

OUT OF OLD BOOKS

BY HELEN SAWYER HOGG

LE GENTIL AND THE TRANSITS OF VENUS, 1761 AND 1769

The eleven-year voyage of the French astronomer Le Gentil to the Indian Ocean to observe the transits of Venus in 1761 and 1769 is probably the longest lasting astronomical expedition in history. In fact, it is quite possible that, except for interplanetary travel, there will never be astronomical expeditions to equal in duration and severity those made for that particular pair of transits.

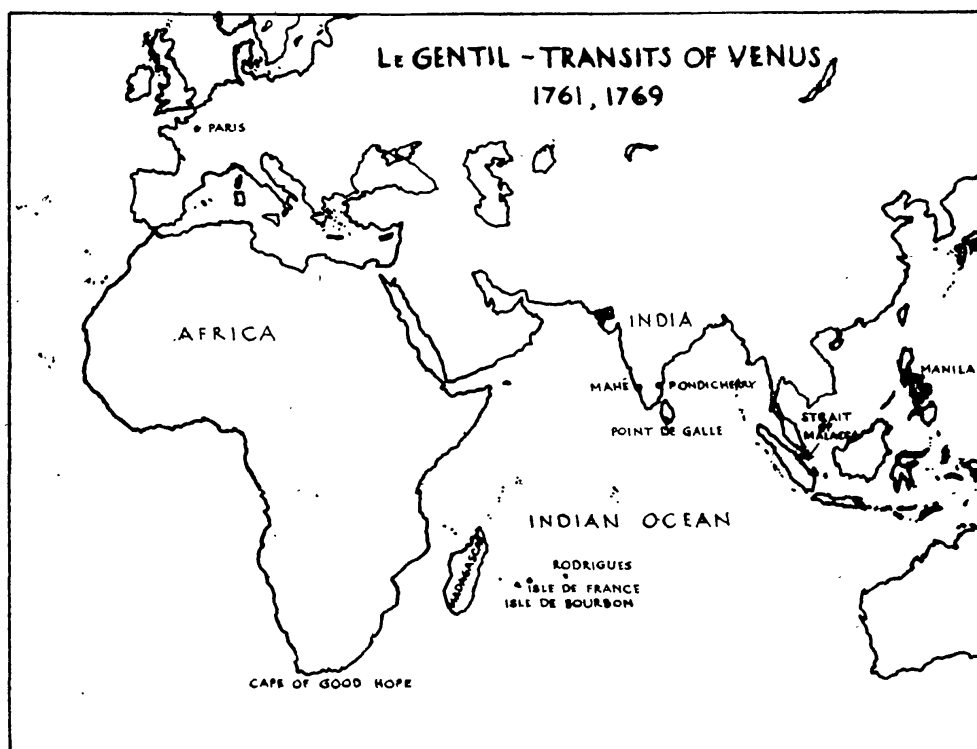
At that time the most important astronomical problem was considered to be the determination of the distance from the earth to the sun by observations of the transit of Venus. The astronomer Halley pointed out this fact in 1716, and urged that astronomers should be sent to distant parts of the world for these transits, which would occur after his death. Observations were needed over a wide range of latitude and longitude. We know now that there are more reliable means of determining the distance of the earth from the sun, so that transits of Venus are unlikely to assume again the importance they held at that time.

The expeditions for this pair of transits, however, constitute one of the most picturesque aspects of historical astronomy. We have already published in this column the experiences of William Wales who made, in 1768, the first astronomical expedition to the Canadian Arctic (this JOURNAL, Nov. 1947, May–August 1948). In the first of these articles we referred to the heart-breaking experience of Le Gentil who, for all his lengthy voyages, failed to achieve any useful observations of either transit. There is little information in the English language about his remarkable journeys. The brief remarks made in the volumes “Transits of Venus”, by R. A. Proctor, 1882, and Sir David Gill’s Introduction to his wife’s volume “Six Months in Ascension”, 1878, contain serious misstatements about Le Gentil’s trip.

Le Gentil himself published the account of his amazing voyage in two volumes totalling over seven hundred pages, in 1782, entitled “Voyage dans les mers de l’Inde fait par ordre du roi, à l’occasion du passage de Vénus sur le disque du soleil le 6 juin 1761, & le 3 du même mois 1769”. By means of a loan of these rare volumes

from Harvard University I have been able to follow Le Gentil's wanderings and studies in the region of the Indian Ocean. Le Gentil's death occurred during the upheaval of the French revolution, and his eulogy was published some years later by J. D. Cassini IV in 1810. I am indebted to the Library of Congress for the loan of this volume entitled "Mémoires pour servir à l'histoire des sciences et à celle de l'observatoire royal de Paris, suivis de la vie de J. D. Cassini, écrite par lui-même, et des Éloges de plusieurs académiciens morts pendant la révolution". A study of these two works, besides giving the background of Le Gentil's expedition, also clears up false impressions created by the above-mentioned English references. He did not, as they state, stay eight years in Pondicherry studying the astronomy of the Brahmins. He was in Pondicherry only two years, and Indian astronomy was only one of his many pursuits there.

By means of excerpts which Miss Sally Hogg and I have translated from these two works, we can follow briefly the life of Le Gentil, and more fully some of the picturesque aspects of his eleven years of wanderings around the Indian Ocean. On the accompanying map, the places which Le Gentil visited are indicated. We translate the account of his early years as given by Cassini.



EULOGY OF M. LE GENTIL

Guillaume-Joseph-Hyacinthe-Jean-Baptiste Le Gentil was born at Coutances, Sept. 12, 1725. His father, a not very well-to-do gentleman of Normandy, nevertheless knew how to make sacrifices to procure a good education for him. . . .

After having made his first studies at Coutances, the young Le Gentil left his province and came to Paris. Not knowing at first to what career he wanted to commit himself, he began by studying theology and took the ecclesiastical garb. . . . M. Le Gentil kept the apparel of abbé only until the title of "savant" procured him a less equivocal esteem and existence.

The abbé Le Gentil, in pursuing his course of theology, had the curiosity to come sometimes to the Royal College to hear the celebrated Professor Delisle. The lessons of astronomy soon detracted from those of theology. The young man found it much more agreeable to spend the evenings in observing the heavens than to spend a part of the day on the benches of the school disputing vain arguments. He continued his new course, and distinguished himself to his illustrious professor, whose goodwill he knew how to merit. One of his friends having proposed to take him to the Observatory and to present him to MM. Cassini, he eagerly seized the opportunity to form a liaison so profitable to his budding taste for the science of the stars.

Jacques Cassini, then 71 years old and dean of the astronomers of the Academy, received him with that grace, that patriarchal good will which touched and won so easily the heart of a young man. The old man regarded as his children all those who wished to devote themselves to astronomy. Informed of the inclination of the young Le Gentil, he proposed to him to come to work at the Observatory under the direction of Cassini de Thury, his son, and of Maraldi his nephew; already members of the Academy of Sciences. . . .

In a few years the new astronomer became familiar with the use of the instruments, the most delicate observations, and the most difficult calculations. His zeal and his acquired knowledge opened to him the doors of the Academy of Sciences; he was received into it in 1753, and soon justified his nomination by a great number of Memoirs on different points of astronomy that he treated with a great deal of sagacity. Some years after, in 1760, there occurred a brilliant occasion to show a great zeal and a beautiful devotion for the sciences; M. Le Gentil did not let it escape him.

The epoch was approaching for this first transit of Venus on the sun, awaited for such a long time, which should finally decide a great question on the parallax and on the distance of the planets. This determination of one of the most important points of the system of the world had occupied for centuries astronomers who were not at all agreed amongst themselves. . . . Everybody appeared therefore to be interested in the preparation for the voyages which were to be carried out by the savants of all nations, to go to different points of the globe to observe the passage of Venus on the disk of the sun, which was to take place June 6, 1761. Everyone was most thankful to the courageous men who were consigning themselves to these distant journeys; and everyone formed for their success wishes as ardent as those which formerly accompanied the departure of the expedition of the Argonauts. . . . M. Le Gentil solicited and obtained the honor of being in the number of voyageurs proposed by the Academy and named

by the Government. The abbé Chappe was destined for Siberia; the abbé Pingré, for the Isle of Rodrigues; Mason, for the Cape of Good Hope, and Le Gentil, for Pondicherry.

