. In 1940 he was awarded the *Encomienda* of the Order of Isabel la Catolica by the Government of Spain. (April 4, 1940.)

3. From the United States Government he received the Medal of Freedom after the War. (February 7, 1947.)

4. He received a Citation and Diploma of Merit from the Philippine Historical Society for his contribution to the study of Philippine history. (March 9, 1951.)

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<sup>22</sup> See *Cultura Social*, Manila, 1929, p. 620.

5. From the Philippine Meteorological Society he received an Award of Distinction in the field of Meteorology. (December 11, 1954.)

6. From the Philippine Women's University he received the degree of "Doctor of Science", *honoris causa*, in 1955, and "Special Award" for the greatest merit on February 19, 1955.

7. From the UNESCO, a few months before his death, he received a Citation for Achievements in Science. (February 23, 1956.)

During the two-year period from 1925 to 1927, he was appointed professor at the University of the Philippines, giving lectures in astronomy and meteorology. His appointment to that post was announced to him by the University President, Rafael Palma, in a letter dated October 6, 1925.<sup>23</sup>

That appointment may have been unique. Father Selga is probably one of the very few priests, if not the only one, ever to have been appointed to a professorship at the University of the Philippines.

Among the scientific congresses and conferences attended by Father Selga were those in Australia in 1923, in Japan in 1926, and in Warsaw in 1935. He was a member of various scientific societies. Among them were the American Astronomical Society, the Astronomical Society of the Pacific, the Franklin Institute, the Société Astronomique de France, the Società Sismologica Italiana and the Sociedad Astronómica de España y América, National Research Council of the Philippines, and the Geological Society of the Philippines.

In the Philippines Father Selga was among the founders and charter members of various scientific and cultural societies. One of these was the National Research Council. The first meeting of that body was held on May 29, 1934, with Father

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<sup>23</sup> Palma's letter is dated October 6, 1925. Selga's reply of acceptance is dated October 14. Selga's resignation was accepted by the Secretary of the University of the Philippines, Felipe Estella, in a letter dated June 6, 1927.

Selga presiding, in his capacity as Director of the Division of Physical and Mathematical Sciences.<sup>24</sup>

Of Father Selga's published articles and monographs, the vast majority were published in the journal of the *Sociedad Astronómica de España y América*, issued in Barcelona. On March 30, 1921 that Society sent him a testimonial of gratitude for his scientific contributions to the journal.<sup>25</sup>

These were some of the public testimonials in which the scientific and cultural world expressed its high esteem of Father Selga. But there were others also in humbler stations who felt gratitude to Father Selga. Among them were the thousands of people who looked to the Observatory for warnings of typhoons and other disasters.

There were also thousands whose fears he personally calmed in moments of crisis. Several testimonies exist in this regard among Father Selga's correspondence. For instance, a postal official in Alabat, Tayabas, wrote to Father Selga who had visited the place after a series of earthquakes in 1937:

Your presence and magnetic personality quieted the panic-stricken people. It was your having come here and explained fully and to the satisfaction of all, all the angles of the earthquake, that made the people come back to themselves.<sup>26</sup>

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<sup>24</sup> *Minutes of the First Meeting of the Division of Physical and Mathematical Sciences*, May 29th, 1934. Bureau of Science Building. Father Selga presiding. 10:30 a.m.

<sup>25</sup> The text of the resolution is given in the letter: "Tenemos el honor de anunciar a Vd. que la Junta Directiva de la S.A. de E. y A., en sesión celebrada el 11 del corriente mes tomó, entre otros, el siguiente acuerdo. Vista la nobilísima serie de trabajos científicos que el Rvdo. P. Miguel Selga, S.J. de Manila, va remitiendo a nuestro Presidente para publicación en la Revista de la Sociedad, cuyas páginas se han visto, durante estos últimos años, enriquecidas y avaloradas con ellos, esta Junta acuerda conste en x x Acta el sincero agradecimiento de la Sociedad hacia tan distinguido colaborador y consocio y desea expresar al mismo la simpatía con que ve su copiosa labor científica en pro de la Sociedad Astronómica de España y América." The letter, dated Barcelona, March 30, 1921, is signed by the Secretary General, F. Armenter, with the "visto bueno" of the President, José Comas Solá.

<sup>26</sup> Felipe Ortiz, official of the post office of Alabat, to Selga, September 13, 1937.

