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**colonial quito**

## COLONIAL QUITO

While the measurements made in Lapland resolved the polemic about the shape of the Earth in favor of Newton's thesis, the work carried out in the Kingdom of Quito had such a broad scope that it demanded an exceptional updating of all the practical methods and resources known to the sciences of geography and astronomy at the time. We will have the chance to discuss this in a later chapter, but here we wish to dedicate a few pages to examine the less geodesic aspects of the mission. Our geodesists, whose length of stay in Peru varied from Bouguer's nine years to Joseph Jussieu's twenty-seven, were not indifferent to the colonial situation. Much to the contrary, their experience there, which might have traveled a parallel but separate path from the lives of the inhabitants of the inter-Andean corridor, was affected by so many events --frequently unpleasant ones-- that the journey became a personal adventure that would leave lasting impressions, both on themselves and on the men and institutions of Quito.

The scientific expedition approved by the Paris Academy of Sciences in 1734 was soon transformed into a state enterprise upon which France and Spain projected their own interests, without diminishing the main geodesic objectives in the least. Nevertheless, an expedition planned with painstaking care, without stinting on any matter that would facilitate the movement of the scientists, the financing of their operations or the necessary sanitary precautions, became an adventure in which there was no shortage of either tragic experiences or moments of glory. In reality, the scanty knowledge of the Andean region rendered some of the precautions taken from the vantage point of the comforts of Parisian courtly life insufficient. Everything was somewhat different from what they had imagined, and the members of this peculiar European legation found that they had to rely on their own capacity to improvise. Once they had arrived in Quito, the mother countries on the other side of the Atlantic were too far away to help. The arm of the institutions and Crowns sponsoring the enterprise did not reach far enough to influence the actual course of the events taking place. Furthermore, few people in Quito understood or accepted the fact that the mission had a strictly scientific purpose. There were inevitable suspicions that the expeditionaries were looking for precious metals or perhaps other as yet undiscovered riches. They could not but behave like Europeans and, in consequence, their interests were also assumed to be comparable with those of most other foreigners or newly arrived immigrants. It was not enough to have the best letters of recommendation, however much the Royal Letters provided by Philip V ordered the administrative authorities to give special

treatment. But we will trace all their steps.

### A State Enterprise

Designing the expedition and assuring the smooth running of the geodesic operations was an extraordinarily uncommon undertaking for the Academy since it involved engaging in an activity of a distinctly different sort from laboratory science. It also involved the commitment of large sums of money and the mobilization of diplomatic resources --whenever they chose the colonial possessions of a different country as the suitable place to make observations--thereby considerably strengthening the relation between the Crown and the Academy, between the State and its men of science. All this took place in a context whereby the Parisian institution exported and internationalized its interest in the shape of the Earth and geodesic observation. Since geography was still a field of essentially empirical and accumulative character, clearly this program not only eased the integration of some small, isolated national scientific communities into modern science but also its practical implications were of great interest to the international powers. Also, in the Royal Court (Audiencia) of Quito, the presence of the expeditionaries reactivated certain local initiatives and legitimized the cultural concerns of some educated Creoles. As an adventure, this expeditionary force produced an international scientific experience that gave a new projection to the work of the Academy. And as an enterprise it contributed notably towards the integration of countries, persons and knowledge into the culture of the Enlightenment.<sup>1</sup>

At the last session of the Academy of Sciences in the 1733 season, L. Godin's project to measure a degree of meridian in the vicinity of the equator was approved. What finally motivated the French to choose the western end of the world, the Royal District of Quito, as the most suitable place for this experiment? This is how it was expressed in the memoir prepared by Du Fay in the name of the Academy:

"After having attentively examined all the places where their plan could be put into practice, they find that none is better than South America, because the isles of Borneo and Sumatra are unsuitable due to the sparse trading done there by Europeans and because they are covered with inaccessible mountains. As for Africa, it is known that the Equator is only inhabited by savage peoples, and it is impossible to penetrate its lands. And the island of Santo Tomé is a place of little consequence for carrying out the observations they intend to make. And since there is no place left but South America in which this attempt

could be put into practice, the place that seems most suitable to this end and closest to Europe are the shores of the Amazon jungle near the mouth of the river of that name. While it is true that this voyage would be the shortest and easiest of all if one felt they could safely span the distance of a hundred or a hundred-and-fifty leagues of land, and if the Spanish Court were to provide the necessary protection; but one may rightly doubt whether that protection would be enough, because they will find extremely difficult obstacles to overcome among the same savage peoples. So only the coast of Peru seems able to promise all the advantages and conveniences that one might desire for this attempt."<sup>2</sup>

This memoir was in due time submitted to the Count of Maurepas, Secretary of both the Admiralty and the Maison du Roi, and also Vice-President of the Academy, who immediately made overtures to the Spanish Court, asking for their approval and the corresponding permission. On February 27, 1734, the French Minister wrote to Champeaux, his Ambassador in Madrid: "Sir, I send you a memoir by some academicians who propose to go to Peru to make astronomical observations there whose uses would be very advantageous for navigation, particularly Spanish navigation. Please pass it on to Mr. de Rottembourg, and have him discuss it with Mr. Patiño, to see if this Minister (the Spanish Secretary of the Armada) will accept this voyage and if he is willing to provide the academicians with the permissions they need, so they can do it with official sanctions and safety. In that case, the names of those who will undertake it will be sent, and everything will be in conformity with whatever Mr. Patiño deems suitable in order to dissipate any suspicion that such an enterprise might arouse with respect to commerce. Please inform me of the result of these overtures by Mr. de Rottembourg on this matter."<sup>3</sup>

Note that the first overtures to the Spanish government were delegated to Count de Rottembourg, a special ambassador whose principal mission was to negotiate special treatment for the introduction of twilled cotton from Silesia on the Indies route, and for this reason he would have to hold meetings with high-ranking officials on the Council of the Indies. Note that from the very first, Maurepas is concerned about clearing all doubts of possible commercial interests by the expedition, although in this regard he did no more than recite what had already been expressed by the academicians themselves in their memoir:

"They only ask the Spanish Court for orders so that the governors of Santo Domingo, Portobelo, Panama, Quito and the rest of the South American colonies protect and support this useful enterprise. And so that they will be

free of the suspicions that might be aroused as regards participation in commerce or anything else prejudicial to Spain's interests, when these academicians arrive in Santo Domingo, they will open and make public their cases and trunks so it can be seen that they are only carrying personal belongings and instruments of astronomy and mathematics, all endorsed or registered. They will embark on Spanish ships and the same registration will be made when they return from Santo Domingo, with the same exactitude, and whenever it is thought suitable they will be subject to any examination the authorities wish to make."

So much French concern for the guarantees and precautions that would predictably be imposed by the Spanish government to protect their monopoly on trade with America does not correspond to what really happened during the expedition, nor is it even consistent with the confidential instructions Maurepas gave to the Marquis de Fayet, the military Governor of Petit Gôave on the island of Santo Domingo, before the French expedition set sail: "...it is necessary that you avail yourself of whatever is necessary to convince the President to agree to let them [the expeditionaries] be transported on a French boat. There are two reasons that make this desirable. The first is that the academicians need to reach their destination as soon as possible, so they can begin their assignment; and the second is to try to do some trade with the Spanish, or lay the groundwork for it; in this matter it will be essential for whoever is in charge of taking them to be a discreet man."<sup>4</sup>

He would insist again on this matter in later correspondence with the colonial authorities in Santo Domingo. Whether there was a secret plan for French commerce to intrude into the Spanish-American market, or whether there were only isolated attempts at it, based more on the opportunity offered by the occasion than on any solid project, the fact is that the Spanish government, emphatically warned by the Council of the Indies, took precautions. On March 28, 1734, Patiño received the French memoir. He dispatched it immediately to the Crown, and on April 6 Philip V's favorable response to the French petition was communicated to the Secretary of the Council of the Indies, Miguel de Villanueva, with the memoir attached so that the Council could consider and propose the safeguards that would have to be adopted "to avoid any kind of fraud" by the academicians.<sup>5</sup> The State bureaucracy handled the question with notable efficiency. On April 8, forty-eight hours after receiving it, the Council of the Indies ordered a translation of the memoir; and exactly one month later, on May 6, it responded to the issues it raised. In the interim, the Council had requested reports from Carlos de la Reguera, the senior cosmographer of the Indies, and from its treasurer. The

cosmographer, while he considered the enterprise "truly useful," proposed the presence of one or two Spaniards, "knowledgeable in mathematics and astronomy," to be appointed by the King at all the academicians' observations, so they could record all the results themselves and --according to a note in the margin-- prevent any illicit trade as well as "allay any other suspicions that might be based on information received in the ports, fortresses and other installations in those countries." It is perhaps on account of this that Reguera recommended that the expeditionaries communicate the results of their observations to the governors of the different provinces where the observations were carried out, so the governors could send them to Madrid and give permission. The treasurer, in turn, was equally fearful about both illicit commerce and the possibility that the foreigners would engage in spying. It would be superfluous to quote the response of the Council of the Indies on April 6, since it reiterates the recommendations mentioned: registration of equipment in every port reached by the expeditionaries, the permanent presence of two Spaniards appointed by the King, reporting the observations to the colonial authorities and orders to the governors that they watch to ensure that no one engaged in illicit trade.

Even before the Minister of the Armada and the King were informed of the Council's proposals, Patiño had anticipated a favorable, if provisional, reply to Maurepas' petition. On May 3 Champeaux wrote to Paris, "He [Patiño] has seen to it that your petition was received, and it was only a matter of formality to have it approved."<sup>6</sup>

In spite of the Council's reservations, on July 11, all the reports having been heard, the King gave final approval to the plan proposed by the Academy, accepting some of the precautions recommended and ignoring others. One of those present at the meeting took hasty notes and gave Champeaux a summary of what took place at the royal audience; what stands out was the King's trusting acquiescence to the French petitions: "and notwithstanding this His Majesty has decided to give them the Licenses in the form they asked for, without requiring them to report on their operations as the Council proposed; the whole resolution or Decree, has been arranged in conformity with the manifesto and the request contained in it."<sup>7</sup>

The King's attitude is surprising and clarifies not only the state of Spanish relations with France, but also his concept of science. While the Council of the Indies expressed all its preoccupation with the unfavorable consequences that might derive from the scientific enterprise, Philip V, by opposing the suggestion that France hand over the reports and maps concerning its operations,

manifested a surprisingly old-fashioned concept of knowledge: understood as an activity that casts favor on the Court, an activity of probably conjectural nature, exempt from practical and political implications. His French origins and the recently signed Family Pact (1733) perhaps explain a denial that was so out of step with the current state of affairs and the very projects of his own Minister Patiño. For the latter, who knew that foreign commercial intrusion could not be avoided merely by preventing the entry of persons, the opportunity for a few Spaniards to share a sojourn in the colonies with the French scientists formed part of his own long-range plan. He commented to Champeaux: "The Minister has replied that this matter is of as much interest to Spain as it is to France, because here we are just as interested in training capable subjects."<sup>8</sup>

Patiño was well aware that the plans for expanding the Armada and for increased exploitation of the natural riches of America could not be accomplished without scientific personnel and trained technicians, and that, although the Council of the Indies fulfilled its function by protecting obsolete laws, the geographic knowledge of the seas and colonial possessions and the renewal of naval construction were urgent necessities. Since its founding, the Royal Naval Academy in Cádiz had formed part of the Admiralty's policy to create an elite corps of officers knowledgeable in the new sciences and capable of understanding the technical needs of the Armada. The lack of tradition and good teachers, and the slowness with which the Spanish nobility and navy accepted this new academic militia made it doubly advantageous to take advantage of the opportunity created by the French request. This was an opportunity not only to learn, but also to watch over and observe the administrative, ecclesiastical and political administration of the colonies with due prudence. Beyond the matter of measuring a degree of meridian, they were exceedingly interested in the results that would come out of the observation program to which they were assigned. This was especially true of everything relating to Atlantic navigation and colonial geography, not to mention the prescription in Point 4 of the Instrucción that Patiño signed on April 22, 1735: "They will make maps of the cities and ports, with their fortifications, wherever they stop, and they will inform themselves of the boundaries of the province and its government, of the towns or places in it, and the fertility or sterility of its lands, and also of the inclination, industriousness and ability of its natives, and the fierceness or friendliness of the untamed Indians, and the ease or difficulty of taming them."<sup>9</sup>

The Academy of Sciences did not want to limit the potential of its envoy either; well in advance, it saw to it that the geodesists would be accompanied by experts in botany, medicine, architecture and drawing, mechanics and

cartography. Godin's initial idea became more complicated as the scientific and political expectations of the expedition broadened. This was true to such an extent that, even before arriving in Quito, J. Jussieu was aware of it: "I realize that this journey, which only had one goal, has been transformed fundamentally by the number of geographic, historical, mathematical, astronomical, botanical, medicinal, surgical, anatomical, etc., fields of knowledge and facts. We are travelling our road writing instructive memoirs, and all this will form a body of very rare and complete works."<sup>10</sup>

Subsequent events did not contradict the botanist and professor of medicine from Paris. We will simply recall, to cite only a few examples, the works of Jussieu and La Condamine on quinine, the discovery of rubber, the scientific discovery of the Amazon, the map of the District of Quito, the delimitation of the borders between the territories of Spain and Portugal, the writing of the important report Noticias secretas de América, the overhauling of medical treatment for the scourges of smallpox and yellow fever, the massive quantity of ethnographic and anthropological observations of the Andean peoples.... There is no room for doubt: the project, in its ambition to obtain information on an extremely wide range of useful topics, fully matched the expectations of the extraordinary intellectual curiosity of the age, anticipating later European ventures.

But let us return to the preparations for the trip. When the Spanish administration was ready to provide the documents that the academics would finally have to carry with them, they found out that the French embassy had still not sent the names of the expeditionaries, although this --as you will remember-- was a promise Maurepas had made with the first orders he sent to Champeaux. A French "informant" in the Council of the Indies informed Paris on July 11, 1734, that the Council wanted "to know how many scientists were going to the Indies, since the manifesto says (referring to the Academy's memoir alluded to earlier) three or four, and they also want to know their names so they can be written in the documents and so they can travel under the authority of their own names, and the King's signature cannot be put on unknown subjects."<sup>11</sup>

On the seventeenth of the same month, Maurepas sent the list of scientists appointed by the Academy. Those chosen were L. Godin, Grandjean de Fouchy, La Condamine, Abbot de la Grive, Joseph Jussieu and Abbot Pimodan.<sup>12</sup> Finally, on August 14, 1734, what we might call the diplomatic phase of the organization culminated when the Spanish Crown provided the royal document that definitively authorized the French to enter the Viceroyalty



of Peru. This document, which was a kind of passport, was sent simultaneously to the parties concerned and to the colonial authorities in the places to which the company was to travel. The document included not only travel and residence permission, but also the reciprocal obligations and precautions to which both the travelers and the Governors were subject.

On August 20 a second royal document was provided which specified the aid promised to the expeditionaries in the document of the fourteenth. In addition to ordering the colonial authorities to find them housing and adequate means of transport, it placed special emphasis on arranging for the easiest method of providing funds. It ordered "... the officers of my Royal Treasury, at the offices where the amounts needed are to be kept, to provide the funds promptly and without any delay, when they present the authorized instrument of the bond made in the city of Cádiz by the French consul there, before the President of the Tribunal of the Chamber of Commerce (Casa de Contratación), on behalf of the Paris Academy of Sciences and these academicians, to pay and remit to my Royal Treasury, in these realms and in the depository of the aforementioned Tribunal, the quantities that are specified in the form expressed, that with their receipt, an authentic copy of the aforementioned instrument and of this office, will be paid to the said royal officials, what thus they might give and pay them."<sup>13</sup>

The credit limit of the Chamber of Commerce, the paying agency for the Royal Banks (Cajas Reales) of Peru and the continent, finally went as high as 4000 pesos, a quantity that did not seem ample enough to Maurepas, who was understandably worried about covering all the costs of the mission. On August 28 he ordered Champeaux "to find out in Cádiz if there were any businessmen in the Nation who were in a position to give them letters of credit for Peru. But since the persons to whom they would be addressed might not have funds, they will need these orders, and all precautions will be little for such a voyage."<sup>14</sup>

In fact the merchants of Cádiz issued letters of credit for an additional 4000 pesos, to be paid by Domingo Miranda, the official in charge of French business in Cartagena de Indias.