In order to get to Pondicherry, a French possession on the south-east coast of India near the tip, Le Gentil had to take the long route around the Cape of Good Hope to the Isle de France, now called Mauritius, where he would hope to contact a vessel bound for India. He had a choice of two vessels of the East India company ready to sail for the Isle de France, and chose the *Berryer*, of fifty cannon. The Duke de la Vrilliere had given the East India company very definite orders for Le Gentil's passage to India. He embarked on the vessel the 26th of March, 1760, and arrived at the Isle de France the 10th of July. He makes little comment on his voyage to this island, but we are led to infer that his first sea trip was not completely pleasant when he remarks, apropos of a trip some years later, "Sea voyages no longer cost me anything, I had become so familiar with this element."

At the Isle de France he learned that war had flared up in India between the French and the British, and that he would have considerable difficulty getting there. Too, the season was approaching when the north-east monsoon forced the vessels to sail by a long and tedious route. There was no vessel bound for India from the Isle de France. As Le Gentil waited there during the summer and fall he became afflicted with a type of dysentery which led him to fear that even if a ship sailed, he might be unable to go. For some time he toyed with the idea of going to the island of Rodrigues a hundred leagues to the east, where M. Pingré was to observe the transit.

Just as he was making preparation to go to this island, a frigate arrived from France on February 19, 1761, bearing news of the utmost importance for India. This determined the governor and the commander-in-chief of the naval forces to despatch a frigate to India immediately. Everyone assured Le Gentil that even in the contrary season a frigate like the *Sylphide* would make the passage from the Isle de France to the coast of Coromandel in two months. Le Gentil left the Isle de France on this frigate the 11th of March, and left the Isle de Bourbon, now Reunion, the 23rd of the same month. As long as they were in the control of winds from the south-east they made thirty to forty-five leagues a day, but when

they entered the region of the monsoons, at latitude 7 degrees south, the favourable wind abandoned them and the north-east monsoon blew them directly opposite to the route they wished.

In this way we wandered around for five weeks in the seas of Africa, along the coast of Ajan, in the Arabian seas. We crossed the archipelago of Socotra, at the entrance to the gulf of Arabia. We appeared before Mahé, on the coast of Malabar, the 24th of May; we learned from the ships of this country that this place was in the possession of the English, and that Pondicherry no longer existed for us. Without stopping further, we set sail. I would not yet have despaired if we had followed our first object to go to the coast of Coromandel; but they made, to my great regret, the resolution to return to the Isle de France. Nevertheless we did hesitate about twenty-four hours at Point de Galle, island of Ceylon; the Dutch there confirmed the news that we had learned at Mahé.

The winter at Galle was in full force; we went through a hard time. We left this coast the 30th of May; the great breeze with which we were accompanied took us to the Isle de France the 23rd of June.

I shall not enter here into greater discussion about this expedition, of the route that I had thought that we would take, and that which we did take. . . . This memoir which is only an extract from my journal which I kept quite regularly day by day shows that I busied myself as I ought with my observations, that my aim was always to go to the coast of Coromandel and that I should not be blamed if I did not appear there; it is a justice which I beg astronomers to do me and which I will have reason to expect from them when they see the details of my memoir. On June 6 I was at 5 degrees 45 minutes of south latitude, and almost 87 degrees 15 minutes of longitude east of Paris. I observed as best I could the transit of Venus, its beginning and end. This observation which I neither published nor calculated has remained as it was made with remarks in a sealed memoir of which I spoke above.

One can imagine the feeling of complete frustration that Le Gentil must have had, to have sailed thousands of miles and spent over a year only to be turned back from land when he was but a few hundred miles from his goal. Although he saw this first transit, his observations, made from a moving ship with uncertainty in the position and the time, could be of no value.

Though he failed to get useful observations of the transit, he was determined to bring back scientific knowledge of the places he was visiting. He was particularly interested in accurate mapping and determination of latitude and longitude, and states

It is known that geography owes its actual perfection to the progress which astronomy has made during the last fifty years, and for that reason astronomers must be regarded as the true geographers. . . .

Before going back to Europe I should have liked to go to visit the archipelago which is north of the Isle de France and to determine its position; I wanted to do

the same thing along the east coast of Madagascar, an island which we frequent a lot and of which we know very little. This work which required several years' stay in these seas compensated me to some extent and made me wait for the transit of Venus in 1769, the sole and last transit that the present generation could hope to see. I resolved then not to leave the Indian Ocean until this time, to make all the observations that I could on geography, natural history, physics, astronomy, navigation, winds, and tides. I was unable to visit the archipelago to the north of the Isle de France; but I made several voyages to Madagascar. I began with Fort Dauphin where from the time of M. de Flacourt we had had an establishment whose remains I still saw in 1761. I was singularly struck, to say so in passing, with the beauty of this island and the fertility which it appeared to have in comparison with the Isle de France.

The provisions are excellent at Fort Dauphin: fish are very abundant and very good, poultry the same; the beef offends only because it is too rich; it causes many people a very dangerous sickness of which M. de Flacourt speaks in his history of Madagascar: he tells at the same time of the means to avoid it. It was with this sickness that I was attacked three or four days after my return to the Isle de France because I had not used the methods set forth by M. de Flacourt. This sickness was a sort of violent stroke, of which several very copious blood-lettings made immediately on my arm and my foot, and emetic administered twelve hours afterwards, rid me quite quickly. But there remained for seven or eight days in my optic nerve a singular impression from this sickness; it was to see two objects in the place of one, beside each other; this illusion disappeared little by little as I regained my strength. . . .

For the next few years Le Gentil stayed at the Isle de France, from which he made numerous excursions to Madagascar and the Isle de Bourbon. He made a map of the east coast of Madagascar which he states to be much better for navigation than any existing map; he studied the customs and garb of the people there, as well as much natural history. He carried on many observations of refraction, of the winds and the monsoons.

These different occupations had led me up to the year 1765. It was time then to think of the second transit of Venus. . . .

After having calculated this transit for India, for Manila, for the Mariana Isles, Mexico, and finally for Europe, I saw that evidently the Mariana Isles and Manila were the sole spots east of Paris the most advantageously placed; not that one could observe at Manila or at the Mariana Islands a greater difference in parallax than on the coast of Coromandel, but because the elevation of the sun above the horizon at the moment of the egress of Venus was to be very great, and would give by this means more hope of succeeding than one could hope for on the coast of Coromandel, where the sun was to be quite low at the moment of the egress of Venus. I knew that the coast of Malabar was then plunged into the most frightful winter; I thought that for this reason it was useless to think of Malabar. I therefore did not waver in making up my mind and in searching for

means of going to Manila. The execution of this plan was not difficult by taking the route to China; because the ships of the India company which passed by the Isle de France to go to China would have taken me as far as there; and from Canton to Manila one finds opportunities every year. All that would still have made a little trouble however, from which I was rescued by the most fortunate event; it was the warship the *Bon Conseil* from his Catholic Majesty, with sixty-four cannon, which was going from Cadiz to Manila and which various circumstances forced to put into port at the Isle de France.

I soon became acquainted with the captain Don Juan de Caseins, through Don Juan de Langara, one of the first officers of the ship. I had seen M. de Langara in Paris. When he knew my plan, he very obligingly offered me passage on his ship. This opportunity appeared so good to me that I did not hesitate to accept it. . . .

I finally left the Isle de France May 1, 1766, quite resolved to say good-bye forever to that island; and indeed I had conceived the plan of going back to Europe by way of Acapulco, and thereby finish my trip around the world; but I had not foreseen what was to happen to me at Manila, and that a last adventure had destined me for the Isle de France. We arrived at Manila August 10th. Our voyage was rather long; it had its difficulties and its wearinesses.