A similar letter was received from Guinobatan, Albay, thanking Father Selga for personally reassuring the people there that they had nothing to fear.<sup>27</sup>

The people of the little island (Isla Verde) in the channel between Mindoro and Luzon were similarly reassured in 1938. Popular rumor had spread of an imminent volcanic eruption in the island. To allay their fears, a group of mountain climbers were sent up the mountain to see for themselves that there was nothing to fear.

Not only the common people, but some important officials also were among those who expressed confidence in Father Selga's scientific work.

From Governor General Henry L. Stimson, Father Selga received a letter of thanks for sending to him, aboard the yacht "Apo", timely warning of an approaching typhoon. As a result, the yacht changed course and took shelter in Pagbilao.<sup>28</sup>

#### CONCLUSION

Father Selga's devotion to his work, and his loyalty to the Church and the Society of Jesus, were evident during all the years of his service in the Philippines.

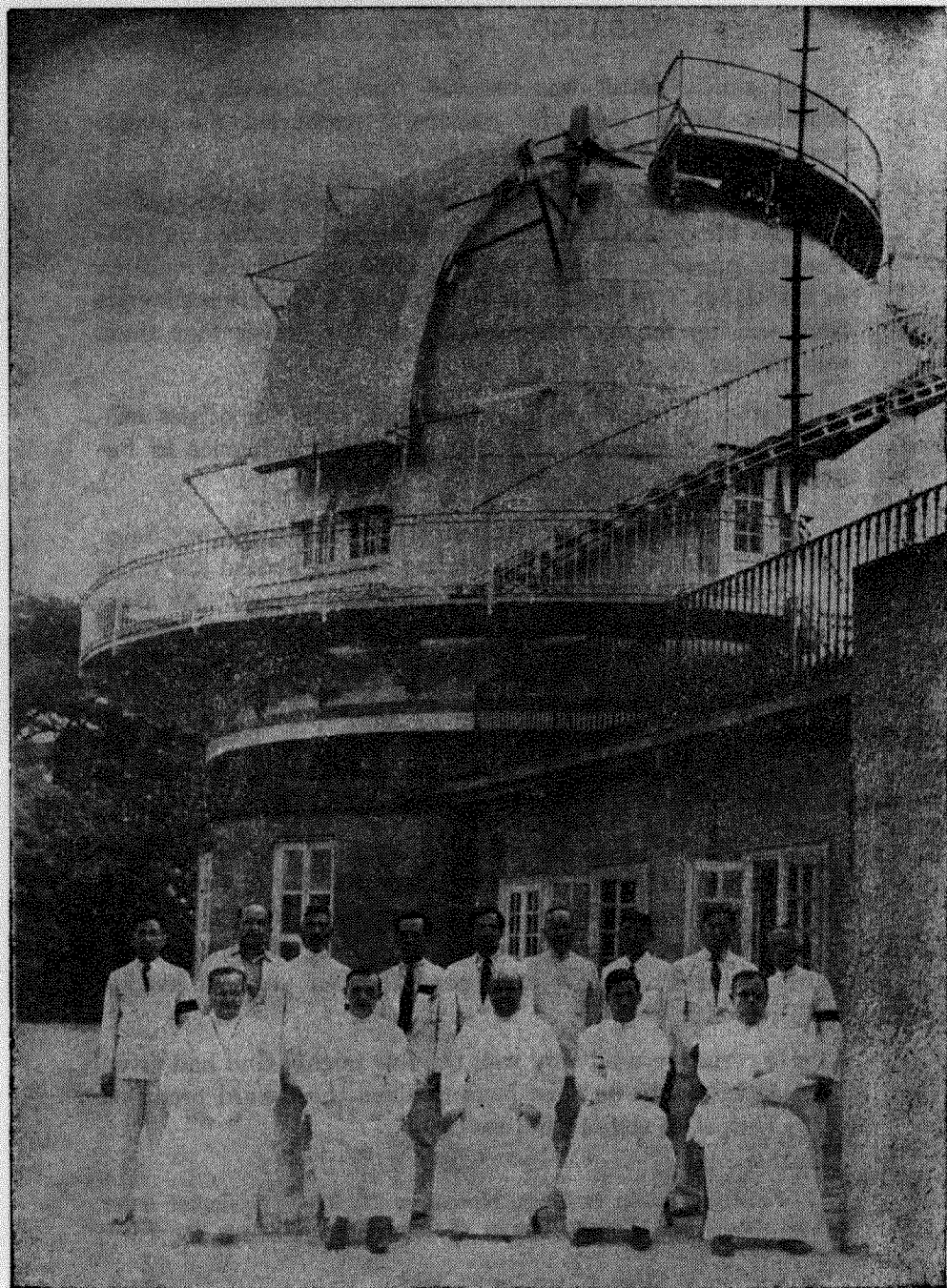
One final manifestation of this devotion was his decision to return to the Philippines when already in failing health. In 1947 when he returned to Spain, his health was greatly improved. He could have stayed on in Spain. He preferred to return to the Philippines and spend the last years of his life in this country.