All these arrangements seemed inadequate to Maurepas; all the precautions taken would turn out to be useless, as events would prove. When they reached Quito, the expeditionaries only had 327 pesos left, having spent 5950 pesos during their stay in Santo Domingo.<sup>15</sup> This situation obliged them to borrow money. In addition, since communications with Europe were

interrupted because of the war with England, the academicians had to finance themselves. They used a variety of means. La Condamine went to Lima in 1737 to borrow 12,000 pesos against some personal letters of credit that he had had the foresight to bring from Paris. Godin, once the geodesic operations were concluded, had to remain at the University of Lima as professor of mathematics until he was hired to direct the Royal Naval Academy in Cádiz. Seniergues and Jussieu established lucrative medical practices. Morainville was commissioned to do works of architecture and painting in various cities. Godin des Odonais, the nephew of the expedition's leader, married the heiress of a wealthy Creole family. Verguin, a cartographer, and Hugot, a watchmaker, worked alternately for the Court, the city council, or the Cathedral of Quito. It appears that all of them became involved, sooner or later, in illicit trading in precious metals and gems. The documentation on this subject is not scarce, but it is extraordinarily ambiguous. When La Condamine was tried for illegal commercial activities, even though people testified that they had acquired merchandise for him, nothing could ever be proven irrefutably. It is true, however, that when the last remittance of money for 24,000 pesos arrived from France at the end of 1738, it was accompanied by a stern warning to Godin: "Take care to put your accounts in order so the exact reasons for the expenses can be submitted to the King."

After La Condamine's personal credit was covered and the debts amassed since 1736 paid, what remained of the new funds, although quite limited, was provided with "...the conviction that this sum would be enough for all their expenses and needs."<sup>16</sup>

Nothing could have been further from the reality of the situation. In 1745 J. Jussieu wrote to his brother Antoine, "It has been five years since any money has been sent to us from France or since I have touched a single cent from the King."<sup>17</sup>

This means that, at least during the last three years of the mission, the academics were left to their own fate. The persistent squabbling among the members of the company and the early publication of the results obtained by Maupertuis' expedition to Lapland had diminished the enthusiasm both of the Academy and of the Secretary of the Admiralty himself. France seemed to have lost interest in the fate of its ambassadors.

Economic difficulties were not the only burden for our enlightened argonauts, although they were among the most painful of them. For the time being, in the summer of 1734, news of the successful diplomatic negotiations

resulting in the travel documents conceded by King Philip fell like a fresh rain, filling the scientific world with delight and obliterating bad omens on the horizon.

However, there still remained the matter of the two Spaniards knowledgeable in mathematics and astronomy whose presence had been recommended by the Council of the Indies. At the French Court, news of the need to appoint these "knowledgeable men" was received with disquiet, and seen as an intentional delaying tactic.<sup>18</sup> The fact is, while the King had not shown too much interest in this trivial point, Patiño on the other hand hastened to request the President of the Royal Tribunal and the Chamber of Commerce, Francisco de las Varas, to designate the two Royal Naval officers. The men chosen were Jorge Juan y Santacilia and José García del Postigo, but, since the latter was at sea and not expected to return soon, he was finally replaced by Antonio de Ulloa y de la Torre-Guiral.<sup>19</sup> On October 4, Maurepas was informed that the nomination had been made and that therefore everything was ready on the Spanish end for the start of the voyage.<sup>20</sup> On January 3, 1735, orders were dispatched to the appointees, assigning them a salary of 40 escudos plus 20 escudos a month for the time they were in the Indies.<sup>21</sup> Finally, on April 22, Patiño signed the instructions by which they were to carry out their activities in America.<sup>22</sup> As we have mentioned, their functions were not limited to merely attending. In addition to their cartographic duties and the observations on geography and ethnography mandated in Point 4, they were also assigned other duties relating to astronomy, geodesy, navigation and botany, and the obligation to report to the governor of the district in which they were working was imposed on them. The Instruction itself ordered them to embark on the frigates *El Conquistador* and *El Incendio*, which would also carry the new Viceroy of Peru, Antonio José de Mendoza Caamaño y Sotomayor, the Marqués of Villagarcía, as well as the recently named bishop of Popayán. On May 26, 1735, they weighed anchor in the port of Cádiz and set course on an enterprise which, although they did not know it then, was to become an adventure.

The French company, which was ready to leave from the port of Rochefort on April 2, 1735, had to delay its departure because of the sudden defection of three of its most important members.<sup>23</sup> Grandjean de Fouchy, Pimodan and de la Grive, fearful of the hardships that awaited them and less desirous of the laurel of fame, precipitously made excuses of illness or private business and abandoned the expedition.<sup>24</sup> Their places were immediately filled by P. Bouguer and Verguin. Accompanying the men --L. Godin, P. Bouguer, C. M. de La Condamine, J. Jussieu, Verguin, Coupolet, Godin des Odonnais,

the surgeon Seniergues, Morainville, and the clock and instrument maker Hugot-- a voluminous quantity of baggage was loaded onto the merchant vessel *Le Portefaix*: nineteen trunks, sixteen crates, twenty-one boxes and nine barrels, as they were registered first in Portobelo and later in Quito. Forty-five percent of these were books and instruments and the rest, in addition to numerous articles of clothing, was comprised of objects for various uses: guns, pistols, swords, gunpowder, saddles, tents, medicine, brandy, rope, kitchen utensils, and so forth.<sup>25</sup> There is no doubt that these gentlemen, bred to the life of the Court, not only expected to reproduce that life in America but were trying to transport the means to do so with them. In this matter, as in the economic sphere, they had to face realities on which they had not counted. When they reached Santo Domingo the Governor General, the Marquis of Fayette, had difficulty arranging the continuation of their voyage to Cartagena: "...in spite of all the measures I have taken for their trip, nothing is more difficult than to find a ship big enough to accommodate all their baggage."<sup>26</sup>

The very same reason --the lack of an adequate boat to carry them to the shores of the Presidency of Quito-- detained them in Panama longer than they wished.<sup>27</sup> In spite of everything, the situation did not become dramatic until they were on dry land and undertook the ascent to San Francisco de Quito on the inter-Andean highway. The trip up the Guayas river, where clouds of mosquitoes attacked them mercilessly, and the ascent of the famed San Antonio ridge in the vicinity of Chimborazo, where due to the sandy nature of the terrain it took them nine hours to advance half a league, must have been a veritable calvary.<sup>28</sup>

But let us accompany them out of Europe, where they were still optimistic and unaware of the calamities to come. Finally, on May 16, 1735, twelve days before the Spanish weighed anchor, the *Portefaix*, under the command of Captain Meschin, set sail from Rochelle for Martinique.

### The Andean Corridor

In the final days of June, 1735, the two Spanish ships, *El Conquistador* and the *Incendio*, entered the sea of the Antilles at Martinique, and on July 7 they were in the channel of Boca Chica at Cartagena de Indias, finally entering the port itself on the ninth. While the French company was still en route --contrary to expectations, there was still no news of them in Cartagena-- Jorge Juan and Antonio de Ulloa continued to make astronomical observations and the

observations of the magnetic declination they had begun during the crossing of the Atlantic and the Antilles, which enabled them to improve the old charts between Santo Domingo and Cartagena. The *Portefaix*, meanwhile, reached Martinique on June 22, a little before the Spanish passed them, with neither aware of the other. The French stayed on the island a few days, also making various astronomical observations, and on completing them set sail for the French sector of Santo Domingo, sighting land on July 11. On the twenty-ninth they were in Petit Goave, and they did not leave for Cartagena until October 30.<sup>29</sup> What delayed their arrival on the continent for three long months, and their meeting with the Spanish part of the expedition? We must remember what was said about the difficulty of finding a vessel large enough to accommodate the enormous quantity of luggage they were carrying. And we must not forget what Maurepas suggested about the desirability for the company to travel on a French ship commanded by a "discreet" captain, so they could engage in surreptitious trade. Whatever the explanation, on November 15, 1735, the academicians reached Cartagena de Indias, and the next day the Spanish sailors came to greet them. Finally, after nearly two years of preparation, the two halves of the expedition met.

Some members of the French party were favorably impressed; others took advantage of the occasion to exercise their own sarcastic wit in letters to third parties. J. Jussieu recounted, in a letter to his brother, "There we met the two Spanish navy officers that Philip V has assigned us as aides. They are both likeable fellows, extremely sweet-natured, very sociable, noble, and they know mathematics very well, and both speak enough French to be easily understood."<sup>30</sup>

As we already know, La Condamine, in a different tone of voice, wrote to Voltaire about the two officers who were ready to assist them "as geometers and astronomers. I don't know what awaits them on their return, but as soon as they were chosen, they suddenly were promoted from cadets to first lieutenants."<sup>31</sup>

With the two groups finally united, the first matter at hand was to cover the last leg of the journey to the Kingdom of Quito. This had to be done, according to the conditions of the passports given to the Frenchmen, via the Pacific route, that is: from Portobelo to Panama, up the Chagres River, and from there southward to the coast of the Presidency at the latitude of the equator. On November 25 they embarked on the French sloop *Le Vantour*, arriving at Portobelo four days later. While they waited there for the Spanish boats that would take them up the Chagres to the other side of the isthmus

--these had been previously solicited from the President of Panama-- the Spanish officers drew a plan of the bay and of the castle of Santiago de la Gloria. Together with the castles of San Felipe de Todo Fierro and San Jerónimo --all three the work of Juan Bautista Antoneli-- they guarded the stronghold and would be destroyed by Admiral Vernon in 1742 during the Nine Years' War.<sup>32</sup> On December 15 the boats they were waiting for arrived, and a week later they left for Panama. They spent Christmas Day 1735 rowing or poling against the current on the Chagres. But on the 29th, before the end of the year, they reached their next stop. As we have seen, they stayed here longer than they wanted to, again for want of an adequate ship<sup>33</sup>, until February 22 when they boarded a miserable vessel named *San Cristobal*. Meanwhile they made observations, as had become their habit. From then on, the division among the members of the French company was a sign of the way their relations would continue to be during the coming years. Seniergues' testimony could not be more eloquent. The expedition's surgeon wrote to Antoine Jussieu on February 18, "Mr. Godin and they (Bouguer and La Condamine) have not spoken to one another for some time. They get along like cats and dogs and they spoil each other's observations."<sup>34</sup>

Under these circumstances the separation into two groups seemed an inevitable consequence. On one side were Godin and Ulloa. Somewhat later, when the division was already established, we find Juan on the other side, together with La Condamine and Bouguer.

Before reaching Guayaquil, the *San Cristobal* stopped in the Bay of Manta, where the expeditionaries disembarked to study the terrain to see if it would be possible to begin the geodesic triangulation there. It did not take long for them to realize that the idea would be impossible to set in motion because of the thick shrubbery that covered the shoreline.<sup>35</sup> The bulk of the expedition, on Godin's orders, continued the voyage to Guayaquil, and from there, still by boat, they went up the River Guayas to the port of Caracol. Finally, from there, now on foot, via Guaranda, Ambato, Mount Chimborazo and Latacunga, they reached San Francisco de Quito on May 29, 1736, and were received by the highest local authorities and lodged for several days in the Governor's own palace. P. Bouguer, who had remained in Manta with La Condamine, decided to part company with the latter and go south in search of the path followed by the majority. He found it, and was the last to arrive in Quito, on June 10. La Condamine, who was unable to take a shortcut in a straight line from Manta, as he had attempted to do, reached the coast at the mouth of the Esmeraldas River. He continued to Quito on the road that was then being opened along the riverbed under the direction of Pedro Vicente Maldonado, in search of a more

direct access from the coast to the interior. Maldonado met the French scientist at the mouth of the Esmeraldas, and this was the beginning of a solid friendship and a fruitful scientific collaboration between the two men.<sup>36</sup>

Finally, on June 4, La Condamine reached Quito and reported that he had been robbed. Whether it due to robbery or some other cause, he found himself halfway there without enough money to continue. Obligated to pay for guides and mules, he had to pawn his luggage, including the quadrant, in the town of Niguas. When he reached Nono, a Franciscan monk providentially lent him enough money to continue on to Quito.<sup>37</sup> His arrival alone and by a different route from the others on the expedition instigated the first quarrel with the Quito authorities, who accused him of having sold everything in order to engage in illicit trade. The truth is that while he was staying at the Convent of the Society of Jesus and enjoying the best treatment at the hands of both the rector, Hormaegui, and Father Larrain, he used the two cells they had given him as a kind of public store to which both authorities and common people came to stock up on luxury goods from Paris. He did this without any attempt at dissimulation and, it is said, with full acquiescence on the part of everyone.<sup>38</sup>

At this point in our narrative, however, we find all of the expeditionaries together in Quito, although exhausted and divided. What sort of place was their host city, what were its people and institutions like? Juan and Ulloa provide us with detailed descriptions whose most salient aspects we extract below.

"This city is located at 00 degrees, 13 minutes, 33 seconds of *southern* latitude; and 298 degrees, 15 minutes, 45 seconds of *longitude* measured from the Meridian of Tenerife...in the interior of the Territory of *South America*...thirty-five leagues...from the Coast.

"The *ravines*...that descend from *Pichincha* are its foundations; and several very deep ones cross it; thus a lot of its buildings are constructed on arcades and vaults; for this reason many of its streets are irregular...the size of the city is comparable to the secondary cities of Europe....

"It is surrounded by two spacious plains...which beautify its outskirts; because the bright, pleasant green of the sown land, and the grass, and the colors of the flowers that adorn plains and hills never wither all year long, so it is a perpetual *Spring* that never declines in any Season....

"To the Southwest...there is a mountain called *Panecillo*...and from *Pichincha* several brooks rush down through the ravines...supplying water to

the city....

"The Mountain of *Pichincha* is a Volcano, and...sometimes it makes formidable fearful rumblings....

"The main Plaza, or the *Plaza Mayor* of Quito, has its four facades; one is beautified by the principal church or Cathedral; another with the Palace of the Court; opposite it the City Hall buildings; and opposite the Cathedral the Episcopal Palace. It is square, and very spacious, and in the middle it is adorned with a beautiful Fountain.... The four main Streets that cross the corners of the Plaza are straight, wide, and beautiful; but three or four blocks away from it begins the imperfection of ups and downs. This unevenness is the reason they do not use carts or any other carriages...the rest of the streets are crooked, uneven, and without any order.... The principal Houses are very roomy, but their Doors and Windows, particularly in the interior, are small and narrow, a custom conserved partly from those of the *Indians*.... The material of which they are made is only Adobe and Mud...they are as durable as if they were made of something stronger.... The city is divided into seven parishes, and there are only as many as are necessary for the Church.... Among the Religious Convents, there are Nuns.... There is also a Hospital where the poor sick are treated.... As for Courts... the main one is the Royal Court... then those of the Cajas, or Royal Treasury... there is a *Tribunal of the Crusades*... a Probate Court (*Tesoreria de Bienes Difuntos*)... there is a Commissary of the Inquisition, Chief Constable and Officers.... The Ayuntamiento, or City Hall, and...the Ecclesiastical Chapter....

