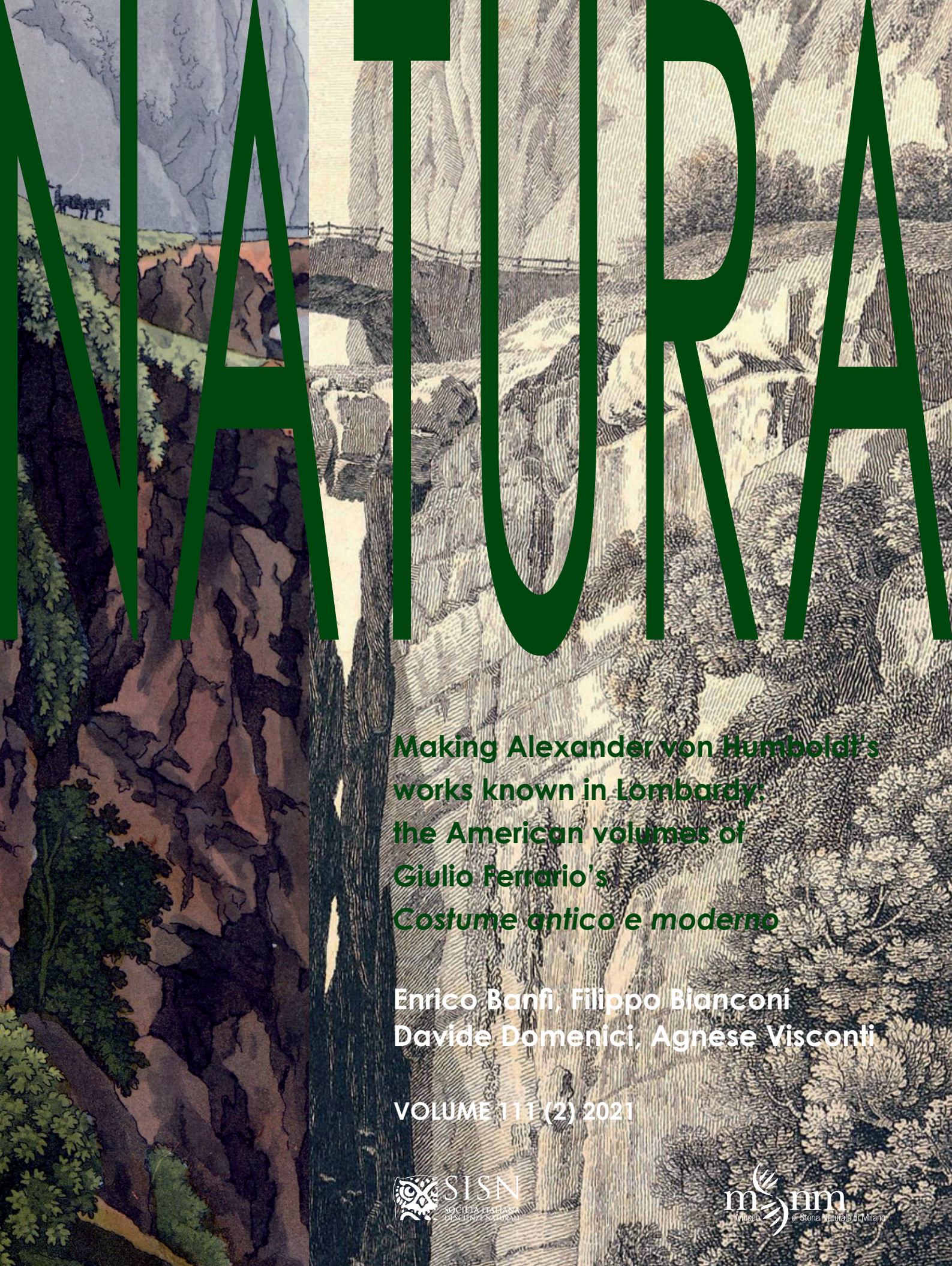

NATURA

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Enrico Banfi, Filippo Bianconi
Davide Domenici, Agnese Visconti

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In copertina On the left, Ferrario's Plate 5 (1821), untitled. On the right, Humboldt's Plate IV (1810), *Ponts naturels d'Iconozo.* (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

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INTRODUCTION

It is well known that the Braidense Library in Milan was one of the few, perhaps the only one, of the Italian peninsula to have in good time purchased the volumes of the *Voyage aux Régions Équinoxiales du Nouveau Continent, fait en 1799, 1800, 1802, 1803 et 1804* (Paris, 1835-1834) that the famous Prussian naturalist-explorer Alexander von Humboldt (1769-1859) was gradually writing after returning from his expedition to Central and South America (1799-1804)[1] (Fig. 1). And it is equally known that between 1816 and 1817 the Swedish-born geologist Scipione Breislak (1750-1826) reviewed for the journal "Biblioteca italiana" some of those volumes (Breislak, 1816a, 1816b, 1817), also pointing out the importance for science of the immense amount of naturalistic materials and physical data collected and assembled by Humboldt and his companion, the French botanist Aimé Bonpland (1773-1858), during their expedition which took place in New Granada (present Panama, Colombia, Ecuador and Venezuela), Peru and New Spain (central-western part of the present United States of America, all of present Mexico, and most of Central America and Cuba).

On the opposite side the use that was made of part of the texts and illustrations collected in Humboldt's work by the Milanese priest, scholar and publisher Giulio Ferrario (1767-1847) has remained largely unacknowledged. The Milanese scholar was renowned for his participation in the constitution of the "Società tipografica dei classici italiani" founded with government support in 1802 in order to publish, as he himself wrote in his "Prospetto de' migliori autori italiani", the works of the great Italian geniuses (le "opere dei grandi geni italiani") (Berengo, 1980: 11). He who had previously worked on the drafting of the catalog of the Litta Library and on the ordering of the manuscripts and printed books of the religious monasteries suppressed by Emperor Joseph II, took part in the activity of the "Society", which published 249 volumes between 1802 and 1814, the year of its closure, with tenacious commitment and solicitude as the person responsible for all the "literary objects".

By virtue of the experience gained during this immense undertaking, Ferrario published between 1815 and 1835 the great encyclopaedic work in 23 volumes entitled *Costume antico e moderno o Storia del governo, della milizia, della religione, delle arti, scienze ed usanze di tutti i popoli antichi e moderni provata con i monumenti dell'antichità e rappresentata cogli analoghi disegni* edited and printed in Milan in Italian and French by himself. The work, of which Ferrario was author, typographer and

Fig. 1 - Alexander von Humboldt and Aimé Bonpland at the foot of the Chimborazo. Oil painting by Friedrich Georg Weitsch, ca. 1810, preserved in the Stiftung Preussische Schlösser und Gärten Berlin-Brandenburg. (Copyright: bkp/Stiftung Preussische Schlösser und Gärten Berlin-Brandenburg/Hermann Buresch).

publisher, was entitled "Alla Sacra Cesarea Reale Apostolica Maestà di Francesco I Imperatore d'Austria" (To the Holy Royal Apostolic Majesty of Francis I Emperor of Austria) and included a total of about 160 associates, of whom more than 120 from Milan, others from Paris, Vienna, Petersburg and London. In addition to government officials, associates included gentlewomen, aristocrats, shopkeepers, jurists and artists (Ferrario, 1815: 461-469) (Fig. 2).

The *Costume* was a monumental treatise with an encyclopaedic character, luxurious and at the same time popular, the result of the compilation of vast materials, travel books, geographical descriptions and historical accounts, rich in 1647 illustrated plates (Pomar Fiol, 2006-2007: 12) that made it a true source of information in the eyes of his contemporaries, even about territories largely unknown at the time. The Milanese scholar and his collaborators arranged the most disparate knowledge, which came from readings of other notable and often heterogeneous works, according to a configuration that reflected the great variety of readings and made the work of considerable interest and originality, although not without some discrepancies, especially in the parts summarised due to the lack of space. In addition to the extensive textual material, there was also, as mentioned above, a very large number of illustrated plates, produced by the aquatint technique at that time in use at the Brera Academy, from which the illustrators who participated in the production of Ferrario's treatise mostly came. In particular, the engraver Gallo Gallina (1796-1874), the illustrator Paolo Fumagalli (news 1817-1839), the painter and academic Ignazio Fumagalli (1778-1842) and the engraver Domenico Bonatti Klemi (1781-1870). (LombardiaBeni-Culturali-stampe e incisioni, undated).

Ferrario's professional role in the Braidense Library facilitated, or better permitted, the drafting of the work. In fact, Ferrario was first curator of the catalogue (1802), then sub-librarian (1820-1838) and finally director. Thus, in that library he set up a veritable laboratory with the possibility of easily accessing every text in it and thus being able to reduce the production costs of his encyclopaedic treatise. In this regard, we believe it is likely that he himself purchased for the Library the works he intended to use, when not in the catalogue.

For the partition of the volumes of the *Costume*, the author chose the one commonly adopted at the time, i.e. the division into Asia and Oceania, Europe, Africa and America. Each country is illustrated according to a prefixed scheme described in the introduction to volume I (Ferrario, 1815: XI-XXIV). The scheme begins with geographical, topographical and historical illustrations; it proceeds to the forms of government, laws and military; it continues with religion, weddings and funerals; it then considers the mechanical arts, the fine arts, poetry, music and dance, to which it adds science; it then mentions domestic and foreign trade, weights and measures; and it concludes with a list of the main travellers and authors of the nation under consideration.

Fig. 2 - The two American volumes (one open, one closed) and the first and last volumes of Giulio Ferrario's *Il Costume antico e moderno* (1815-1835). (Photo by Marcello Alfini).

In reason of the innovative aspect and the breadth and variety of the topics covered, Ferrario's work was, from the very first volumes published, part of the dynamic movement that characterised the Milanese book market during the first decades of the Restoration, when the traditional production for aristocratic culture and the consolidated area of Italian classics were joined by novels by foreign authors, collections of science and travels adressed mainly to the intellectuals and the bourgeoisie (Berengo, 1980: *passim*).

The *Costume* was launched with the formula of the association that represented, as far as the Milanese book market was concerned, a typical publishing initiative of the Restoration. The association was starting with the announcement in the "Gazzetta di Milano" of a work planned to be published in files or volumes at regular intervals and within a fixed period; those who associated to it undertook to pay an instalment upon delivery of each issue and enjoyed a favourable price. The advantages for the publisher were considerable, in particular the mitigation of business risks, and the reduction of equity commitment in the initiative, and also the possibility to deliver the work directly to the subscribers, thus avoiding the brokerage of booksellers. There were also significant advantages for the associates: a price reduction compared to the total price that the work would have once finished and that was fixed at the beginning, the instalment of the expense and the assurance of receiving all the issues at home.

Going now to discuss the textual materials that the Milanese scholar obtained from Humboldt's work and included in volume VII, *L'America* (1820) and volume VIII, *America meridionale* (1821) of the *Costume*, we can note that they are based on the following volumes of *Voyage*: XV, *Vues des Cordillères, et monumens des peuples indigènes de l'Amérique*, also known under the title of *Atlas pittoresque* (1810); XXIII, *Recueil d'observations de zoologie et d'anatomie comparée* (1811, coauthor Bonpland); XXV and XXVI, *Essai politique sur le Royaume de la Nouvelle Espagne* (1811); XXVII, *Essai sur la géographie des plantes* (1805); and from the standalone work *Ansichten der Natur/Tableaux de la nature* (1808) as well. As can be seen from the publication dates, these were relatively recent texts that the Brera Library already owned, as can be inferred from Volta's letter to Linussio (see note 1), and which Ferrario, through the writing of his two volumes on America, used and spread most likely first upon to the public of Lombardy. As for the illustrated plates − presented further on in 24 cards supported by explanatory texts − depicting landscapes, pre-Columbian monuments and hieroglyphs, they were all copied by Ferrario from the *Vues*.

Before submitting iconographic materials and explanatory texts common to the *Vues* and the American volumes of the *Costume*, it seems worth briefly describing the conceptual vision on which Humboldt's writings, which Ferrario used, are based.

We will start with some considerations on the *Vues*, an editorial formula already tested in Europe, i.e. the illustrated book where each plate corresponds to an explanatory text, generally used for the numerous editions of pictorial journeys and much appreciated by the public (Greppi, 2021: 197). The *Vues* consist of 69 engraved plates, some etched and some others aquatinted, and of texts describing them. The *Vues* also include Humboldt's reflections related to the themes dealt with, as well as a dense network of references and links to similar situations in other parts of the world. The plates and texts are not geographically arranged, because, as Humboldt wrote: "la difficulté de réunir et de terminer à la fois un grand nombre de Planches gravées en Italie, en Allemagne et en France, m'a empêché de suivre cette méthode. Le défaut d'ordre, compensé, jusqu'à un certain point, par l'avantage de la variété, est d'ailleurs moins répréhensible dans les descriptions d'un Atlas pittoresque que dans un discours soutenu" (Humboldt, 1810: III). Indeed it was not just a question of bringing together and finishing at the same time plates engraved in different towns and on different occasions, but rather the intention − and this makes Humboldt's choice particularly interesting and original − of representing the natural and cultural worlds, alternating them in a single weave. In fact Humboldt writes: "En présentant dans un même ouvrage les monumens grossiers des peuples indigènes de l'Amérique et les vues pittoresques du pays montueux que ces peuples ont habité, je crois réunir des objets dont les rapports n'ont pas échappé à la sagacité de ceux qui se livrent à l'étude philosophique de l'esprit humain. Quoique les moeurs des nations, le développement de leurs facultés intellectuelles, le caractère particulier empreint dans leurs ouvrages, dépendent à la fois d'un grand nombre de causes qui ne sont pas purement locales, on ne sauroit douter que le climat, la configuration du sol, la physionomie des végétaux, l'aspect d'une nature riante ou sauvage, n'influent sur le progrès des arts et sur le style qui distingue leurs productions. Cette influence est d'autant plus sensible que l'homme est plus éloigné de la civilisation. Quel contraste entre l'architecture d'un peuple qui a habité de vastes et ténébreuses cavernes et celle de ces hordes longtemps nomades, dont les monumens hardis rappellent, dans le fût des colonnes, les troncs élancés des palmiers du désert! Pour bien connoître l'origine des arts, il faut étudier la nature du site qui les a vus naître" (Humboldt, 1810: 3).

It's clear from these words that, unlike other writings published by Humboldt in the first years after his return from his journey to tropical America (Beck, 1961: 349-350), the *Vues* were not conceived as an essay addressed to scientists. Rather, they followed in the wake opened up by Humboldt himself with the publication of *Ansichten der Natur / Tableaux de la Nature* (1808), through which the Prussian naturalist had begun to develop his project aimed − as Franco Farinelli, to whose reflections we owe for a part of this paper, writes − at "strappare la borghesia tedesca dal proprio atteggiamento contemplativo [...] per dotarla di un sapere in grado di garantirle la conoscenza e il dominio della Terra"[2] (Farinelli, 1981: 151; Farinelli, 2018: XXII-XXIII). To this end, in both the *Tableaux* and the *Vues*, landscapes played the double role of arousing enjoyment and exhorting towards a scientific understanding of nature (Farinelli, 1981: 151). The poetry of the *Tableaux* and the art of the *Vues* were thus transformed into science through the mediation of vision, i.e. of the described and painted landscape. *Tableaux* and *Vues* were, in other words, incitements to learn about the natural sciences through the proposal of landscapes intended to become scientific concepts, i.e. to pass from artistic vision to rational interpretation. Humboldt himself expressed this

conviction in the cycle of lectures he gave in the hall of the Singakademie in Berlin between November 1827 and April 1828 and also in *Einleitende Betrachtungen über die Verschiedenartigkeit des Naturgenusses und eine wissenschaftiche Ergründung der Weltgesetze* (Humboldt, 1845: 3-33).

Humboldt adds the following in the *Vues*: "Une partie de cet Atlas est destinée à faire connoître les grandes scènes que présente cette nature. On s'est moins attaché à peindre celles qui produisent un effet pittoresque qu'à représenter exactement les contours des montagnes, les vallées dont leurs flancs sont sillonnés, et les cascades imposantes formées par la chute des torrens". (Humboldt, 1810: 3-4).

But in order for the artistic form to be overlaid with naturalistic content and then replace "allo stadio della contemplazione quello della considerazione pensante, ovvero la conoscenza scientifica" (Farinelli, 1981: 152), it was necessary to "donner la plus grande exactitude à la représentation" of the depicted objects (Humboldt, 1810: V). Hence Humboldt's decision to address very talented painters and engravers working under his watchful eye. First and foremost, Wilhelm Friedrich Gmelin (1760-1820) and Joseph Anton Koch (1768-1839), who lived in Rome and whom he had met in 1805 during his stay in that capital immediately after returning from his journey to America, with the aim to visiting his brother Wilhelm and to studying the pre-Columbian paintings in the Vatican Library (Bourguet 2017: *passim*). In Rome, he had brought his field diaries with sketches[3] of the landscapes he had observed and the hieroglyphic manuscripts and Mexican drawings acquired during his expedition, perhaps with the idea of having them transformed into plates to be collected in a volume, the *Vues* aiming, as we said, to accompany the text in order to continue his artistic-scientific conception.

With regard to the landscapes, Gmelin and Koch were in charge of the illustration of most of the landscape sketches, while the engravings were initially made by Gmelin himself for the *Ponts naturels d'Icononzo* and the *Chute du Tequendama*. Later, engravings were made by Christian Friedrich Traugott Duttenhofer (1778-1846) of Stuttgart for *Inti Guaicu* drawn by Koch in Rome and by Anton Wachsmann (1765-1836) & Friedrich Arnold (1786-1854) of Berlin for the *Passage du Quindiu, dans la Cordillère des Andes*, for the *Pyramide de Cholula* and for the *Cascade du Rio Vinagre, près du volcan de Puracé*, drawn by Koch in Rome and for the *Cotopaxi* painted by Gmelin in Rome. However, the German engravers, in Humboldt's opinion[4] not of an adequate quality standard, were soon replaced by the Parisian artist Louis Bouquet (1765-1814) who engraved the plates for the *Monument péruvien du Cañar* drawn by Gmelin; the *Roches basaltiques et Cascade de Regla* also drawn by Gmelin and the *Costumes des Indiens de Mechoacan* and *Volcan Jorullo*. After it was the turn of the French illustrators, starting with the drawing of the beautiful table of the *Chimborazo vu depuis le Plateau de Tapia* that was made by the architect Jean-Thomas Thibault (1757-1826) and engraved by Bouquet, and finally, Humboldt turned to the draughtsman Pierre-Antoine Marchais (1763-1859), continuing to ask Bouquet to engrave the plates of *Coffre de Perotte*, *Volcans d'air de Turbaco* and *Vue du Cayambe.*

As for the plates and texts devoted to pre-Columbian ruins, artifacts and pictorial manuscripts, a relevant difference can be noted among those plates and texts dealing with South America and those devoted to Mexico (New Spain). In the former, Humboldt heavily relied on his own field experiences, mostly representing ancient ruins within their natural settings (e.g., 1810, Plates XVII, XVIII). In the latter, on the other hand, Humboldt mostly relied on a network of antiquarians, explorers and collectors which he met both during his travel in New Spain between March 1803 and March 1804 (O'Gorman, 1958; Bopp, 1962; Miranda, 1995; Sluyter, 2006; Echenberg, 2017) and during his subsequent stay in Italy in 1805 (Bourguet, 2017).

Humboldt's interest toward ancient Mesoamerican civilizations – the subject of a long scholarly tradition (e.g. Zúñiga, 1959; Bernal, 1962; Matos Moctezuma, 1969; Quiñones Keber, 1996) – is obvious. Despite having spent much less time in New Spain than in South America, in the *Vues* Humboldt devoted 42 plates (out of a total of 69) to Mexico. Of these 42 plates, only five represent natural landscapes devoid of any ancient element, a single view illustrates the main Plaza of Mexico City and five are devoted to ancient ruins (Cholula, Xochicalco and Mitla, only the former actually visited by Humboldt himself). The remaining 31 plates are all devoted to Indigenous artifacts such as stone sculptures, a (misunderstood) stucco basrelief, one adze, one vessel, and several manuscripts. It is in the plates and texts devoted to Mesoamerican ruins and artifacts that Humboldt's intellectual debt toward Spanish and Spanish-American intellectuals is more evident. This debt has been at the center of a longstanding debate among those scholars who celebrated – often in an almost hagiographic way – Humboldt's scientific contributions (e.g. Labastida, 1975, 2017; Wulf, 2015) and those who, on the contrary, stressed the highly derivative and epistemologically colonial character of his work, strongly dependant on the contributions of local scholars whose role has been almost obscured in European historiography (e.g. Ortega Medina 1966, 1976; Pratt, 1994; Cañizares-Esguerra 2001, 2006, 2019). The analysis of the plates devoted to Mesoamerican artifacts, indeed, makes clear how Humboldt took advantage of the work of local scholars, whose contributions (together with most of the then available historical sources and scholarly works) he employed to add his own (at times wrong) comments and to embark in his wide ranging, inter-cultural comparisons, leading to contradictory judgements on Indigenous art and aesthetics (Lubrich, 2016). At the same time, it is also evident that the success of Humboldt's lavishly illustrated publications gave to those researches an enormous international resonance, as also attested by Ferrario's Italian publications. An outstanding example of this phenomenon is the plate *Relief Mexicain trouvé à Oaxaca*, engraved by F. Pinelli (1781-1835) in Rome: the engraving was based on a drawing transmitted to Humboldt by the Spanish botanist V. Cervantes Mendo (1755-1829) professor of Botany in Mexico City. Cervantes' drawing was a copy of a drawing by J. Castañeda who, in his turn, had copied an original field drawing by R. Armendáriz. Such chain of copies made that Humboldt's plate was the first image of a Classic Maya monument ever published, even if – ironically enough – Humboldt misattributed it to the Zapotecs of Oaxaca! On other instances

Humboldt relied on information and drawings provided by outstanding figures of early Mexican archaeology such as G. Dupaix (*Buste d'une Prêtresse aztèque*, engraved by Massard l'ainé in Paris; Humboldt, 1810, Plates I and II; *Bas Relief Aztèque de la Pierre des Sacrifices, trouvé sous le pavé de la grande Place de Mexico*, engraved by J. Massard in Paris (Humboldt, 1810: Plate XXI)[5]; Luis Martín (*Ruines de Miguitlan ou Mitla, dans la Province de Oaxaca*, engraved by Bouquet; (Humboldt, 1810: Plates XLIX and L), A. de León y Gama, M. Alzate, C. de Sigüenza y Góngora, G. M. Gemelli Careri, and others. From local intellectuals Humboldt also obtained original Indigenous documents which he acquired and brought to Berlin (where they are known today as "Humboldt fragments"): this is the case of the colonial codices illustrated in Plates XII, XXXVI and XXXVIII, as well as of the herein commented *Fragment d'un Calendrier chrétien tiré des manuscrits aztèques conservés à la Bibliothéque royale de Berlin*, engraved by Bouquet in Paris (Humboldt, 1810, Plate LVII), which proceeded from the collection assembled by the Italian scholar L. Boturini and then passed in the hands of M. Fernández de Echeverría y Veytia and A. de León y Gama before ending up in Humboldt's possession.