Don Juan de Caseins introduced me to the governor of Manila in the letter in which he informed him of our arrival. August 13th, four days afterwards, I went down with M. de Caseins and I went to see the governor to whom I gave a letter of recommendation which had been given to me by M. Desforges, governor of the Isle de France.

We were anchored at Cavité, the port of Manila, about three leagues from that city. We found in this port a little vessel with three masts ready to sail for the Mariana Islands. Although the voyage which I had just made had quite tired me and I needed a little rest, I forgot when I saw this ship, all the fatigues which I had just undergone, and I wanted only to go aboard in order to pursue my course to the Marianas. . . . M. de Caseins, to whom I had promised before his departure from Manila to determine the longitude of the city, was the reason that I took no serious steps to embark. He had assured me that I should not lack opportunities to go to these islands by embarking on one of these galleys, and that he would recommend me for that to the governor. Therefore I abandoned for the moment the project of the Marianas. It was a great piece of good fortune for me; for the ship and everything in it perished when it was going out of the Strait of the Philippines to enter the south seas. It is true that only three or four people were drowned, those who were the most eager to save themselves, which is what almost always happens in shipwrecks. I cannot answer that I would not have increased the number of persons eager to save themselves; but I would have lost all my journals and my astronomical instruments, an irreparable loss for me.

After we had acquitted ourselves of a vow which Don Juan de Caseins had made when approaching the Philippines, in bad weather, with which we were troubled for seven days, my first care was to determine the longitude and latitude of Manila. . . .

I became acquainted with Don Estevan Roxas y Melo, and with Don Andres Roxo. The elder Melo was a native of Lima, and canon of the cathedral church of Manila; he was a very inquisitive man, learned, having studied, keen on books and mathematical instruments. The Peruvians have excellent qualities of heart and are very good friends. Don Estevan Melo did me the greatest services during my stay in Manila. Don Andres Roxo was Mexican; he had come to Manila with his uncle Don Manuel Antonio Roxo, Archbishop of Manila; he was his secretary. . . . I divided my time between the house of Don Andres Roxo and the house of Don Estevan Roxas y Melo. Our intimacy has lasted even until now. I have received regularly every year since my departure from Manila news of these two friends; the last told me that death had carried off one of the two, Don Estevan Roxas y Melo.

Manila is without contradiction one of the most beautiful countries in the seas of Asia; the climate is excellent there, the soil is of the greatest fertility. The Philippines have fifteen or sixteen fine ports, and they are covered with the finest woods for building. At Cavité I saw some of these woods which were of a huge size, and a table in the sacristy of the Jesuits in Manila which was eleven feet in diameter and proportionately thick; it was made of a single piece drawn from the trunk of one of these trees. This table is at present in Spain; M. de Caseins took it to the king. . . .

The wood called *tindalo* is one of these fine kinds of wood; it is of a dark red, ferruginous, solid, and very heavy; it is capable of being very finely polished which makes it shine like a mirror; this wood does not warp nor spoil. Don Estevan y Melo had made from this wood expressly for me a table with a rim and folding stool with which he presented me two weeks before my departure from Manila. This table was twenty-two inches broad and twenty-eight long and made of a single board, and it gave me so much pleasure through the beauty of its wood that I regretted using it on ship. I wrapped it up as best I could, and I brought it with me to Paris where it arrived in a very good state, and where I keep it as a curious piece of furniture and as a monument which always recalls to me with pleasure the memory of so true a friend as Don Estevan Roxas y Melo.

(To be continued)

OUT OF OLD BOOKS

BY HELEN SAWYER HOGG

LE GENTIL AND THE TRANSITS OF VENUS, 1761 AND 1769

(cont'd from January-February issue)

Le Gentil had arrived at Manila August 10, 1766, all ready to begin his preparations for the transit of 1769. After some months there, however, doubt began to assail him that this was the best place for his observation. The circumstance which finally decided him to leave the Philippines and go to Pondicherry to observe the transit was the attitude of the Spanish governor. The governor was not kindly disposed to the French, and actually was such a tyrannical character that two years after Le Gentil's departure he was arrested, and died in prison.

Before leaving the Isle de France May 1, 1766, Le Gentil had written to France for letters of recommendation from the Court of Spain to the governor of the Philippines, since in these islands he would be venturing upon foreign soil and possible hostility. When on July 10, 1767, Le Gentil received replies from France to his letter and showed them to the governor, the latter said that a year and two months was too short a time for a reply to be received from France, and that therefore the letters must be forgeries!

July 10, 1767, I received an answer to the letters which I had written to France the preceding year, 1766, before my departure from the Isle de France; these new letters came through Mexico and Acapulco in the galleon the Saint Charles. I was told of letters of recommendation from the Court of Spain. M. le duc de Chaulnes, with the consent of M. le duc de la Vrilliere, took all necessary steps so that the matter would not languish. My letter found the illustrious M. Clairaut dead; M. de la Lande did not neglect taking an interest in this new enterprise. It was not possible to expect more speed by sea; there was not a single moment lost; hence the governor of Manila, to whom I showed them, a restless man, of evil intentions to the French in general, regarded me in Manila with a jealous eye, collected the times of all my letters and of my departure from the Isle de France, those of the departure of M. de Caseins from Manila. He made a combination of all these times and he concluded that I could not yet have received any answer to my letters, and that those which I had shown him were necessarily forgeries. . . .

This odious and injurious suspicion caused me a good deal of sorrow, and gave me also some worry for the rest of the time which I had still to remain in Manila.

. . . M. de la Lande pointed out to me at the end of his letter that M. Pingré had read at the Academy a memoir in which he complained that I was going too far: he would have wanted me to return to Pondicherry; to the others it was all the same, according to M. de la Lande, whether I remained at Manila or whether I returned to Pondicherry and he told me that I could decide as I wished. I had a great deal of time before me to make up my mind again and to go to the coast of Coromandel.

When I had reflected well and calculated the inconveniences of the two coasts I decided to leave for Pondicherry. The climate of Manila was the only thing which swayed me a little. . . . I considered, I said, that I was running very great risks by staying at Manila; that I was exposing myself not only to the risks of cloudy weather on the day of my observation, but also to the caprice of him who governed. I saw that the governor acted despotically and tyrannically in everything; I saw that, in this distant country, reasons would not be lacking to arrest a man in the course of the most serious and important affairs; I had very striking examples of this before my eyes which would be too long to relate here. . . .

I decided to go in search of a free country since I could choose to do so. Sea voyages no longer cost me anything, I had become so familiar with this element. I wrote to M. le duc de Chaulnes and to M. de la Lande that I should be at Pondicherry in time for the transit of Venus; . . .

When these preparations were finished I used the opportunity of a Portuguese ship from Macao: this vessel had come from Madras and it was returning there. We sailed February 2, 1768, at six o'clock in the evening by a little breeze from the south-east; but our vessel, badly loaded, could not go two leagues without furling the sails; it even went down quite considerably although having only its four lower sails; and although the wind was quite good we were obliged to put about and to go back and anchor at Manila.

Three days later this vessel again got under way, and Le Gentil had a good journey on it, reaching Malacca February 18th and Pondicherry itself after only thirty-two days' sailing. In a long letter to his friend Don Estevan y Melo, Le Gentil writes more fully about the actual happenings aboard ship than he does in other parts of the volume, and we reprint two of these incidents which give a vivid idea of sailing ships in those days.

We therefore sailed as you know February the 5th on the Saint Antoine, and I was on it by the grace of God so to speak, on a ship rather badly ballasted, and which had neither surgeon nor chaplain. We were at first led by a little breeze from the east, by which we passed the isle of Corregidor during the night. . . . Here I shall praise to you the vessel on which I was. For a ship built at Surate by Marates or Malabar Indians, that is to say, by people who do not understand the construction of the Europeans (they do not even bother themselves with it at all), it had very good qualities. It was a fine flute of about 500 tons, very well and very solidly constructed, but without having the grace which our new builders give to ours.