"As for the Dances...the most particular thing in the matter is that without payment or any other benefits except their own enjoyment, they keep this activity up for fifteen days before the Holiday, and for more than a month after it is over, without thinking of work or anything else whatever....

"The Community of lower or common folk can be divided into four classes; the Spaniards or Whites; Mestizos; Indians, or Natives; and Negroes with their descendants.... In these four classes the City, according to the best calculation, has between 50 and 60 thousand Persons.... One must recognize that among these four groups of People, it is the Spanish that have the highest status.... The Men do not practice any mechanical trades, seeing them as a blot on their reputation, which consists of not being Black, Brown, or Tan. The least presumptuous Mestizos devote themselves to the Arts and Trades; and still from them choose those of higher esteem, such as Painters, Sculptors, Silversmiths, and others of this class as being the exercise of copying in line



with their intelligence and compusure; ignoring those not considered of so much education, or skill.... They fall into the defect of Laziness, and slackness, which predominates among them to an extreme degree.

"As for the clothing one cannot help but notice a difference with respect to the style in Spain... since... when they wear the Cape they add a long coat that comes down to the knee, with tight sleeves, open at the sides, in pleats, and full of needlework, and eyelets, and buttons in double rows, which they use as adornments.... The dress of the Mestizos is all blue, and made of local cloth....

"If any style of dress seems particular, it would be the Indian, so scanty and poor as it is.... Mestizo women and Spanish women do not dress differently....

"The distinguished youth of this country spend their first years studying Philosophy, Theology, and some go on to Law...they are all able in these Faculties, but very deficient in knowledge of Politics, History and the other Natural Sciences that contribute to the greatest cultivation of knowledge. One notices in this country that there are more people of the feminine sex than of the masculine. The only activity in which persons of distinction engage --those who do not have a calling for the Church-- is to visit each other in their Haciendas... those who engage in Commerce being very rare.... The lack of occupations... and the negligible education... leads them... to the established custom, general in all the Indies, of the Dances, or *Fandangos*. In Quito these are much more licentious and frequent; the looseness arrives at an extreme which reaches the point of being abominable; and the disorder is correspondingly great....

"The drink *Aguardiente de Cañas* (sugar cane liquor) is common among everyone here; with the difference that decent persons use it in moderation.... The disorder caused by this drink is noticeable among the Mestizos.... Vulgar Spanish and Mestizo women also drink immoderately, and hold their liquor better than seems natural for their sex..... Maté tea is very common in this country... but the style of drinking it is too unhygienic, because everyone drinks from the same straw.... There is no vice that is not easily introduced when there is idleness.... We see, that drunkenness is one, but gambling has no fewer followers.... Vulgar folk, and Indians, are more disposed to stealing, which they practice through petty theft.... The Mestizos are audacious, and cunning in any kind of robbery.

"The language spoken in Quito, and in all the settlements of the Province, is not uniform; Spanish is just as common here as Incan; the Creoles particularly use the latter as much as the former.

"The wealth of Quito compared to other cities in the Indies is not considerable; but neither can it be called a poor city...<sup>39</sup>

Although long, the text wastes no words. It contains details of the way people dress or entertain themselves, without omitting information relative to the colonial order and its division into castes. Of especial interest are the comments on all the prejudices the expeditionaries, as enlightened Europeans, brought to America. In fact, Ulloa's description, even more than it shows us a picture of Quito, reveals the essential features of his own personality. Furthermore, as part of a discussion with pretensions of objectivity, the account has greater significance than what is purely personal, and, in fact, reflects the mindset of an epoch. It allows us, consequently, to know what the members of the expedition were like. Whatever Quito may have been like, with all its urban deficiencies and licentious customs, it must have seemed to them the best reward after such a long journey.

Behind them was a dilatory stretch filled with frustrations and anxieties; that was the nature of their encounter with this grandiose, unexpected landscape, so very different from anything they had ever known, with its strange tropical climate, its exuberant and unhealthy wilderness. Yellow fever, leprosy, ringworm and tetanus were endemic in Cartagena. Among other inconveniences were various insects and other pests that were annoying even indoors, such as cockroaches, chiggers, scorpions, centipedes and bats.<sup>40</sup>

A few days after their arrival in this city, Jussieu, Godin des Odonais, Morainville and Bouguer caught an illness that no one could definitely diagnose. Was it the fever that Europeans usually caught in this climate, commonly called the *chapetonada*? From Portobelo Jussieu wrote to his brother that this city was the "foulest and most unhealthy in the Universe,"<sup>41</sup> and if we consult Antonio de Alsedo's Diccionario Geográfico we read that "the climate of this city is horrible, because it is extremely hot, and this has to do with its location; since it is surrounded on all sides by mountains, no air can pass through and the thick growth of trees does not permit the sun's rays to penetrate and consequently these prevent the earth they screen from drying out, and from it vapors rise which condense into clouds and cause heavy rainfall...these continuous rains are frequently accompanied by thunder and lightning storms that frighten everyone, since the sound of the thunder is prolonged as it echoes

through the caverns in the mountains, and to this is added the intolerable noise of a thousand species of monkeys that abound...."<sup>42</sup>

The course of the Chagres was plagued with alligators, monkeys and mosquitoes; and Guayaquil, in the midst of its undeniable fertility and many pleasant features, was swarming with insects and animals, "both the waters that flood it in winter, fertilizing it (the region) later and the putrefaction and insufferable heat nourish plagues of mosquitos, toads, rats, scorpions, vipers, poisonous snakes, including fer-de-lance, coral snake, rattlesnake and *bejuco*, and there are always lots of them even after the bird of prey called *curiquingui* hunts them for us, eliminating all it can find; in the rivers it is unbelievable how many alligators there are as they come out onto the beaches to lie in sun..."<sup>43</sup>

Finally, not far from Quito, Couplet died of a virulent fever; and in following years there were continuous health problems and obvious risks as a consequence of the endemic diseases and vicious epidemics, as well as the terrible scourge of yellow fever that devastated the city of Guayaquil in 1740.<sup>44</sup>

No moment, however, was as dramatic as the year 1743, when smallpox swept through Quito and once again the terrible fever spread along the Pacific coast. Of the forty or fifty thousand persons who lived in the capital, at least twenty percent suffered the worst consequences: "...last year in the month of October," Jussieu wrote to his brother Antoine in 1744, "an epidemic of pestilential malignant fever took control of Quito and carried off more than eight thousand souls."<sup>45</sup>

Along with these catastrophes, there was the threatening and endemic "Bug" or "Valley Sickness," an acute form of *necrotic proctocolitis* produced by *oxyuris*, which persistently decimated the population. Its treatment was as aggressive as it was feared: "...but as these people," Ulloa tells us, "live under the impression that there is no Accident, when one is failing from the Bug, his cure must not be postponed: and this is very violent, consisting of reducing his medicines to Sour Lemon, peeled until the juicy part is exposed, gunpowder and chili or ground red pepper; of which a ball is made and introduced into the anus, and they take care to change it two or three times a day until they judge him free of the need for this treatment."<sup>46</sup>

The treatment's aggressive nature was augmented by its being used nearly indiscriminately, since any kind of dysentery, also common in those parts, was treated with the same medicine to prevent worse illnesses.

However great and continuous the perplexity of the Europeans must have been at the beginning of their journey, that of the natives of the country was no less intense concerning their visitors. The inhabitants of the different towns they visited were hospitable as well as suspicious about the objectives of the mission. Towns competed with each other to wine and dine such an illustrious company. The Presidency of Quito, isolated by the mountains between Bogota and Lima, and so far away and marginal with respect to the mother country, received the European contingent with a mixture of gladness and surprise. So many needs in a country so far from the real centers of power seemed inexplicable unless they were hiding secret designs. For the geodesic triangulation they had to install markers on several Andean mountains (Pichincha, Chimborazo, Cotopaxi, and others) where they were caught by surprise by violent blizzards and glacial cold; the natives who accompanied them not only abandoned them, stealing the tents with which they set up their observation posts; they also, in their fright, invented and spread the wildest stories about the real objective of the mission: "...everything was confused even among the most educated people...and they didn't know what to make of so many astonishments and novelties. Some thought our resolution was folly; others attributed it to greed, convincing themselves that we were looking for precious minerals by using some special method we had invented; others called us magicians, and all of them were steeped in endless confusion; because none of the things they were thinking of even came close to having any relation to the difficulties and hardships in what we were doing."<sup>47</sup>

Certainly, judging by what Ulloa tells us, their long sojourns on the snowy Andean slopes, poorly fed and deprived of all the comforts they were used to, made their encounter with these people, their villages and customs equally fascinating to them. "...the rusticity of these places was transformed in our view into the opulence of cities; communication with a priest, and the two or three persons who accompanied him, seemed the most rational business in the world; the little markets...the greatest marketplace of merchandise and business that we could desire; and through this apprehension the smallest thing looked large to us..."<sup>48</sup>

Ulloa's words certainly sound sincere. But there was more than just a recounting of bitter experiences or exhausting treks. Those for whom the book was destined knew enough to appreciate the deep emotion in the descriptions of the physical phenomena where the magic and grandeur of the landscape crosses the boundary of the rational. These personal experiences, meant to overflow the reader's capacity for wonder, are a fundamental part of all the accounts that were published. Thus, for example, were the eruptions of

Cotopaxi in 1743 and 1744 which, after fearful noises and vigorous flare-ups, melted its perpetual snows producing terrible avalanches that destroyed the lives and property of the inhabitants of Latacunga.<sup>49</sup> But besides these dramatic episodes other experiences are presented, equally spectacular but not at all tragic, such as this one written during a stay on the plateau of Pambamarca: "At the hour of dawn the whole mountain was enveloped in clouds, very dense, which gradually dissipated as the Sun rose, and only a thin vapor remained, so faint that the eye could not distinguish it: on the side opposite from where the sun rose, on the same mountain, about ten yards away from where we were, the image of each one of us could be seen represented in a kind of mirror, and centered about his head were three concentric rainbows; and the last or outermost color of one touched the first color of the next; and outside all and a little distance away was a quarter arc formed only of the single color white; all of them were perpendicular to the Horizon; and as the subject moved from one side to another, the Phenomenon accompanied him entirely in the same direction and order; but the most amazing thing was, that we were all there together, six or seven persons, but each one saw the Phenomenon of himself, and did not see it of the others."<sup>50</sup>

No less fantastic was the spectacle of three concentric white arcs formed by the light of the moon projected on the slope of the mountain.

Undoubtedly these experiences motivated feelings of closeness on the part of the geodesists towards a countryside that was at times so rough and on occasion so fascinating.

As they accumulated experience with new difficulties, the Europeans became more and more adapted to the feel of the land. It could not have been otherwise if they wanted to finish their business successfully and survive as well. The financial problems, the question of transportation, the mere adaptation to the physical ambiance and the strange cultural environment were all factors that impelled their gradual incorporation into the life of the country. But this incorporation was not unequivocally harmonious. Quite to the contrary, it gave rise to new conflicts and led the expeditionaries to participate in the country's social conflicts and crises. The accusations of illicit trade, probably well-founded, and the consequent trials to which La Condamine was subjected, were made so much of because the incoming President of the Court, the Creole Araujo, used the issue to denounce his predecessor of bribery and negligence. But if there really was illegal activity, and it is very probable that there was, it would not have been divorced from the circumstances of debt and other economic qualms in which the expeditionaries found themselves.

Likewise, the high incidence of disease in those latitudes, and the inconvenience, or simply the absence of sanitary facilities, explain the expeditionaries' active participation in the struggle against illness. The outbreak of hostilities with England and the threat to the coasts of the Viceroyalty required the integration of the Spaniards into the defense system and shipbuilding during the time the conflict lasted. Finally, the work of all the Europeans contributed, along with selected minor contributions by some natives, to better geographical knowledge of the region's territory.

There is no doubt whatever, then, that the people of Quito were beneficially affected by the arrival of the Franco-Spanish company. But naturally, this relationship was not one-way, and the natives also influenced the scientific activities of the expeditionaries.

Their reception in Quito, with President D. Dionisio de Alsedo y Herrera still in office, was hospitable at first in spite of the registration of equipment that was required by the instructions given by the Crown to its colonial authorities, and except for the reprimand to La Condamine because of his spontaneous and suspicious arrival. But tensions with the city, on account of its own conflicts, were not long in coming.

By the beginning of 1736 relations between Creoles and *chapetones*<sup>51</sup> had become tense over the issue of the election of mayors to the Quito city council. This election was complicated by a similar conflict between natives and foreigners that had been unfolding in the Quito's provincial congregation of the Society of Jesus for some time. Five years earlier, in 1731, the appointment of the Spaniard Hormaegui as rector of Quito's *colegio maximo* had been ignored by the provincial priest and a group of Creole Jesuits in a show of disrespect. To right the wrongs Father Andrés de Zárate was sent to the zone; he energetically confirmed Hormaegui and sentenced the rebellious priests to severe exile, earning the enmity of the city council which at the time favored the exiles. There was a moment of such extreme tension that an uproar arose endangering the safety of Zárate himself, and the Viceroy had to intervene to pacify emotions and calm everyone down. The Creole group that controlled the city council perhaps hoped that, in retaliation for Zárate's striking a blow in favor of Hormaegui, Villagarcía would allow the two mayors whose terms were over in 1736 to continue in office once he was reelected. These two, Don Juan José de Mena and Don Martín de Unda, had specifically declared themselves opposed to Zárate's disciplinary measures. This solution was expressly prohibited in the laws of the Indies. However, against the majority will of the city council, and with only two votes in favor, two different

men were designated by President Alsedo: Don Lorenzo Nates and Don Simón Mosteserín. Although the city council appealed again to the Marqués de Villagarcía, they were merely rebuked by the Viceroy for causing disturbances in Quito and "burdening this high government with its complaints and personal grudges."<sup>52</sup>

More than just complaints and personal grudges, what was being disputed there between newcomers and Creoles was the control of all elements of power on the local level, based on feelings of hometown possessiveness more related to the out-of-the-way isolation of the territory than to any supposed seeds of nationalism, as earlier authors have liked to imply.

In this discordant atmosphere, at the end of December, 1736, the change of guard in the Presidency of Quito was accomplished in the person of Don José de Araujo y Río, of Lima. From that point on a sordid war of accusations began between the outgoing and incoming Presidents, who alleged each other of: illicit of commerce in Asian cloth brought from Mexico when one returned from the peninsula in the fleet of New Spain --Alsedo accused Araujo--<sup>53</sup>, and connivance or overlooking this kind of activity on the part of the academicians--Araujo accused Alsedo. It was a war whose intensity would provoke the serious incident of protocol that occurred between the two Spanish naval officers and the new Governor and Captain General, Araujo. This episode raised once again such apparently unconnected issues such as the problem of financing the geodesic enterprise in its most trivial details and the struggle between the castes of which we have been speaking.<sup>54</sup>

The Spanish naval officers had sailed from Cádiz unequipped even with observation instruments. The experiments carried out during the crossing and in Cartagena were made with a few inadequate instruments loaned to them. However, they were waiting for Patiño's request to Du Fay for an exact replica of the instruments carried by the French academicians and built by the most prestigious craftsmen of the day.<sup>55</sup> But when this precious cargo arrived in Quito in January 1737, the treasurer of the Royal Treasury, Don Fernando García Aguado, following instructions given by President Araujo, refused to pay the twenty pesos it cost to transport it over the last leg of the trip on muleback. Araujo must have known how well the Spaniards and his predecessor, Alsedo, had gotten along with each other. But more importantly, and there is proof of this, at the protocol visit paid to the new President by the whole company at the end of December 1736 to introduce themselves, there was already occasion for friction between Araujo and the navy men. The latter opened the conversation by addressing him as "your Lordship," knowing that

this was not his legal title, and since the President did not respond by addressing them in kind with the same honorific, for the rest of the conversation they addressed him as simply "your Mercy," which, as they expected and perceived, hurt Araujo's feelings, although he did not say anything. The storm broke when, in the face of the treasurer's stubborn refusal to pay the cost of the transportation, Ulloa requested in writing that the President order it paid: "...but having received my letter, he asked who had brought it, and ordered him to come inside: and as it was a servant of mine he returned the opened letter, from the bed where he was lying, somewhat ill, and told him: 'take it, and tell Ulloa to learn to write and to learn some style, since one does not address me as your Mercy, but your Lordship.'<sup>56</sup>

When he received this reply, the navy officer was furious, and he went to the President's house, stormed in, and marched into the bedroom where Araujo was lying. Here Ulloa had strong words with everyone present, including the sick man's wife, and of course he continued to address him as "your Mercy." The President took this as a grave insult and ordered the navy lieutenant placed under house arrest. Ulloa challenged the President and, citing his position as an officer of the Spanish Navy, he immediately invoked the military privilege whereby he was only subject to his fellow officer Jorge Juan, as the higher officer of the two. When Araujo pointed out that in addition to being President and Governor, he was the Captain General of the Court, Ulloa audaciously needled him by saying that his title of Captain General was only honorary, bought for 26,000 *reales* --this last detail is according to Alsedo's version of the scene-- and expired with the end of his term as President. Having said this, Ulloa left and spent the whole day boasting about his disdain and making his contempt publicly known.