The recognition of the relevance of the local intellectual networks cannot lead to a complete downplay of Humboldt's own contributions or to limit them to a matter of international diffusion. During his stay in Rome, for example, Humboldt was able to locate Mexican manuscripts in local collections: even if he was not the first scholar in commenting them (again, he took advantage of the manuscript commentaries written by the Mexican Jesuit L. Fábregas), Humboldt reproduced some of their pages with outstanding precision (his drawings were clearly traced directly on the originals) and, again, was the first to publish them in a printed volume, e.g. *Manuscrit hiéroglyphique aztèque, conservé à la bibliothéque du Vatican*, engraved by Langlois (Humboldt, 1810: Plate XIII). The same can be said for most of the other Mesoamerican codices he illustrated. Humboldt also recorded relevant information on the codices' provenance, such as the mention of the fact that the so-called *Codex Borgia* (Plate XXXVII), which he saw in the collection of Cardinal Stefano Borgia, was previously owned by the Giustiniani family, a detail that recently allowed to trace back its Italian history to the beginning of the 17th century (Humboldt, 1810: 89; Domenici & Laurencich Minelli, 2014: 193-196) (Fig. 3). A most curious case is that of the Plate *Costumes dessinés par des peintres mexicains du temps de Montézuma* (Humboldt, 1810: Plate XIV), where Humboldt corrected the shape of the human bodies, in order to rectify the deformations introduced by the European copyist of the so-called *Codex Vaticanus A* (Vat. Lat. 3738): even if we are forced to blame the epistemologic arrogance required to "correct" an original 16th century source, we must also admit that Humboldt's corrections reveal an unprecedented degree of understanding of Indigenous visual codes – especially in the depiction of human bodies – whose precocity has not been praised enough in the field of Mesoamerican studies.[6]

Returning now to the naturalistic themes of the *Vues* we would like to recall the following plates that seem to us most indicative of Humboldt's intention to lead the reader to a rational interpretation through aesthetics.

First of all that of *Chimborazo vu depuis le Plateau de Tapia*, by Thibauld (Humboldt, 1810: Plate XXV), a splendid and enchanting view, or rather a glimpse that captures the eye with its magnificence and yet at the same time accurately and precisely depicts the snows that break away from the bottom of the sky, the precise contours of the mountain and the channels that run through it, the edge of the vegetation, to which are added, to indicate the width of the field, the men going to the market in nearby Lican − among them a native in the act of herbalising, which marks the presence of Humboldt and Bonpland −, the domesticated llamas and finally the exotic plants, indicating the aridity of the soil of the plain and at the same time acting as floristic reference signals. With regard to this plate, Humboldt writes, immediately assuming the scientific register: "La masse du Chimborazo est si énorme, que la partie que l'oeil embrasse à la fois près de la limite des neiges éternelles, a sept mille mètres de largeur. L'extrême rareté des couches d'air, à travers lesquelles on voit les cimes des Andes, contribue beaucoup à l'éclat de la neige et à l'effet magique de son reflet. Sous les tropiques, à une hauteur de cinq mille mètres, la voûte azurée du ciel paroît d'une teinte d'indigo. Les contours de la montagne se détachent du fond de cette atmosphère pure et transparente, tandis que les couches inférieures de l'air, celles qui reposent sur un plateau dénué d'herbes, et qui renvoie le calorique rayonnant, sont vaporeuses, et semblent voiler les derniers plans du paysage".[7] He goes on to highlight the scientifically reproduced naturalistic components (plants and animals), finally pointing out the following: "A trois mille cinq cents mètres de hauteur absolue, se perdent peu à peu les plantes ligneuses à feuilles lustrées et coriaces. La région des arbustes est séparée de celle des graminées par des herbes alpines, par des touffes de Nerteria, de Valérianes, de Saxifrages et de Lobelia, et par de petites plantes crucifères. Les graminées forment une zone très large et qui se couvre de temps en temps de neiges, dont la durée n'est que de peu de jours. Cette zone, appelée dans le pays le *pajonal*, se présente de loin comme un tapis d'un jaune doré. Sa couleur contraste agréablement avec celle des masses de neige éparses: elle est due aux tiges et aux feuilles des graminées brûlées par les rayons du soleil, dans le temps des grandes sécheresses". (Humboldt, 1810: 201-202). Laura Péaud (2014) has dwelt on the Chimborazo plate with precise comments.

Secondly the plate of the *Passage du Quindiu, dans la Cordillère des Andes* (Humboldt, 1810: Plate V), which takes us to the middle of the Andes and is of great significance for its abundance of naturalistic and anthropic signs and detailed scientific information. It guides us to a grandiose view of very high and partly snow-covered mountains, rich vegetation and men engaged in the hard work of "cargueros" or "silleros", i.e. transporters of other men, who, numerous in the caravan, gradually took over those burdens and who aroused in Humboldt's soul a profound feeling of indignation and benevolence, so much so that he chose, in the name of universal brotherhood, to make the journey on foot day after day. However, the scientific interpretation prevails, with the minute description of the clothing of the cargueros and the calculation of the weight they could carry, the careful depiction of the palms that reach 50 metres in height and form a riparian oasis along the thin outline of the Combeima River, going so far as to

Fig. 3 - Peintures hiéroglyphiques du Musée Borgia à Veletri (Humboldt, 1810: Plate XXXVII). (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

cover it in some places. This is followed by a description of the superb *Mutisia grandiflora* Bonpl. whose scarlet flowers, Humboldt specifies, are 16 centimetres long, a reference to the wax palm, which in 1952 was named the national plant of Colombia by the Comisión Preparatoria del III Congreso Sudamericano de Botánica, while in the distance we can see the small town of Ibague half-hidden by the thick forests that surround it. Three tiny Indigenous people stand beside the fence, acting as scale markers.[8]

No less attractive is the majestic *Cascade du Tequendama* (Humboldt, 1810: Plate VI) whose origin is lost in legend which Humboldt, always attentive to fantastic narratives and myths as an expression of the cultures of peoples (Quaini, 1992) recounts in full. The vigour and shape of the trees and herbaceous plants, their distribution in scattered groups, the contrast between stony masses and the freshness of the vegetation[9] form a great nature scene. The waterfall, Humboldt continues, combines everything that can make a picturesque site, which he succeeds in rendering even more attractive by comparing it with the waterfalls of the Alps and thus establishing a familiar interconnection for the observer, interconnection that continues in the description of the wheat and barley fields and the oak and alder woods that grow at the top of the waterfall. Then he suddenly leaves the familiar ground in order to illustrate the rapid transition to a tropical flora composed of palms, banana trees and sugar cane at the foot of the cascade. And finally, intrigued by this unusual situation, he shifts the narrative from the level of aesthetics to that of logic, i.e. he replaces the picturesque with the rational and strives to understand, with the help of scientific instruments, carried with difficulty along a steep cliff to the bottom of the waterfall, the sudden change of the vegetation. Lastly, in order to give the maximum precision to the size of the cascade, he inserts two men at the top of the wall on the left side of the plate, acting as scale markers but at the same time, with their tiny, almost imperceptible figures, brings the vision back to its original sublime majesty.[10]

By way of example, we would like to draw attentiono to two more plates which confirm Humboldt's aim of leading the reader to a rational knowledge of nature through the beauty of the image. They respectively depict a condor (Humboldt & Bonpland, 1811: Plate VIII) and a monkey (Humboldt & Bonpland, 1811: Plate V). If we compare the two images with the plates in the *Vues*, we can see that Humboldt keeps choosing − again entrusting the illustration to talented artists, namely Nicolas (1770-1830) and/or Jean-Baptiste fils (1772-1852) Huet − an illustration aimed at attracting the viewer to science through aesthetic vision. Instead of the landscape, he replaces the humanisation of the animal, depicted in the act of feeding, in a begging position or during wakefulness and sleep, so that while the animal attracts the viewer's sympathy, the precision of the drawing clearly highlights the perspective of rational thought that is fully realised in the text description.

Particularly interesting is the image of the Andean condor [*Vultur gryphus* Linnaeus, 1758] whose rapacity is highlighted by the presence of the sheep skeleton beneath its legs, which also acts as a scale marker and which allows Humboldt to refute, as he writes in the *Recueil*, the belief, alive in Europe, in its gigantic dimensions: an incitement, once again, to learn the natural sciences in order to apply reason to understanding the world. It is in this same light that Humboldt's attempt to link botanical and zoological geography should be considered, when he writes that to "lier, sous un même point de vue, la géographie des plantes à celle des animaux, je dirois que le Condor ne va pas plus loin vers l'isthme que le quinquina, le befaria, l'escallonia et d'autres plantes alpines des hautes Andes. J'ignore absolument si ce grand oiseau se trouve au nord de Panama" (Humboldt & Bonpland, 1811: 37) (Fig. 4).

Equally noteworthy is the plate showing the monkey called by Humboldt *Simia leonina* [*Saguinus fuscus* (Lesson, 1840)], a hitherto unknown species depicted next to a corn cob with the aim of highlighting its Americanity and at the same time its extraordinarily smallness. It differs, writes Humboldt, from all known species and is also very rare in its environment (the plains of the eastern Andes). And he continues: "Je n'ai pu voir que deux individus [à Popayan] de ce singe très rare: c'étoient les premiers qu'on eût portés vivans à l'ouest de la Cordillère. On les tenoit dans une cage, et leurs mouvements étoient si rapides et si continuels que j'eus beaucoup de peine à les dessiner. Leur sifflement imitoit le chant des petits oiseaux, et je suppose que la conformation de leur larynx est analogue à celle que j'ai décrite du simia oedipus [*Saguinus oedipus* Linnaeus, 1758, now considered critically endangered]" (Humboldt & Bonpland, 1811: 14-16) (Fig. 5).

Certain at this point that he had succeeded in captivating the reader with the marvellous depiction of his landscapes and animals, in other words with the beauty of art, Humboldt goes on warning him that the path to naturalistic knowledge requires time, sacrifice and patience. He suggests that "des siècles ne suffiroient pas pour observer les beautés et pour découvrir les merveilles que la nature y a prodiguées sur une étendue de deux mille cinq cents lieues, depuis les montagnes granitiques du détroit de Magellan jusqu'aux côtes voisines de l'Asie orientale. Je croirai avoir atteint mon but, si les faibles esquisses que contient cet ouvrage excitent des voyageurs amis des arts à visiter les régions que j'ai parcourues, pour retracer fidèlement ces sites majestueux, qui ne peuvent être comparés à ceux de l'ancien continent" (Humboldt, 1810: 4).

Turning now to the texts and the American plates of the *Costume*, it can be seen that Ferrario's writings were put togerther by assembling parts of Humboldt's texts mentioned above and also parts of the following works: *The Mendoza Codex*, 1529-1553; Garcilaso de la Vega el Inca, *Comentarios Reales*, 1609; Francisco Hernandez, *Tractatus del Quadrupedibius Novae Hispaniae*, in Idem, *Nova Plantarum, Animalium et Mineralium Mexicanorum Historia*, 1661; Antonio de Solís, *Historia de la conquista de México*, *poblacion y progressos de la América septentrional, conocida por el nombre de Nueva España*, 1684; Antonio de Ulloa, *Relación histórica del viage a la America Meridional*, 1748; Francesco Saverio Clavigero, *Storia antica del Messico*, 1780-1781; Antonio Alcedo, *Diccionario geográfico-histórico de las Indias Occidentales o América*, 1786-1789 and Conrad Malte-Brun, *Précis de la Géographie universelle*, vol. V, 1817. And it can therefore be observed how Ferrario's texts and plates provide the reader with an ensemble not always supported by an organic project.

Fig. 4 - *Vultur gryphus* Linnaeus 1758 (Humboldt & Bonpland, 1811: Planche VIII). (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense).

Humboldt's writings, always translated or summarized by Ferrario with great precision, are often lightened of the scientific parts and lack the tension towards a higher knowledge that, as mentioned above, Humboldt had imprinted on them. What is most missing in Ferrario's work are the numerous connections between the American themes considered and the similar ones in Asia, Europe and Africa, which Humboldt continually weaves with the aim of establishing a unitary knowledge of what he observed. For instance, let us recall the comparison between the natural bridges of Icononzo and those of Mexico, Virginia and Portugal (Humboldt, 1810: 20), the comparison between the vegetation growing on the basalts of the Regla cascade and that of the granites of Lapland (Humboldt, 1810: 122) and the equality between the serpentines on the island of Cuba and those in Germany, and between the amygdaloids on the plateau of Mexico and those at the foot of the Carpathian Mountains (Humboldt, 1810: 123) and finally the difference between the Tequendama waterfall and those in Switzerland, the Pyrenees and Niagara (Humboldt 1810: 21). Many other comparisons Humboldt made between Indigenous American civilizations and the Old World ones.

With regard to the quality of the iconographic material, the illustrations in the *Costume* appear to be of a lower level than those in the *Vues*, probably due to the backwardness of the techniques employed in Milan, even among the teachers of the Accademia di Belle Arti di Brera, which, as we have seen, the Milanese scholar adressed; to the haste in proceeding with the work, amidst the many difficulties related to the vast amount of material collected and the need to meet the deadlines for publication; and finally to the lack of knowledge of the landscapes and natural elements of tropical America of the artists who painted the plates of the *Costume*, and who for the first time were tackling these landscapes and elements. On the other hand, the plates in the *Vues* were, as mentioned above, drawn, engraved and coloured under the watchful eye of the Prussian naturalist. And yet, in spite of these shortcomings, Ferrario's illustrations – and especially those depicting archaeological artifacts and Indigenous pictorial documents – are, on the whole, faithful to Humboldt's ones: the objects depicted are, even if not always clearly, mostly recognisable and, in any case, such as to encourage the reader to seek between the written pages the elements for reaching a rational knowledge of what he observed in the plates. In this regard, it should not be forgotten that Ferrario addressed the question of the relationship between image and text as early as the first volume of the *Costume*. In fact, at the beginning of his work he writes: "le figure non sono poi inventate a capriccio, come suole spesso accadere in opere di simile fatta, ma cavate diligentemente dalle migliori storie della natura, dalle statue, dalle medaglie, da' bassi rilievi, e dalle più accreditate relazioni de' viaggiatori; e ciò venne eseguito con quella giusta economia che ci siamo prefissi, senza però nulla detrarre al vantaggio che deriva dalla rappresentazione degli oggetti, e di quelli in ispezie

Fig. 5 - *Saguinus fuscus* (Lesson 1840). (Humboldt & Bonpland, 1811: Planche V). (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense).

che non si possono bastantemente spiegare col discorso" (Ferrario, 1815: XXIV). We would also add, with regard to painting in particular, that in the exergue to the first volume of the *Costume* Ferrario includes the following words taken from *Saggio sull'architettura e sulla pittura* by Francesco Algarotti: "Lo studio medesimamente del paesaggio potrà instruirlo [il pittore] della varietà degli alberi e delle piante, che allignano sotto varj climi, della varia qualità del terreno, e di simili altre cose, che caratterizzano i differenti paesi. E così egli verrà a poco a poco a rendersi atto a potere secondo l'uopo rappresentare nelle opere sue le particolari proprietà delle nazioni, de' paesi, de' tempi; parte anch'essa di non picciola importanza al pittore, ed è denominata costume" (Algarotti, [undated]: 95).

In addition, it should be said that Ferrario's decision to include the landscapes of the *Vues* in the American volumes of the *Costume* reveals his considerable sensitivity to landscape painting, a genre that, following Humboldt's journey to Latin America, had found a rich source of inspiration in the tropics (Greppi, 2021: 91-166).

Finally, let us point out that not only for Lombardy, but also for the Italian peninsula, the *Costume* was considered by critics, upon its release on the book market, as "la prima vasta opera fino ad allora mai immaginata", worthy of being placed among those "fatte per onorare oltre che l'autore [...] anche il paese nel quale [erano] pubblicate e il secolo nel quale [vedevano] la luce". Special attention was also given to the "eccellenti saggi dell'arte di miniare le figure, la quale coltivata con successo in Francia, in Inghilterra e in Germania non [era stata] [fino ad allora] che rozzamente e imperfettamente trattata in Italia" (Anonymous, 1816: 245-247). The positive judgement of Ferrario's contemporaries was confirmed later on, despite the fact that some mistakes and a certain lack of uniformity were gradually detected (Anonymous, 1817: 96-97). These were, however, shortcomings considered inevitable in a work "di cotanta mole che [avrebbe formato] mai sempre un'epoca nei fasti dell'italiana tipografia" (Anonymous, 1826: 81).

The "cotanta mole" (huge amount) had been further expanded compared to the initial estimate due to the addition of four volumes including a supplement to Sardinia; a catalogue of the most significant writings published by travellers between 1820 and 1829; an appendix of the most recent geographical discoveries; and a general alphabetical and subject index. This increase in size was probably responsible for the reduction in the number of subscribers from the initial 150 to 86 by the end of the work (Pomar Fiol, 2006-2007: 13).

With regard to the success of the *Costume*, it should be noted that many cheap reprints were offered to the public by various publishers on the Italian peninsula, all of which were characterised by lower quality and fewer images, copied from Ferrario's volumes and not from Humboldt's *Vues*. However, it must be acknowledged that these low-priced reprints helped to spread part of Humboldt's thought and work not only in Lombardy, but also in other Italian States, albeit in an approximate, haphazard and reductive way. The main reprints include those by Vincenzo Batelli, Florence, 1823-1837, which gave rise to a sensational publishing case (Berengo, 1980: 281-308), Alessandro Fontana, Turin, 1829-1833, Vignozzi brothers, Livorno, 1830-1838, and Tramater, Naples, 1834-1837.

At this stage, we can state not only that, with his two volumes on the Americas, Ferrario was, most probably, as mentioned above, the first to spread and put into circulation to the public in Lombardy, and more generally that of the Italian peninsula, a considerable part of Humboldt's work and scientific vision, but also that he was able to render the naturalistic vision of the Prussian scientist in a satisfactory way, although not always complete and sometimes simplified, as he himself admitted, asserting that he "[aveva] tralasciato di [ingolfarsi] nella più profonda erudizione e schivate tutte le più piccole particolarità della storia, le quali servire non potrebbero che di pascolo ad una vana curiosità" (Ferrario, 1815: XXIV). And yet, despite these shortcomings, it is possible, in our opinion, to consider Ferrario's American volumes as a starting point for those who wish to continue and deepen this initial research. We would also add that the *Costume* was the precursor of a genre that enjoyed considerable success until the second half of the nineteenth century, and we therefore believe that it might be of some significance to start an investigation into the presence of Humboldt in other travel narratives, illustrations of peoples' habits and descriptions of exotic landscapes. In this regard, as a probable effect of the publication of Ferrario's American volumes and perhaps upon the suggestion by Ferrario himself, we would point out the publication of *Viaggio al Messico, alla Nuova Granata ed al Perù ossia saggio politico sul Regno della Nuova Spagna del signor Alessandro de Humboldt*, translated by Gaetano Barbieri, Sonzogno, Milan 1827-1829 (7 volumes), included in the *Raccolta de' viaggi più interessanti eseguiti nelle varie parti del mondo, tanto per terra quanto per mare dopo quelli del celebre Cook, e non pubblicati finora in lingua italiana* that the publisher Giambattista Sonzogno issued between 1815 and 1822, and that his son Lorenzo continued until 1832 (Berengo, 1980: 159-160).[11] In the preface to *Viaggio al Messico*, that Ferrario had used in its original French edition (1811) quite often in his first american volume (1820) as seen above, the publisher warned his 360 subscribers[12] that, although that work had not been written as a travel account, it was nevertheless "evidente che [racchiudeva] in sé i risultamenti delle osservazioni fatte da quel celebre viaggiatore nel percorrere e nel soggiornare nella parte più considerevole dell'America spagnuola". And he explained the reasons for proposing the work in Italian, by recalling "la grande e meritata fama dell'Autore, l'importanza delle provincie delle quali si [trattava], la profondità e novità delle osservazioni da lui fatte, le sue scoperte scientifiche e le grandi viste generali sotto le quali egli per il primo [aveva] saputo considerare i fenomeni fisici e politici di quel vasto continente non abbastanza esplorato, [che avevano] meritamente eccitato l'attenzione degli eruditi e degli uomini di Stato", so much so that the various editions of the work "furono ben presto esaurite […] in diversi paesi e in diversi idiomi". ([Sonzogno], 1827: V-VI). This Sonzogno's decision is a sign, we believe, of the consideration that the Prusssian scientist was beginning to get in those years among readers in Milan and Lombardy, following the publication of the plates and texts of the American volumes of the *Costume*.

Note to the following cards

With the aim of enabling the reader to draw a comparison between the materials in Humboldt's *Vues* and those in Ferrario's *Costume*, we present a series of 24 cards arranged in two different ways. With regard to landscapes and monuments we chose the chronological sequence of Humboldt's and Bonpland's visits. On the other hand, as far as the plates devoted to archaeological materials are

Fig. 6 - Map of northwest South America showing the itineraries, the sites and volcanos visited by Humboldt and Bonpland in 1801-1803 and described by Humboldt (1810). (Design by Claudio Pagliarin, Graphics Laboratory of the Museum of Natural History in Milan).

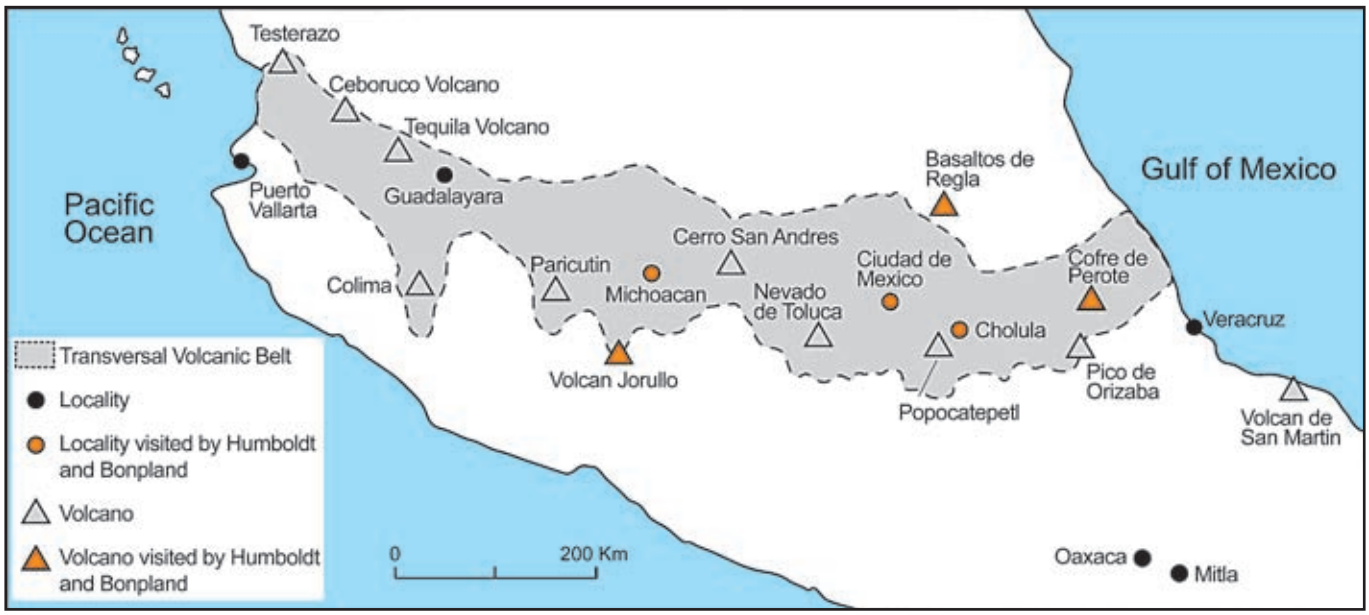


Fig. 7 - Map of south-central Mexico showing the Transversal Volcanic Belt (Langridge *et al*., 2013), the localities and volcanoes visited by Humboldt and Bonpland in 1803-1804 and described by Humboldt (1810). (Design by Claudio Pagliarin, Graphics Laboratory of the Museum of Natural History in Milan).

concerned, since most of them do not relate directly with Humboldt's itinerary, we decided to present them in the order that Humboldt himself proposed in his work when trying to excuse himself with the reader for the haphazard assemblage of the plates (Humboldt, 1810: III-IV).