We arrived at la Viole at seven-thirty in the evening; it was night, the weather was not very clear, and the moon in its course did not lend us its light: we were between two equally redoubtable dangers: one is la Viole, the other a sand bank, on which there are several trees and which is not farther than a league and a half from la Viole. It was necessary to pass between the two, and it was night. I shall confess here to you that I was a little worried; not precisely because of the spot in which we were, because the passage which some sailors consider perilous is not so to every sailor; but in connection with a little dispute which arose between the captain and the first pilot.

To recount the affair to you exactly, you will suppose in the first place that in the ships of Macao the captains understand navigation not at all or very little; the first pilot alone is in charge of guiding the vessel, the captain must not meddle in it in any manner, he is only a figure-head in this regard; everything else depends on him. Unhappily for us our captain and our first pilot did not agree very well; it was this which was the cause of the little story which you are going to hear.

We were scarcely through la Viole when the captain cried from above the poop where he was, to the first pilot to make a manoeuvre (I do not remember what) of which the latter did not approve; the pilot answered rather brusquely that he would not do it, alleging that he was in charge of the conduct of the ship, that he knew what he had to do, and how it was necessary to navigate. The captain insisted, wanting, he said, to be obeyed. The pilot kept answering him in the same tone: finally the dispute became heated; the latter went into a passion and went and locked himself in his cabin, abandoning his ship to the pleasure of the wind.

I was on the poop taking the air with the captain when this scene took place. As our two men had spoken very quickly as is the custom in all disputes, and as I was not familiar enough with Portuguese, since moreover I was far from the pilot who was on the castle, I had lost a good deal of what was said; and I did not know the decision which our pilot had made. The captain did not stir from his place: so that I did not know the danger which we could run. I went down on the castle a moment after the scene; I looked for the pilot, I did not find him; I went to his cabin, he was in it but he was sulking, and nothing that I could say to him was capable of making him take up the helm again.

I went to find the Armenians and especially the supercargo, as they had a personal interest in the ship because they had freight and because it was returning loaded with piastres for their reckonings, I did not doubt that they would bring my man back to reason.

However, the ship kept on advancing. I took over here for the first time the office of pilot: while the Armenians flew to the cabin where he was and while they were entreating him, I went to the tiller to see if the steersman were not going away from his course.

The Armenians had frightful difficulty in getting the pilot out of his cabin; but when the Seigneur Melchisedek, with that great phlegmatic air which you know in him, had spoken to him about conscience, he finally succeeded in conquering his obstinacy. "*Hombre*", he said to him, (from what he told me a moment afterwards), "*tiene usted consciencia?*" "Are you a man who has any conscience?" He submitted at this word conscience, coming from the mouth of an Armenian,

and he resumed the conduct of the vessel. This pilot was a brusque and gross man, he became moody easily; otherwise it appeared to me that he understood this sort of voyage very well.

Near the coast of Malay and Pol Pinang the following incident occurred:

Our two first pilots and a passenger had gone to land in the ship's boat, incited by curiosity to see the island. They tried to get me to go to land with them; but my policy is never to quit my ship unless it is in a port or in a sure roads; although it was very fine weather when they descended, they could not persuade me to decide to go with them. How thankful I was for my resistance when I saw the bad weather and when I perceived all the horror of the condition to which the travellers were reduced! They had astonishing trouble in getting back on board ship: twice they arrived to take the route back from the island; it was darkest night, and there was a very heavy rain; they were led only by the waves of the sea which appeared all on fire. Finally the desire to sleep on board ship rather than pass the night on land without any shelter made them make a vigorous effort a third time. They finally gained shipboard at eight o'clock in the evening; we heard them a long time before seeing them; they shouted to us to throw them a mooring rope. Their repeated cries in the middle of the night, the bad weather, the noise of the sea, the efforts which they were making to come alongside, all that represented for me the picture of shipwrecked people. . . .

You see by this tale what Portuguese vessels are. I have never heard of a European vessel anchored in an open roadstead, in which there was so little discipline that the two first pilots could thus abandon their ship for a pleasure jaunt. Only the captain remained, and he was as little in condition to conduct his vessel as I am to lead an army, and for pilots, two old automatons to whom I would not have entrusted the conduct of a launch.

In spite of these somewhat harrowing experiences, Le Gentil considered his trip an excellent one, and concludes his account of the trip by saying:

It is not possible to have a more fortunate voyage than that. You will see by recapitulating all the dates reported in this letter that we took only thirty-two days sailing to go from Manila to the coast of Nagpatnam although we left Manila late: this passage is one of the finest which has been seen for a long time. As to the manner in which I was treated aboard the ship, the Saint Antoine, I cannot complain of it since the captain treated me as himself.

(To be continued)

OUT OF OLD BOOKS

BY HELEN SAWYER HOGG

LE GENTIL AND THE TRANSITS OF VENUS, 1761 AND 1769

(With Plate V)

(*Continued from March-April JOURNAL*)

The brief accounts of Le Gentil's trip in nineteenth century literature agree in a misstatement, namely that Le Gentil stayed eight years at Pondicherry. This error has been perpetuated in the works of Camille Flammarion, Richard Proctor and Sir David Gill, and we can only hope that by reprinting here the direct translation of Le Gentil's own statements we may correct this false notion permanently. It was not until March 27, 1768, that Le Gentil arrived at Pondicherry for the first time, after seven years spent at the Isle de France and on trips to the surrounding islands and to the Philippines, from which he sailed to Pondicherry.

On the 27th, at five-thirty in the morning, we sighted Pondicherry: we crowded sail toward it and at six-thirty we anchored a half league from land: . . .

When we were anchored, a little boat was sent to us from land, in which I embarked with all my possessions and astronomical instruments of which you know. It was therefore on March 27th [1768] at nine o'clock in the morning that I saw myself on the land which fate had marked for me. My first step was to present myself to the governor. . . . M. Law therefore gave at once the order to disembark my possessions and to be careful of them; he had me get into his open carriage with him and took me to his country house where I found a large and pleasant company, good music, and an excellent dinner. I spent the day in enjoying myself and at eleven o'clock in the evening I returned to Pondicherry with the governor. The next day he told me to go to look for a site to build an observatory for myself: he himself went with the chief engineer to reconnoitre the spot which I had pointed out, and ordered that masons be sent there at once.

Such is, dear friends, the fate which awaited me at Pondicherry and which I owe to M. Law, governor general for the King of all the French establishments in India. Under his auspices I enjoyed at Pondicherry that sweet peace which is the support of the muses; I occupied myself in the midst of this peace in devoting happy moments to Uranus; with my soul content and satisfied I await with tranquillity until the approaching ecliptic conjunction of Venus with the sun comes to terminate my academic courses.

In Volume II Le Gentil gives a description of his observatory. Plate V is a reproduction of the original drawing of the observatory (HI).

As we read his description we wonder if he is the only astronomer who ever pursued his labours tranquilly above sixty thousand weight of powder!

On the ruins of the citadel were seen the remains of the magnificent palace built by the late M. Dupleix; there were two great pavilions partly upset or destroyed, which had been built on strong walls twelve to fifteen feet high and on a vault six to seven feet thick. All this excellent masonry of brick, of limestone, and of sand, had resisted the effects of the gunpowder and was quite whole and quite solid; but the pavilions were partly fallen. I went to visit the remains of these pavilions; I looked at the most easterly, that which appeared to me in best condition, the most suitable to my plan, and which at the same time demanded the least in the way of expense to make a comfortable observatory of it; besides, under the vault which sustained the remains of the other pavilions was one of the powder magazines; it is true however, that the basement of my observatory served also, in the end, for over six weeks as a magazine for more than sixty thousand weight of powder. In spite of that, since M. Law had given me the liberty of inhabiting my observatory, this circumstance did not interrupt the course of my observation.