At this point Araujo decided to convene a tribunal of justice to proceed in correct form against the naval officer; and it ordered him to be imprisoned by majority vote. The public prosecutor of the Court, Don Juan de Valparada, voted against this sentence, citing the damage Ulloa's imprisonment could do to the scientific mission, and proposing to move the trial to the Crown so the King himself would be the one to proceed against the officer.

The situation was aggravated when Juan, who was required to mediate in the conflict before Araujo himself, not only continued to refuse to use the respectful term of address "your Lordship," but defended everything his wayward colleague had done. Once the navy officers were outside, on the way to Don Antonio's incarceration, they both drew weapons on the bailiffs --who were only trying to carry out the sentence-- and sought immediate protection in



the Jesuit college. Given the ugly aspect the affair was beginning to acquire on their part, Juan and Ulloa wielded the reasons Valparada had raised to justify his voting against a prison sentence, underscoring the need to pursue the scientific mission. As a last resort they wanted to appeal to the authority of the Viceroy of Peru. But since they suspected that their letters to Lima might be intercepted by Araujo, they decided to go there in person, and Jorge Juan left secretly at dawn on February 7.

Perhaps it was because the Viceroy's intervention settled the lawsuit; perhaps it was because Araujo changed his strategy of direct harassment against the naval officers to one of discrediting the entire mission --the only way to cover the non-punishment of Juan and Ulloa-- by denouncing its practice of illicit trade. In any case, on his return from Lima, Juan found no obstacles to the continuation of the geodesic work with the rest of the company, while La Condamine, who had gone at the same time to the capital of the Viceroyalty with the main objective of obtaining funds against his letters of credit, had to face the trial brought against him by Araujo for the illegal introduction of merchandise, a trial which --of course-- also implicated, indirectly, the former president Alsedo. When all was said and done, and without any further legal action, the protocol quarrel ended as water under the bridge; as for the trial against La Condamine, in the end nothing could be definitely proven, or no one wanted to provide evidence.

All these tribulations, although they may have slowed down the optimal progress of the scientific work, never managed to bring it to a halt. Thus, for example, La Condamine did not fail to take advantage of his trip to Lima to stop in Loja to study quinine and its fever-reducing properties. This was certainly one of the major objects of interest to the members of the geodesic mission, as well as for the Parisian Academy itself.<sup>57</sup> The first opportunity to make direct contact with the legendary and well-known region of Malacatos came in February 1737, when financial problems were stifling the normal progress of the expeditionaries' activities. Before La Condamine left to cash in his letters of credit, Jussieu had informed him of the desirability of obtaining samples, recognizing the different existing species, and requesting information from the local people about how they used and traded the plant. It is fair, then, to recognize this astronomer as the first to send observations to Europe about Peruvian bark; his outstanding contributions were the drawing and description of the branches, leaves and flowering parts, and these data were used by Linnaeus in 1742 when he did his classification, assigning the genus the name *Chinchona*.<sup>58</sup> La Condamine, however, was not a botanist, and this explains some errors that caused longstanding confusion in the academic circles of the

old country. For example, he thought he had drawn the so-called red quinine, when in fact it was the white variety that illustrated his text. La Condamine himself, who had not shunned this opportunity to win scientific fame for work that was not exclusively his own, asked his readers to judge him with good will: "The short sojourn I made in Loja did not permit me to examine these differences of color, properties, and diversity of species by myself. These examinations require time, and above all the services of a botanist, which cannot be expected until Mr. Jussieu makes the journey."

Perhaps it is because of this that Antonio Alsedo does not give him greater recognition in his article on Loja in the Diccionario geográfico: "The principal asset of this country is quinine, called there cascarilla bark of Loja, which is not found anywhere else, and the whole world is supplied solely from there, creating abundant commerce in this precious plant with all nations. Although it is the opinion of some authors that the Indians knew about its fever-reducing properties and used it, it is true that until 1730 it was not widely accepted there, as they believed that what was sent to Europe and other places was to strengthen dyes, which is what it was used for there; but after they learnt the reputation it has and its properties, they began to do the same, and after Mr. Jussieu, professor of botany, who came to Peru with the academicians of the Paris Sciences in 1735, was in Loja and showed them how to collect it, use it, make the extract of it, distinguish its qualities and other operations as peculiar as they are useful. The vast mountains where this tree grows begin ten leagues before arriving at the plain of Cuzibamba, and they extend towards the province of Yaguarsongo for more than seventy leagues."

However, Alsedo's assertions are true in part. In the first place, if he had read La Condamine's memoir, he would have found out about the early use of quinine by the South American aborigines, as well as about several very valuable documents, such as the ones he collected in Lima at the Jesuit college pharmacy, edited in 1696 by Diego de Herrera, which contain important data about the history and use of the plant. In the second place, but no less decisive, are the aspects of a cultural and anthropological nature appreciated by Juan and Ulloa. In fact, the indigenous people believed that it was counterproductive to use therapeutic remedies considered extremely "hot" to treat an illness like malaria that was classified according to their medico-scientific criteria as hot. This dichotomous conceptual scheme, prevalent in indigenous thinking and largely shared by Hippocratic European medicine, attributed health failures to an upset in the balance of opposites.<sup>59</sup> Thus, it was indicated to treat illnesses classified as "hot" with remedies whose character was essentially "cold." Hence it was not the case that they were

ignorant of the properties of quinine, but that they made a different use of the cascarilla bark of Loja, as they had "effective" methods, in aboriginal medical practice, for transforming a hot or cold medicine into its opposite. However, a much deeper knowledge of the situation was necessary for the academicians to be able to perceive the ample accumulation of popular practices relating to the curative use of quinine. This was accomplished by Miguel de Santisteban, a Spanish official sent by the Crown to Loja. When he presented his Informe on the point in 1753, he appended a manuscript by a local person, probably a medicine man and quinine dealer, who at the age of 80 claimed to have known about the regular use of *chinchonas* to fight malaria and other infectious diseases since his childhood.<sup>60</sup> Leaving aside the question of whether it was the expeditionaries or the natives of Loja who discovered the use of quinine, let us comment briefly on the memoir also written by Jussieu which unfortunately remained unpublished until 1936.

As La Condamine announced, Jussieu, together with Morainville and Seniergues, went to Malacatos in March of 1739. In his "Description de l'arbre à Quinquina," he offered interesting elements of its history, especially in the field of linguistics, as it was the first to identify its name in the indigenous language: "They call it *yara chucchu cara chucchu*. Yara means *tree*, cara the *bark*, chucchu *chills* from fever, hence, the tree of intermittent fever. They also call it *ayac cara*, which means bitter bark."<sup>61</sup>

Undoubtedly, the name by which the natives identified it expresses a definite therapeutic use. This, however, did not get in the way of the academicians' transmitting their own experiences and enriching the culture existing in Loja before their arrival. This is the testimony written by Jorge Juan and Antonio de Ulloa together with their observations: "Mr. de Jussieu...at the same time dispensed the great favor of showing, and pointing out to the Spanish magistrate there, and to the Indians, how to cut it, so it would not be mixed, and so it would reach Europe in purer form; he taught them also a method for obtaining the Extract, and finally he put it to use in that Territory, where it had not been...and although they were not ignorant of its virtue they were not subject to making good use of it, possessed of the apprehension that, since the nature of this Simple was extremely hot, it could not be good for them: but once dissuaded of this, and having experienced its favorable effects, they began to use it with such frequency and, I know, that at present without paying attention to the kind of Fever, they take it for everything."<sup>62</sup>

In sum, it seems that a certain democratization in the use of the

febrifuge came about, accompanied by aspects of acculturation that robbed the medicine men of jealously guarded secrets, and the people of rites that had formed part of their earlier cultural identity.

Along with the knowledge of quinine, this journey to Loja was also the occasion for La Condamine to discover rubber for Europe, and he wrote the first scientific description of it, its origins and its properties, to which he later had another opportunity to add when he went to Cayenne.<sup>63</sup>

But let us return to the lives in Quito of these "gentlemen of the fixed point," as they were dubbed humorously by the natives, who were surely amused by such a fuss over marking the boundaries of the Andes and pointing at the sky. It wasn't all troubles, quarrels and animosity. Our argonauts also enjoyed the hospitality, protection and generous friendship of several select, cultivated residents of Quito. Remember the early meeting between La Condamine and Pedro Vicente Maldonado when the former was still at the mouth of the Esmeraldas on his way to Quito. From the beginning, when they returned to the capital, both Pedro Vicente and his brother Ramón Joaquín Maldonado took the company under their wing and introduced them to the most exclusive social and economic circles in the city. They stood behind them during their worst moments, and they helped them --especially Pedro Vicente-- with the geodesic work. They were extremely useful guides on ethnographic and geographic matters. In addition to all this, the foreigners spend long evenings at the Maldonado house, talking of curious things, relaying news of Europe and reading French books.<sup>64</sup> Or the Maldonados visited them in their respective lodgings. During times of economic hardship for the company, Pedro Vicente, Ramón and José Antonio offered to act as guarantors or made direct loans both to the academicians and to the Spanish navy officers. Among the distinguished families they met in Quito through the Maldonados, special mention should be made of the Creole Casagrande, a wealthy businessman whose daughter Isabel was married to the young Godin des Odonnais, the nephew of the expedition's leader, on December 27, 1741. Although in the midst of all the financial troubles this lucky match was a boon, the marriage must be seen more as a marriage of love than one of convenience, if we follow the long and hazardous vicissitudes that befell both spouses until they met once again in Paris, having decided to move to Europe. In 1749, with the geodesic mission long finished, and the couple having decided to move to the old country, the husband, still a young man, decided to go first to prepare a proper reception for his wife. With this intent he left via the Amazon route; but when he arrived in Cayenne, with neither money nor sponsor, he had to wait fifteen years before he could continue his journey. Finally, in November, 1765, he

had a reply to his entreaties and was able to embark, reaching the French capital in 1766. Meanwhile, the wife, anxious over the lack of news of her husband, finally decided to look for him along the same route, but she also met with misfortune. Crossing the Amazon valley, a fatal accident caused the death of all her companions; nevertheless, this did not prevent her from continuing alone towards Paris, which she did not reach until 1773. Thus concluded twenty-four years of separation and heartache.

But let us not get ahead of our story. If the social life in Quito was gratifying, equally so were the vacations spent in Riobamba, the Maldonado's native region where, during the fall of 1738, they stayed at the ranch of Don José Dávalos, the brother-in-law of Pedro Vicente's, and father of a family possessed of exquisite taste, immense culture and extreme elegance. It was a rare Parnassus isolated in the Andes, in which European music was played with gusto, oil paintings created, and the Memoirs of the Paris Academy of Science translated from the French.

Here we have them, our enlightened argonauts, inevitably caught up in the society of Quito. What a long sweep for these men who were called the "gentlemen of the fixed point" by people who were half suspicious, half skeptical, people in authority who suspected and harassed them, and people who as sharers of their culture admired and offered them devoted friendship. But how did the expeditionaries perceive a social environment that was so diverse, a cultural mosaic so full of subtle shades? Did their experience in South America correspond to the expectations of surrender that Voltaire blazoned with such fervor?

### **Philosophy in Isolation**

The writings the expeditionaries left behind show notable differences between the French academicians and the Spanish navy officers in the attitude to their surroundings. The first testimonies of contact with South America already reveal not only their prejudices but also their indifference to social realities. Jussieu wrote in 1736, "We are going to a country where one can more easily find a gold mine than a wise man. The Spaniard of old is supremely ignorant, our difference is great; I recognize this even though I reply that America is an open place where, on the other hand, with a little knowledge one can learn a great deal."<sup>65</sup>

It is true that ignorance and lack of interest in the sciences was widespread. This is why La Condamine and Bouguer were interested in meeting as many educated men as possible in the Court of Quito. Magnin, Maldonado, Maroni, Alsedo and Dávalos are remembered as if they were phenomena destined to excite European intellectual curiosity. This fact contrasts with the paucity of information about them in the writings of Jorge Juan and Antonio de Ulloa who, in contrast, were more interested in the description of cultural or governmental institutions. They write in the Relación histórica... that the experience of the first work on the high slopes of Pambamarca and Pichincha "...served as an initiation into the life we would have later."<sup>66</sup>

In reality, since they came from a country where science was still not a relevant social institution, their attitude in America could not be so much one of offering experimental observations of interest to European science, but rather one of immersing themselves in the ambience that surrounded them.

And to the contrary, there is a considerable restraint in the writings of the academicians with respect to the reality in which the South American inhabitant lived. One can not even say that he interested them as an object of study; their descriptions are superficial when they are not merely vague abstractions. Such a long stay and such strong conflicts were not enough to erase the culture shock; and in the same way that their perceptions of physical, botanical, geographical or anthropological reality were conditioned by their identity as European scientists and technicians, they were only interested in the inhabitants who were able to express themselves in French and understand geometry or European music. The richest descriptions left to us by the Spaniards, who were interested, for example, in the taste of a meal or the autochthonous procedures of textile production, are the result of an attitude that shows more harmony with their South American destiny. For example, although they coincide with Bouguer and La Condamine in their disdain for or rejection of the values and style of life of the indigenous people, they are nevertheless interested in discovering and imagining the greatness of the civilization that built Cuzco. When they discuss the low cultural level of the region, they attribute it to the poor quality and scarce quantity of existing educational institutions. But they do not stop at that. When they meet educated persons, they notice the rhetorical and useless character of their knowledge, attributing it to "...the poor communication they have with Persons who could instruct them in these things."<sup>67</sup>

As we have said, one can also detect a notable influence on the scientific

authorities who precariously existed in the Royal Court of Quito before the arrival of the expeditionaries. Unlike the case of cities like Mexico or Lima, the two universities of Quito were run by Jesuits and Dominicans. This peculiarity did not indicate special deference to the doctrines of the Church; on the contrary, and especially in the Jesuit centers, students benefitted not only from a greater sensitivity towards modern science, but also from the mobility of their professors and the frequent arrival of Europeans who came to reinforce the missionary work.<sup>68</sup> Furthermore, the careful spatial distribution by provinces, and their integration around a decision-making center located in Quito, made the geographic reconnaissance of the vast territories belonging to the Court necessary. All these observations, sometimes recorded on road maps that connected distant missions to the capital, had built up an accumulation of experience that remained neglected in the principal Jesuit colleges.<sup>69</sup>

On the other hand, the mere exercise of administrative power, or the search for economic alternatives to the situation of prolonged crisis Quito was going through, had generated a growing eagerness to know more about natural resources, population distribution, production and finances in different cities, and so forth. This information, gathered for purely administrative use, was waiting for the arrival of someone who could point out its scientific uses. Along with the Jesuits and the bureaucrats, there were a certain number of Creoles whose interest grew through contact with European culture and drawing-room conversations. They were friends and protectors of the expeditionaries, especially of La Condamine. "In a country where the arts and sciences are generally under-cultivated, there is a small number of people who are the repositories of this sacred fire."<sup>70</sup>

They were really nothing but that, repositories of a brilliant, distant and perfectly ornamental culture. José Dávalos, at "Los Elenes," his hacienda in Riobamba, had amassed a fine library on topics that ranged from theology to optics, passing through philosophy, history and mathematics. And while they discussed modern science, La Condamine tells us that his daughter masterfully performed lovely *partitas* or his son Antonio translated the Memoires de l'Académie. He was not the only such case, as the Marqués de Maenza in Latacunga had also created a Parnassus dedicated to science, which did not want for the most precise instruments nor an observatory that "had every instrument there was, made in London and Paris."