The textual and iconographic materials of the two authors, when compared, show some differences. These are due, for the texts, to Ferrario's simplification of what is written in the *Vues* and at the same time to the addition of some parts taken from the *Tableaux de la nature* and from the volumes of the *Voyage*, mentioned above, with particular regard to the *Essai politique sur le Royaume del Nouvelle Espagne*. As for the landscape plates, it is worth noting that the artists who worked for Humboldt were more skilled than Ferrario's ones at renderingr the chiaroscuro effects, the sharpness of the mark and the veiling of the background in their engravings, through the use of both etching and aquatint techniques. In addition, the Milanese illustrators had difficulties in depicting landscapes totally unknown to them without expert guidance in tropical environments, which were thus partially altered and consequently deprived of their evocative and communicative capacity.

To the images by Humboldt and Ferrario we have added, when considered appropriate, a photograph showing the current situation of the represented places in order to highlight permanence and change.

We have left the title of the images in French, as written by Humboldt, adding in brackets the name of the country in which the depicted landscapes are located and, when possible, the date of Humboldt and Bonpland's visit, the geographical coordinates, as well as the altitude.

As an introduction to the cards we have drawn two maps with the geographical indication of the depicted places (see Figs. 6 and 7).

We have described the geological and volcanological situation, referring for more details on the individual volcanoes of Ecuador and their evolution to Moreno Yanez & Borchart de Moreno (2010).

With regard to botanical identification of Humboldt's plant illustrations it should be taken into account that it must proceed by interpretation, as the plants are not fresh or dried specimens directly observable, but interpretations of natural reality. When reproduction is aimed at the recognition of a plant species (scientific drawing), the distance between real and virtual is reduced to zero. However, this is not the case with Humboldt, who chose an artistically creative solution for the naturalistic subjects he wanted to portray, while respecting their scientific value. Hence, in the absence of captions, the need to understand each time which species, genus or family he wanted to recall in his traveller experience. The specimens depicted have a degree of identificability proportional to the scientific nature of the depiction; sometimes Humboldt caricatures one or more characters that may be diagnostic for the family, genus and, in more fortunate cases, the species. The best results have been achieved by cross-referencing, whenever possible, diagnostic elements from the figure of the plant with Humboldt's references to it in the text. The scientist's notations have in some fortunate cases even made it possible to eliminate uncertainties concerning the species at once, to the exclusion of possible alternatives, but they have mainly limited themselves, always usefully, to directing the search for the most congruent taxonomic identification. With regard to individual subjects, the morphological characters of the illustration were related to the geographical distribution of the species up for identification (primary range and possible secondary range), ecology, habitat, possible shaman-ethnobotanical values and post-colonial evolution in Europe and North America of economic and industrial uses (agaves, *Beaucarnea recurvata*, cinchona, coca etc.). The bibliographic and iconographic documentation consulted was selected on a case-by-case basis, with *Flora Neotropica* (1967 onwards), *Flora Mesoamericana* (1994 onwards), *Flora mexicana* (Sessé & Moziño, 1894), *Catalogue of the vascular plants of Ecuador* (Møller Jørgensen & León Yánez eds., 1999) and *Flora of Chile* (vol. 1-6, Missouri Botanical Garden, online, 2004) playing an essential role. Contributions of monographic interest include Moscol Olivera & Cleef (2009) for *Nertera granadensis*, Loaiza & Morrone (2011) for *Armatocereus godingianus* and *Opuntia soederstromiana* (Chimborazo), The *Gymnosperm Database* (Earle, 1997 onwards) for *Taxodium huegelii* in Puebla (Mexico) and Viveros-Viveros et al. (2009) for *Pinus hartwegii* (Coffre de Perote). The bi- and trinomial nomenclature (accepted names) follows IPNI (2021), Tropicos and PoWO (2021), that of the families APG IV (Stevens, 2001 onwards).

Lastly, it should be noted that geological elements prevail over botanical and more generally biological ones. This choice was made by Humboldt for at least two reasons: firstly, because of his deeper knowledge of abiotic disciplines, in particular geology, which he had studied since his early years at university, together with chemistry and physics, than of biotic ones[13]. Secondly, because it would have been impossible to reproduce animals and plants in large numbers and with great precision in landscape paintings, as they would have filled up the foreground and prevented an overall view. The depiction of plants and animals was therefore the subject of specific works in which they are represented, as we have seen with the condor and the monkey, individually and with the utmost precision.

Insofar as the places where the volumes, from which the images were taken, are preserved, it should be specified that Humbodt's images were reproduced from the copy of the *Vues* housed in the Braidense Library in Milan and used by Ferrario himself.

As for Ferrario's images, they have all been reproduced from the copy of the *Costume* housed in the same Braidense Library.

Finally we would point out that the work plan is by Filippo Bianconi, member of the Ticinese Society of Natural Sciences, and Agnese Visconti, former professor at the University of Pavia, who are also the authors of the geological and historical part respectively; the botanical part is by Enrico Banfi, former director of the Museum of Natural History in Milan, and the archaeological part is by Davide Domenici, professor at the University of Bologna.

VOLCANS D'AIR DE TURBACO
(Nueva Granada - Colombia)

Visit of Humboldt and Bonpland:	between 6 and 17 April 1801
Coordinates:	10°19'56" N / 75°21'28" W
Altitude*:*	approx. 150 m a.s.l.

After a stay of almost three months on the island of Cuba, Humboldt and Bonpland embarked in Havanna [*sic*] on 9 March 1801 and after a stormy and dangerous journey by sea they arrived in the port of Cartagena in Colombia (then Nueva Granada) on 30 March 1801. In order to escape its heavy climate they settled in the small town of Turbaco, 10 km South of Cartagena and with a mild and ventilated climate. Humboldt and Bonpland lived there from 6 to 18 April with the aim of botanizing ("Nous allions tous les jours herboriser dans la forêt de Turbaco, depuis cinq heures du matin jusqu'à la nuit". [Humboldt, 1826b: 357]) and visiting the "air volcanoes" in a forest clearing nearby.

In today's terminology, 'air volcanoes' are referred to as 'mud volcanoes', also known as *vulcanelli*. In Sicily, they are of two types, called *maccaluba* and *salse.* The most famous in historical times are the mud volcanoes of Aragona, North of Agrigento (Girgenti). Mud volcanoes are small cones, from a few decimeters to several meters high, which erupt water and clay, softened by water, combined with saline substances and also methane and hydrocarbons (bitumen or oil; the vulcanelli are often associated with oil fields). Their genesis is linked to a particular phenomenon known as sedimentary volcanism, with water and gas under pressure rising up through structural discontinuities in clay formations or through actual faults; the unconsolidated material comes up to the surface, giving rise to a mud cone with a crater-like top. The phenomenon sometimes takes on an explosive character, with the expulsion of clayey material mixed with gas and water hurled at considerable height; in many cases the gas is flammable. There are approximately 800 mud volcanoes in the world, half of which are located in the state of Azerbaijan (see Fig. 10).

The Turbaco volcanoes are part of a belt of mud volcanoes about 350 km long, running from the Gulf of Urabà in the South to the mouth of Rio Magdalena in the North, and parallel to the coast of the Caribbean Sea West of the Cordillera Occidental (Gansser, 1960: 4).

Humboldt's Text

Humboldt offers an excellent detailed description of this site. The Indians who accompanied the two scientists on their botanizing "nous parloient souvent d'un terrain marécageux [...] et appelé par les créoles, les Petit Volcans, *los Volcancitos*. Ils racontaient que, d'après une tradition conservée parmi eux, ce terrain avait jadis été enflammé, mais qu'un bon religieux, curé du village, et connu par sa grande piété, étoit parvenu, par de fréquentes aspersions d'eau bénite, à éteindre le feu souterrain: ils ajoutoient que, depuis ce temps, le volcan de feu étoit devenu un volcan d'eau, *volcan de agua*". The Indians had taken Humboldt and Bonpland to visit *the Volcancitos de Turbaco* (the precise date is unknown) "au centre d'une vaste plaine bordée de Bromelia karatas [*Bromelia karatas* L.]. Les volcancitos sont situés à six mille mètres à l'est du village de Turbaco dans une forêt épaisse qui abonde en *beaumiers de tolù* [*Myroxylon balsamum* (L.) Harms], en *Gustavia* à fleurs de nymphea [*Gustavia gracillima* Miers, not shown on the plate] et en *Cavanillesia mocundo* [*macondo*] [*Cavanillesia platanifolia* (Humb. & Bonpl.) Kunth, not shown], dont les fruits membraneux et transparens ressemblent à des lanternes suspendues à l'extrémité des branches".

The *volcancitos* comprise 18 or 20 small cones, 7 to 8 m high, made of blackish-grey clay, with an opening filled with water at the top. In the lapse of two minutes, usually five explosions of a large quantity of air, partly accompanied by an ejection of mud, do occur. The force of the exploding air from the surface of the water "peut faire supposer que dans l'intérieur de la terre, il [l'air] éprouve une grande pression". These explosions are preceded 15 to 18 seconds before by a dull noise. The text ends with a description of the analysis results of the air samples: Humboldt states that they are almost pure nitrogen containing less than 0.5 % oxygen. (Humboldt, 1810: 239-241).

Humboldt's Plate (Fig. 8)

Humboldt's Plate LXI (1810) is among the best of those included in this article. It was drawn by Marchais on the basis of a sketch made by the Prussian naturalist on the spot and engraved by Bouquet. Five *volcancitos* emerge in the clearing surrounded by palm trees; some of them spray water from their craters that trickles down the sides. In the foreground, Humboldt himself and an Indigenous man covered with a cloth rolled up around his hips stand as staffage (but the two figures are too large to serve as scale markers). Looking at the plate, it is possible to see on the left aroid (*Aracea* sp.), on the right *Ceroxylon* sp. shooting at the base and mimosas; behind the mimosas stands a small palm tree. On the right there is *Dieffenbachia* sp., and further on to the right *Bromelia karatas*, L. The broadleaf tree next to the palm tree is *Myroxylon balsamum* (L.) Harms. The tropical forest is in the background. The plate is very elegantly coloured with a light green colour that fades towards the horizon.

Ferrario's Text

Ferrario's translation (1821: 56-57) is correct and almost complete, except for four paragraphs, the last of which omits the description of the chemical composition of the air.

Ferrario's Plate (Fig. 9)

Ferrario's Plate 7 (1821), authored by Fumagalli, reproduces the whole landscape fairly faithfully, but many details are false: for example, the large palm tree in the

Figs. 8-9 – 8) Above, Humboldt's Plate XLI (1810), Volcans d'air de Turbaco. 9) Below, Ferrario's Plate 7 (1821), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

foreground is crudely engraved, the water sprays are somewhat exaggerated and the forest on the horizon is rudely drawn. The colours do not correspond to Humboldt's original and are in some cases too garish. Overall, the engraving lacks delicacy of line. The scientific aim is nevertheless evident with regard to the geological aspects. As for the botanical aspects, the depicted plants are not recognizable.

Humboldt's investigations of the Turbaco volcanoes after 1810

Humboldt, who was fond of volcanology, continued to deepen the understanding of the Turbaco *volcancitos* in particular, and of the salse (mud volcanoes) in general after 1810.

In volume XII of his *Voyage aux régions équinoxiales*, in chapter XXIX of book XI, he takes up the 1810 account, adding various new data. He writes as follows "[...] nous nous fîmes conduire par les Indiens aux *Volcancitos* de la forêt: nous y trouvâmes le phénomène des *Salses* ou *Volcans d'air*, dont l'étude n'est pas sans intérêt pour la connoissance si importante des *éruptions boueuses*". For the first time Humboldt uses the term "salse" and "mud eruptions". He goes on stating that the erupting air "est de l'azote presque pur", that "on n'observe aucune trace d'odeur d'hydrogène sulfuré" and that his on-site experiences indicate a lack of oxygen and carbonic acid (carbon dioxide). Humboldt estimates the daily volume of nitrogen emitted at "plus de 3000 pieds cubes" (equal to about 0.03 cubic metres). During his visit to the *volcancitos*, Humboldt was "très porté à regarder le phénomème des *salses* comme un petit phénomème local. [...] Je ne connoissois alors que par quelques récits de Dolomieu et par des descriptions très-imparfaites les volcans de boue de la Sicile, dont Strabon avoit déjà fait mention (Salse de Macaluba, près Girgenti)". But some fifteen years later it was discovered that the salses are linked to volcanic phenomena and that they are "[...] l'effet d'une même cause, dont le centre d'action se trouve à una grande profondeur dans l'intérieur du globe". Humboldt further describes his knowledge of the gases emitted by the salses at the edge of the Caspian Sea, in particular "les salses de Bakou". He concludes: "Ces salses sont si variées dans leur aspect, qu'à une époque donnée, on a de la peine à les désigner par un même nom. La chaleur souterraine qui s'y développe par intervalles [...] prouve leur communication avec des crevasses très-profondes, avec la source commune des volcans" (Humboldt, 1826b: 354-379).

In *Fragmens de géologie et de climatologie asiatiques*, Humboldt briefly describes the intimate relationships between the volcanoes and the salses (or mud volcanoes) of South America, Italy and the Caspian Sea (Humboldt, 1831, vol. I: 1-7). He then reports the "Extrait d'une lettre adressée à M. le baron A. de Humboldt, par M. Lenz [Emil Lenz, Baltic-German physicist (1804-1865)], à Saint-Pétersbourg" on the Baku salses, which are similar to those of Turbaco, with the difference that the gas emitted is flammable, which is also true for many mud volcanoes and perhaps also for the *volcancitos* before they turned from *fire* to *agua* (Humboldt, 1831, vol. I: 172-183).

Fig. 10 - The Bahar mud volcano, 55 km southwest of Baku in Azerbaijan; note the similary with the Turbaco *volcancitos*. (Photograph taken 5 September 2015 by © Uzeyir Mikayilov. A view of Grosser Kanizdagh from Bahar Mud Volcano. <httphttps://commons.wikimedia.org/wiki/File:A_view_of_Grosser_Kanizdagh_from_Bahar_Mud_Volcano_0.jpg>).

CHUTE DU TEQUENDAMA
(Nueva Granada - Colombia)

Visit of Humboldt:	28 August 1801
Coordinates:	4°34’29” N / 74°17’36” W
Altitude of top:	2,467 m a.s.l. (determination by Humboldt)
Drop:	157 m

On 18 April 1801 Humboldt and Bonpland left Turbaco and on 21 April they sailed the Rio Magdalena upstream to Honda, where they stayed until 22 June. Then they continued overland to Bogotá, where they arrived on 29 June; they remained there until 7 September, as guests of José Celestino Mutis [(1732-1808), the famous Spanish botanist and mathematician, who moved to South America in 1760 (Greppi, 2021: 179-180)]. Bonpland, feverish, stayed in Bogotá for several weeks, while Humboldt made many excursions: on 28 August he visited the Tequendama waterfall (*salto*), located about 30 km southwest of Bogotá, enclosed by an amphitheater consisting of a clayey sandstone and fed by the waters of Rio de Bogotá (known also as Rio Funzha), which drains the vast Bogotá plateau. The *salto* was apparently formed by the retreat of a glacier during the last ice age.

It has been of great touristic interest during the last century, but lost much of its attraction due to the construction of several hydroelectric plants upstream and to heavy water contamination, but nevertheless remains impressive (Fig. 11).

Humboldt’s Text

Humboldt had a penchant for waterfalls, as he explains in the introduction to the *Vues* (Humboldt, 1810: 4). The Tequendama waterfall is described in the text related to Plate VI (Humboldt, 1810*:* 19-23); it includes the legend of its formation, the naturalistic description and a comment on the beauty of the waterfall. The Bogotá plateau, “deux mille six cent soixante mètres au-dessus du niveau de la mer […] est entouré de montagnes élevées: le niveau parfait de son sol […] tout y semble indiquer l’existence d’un ancien lac”. The waterfall drops along a fault (“une crevasse, qui paroît formée par un tremblement de terre”) and descends towards the basin of Rio Magdalena. An Indian legend tells that the lake was created by the malice of *Huythaca*, the beautiful companion of old *Bochica*, who with powerful hands destroyed the rocks that barred the lake towards Tequendama. “La sixième Planche ne peut donner qu’une faible idée [du] spectacle majestueux. S’il est difficile de décrire les beautés des cascades, il l’est encore plus de les faire sentir par le secour du dessin. L’impression qu’elles laissent

Fig. 11 - The Tequendama fall. (Photograph taken on 27 January 2008 by © Francisco Antonio Zea Becerra. Salto del Tequendama. Río Bogotá. San Antonio del Tequendama, Cundinamarca. Colombia. <https://www.flickr.com/photos/14883593@N00/388525224>).

dans l'ame [*sic*] de l'observateur dépend du concours de plusieurs circonstances: il faut que le volume d'eau qui se précipite soit proportionné à la hauteur de la chute, et que le paysage environnant ait un caractère romantique et sauvage, […] la vigueur et la forme des arbres et des plantes herbacées; […] le contraste entre les masses pierreuses et la fraîcheur de la végétation. […] La chute (*salto*) de Tequendama réunit tout ce qui peut rendre un site éminemment pittoresque". He continues specifying that "[…] le volume d'eau en deux bonds se précipite à une profondeur de cent soixante-quinze mètres [actually 157 m]. […] On a ajouté au dessin de la cascade la figure de deux hommes pour servir d'échelle à la hauteur totale du *salto* (see Figs. 12 and 13)". It seems that the enormous mass of vapour rising from the foot of the waterfalls contributes greatly to the fertility of the Bogotá plateau. The inhabitants of Bogotá say that "[…] la chute du Tequendama est si haute, que l'eau tombe d'un saut du pays froid (*tierra fria*) dans le pays chaud (*tierra caliente*)". Humboldt's description of the vegetation is particularly fascinating, with the strong contrast between the one of the upper part of the waterfall and the one of the lower part: "On vient de quitter des champs cultivés en froment et en orge: outre les aralia [different Araliaceae species], l'alstonia theaeformis [presently accepted name: *Symplocos theiformis* (L.f.) Oken, Symplocaceae], les begonia [*Begonia* spp., Begoniaceae] et le quinquina jaune (*Cinchona cordifolia* Mut.) [presently accepted day name: *Cinchona pubescens* Vahl (Rubiaceae)], on voit autour de soi des chênes [*Quercus* spp.], des aunes [*sic*] [*Alnus acuminata* Kunth, Betulaceae], et d'autres plantes dont le port rappelle la végétation de l'Europe; et tout-à-coup on découvre, comme du haut d'une une terrasse, et pour ainsi dire à ses pieds, un pays ou croissent les palmiers, les bananiers et la canne à sucre". Humboldt walked down to the foot of the waterfall: "Je suis parvenu à porter des instrumens [*sic*] dans la crevasse même, au pied de la cascade. On met trois heures à y descendre par un sentier étroit (*camino de la Culebra*). […] Le fond de cette crevasse n'est que foiblement éclairé par la lumière du jour. La solitude du lieu, la richesse de la végétation et le bruit épouvantable qui s'y fait entendre, rendent le pied de la cascade du Tequendama un des sites les plus sauvages des Cordillères".

Humboldt's Plate (Figs. 12 and 13)

Humboldt's Plate VI was drawn and engraved in Rome by Gmelin based on Humboldt's field sketch; it is in black and white and of high quality. It illustrates beautifully the features described in the text: the flow of the falling water, its explosion at the foot, the vertical wall to the left with the representation of the smallest details of the sandstone (the thin stratification and the vertical fissures), the shape of the trees with three palms at the foot of the left wall (where they stop at the edge of the *tierra caliente* coming from the Cauca Valley) and two almost invisible small men at the top of the waterfall acting as scale (see Fig. 12). As for the botanical part of the plate, one can easily detect on the right Euterpe sp., indicative of that part of South America. The remaining vegetation is anonymous and just fills the plate.

Ferrario's Text

Ferrario's text (1821: 49-51) is faithful to the original and almost complete. It lacks the detailed description of the legend of *Bochica* and *Huythaca*, and the paragraph where Humboldt explains the differences between the Tequendama waterfall and those in Switzerland (Pissevache, Staubach, and the Rhine in Schaffhausen) as well as the Niagara Falls. Ferrario writes Santa-Fè tout-court instead of "Santa-Fè de Bogotá".

Ferrario's Plate (Fig. 14)

Ferrario's Plate 4 (1821) is unfortunatly coloured in too strong tones. The engraving, unlike Humboldt's, is clashed, and the various elements that make up the landscape are coarse and fail to convey the impression of elegant finesse of Humboldt's plate. This is particularly true for the right part of the plate, which looks like a large brick wall broken by deep cracks, as well as for the various elements shaping the landscape, for the trees at the waterfall foot and even more so for those crowning it, all crudely depicted. The small men acting as scale on Humboldt's plate are missing. Overall, this is one of Fumagalli's poorest engravings.

Fig. 12 - Detail of Humboldt's Plate showing two small men on top of the left rock acting as scale.

Fig. 13 - Humboldt's Plate VI (1810), *Chute du Tequendama.* (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

Fig. 14 - Ferrario's Plate 4 (1821), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

PONTS NATURELS D'ICONONZO
(Nueva Granada - Colombia)

Visit of Humboldt and Bonpland:	14 September 1801
Coordinates:	4°11'12'' N / 74°30'00" W
Altitude of the upper bridge:	893 m a.s.l. (Humboldt's determination)
Drop from the upper bridge:	97.7 m (Humboldt's determination)
Stream:	Rio Sumapaz (Summa Paz)

On 8 September 1801, Humboldt and Bonpland left Bogotá toward Popayan and Quito, crossing Fusagasugá and Pandi, and on 14 September they visited the two natural bridges of Icononzo, nowadays known as *Puente natural de Pandi-Cundinamarca* over Rio Sumapaz, which limits the Departments of Cundinamarca on the East and Tolima on the West. The term Icononzo originates from 'Icononzue', a local name meaning 'whisper of deep water'. The two natural bridges straddle a deep, narrow gorge about 2 km West of Pandi and 4 km East of Icononzo.