He certainly used very well the five talents God had given him. At his death he must have received the reward promised in the Gospel to the faithful servant.

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<sup>27</sup> Faustino Rañola to Selga, November 22, 1934. A similar letter was received from Mariano Ramos of Candelaria, Tayabas, dated November 27, 1934.

<sup>28</sup> Stimson to Selga, November 23, 1928.



THE STAFF OF THE MANILA OBSERVATORY IN 1941

PUBLICATIONS OF FR. MIGUEL SELGA, S.J.

I. Scientific papers published at the Manila Observatory (Manila, Bureau of Printing):

- 1 Astronomical and Meteorological Conditions of the Eclipse of the Sun, May 9, 1929, in the Philippines. 1928. 24 pp., 4 plates, 1 map.
- 2 The Sunshine of Manila. 1928. 22 pp., 2 plates.
- 3 The Evaporation of Manila. 1928. 15 pp. 1 plate.
- 4 The Intensity of Rainfall in the Main Cities of the Philippines. 1928. 17 pp. 2 plates.
- 5 The Intensity of Rainfall at Manila. 1928. 27 pp., 6 plates.
- 6 The Publications of the Observatory of Manila. 1928. 21 pp.
- 7 Hail in the Philippines. 1929. 20 pp., 1 fig.
- 8 Preliminary Report on the Weather at Tagaytay. 1930. 24 pp., 2 plates, 8 fig.
- 9 The Velocity of the Wind at Manila, Baguio, Iloilo and Cebu. 1931. 35 pp., 3 plates.
- 10 The Largest 24-Hour Rainfall in the World. 1932. 14 pp., 3 plates.
- 11 Weather Observations from Ships. 1932. 69 pp.
- 12 Preliminary Report on the Weather at Mantalongon. 1934. 35 pp., 7 plates, 9 photographs.
- 13 Observations of Rainfall in the Philippines. 1935. 289 pp., 118 plates.
- 14 Charts of Remarkable Typhoons in the Philippines, 1902-1934. 1935. 1 p., 12 plates.
- 15 Charts of Remarkable Typhoons in the Philippines, 1902-1934, Catalogue of Typhoons 1848-1934. 1935. 55 pp., 12 plates.
- 16 The Publications of the Observatory of Manila. Second edition, enlarged. 1936. 30 pp.

II. Official Publication of the Manila Observatory (Manila, Bureau of Printing):

*Volume One*

- 17 Historical Survey of our Knowledge of the Longitude of Manila. 1927. 26 pp. (No. 2)
- 18 The Eclipse of the Sun of June 20, 1629 at Manila. 1927. 8 pp. (No. 3)
- 19 The Introduction of the Gregorian Calendar in the Philippines. 1928. 13 pp. (No. 5)

*PHILIPPINE STUDIES*

- 20 Observations of the Brightness of Lunar Eclipses in the Philippines Prior to 1927. 1929. 19 pp. (No. 7)
- 21 Astronomical Observations Made in the Philippines Prior to 1927. 1930. 74 pp. (No. 8)
- 22 Meteorites in the Philippines. 52 pp., 2 plates. (No. 9)

*Volume Two*

- 23 The Philippines in the West and in the East. 1931. 31 pp. (No. 1)
- 24 The Severity of Summers at Manila. 1931. 31 pp. (No. 2)
- 25 Los Mapas de Filipinas por el P. Pedro Murillo Velarde, S.J. 1934. 132 pp. 2 maps. (No. 4)

*Volume Three*

- 26 Historical Notes on the Oceanography of the Philippines. 1931. 29 pp. (No. 1)
- 27 Windroses of Ideal Marine Stations in and near the Philippines. 1931. 23 pp. 10 plates. (No. 2)
- 28 Sea Surface Temperatures in the Philippines. 1931 81 pp. (No. 3)
- 29 Variation of the Temperature of the Sea with Depth in the Philippines. 1931. 13 pp., 2 plates. (No. 4)
- 30 Observations of the Salinity of the Sea in the Philippines. 1931. 11 pp. (No. 5)
- 31 Phosphorescence in the Philippine Seas. 1931. 7 pp. (No. 6)
- 32 Marine Deposits in the Philippines. 1931. 12 pp. (No. 7)
- 33 The Deepes of the Philippines. 1931 9 pp., 1 fig., 1 map. (No. 8)