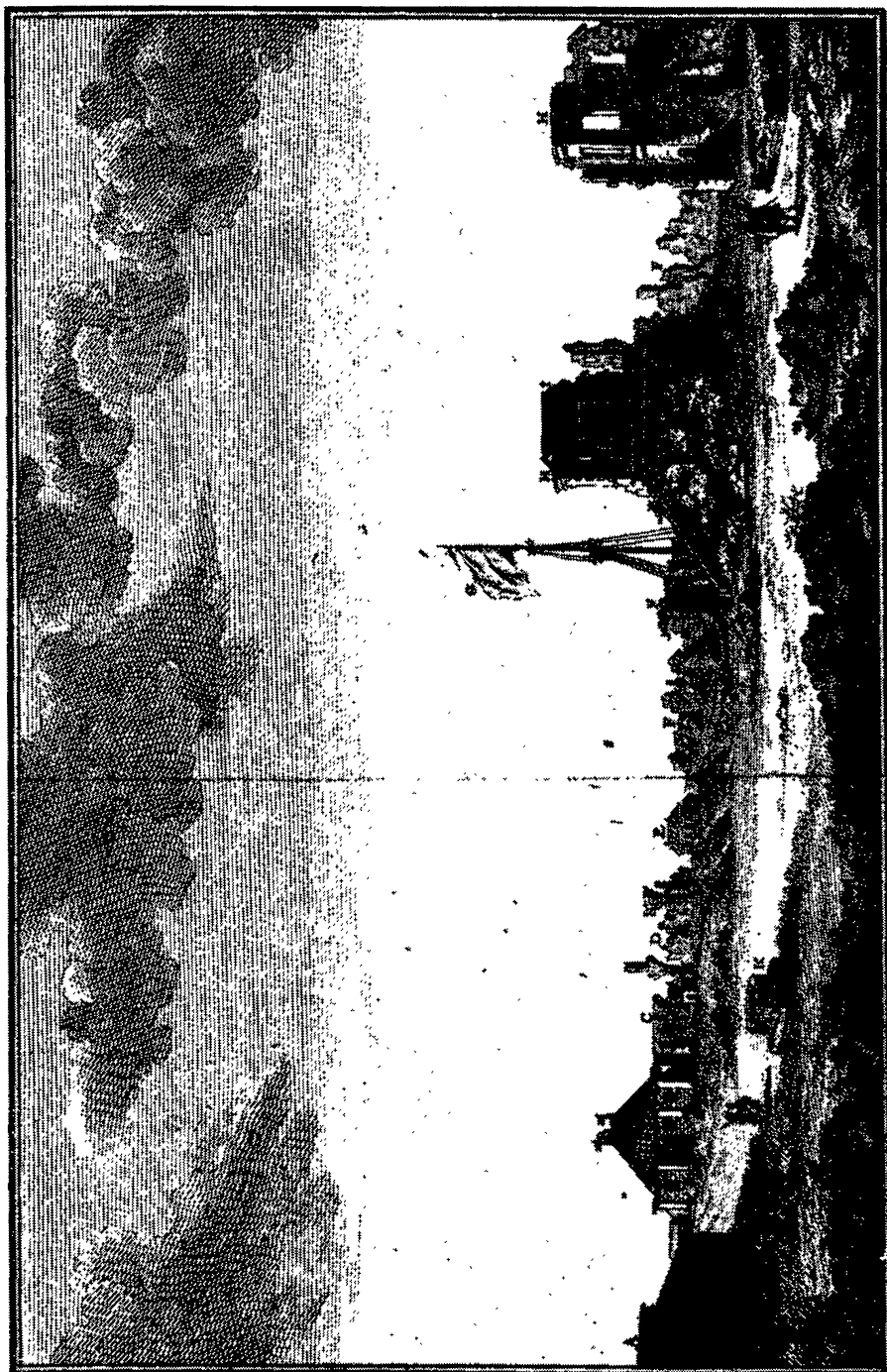
I gave an account of my examination to M. Law: he took the trouble of going to that place some days afterward accompanied by the chief engineer; he gave the necessary orders, and they began on April 18th to build the observatory on the plan I had asked for. But the great rains held up the work for several days: it was not finished until May 24th. June 11th the doors and windows were finished and put in place, and I went to take possession of the observatory; I had my instruments and my belongings transported there; it was my dwelling and my retreat during my stay at Pondicherry; I was more in touch with my work there.

As soon as I was in possession of a proper place for observing I worked at cleaning my quadrant and my clocks; and July 14th I was in a position to take the corresponding heights of the sun. My first care was to fix in a more precise manner than had ever been done previously the latitude and longitude of Pondicherry.

Another type of work appeared very interesting to me: I had begun it at the Isle de France, I finished it at Pondicherry in 1768; it is an account of the monsoons, and an examination of the different routes which are to be followed when going from the Isle de France to India.

During his two years at Pondicherry Le Gentil made a study of various aspects of Indian astronomy, and recounts in detail the native myths concerning eclipses and the behaviour of the people during them. The Brahmin method of calculating eclipses particularly intrigued him.

PLATE V



VUE D'UNE PARTIE DES RUINES DE PONDICHERY.

en 1769.

Le Gentil's Observatory is the building (HI) at the right of the flagpole.

I amused myself also during my stay at Pondicherry in making some acquaintance with the astronomy, the religion, the habits, and the customs of the Indian Tamouls whom very improperly we call Malabars.

What I had heard of their astronomy had piqued my curiosity; but what finally sharpened it was the ease with which I saw calculated before me, by one of these Indians, an eclipse of the moon which I proposed to him, the first which occurred to me. This eclipse, with all the preliminary elements, took him only three quarters of an hour of work. I asked him to put me in a position to do likewise, and to give me every day an hour of his time. He consented to it; and when I asked him in how much time I could hope to be in a position to calculate an eclipse of the moon according to his method, he answered me, with an air rather indicative of conceit, that with ability I would be able to do as much as he at the end of six weeks.

This answer did not rebuff me, it only made me still more curious. I bound myself to take for about an hour every day my lesson in Indian astronomy. Whether it was the fault of my master or whether it was mine, or whether it was that of the interpreters (I changed them three times), I needed more than a month of work at an hour per day to be able to calculate an eclipse of the moon, although the method has appeared to me since then very simple and very easy. The eclipses of the sun gave me much more trouble, because the calculation is much more complicated.

As to the exactness of this method, the agreement with observation has appeared to me quite singular in lunar eclipses; the error in several which I have calculated amounts to no more than 25 minutes of time.

. . . The Brahmins know nothing about comets: the Indians believe that they are a sort of sign of the wrath of the sky. They were quite astonished to see me spend part of the nights in observing the comet which appeared in 1769; they asked me many questions about the cause of this phenomenon. What finally surprised them was to see that comet again in the evening at the end of the months of October and in the first days of November, just as I had predicted to them as well as to all Pondicherry.

Although the Brahmins do not observe, they are able to trace the meridian line by the gnomon method; they use it every time that they build a pagoda, because their religion teaches that temples are to be oriented according to the four cardinal points; so that the four faces of the pyramids which serve as entrance and as portal to their pagodas, are exactly north and south, east and west.

Le Gentil finally received, a month before the transit, the letter from the King of Spain which he had requested for the governor of the Philippines. We reprint this letter just as it is given, as an impressive example of the high regard in which astronomers and their enterprises were held in court circles two centuries ago.

In the month of May 1769 I received from the Court of Spain the letter of recommendation which had been promised to me in 1767 for the Governor of Manila. This letter had gone around the world except for about five hours or 75 degrees of longitude. It had indeed left Cadiz, had gone to Mexico, from Mexico to Acapulco, from Acapulco to Manila by galleon, from Manila to Canton, from Canton to Pondicherry. . . . Here is the letter addressed to the governor.