The extravagance of this behavior was known all over the province; the most respectful called Dávalos "the lonely philosopher."<sup>71</sup>

All of them, whether in the peace of the Parnassus or the busy activity of political or missionary life, lived in isolation and without any social recognition of their cultural yearnings. The arrival of the expeditionaries was well-received by these people, who, in exchange, secured a sound academic background necessary for the pursuit of their tasks. The times, however, were not propitious for Creoles ennobled by studies. The drawing-rooms they promoted were soon replaced by the *Academia Pichinchense*, a society dedicated to the cultivation of experimental science and supported by several private persons and the Jesuits. Although founded about 1761, it institutionalized a tradition that had been developing through contacts with the geodesic mission and that had, for example, also decisively influenced the introduction of the teachings of Descartes at the University of San Gregorio in 1745.<sup>72</sup> This was not done in defense of Cartesianism, but as a formal acknowledgment of dialogue with modern science. This, added to the enthusiasm for empirical observation and physics laboratories, constituted an extraordinary advance. Brother Magnin, who had devoted himself to evangelism at the famous mission of Mainas since 1738, finished his Millietus amicus cum Cartesio, seu Cartesius reformatus in 1744 to publicize his sympathy for Cartesianism. Dedicated to the Paris Academy of Sciences with extravagant praises, it includes a prologue in which the intimate reasons for this intellectual effort are explained: "...to look for some relief from the boredom inherent in so many years of toiling with Savages.... Here I am in the farthest corner of America, where everything is missed, among semi-men or semi-animals, as these Indians are, who like wild beasts have their dens in the middle of the forest."<sup>73</sup>

Before this flight through the sublime paths of Cartesian metaphysics, he had published a Breve descripción de la Provincia de Quito and drew the map of Provincia de Quito con sus Misiones de Succumbios de Religiosos de S. Francisco y de Maynas de Padres de la Compañía de Jesús (1740). In both cases Magnin recognizes his debt to La Condamine and the other academicians; it is, obviously, a less sublime but equally influential work. More than just a simple physical description of the territory, it extends to politics (administrative and ecclesiastical organization), economy (communities, natural riches, natural products, botany, zoology, epidemiology) and even the history of the country. There is no room for doubt that these works were extremely useful in the development of the mission, as they were the first attempt at a cartographic reconnaissance of the zone. For Magnin as well as for Maroni, another enlightened Jesuit who had published Noticias auténticas del famoso río Marañón (1738), La Condamine obtained the status of honorary members of the Academy of Sciences. The clergymen, who had expressed such solicitude towards the academicians, thus obtained the recognition of this prestigious



Parisian institution. La Condamine was proud that his quadrant, which had belonged to the Lord of Liouville, came to rest in Magnin's hands.

One more thing can be said about Dionisio de Alsedo's Compendio histórico...de Guayaquil (1741). He also recognizes in his preface that the primary incentive that led him to write it was the presence of the geodesists. Historians do not agree on whether Alsedo's work was plagiarized from the Compendio histórico de la Provincia y Puerto de Guayaquil (1754), which had been written earlier by the Jesuit Jacinto Morán Butrón and presented to him for approval. Whatever the case, it is true that in 1736 a cultural blossoming occurred, directed at what we might regard as a program of scientific identification with the country.<sup>74</sup>

None of the residents of Quito were as heavily influenced as Pedro Vicente Maldonado.<sup>75</sup> A member of a wealthy and illustrious family from Riobamba with extensive property holdings scattered throughout the Kingdom, he proposed opening a road to link Quito with the Pacific, following the course of the Esmeraldas River. The project attracted major interest because the Guayas River was untransitable for half the year, and "...the Province of Quito [found itself] with such vulnerable, infrequent and costly communication with the other Kingdoms that it could not easily import goods from Europe and produce from America, nor export its own."<sup>76</sup>

In addition to solving the technical and financial difficulties, a geographical reconnaissance had to be made of the terrain, an enterprise that was substantially modified with the arrival of the academicians. An exercise that had initially --as in Magnin's case-- not gone beyond a more or less rigorous, but quantitative, description of the country was transformed into a map of great precision in which positions were fixed using the methods and instruments of practical astronomy. The earlier enthusiasm on the part of Maldonado and his family for the experimental sciences was replaced by the rigid methodological discipline imposed by mathematical geography. The change was of such magnitude that Maldonado has justly been called the first Ecuadoran scientist and the first South American geographer: Ecuadoran because his project meant the identification of a market and the integration within it of territories until then divided up according to the interests of the mother country, and South American geographer since his identity as a Creole was added to the elaboration of a map of such precision that it earned the praises of the Royal Society and the Academy of Sciences. Unfortunately, Maldonado, who had gone down the Amazon to accompany La Condamine, was seized by a sudden illness in London, where he died in 1748. By then, during the four years he had been

in Europe, he had amassed a great collection of machines, instruments and books, acquired with the money that came from the sale of all his South American possessions. He had planned to bring them to Quito to pursue his studies.

There is no doubt that this exposition had important repercussions on science in France and Spain, and also in the Royal Court of Quito. It is not surprising that it was around the generically geographic findings that the crystallization in the form of an active science took place, which until then had only paralleled academic culture. This happened firstly because the expedition had an eminently geodesic goal; but secondly and more important, because it dealt with a kind of knowledge that did not require a great deal of complicated methodology. It was a field that had already had a long empirical tradition, especially among the Jesuits, and for which there was considerable social demand. Geography, whether physical or political, became the discipline which supported the takeoff of science in this part of colonial America, and it also led to the birth of a kind of national consciousness. Juan Pío Montúfar's Razón acerca del estado y gobernación política y militar... de la Real Audiencia de Quito (1755), a synthesis of everything that was produced during these two decades of study, demonstrates this. Furthermore, after the geodesic mission the whole territory where the research took place began to be known by the name *tierras del ecuador*, until in 1830 the founding fathers of Independence declared it a nation bearing the significant name of the Republic of Ecuador.

But let us return to the course of events, since new experiences awaited the expeditionaries--contradictions as well as convergence with the colonial world, and once again imponderable contingencies of a material order. These repeatedly delayed the completion of the mission, deepened the differences between them, and finally made the return to Europe into a chaotic diaspora in which it was "every man for himself."

### **The Final Diaspora and the Impossible Return**

In July 1739, when the company was on the point of finishing its geometric mission and starting its astronomical observations in the areas of Tarqui and Baños, they were invited to the fiestas that were to be held a few days later in the nearby city of Cuenca. Two weeks before the event, Doctor Seniergues had been summoned by this city to treat a patient afflicted with a malignant fever. The surgeon took advantage of the occasion to alleviate his

lovelorn condition, and had intimate relations with a local woman, who several days later was insulted by a former suitor in the Frenchman's presence. It does not appear that it was purely humanitarian reasons, as La Condamine suggests,<sup>77</sup> that moved Seniergues to confront the Creoles, but, as Morainville claimed in the ensuing trial, the doctor "contracted illicit friendships" with several other women in the city."<sup>78</sup>

The fact is that on the last day of the fiestas --explains La Condamine-- when the bullfight was over and after several days of growing tension, between 150 and 300 men organized by the vicar Juan Jiménez Crespo started a riot against the French presence, ending with the lynching of the surgeon. Jorge Juan, who with Godin was too far away from the place where the events took place, was unable to avert the tragic outcome. But La Condamine thought a rescue must have been within his reach, since "...the people, always slaves to fear, had great respect for him and had not forgotten that he had bravely rescued his comrade from a incident two years before that was nearly as dangerous."<sup>79</sup>

No doubt he was referring to the occasion on which he drew arms against Araujo's bailiffs, averting Ulloa's arrest.

The truth is that if the tumult began against Seniergues, as the official documents would have us believe, other testimonies confirm not only the danger run by the whole company, but the clear political context the uproar had. Proof of this is in the repeated cries raised at the hanging: "...long live the King and down with the bad government, kill the French (Gavachos)" and other slogans.<sup>80</sup>

The reports that have been preserved about these events systematically hide their political background; but the obstacles, delays, and negligence displayed by the police authorities responsible for pursuing and punishing those responsible for the uprising permits the inference that in some sense this must be seen as another episode of the animosity between the different coexisting ethnic groups.

Another episode that merits special attention for its notable repercussions on the expedition's work was the war with England (1739-48), which almost exclusively occupied the two Spanish naval officers for more than three years in the defense of the South American coastline. Briefly this was the sequence of events:

In May of 1738, due to Spain's many seizures of English merchant ships, there was a very tense moment in diplomacy that nearly sparked the onset of hostilities between the two parties. The talks in London (9-11-1738) and El Pardo (14-1-1739) reached a solution to the crisis, whereby Spain agreed to indemnify the merchants in the amount of £95,000 for damages and losses. Before making the payment, Patiño insisted that the South Sea Company reciprocate by repaying their previously contracted debt of £68,000<sup>81</sup>. When the company refused, Philip V refused to grant the permit boat and the right to transport negroes as stipulated in the treaty of Utrecht. The crisis in English commerce, pressure from the merchants, the lack of control existing in America after the disaster at the Portobelo fair, and the belief that it was possible to inflict a serious defeat on the incipient Spanish Armada led Admiral Edward Vernon, in command of a fleet, to set sail for the Caribbean, "to engage in whatever sort of hostilities against the Spanish that I judge most appropriate."<sup>82</sup>

This precipitated events and in November 1739 England declared war on Spain. A few days later, on December 2, the English fleet appeared in the Bay of Portobelo --which was getting ready to celebrate its fair-- destroying its fortifications and burning the city. The merchants from the South Sea, who were at that moment in Panama with a fortune of about twelve million pesos, decided to transport it to Quito for safekeeping. This event has been seen by some historians as a key factor for the province, which saw its financial situation improve and experienced a rise in its standard of living from misery to poverty.

Since the fleet commanded by Blas de Lezo was still in Cartagena, Admiral Vernon left Portobelo and set sail for Cartagena to attack the Spanish navy. If he had succeeded in this, both the Caribbean ports and the goods in the galleons that had accompanied Lezo from Cádiz would have been undefended. The English Admiral's predictions did not come true, in spite of the fact that the siege of the forts had been so implacable that the worst rumors circulated through the colony and reached Quito, where Bouguer and La Condamine wrote about what was happening.<sup>83</sup> Meanwhile Admiral Anson was trying to get to the South Sea past Cape Horn in order to capture all the ports from Valparaiso to Panama and, perhaps, to intercept the fleet of galleons from the south which were carrying the treasure of the Lima merchants.

Jorge Juan and Ulloa, who were in Cuenca making astronomical observations, were summoned by the Marques of Villagarcia, Viceroy of Peru, to come to Guayaquil and assist with its defense in case of an English attack. When the southern winter began and no English presence had been detected yet

in the Pacific, Juan and Ulloa obtained permission to go to Quito and pursue their work. They had only been there three months when, on December 5, 1741, they received the news of the sacking of Payta by Admiral Anson's squadron. Fearing that the English would attack Guayaquil, the authorities again summoned the two officers to the port. Once more La Condamine reported the events: "No doubt you have heard the news about the razing of Payta. The President has gone to Guaranda; the Spaniards as well as the volunteers did not want to accept the command of the provincial troops, unless those of Guayaquil and the magistrate were also under their orders."<sup>84</sup>

The dissent between the officers and the military authorities of the zone go totally unmentioned in the Relación histórica...<sup>85</sup> Las Noticias Secretas, however, is full of references to the poor state of the defenses, troops and administration, which was the basis for the navy lieutenants' demand to be given full command of operations. Events proved that their plan was not accepted; and we will see that they were occupied with defense duties distinct to those they had requested. "I found out later," La Condamine wrote to Bouguer, "that they wanted to embark for Lima or the first port where they could reach the squadron that was waiting in Lima, and that they had reached Buenos Aires not having been able to go around Cape Horn."<sup>86</sup>

In any case, once it was verified that Anson had gone north, and again confirmed that the bay's defenses were in acceptable condition, Ulloa decided to return to Quito, leaving Jorge Juan in Guayaquil. As soon as he arrived he received new orders from the Viceroy for both of them to go to Lima immediately. On February 26, 1742, after fetching Juan in Guayaquil, they reached the capital of the Viceroyalty. There they experienced the earthquakes of May, June and October of that year, and in the nearby port of Callao they had to take charge of reorganizing its defenses, drawing plans and maps of the fort and the nearby shoreline and, especially, arming two merchant ships, the *Belén* and the *Rosa*, whose command they assumed on December 4, 1742 to inspect the coasts of Chile and the islands of Juan Fernández and, as the case arose, prevent or warn of the entrance of new English reinforcements in the Pacific. For more than six months they sailed between the ports of Valparaiso, Concepcion and Juan Fernandez, until, the danger past due to the arrival of winter, they anchored again in Callao in November 1743.

Juan and Ulloa's prolonged absence from the place where the astronomical observations were taking place would have hindered the inclusion of their work had it not been for the constant help they received from Godin. On the other hand, all those voyages allowed them to acquaint themselves with numerous

ports. They took copious notes, which they later worked into a long report on local customs, civil and ecclesiastical administration, commerce and the military, and cartography and planimetric measurements. The work undertaken at the arsenal of Guayaquil and the fort and citadel of Callao were especially important for their later repercussions. "We were ordered to go to the fortress of Callao, to survey its defensive fortifications, and to oversee the construction of two small galleons which have been ordered to be built there, so that together with six that were being built in the Guayaquil shipyards they could provide opposition to any landing the enemy (in case they enter this Sea) might attempt; and having the verbal permission from His Excellency, to build under our direction what was lacking, one of us took on this task, and the other took charge of drawing the Plan of the Fortress."<sup>87</sup>

The War Council held in Lima (12-8-1740) decided to demand the presence of the two navy lieutenants and put them in charge of the construction and arming of eight small galleons; in addition to this, the Minister of the Admiralty ordered them to draw up plans of the ports, anchorages and boundaries of the coastline of the Viceroyalty.

Jorge Juan's participation --Ulloa took charge of the plans-- in the building of the ships must have been considerable, according to the information contained in the Noticias secretas de América. We can see that his subsequent influence on the the Spanish method of constructing in the *English style* in the 1750's, had its earliest antecedent in the activities which he was obliged to carry out during his years with the geodesic expedition. This was a period in which both men took advantage of their training in different but complementary aspects of scientific activity. While Jorge Juan took charge of astronomy and naval construction, or, in the terminology of the age, *mixed mathematics*, Ulloa specialized in knowledge in the fields of geography and natural history, practising these sciences in the most enlightened sense of the word.