*Volume Four*

(This volume was not available for inspection)

*Volume Five*

- 34 Los Terremotos de Enero de 1743 en Tayabas y Laguna de Bay. 1941. 28 pp. (No. 1)
- 35 Bibliografía del Temblor de San Andrés en Manila, 1941. 24 pp. (No. 3)
- 36 La Relación Oficial del Terremoto de 3 de Junio de 1863 en Manila. 1941. 20 pp. (No. 4)
- 37 El Temblor de 1863 y las Actas del Ayuntamiento de Manila. 1941. 11 pp. (No. 5)

- 38 **Indice y Breve Resumen de Documentos Relativos al Temblor de Manila del 3 de Junio de 1863.** 1941. 38 pp. (No. 6)

*Volume Six*

- 39 **Taal: Relación de Bencuchillo (Enviada para la Publicación el 23 de Julio de 1941).** *Manuscript.* (No. 1)
- 40 **Taal: Relación de Bencuchillo (Enviada a la Imprenta el 23 de Julio de 1941).** *Notes of previous article.* (No. 2)
- 41 **Relación de la Erupción del Volcán Taal en 1754, por un Padre Misionero Jesuita.** *Manuscript and Notes.* (No. 4)
- 42 **Notas sobre las Erupciones del Volcán Taal (1716-1881).** (Manuscript and notes sent to the printing press on 23 July 1941.) (No. 5)

III. *Special Articles in Revista de la Sociedad Astronómica de España y América.*

*A. Before coming to the Manila Observatory*

- 43 **Singularidad del Espectro de la Nebulosa N.G.C. 6514.** (Sent from Lick Observatory, California). 1914. Vol. IV, p. 120.
- 44 **Velocidad Radial de la Nebulosa de Andrómeda.** 1914. Vol. IV, No. 39, p. 122.
- 45 **Observaciones Espectroscópicas de la Nebulosa N.G.C. 4594.** 1914. Vol. IV, pp. 116-120.
- 46 **Descubrimiento de las Nebulosas de Gran Velocidad Radial.** 1915. Vol. V, No. 40, pp. 7-8.
- 47 **El espectro Secundario en los Sistemas Binarios Espectroscópicos.** 1915. Vol. V, No. 41, p. 17.
- 48 **Determinación de la Magnitud Absoluta de un Astro.** 1915. Vol. V, No. 41, p. 23.
- 49 **Espectro de la Nebulosa N.G.C. 1068.** 1915. Vol. V, No. 41, p. 24.
- 50 **El Mapa Celeste de Harvard.** 1915. Vol. V, No. 43, p. 59.
- 51 **Observaciones Espectroscópicas del Cometa 1914b (Ilatin-sky).** 1915. Vol. V, No. 43, p. 54.
- 52 **Funciones Numéricas, Estadística Estelar.** 1915. Vol. V, No. 43, p. 59.
- 53 **Tabla para Calcular la Corrección Diurna en el Estudio de Velocidades Radiales.** 1915. Vol. V, No. 42, p. 42.
- 54 **Serie Polar Norte.** 1915. Vol. V, No. 45, p. 90.