“De par le roi. Au gouverneur & capitaine générale des isles Philippines, & président de l’audience royale de la ville de Manille: Le roi se trouve informé que sur le vaisseau de guerre *le Bon Conseil*, qui est sorti de Cadix en droiture pour ces isles (Philippines) en mars de l’année passée, s’est embarqué M. Gentil, membre de l’académie royale des sciences de Paris, à l’effet d’observer le passage de Vénus sur le disque de soleil, phénomène très-rare & qui importe beaucoup à la perfection de l’astronomie, & qu’il désire rester dans ce continent jusqu’en juin 1769, que doit se répéter le même passage de Vénus. Sa Majesté veut que ce particulier soit traité par V.S. & tous les autres officiers de ces isles, avec la distinction qu’il mérite, & qui convient à l’harmonie qui règne entre les deux couronnes, & que pour les observations qu’il voudra faire, on lui facilite tous les secours nécessaires pendant le tems qu’il restera dans ces isles. A cette fin, V.S. fera tout ce qui sera convenable; & de son côté, elle aura grande attention que la volonté de S.M. s’accomplisse.

Que Dieu garde V.S. beaucoup d’années! A Saint Ildephonse, le 2 août 1766.
Signé, Don Julien de Arriaga.”

Le Gentil gives a lengthy discription of the sky conditions at Pondicherry, especially of the time around the transit of June 3rd. The egress of this transit was all that was scheduled to be seen from Pondicherry, early on the morning of the 4th. Those astronomers, professional or amateur, who have spent months of work in preparation for some sky event, always with worry as to the arrival of clouds at the critical moment, can appreciate the description Le Gentil gives of the critical time of June 3-4.

The nights at Pondicherry are of the greatest beauty in January and in February; you cannot have any idea of the beautiful sky which these nights offer until you have seen them. I had nowhere seen Jupiter so well with my telescope of fifteen feet [focal length] as I did there; the stars had no twinkling: I have very often left my telescope exposed to the night air for several hours in a vertical position without the objective receiving the slightest dampness. The month of March is not so fine, in April the weather begins to grow dull; but June, July, August and September are not very suitable to astronomical observations; in these months you have scarcely anything except fine mornings. In October, November, and December you have the rainy season and the winter.

I was prepared for the transit of Venus on June 3, 1769. The English at Madras had sent me an excellent achromatic telescope three feet long and I was awaiting the moment of the observation with the greatest impatience.

During the whole month of May, until the third of June, the mornings were very beautiful; the weather was still of this same fineness the day before. At nine o'clock in the evening I observed with M. Law who was using the achromatic telescope, the emersion of the first satellite of Jupiter which we saw very well. . . .

Sunday the fourth, having awakened at two o'clock in the morning, I heard the sand-bar moaning in the south-east; which made me believe that the breeze was still from this direction, or at least that it would blow from there in the morning. I regarded this as a good omen, because I knew that the wind from the south-east is the broom of the coast and that it always brings serenity; but curiosity having led me to get up a moment afterwards, I saw with the greatest astonishment that the sky was covered everywhere, especially in the north and north-east, where it was brightening; besides there was a profound calm. From that moment on I felt doomed, I threw myself on my bed, without being able to close my eyes. I no longer heard the bar in the south-east, but in the north-east; it was another very bad omen for me. Indeed, when I got up a second time I saw the same weather still, the north-east was even more overcast.

At five o'clock the wind blew ever so little from the south-west: which gave me again a gleam of hope, all the more because the part of the sky from the south to the east was a little clear; I believed therefore that the breeze might turn in this direction, and that it might clear the sky. However, the north and the north-east were continually threatening; the clouds did not move, and I still heard the bar in the north-east, so that I was between hope and fear. But this state of uncertainty did not last for very long: little by little the winds passed to the west, to the north-west, and to the north; in less than seven or eight minutes the weather was obstructed, as it were, by the approach of a gust of wind; from the north the winds passed to north north-east, and north-east, where they were at about five thirty. Then they blew with fury; the great clouds which until then had been motionless in the north-east began to move. They soon spread out so that they formed a second curtain. Among several little gaps that they left between them could be perceived the upper layer of clouds which was pale and continuous, but quite sufficient to hide the sun if it had been the only layer. The ships which until then had not swung before the wind, were forced to do so: the sea was white with foam, and the air darkened by the eddies of sand and of dust which the force of the wind kept raising continually. This terrible squall lasted until about six o'clock. The wind died down, but the clouds remained. At three or four minutes before seven o'clock, almost the moment when Venus was to go off the sun, a light whiteness was seen in the sky which gave a suspicion of the position of the sun, nothing could be distinguished in the telescope.

Little by little the winds passed to the east and to the south-east where they were at nine o'clock for a little while; the clouds brightened, and the sun was.

seen quite brilliant; we did not cease to see it all the rest of the day although the base of the sky remained covered with a whitish cloud. . . .

It is indeed a very singular and very rare phenomenon on the coast of Coromandel to have experienced during the season of the monsoon from the south and of the land breezes, a turning of the winds to the north-east, and a sort of gale from this direction which lasted two hours at the most. . . .

There was the same thing at Madras, where M. Call, chief engineer of that place, had been commissioned by M. Maskelyne to make the observations. . . . The observers were sleeping tranquilly when they were awakened by a most abundant rain and by a gusty wind, which carried off the tent and upset a part of their instruments. . . . This whirlwind was felt along the whole coast of Coromandel for more than thirty leagues advancing along the land of the peninsula.

That is the fate which often awaits astronomers. I had gone more than ten thousand leagues; it seemed that I had crossed such a great expanse of seas, exiling myself from my native land, only to be the spectator of a fatal cloud which came to place itself before the sun at the precise moment of my observation, to carry off from me the fruits of my pains and of my fatigues. . . .

I was unable to recover from my astonishment, I had difficulty in realizing that the transit of Venus was finally over. . . . At length I was more than two weeks in a singular dejection and almost did not have the courage to take up my pen to continue my journal; and several times it fell from my hands, when the moment came to report to France the fate of my operations. . . .

While the sky was treating me thus at Pondicherry, it presented the most calm appearance at Manila, as I have learned since by letters which I received and through Don Estevan y Melo himself who sent me the observation which he had made along with Father Théatin. M. Dargelet took the trouble of calculating it; you will see that it is very exact, and that it should merit perhaps as much as many others to be used for the parallax of the sun.

Le Gentil had by no means seen the end of his misfortunes. He fell ill, and in addition had considerable difficulty in getting passage back to France. In the following extracts we read of his troubles, as well as of the sad fate of M. Veron, another astronomer imbued with zeal for making observations in remote lands, but who became a victim of the diseases rampant in the tropics.

During the month of September while observing the comet I was attacked by a daily fever of which I did not take very good care in the beginning, and which finally forced me to stay for several days in my room.

My plan had been to go back to France on the ship *Villevault*: it was to leave in the month of October and go past the Isle de France. I had several cases of natural history to take on there; hence this arrangement suited me very well. . . . I was in bed at the time that the vessel left. My recovery was only

apparent. Toward the end of December I fell seriously ill of the same fever; it was accompanied by dysentery and very sharp pains in my stomach. This time I recovered from it only with very great difficulty, and I saw myself almost forced to remain always in Pondicherry; but I had so great a desire to go back to Europe that I embarked on March 1, 1770, still convalescent, on the ship the *Dauphin*. This ship was to pass by the Isle de France, remain there several days, and continue its route to France; we anchored at the Isle de France on the evening of the 16th of April.

The state of my health did not permit me to continue on the ship and to go around the Cape of Good Hope in the bad season. M. Law had very strongly assured me before I left, that the *Indian*, which had gone to the coast of Malabar, would pass by the Isle de France in the month of May, or in the month of June. I therefore decided to stop at this island, and to recover entirely while waiting for the ship *Indian*. I found on the Isle de France my acquaintances and my friends, among whom I recovered from the fatigues of the voyage and regained my health. . . .

I had seen in India M. Veron, who had just made the trip to the south seas with M. de Bougainville. This astronomer was then on the *Vigilant*, a ship of the King, and he was going to the Moluccas; this was in the month of June 1769, when I saw him during his respite at Pondicherry, I gave him a letter of recommendation for Don Estevan Roxas y Melo in Manila, through which he was to pass and where he proposed to observe the transit of Mercury across the sun on November 9 of the same year, 1769. He arrived at the Isle de France in extremity, from a fever which he had acquired by his great zeal to observe throughout the night on land when he was at the Moluccas; he died three or four days after disembarking from ship, July 1, 1770.