Humboldt's Text

Humboldt offers a long description of the natural bridges of Icononzo (Humboldt, 1810: 9-13), which is partly quoted below. "La vallée d'Icononzo ou de Pandi, dont une partie est représentée dans la quatrième Planche, est moins remarquable par ses dimensions que par la forme extraordinaire de ses rochers, qui paroissent taillés par la main de l'homme. Leurs sommets nus et arides offrent le contraste le plus pittoresque avec les touffes d'arbres et de plantes herbacées qui couvrent les bords de la crevasse. […] Plus profondes et plus étroites que celles des Alpes et des Pyrénées, les vallées des Cordillères offrent les sites les plus sauvages et les plus propres à remplir l'ame [*sic*] d'admiration et d'effroi. Ce sont des crevasses dont le fond et les bords sont ornés d'une végétation vigoureuse. […] La vallée d'Icononzo ou de Pandi […] est moins remarquable par ses dimensions que par la forme extraordinaire de ses rochers, qui paroissent taillés par la main de l'homme. […]. Le petit torrent […] porte le nom de *Rio de la Summa Paz*. […] Ce torrent, encaissé dans un lit presque inaccessible, ne pourroit être franchi qu'avec beaucoup de difficultés, si la nature même n'y avoit formé deux ponts de rochers. […] Le chemin de Santa-Fe [Bogotá] à Fusagasuga, et de là à Pandi, est l'un des plus difficiles et des moins frayés que l'on trouve dans les Cordillères. […] La crevasse profonde à travers laquelle se précipite le torrent de la Summa Paz occupe le centre de la vallée de Pandi. […] Il est très-probable que cette crevasse a été formée par un tremblement de terre: elle ressemble à un filon énorme, dont la gangue auroit été enlevée par les travaux des mineurs. Les montagnes environnantes sont des grès à ciment d'argile: cette formation repose sur les schistes primitifs (*thonschiefer* [*sic*]) de Villeta. […] Dans la vallée d'Icononzo [above: "vallée de Pandi"], le grès est composé de deux roches distinctes. Un grès très compacte et quartzeux, à ciment peu abondant […] repose sur un grès schisteux (*sandsteinschiefer* [*sic*]) à grain très-fin, et divisé en une infinité de petites couches très-minces et presque horizontales. On peut croire que le banc compacte et quartzeux, lors de la formation de la crevasse, a résisté à la force qui déchira ces montagnes, et que c'est la continuation non interrompue de ce banc qui sert de pont pour traverser d'une partie de la vallée à l'autre. Cette arche naturelle a quatorze mètres et demi de longueur sur $12^{m},7$ de largeur; son épaisseur, au centre, est de $2^{m},4$. Des expériences faites avec beaucoup de soin sur la chute, nous ont donné $97^{m},7$ pour la hauteur du pont supérieur au-dessus du niveau des eaux du torrent. […] Les Indiens de Pandi ont formé, pour la sûreté des voyageurs, une petite balustrade de roseaux. […] Dix toises [about 20 m] au-dessous de ce premier pont naturel, s'en trouve un autre. […] Trois énorme masses de rochers sont tombées de manière à se soutenir mutuellement: celle du milieu forme la clef de la voûte". Humboldt assumes that the natural arch could be a remnant of a pre-existent destroyed one and quotes as a similarity a nearly collapsed wall in the Colosseum in Rome.

"Au milieu du second pont se trouve un trou de plus de huit mètres carrés, par lequel on voit le fond de l'abîme: c'est là que nous avons fait les expériences sur la chute des corps. Le torrent paroît couler dans une caverne obscure: le bruit lugubre que l'on entend est dû à une infinité d'oiseaux nocturnes qui habitent la crevasse et que l'on est tenté d'abord de prendre pour ces chauve-souris de taille gigantesque, qui sont si communes dans les régions équinoxiales. On en distingue des milliers qui planent au-dessus de l'eau. Les Indiens nous ont assuré que ces oiseaux ont la grosseur d'une poule, des yeux de hibou, et le bec recourbé. On les appelle *cacas*, et la couleur uniforme de leur plumage, qui est d'un gris brunâtre, me fait croire qu'ils n'appartiennent pas au genre *caprimulgus*, dont les espèces sont d'ailleurs si variées dans les Cordillères. Il est impossible de s'en procurer, à cause de la profondeur de la vallée. On n'a pu les examiner qu'en jetant des fusées dans les crevasses, pour en éclairer les parois". These birds have later been determined and described by Humboldt himself as *Steatornis caripensis* (Humboldt, 1817: 51-52). "L'élévation du pont naturel d'Icononzo est de huit cent quatre-vingt-treize mètres (quatre cent cinquante-huit toises) au-dessus du niveau de l'Océan".

Humboldt then mentions similar phenomena in Virginia (United States), in the Cumban Mountains (Province of *los Pastos*), moreover the bridge *Mère de Dieu*, called Dantó, in Mexico, and the perforated rock near Grandola in the Province of Alentejo in Portugal. He ends as follows: "Mais je doute qu'on ait découvert jusqu'ici, quelque part sur le globe, un accident aussi extraordinaire que celui qu'offrent les trois masses de rocher qui se soutiennent mutuellement en formant une voûte naturelle".

The "crevasse profonde" was surely not originated by an earthquake, as Humboldt states, but by a linear tectonic structure; however, at the beginning of the nineteenth century the tectonic branch of geognosy did not yet exist.

Humboldt' Plate (Fig. 15)

Humboldt's Plate IV (1810), in black and white, drawn and engraved by Gmelin in Rome from the field sketch by Humboldt, is of high quality and illustrates perfectly the features described in the text. As in the *Chute du Tequendama* Plate, you note, acting as a scale, on the left side of the upper bridge, three men behind a couple of mules. The depth of the gorge is emphasised by the light and shade interplay, which underlines the almost horizontal sandstone strata and the vertical fissures, more pronounced on the shadowed wall. The three voluminous blocks, slotted together and with the middle one acting as a sort of keystone, are underlined by the light and shade interplay. The deliberately anonimous plants surrounding the walls frame the plate and emphasise the uniqueness of the rock complex. A small flock of *Steatornis caripensis* can be seen at the foot of the waterfall.

Ferrario's Text

Ferrario's description (1821: 51-53) is almost exhaustive: only the introducting and the final paragraphs, which are of small importance for the understanding of the text, are missing; the final paragraph contains the description of the discovery of *Steatornis caripensis*. The translation is fundamentally correct, except for the petrographic and geologic terminology: the two types of "grès" (sandstone) are translated with the term "pietra bigia"; Ferrario, not being a geologist, mixes up the French term "grès" with the Italian "grigio" (grey) and hence "pietra bigia" (grey stone). The term "spaccatura" is not quite correct as well: Humboldt writes the word "crevasse", which means "crepaccio". The correct term should be "gorge", respectively "gola".

Ferrario's Plate (Fig. 16)

Ferrario's Plate 5 (1821), authored by Fumagalli, is coloured, with flashy, almost fancy colours: the rocks in reddish brown and the plants painted in two different greens, whose meaning is not clear. The rocks on the two walls, particularly the one in shadow, appear flat, with very little relief; of the three blocks in the centre of the lower bridge, only the two lateral are correctly represented; the stream at the base of the gorge carries too much water. The landscape lacks the third dimension, which, on the other hand, is very well represented in Humboldt's plate. In brief, a copy without elegance. The *Steatornis caripensis*, shown in Humboldt's plate at the foot of the waterfall, are missing. However, the main subject of the plate, namely the representation of the two natural bridges, is clearly shown.

Detail in the two plates

Humboldt's Plate 4 and Ferrario's Plate 5 are compared in a detail of the upper part of the two bridges (Fig. 17), which clearly highlights the difference in the two engraving techniques: etching, in the case of Humboldt, and aquatint, in the case of Ferrario.

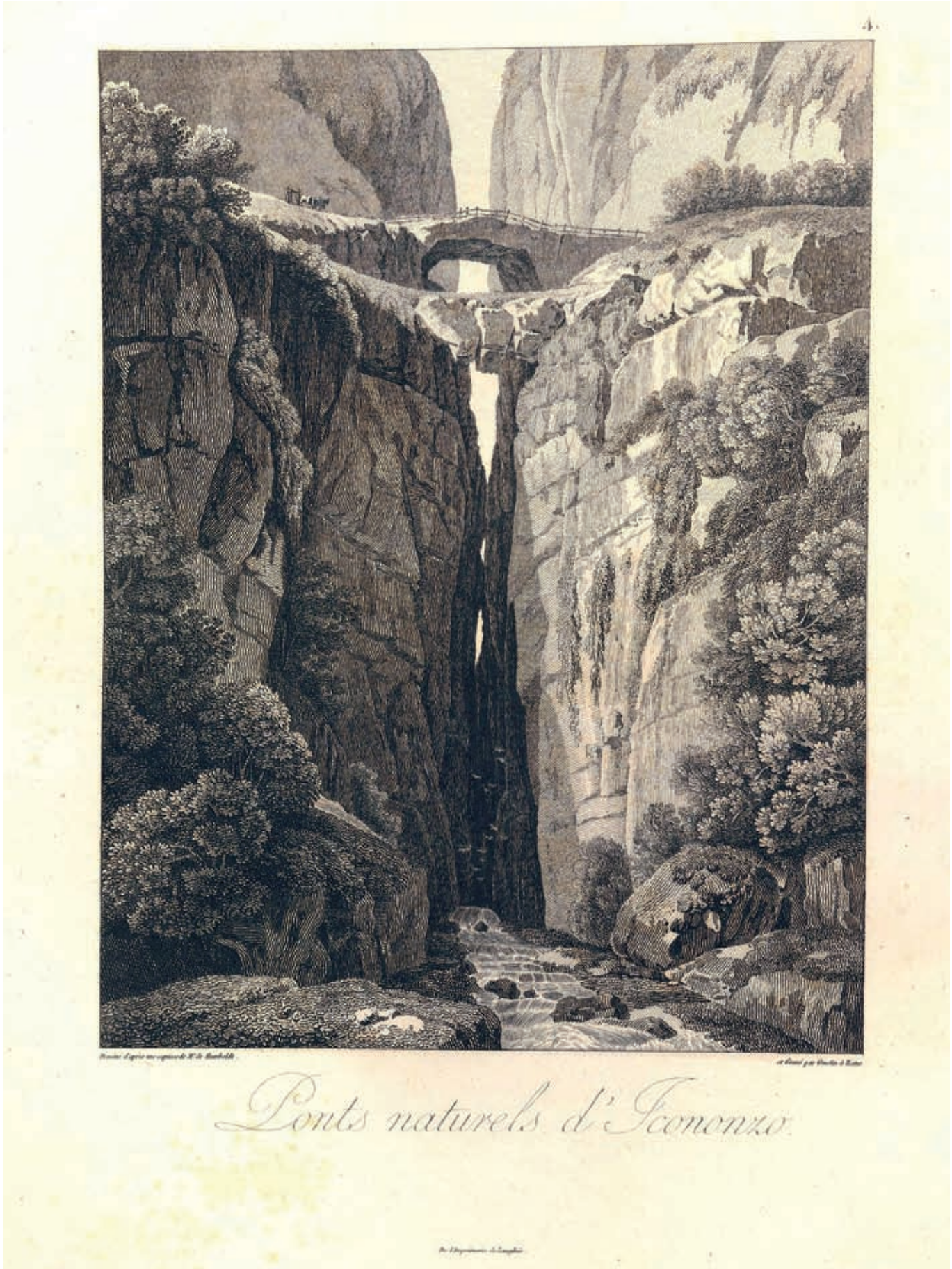


Fig. 15 - Humboldt's Plate IV (1810), *Ponts naturels d'Icononzo.* (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

Fig. 16 - Ferrario's Plate 5 (1821), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

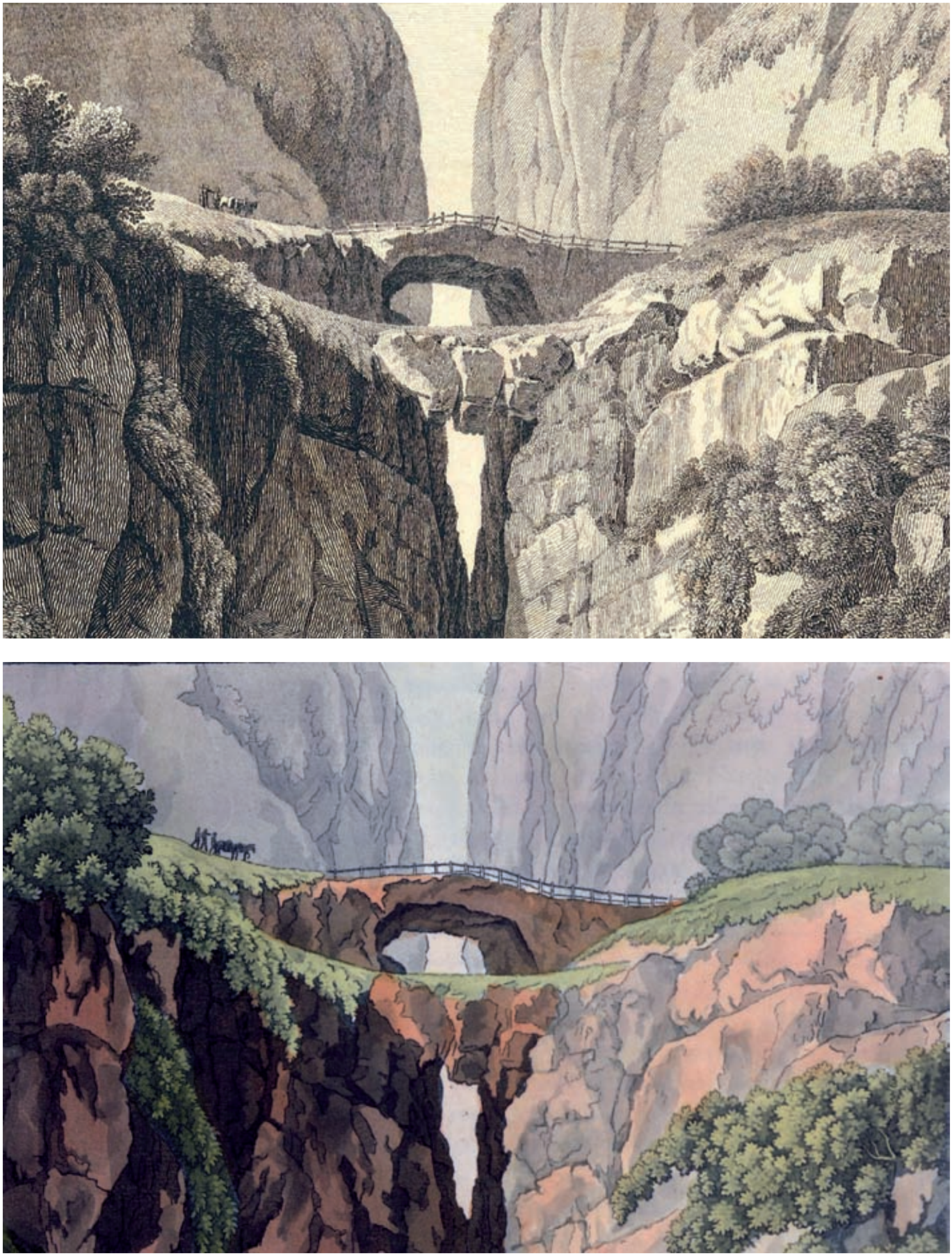


Fig. 17 - Details in the two plates. Humboldt's Plate IV and Ferrario's Plate 5 are compared in a detail of the upper part of the two bridges, which clearly highlights the difference in the two engraving techniques: etching, in the case of Humboldt, and aquatint, in the case of Ferrario.

PASSAGE DE LA MONTAGNE DE QUINDIU, DANS LA CORDILLÈRE DES ANDES (Nueva Granada - Colombia)

Passage of Humboldt and Bonpland:	15 October 1801 (pass crossing)
Coordinates:	4°28'21" N / 75°33'20" W
Altitude of the pass:	3,500 m a.s.l. (Humboldt's estimate)

The most frequently used crossing from Bogotá to Popayan and the banks of the Rio Cauca was the *Paramo de Guanacas*. Humboldt and Bonpland preferred the passage over the *Quindiu* (or *Quindio*) mountain in the central chain of the Andes, between the cities of Ibague (in the basin of Rio Magdalena) and Cartago (in the basin of Rio Cauca), considered to be the most strenuous in the Andes.

Acevedo Tarazona and Martínez Botero (2005) published an interesting article on the history of the passage over the Quindiu mountain with extensive quotations from Humboldt's text.

Humboldt's Text

Humboldt's description (1810: 13-19) is very detailed. Humboldt, who crossed the passage followed by a caravan of twelve oxes loaded with instruments and collections, describes it as a very narrow path that wounds through a dense, uninhabited forest and that in fine weather could be walked over in 10-12 days. The path, which as a rule was no more than 40-50 cm wide, was carved into a rock covered by a thick layer of clay and looked like an open-air tunnel in the forest. The path was narrow, but stretches at the edge of precipices were very rare. The altitude of the highest point, the *Garito del Paramo*, was determined by Humboldt being 3,500 m a.s.l. During the ride, the sharp thorns of the bamboo roots (*Guadua angustifolia* Kunth (Poaceae), which abound in the marshy areas of the path, destroyed the shoes of Humboldt and Bonpland, who in the name of universal brotherhood had refused to be carried by men, known as *cargueros* or *silleros*. It was customary for these men, who normally carried from six to seven *arrobas* (75-88 kg), to carry the well-off people on a chair tied on their backs. Humboldt and Bonpland thus ended up without shoes and were forced to walk barefoot during the last days of the crossing, when they also had to endure uninterrupted rain. Humboldt continues the description of the voyage by mentioning the rich vegetation and in particular the wax palms then called with the now obsolete binomial term *Ceroxylon andicola* (current name: *Ceroxylon alpinum* Bonpl. ex DC), which reaches 50 metres in height, and the superb Mutisia grandiflora [*Mutisia grandiflora* Humb. & Bonpl. (Asteraceae)], whose scarlet flowers are 16 centimetres long. The description of the preparations for the journey is also noteworthy: "Lorsqu'on est arrivé à Ibague, et qu'on se prépare au voyage, on fait couper dans les montagnes voisines plusieurs centaines de feuilles de vijao, plante de la famille des bananiers, qui forme un nouveau genre voisin du Thalia [*Calathea lutea* (Aubl.) E.Mey. ex Schult. (Marantaceae)], et qu'il ne faut pas confondre avec l'Heliconia bihai [*Heliconia bihai* L., (Heliconiaceae)]. Ces feuilles, membraneuses et lustrées comme celles du Musa, sont d'une forme ovale, et ont cinquante-quatre centimètres (vingt pouces) de longueur, sur trente-sept centimètres (quatorze pouces) de largeur. Leur surface inférieure est d'un blanc argenté et couverte d'une matière farineuse, qui se détache par écailles. C'est ce vernis particulier qui les rend propres à résister longtemps à la pluie".

Humboldt's Plate (Fig. 18)

Humboldt mentions that Plate V (1810), in black and white, was "dessinée d'après une esquisse de Mr. De Humboldt par Koch à Rome. Gravé par Duttenhofer à Stuttgard [*sic*]." and goes on noting that it "représente un site très-pittoresque, que l'on découvre à l'entrée de la montagne de Quindiu, près d'Ibague, à un poste que l'on appelle le pied de la Cuesta. Le cône tronqué de Tolima [Tolima volcano, 5,280 m a.s.l., which is part of the stratovolcano group (from South to North: Nevado di Tolima, Nevado del Quindio, Nevado de Santa Isabel and Nevado del Ruiz)] couvert de neiges perpétuelles, et rappelant par sa forme le Cotopaxi et le Cayambe, paroît au-dessus d'un masse de rochers granitiques". In the foreground there is a group of *cargueros* described as follows: "On y reconnoit la manière particulière dont la chaise, construite en bois de bambousier, est liée sur les épaules, et tenue en équilibre par un fronteau semblable à celui que portent les chevaux et les bœufs. Le rouleau que l'on voit dans la main du troisième carguero est le toit, ou plutôt la maison mobile dont le voyageur se sert en traversant les forêts de Quindiu". In the foreground, on the right, is an agave [*Agave* sp.] abloom, in the background on the left *Ceroxylon quindiuense* (H.Karst.) H.Wendl. (Arecaceae), forming a riparian oasis along the Combeima River, partly submerged by vegetation on the right. Finally, the town of Ibague can be seen in the background on the far right and, in front of it, a fence with three small natives acting as scale.

The plate is excellent; the intensity of the grey tones diminishes as one moves away from the foreground, aiming at rendering the threedimensionality of the landscape.

Ferrario's Text

Ferrario's translation (1821: 12-14) is almost correct and complete. However, the key paragraph about Humboldt's disdain for the treatment of *cargueros* and *cavallitos* in the service of mine managers is missing. The final paragraph on the botany and the wax palm is also missing. The long description of the *cargueros* is strangely placed in note 1. The text contains two errors: Ferrario writes without exception "Garguero" instead of "Carguero" (always with the initial letter in capital); in the description of the weights carried by the *cargueros* he makes a small oversight: he writes "from 75 to 68 kilograms" instead of "from 75 to 88 kilograms".

Ferrario's Plate (Fig. 19)

In contrast with Humboldt's Plate, Ferrario's Plate 1 (1821), authored by Fumagalli is flat behind the tree-lined foreground; the granite mass and the Magdalena valley with the eastern Andes chain in the background lack relief; the clouds are hardly visible; the three little men at the beginning of the fence in the background are missing; and the cone of eternal snows at the top of the Tolima volcano is also missing. The riparian vegetation is not recognisable and the shrinkage in the density of the vegetation makes the Combeima River too visible, reducing the impression of wild isolation of the place.

Figs. 18-19 – 18) Above, Humboldt's Plate V (1810), *Passage du Quindiu, dans la Cordillère des Andes*. 19) Below, Ferrario's Plate 1 (1821), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

CASCADE DU RIO DE VINAGRE PRÈS DU VOLCAN DE PURACÉ
(Nueva Granada - Colombia)

Visit of Humboldt and Bonpland:	between 16 and 19 November 1801
Coordinates:	2°23'00'' N / 76°27'00" W
Altitude:	approx. 2,700 m a.s.l.
Drop:	over 120 m (Humboldt's estimate)
Stream:	Rio Vinagre (or Pusambio)

After crossing the Quindiu mountain, Humboldt and Bonpland reached the town of Cartago, where they stayed from 13 to 21 October 1801. They continued southwards and in early November reached Popayan in the valley of Rio Cauca, where they stayed until 27 November. From 16 to 19 November they made an excursion to the village of Puracé, about 20 kilometres east-southeast of Popayan. During that short stay they visited the Rio Vinagre waterfall, 500 m East of the village, and on 18 November they climbed the Puracé volcano.