Finally, as we have said, one of the most obscure points in the history of this expedition concerns the dispersion and diversity of the routes by which its members returned to Europe. Remember the vicissitudes of one Godin des Odonnais, and keep in mind that twenty-seven years elapsed between Bouguer's return to France and Jussieu's, while other members of the expedition remained in America, for various reasons, until their deaths. One might say that except for a few contacts with the Academy, the financial and scientific links with France were suspended around 1740. The Spanish-English War and the growing hostility in the relations with the colonial administration left the astronomers isolated, and this caused them to grow discouraged and impatient,

which aggravated the distrust and deepened the divisions among them. We can well understand La Condamine's words written to Bouguer in 1741: "Perhaps I am the last to repent having made the journey, but my repentance increases with every day this grows longer: it is especially the length of the mission that makes me lose my patience. For a long time I have asked myself about all of this, and I have become aware that if I had known the future, I would have accepted the voyage and its duties for three years, but if I had foreseen that it would last six years, which we have now completed, I would never have decided to undertake it."<sup>88</sup>

If he had known then that he still had three long years to spend on South American soil! To the immediate causes of discouragement we must add, with hindsight, that the first purpose of the expedition --to resolve the polemic about the shape of the earth-- had been accomplished years before by Maupertuis in Lapland. With that, the hope of making a "first discovery" was lost, and for some of those appointed by the Academy, desirous of prestige and fame in Europe, that had been the only reason for undertaking the trip. This was true of La Condamine, who furthermore, because of his long absence, lost his post as Director of the Jardín de Roi to Buffon. It was also true of Jussieu, encouraged by Bernard and Antoine to gain a place in the Academy in spite of his youth, and, of course, of all the lesser-ranking members, such as Hugot, Couplet, Morainville, Godin des Odonnais and Verguin himself. The information we have about Seniergues, however, permits us to venture the hypothesis that his interests leaned more towards the desire to make a fortune by trading in precious metals and gems.

Whatever the case, the mission became an odyssey with no end in sight, and Europe seemed an eternally postponed Ithaca. We know what day Bouguer decided his observations were finished and began making preparations to leave; but it is really not possible to accurately designate any specific date as the last day of the mission. By 1739 the academicians began writing to their colleagues that the work was coming to an end. In a joint declaration made on May 10, Bouguer said he had finished and was ready to return to Europe. Nevertheless, in spite of his preparations he had to delay his return due to the outbreak of war with England. Things being as they were, Godin revised his calculations and told his compatriots that he had found serious variations in the positions of the stars observed which could not be explained according to theoretical predictions. He recommended, therefore, that they repeat the astronomical observations and rebuild the instruments to which he initially attributed the errors.

La Condamine and Bouguer set about revising their calculations and observations, and one wrote to the other in 1740, "Sir, yesterday I finished calculating the length of the meridian."<sup>89</sup>

Fearful that Godin's alarm might be true and that, without new verifications, hasty communication of their results to the Academy might be easily criticized by the head of the expedition, the scientists were still announcing the end of the observations in 1742. In fact, doubts and hesitations about the accuracy of the data began to arise in 1740. This circumstance cannot be explained by considerations intrinsic to the scientific method. Rather it was due to the situation of conflict in personal relations, which were so extreme that when they returned to Paris the Academy had to appoint judges to pass judgement on their many incompetent and irresponsible actions.

They all blamed each other for causing the delay, and even though in fact they had the final results, months went by without anyone daring to make them public. The verifications that held them back were not merely incidental uncertainties --evaluating errors of measurement, considering effects initially not taken into account-- but there is no doubt that for these they lacked not only instruments of theoretical analysis but also sufficient equipment for experimental corroboration, as they were well aware.

On January 24, 1742, Bouguer wrote from Quito to Reamur and De Mairan, members of the Academy, informing them that if he had not already returned it was due to the despotism and authoritarianism of Godin, who was keeping them there because he had to verify observations that he had not made correctly.<sup>90</sup> A month later Jussieu confirmed the fact that everything was ready to return home: "In a few months I think we will be ready to leave for France."<sup>91</sup>

As the company was still divided into two groups, as it had been almost from the beginning, the departure was delayed yet another year. While La Condamine and Bouguer, who were respectively in Tarqui and Cochesqui, checked their observations until the early months of 1743, Godin awaited the return of the Spaniards so he could finish his work.<sup>92</sup> In February of 1743 events took place which broke the group's discipline: by common agreement in 1739 they had committed themselves to presenting the results in Paris in unison. In spite of the Academy's instructions which obliged them to return along the Amazon route, each one of them now decided on his own route home.

On February 20, 1743, Bouguer reached Quito from Cochesqui, ready to



begin his journey home to France. Advised by Pedro Vicente Maldonado, with whom he had forged a close friendship at the end of 1740,<sup>93</sup> and by Miguel de Santisteban,<sup>94</sup> who apparently accompanied him on the journey, he decided to follow the course of the Magdalena River to the Caribbean and from there to Santo Domingo, from where it would be possible to sail on a French ship.<sup>95</sup> In July 1744 he reached Paris and with consummate speed, wanting to be ahead of the rest of his colleagues, began the reading of his Relation abregée... on the 29th of the same month.<sup>96</sup> Aware of the consequences that would come of being seen as the group's spokesman, and in light of the news of La Condamine's imminent arrival, on January 30, 1745, he deposited four letters that seriously compromised Godin's scientific prestige with the Secretary of the Academy, letters that also affected La Condamine's reputation. On February 23 La Condamine arrived in Paris and Bouguer, anticipating the conflicts that in fact were to occur over matters relating to his countryman, demanded the appointment of two commissioners to examine his report.<sup>97</sup> This started a bitter dispute between the two academicians, who exchanged letters of point and counterpoint for years, a dispute that eventually proved boring both to themselves and to everyone else.

Two months after Bouguer's departure from South America, La Condamine received the news and made preparations to leave as soon as possible. In accordance with the Academy's instructions, he ventured to make his return trip by following the Amazon River, which would allow him to write the first scientific description, according to the French chronicles of the times, of the geography and vegetation of that region. After a short stay in Loja to complete his observations on quinine, he left Jaén on June 23 to travel along the Marañón. During the first part of his crossing, from the city of Borja, he was accompanied by the Jesuit P. Magnin; five days later, on July 19, in a place known as Laguna, he met Pedro Vicente Maldonado, with whom he travelled as far as Pará.<sup>98</sup> The opinion formed in French intellectual circles about La Condamine's Amazon experience certainly seems incorrect. Today it is known that he made extensive use of the letters and descriptions that the Jesuit missionaries of Peru possessed about Marañón and the Amazon. In particular he used the letter by P. Fritz that is preserved in the archives of the College of San Francisco in Quito. It is also worth pointing out again the constant cooperation he received from P. Magnin and, of course, from Pedro Vicente Maldonado. The Frenchman, ill, lacking a passport, and afraid of losing his papers due to the war, decided to go up the Atlantic coast to Dutch Guyana. Meanwhile, Maldonado embarked on a Portuguese fleet on December 3, 1743, carrying La Condamine's "scientific testimony" and responsible for delivering it to the French ambassador in Lisbon.<sup>99</sup> La Condamine did not leave South

American shores for Amsterdam until September 3, 1744, arriving on November 30. Finally, on February 23, 1745, at a solemn public session of the Academy, he read a summary of his Amazon journey,<sup>100</sup> and only two months later the long polemic began with Bouguer to which we referred above.

It is not easy to reconstruct this part of the life of the head of the expedition. The biography of Luis Godin was systematically obscured or silenced by his own companions in the Academy. In general, French historiography, unlike Spanish or Peruvian --partly for lack of information--has cast undeserved criticisms at him, which are based on his refusal to publish the results of his observations. Taking the easiest route, it has been supposed --in accordance with the negative opinions spread by La Condamine and Bouguer-- that this absence of publications confirms his mediocrity and incompetence. Added to this is the fact that he delayed his return to France for more than six years, during which time he held posts in the service of the Spanish Crown. As we will see in the next chapter, the inaccuracy of the criticism concerning his scientific knowledge is now proven, and here we will see what caused his long stay in America.

In 1743, Godin received an offer from the University of Lima to take charge of the chair of mathematics that had been vacant since the death of its incumbent, Pedro Peralta.<sup>101</sup> Ulloa comments, "After he accepted, the Viceroy was very pleased with the good choice that the University had made in him, and knowing about his great talents, after having confirmed him in the post they also honored him by conferring the title of His Majesty's Cosmographer and other similar titles."<sup>102</sup>

It still seems surprising that Godin, a member of the Paris Academy of Sciences, committed himself to remain in a city where his scientific activity and his own personal prestige would suffer serious deterioration because of the distance and isolation from the centers of scientific power in Europe. He had to accept the post, said Ulloa, because he was not "...in a position to go to Europe for the time being, although he wanted to, because first he had to finish some affairs having to do with his Company...."<sup>103</sup>

And no wonder he was not in a mind to return, with a personal debt of three or four thousand pesos! Given the precarious financial condition of the company --poverty stricken once again!-- Godin had proposed in the past to divert the course of the Pique River in order to recover a treasure supposedly worth 30,000 pesos from its bottom.<sup>104</sup> But, with the imaginative project that would have benefitted the whole company a failure, the astronomer was left

with a debt contracted in his own name, with no choice but to accept the university post. In 1745 Jussieu wrote to his brother, referring to Godin's projects: "Mr. Godin is in Lima, where he occupies the chair of professor of mathematics left vacant by the death of Mr. Peralta; it will soon be a year since he left."<sup>105</sup>

However, he never lost hope of returning to his country in the same financial condition in which he had left it. Worried by the sanctions with which the Academy might punish him on his return, he asked the University of Lima to write to Paris and testify to his situation. The letter, dated November 1744, did not reach Paris until March 1746<sup>106</sup>, too late. On October 13, 1745, the King had ordered a substitute appointed to fill his place, and he was thus considered expelled from the Academy.<sup>107</sup>

As for his activities as professor of cosmography and mathematics, as well as his conscientious editorship of La Gaceta de Lima, we know almost nothing.<sup>108</sup> On the other hand, documentation is abundant on his participation in the task of reconstructing the city after the terrible earthquake of 1746.<sup>109</sup> On October 26, at 10:30 at night, a violent tremor lasting more than three minutes, preceded by terrifying subterranean rumbles, flattened 2975 dwellings. Only twenty-five houses were left standing in the city. Even the great public buildings of the Viceroyalty's capital suffered serious damage, when not totally or partly demolished. One of the towers of the Cathedral fell on its dome, and the cemetery itself was laid open like a frightful common grave with the corpses all tumbled together. Of the health centers, only the Hospital of San Juan de Dios, recently inaugurated, withstood the attack. The city walls, the mint, the sanctuary, numerous convents and churches, even the Pizarro Palace itself, the seat of government, were rendered useless and in ruins.<sup>110</sup> The catastrophe, without a doubt, brought an end to the great Baroque style of Lima. But the greatest tragedy occurred among the population, with more than a thousand dead. During the next twenty-four hours another two hundred tremors shook the area, whose inhabitants, before suffering the consequent epidemic scourge, were also punished by avalanches produced by the eruptions of Lucanas and three other volcanoes in the region of Cajamarca. Even so, all this misery was little in comparison to what happened to the port of Lima, where the violence of the gigantic waves destroyed nineteen of the twenty-three ships moored in Callao, leaving only two hundred survivors out of its four thousand inhabitants.<sup>111</sup>

Godin's services were needed right away, and on November 10 he was commissioned by the Viceroy to evaluate the damage and propose a

reconstruction plan. His suggestion that they move the city to another location was rejected out of hand by the government because of the excessive costs projected. This plan was followed by his recommendation that tall buildings be prohibited except in cases of construction for government or cultural centers, "...giving them a certain diminution in the thickness of their walls, that would be a decimeter of their height, so that having eight yards of height (which seems enough for the temples which have to be rebuilt), this diminution would amount to four quarters of a vara, dividing it equally for each house of said wall, in such a way that it deviates from the plumb line from two-fifths of a vara to eight varas of elevation."<sup>112</sup> Godin's plan involved almost totally changing the physiognomy of the city, which would have to be extended beyond the confines of the old city walls. The reasoning he brought to bear was doubtless overwhelming; with respect to the churches, his criterion was that "...to build towers on the temples is to open tombs once again for the parishioners."

He proposed the similar standards for private buildings: "In no case will second floors be permitted, neither adobe, nor framework, nor anything else higher than the roof of the dwelling, which must be made with beams."

Although the Paris astronomer's report was well received, its cost was high and resistance was strong to acceptance of such profound urban restyling. While the general plan was rejected, in spite of the modifications he introduced in a second report dated November 25, several particular projects, like the reconstruction of the Cathedral and, especially, the fortification of Callao, did not meet with the same fate. Construction had already started on his hexagonal fortification plan by January 1747, and it was finished in 1761. The work he planned, however, had to be done without his presence, since the time was drawing near for his departure for Europe.

In 1747, Jussieu received orders from the Count of Maurepas to go to Lima and retrieve several instruments from Godin, especially the Peruvian toesa which was still in his possession.<sup>113</sup>

On his way to Lima, passing through the mythical province of Canelos, the botanist took advantage of the situation to do some herb collecting.<sup>114</sup> His arrival in Lima at such a dramatic moment caused a change in travel plans. As had happened in 1743 with the yellow fever epidemic that swept through Quito, the Viceroy required his assistance, and he had no choice but to join the debilitated health structure in the capital. Soon, however, the luck of the two French scientists changed. Efforts by Juan and Ulloa, who had been in Madrid

for a year, were successful in getting Godin named Director of the Cadet Academy in Cádiz on August 29, 1747. Godin, for whom the possibility of returning to Europe had been constantly receding, expressed his pleasure in his letter of acceptance: "The favor with which your Majesty honors me in appointing me to the post of Director of the Royal Naval Academy is for me as honorable as unexpected.... I accept it of course, full of the most respectful obedience and the greatest pleasure." <sup>115</sup>

His emotional words of thanks are certainly believable, and the news that his debts would be paid by the Crown must also have been well received. And, in fact, with the payment of the 3796 pesos that his creditors were demanding, a quantity that perhaps he never would have been able to raise working in his current job, he was free of all obligations by July 1748. A few weeks later, he left for Buenos Aires planning to travel through La Paz and the mines of Huancavélica and Potosí. It took him twelve months of remarkably hard travelling before he reached the Atlantic coast. <sup>116</sup>

We know that in the middle of 1749 they were in La Paz, where they probably separated to follow different routes--Jussieu went to Potosí and Godin continued to the capital of the Argentine. Before they parted ways, Godin asked Jussieu to write to his brothers and request they have him readmitted to the Academy. "M. Godin, my traveling companion, has asked me to send his regards and express his sincere friendship, he has always spoken of you in words that indicate he considers you are aware of the injury that has been committed against him. I beg you and your friends to try to have him readmitted to the Academy as a veteran member without pension or salary." <sup>117</sup>

His readmission to the Academy, on the terms expressed in the letter, became a reality by Royal Order on June 16, 1756 at a solemn session attended by Godin himself. <sup>118</sup>

On July 29, 1750, he left Buenos Aires on a Portuguese ship, passing through Rio de Janeiro --where apparently he saw La Caille, who was going to Cayenne to do his geodesic and astronomical observations-- and through Lisbon.<sup>119</sup> In 1751 he reached Paris, where he met Ulloa and received Ensendada's administrative order to assume the post of Director of the Cádiz Academy as soon as possible, a job he held until his death in 1760.