M. Veron was of a very gentle character, tireless in work, a good observer; he could be counted on when entrusted with some operation relative to astronomy. . . . hence he was very much mourned by the commissioner.

I asked the commissioner for the papers, maps and journals of this astronomer: they were handed over to me numbered and signed, under receipt; I made a copy of them which I took away with me. The original remained at the Isle de France, and my receipt was returned to me.

This same commissioner tried to persuade Le Gentil to take a trip to the island of Tahiti for further discoveries, but by this time, Le Gentil says, a disgust of travel was beginning to lay hold on him, and he was impatient to see his native land. He therefore embarked on the ship *Indian*, expecting that he was making his final departure from the Isle de France, and little knowing what was ahead for him.

The *Indian* arrived July 26; this ship belonged to the India Company; I therefore asked for my passage from the administrators of this company; they procured for me all the facilities which I needed. I took on board with me all

my cases of natural history, to the number of eight, which I had left in the hands of a very reliable person on my departure for Manila. We were to stop at the Isle de Bourbon, at the Cape of Good Hope, and at Ascension Island.

I was impatient to leave. We were approaching the season of hurricanes, the plagues which so often afflict the Isles of France and of Bourbon, and I knew that ships which meet these hurricanes fare very badly. We left the port of the Isle de France November 19, 1770; we would have been able to leave a week sooner. On the afternoon of the 20th we anchored at the Isle of Bourbon, at the harbor of Saint-Denys. The too long and useless sojourn which we made there was fatal to us, and caused me all the obstacles and the delays which remain for me to describe. December 3rd we were attacked by a hurricane which forced us to weigh anchor on the broadside and gain the open sea; it was then noon. Towards evening the try-sail was put out under the fore. During the night the violence of the wind and sea was so great that the helm of the rudder broke in its mortise; while the carpenters were busy repairing the helm, the tide-wave broke the bowsprit mast from its gammoning: this fall pulled down the main top-mast and the mast of the top-gallant sail of the mizzen-top, which all came down in a single fall; our main-yard was badly damaged, and I regard it as a sort of miracle that our main mast did not fall; for our main-shrouds had then more than six inches of slack; besides that, we were leaking in all parts. We took six or seven days to get into shape to reach the Isle de France again; we arrived there January 1, 1771, to the great astonishment of all the colony, since the last thing they expected was to see us again.

This annoying disaster made me lose all my hopes, made all my plans vanish. However much desire I had to be in France, I saw myself separated from it by an immense barrier and probably for a long time. This delay caused me the greatest anxiety because I felt that it could hurt me very badly. I had received at Pondicherry letters from my procurer in lower Normandy which had informed me that my heirs had spread the rumour of my death; that they spoke of nothing less than of having him give a reckoning and of taking possession of my estate. They lacked a certificate; and it was the sole difficulty which had held them back until then.

(To be concluded)

OUT OF OLD BOOKS

BY HELEN SAWYER HOGG

LE GENTIL AND THE TRANSITS OF VENUS, 1761 AND 1769

(*Concluded from May-June JOURNAL*)

Le Gentil's despair at his unscheduled return to the Isle de France after the ship *Indian* had been damaged by a tempest, was heightened by the fact that he had great difficulty in getting passage on any other ship bound towards France. He had been assured passage on a French ship returning from China, but when the vessel arrived he was not allowed to embark on it, for no definite reason except apparently a hostility on the part of the French officials on the island. He states that this was the only disagreeable episode which he experienced in any of the colonies of France during his lengthy sojourns. In March 1771 however, a Spanish warship arrived, whose captain received Le Gentil most cordially, and it was on the Spanish frigate *Astrée* that Le Gentil was finally transported to Cadiz. Even on this ship, his passage around the Cape was not an easy one.

I had planned to re-embark on one of the ships returning from China, which passed by the Isle de France on their return, arrived there in the first days of March and left again in the same period. I was assured on the word of the commissioner who had promised that he would get me a place on one of these ships, and who had repeated the same promise to me more than once. But in actual fact I could find no place on these ships under the pretext that they were loaded with special cargo and that they no longer belonged to the India Company. Finally I experienced here on the part of the government of the Isle de France exactly the same difficulties which had been made in Manila when I wanted to go to Acapulco in 1767. It seemed that at that moment the same spirit animated the Philippines and the Isle de France. There had been a time when M. Desforbes was in command of this island, when all possible ways had been opened for me. There was, very happily for me, at the Isle de France, the *Astrée*, warship of his Catholic Majesty. This frigate was returning from Manila, and was commanded by Don Joseph of Cordova, captain of the frigate; I had known him on my voyage on the *Bon Conseil*. The *Astrée* arrived March 7th. . . .

How impossible it is for me to find terms to depict the obliging air with which Don Joseph of Cordova received the proposition of M. de Modave [to take Le Gentil as a passenger], and to describe the pleasure which it appeared to give him. . . . As if Don Joseph of Cordova wanted to command a great ship solely from the desire of seeing me more comfortable there. . . .

Don Joseph of Cordova, with whom I dined on the 26th at the home of M. Estenaur, having assured me that he was leaving within two or three days, I had carried on board the greater portion of my belongings on the 27th. . . .

On the afternoon of the 29th I carried aboard the rest of my belongings, even my bed. I returned to land however to spend the evening with some of my friends, and I slept at the home of one of them. I trusted in the word which Don Joseph of Cordova gave me that in case he was leaving the next day he would warn me of it by a cannon shot.

Indeed, the next day, the morning of the 30th, at ten o'clock a loud cannon shot which I heard made me rush on board. It was in such haste that I left the Isle de France. . . .

We sailed March 30, 1771, and I left the Isle de France three months after my return on the Indian: at the timewhen I should, without the adventure of the tempest of Dec. 3, 1770, have been in France, or at least near its shores.

We found ourselves towards the end of April around the Cape of Good Hope where new troubles awaited me for we remained almost two weeks struggling before being able to round this cape. During this time we experienced tempests on tempests, some of which were almost as bad as those which I had seen on the Indian. My sole worry in the midst of all these storms was the fear of being forced to see again the Isle de France, that island which I had nevertheless loved very much; but the sight of it had become unbearable to me since the misfortunes which I had finally had to experience. I told Don Joseph of Cordova my worry about the bad weather which we were having; he assured me that he would go back only as a last resort. He was an excellent officer, very intelligent and very active. He kept his eye on everything: he had a great deal of confidence in his frigate which was indeed an excellent ship. I learned during this hard passage what a good ship well commanded can do on the sea. Our frigate carried twenty-six twelve-inch cannon, armed, the gun ports open, and with only our port lids. Thus we went around the Cape in the middle of the worst weather; the sea was horrible, as I had never before seen it; I admired how this little ship balanced in the middle of this frightful sea; we received only a single wave over us, which did not do us the least harm. We continually manoeuvred; I believe that more manoeuvres were made on board the *Astrée* during the two weeks in the seas of the Cape of Good Hope than I had seen made during six years of travel. . . .

At this point in his narrative Le Gentil gives an interesting description of the visibility of Canopus and Sirius before sunset. Most of Le Gentil's scientific observations were published in different memoirs of the French Academy of Sciences, and are not included in the two volumes of his "Voyage" from which we are quoting.

At the Banc des Eguilles, before the tempest of which I have just spoken, the sky was of the greatest transparency and I witnessed a phenomenon which had never been seen in France, at least as far as I know, even in the finest and



most serene weather. April 10th, when we were at 30 degrees 45 minutes of south latitude and about 16 degrees east of the Cape of Good Hope, a quarter of an hour before sunset, I perceived a star which was bordering upon the yard of the top gallant sail: I recognized that it was Canopus; then I looked for Sirius which I saw much more distinctly than Canopus. Indeed, Sirius in its splendour triumphs over this latter, and it is probable that I would have seen these stars still sooner if I had looked for them; but I did not know that they could be seen when the sun was above the horizon. I informed M. de Cordova and his office staff; they all saw, as I did, Canopus and Sirius before sunset. The night which came on resembled those beautiful nights of India of which I have spoken, and the stars had no twinkling.