The small village of Puracé is famous for the beautiful waterfalls of the Pusambio River, called Rio Vinagre (literally "stream of vinegar") by the Spaniards. The name 'Vinagre' given to the waterfall by Humboldt is incorrect. Rio Vinagre, which originates on the slopes of the Puracé volcano, has several branches that join West of Puracé and flow into the Rio Cauca. Its present-day name is Cascada de San Antonio, whose location coincides with the one described by Humboldt (see Fig. 22).

The volcano is located at the northern edge of the *Parque Nacional Natural de Puracé*, 10 km southeast of Puracé. It is 4,646 m high and is part of the *los Coconucos* volcanic chain of Pliocene age. It is one of the most active volcanoes in Colombia. In addition to fumarole fields, the area around the volcano has at least 15 hot springs, known for their curative properties as well as tourist attraction. The thermal waters are acidic and have temperatures up to 90°C. Sulphur, mentioned by Humboldt, is mined in the *Mina de Azufres Natural "El Vinagre"* where it is deposited by the oxidation of hydrogen sulphide to elemental sulphur in fault zones (Megyesi, 1962).

Humboldt's Text

Humboldt describes his arrival at the waterfall and the pleasant contrast it creates between cultivated fields, ravines and arid mountains as follows: "En montant de Popayan vers la cime du volcan de Puracé, une des hautes cimes des Andes, on trouve, à deux mille six cent cinquante mètres d'élévation, une petite plaine (*Llano del Corazon*), habitée par les Indiens, et cultivée avec le plus grand soin. Cette plaine charmante est limitée par deux ravins extrêmement profonds, et c'est au bord des précipices que sont construites les maisons du village de Puracé. Des sources jaillissent partout du roc porphyritique [volcanic rocks, probably andesites]; chaque jardin est entouré d'une haie vive d'euphorbes (*lechero*) [*Euphorbia heterophylla* L. (Euphorbiaceae)] à feuilles minces et du vert le plus tendre. Rien de plus agréable que le contraste de cette belle verdure, avec le rideau de montagnes noires et arides qui entourent le volcan". The water of Rio Vinagre is warm towards its source because of the "fonte journalière des eaux de neige, et au soufre qui brûle dans l'intérieur du volcan. Elle forme, près de la plaine du *Corazon*, trois cataractes, dont les deux supérieures sont très considérables. C'est la seconde de ces chutes (*chorreras*) qu'offre la Planche XXX. [...] L'eau, qui s'ouvre un chemin à travers une caverne, se précipites à plus de cent vingt mètres de profondeur [perhaps an overestimate of Humboldt, who drew the waterfall from an Indio's garden, near the house of the Franciscan missionary of Puracé]. [...] Les eaux du Rio Vinagre sont chargées à la fois d'oxide de fer et d'acides sulfurique et muriatique". (Humboldt, 1810: 220-221).

Humboldt's Plate (Fig. 20)

Humboldt's Plate XXX (1810), in black and white, was drawn in Rome by Koch after a sketch taken in the field by Humboldt and engraved by Arnold in Berlin. The plate is fine and the varying intensities of grey highlight, as in other plates, the rock walls and improve the three-dimensional appearance of the landscape. Two men (most likely Humboldt and Bonpland) in the foreground act as staffage. "Le premier plan du dessin présente un groupe de Pourretia pyramidata [*Puya pyramidata*, (Ruiz & Pav.) Schult. & Schult.f. (Bromeliaceae)], plante voisine du Pitcarnia connue dans les Cordillères sous le nom d'*achupallas*. La tige de cette plante est remplie d'une moelle farineuse qui sert de nourriture au grand ours noir des Andes [*Tremarctos ornatus* (Cuvier 1825)], et quelquefois, dans les temps de disette, aux hommes mêmes". Three birds fly in front of the white background of the waterfall; they cannot be identified, however, considering their large size, they might be *Ara* sp. parrots, a very conspicuous and large genus, typical of the wide South American areas between forests and watercourses.

Ferrario's Text

Ferrario's translation (1821: 53-54) is correct and almost complete: only the last sentence about the nutritional value of *Pourretia pyramidata* is missing.

Ferrario's Plate (Fig. 21)

Ferrario's Plate 6 (1821), authored by Fumagalli, is the most unfortunate of those reproduced in this article. The rock walls are depicted with white spots, the water of the waterfall almost without brushstrokes does not give the impression of falling, the three birds, presumably *Ara* sp. parrots, in front of the waterfall are missing, the sky is cloudless. The plate is fancifully coloured: the rock walls in pink and the grass in the foreground in yellow.

Fig. 20 - Humboldt's Plate XXX (1810), *Cascade du Rio de Vinagre près du Volcan de Puracé.* (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

Fig. 21 - Ferrario's Plate 6 (1821), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

Fig. 22 - The Rio Vinagre waterfall or Cascada de San Antonio. (Created from Starter SP2013 Master Page originally, © by Randy Drisgill, April 21, 2013. <http://purace-cauca.gov.co/MiMunicipio/Paginas/Galeria-de-Imagenes.aspx#images-9>).

VOLCAN DE CAYAMBE
(Nueva Granada - Ecuador)

Visit of Humboldt and Bonpland:	presumably in February-March 1802
Coordinates:	0°1'15" N / 77°59'22" W
Altitude:	5,790 m a.s.l.
Humboldt's determination:	3,028 toises / 5,901 m a.s.l.

Cayambe Volcano, 30 km east-northeast of Quito, lies on the western edge of the *Parque Nacional de Cayambe-Coca* and is the third highest after Chimborazo and Cotopaxi. Three kilometres South of its snow-capped summit it is cut by the Equator line. The last eruption took place in 1785, but the volcano is potentially active, as evidenced by periodic seismic phenomena (the last one in 2016), monitored with three seismic stations. Humboldt almost certainly did not climb Cayambe, but simply drew it from Quito, as he writes in his description, presumably in February-March 1802. The Cayambe Volcano is shown in a present-day aerial photograph on Fig. 25.

Humboldt's Text

Humboldt's description (1810: 241-42) is unusually brief and lacking details. This seems to confirm the suspicion that Humboldt did not climb the Cayambe. The text begins stating that the Cayambe, after the Chimborazo, is the second highest of all the peaks in the Cordilleras that have been determined with some precision. With angle measurements taken from the Exido in Quito, Humboldt confirmed the altitude of 5,901 m a.s.l. (3,028 toises) determined by Pierre Bouguer and Charles-Marie de La Condamine during their trip to Ecuador (1735-1745) undertaken on behalf of the Academie Royale des Sciences et Belles Lettres of France with the aim of determine the arc of terrestrial meridian near the Equator (La Condamine, 1751). The two authors had incorrectly named the volcano as *Cayambur* instead of the correct term Cayambe-Urcu.

Humboldt writes that he drew the Cayambe from above Quito's Exido, which was "trente-quatre mille toises [*sic*]", that correspond to about 66,000 km away from Quito! Therefore, this is a serious mistake, perhaps a typographical error. Moreno Yanez & Borchart de Moreno (2010: 46) conclude that Humboldt drew Cayambe from Hacienda Guachalà, located 22 km (11.3 toises) west-southwest of Cayambe. The shape of the volcano is that of a truncated cone, reminiscent of the outline of the *Nevado de Tolima*, illustrated on Plate 5. Of the mountains surrounding Quito, Cayambe is "la plus belle et la plus majestueuse". He adds further: "On ne peut se lasser de l'admirer [la montagne de Cayambe] au coucher du soleil, lorsque le volcan de Guagua-Pichincha, situé à l'ouest, du côté de la mer du Sud, projette son ombre sur la vaste plaine qui forme le premier plan du paysage. Cette plaine, couverte de graminées, est dénuée d'arbres. On n'y voit que quelques pieds de Barnadesia [*Barnadesia spinosa* L.f.], de Duranta [*Duranta* sp. (Verbenaceae)], de Berberis [*Berberis* sp. (Berberidaceae)] et ces belles Calcéolaires [*Calceolaria* sp. (Calceolariaceae)] qui appartiennent presque exclusivement à l'hémisphère austral et à la partie occidentale de l'Amérique".

The description ends with a sentence indicating the grandeur and majesty of the volcano: "On peut considérer cette montagne colossale comme un de ces monuments éternels par lesquels la nature a marqué les grandes divisions du globe terrestre".

Humboldt's Plate (Fig. 23)

Humboldt's Plate XLII (1810), one of the finest, was drawn by Marchais on the basis of a sketch taken in the field by Humboldt and engraved by Bouquet. It shows a sequence of five planes ending at the cone of Cayambe: on the left foreground are bare rocks with trees, in the centre three men as staffage, Humboldt, Bonpland and perhaps Carlos Montúfar (1780-1816, a Creole nobleman and soldier who accompanied Humboldt and Bonpland on their expeditions to present-day Ecuador, Peru, Mexico, the United States and Cuba and as far as Europe). Also on the left in the foreground is *Barnadesia spinosa* L.f. (Asteraceae) vegetation, representative of the place; on the right in the foreground is a possible species of the Gesneraceae family; on the descent towards the plain three half-men can be glimpsed; further on two men are walking on the barren plain; then follow three hills with little vegetation; between the last two hills on the left are fog banks; and finally the snow-capped volcano. The shadows clearly indicate that the sun is shining from right to left. The colours are sophisticated, particularly the various shades of green and the increasingly intense blue towards the sky top. The vegetation of the second and third planes is not depicted with the accuracy of the text description, but is rather an anonymous, contour-like ensemble, perhaps deliberately depicted in this way to bring out the succession of planes in the landscape.

Ferrario's Text

Ferrario's translation (1820: 39-40) is essentially correct. However, some text passages are omitted, such as the paragraph on the plain separating Quito from Cayambe and the plants growing there.

Ferrario's Plate (Fig. 24)

Ferrario's Plate 3 (1820), authored by Fumagalli, is close to the original as a whole, but lacks the feeling of depth resulting in a flattened whole also due to the lack of the three prominent shadows in the foreground staffage figures. The three halved men in the second plane are missing and the two men in the plain stand on the left and not on the right of the plate, as in the original. The colours are false and clashed, particularly the green shades and those of the pink rocks in the foreground.

Figs. 23-24 – 23) Above, Humboldt's Plate XLII (1810), *Vue du Cayambé* [the only exception with the "é" with acute accent]. 24) Below, Ferrario's Plate 3 (1820), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

Fig. 25 - Cayambe volcano in an aerial photograph. (Photo taken 22 September 2010, by © Carlos Costales Terán. Vista aérea del volcán Cayambe. <https://it.m.wikipedia.org/wiki/File:EL_CAYAMBE_DESDE_EL_AVION.JPG>).

VOLCAN DE COTOPAXI
(Nueva Granada - Ecuador)

Visit of Humboldt and Bonpland:	28 April 1802
Coordinates:	0°41'01" S / 78°26'14" W
Altitude:	5,897 m a.s.l.
Determination by Humboldt:	2,952 toises / 5,754 m a.s.l.

Cotopaxi Volcano is a stratovolcano, the most active in Ecuador and one of the highest active volcanoes in the world. It is located 33 km northeast of the town of Latacunga and 50 km South of Quito in the Cordillera Oriental. The name Cotopaxi means "throne of the moon" in the Kichwa language. The volcano has a long history of eruptions. An eruption around 1698 caused the death of hundreds of people. The first recorded eruption was in 1757; the last was on 26 June 1877, with pyroclastic flows. Since 2003 there has been an increase in volcanic activity, with a peak in 2015, marked by ash emissions. The Cotopaxi Volcano is shown in a present-day view on Fig. 28.

Humboldt's Text

The description of the Cotopaxi volcano (1810: 41-47) is very long and partly devoted to general considerations about volcanoes.

The first observation concerns the fact that in the South American Cordillera the "énormes élévations" of the plains at the base of the peaks reduce the impression resulting from the great masses. However, he concludes that in all climates "ce n'est pas tant la hauteur absolue des montagnes, que leur aspect, leur forme et leur agroupement, qui donnent au paysage un caractère particulier". He adds his desire of representing this physiognomy of the mountains in a series of drawings, with the aim of comparing them with those of other parts of the world. Unfortunately, he continues, the data needed for such comparisons were still very scarce; he mentions the panorama of the Swiss Alps constructed from the shores of Lake Neuchâtel by the German surveyor Johann Georg Tralles (1763-1822) using a very precise repeating circle. On the contrary, Humboldt determined the angles with Ramsden's sextant, mentioned in the text on Pichincha. He finally notes the analogy of the mountain shapes of the two continents and, he adds, "on est frappé d'une ressemblance de forme qui se fonde sur une identité de causes et de circonstances locales".

"Le Cotopaxi [...] est le plus élevé de ces volcans des Andes, qui, à des époques récentes, ont eu des éruptions. […]. [Il] est aussi le plus redouté de tous les volcans du royaume de Quito: c'est celui dont les explosions ont été les plus fréquentes et les plus dévastatrices". Humboldt determined he absolute altitude with 5,784 m a.s.l. (2,952 toises). The text continues with the report of some historical eruptions (1738, 1744, 1768 and 1803). The most interesting was the one of 4 April 1768, when "la quantité de cendres vomies par la bouche du Cotopaxi fut si grande que, dans les villes d'Hambato et de Tacunga [some 35 km southwest of the volcano], la nuit se prolongea jusqu'à trois heures du soir, et que les habitants furent obligés d'aller avec des lanternes dans les rues".

The geologist, says Humboldt, is surprised to note that the most active volcanoes in the Kingdom of Quito are in the eastern chain of the Andes, the furthest away from the coast, and specifies that Cotopaxi is 2°2' away from the nearest coast. The volcano itself is described with partly enthusiastic words: "La forme du Cotopaxi est la plus belle et la plus régulière de toutes celles que présentent les cimes colossales des hautes Andes. C'est un cône parfait qui, revêtu d'une énorme couche de neige, brille d'un éclat éblouissant au coucher du soleil, et se détache d'une manière pittoresque de la voûte azurée du ciel. [...] Le cratère est environné d'un petit mur circulaire, qui se présente sous la forme d'un parapet", represented in the sketch below the main drawing of the plate. The limit of the eternal snows lies at 4,411 m a.s.l. Not far from the southwest flank of the volcano there is a small mass of rugged rocks, called *la Tête de l'Inca* (*la Cabeza del Inca*) by the natives according to a legend. Humboldt still leaves open the important question of whether "le cône, comme le *Somma* du Vésuve, est composé d'un grand nombre de couches de laves superposées les unes aux autres". He ends writing that in order to distinguish the active volcano from extinct ones "je me suis permis d'indiquer une fumée légère au-dessus du cratère du Cotopaxi" and that the point from which he drew Cotopaxi (in the plain between the two cordilleras) "est un des sites les plus majestueux et les plus imposans [*sic*] que j'aie vus dans les deux hémisphères".

Humboldt's Plate (Fig. 26)

Plate X (Humboldt, 1810), in black and white with sepia tint, was drawn by Gmelin in Rome based on Humboldt's field sketch and etched by Arnold in Berlin. The plate is excellent. The perfect cone of the volcano is somehow idealized and represented in three sharply subdivided horizontal layers, from bottom to top: the base, covered with undefined vegetation, is overlaid by a bare belt of volcanic rocks, in turn overlaid by the cone of the volcano truncated with a clear cut above which it is covered by perennial snow. To the right stand the rugged rocks of the *Cabeza del Inca,* also snow-capped. The tones of the sky are blurred in order to give more relief to the image. Humboldt, as he says in the text, drew some smoke plumes emitted from the crater, even though the volcano was inactive at the time of the drawing. A small sketch that highlights the circular railing on the top of the cone is shown in the lower part of the plate.

Ferrario's Text

Ferrario's description (1821: 76-77) is confused. It is mostly taken from Malte-Brun's text (1817: 568-569), which was in turn translated from Humboldt's original, as shown by the fact that in both texts the altitude of Cotopaxi is given as 2,052 toises, whereas Humboldt's orig-

Figs. 26-27 – 26) Above, Humboldt's Plate X (1810), *Volcan de Cotopaxi*. 27) Below, Ferrario's Plate 10 (1821, upper half), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

inal says 2,952 toises. The original text is at least halved, probably for space limit reasons. It lacks both the long introduction with general considerations on volcanoes and the physiognomy of mountain ranges, and the long final text with legends on the origin of the *Cabeza del Inca*, the beauty of Cotopaxi and the question of the structural evolution of the volcano. On the contrary, a fifth of the text is devoted to Antonio de Ulloa's description, without indication of the source, of the 1533 eruption and the ensuing conquest of the province by the Spanish admiral Sebastián Belalcázar in 1535.

Ferrario's Plate (Fig. 27)

In Ferrario (1821) the volcano Cotopaxi is represented by Fumagalli in the upper half of Plate 10 (the lower one illustrates the Pichincha complex). The etching is broadly faithful to the original, which by the way is easy to copy. However, the technique is as usual crude, particularly in the details: the two lower layers are almost indistinguishable, the crestline of the *Cabeza* rough and the colour nuances of the sky senseless. The two lower layers are coloured in black and brown. The vegetation is hardly distinguishable from the rocks.

Fig. 28 - The Cotopaxi volcano seen from the West; on the right (southwest) the rugged rocks of the Cabeza del Inca. (Photograph taken 5 October 2010, by © Carlos Costales Terán. Volcán Cotopaxi. <https://es.m.wikipedia.org/wiki/Archivo:Volc%C3%A1n_Cotopaxi.JPG>).

VOLCAN DE PICHINCHA
(Nueva Granada - Ecuador)

Visits of Humboldt and Bonpland:	14 April 1802 (Rucu Pichincha - R), 26 and 28 May 1802 (Guagua Pichincha - G)
Coordinates:	0°09'46'' S / 78°34'00'' W (G) 0°09'60'' S / 78°34'21'' W (R)
Altitude:	4,776 m a.s.l. (G), 4,696 m a.s.l. (R)
Humboldt's determinations:	between 2,300 and 2,500 toises (4,803 and 4,872 m a.s.l.)

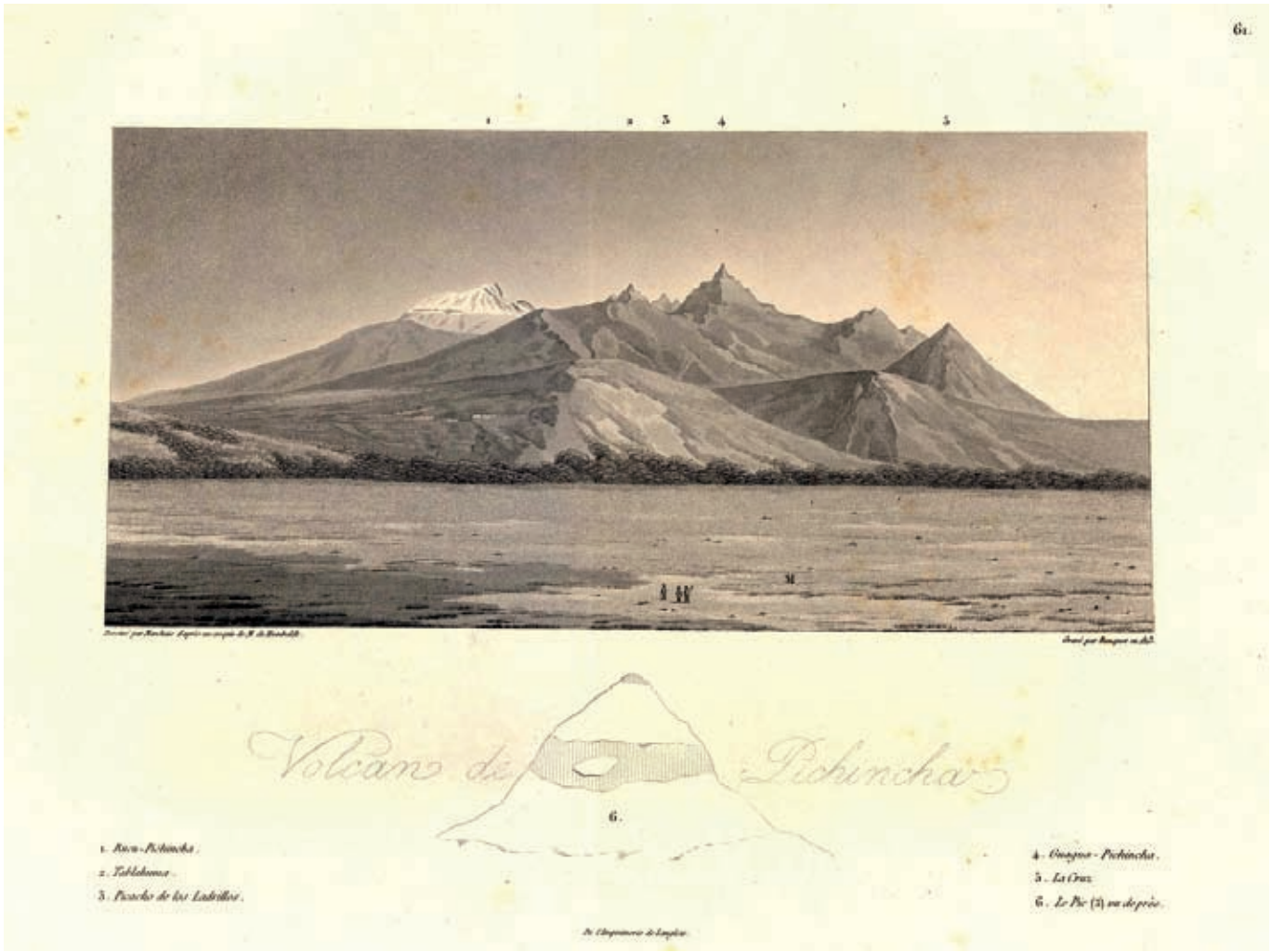
The two volcanoes visited by Humboldt and Bonpland are the main ones in the Pichincha chain in the Cordillera Occidental. They are very close to Quito, i.e. 10 km (Rucu Pichincha), respectively 13 km (Guagua Pichincha) away.

Humboldt first climbed Rucu Pichincha, which he incorrectly named "Guaguapichincha", and later the crater margin of Guagua Pichincha, which he named "Rucupichincha". The swap of the two toponyms was taken over from the descriptions by the academic Charles-Marie de La Condamine (1751: 147-156), who in June 1742 carried out several measurements together with the physicist and geometer Pierre Bouguer in the Pichincha chain (see also card on Cayambe). Rucu in the Quichua language means "the old man", wheres Guagua means "the child"; in geological terms, both are very young stratovolcanoes (of Pleistocene age, Upper Quaternary). Detailed descriptions of the ascents were published by Humboldt 51 years later (1853b: 5-39 and 39-71).

Rucu Pichincha is an extinct volcano with two craters, one inside the other. Several historical eruptions are known; the last one on 22 March 1859 almost entirely destroyed the city of Quito. After climbing the mountain, Humboldt during the descent, at the altitude of 4,590 m a.s.l. had an attack of mountain sickness with vertigo and fainting; he was helped by his companions and strengthened with a little bit of wine.