Jussieu, meanwhile, was one more victim of the economic hardships that plagued the expeditionaries until the very moment of their return, difficulties that must have been tragic for the lower ranking members. Jussieu wrote in

1743, "My medical practice allows me to think seriously of leaving this exile and not waiting M. Godin's help, which is of little concern to him."<sup>120</sup>

It was just as well that he sought his own source of income, since, as we have seen, Godin was in no position to help anyone. When Jussieu was ready to leave Quito, there was an epidemic of malignant fever that delayed him, his medical services being required at the request of the local authorities. During the entire duration of the expedition, and especially after the assassination of Seniergues, which deeply affected him, he showed constant signs of being sickly and melancholy. The terrible epidemic in Quito finally convinced him to delay his return almost indefinitely for reasons of health and humanitarianism. In 1743 he wrote to his brother: "My stay in Peru gets more and more miserable and insufferable, I am plunged into profound melancholy, illness pursues me, and on two occasions I have been on the point of losing my life. Recently I was attacked by a pleurisy accompanied by symptoms of epidemic illness and I thought I was going to die of it; since I didn't think I would live I took the precaution of receiving all the holy sacraments and of making a will."<sup>121</sup>

After separating from Godin, his journey through America was incredible. From Potosí he returned to Lima, where in 1750 we find him performing various jobs and, apparently, perfectly integrated into the South American style of life. In 1751 a nine-year-period began in which he stopped writing to Europe, a fact that caused him to be made a veteran pensioner, as had happened years earlier to Godin.<sup>122</sup> The manuscripts kept in the Paris Museum of Natural History show, however, that he still pursued his botanical studies, although they are interleaved with other works for the Spanish Crown. Domingo Jáuregui, a Spanish military officer stationed in the Viceroyalty, wrote to Bernard Jussieu on his return to Spain with accounts of Joseph's activities and the way he was working on the lakes of Potosí "...to increase the water level which, since it is used to crush metals from the Plata mines, must have thus caused him to help increase the assets of the Royal Treasury along with the universal relief of the community. In the city of La Plata, he opened a road through the mountains of limestone and rock to prepare the way for a bridge."<sup>123</sup>

In 1759, Jussieu and A. de Ulloa, at the time named governor of the mines of Huancavélica, met again in Lima, and although the Spaniard encouraged him to return, it was not until 1771 that he undertook the journey to the old continent by way of Panama and Santo Domingo. He reached Paris in the same year, ill and with his mental faculties seriously diminished.

We can say practically nothing about the rest of the expedition. Verguin,

who was taken by surprise in Quito by the terrible plague of 1743, fell gravely ill and was not able to undertake the return voyage until 1745, by way of Guayaquil, Panama and Santo Domingo; he reached France in 1746.<sup>124</sup> Morainville stayed in Quito, soon separating himself from the rest of his colleagues: La Condamine is the only one to offer precise information about him, "M. de Morainville, who stayed in the province of Quito, killed himself falling from a scaffold on a church he was building in Cicalpa, near the city of Riobamba."<sup>125</sup>

Finally, of the mechanic and watchmaker Hugot we know even less. In 1746 he wrote to Jussieu in almost pathetic words describing the situation in which the academics had left him. "So I stayed in Quito, where I spend my life working to pay off my debts with sweat and toil."<sup>126</sup>

We assume that, like Couplet, Seniergues and Morainville, they must have died without returning to his native country.

The same thing happened to Pedro Vicente Maldonado, who sold his Ecuadoran possessions to enable him to move to Europe and buy books, instruments and machines which he wanted to install in Quito in a modern laboratory dedicated to the advancement of the sciences. As soon as he reached Madrid he directed his first activities towards the goal of securing his appointment as Governor of the Province of Esmeraldas, which was accorded to him on November 17, 1745 in the Audiencia of that city, in reciprocation for his having invested personal resources towards the construction of the road linking Quito to the Pacific. To demonstrate his merit and arguments, he wrote and published his Descripción de la Provincia de Esmeraldas (Madrid, 1744), in which he presented a systematic study of the geography, resources and population of a practically unknown zone of the country. When his negotiations with the Council of the Indies concluded satisfactorily in his interests, he moved to Paris. There his friend La Condamine helped to introduce him to academic circles and to obtain the title of corresponding member of the Academy of Sciences on March 24, 1747. By then, he had already participated under the orders of the Duke of Huescar in the Flanders campaign, and decided to publish his map of the province of Quito in France. His traveling companion on the trip through the Amazon was not the only sponsor he had in Europe. Before he left America, Jussieu gave him a letter of introduction to his brother Antoine, in which he expressed his deepest affection for the Creole from Riobamba. "I beg you to treat this gentleman with all you have to offer, as he is worthy of every attention and very deserving, respect him as if it were myself."<sup>127</sup>

Undoubtedly, Maldonado had good friends and was the object of sincere affection among all the members of the geodesic expedition.

We have already taken the opportunity to mention the merit and importance of his contribution to the geographic knowledge of the Kingdom of Quito. The Mapa which was posthumously published by La Condamine in Paris in 1750 was justly praised by all the scientists who saw it. We will not dwell on the list of positive reactions it received at the Royal Society and the Academy of Sciences. We will simply point out one of the most meaningful features that set it apart from earlier convention, particularly from the work done in 1707 by the Jesuit Samuel Fritz. A comparison of the two maps shows a radically different concept of geographical space. While in Fritz's work the center of the map is occupied by the great fluvial route of the Amazon River, Maldonado's has as its axis the meridian that passes through the tower of the Church of La Merced in Quito. Obviously, this is not only a reflection of two nearly opposite visions of the country, one linked to missionary work and the other to the economic and political organization of the territory; it also reflects different techniques of collection and codification of geographic information coming from different sources and distinct methodologies.<sup>128</sup>

Unfortunately, Maldonado died in London on November 16, 1748 in strange circumstances. Among Jussieu's papers there is a note in which one may read that his death was caused "...by a malignant fever, and that [he] was buried without ostentation and secretly.... He was generally respected by scholars, to whose numbers he belonged because of the curious discoveries he had made both in the sciences and in his extraordinary productions on nature."<sup>129</sup>

And, in fact, while he was waiting in La Laguna for La Condamine, he had time to observe the curious use the indigenous people made of curare as well as the technique of preparing it through long cooking of the shoots of a vine known today as *Chododendron Tomentosum*. This was the topic of the report sent to the Royal Society on October 12, 1748, which validated his being named a Fellow. The issue of the poisons called *Ticunas* awakened a growing interest in European scientific circles, first of all because they were looking for a potent muscle relaxer that could be used in surgical interventions.<sup>130</sup> It was also of interest, however, because it was hoped that a therapeutic remedy effective against smallpox and rabies could be found in poisonous substances of vegetable origin, as experiments with animal venoms had failed.<sup>131</sup> This explains the warm welcome Maldonado received in London. Nothing would have pleased him more than to have returned to his own country with the



solution to one of the health problems that periodically ravaged the Andean region. His premature demise prevented this, depriving the Kingdom of Quito of one of its most able men. However, it is right for us to include him in the list of active members of the expedition.

Thus ends an adventure that speaks for itself. As a final comment on the intensity of this undertaking, let us confess that we ourselves have felt the nostalgia for America that must soon have burdened those who succeeded in returning to the old continent, as well as the nostalgia for Europe that surely stayed with those who remained in America until the end of their days.

## NOTES

1. A. Lafuente and E. Estrella, "Scientific Enterprise, Academic Adventure and Drawing Room Culture in the Geodesic Mission to Quito (1735-1755), XVII International Congress of History of Science (Berkeley, 1985), Vol. V.

2. The most interesting parts of this memoir have been published by Luis J. Ramos Gómez, Las Noticias secretas de América de Jorge Juan y Antonio de Ulloa, 2 vols. (Madrid, C.S.I.C., 1985), I, pp. 6-8 and Note 14. All the documents, together with this memoir, that antedate the Royal Decree of August 14, 1734, can be found in A. G. I., Indiferente General, 333. For his part, La Condamine had proposed Cayenne.

3. Maurepas to Champeaux; Marly, 27-2-1734. A. N. P. Marine, B<sup>7</sup> 147, p. 324.

4. The instruction was dated in Versailles, 25-1-1735. Archives Nationales (Paris), Colonies, B63, F<sup>o</sup> 366-367<sup>v</sup>.

5. The entire process of the consultation with the Council of the Indies is recounted in detail in L. J. Ramos Gómez, op.cit., I, pp. 8-11. Also in A. Lafuente, "Una ciencia para el Estado: la expedición geodésica, hispano-francesa al virreinato del Perú (1735-1743)," Revista de Indias, 43 (1983), 549-629.

6. Champeaux to Maurepas; Madrid, 3-5-1734. A. N. P., Marine, B<sup>7</sup> 324.

7. Conserved in the same file is a French translation of the text reproduced. "Extrait d'une lettre de Madrid sur l'affaire des accademiciens qui demandent d'aller au Perou pour y faire des observations astronomiques et botaniques du 11 juillet 1734," A.N.P. Marine, B<sup>7</sup> 324. In the margin is written "M. Du Fay approuve tres fort que ceux deux Espagnols soient du voyage." Also written in the margin is, "Joint á la lettre de M. Champeaux du 12 juillet 1734"; however, the file contains three letters with that date and none of them makes reference to the topic of the expedition.

8. Champeaux to Maurepas; Madrid, 18-10-1734. A.N.P. Marine, B 325.

9. "Instrucción que han de observar los tenientes de navío de la Real Armada Don Jorge Juan y Don Antonio de Ulloa, que S. M. ha mandado pasen al reino del Perú a asistir a las observaciones astronómicas..." José Patiño, Minister of the Navy, April 22, 1735. Archivo General de Indias, A. G. I., Lima, 590. Reproduced by L. J. Ramos Gómez, op. cit., I, pp. 22-25.

10. "Copie de la lettre de M. Jussieu ecrite a M. de Par. A Panama á 15 Fèvrier 1736", Bibliothèque Centrales du Museum d'Histoire Naturelle (M. H. N.) ms. 179.

11. A. Lafuente, "Una ciencia..." op. cit., pp. 555 and 558.

12. Maurepas to Champeaux; Versailles, 17-7-1734. A.N.P. Marine, B<sup>7</sup> 148, p. 106. Maurepas to Du Fay; Versailles, 24-7-1734. A.N.P. Marine, B<sup>7</sup> 148, p. 190. Maurepas to the French agent in Cadiz, M. Caillet; Fontainebleau, 18-10-1734, A.N.P. Marine, B<sup>7</sup> 148, pp. 758-763.

13. A.G.I. Lima, 590. Collected by La Condamine, Journal... p. 277. Published by L.J. Ramos Gómez, op. cit., I, 14-15.

14. Maurepas to Champeaux, Versailles, 28-8-1734. A. N. P., Marine, B<sup>7</sup> 148, p. 410.

15. A. Lafuente, "Una ciencia...", pp. 577 ff.

16. Both documents are found among the papers which Jules Maillard de la Gournerie compiled: Archives de l'Institut de France (Paris), AIF, ms. 2118. The first text is from a letter from Maurepas to Godin

dated at Versailles, 15-4-1737. The second is from another, written by the French consul in Cádiz, Partyet, to Domingo Miranda, business agent in Cartagena de Indias.

17. Letter from J. Jussieu to A. Jussieu, 16-3-1745. M.H.N., ms. 179.

18. In a letter from Maurepas to Champeaux (Versailles, 11-9-1734) he urges him to put pressure upon the authorities, "...if this nomination is postponed, it might hamper and delay the activities of the academicians, on the pretext that they have not yet arrived; it is necessary that you cause this difficulty to disappear in the orders that the Council of the Indies is ordered to issue..." A.N.P., Marine, B<sup>7</sup> 148, p. 515.

19. J. F. Guillén, Los tenientes..., *op. cit.*, p. 22.

20. Champeaux to Maurepas, Segovia, 4-20-1734. A.N.P., Marine, B<sup>7</sup> 325.

21. Jorge Juan's appoint to lieutenant in the Navy is found in the Archivo General de la Marina (Viso del Marqués), AGM, Expedientes personales, Jorge Juan. The Royal Order of 3-1-1735 awarded 40 *escudos* monthly to each of them from the day of their embarkation to America "so that they might attend to all the observations that they need make" (fols. 1-6). Four days later (Cadiz, 7-1-1735) the amount was raised to 60 *escudos*, with the indication that they were to "go with the aforementioned astronomers to assist them in all the observations and maps they might make to improve navigation to the Indies and each separately report everything that they might do according to the instruction which will be given them for their conduct" (fols. 7-10). Another Royal Order (Buen Retiro, 1-9-1735) orders that they be given every kind of assistance on this mission, such as that their travel and freight expenses be paid from the American royal treasury. The three documents are in the Archivo del Museo Naval, A.M.N., ms. 2197.

22. A.G.I., Lima, 590, fols. 68<sup>v</sup> and following. The Instruction is reproduced in full by L. J. Ramos Gómez, *op. cit.*, I, 23-25.

23. Maurepas to Champeaux, Versailles, 2-4-1735. A.N.P., Marine, B<sup>7</sup> 150, p. 565. We know from another letter from Maurepas to the naval intendent in Rochefort, M. de Beauharnois (Versailles, 14-12-1734) that as of April 2 the three academicians had not yet been abandoned. See this letter in A.N.P., Colonies, B 62.

24. Maurepas to Beauharnois (Versailles, 11-4-1735), where he informs him of the changes that had taken place in the company, which was to move to Quito; A.N.P., Colonies, B 62, fols. 152<sup>v</sup>-153.

25. Maurepas to Beauharnois (Versailles, 14-12-1734). A.N.P., Colonies, B 60, fols. 269<sup>v</sup>-269<sup>v</sup>. Maurepas to Beauharnois (Marly, 15-2-1735), A.N.P., Colonies, B 60, fol. 142. A.G.I., Quito, 134, fols. 367<sup>v</sup>-400<sup>v</sup>.

26. Letter from the Marquis de Fayet to Maurepas; Petit Goâve, 6-9-1735. A.N.P., Colonies, C<sup>9A</sup>-41.

27. La Condamine, Journal..., p. 10.

28. A. de Ulloa, Relación..., II, 267. On the living conditions of the expeditionaries in America, see also Relación..., I, 307ff.

29. La Condamine, Journal..., pp. 3ff.

30. Joseph Jussieu to his brother Antoine, Portobelo, 16-12-1735. M.H.N., ms. 179, p. 4.

31. See above, p.6 of this chapter.

32. We have extracted some data relating to the life, climate, customs, complementary information, and so forth, on the ports and cities through which the expeditionaries passed from the corresponding articles in the

Diccionario Geográfico de las Indias Occidentales o América by Antonio de Alsedo, Ciriaco Pérez Bustamante, ed. (Madrid, Biblioteca de Autores Españoles, 1967).