B. *After arriving at the Manila Observatory*

- 55 Nota sobre la Nebulosa N.G.C. 4594. 1917. Vol. VII, No. 52, pp. 7-8.
- 56 Nota sobre la Velocidad Radial y Rotación de la Nebulosa N.G.C. 4594. 1917. Vol. VII, No. 52, p. 8.
- 57 Nota sobre la Estrella Espectroscópica Doble Scorpii. 1917. Vol. VII, No. 52, pp. 8-9.
- 58 Aplicación de las Fórmulas de Florbes, Madsen y Spitaler a Manila. 1917. Vol. VII, No. 53, pp. 21-22.
- 59 Aplicación de la Fórmula de Liais a la Temperatura Media Anual del Archipiélago Filipino. 1917. Vol. VII, No. 53, p. 22.
- 60 Comparación de Varios Sistemas de Obtener la Temperatura Media Diaria. 1917. Vol. VII, No. 53, pp. 23-24.
- 61 Uniformidad de la Temperatura en Manila. 1917. Vol. VII, No. 56, pp. 71-73.
- 62 Intensidad de la Gravedad en Manila. 1917. Vol. VII, No. 57, pp. 85-88.
- 63 Observaciones Meteorológicas a Bordo de un Submarino. 1918. Vol. VIII, No. 59, pp. 15-17.
- 64 Longitud del Péndulo de Segundos en Manila. 1918. Vol. VIII, No. 59, pp. 17-19.
- 65 Valores de los Elementos Meteorológicos de Manila en Unidades C.G.S., 1918. Vol. VIII, No. 60, pp. 35-36.
- 66 Transmisión Radiotelegráfica de las Señales Horarias del Observatorio de Manila. 1918. Vol. VIII, No. 61, pp. 57-58.
- 67 Longitud Geocéntrica y Radio Vector de Algunos Puntos del Archipiélago Filipino. Vol. XVIII, No. 61, pp. 58-60.
- 68 Un Catálogo Antiguo de Estrellas Astrales. Vol. VIII, No. 63, pp. 84-90.
- 69 Observaciones de Nova Aquilae-Serpentis. Vol. VIII, No. 63, pp. 90-91.
- 70 Principales Códices y Ediciones del Almagesto. Vol. XI, No. 64, pp. 7-10.
- 71 Tercera Serie de Observaciones Fotométricas de Nova Aquilae 3 en Manila. Vol. IX, No. 64, pp. 12-13.
- 72 Una Nueva Investigación Espectroscópica de 6 Scorpii. Vol. IX, No. 65, pp. 22-26.
- 73 Nuevas Velocidades Radiales de 2 Orionis. Vol. IX, No. 65, pp. 27-29.
- 74 Nuevas Velocidades Radiales de E Orionis.
- 75 Segunda Serie de Observaciones Fotométricas de Nova Aquilae 3 en Manila. Vol. IX, No. 65, pp. 31-32.
- 76 Cuarta Serie de Observaciones Fotométricas de Nova Aquilae 3 en Manila. Vol. IX, No. 65, p. 33.

- 77 Quinta y Ultima Serie de Observaciones Fotométricas de Nova Aquilae 3 en Manila. Vol. IX, No. 65, p. 34.
- 78 Estrellas Binarias de Período Corto. Vol. IX, No. 66, p. 42.
- 79 Fotografías Astronómicas de larga Exposición. Vol. IX, No. 69, p. 91-92.
- 80 Temperaturas Urbanas y Suburbanas. Vol. IX, No. 69, pp. 90-91.
- 81 El Eclipse total de Sol de 17-18 de Agosto de 1868. Vol. X, No. 70, pp. 10-19; No. 71, pp. 43-47; No. 72, pp. 65-68; No. 73, pp. 79-82; No. 74, pp. 89-94.
- 82 El Aerolito de Ensisheim. Vol. X, No. 70, pp. 24-27.
- 83 La Curva de la Frecuencia de la Nubosidad de Baguio. Vol. X, No. 70, pp. 28-30.
- 84 Nuevas Unidades de Distancia Estelar. Vol. X, No. 70, pp. 30-34.
- 85 La Constante de la Gravitación Universal. Vol. X, No. 71, pp. 47-51.
- 86 Empresas que Alientan: Silencio que Deprime. Vol. X, No. 71 pp. 51-52.
- 87 Velocidad del Viento y de los Dirigibles. Vol. X, No. 73, pp. 83-85.
- 88 La Sequía de 1849 en Manila. Vol. X, No. 74, pp. 96-97.
- 89 Cometas en Filipinas. Vol. XI, Nos. 75, 76, 77, 78; pp. 3-8, 20-28, 33-37, 50-53, 68-70.
- 90 Ligeros Apuntes sobre el Temblor del 16 de Septiembre de 1852 en Filipinas. Vol. XI, No. 75, pp. 9-10.
- 91 Nota sobre los Cometas de los años 1300, 1349, 1362 y 1456. Vol. XI, No. 76, pp. 29-30.
- 92 El Baguio de 22 de Octubre de 1831 en Manila y Provincias Vecinas. Vol. XI, Nos. 77, 78; pp. 39-41, 57-59, 71-73.
- 93 El Eclipse de Luna del 27 de Octubre de 1920 en Filipinas. Vol. XI, No. 79, pp. 73-75 and Vol. XII, No. 81, pp. 3-5.
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- 252 *Jesuitas Botánicos en las Antiguas Misiones de Filipinas.*
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