Guagua Pichincha is the most active volcano in Ecuador. It has a large crater with intense sulphur exhalations (see Fig. 29). The heaviest eruption occurred in 1660 with the emission of ashes over an area of 1,000 km radius; the town of Quito was covered by a 30 cm thick layer of ash. On 7 October 1999 an explosion took place in the crater with the emission of a 12 km high ash "mushroom". Humboldt observed the interior of the crater from a sort of loggia on the rim and notes that the crater is oval-shaped with a N-S axis longer than 800

Fig. 29 - The crater of the Guagua Pichincha volcano with the internal cones; note the yellowish sulphur deposits originating from the fumaroles. (Photograph taken 13 March 2006 by © Jaime del Castillo. Guagua Pichincha volcano crater. Pichincha - Ecuador. <https://commons.wikimedia.org/wiki/File:Ecuador_-_Crater_GuaguaPichincha.JPG> - Released under GNU Free Documentation license).



Figs. 30-31 – 30) Above, Humboldt's Plate LXI (1810), *Volcan de Pichincha.* 31) Below, Ferrario's Plate 10 (1821, lower half), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

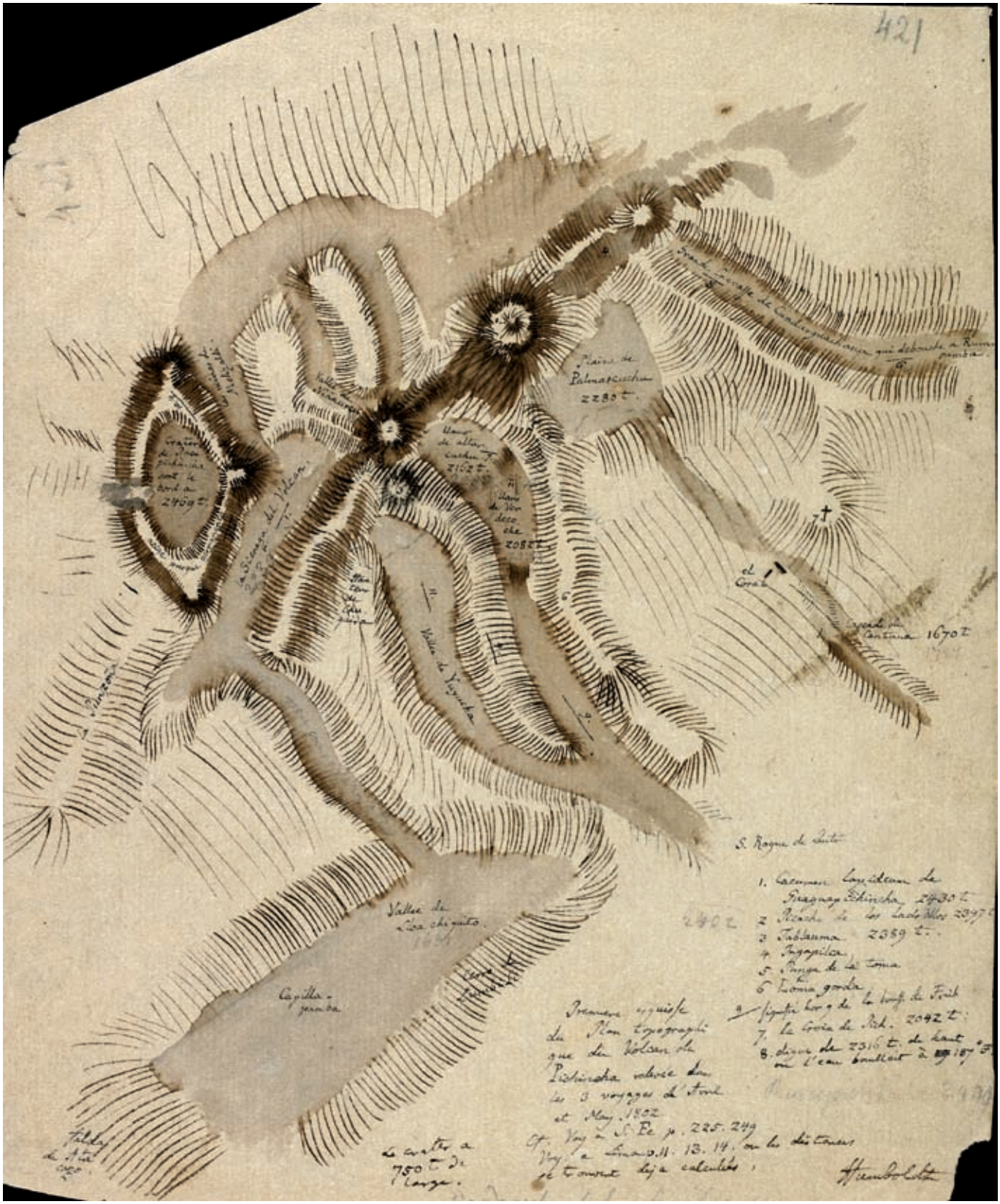


Fig. 32 - The Pichincha chain of volcanoes; on the left the oval crater of Guagua Pichincha, on the right at the bottom the summit with the cross that served as a trigonometric point for the measurements of La Condamine and Bouguer. (Humboldt's sketch in his field book VIIbb/c, folio 4212. (Courtesy of Staatsbibliothek zu Berlin – PK. <https://digital.staatsbibliothek-berlin.de/werkansicht?PPN=PPN779884310&PHYSID=PHYS_0820&view=overview-toc&DMDID=DMDLOG_0001>).

toises (1.6 km); the interior basin is about 400 to 500 m deep (see Fig. 29), brightened by bluish flames accompanied by sulphurous vapour emissions.

Humboldt's Text

Humboldt's description (1810: 291-92) is unusually short and is limited to the listing of the five peaks represented in Plate 61 taken from the Hacienda de Chillo owned by Juan Pio de Montúfar Marquis of Selvalegre (1758-1819), father of Carlos de Montúfar's (1780-1816), who accompanied Humboldt on his journey to Ecuador, Peru, Mexico, the United States, Cuba, and Europe.

The following peaks are described:

1) Rucupichincha [*sic* for Guaguapichincha] with the snow-capped peak;
2) the cone of Tablahuma;
3) the Picacho de los Ladrillos;
4) the rocky peak of Guaguapichincha [*sic* for Rucupichincha], which is the *cacumen lapideum* of the two French academics La Condamine and Bouguer (from an inscription on a marble plaque placed by Le Condamine on one of the corridors of the Jesuit College in Quito);
5) the peak with the famous cross used as a trigonometric point during the measurement of the meridian by La Condamine and Bouguer (see Humboldt's field sketch in Fig. 32).

According to Humboldt's observations, the peaks' altitudes range from 2,300 toises (4,483 m) to 2,500 toises (4872 m) a.s.l.

The description ends with a technical note: "Les distances et beaucoup d'angles de hauteur qui ont servi pour tracer ce dessin, ont été déterminés au moyen d'un sextant de Ramsden".

Humboldt's Plate (Fig. 30)

Plate LXI (1810), in black and white, was drawn by Marchais after the field sketch taken by Humboldt and engraved by Bouquet. It is depicted in rather dark grey tones, almost without shadows and with the only white spot of the eternal snows on the Guagua Pichincha. The plate shows the Pichincha chain of volcanoes taken from the Hacienda de Chillo of the Marquis of Selvalegre. The foreground shows the plain of Cachapamba with two groups of almost invisible men acting as staffage; the foot of the volcanic chain is marked by a row of unidentifiable trees. The volcanic peaks are numbered, with the toponyms of the two main volcanoes swapped, from left to right (i.e. from southwest to northeast), as in the above text:

1) Rucu-Pichincha [*sic* for Guagua Pichincha]
2) Tablahuma
3) Pichaco de los Ladrillos
4) Guagua-Pichincha [*sic* for Rucu Pichincha]
5) La Cruz
6) "Le Pic (3) vu de près": a schematic section of the Pichacho de los Ladrillos volcano is drawn under the panorama without explanation: the two strata represented by vertical lines are likely pumice layers and the uncoloured ones lavas or ash deposits. Fig. 32 shows the field-sketch by Humboldt.

Ferrario's Text

Ferrario's description (1821: 75-76) does not correspond to Humboldt's text, but is the literal translation of Conrad Malte-Brun's French text (1817, V: 568), whereby both do not mention the respective sources. "Dal ricinto del cratere escono, quasi sorgessero dall'abisso, tre picchi o tre rupi che non sono coperte di neve, perché i vapori esalati dalla bocca del vulcano ve la fan tosto dileguare. Onde esaminar meglio il fondo del cratere ci coricammo bocconi, e non credo che l'immaginazione figurarsi possa qualche cosa di più tristo, di più lugubre, di più spaventoso di quanto fu da noi allora veduto. La bocca del vulcano forma un buco circolare di quasi una lega di circonferenza, i cui orli tagliati perpendicolarmente son coperti in cima di neve; l'interno è d'un nero cupo, ma la voragine è sì immensa che vi si distingue la cima di parecchie montagne che vi stanno per entro. Pareva che le loro sommità fossero due o trecento tese più basse di noi: or si figuri chi può ove deve trovarsi la loro base. Io non dubito che il fondo del cratere esser non debba a livello colla città di Quito".

Ferrario's Plate (Fig. 31)

The panorama depicted in the lower half of Ferrario's Plate 10 (1821) by Fumagalli, is crude and gives the impression that the volcanoes are squeezed, the illuminated flanks are almost white and strongly contrast with the shadowed ones. To the opposite, the two groups of small men acting as staffage are much more visible and enlighted. The plate is almost completely coloured with pinkish tints, with the exception of the section of the plain in the foreground, which is coloured with greenish tints. The five peaks are correctly distinguishable, but they are not designated and numbered and can therefore not be located, since the plate has no title.

LE CHIMBORAZO VU DEPUIS LE PLATEAU DE TAPIA
(Nueva Granada - Ecuador)

Visit of Humboldt and Bonpland:	23 June 1802
Coordinates:	1°28'11" S / 78°49'02" W
Altitude:	6,263 m a.s.l.
Humboldt's determination.:	3,358 toises / 6,545 m a.s.l.
Altitude reached by Humboldt and Bonpland.:	3,031 toises / 5,906 m a.s.l.
Start of perennial snow according to Humboldt:	4,800 m a.s.l.

After the ascent of Guaga Pichincha on 28 May 1892, Humboldt and Bonpland left Quito on 6 June and on 23 June attempted without success the ascent of the Chimborazo volcano accompanied by Carlos Montúfar (for details on Montúfar see the card on the volcano Cayambe). The summit was reached only in 1880 by Edward Whymper and the brothers Louis and Jean-Antoine Carrel. With 6,263 m a.s.l., Chimborazo is the highest volcano in Ecuador. Due to the Earth's rotation, its radius in the equatorial zone is the largest in the world, and therefore its altitude from the centre of the Earth is approximately 11,000 m, i.e. 2,168 m higher than the peak of the Everest, which is 8848 m a.s.l. Chimborazo is a potentially active stratovolcano originated in the Palaeocene. The last eruption took place in 550 A.D. The volcano is located about 30 km north-northwest of the town of Riobamba and about 150 km South of Quito.

Humboldt dedicated two texts (1810: 102-107 and 200-202) and two plates to it (1810, no. XVI and no. XXV). Only the latter is reproduced in Ferrario (1821). The Chimborazo was used as the basis for the famous section illustrating the distribution of vegetation in relation to altitude (Humboldt & Bonpland, 1805: out of text plate; see Fig. 36). Humboldt later took interest in this volcano until almost the end of his life in various publications, the most important of which are those of 1820, 1826a, 1853a and 1853b. In the latter, *Kleinere Schriften. Erster Band, geognostische und physikalische Erinnerungen*, Humboldt describes in minute details the attempted ascent of Chimborazo, mentioning the symptoms of altitude sickness he suffered and noting that the flanks of the volcano are composed of augite porphyry (Humboldt, 1853b: 133-174).

Humboldt's Text on Plate XVI (Fig. 33)

Although Plate XVI - *Vue du Chimborazo et du Carguairazo* (1810) has not been considered by Ferrario, it seems necessary to summarise Humboldt's text, because it serves as an introduction to the one of Plate XXV. The text (Humboldt, 1810: 102-107) begins with general considerations on the Andes Cordillera, which is usually subdivided into several branches: three branches occur in Colombia (see the paragraph on the Quindiu Pass), while in Ecuador there are only two: "[...] dans le royaume de Quito [...] les sommets les plus élevés sont rangés en deux files qui forment comme une double crête de la Cordillère: ces cimes colossales et couvertes de glaces éternelles ont servi de signaux dans les opérations des académiciens françois, lors de la mesure du degré équatorial". [See the note on the geodetic measurements of Charles-Marie de La Condamine and Pierre Bouguer in the Cayambe and in the Pichincha cards]. "La plaine de Tapia, que l'on découvre sur le premier plan de la seizième Planche [...] a une hauteur absolue de deux mille huit cent quatre-vingt-onze mètres (quatorze cent quatre-vingt-trois toises) [...] C'est sur une arête étroite qui sort du milieu des neiges, sur la pente méridionale, que nous avons tenté de parvenir, non sans danger, MM. Bonpland, Montúfar et moi, à la cime du Chimborazo. Nous avons porté des instrumens [*sic*] à une hauteur considérable, quoique nous fussions entourés d'une brume épaisse, et fort incommodés par la grande rareté de l'air". Follows a long description of the "trois espèces de forme principales qu'affectent les hautes cimes des Andes. [...] [La] troisième forme des hautes cimes des Andes, et la plus majestueuse de toutes, est celle du Chimborazo, dont le sommet est arrondi: elle rappelle ces mamelons dépourvus de cratères. [...] on voit paroître le Chimborazo comme un nuage à l'horizon: il se détache des cimes voisines; il s'élève sur toute la chaîne des Andes, comme ce dôme majestueux, ouvrage du génie de Michel-Ange, sur les monumens antiques qui environnent le Capitole". Humboldt is probably referring to St. Peter's Cathedral in Rome, where Michelangelo was architect between 1546 and 1564.

Ferrario's Text

Ferrario in the paragraph *Cordigliere di Quito* (1821: 15) translates the essential parts of Humboldt's text describing his Plate XVI, omitting a few statements of minor importance. As mentioned above, Ferrario did not copy this plate.

Humboldt's Text on Plate XXV

The description accompanying Plate XXV - *Le Chimborazo, vu depuis le plateau de Tapia* (1810: 200-202) is more specific than the one related to Plate 16. "La Planche XXV offre le Chimborazo, comme nous l'avons vu après une chute de neige des plus abondantes, le 24 juin 1802, jour qui suivit immédiatement celui de notre excursion vers la cime. [...] La masse du Chimborazo est si énorme, que la partie que l'œil embrasse à la fois près de la limite des neiges éternelles, a sept mille mètres de largeur. [...] Sous les tropiques, à une hauteur de cinq mille mètres, la voûte azurée du ciel paroît d'une teinte d'indigo. [...] Le plateau de Tapia [...] est élevé de trois mille mètres". Humbodt then goes on listing the biological components (plants and animals) of the Tapia Plain, in particular succulents [*Armatocereus godingianus*], Agave [*Agave* sp.] and saplings of Schinus molle [*Schinus molle* L. (Anacardiaceae)]; and showing also some domestic llamas (*Camelus lacma*) [Lama *glama* L. 1758]. He then points out the following: "À trois mille cinq cents mètres de hauteur absolue, se perdent peu à peu les plantes ligneuses à feuilles lustrées et coriaces. La région des arbustes est séparée de celle des gram-

Figs. 33-34 – 33) Above, Humboldt's Plate XVI (1810), *Vue du Chimborazo et du Carguairazo.* 34) Below, Humboldt's Plate XXV (1810), *Le Chimborazo vu depuis le Plateau de Tapia.* (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

inées par des herbes alpines, par des touffes de Nertera [*Nertera granadensis* (Mutis ex L.f.) Druce, Rubiaceae], de Valérianes [*Valeriana alypifolia* Kunth (Caprifoliaceae)], de Saxifrages [*Saxifraga magellanica* Poir. (Saxifragaceae)] et de Lobelia [*Lobelia tenera* Kunth (Campanulaceae)], et par de petites plantes crucifères [Brassicaceae spp.]. Les graminées [Poaceae spp.] forment une zone très large et qui se couvre de temps en temps de neiges, dont la durée n'est que de peu de jours. Cette zone, appelée dans le pays le *pajonal*, se présente de loin comme un tapis d'un jaune doré. Sa couleur contraste agréablement avec celle des masses de neige éparses: elle est due aux tiges et aux feuilles des graminées brûlées par les rayons du soleil, dans le temps des grandes sécheresses. [...] Plus loin la limite des glaces éternelles est le terme de la vie organique". Then follows a long paragraph with considerations on the altitude of certain mountains. The description ends mentioning the exquisite architect Thibault, who "a bien voulu exécuter le dessin colorié dont la gravure fait le principal ornement de cet ouvrage. [...] Pour que l'œil puisse suivre la gradation des plans, et saisir l'étendue du plateau, M. Thibault a animé la scène par des figures groupées avec beaucoup d'intelligence. On aime à publier des services rendus par l'amitié la plus désintéressée".

Humboldt's Plate XXV (Fig. 34)

Plate XXV (1810), the most famous one, was drawn by Thibault on the basis of Humboldt's field sketch and engraved by Bouquet. It is dominated by the Chimborazo in the centre, flanked by the Carguairazo volcano on the far right. The volcanic cone is cut by the sharp edge of the perennial snow. As Humboldt writes: "M. Thibault a animé la scène" with exotic plants, indicative of the aridity of the soil of the plain and at the same time floristic landmarks**.** On the left and right in the foreground *Opuntia soederstromiana* Britton & Rose (Cactaceae); on the left in the foreground *Agave* sp. (Asparagaceae), in the background *Armatocereus godingianus* (Britton & Rose) Backeb. (Cactaceae). In the background are shown some domestic llamas (*Camelus lacma*) [*Lama glama* L. 1758] and groups of Indians acting as staffage and thus giving an impression of depth and the sense of the vastness of the Tapia plain. The sky is coloured in indigo, the intensity of which increases with altitude and, together with the white of the ice and snow, further emphasises the gigantic mass of the volcano.

Ferrario's Text

Ferrario's translation (1820: 38-39) is essentially correct, although some passages of the text are omitted. It contains a translation error: the plain of Tapia is defined as "orrida", while the French original is "aride", dry.

Ferrario's Plate (Fig. 35)

Ferrario's Plate 2 (1820), authored by Fumagalli, reproduces the original almost faithfully, but as in other plates, it fails to convey the sense of depth of the landscape and the splendour of the volcano. This imperfection is increased by the use of weak and false colours, especially the indigo of the sky, replaced by white, which makes it difficult to distinguish the snow-capped flanks of the volcano.

Fig. 35 - Ferrario's Plate 2 (1820), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

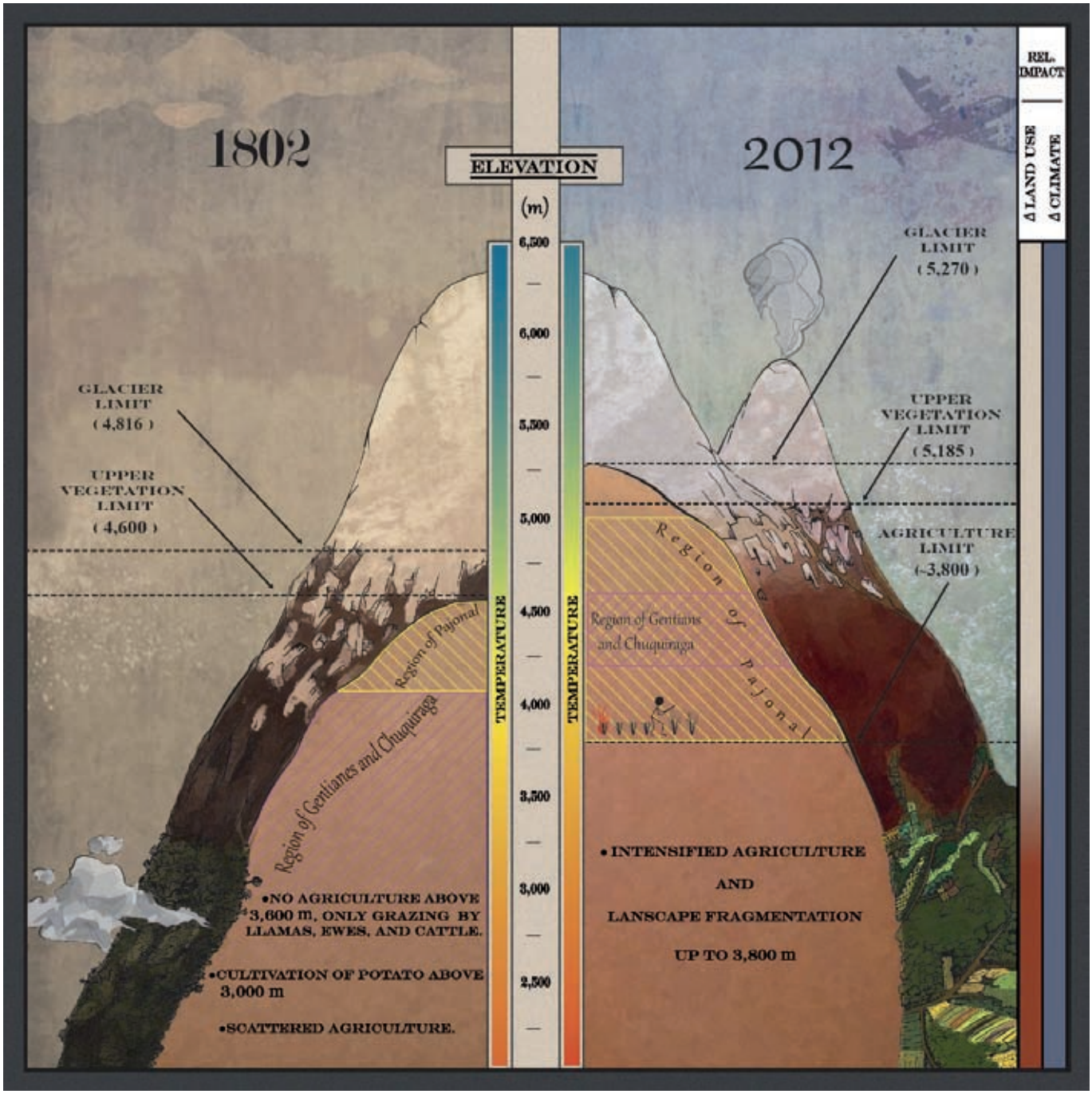


Fig. 36 - Upslope shift of Chimborazo's vegetation and glacier limits from 1802 (Humboldt, 1810) to 2012 (Morueta-Holme *et al*., 2015: Fig. 4. (Courtesy of Proceedings of the National Academy of Sciences (PNAS). <https://www.pnas.org/content/pnas/112/41/12741/F5.large.jpg>).