33. La Condamine, Journal..., p. 10.
34. Panama, February 18, 1736. M.H.N., ms. 179.
35. Juan and Ulloa, Relación histórica..., pp. 190-191.
36. Neptalí Zúñiga, La expedición científica de Francia del siglo XVIII en la Presidencia de Quito (Quito, 1977), p. 18 and n. 4.
37. La Condamine, Journal..., pp. 14-15.
38. A.G.I., Quito, 133; and N. Zúñiga, op. cit., pp. 19-24, 25; and J. Guillén Tato, op. cit., p. 53.
39. A. de Ulloa, Relación..., I, 348ff.
40. Antonio de Alsedo, Diccionario Geográfico..., 3 vols. (Madrid, 1967). See the articles corresponding to the place-names Cartagena, Portobelo, Chagres, etc.
41. Letter from J. Jussieu to A. Jussieu, Portobelo, 16-12-1735. M.H.N., ms. 179, p. 4.
42. Antonio de Alsedo, Diccionario Geográfico..., III, 230.
43. Ibid., II, 176.
44. Eduardo Estrella, Medicina y estructura socio-económica (Quito, 1980).
45. J. Jussieu to A. Jussieu, Quito, 26-6-1744. M.H.N., ms. 179.
46. A. Ulloa, Relación..., I, pp. 385-386. See also, V. Paredes Borja, Historia de la medicina en Ecuador, 2 vols. (Quito, 1963); M. Madero, Historia de la medicina en la provincia de Guayas (Guayaquil, 1955).
47. A. de Ulloa, Relación..., I, 317.
48. A. de Ulloa, Relación..., I, 316.
49. A. de Ulloa, Relación..., I, 571-572.
50. A. de Ulloa, Relación..., I, 592ff.
51. Persons of European ancestry born in the Viceroyalty were known as chapeltones, but since such persons were generally Spaniards, the term chapelón was also applied to Spaniards residing there.
52. Alsedo's judgment, cited by L. J. Ramos Gómez, op. cit., pp. 52-53 and n. 84.
53. A.G.I., Escribanía de Cámara, 914, 915 and 916; cited by L. J. Ramos Gómez, op. cit., p. 59 and n. 1.
54. The bulk of the documentation on this incident is found in A.G.I., Quito, 133, 134, sources on which several accounts have been based, e.g., J. F. Guillén, Los tenientes..., pp. 69-85; L. J. Ramos Gómez, op. cit., pp. 70-81; A. Lafuente, "Una ciencia...", op. cit.

55. Biblioteca Nacional de Madrid, B.N.M., ms. 15619, fols. 7-8. The instrumentation included: an astronomical quarter circle and semicircle (C. Langlois); a recipiangulo, a declination compass, a new model compass, and a compass of inclination (J. Lemaire); a plane table (Dehse); a pendulum clock with second hand (Thiout); a large and small telescope (C. Paris); two large spyglasses (Marie).

56. Explanatory letter which A. de Ulloa sent to Patiño; Quito, 12-2-1737; A.G.I., Quito, 133, fols 206-223. This document is reproduced in its entirety in J. F. Guillé, Los tenientes..., *op. cit.*, pp. 68-85.

57. On the history of quinine, see Jaime Jamarillo Arango, "Estudio crítico acerca de los hechos básicos en la historia de la quina," Anales de la Sociedad Peruana de Historia de la Medicina, 10 (1948-49), 31-86. See also, F. Guerra, "El descubrimiento de la quina," Medicina e Historia, no. 69, June 1977.

58. La Condamine, "Sur l'arbre du quinquina," in Mem. 1738, pp. 226-243. This report is published in A. Lafuente and E. Estrella, La Condamine en la América meridional (Barcelona, Altafulla/Mundo Científico, 1986).

59. E. Estrella, Medicina aborigen (Quito, 1977), pp. 77ff.

60. Miguel de Santisteban, "Informe de su Comisión para el reconocimiento de la Quina de Loja (Quito)", Santa Fe, 4-6-1753; Anales de la Real Academia de Farmacia (Madrid), 15 (1949), 655-672.

61. The manuscript report can be found in A.A.S., Dossier J. Jussieu. It was published by the Société du traitement des Quinquinas (Paris, 1736).

62. A. de Ulloa, Relación..., I, 440.

63. A. Chevalier, "Le deuxième centenaire de la découverte du Caoutchouc faite par Charles-Marie de La Condamine," Revue de Botanique Appliquée et d'Agriculture Tropical, no. 179 (1936), 519-526. A. de Ulloa (Relación..., I, 536) describes this resin under the name Goma.

64. Statement of Ramón Joaquín Maldonado y Sotomayor, Quito, 15-2-1737; A.G.I., Quito, 153. Cited in Neptalí Zúñiga, La expedición científica de Francia..., p. 32, n. 3. In the same volume (pp. 30-37) there is a suggestive description of the life of expeditionaries in Quito.

65. Letter from J. Jussieu to his brother Antoine, Panama, 15-2-1736; M.H.N., ms. 179.

66. Jorge Juan and A. de Ulloa, Relación..., I, 315.

67. Jorge Juan and A. de Ulloa, Relación..., I, 371.

68. S. Guerra, "El pensamiento ecuatoriano en los siglos XVI, XVII y XVIII," Cultura (Quito), 2 (1979), 65-94.

69. C. Bailey, "Descubridores jesuitas del Amazonas," Revista de Indias, 1 (1940), 121-185. See our introduction in A. Lafuente and E. Estrella, La Condamine..., *op. cit.*

70. Ch. M. de La Condamine, Journal..., p. 170. See also, J. M. Vargas, "Contribución ecuatoriana a los estudios científicos," Boletín de la Academia Nacional de Historia (Quito), 48 (1965), 162-179.

71. Cited in J. M<sup>a</sup>. Barnadas, "El P. Mario Cicala (1718-?) y su obra," Boletín de la Academia Nacional de Historia (Quito), 49 (1966), 93-103.

72. E. Keeding, "Las ciencias naturales en la Antigua Audiencia de Quito. El sistema copernicano y las leyes newtonianas," Boletín de la Academia Nacional de Historia (Quito), 57 (1973), 43-67.

73. The prologue of the work cited, as well as biographical study, can be found in J. Tobar Donoso, "Un nuevo mapa de las misiones ecuatorianas," Boletín de la Academia Nacional de Historia (Quito), 35 (1955), 72-89. This article also includes a reproduction of Jean Magnin's manuscript, Breve descripción de la Provincia de Quito (1740).

74. See N. Gómez, "El manejo del espacio en la Real Audiencia de Quito (siglos XVII y XVIII)," in J. P. Deler et al., eds., El manejo del espacio en el Ecuador. Etapas claves (Quito, 1983).

75. N. Zúñiga, Pedro Vicente Maldonado. Un científico de América (Madrid, 1951).

76. P. V. Maldonado, Descripción de la Provincia de Esmeraldas (Madrid, 1744), p. 2. Most of the documentation referring to Maldonado and his family has been published in J. Rumazo, ed., Documentos para la historia de la Audiencia de Quito, 8 vols. (Madrid, 1948-50).

77. La Condamine, Carta a la señora..., op. cit., p. 101.

78. "Copie authentique..." fol. 33, B.N.P., Fonds Espagnols, ms. 51.

79. La Condamine, Carta a la señora..., op. cit., p. 107.

80. Text relating to Godin's declaration, "Copie...", op. cit., B.N.P., Fonds Espagnols, ms. 51, fol. 94<sup>v</sup>.

81. Cf. Antonio Bethancourt, "Patiño en la política de Felipe V," in Estudios y Documentos. Cuadernos de Historia Moderna, no. 1 (Valladolid, 1954).

82. Cited by G. J. Walker, Política..., op. cit., p. 255.

83. La Condamine to Bouguer, Quito, 18-7-1741 (received by Bouguer in Tarqui, 20-7-1741), A.O.P., ms. C-2-7, p. 12.

84. La Condamine to Bouguer, Quito, 19-12-1741 (received in Riobamba, 25-12-1741); A.O.P., ms. C-2-7.

85. A. de Ulloa, Relación..., II, 265ff.

86. La Condamine to Bouguer, Quito, 24-12-1741; A.O.P., ms. C-2-7. More information can be found in La Condamine's letter to Bouguer (Quito, 19-12-1741) in the same file.

87. Juan and Ulloa to José de la Quintana, Secretary of the General Office of the Indies, Lima, 30-5-1741; A.G.I., Lima, 1489.

88. La Condamine to Bouguer, Quito, 24-4-1741; A.O.P., ms. C-2-7.

89. La Condamine to Bouguer, Quito, 21-9-1740; A.O.P., ms. C-2-7.

90. Bouguer to Réaumur and Mairan, Quito, 24-1-1742; A.O.P., B-5-7.

91. J. Jussieu to A. Jussieu, Quito, 26-2-1741; M.H.N., ms. 179.

92. A. de Ulloa, Relación..., II, 376.

93. In effect, Bouguer toured the road that Pedro V. Maldonado had built between the coast and Quito in 1740: "Relation du voyage fait à la rivière des Esmeraldes pour déterminer au dessus du niveau de la mer la hauteur absolue des montagnes qui ont servi à la meridienne"; A.O.P., C-2-7.

94. Miguel St. Esteban, lieutenant coronel of the army and corregidor of Cochuelas and Vilabamba was named a correspondent of La Condamine in the Academy of Science of Paris on May 10, 1749. In the Index Biographique de l'Académie des Sciences (Paris, 1979), it says that he was Secretary of the Viceroyalty of New Granada and that his surnames were Saint-Esteban Alvarez de Vera. It also indicates that he was dropped as a member of the Academy on August 24, 1767. See A.A.S., Dossier Miguel St. Esteban. In G. de Fouchy, Tableau chronologique de l'Académie Royale des Sciences de Paris depuis son établissement en 1666, jusqu'en 1744 (Paris, 1774), it says that he was corregidor of Quito. La Condamine calls him Miguel de Santistevan and that he was born in Peru and was from Conchuchos. Cf. Journal... (Paris, 1751), p. 142.

95. The course that he followed is marked on the "Map of the Province of Quito and its environs. Posthumous work of D. Pedro Maldonado, gentleman-in-waiting of His Majesty and Governor of the Province of Esmeraldas; based on astronomical and geographical observations of the academicians of the Royal Academy of Sciences of Paris and of the officer of the Royal Naval Academy of Cádiz and also of the Reverend Father Missionaries of Maynas. On which the coast from the Boca de Esmeraldas up to Tumaco with the course from Quito to the Marañon, by a footpath from Baños to Canelos, and the course of the rivers Babonaça and Pastaça are delineated over the demarcations of another author. Published by order and expense of His Majesty. MDCCL." In it the following is indicated: "The road from Villa Ibarra to Popayán, in its environs conforms to the chart of Mr. Bouguer and that of Miguel de St. Esteban"; A.G.I., Panamá, 146. In B.N.P., Fonds Espagnols, ms. 109, there is a manuscript text explaining the map: "Derrotero de Don Miguel de Santi-Estevan (Corregidor que fue de...en el alto Perú) desde la ciudad de Lima hasta Caracas por los años 1740 y 1741)" (with ex-libris of La Condamine).

96. La Condamine, Relation abrégée d'un voyage fait dans l'intérieur de l'Amérique meridionale (Paris, 1745). This is a modified version of the report published under the same title in Mem. 1744 (Paris, 1748), 249-297. See also, Reg. 1744, p. 418.

97. Bouguer finished the reading of his report on 27-2-1745, Reg. 1745, p. 40. The commissioners were Mairan and Réaumur.

98. La Condamine, Relation abrégée..., op. cit., p. 476.

99. La Condamine, Relation abrégée..., op. cit., p. 477.

100. Reg. 1745, p. 129.

101. Pedro Peralta Barnuevo Rocha y Benavides was named correspondent of Bouguer in the Academy on December 23, 1738. The Memoires de l'Académie des Sciences (Mém.) published numerous astronomical observations performed by Peralta in Lima. In A.A.S., Dossier Pedro Peralta there is a letter of thanks for the publication of his observations and for the shipment of instruments he had requested, dated November 3, 1718. For more information on Peralta, see Carlos Enrique Paz Soldán, "D. Cosme el precursor (1711-1796)," Anales de la Sociedad Peruana de Historia de la Medicina, 1 (1939), 79-95, and the same author, "Isaac Newton y los albores de la Escuela Médica Peruana," Anales de la Sociedad Peruana de Historia de la Medicina, 4 (1942), 63-88.

102. A. de Ulloa, Relación..., op. cit., II, 378.

103. Loc. cit.

104. Cf. La Condamine, Journal..., p. 137.

105. J. Jussieu to Antoine Jussieu, Quito, 16-3-1745; M.H.N., ms. 179.

106. Reg. 1746, p. 53.

107. The order would be read in the academic session of December 22, 1745; Reg. 1745, p. 321. The

expulsion went into effect when Cassini de Thury was named to take his place on January 8, 1746; Reg. 1746, p. 1.

108. Cf. Trystran, Le procès des étoiles, pp. 194-5.

109. See José Eusebio Llano Zapata, Carta o diario que escribe a su más venerable amigo y docto correspondiente el Dr. D. Ignacio Chiriboga y Daza, Canónigo de la Santa Iglesia de Quito, relación del terremoto de 1746 (Madrid, 1746). Copious documentation is preserved in A.G.I., Lima, 511 and 1490. Also, A.G.I., Lima, 985, 1489, 1493, 1569.

110. Jorge Bernales Ballesteros, Lima, la ciudad y sus monumentos (Seville, 1972). Guillermo Lohmann Villena, Las defensas militares de Lima y el Callao (Seville, 1964). Alberto Giesecke and Enrique Silgado, Terremotos del Perú (Lima, 1981).

111. A. de Ulloa, Relación..., II, 107, 108.

112. "I received a counter-order from the most illustrious Count of Maurepas to go to Lima to regain the objects which belong to the Academy from the hands of Sr. Godin;" report of L. Godin, A.G.I., Lima, 511; cited by J. Bernales Ballesteros, op. cit., pp. 304ff.

113. J. Jussieu to Antoine Jussieu, Elan, 12-4-1748; M.H.N., ms. 179.

114. "Journal de mon voyage à la province to Canelos" (around January 1748). Ms. of Jussieu preserved in M.H.N., ms. 179.

115. L. Godin to the Marqués de la Ensenada, Lima, 13-5-1748; A.G.S., Marina, 82.

116. On May 18, 1748, the Viceroy informed the Navy Admiralty of the payment of the figure mentioned (A.G.S., Marina, 82). On October 11, 1750, Godin again wrote to his protector Ensenada to tell him that after twelve months of travel, he still had to wait another ten in the Colonia de Sacramento awaiting a ship to take him to Europe (A.G.S., Marina, 83).

117. Postscript to J. Jussieu's letter to Antoine Jussieu, La Paz, 22-7-1749; M.H.N., ms. 179.

118. Reg. 1756, p. 351.

119. Godin wrote to Jussieu (Buenos Aires, 14-7-1750) that he could wait no longer and was departing for Lisbon within two weeks (M.H.N., ms. 179).

120. J. Jussieu to Antoine Jussieu, Quito, 25-4-1743; M.H.N., ms. 179.

121. J. Jussieu to Antoine Jussieu, Quito, 28-7-1744; M.H.N., ms. 179.

122. Antoine wrote (Paris, 29-11-1756) to Joseph complaining about his long silence. Pedro Virgili had written to Antoine informing him of his brother's activities. The French botanist's letter of thanks is preserved next to the previous one in M.H.N., ms. 179. For a notice on the steps leading to Jussieu's expulsion from the Academy, see Reg. 1758, p. 440.

123. Domingo de Jáuregui to Bernard Jussieu, Madrid, 17-12-1759; M.H.N., ms. 179.

124. On November 26, 1746, he was elected correspondent of Bouguer in the Academy.

125. La Condamine, Carta de M. de La Condamine..., op. cit., p. 137.

126. Hugot to J. Jussieu, Quito, 21-11-1749; M.H.N., ms. 179.



127. J. Jussieu to A. Jussieu, Quito, 24-4-1743; M.H.N., ms. 179.

128. See N. Gómez, "El manejo del espacio...", op. cit., pp. 160ff.

129. M.H.N., ms. 179. The draft has neither date nor signature in Spanish.

130. La Condamine in his Viaje a la América meridional (op. cit., p. 96) narrates the experiments he carried out in this regard in Cayena and Leyden.

131. See Celin Astudillo, "Don Pedro Vicente Maldonado y el curare," Boletín de Informaciones Científicas Nacionales (Quito), no. 116, August 1984, pp. 120-123. In reality this article is a commentary on a paper presented by Albert Di Coppua at the I Jornadas Hispano-Andinas de Historia de la Medicina (Quito, 1984) which we have been unable to consult.