After the *Astrée* had rounded the Cape, it met the French vessels on which Le Gentil had been refused passage, and acted as escort for them. There was also an interesting meeting with an English vessel, from whose captain Don Joseph extracted the information that England was not at war with Spain. This encounter ended happily when the English captain presented Don Joseph with the treat of a sack of potatoes. Le Gentil appears to condemn this latter with faint praise when he remarks, "At sea everything seems good."

Finally we went around this Cape quite luckily on May 11th: I say very luckily, to have come to the end of it without the slightest mishap, except for the loss of a great forestay which was carried off contrary to our expectations, because it was quite new and Don Joseph of Cordova had had it made expressly before arriving at the Cape to maintain us at the Cape.

When we had arrived at 11 degrees of north latitude and near the 36th meridian west of Paris, we met the French vessels from China on which I had not been able to embark at the Isle de France: they had left about ten days after us.

We had all left this island with news of the preparations of war between Spain, France and England: consequently the vessels from China which had forty-five millions of riches asked M. de Cordova to escort them as far as the neighbourhood of the tropics because they hoped to find there some ships which would give us news of Europe, the ships of England which are going to America going ordinarily as far as the tropic of Cancer. M. de Cordova answered quite obligingly to the captain of the *Duras* commanding the little division, "that he could not ask better than to escort them; but that he was afraid of making him lose some time because his frigate did not go as well as the two French vessels; however he would go as fast as he could". M. Dordelin commanding the *Duras* having agreed that he would suit his pace to that of the *Astrée*, we went together from June 11 until the 24th of the same month. That day, which was the second after we had left the tropics, we met an English vessel with three masts. We stopped it: the ship's boat was put to sea and sent to look for

the captain and the supercargo with an order to bring back the invoice of the ship. The English captain was not too sure what they wanted him to say: he did not imagine that we had come from so far and that we were as little informed about the affairs of Europe as we were. When he had arrived on board the *Astrée* Don Joseph of Cordova, the better to draw out from him the information we desired, declared to him that he was his prisoner "because he had", he told him, "met only two days ago a despatch boat from Spain which was carrying to America the news of the declaration of war between Spain and England." The English captain appeared much surprised at the statement: he answered "that he knew nothing of this news; that it was indeed true that there had been a great deal of preparation in England; that they had armed; but that on his departure they were busy in disarming because the differences which had arisen among the three powers, England, France, and Spain, were settled." He was asked if he could give us some proof of what he said. He offered to show us the *London Gazette* for which he sent from his ship, and in which we saw the truth of what he had told us. Don Joseph of Cordova had brought some Spanish wine of several kinds, some biscuits, macaroons, etc., and we drank to his bon voyage. Potatoes were, without doubt, in fashion in England as I found them in France when I arrived; for when the English captain had returned to his ship he sent us a great bag of them and butter in proportion. At sea everything seems good; this sort of refreshment gave us great pleasure.

The ships from China, better sailors than the *Astrée*, thanked Don Joseph of Cordova and left us.

The captain of one of these ships wrote me to ask me to go on to his ship. It was too late to profit from his offer, he had refused me at the Isle de France; Don Joseph of Cordova had on the contrary received me with a great deal of kindness; I had received from him until then all sorts of good treatment; was it possible for me not to recognize so great a service by abandoning my benefactor at the moment when we were reaching Cadiz? . . .

We were delayed still again by contrary winds for eight to ten days; this was after having passed the Azores. At last I arrived at Cadiz the first of August, four months and two days after having left the Isle de France.

Le Gentil, who lingered nearly a month at Cadiz to rest and escape the heat, describes his overland journey to France in some detail. He had left the Isle de France so precipitously that he had not procured piastres, and had only paper money with him, so he had to be indebted to his friends to furnish him with money in Spain. One of his great moments was his actual reentry into France on October 8, 1771.

The eighth, at sun rise, we passed the crest of the Pyrenees, and at last I set foot on France at nine o'clock in the morning, after eleven years, six months and thirteen days of absence.

Unfortunately several disagreeable episodes greeted his return. One was that his heirs and creditors, believing him dead, were all ready to divide his estate. Another was that his procurer had been careless in keeping the estate funds and had been robbed of a large sum, which loss, after an acrimonious court fight, Le Gentil had to suffer himself. Probably his most bitter reward was to learn that he had been superseded in the Academy of Sciences, on whose behalf he had undertaken the journeys! This last indignity was rectified on February 28, 1772, four months after his return, by a letter from the faithful Duc de la Vrilliere informing him that His Majesty begged him to take his place again in the Academy.

Le Gentil must have derived a certain amount of sardonic satisfaction from people's astonishment at his appearance in the flesh, when he was finally able to drive in his native region. He says,

I was very well received by everybody; people went to their windows and doors when I passed through the streets, and I had many times the satisfaction of hearing people recognize me and attest loudly that I was really alive.

One of the most bitter disappointments of his voyage was the loss of his precious cases of natural history, to the number of eight. These had left the Isle de France with him on the vessel *Indian* on its ill-fated attempt to round the Cape. After the return of the vessel to the Isle de France Le Gentil was not able to locate the whereabouts of the cases. He spent much time after his arrival in France trying to trace them, but he never saw them again, even though people with diplomatic powers made vigorous efforts to discover what had happened to them.

A happier aspect of his return was his marriage to Mlle. Potier, of Cotentin; and the arrival of a daughter that he adored provided him with a happy family circle after his years of lonely wanderings. He spent much time in writing his memoirs and the papers from his expedition. He died from an illness he contracted in October 1792, and was thereby spared many of the horrors of the revolution. Cassini in the concluding paragraphs of his Eulogy (*op. cit.*) sums up Le Gentil's personality.

A healthy constitution which the voyages had strengthened rather than weakened, exempted M. Le Gentil from any sickness and would have brought him a longer life if an acute illness had not carried him off in the month of October 1792. He was only sixty-seven years old; but death, by cutting his

life short like that, spared him at least the spectacle of the great storm which was going to break, and of the destruction of the Academy of Sciences which certainly would have troubled the peace and happiness which he prided himself on enjoying. His face did not prejudice one in his favour; but animated by conversation, it took on an expression of wit and of originality which was pleasing. In his sea voyages he had contracted a little unsociability and brusqueness, but without rudeness; because to his intimates he was gay, pleasant, and agreeable. Finally to finish picturing him we shall say that he was a good fellow member of the Academy, a very good husband, and an excellent father.

His place in the Academy was not filled. In 1793 it was no longer a question of naming persons to academies, people busied themselves in suppressing them.

Thus at the age of sixty-seven, death came to Le Gentil, whose zeal for astronomy had carried him on eleven years of voyages and absence from his native land. Contrary to the impression given by Flammarion in his volume "Popular Astronomy" (Gore's translation, 1894, page 233), his life did not end soon after his return to France, for he enjoyed twenty-one years of life there after his voyages.

In his attempts to observe the transits of Venus he has set a record for astronomical persistence which it would be hard to equal. Nowadays we have astronomical equipment and facilities of living which it would have been impossible even to imagine two centuries ago. We can hardly hope to surpass some of the early astronomers in zeal, however.

For some centuries now the transits of Venus have been occurring in pairs eight years apart, with more than a century between the pairs, and this will continue for some time to come. Before and after these long periods of pairs of transits, there are long intervals of time during which the transits occur singly with an interval of more than a hundred years between each one. It is unusual when, in a given century, no transit of Venus occurs, as happens in the twentieth century. The last pair of transits occurred on December 8, 1874, and December 6, 1882. Few of our JOURNAL readers at present will have the opportunity to see a pair of transits as the next pair will not occur till June 8, 2004, and June 6, 2012.