MONUMENT PÉRUVIEN DU CAÑAR
(Nueva Granada - Ecuador)

Visit of Humboldt and Bonpland:	3 July 1802
Coordinates:	2°32'25" S / 78°50'25" W
Altitude:	3,140 m a.s.l.

The monument is located in the southern Cañar region of Ecuador (about 43 km North of the town of Cuenca) within Ingapirca, the largest Inka site of the country, built after the Inka subjugation of the local Cañari tribes in the 15th century and used as fortress and warehouse to supply the Inka troops on their way to the North of the country. The elliptical building with the central rectangular structure was a temple devoted to the cult of the Sun. The building shows the typical Inka masonry, where perfectly cut stones were fitted together with no use of mortar.

It should be noted that at present the vegetation has been removed thus allowing the entire view of the monument (see Fig. 37).

Humboldt's Text

Humboldt and Bonpland visited the Cañar monument (Humboldt, 1810: 107-110) on their way southwards from the Paramo de l'Assuay and found it in perfect conditions. Humboldt describes the surrounding places as follows: "Nous avons été forcés de traverser [les Andes de Quito] pour parvenir de Riobamba à Cuenca, et à ces belles forêts de Loxa [Loja], qui sont si célèbres par leur abondance en quinquina [*Cinchona officinalis* L.]" and adds that "ce qui frappe le plus dans ce petit monument, entouré de quelques troncs de schinus molle [*Schinus molle* L.], c'est la forme de son toit, qui lui donne une ressemblance parfaite avec les maisons européennes". The shape of the monument's roof and also the presence of windows, disorienting elements in Inka architecture, raised perplexity to Humboldt, as it did to La Condamine who had visited the monument (La Condamine, 1748: 445) during his stay in Ecuador (see Cayambe card). Humboldt's description resumes that of La Condamine.

Humboldt's text does not contain information on the local geology but only on the regional one; however, this is without importance for the description of the plate.

Segundo E. Moreno Yánez & Christiana Borchart de Moreno (2010: 64-67) have published detailed and sharp notes about this monument.

Humboldt's Plate (Fig. 38)

The Cañar monument is represented in Plate XVII (Humboldt, 1810). This plate like the one of the Pyramide of Cholula, is particularly interesting for the intertwining of natural and cultural worlds. It was masterly engraved by Gmelin on a field sketch by Humboldt during his stay in Rome in 1805. In Humboldt's opinion Gmelin was quite rightly famous for his talent and the wide range of his knowledge.

The pre-Columbian building is represented in a rather idealized way, with a seemingly circular shape (rather than elliptical, as it is); curiously enough, the steps leading to the access are turned 90° with respect to their real position. Various straight walls are today located around the structure but it is hard to know if they were visible at the time of Humboldt's visit.

The plate is particularly interesting from a floristic point of view: from left to right you can note: *Schinus molle* L. (Anacardiaceae); a set of anonymous filling vegetation; shrubby broadleaves; towards the centre a plant of *Dieffenbachia* sp. (Araceae); to the right in the foreground an aroid (Aracea, sp.) and next to it Humboldt and Bonpland with a native accompanying them in their botanizing, acting as staffage.

On the left, in the background, are two *Lama glama* L., 1758, whose presence increases the perception of the dimensions of the monument.

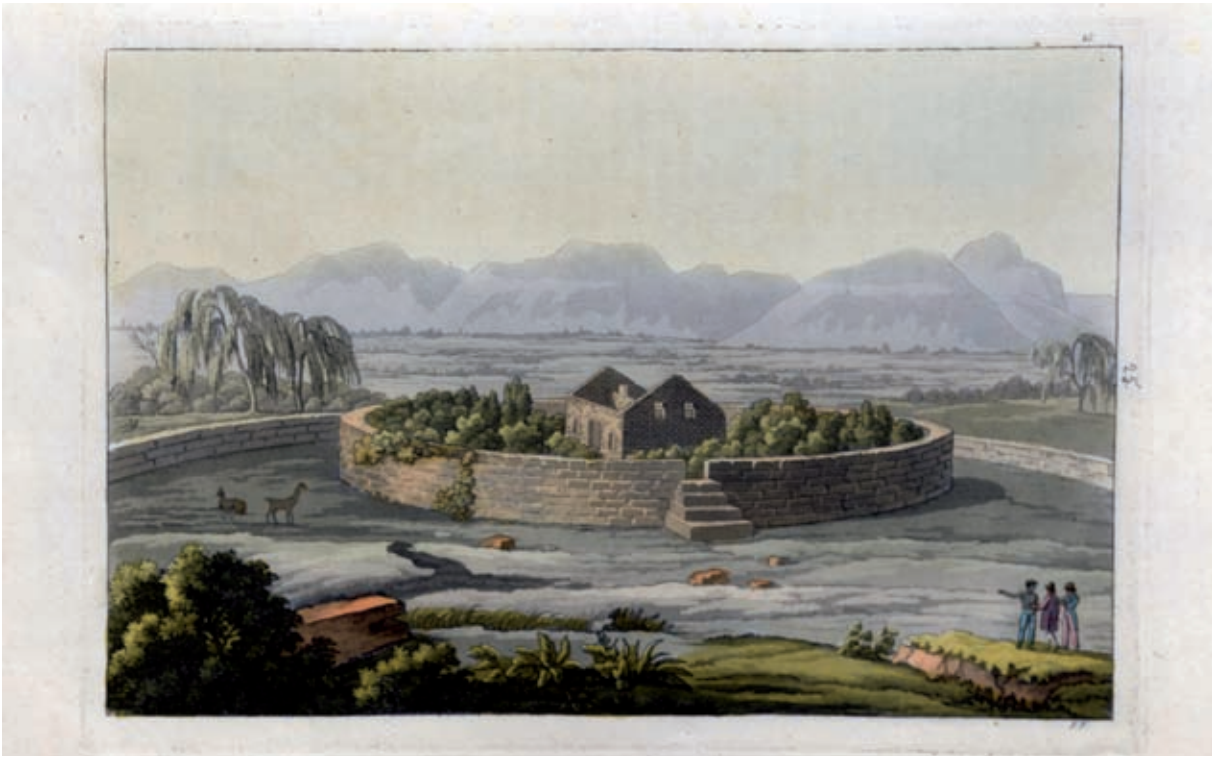
Ferrario's Text

Ferrario's text (1821: 164) is particularly patchy and leads one to suppose that it was not written by the Milanese scholar, but by a contributor.

Ferrario's Plate (Fig. 39)

Plate 25 in Ferrario (1821), unsigned, does not bear the artist's name and has been realized in a rough and flat manner, with excessively garish and misleading colours. In particular, the mountains in the background of the landscape are not clearly depicted. The native man accompanying Humboldt and Bonpland has been dressed, whereas in Humboldt's plate he is only covered by a cloth rolled up over his loins. *Schinus molle* L. is hardly recognisable and moreover its dimensions are excessive compared to those of the monument.

Fig. 37 - The Cañar monument (Ingapirca site) today, made visible by the removal of the vegetation. It is among the most important Inka ruins in Ecuador (Photograph taken 10 April 2010 by © Cayambe. Ingapirca, Ecuador: Ruins of the Cañari-Inca civilisations. <https://commons.wikimedia.org/wiki/File:Ingapirca_archaeo_01.jpg>).



Figs. 38-39 – 38) Above, Humboldt's Plate XVII (1810), *Monument Péruvien du Cañar.* 39) Below, Ferrario's Plate 25 (1821), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

ROCHER D'INTI-GUAICU
(Nueva Granada - Ecuador)

Visit of Humboldt and Bonpland:	3 July 1802 (?)
Coordinates:	approx. 2°35' S / 78°51' W
Altitude:	approx. 3,100 m a.s.l.

Coordinates and height are approximative estimates. In fact Humboldt does not inform precisely on the rock boulder with pre-Columbian petroglyphs, a part from mentioning that the Rock sits in Gulan Valley, just below the Cañar "fortress".

Humboldt's Text

Humboldt arrived at the Rocher d'Inti-Guaicu descending "de la colline dont le sommet est couronné par la forteresse du Cañar, dans une vallée creusée par la rivière de Gulan, on trouve de petits sentiers taillés dans le roc; ces sentiers conduisent à une crevasse qui, dans la langue quichua, est appelée *Inti-Guaicu* ou le *ravin du soleil.* Dans ce lieu solitaire, ombragé par une belle et vigoureuse végétation, s'élève une masse isolée de grès [sandstone], qui n'a que quatre à cinq mètres de hauteur. Une des faces de ce petit rocher est remarquable par sa blancheur: il est taillé à pic, comme s'il eût été travaillé par la main de l'homme. C'est sur ce fond uni et blanc que l'on distingue des cercles concentriques qui représentent l'image du soleil, telle qu'au commencement de la civilisation on voit figurée chez tous les peuples de la terre; les cercles sont d'un brun noirâtre: dans l'espace qu'ils renferment, on reconnoît des traits à demi effacés qui indiquent deux yeux et une bouche. Le pied du rocher est taillé en gradins qui conduisent à un siège pratiqué dans la même pierre, et placé de sorte que, du fond d'un creux, on peut contempler l'image du soleil. [...] En examinant de près le rocher d'Inti-Guaicu, on découvre que les cercles concentriques sont des petits filons de mine de fer brune [brown iron veinlets, i.e. hematite, iron oxide], très-communs dans toutes les formations de grès. Les traits qui indiquent les yeux et la bouche sont évidemment tracés au moyen d'un outil métallique: on doit supposer qu'ils ont été ajoutés par les prêtres péruviens, pour en imposer plus facilement au peuple. A l'arrivée des Espagnols, les missionnaires ont eu un grand intérêt de soustraire aux yeux des indigènes tout ce qui étoit l'objet d'une antique vénération: aussi reconnoît-on encore les traces du ciseau employé pour effacer l'image du soleil" (Humboldt, 1810: 111-112).

It should be noted that Humboldt, who was more attracted to rocks than to living organisms (Banfi & Visconti, 2020), quickly mentions the vegetation and then goes on to describe the Rock face and the image engraved in it.

Although Humboldt specifies that the Inti-Guaicu Rock is shaded by beautiful and thriving vegetation, he only draws a few bromelioid (Bromeliaceae sp.) specimens, both on the left foreground and along the ridge of the Rock itself. The other plants are anonymous fillers, and almost appear set aside in order to highlight the pure white front of the rock and the sun engraved on it.

Humboldt' Plate (Fig. 40)

Humboldt's Plate XVIII (1810) clearly shows his predominant interest in geology and rocks over that in botany. Although he states that the Inti-Guaicu Rock is surrounded by beautiful and luxuriant vegetation, he only depicts a few specimens of bromeliad (Bromeliacea, sp.), depicting in detail the sun-like petroglyph and what seem to be man-made steps.

The Plate has been the subject of a study by Georgia de Havenon (2017: Chap.3).

Ferrario's Text

Ferrario's text (1821:142-143) is faithful in the copied portions, some are however omitted.

Ferrario's Plate (Fig. 41)

In Plate 20 (Ferrario, 1821) Fumagalli has attempted to convey the white colour of the Rock and to duplicate its cracks; however, he failed in making the specimens of bromeliad (Bromeliacea, sp.) in the foreground recognisable. On the other hand, the sun-like petroglyph is more visible than in Humboldt's plate.

Figs. 40-41 – 40) Above, Humboldt's Plate XLIII (1810), *Rocher d'Inti-Guaicu.* 41) Below, Ferrario's Plate 20 (1821), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

PYRAMIDE DE CHOLULA
(Nueva España - Mexico)

Visit of Humboldt and Bonpland:	between 22 and 25 April 1803
Coordinates:	19°03'27" N / 98°18'07" W
Altitude:	2,180 m a.s.l.

The Pyramid of Cholula, once called Tlachihualtepetl (hand-made mountain) in Nahuatl language, is 450 metres wide at the base and 55 metres high, being the largest ancient pyramid in the world in terms of volume. It is located within the modern city of Cholula (Puebla, Mexico). Only part of the original outer surface is today visible, while extensive tunnels have been excavated in its interior to reveal its four major construction phases, dated between the Late Preclassic (ca. 300 B.C.) and the Late Classic period (ca. A.D. 900). Even after that date, the pyramid was still used as a funerary precinct when Cholula became the main sanctuary of Quetzalcoatl in Central Mexico. The city was the theatre of one of the worst massacres perpetrated by the Spanish conquerors in 1519.

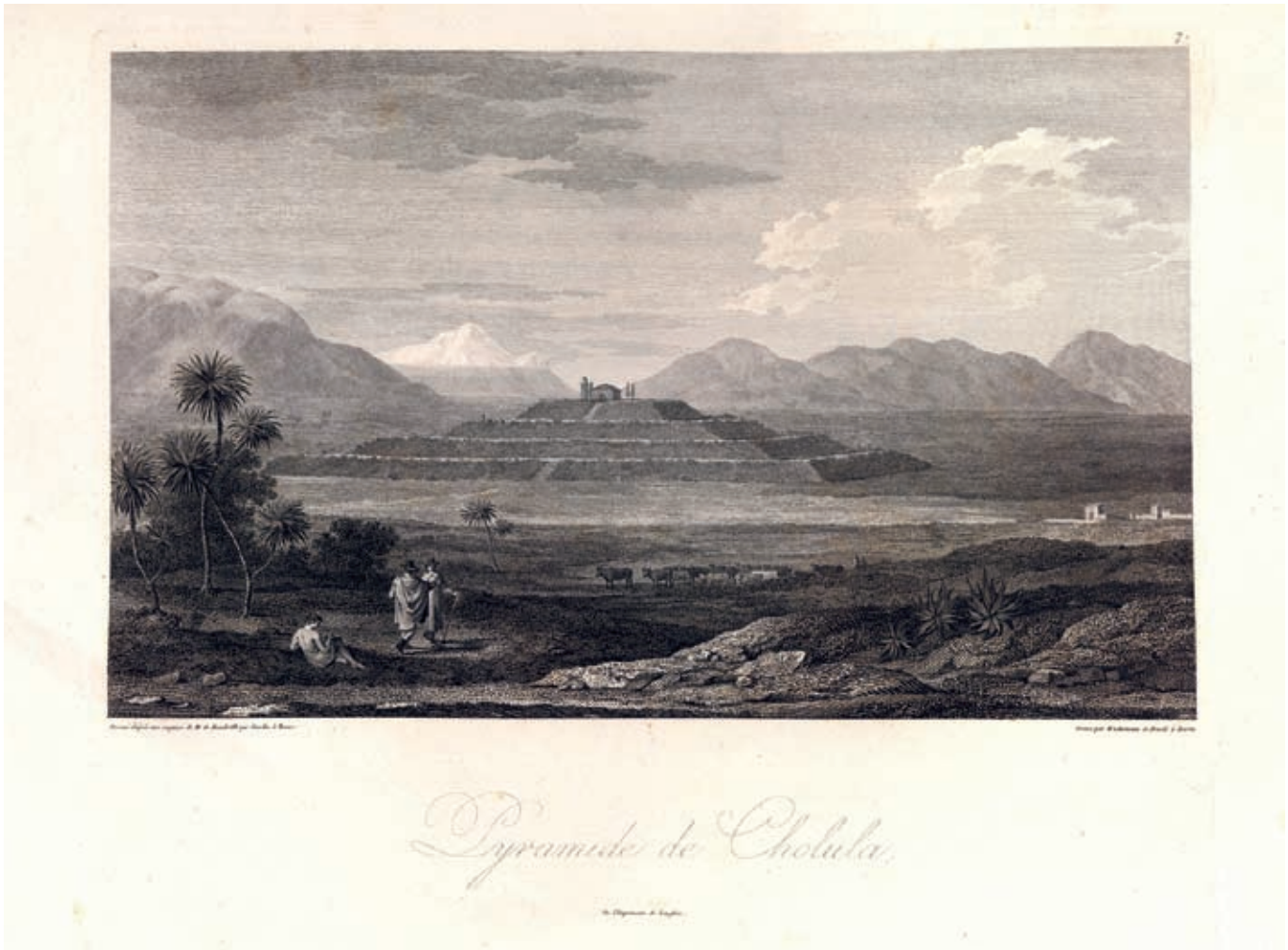
On the top of the pyramid, which today looks like a natural hill, stands the Catholic Church dedicated to Nuestra Señora de los Remedios, built in the late 16th century. (Fig. 42).

Humboldt' Text

Humboldt describes the Pyramid of Cholula as follows (1810: 24-36): "Le plus grand, le plus ancien et le plus célèbre de tous les monumens pyramidaux d'Anahuac, est le téocalli de Cholula. On l'appelle aujourd'hui la montagne faite à mains d'homme (*monte hecho a mano*). Á le voir de loin, on seroit en effet tenté de le prendre pour une colline naturelle couverte de végétation". He goes on, with a certain indifference with regard to the attraction for ruins, stating. "C'est dans son état de dégradation actuelle que cette pyramide est représentée sur la septième Planche. La petite ville de Cholula [...] compte aujourd'hui à peine seize mille habitans. La pyramide se trouve à l'est de la ville, sur le chemin qui mène de Cholula à la Puebla. Elle est très-bien conservée du côté de l'ouest, et c'est la face occidentale que présente la gravure que nous publions. La plaine de Cholula offre ce caractère de nudité qui est propre à des plateaux élevés de deux mille deux cents mètres au-dessus du niveau de l'Océan. On distingue sur le premier plan quelques pieds d'agave [*Agave* sp. (Asparagaceae)] et des dragoniers [perhaps *Nolina* sp.]; dans le lointain, on découvre la cime couverte de neige du volcan d'Orizaba, montagne colossale de cinq mille deux cent quatre-vingt-quinze mètres d'élévation absolue.

Il y a sept à huit ans qu'on a changé la route de Puebla à Mexico, qui passoit jadis au nord de la pyramide: pour

Fig. 42 - The Pyramid of Cholula today. (Photo taken 12 October 2013 by © Diego Delso. Gran Pirámide de Cholula, Puebla, México <https://commons.wikimedia.org/wiki/File:Gran_Pir%C3%A1mide_de_Cholula,_Puebla,_M%C3%A9xico,_2013-10-12,_DD_10.JPG>).



Figs. 43-44 – 43) Above, Humboldt's Plate VII (1810), *Pyramide de Cholula.* 44) Below, Ferrario's Plate 71 (1820), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

aligner cette route, on a percé la première assise, de sorte qu'un huitième en est resté isolé comme un monceau de briques. C'est en faisant cette percée qu'on a trouvé dans l'intérieur de la pyramide une maison carrée, construite en pierres, et soutenue par des poutres de cyprès chauve (Cupressus disticha) [*Taxodium huegelii*, Hort. ex P. Lawson & Son]".

Humboldt correctly attributed the pyramid to a pre-Aztec (and even pre-Toltec) civilization and takes the opportunity to describe Mexican pyramids as teocalli («God's House»), describing the pyramids of Teotihuacan and Tajín and comparing them with Old World ones. He then described the dimensions and shape of the Pyramid of Cholula, recording some of the archaeological finds that were done in its interior, erroneously associating the monument to the later cult of Quetzalcoatl, a god to whom he devots a long passage of the text.

In the final part of the text he reports a legend still alive among the Cholula Indians and also recorded in Codex Vaticanus A (which Humboldt saw in the Vatican Library) according to which before the "grande inondation (apachihuiliztli) qui eut lieu quatre mille huit ans après la création du monde, le pays d'Anahuac étoit habité par des géans (Tzocuillixeque): tous ceux qui ne périrent pas furent transformés en poissons, à l'exception de sept qui se réfugièrent dans des cavernes. Lorsque les eaux se furent écoulées, un de ces géans, Xeihua, surnommé l'architecte, alla à Chololan, où, en mémoire de la montagne Tlalóc, qui avoit servit d'asile à lui et à six de ses frères, il construisit une colline artificielle en forme de pyramide: iI fit fabriquer les briques dans la province de Tlamanalco, au pied de la Sierra de Cocotl, et, pour les transporter à Cholula, il plaça une file d'hommes qui se les passoient de main en main. Les dieux virent avec courroux cet édifice, dont la cime devoit atteindre les nues: irrités contre l'audace de Xelhua, ils lancèrent du feu sur la pyramide; beaucoup d'ouvriers périrent, l'ouvrage ne fut point continué, et on le consacra dans la suite au dieu de l'air, Quetzalcoatl".

Humboldt's Plate (Fig. 43)

The Pyramid of Cholula, drawn by Gmelin in Rome, is shown on Plate VII (Humboldt, 1810). The plate, as the one of the Cañar Monument, is particularly interesting for the intertwining of nature and culture, especially because the pyramid, seen from a distance, looks like a natural vegetation-covered hill.

A *Beaucarnea recurvata* Lem. (Asparagaceae) can be noted on the left, and on the right three specimens of *Agave* sp., both native to Mexico. Humboldt, Bonpland and an Indigenous man facing backwards stand in the foreground. In the background on the right can be seen a herd of cattle [*Bos taurus* L.] followed by two Indigenous men, acting as scale markers. The plate has been the subject of considerations developed by Elisa Garrido (2015: 60-63) on Humboldt's artistic conception.

Ferrario's Text

Ferrario (1820: 556-558) correctly summarises Humboldt's text, but omits the passages where Humboldt develops relationships between the Pyramid of Cholula and other monuments, both from the New and the Old World.

Ferrario's Plate (Fig. 44)

Plate 71 (Ferrario, 1820), authored by Fumagalli, is coloured so confusingly that the depth of the landscape cannot be conveyed, also because the Orizaba volcano, which serves as background in Humboldt's plate, is barely visible. The vegetation is mixed up and unrecognisable.

ROCHES BASALTIQUES ET CASCADE DE REGLA
(Nueva España - Mexico)

Visit of Humboldt and Bonpland:	between 19 and 21 May 1803
Coordinates:	20°14’18” N / 98°33’45” W
Altitude:	2,000 - 2,044 m a.s.l.
Drop of the four waterfalls:	40 m

During their sojourn in Mexico (from 22 March 1803 to 7 March 1804) Humboldt and Bonpland visited several sites with volcanic rocks. The first visit was to the basaltic rocks of Regla, of Pleistocene age (ca. 2.8 million years ago). Originally, they were lava flows that, as a result of rapid cooling, contraction and fissuring, formed basaltic prisms (or columns) with a diameter of approximately 80 cm, a pentagonal or hexagonal cross-section (see Fig. 45) and up to 30-40 m high. The San Antonio Regla stream cuts its way down the basalts forming four small waterfalls, each 7 to 8 m high, the lower of which is called *Cascada de la Rosa*. In 2007, the site was considered one of the country’s 13 natural wonders.

Occurrences of columnar basalt are very common in the world; particularly well known are those of the *Giant’s Causeway* in Ireland, with some 40,000 columns, mentioned in Humboldt’s text referred to the plate below, and those of the Antico Scalo dei Malavoglia in Aci Trezza at the foot of the Etna volcano in Sicily.

Humboldt’s Text

The description of Plate XXII (Humboldt, 1810: 122-124) begins with a long consideration on the variations in animals and plants, as well as in rocks. Humboldt writes: “En changeant de latitude et de climat, on voit changer l’aspect de la nature organisée, la forme des animaux et des plantes, qui impriment à chaque zone un caractère particulier: à l’exception de quelques végétaux aquatiques et cryptogames, dans chaque région le sol est couvert de plantes diverses. Il n’en est point ainsi de la nature brute, de cette agrégation de substances terreuses qui couvre la surface de notre planète: le même granite décomposé, sur lequel, dans les frimas de la Laponie, végètent des vaccinium, des andromèdes et le lichen qui nourrit le renne, se retrouve encore dans ces bosquets de fougères arborescentes, de palmiers et d’héliconia, dont le feuillage lustré se développe sous l’influence des chaleurs équatoriales. [...] Le climat influe sur la forme des animaux et des plantes, parce que le jeu des affinités qui préside au développement des organes est modifié à la fois et par la température

Fig. 45 - Detail of the columnar basalts of Regla. (Photograph taken 7 April 2017 by © Rafael Saldaña. Basaltic prisms of Santa María Regla. <https://commons.wikimedia.org/wiki/File:Basaltic_prisms.jpg>).

de l'atmosphère et par celle qui résulte des diverses combinaisons formées par l'action chimique. [...] Sous touts les climats, la croûte pierreuse du globe présente le même aspect au voyageur; partout il reconnoît, et non sans une certaine émotion, au milieu d'un nouveau monde, les roches de son pays natal". However, he does not mention that his first publication had been on the columnar basalts South of Bonn (Humboldt, 1790). At that time Humboldt was still a convinced Neptunist, but following his ascent of Pico de Teide in 1799 on the Island of Tenerife at the latest, he became a follower of the Plutonist theory. "Les basaltes de Regla présentent une preuve incontestable de cette identité de forme que l'on observe parmi les roches des divers climats. En jetant les yeux sur ce dessin, le minéralogiste voyageur reconnoît la forme des basaltes [...] des monts Euganéens ou du promontoir d'Antrim, en Irlande [...]. Une petite rivière [...] se fraie un chemin à travers des groupes de colonnes basaltiques [...] mais la chute [one of four] n'a que sept ou huit mètres de hauteur. Des deux côtés du ravin s'elèvent des basaltes colonnaires qui ont plus de trente mètres de hauteur, et sur lesquels se présentent des touffes de cactus et de yucca filamentosa. Les prismes ont généralement cinq à six pans [i.e., they have a pentagonal or hexagonal section] et quelquefois jusqu'à douze décimètres de largeur. Chaque colonne a un noyau cylindrique d'une masse plus dense que les partie environnantes [as indicated in the left foreground of the plate]. La plupart des colonnes de Regla sont perpendiculaires; on en observe cependant aussi, très-près de la cascade, dont l'inclinaison est de 45° vers l'est; plus loin, il y en a d'horizontales. [...] La masse de ces basaltes est très-homogène: M. Bonpland y a observé des noyaux d'olivine [...] les prismes reposent sur une couche d'argile, sous laquelle on trouve encore du basalte: en général, celui de Regla est superposé au porphyre de Real del Monte".

Humboldt's Plate (Fig. 46)

Humboldt's Plate XXII (1810), in black and white, was drawn by Gmelin in Rome based on Humboldt's field sketch and engraved by Bouquet in Paris. The plate shows the lowest (fourth) waterfall, the Cascada de la Rosa, which cuts through the great mass of columnar basalts. They are mostly vertical, partly inclined, covered by a layer not described in the text and therefore not identifiable. In the left foreground, Humboldt, Bonpland and an Indian are acting as scale; the latter rests his right hand on a basalt column of exaggerated diameter. Next to the three men you can observe a Gesneriacea (sp.). *Beaucarnea recurvata* Lem. (Asparagaceae), shown in the upper right corner; it is a Mexican plant by definition, whose presence in a landscape geographically not identifiable, fills the clear role of floristic reference indication.

Ferrario's Text

Ferrario (1820: 516) in the paragraph *Montagne*, which is part of the Chapter "Descrizione fisica generale del Messico" (1820: 511-600) limits himself to a single sentence: "Ci basti qui l'accennare […] che finalmente i basalti della Regla, le cui colonne prismatiche alte trenta metri, hanno un nocciolo più duro del rimanente, formano l'ornamento di un'assai pittoresca cascata".

Ferrario's Plate (Fig. 47)

Ferrario's Plate 60 (1820), authored by Fumagalli, is perhaps the one, among those presented in this essay, that comes closest to the original. However, it is unfortunately coloured: the basalt columns are depicted in a delicate pink, whereas in nature they have a very dark green colour. The vegetation is not identifiable.

Fig. 46 - Humboldt's Plate XXII (1810), *Roches basaltiques et Cascade de Regla* [the lower waterfall, *Cascada de la Rosa*]. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

Fig. 47 - Ferrario's Plate 60 (1820), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

COSTUMES DES INDIENS DE MECHOACAN
(Nueva España - Mexico)

Visit of Humboldt and Bonpland:	14-15 September 1803
Coordinates:	19°46'06" N / 101°11'22" W
Altitude:	926 m a.s.l.

The two plates representing four figurines carved in wood and dressed in a fabric made from the pith of an aquatic plant are inserted as a short break. They are the manufact of the Indians of the ancient Kingdom of Mechoacan, nowadays Michoacan, a Mexican State located in the central part of the country and facing the Pacific Ocean. Together with tourism, handicrafts continue even nowadays to be one of the State's main economic sectors.

Humboldt's Text

Humboldt writes that: "les Indiens de la province de Valladolid, l'ancien Royaume de Méchoacan, sont les plus industrieux de la Nouvelle-Espagne. Ils ont un talent remarquable pour découper de petites figures en bois, et pour les costumer avec des vêtemens faits de la moelle d'une plante aquatique. Cette moelle très poreuse s'imbibe des couleurs les plus éclatantes; et, taillée en spirale, elle offre des morceaux d'une dimension considérable. J'avois rapporté, pour Sa Majesté la Reine de Prusse, un groupe de ces figures indiennes, disposées avec beaucoup d'intelligence. Cette princesse, qui réunissoit un goût éclairé pour les arts à une grande élévation de caractère, avoit fait dessiner celles de ces figures qui avoient le moins souffert par le transport. Ce sont ces dessins que présentent les Planches LII et LIII: en les examinant, on est frappé du mélange bizarre de l'ancien costume indien avec le costume introduit par les colons espagnols". (Humboldt, 1810: 275).

Humboldt's Plates (Fig. 48 and 49)

The figurines are depicted in plates LII and LIII (Humboldt, 1810).

In Plate LII, behind the couple stands *Agave salmiana* Otto ex Salm-Dyck (Asparagaceae), and just above the hem of the girl's underskirt an embroidery made of small passion flowers (*Passiflora* sp.) leaves indicating the passion between her and the young man.

The vernacular name of the plant is flor de la pasión, originally attributed by the Spaniards to the South American species *Passiflora caerulea* L. (type of the genus), which identified a symbol of the Christian cross in the curious 3-branched floral stylus. Linnaeus immortalized their vision in the botanical name of the genus (*Passiflora*). However, the intriguing beauty of the flower, shared by all species of Passiflora, ensured the victory of profane love over sacred love, giving the plant a decidedly human symbolic value.

Plate LIII shows on the left, behind the girl, a palm *Brahea dulcis* (Kunth) Mart. (Arecaceae), endemic to Mexico. Just above the hem of the girl's underskirt is an embroidery with small *Passiflora* sp. leaves, with the same meaning as above.

Ferrario's Text

Ferrario's text is entirely translated from Humboldt's one (1820: 595).

Ferrario's Plate (Fig. 50)

Ferrario assembles Humboldt's Plates LII and LIII (1810) into a single one authored by Gallina (Ferrario, 1820: Plate 85). The agave is barely recognisable, the palm tree is missing and the leaves embroidered on the underskirts of the two girls are not recognisable.

Overall, the plate is rather coarse and the background of the mountains has been partly modified.

Fig. 48-49 – 48) Left, Humboldt's Plate LII (1810), *Costumes des Indiens de Mechoacan.* 49) Right, Humboldt's Plate LIII (1810), *Costumes des Indiens de Mechoacan.* (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

Fig. 50 - Ferrario's Plate 85 (1820), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

VOLCAN DE JORULLO
(Nueva España - Mexico)

Visit of Humboldt and Bonpland:	19 September 1803
Coordinates:	18°58'20" N / 101°43'04" W
Altitude:	1,220-1,240 m a.s.l.
Prominence determined by Humboldt	513 m / 263 toises

After a series of earthquakes, the Jorullo volcano surged on 29 September 1759 and its eruptions continued until 1774. Humboldt and Bonpland visited it 44 years later, in 1803, and it was still hot.

Humboldt's Text

In his description of the Jorullo volcano, Humboldt (1810: 241-242) begins stating that he was the first geologist who visited the young volcano and determined its geographical position. "Mon dessin représente le volcan de Jorullo (Horullo ou Juruyo), environné de plusieurs milliers de petits cônes basaltiques. [...] On trouve indiquée sur le premier plan une partie de la savane dans laquelle cet énorme soulèvement a eu lieu, la nuit du 29 septembre 1759. C'est l'ancien niveau du terrain bouleversé que l'on désigne aujourd'hui sous le nom de *Malpays* ["badlands" in a volcanic field]. Ce dernier, hérissé de petits cônes de deux à trois mètres de hauteur, a une étendue de quatre milles carrés [about 15 km²]. Le terrain soulevé a la forme d'une vessie, et sa convexité augmente progressivement vers le centre [see Fig. 51]; de sorte qu'au pied du grand volcan, le sol est déjà élevé de 160 mètres au-dessus des cabanes indiennes que nous habitions dans les *Playas de Jorullo*. [...] Les cônes sont autant de *fumaroles* qui exhalent une vapeur épaisse et communiquent à l'air ambiant une chaleur insupportable. On les désigne [...] par la dénomination de petits fours, *hornitos*. Ils renferment des boules de basalte enchâssées dans una masse d'argile endurcie. La pente du grand volcan, qui est constamment enflammé, est couverte de cendres. Nous sommes parvenus dans l'intérieur de son cratère, en gravissant la colline de laves scorifiées et rameuses. [The details of the very dangerous descent are mentioned by Conrad Malte-Brun (1817: 451-452), seven years after the publication of Humboldt (1810), without indication of the source (Delamétherie 1804: 137), and taken up by Ferrario (see below)]. [...] Nous rappellerons ici come un fait remarquable, que tous les volcans de Mexique se trouvent rangés sur une même ligne, dirigée de l'est à l'ouest, et qui forme en même temps un *parallèle des grandes hauteurs*. [...] On est tenté de croire que le feu souterrain s'est fait jour par une énorme crevasse qui existe dans l'intérieur de la terre sous les 18°59' et 19°12' de latitude, et qui se prolonge de la mer du Sud à l'Océan Atlantique [see the geological observations below]".

Geological observations

The Jorullo volcano is a volcanic ash cone (scientifically called a pyroclastic deposit), located in the Michoacán-Guanajuato volcanic field. The roughly oval crater has the surface 400 x 500 m and is 150 m deep. The Jorullo is accompanied on its flanks by five smaller cones aligned along a southwest-northeast axis (cf. Fig. 51). A total of eight lava flows, predominantly basaltic and varying in thickness from 10 to 50 m, cover an area of approximately 9 km² around the six volcanic cones and are in turn covered by layers of varying ash thickness. 183 years later, in 1942, the Paracutin volcano, approx. 80 km northeast of Jorullo, also an ash cone, surged.

The two volcanoes are part of the Transversal Volcanic Belt (*Eje Volcanico Transversal*), a volcanic field that extends 900 km from the West, starting from the Revillagigedo Islands in the Pacific Ocean, eastwards to the coast of the Gulf of Mexico, in southcentral Mexico, along the 19th parallel North (see Fig. 7). The Cofre de Perote (next card) also belongs to this belt, which represents the south-

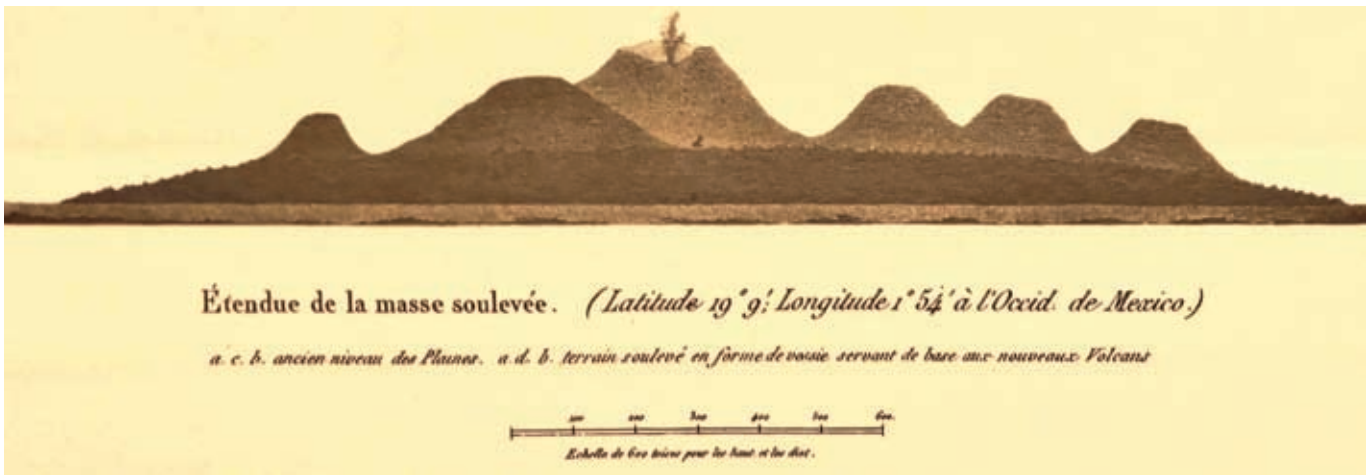


Fig. 51 - Profile seen from the West of the six Jorullo volcanoes with "la masse soulevée" in the foreground ("blister"). Detail from Humboldt (1814-[1838], Plate 29. Source: https://www.davidrumsey.com/luna/servlet/detail/RUMSEY~8~1~292877~90064412:XXIX--Plan-du-volcan-de-Jorullo-?qvq=q:pub_list_no%3D%2212125.000%22;lc:RUMSEY~8~1&mi=4&trs=61).

Fig. 52-53 – 52) Above, Humboldt's Plate XLIII (1810), *Volcan de Jorullo.* 53) Below, Ferrario's Plate 61 (1820), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

ern limit of the North American tectonic plate; the subduction zone (the Balsas River fault), marking the geological boundary between North and Central America, crops out immediately to the South.

Humboldt's observations and his timid interpretation ("on est tenté de croire") have been confirmed about a century later by the theory of tectonic plates: the "énorme crevasse" is the subduction zone of the Transverse Volcanic Belt along the 19th parallel North, which he correctly observed. This is one of several examples of his acceptance of the inductive method.

On the contrary, Humboldt's theory that the thousands of small cones (*hornitos*) with fumarolic exhalations are the result of as many minute volcanic eruptions that formed a kind of bladder-shaped tumescence ("le terrain soulevé a la forme d'une vessie") had been denied by the geologist George Julius Poulett Scrope (1797-1876) (1826: 55-65). On the basis of stringent arguments, this author demonstrated that the *hornitos* field is just lava erupted from the six volcanoes with water vapour exhalations, in turn covered with ash (which forms clay with water, the *Malpays*).

Humboldt gave a short description of the Jorullo volcano as early as 1805 (p. 130) with two details conflicting with those of 1810: the date of the eruption start (14 September 1759 instead of 19 September) and the altitude over the plain (486 m instead of 513 m; in a footnote he adds that the volcano is more than three times as high as the Cheops pyramid in Egypt, which is only 142 m high). After 1810, Humboldt continued to publish data on the Jorullo volcano (i.e. in 1811a: 303-304; 1811b: 293-302).

Humboldt's Plate (Fig. 52)

Humboldt's Plate XLIII (1810), in black and white, was drawn in Rome by Gmelin based on Humboldt's field sketch and engraved by Bouquet in Paris. It clearly illustrates the written text, with the ondulated lava flow in the foreground, the plain of the *Malpays* with hundreds of *hornitos* and in the background the smoking Jorullo volcano framed by the five smaller ones. On the right, between two *hornitos,* you can note Humboldt, Bonpland and two Indians, one of them crouched down, as scale.

Ferrario's Text

In card *Particolarità sui vulcani* (1820: 517) of chapter *Descrizione fisica generale del Messico* (1820: 511-600) Ferrario describes the volcano Jorullo in two parts. The first one, without source citation, is a translation of the text by Malte-Brun (1817: 451-452), who in turn does not cite his source, i. e. Delamétherie (1804: 137). Particularly interesting is the mention of the descent into the crater: "I signori Humboldt e Bonpland scesero nel cratere infiammato del gran vulcano, fino a 250 piedi di profondità perpendicolare [258 pieds, equal to 85 m, in the original], saltando sopra crepature che esalavano l'idrogeno solforato infiammato, e giunsero dopo molti pericoli quasi fino al fondo del cratere". The second part of the text broadly corresponds to Humboldt's one.

Ferrario's Plate (Fig. 53)

Ferrario's Plate 61 (1820), authored by Fumagalli, is the most faithful to the original subject, but for the lack of clouds on the left side of the sky. The vegetation of the mountain opposite to the volcano is anonymous and acts as a filler. The plate is uselessly coloured, with a light pink tint in the foreground and a yellow colour for the fumaroles. The depicted figures are arranged in a slightly different way.

COFFRE DE PEROTTE
(Nueva España - Mexico)

Visit of Humboldt and Bonpland:	7 February 1804
Coordinates:	19°29'40" N / 97°08'53" W
Altitude:	4,282 m a.s.l.
Humboldt's determination:	4,088 m a.s.l. / 2,097 toises

Humboldt and Bonpland left Mexico City on 24 January 1804. On their way to Veracruz they climbed the Cofre de Perote on 7 February 1804. *Cofre* means chest or caisson in Spanish, and by analogy also sarcophagus. The name given to the volcano alludes to the caisson-shaped rock that crowns the mountain, 30 to 40 m high and 100 m wide, which is now unfortunately scarred by numerous antennas (see Fig. 54). The original Indigenous name is *Nauhcampatepetl*, meaning square mountain. It is a shield volcano originated in Pleistocene time (1.4 million years ago), active for about 400,000 years and is now considered to be inactive. The volcano is located at the intersection of the Transversal Volcanic Belt (*Eje Volcanico Transversal*) with an eastwest orientation and the Sierra Madre Oriental with a northsouth orientation. It is placed 50 km North of the volcano Pico de Orizaba (with 5,636 m the highest point in Mexico) and 200 km East of Mexico City (see Fig. 7).

Humboldt's Text

The description of Plate XXXIV (Humboldt, 1810: 233) is very brief and is here quoted almost in full. "Cette montagne de porphyre basaltique [basaltic andesite and dacite] est moins remarquable par sa hauteur que par la forme bizarre d'un petit rocher placé à son sommet, [....] semblable à une tour carrée, qui lui a fait donner, parmi les indigènes de race aztèque, le nom de *Nauhcampatepetl*, de *nauhcampa*, quatre parties, et *tepetl*, montagne, et parmi les Espagnols, le nom de *Coffre* [*sic*] *de Perote*. De la cime de cette montagne on jouit d'une vue magnifique sur le Plateau de Puebla, et sur la pente orientale des Cordillères du Mexique couverte d'épaisses forêts de *liquidambar* [*Liquidambar styraciflua* L. (Altingiaceae)], de fougères arborescentes et de mimoses. [...] Le Coffre n'entre point dans la limite des neiges perpétuelles; j'ai trouvé, par une mesure barométrique, son sommet élevé de 4088 m (2097 t.) au-dessus du niveau de la mer. Cette hauteur excède de 400 mètres celle du Pic de Ténériffe. J'ai dessiné la montagne près de la grande bourgade de Perote, dans la plaine aride et couverte de pierre ponce [pumice stone] que l'on traverse en montant de Vera-Cruz à Mexico. La crête du Coffre ne présente qu'un rocher nu, entouré d'une forêt de pins [*Pinus hartwegii* Lindl. (Pinaceae)]. En gravissant vers la cime, j'ai vu disparoitre le chêne [*Quercus* spp. (Fagaceae)] à 3165 m (1610 t.) de hauteur; mais les pins qui par leurs feuilles ressemblent au Pinus strobus [*Pinus strobus* L.], ne se perdent entièrement qu'à la hauteur absolue de 3942 m (2022 t.). Sous chaque zone, la température et la pression barométrique prescrivent aux végétaux des limites qu'il leur est impossible de franchir".

Humboldt's Plate (Fig. 55)

Humboldt's Plate XXXIV (1810), coloured, was drawn by Marchais in Paris based on Humboldt's field sketch and engraved by Bouquet. The sketch was taken from the edge of the village of Perote about 10 km northwest of the volcano. The foreground shows the hillside at the lower margin of the arid plain, where are depicted *Opuntia* sp. on the left, symbol of the American desert flora, and Humboldt himself behind an Indian acting as staffage. The plain is scattered with large blocks of pumice stone. The huge mass of bare volcanic rocks arises in the background, coverede by a strip of vegetation in the upper part and crowned by the *cofre*. The left half of the sky is fringed with clouds. The plate is coloured with elegantly shaded hues, varying from green to light blue and to a more intense yellow in the plain, while the indigo of the sky increases in intensity from bottom to top, thus pointing out the impression of the third dimension.

Ferrario's Text

Ferrario (1820) in the paragraph *Montagne* writes just a single sentence: "Ci basti qui accennare […] che il *Cofre de Perote*, montagna di porfido alta 2097 tese dal livello del mare, rappresenta un antichissimo sarcofago sormontato in una delle sue estremità da una piramide". (Ferrario, 1820: 516). Ferrario copies this mistake from Malte-Brun (1817: 451), who writes that the *Coffre de Perote* "représente un sarcophage antique surmonté, à une de ses extrémités, d'une pyramide" and in note 1 quotes "A. de Humboldt, *Vues et Monumens*, pl. XXXIV".

Ferrario's Plate (Fig. 56)

Ferrario's Plate 59 (1820), authored by Fumagalli, is a faithful but crude copy, lacking the impression of depth. The plain is almost unrecognisable, the pumice boulders and plants on the upper part of the volcano are too large and the clouds are missing on the left half of the sky. The plate is coloured in implausible tones: the rocks and the plain are purplish and the sky partly yellowish.

Fig. 54 - The Cofre, i.e. the summit of Perote. (Photography loaded 5 January 2021 by © jjmc_phx. <https://it.wikiloc.com/percorsi-4x4/cofre-de-perote-63503190/photo-42167833>).

Figs. 55-56 – 55) Above, Humboldt's Plate XXXIV (1810), *Coffre de Perotte.* 56) Below, Ferrario's Plate 59 (1820), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

VUE DE LA GRANDE PLACE DE MEXICO
(Nueva España - Mexico)

Visit of Humboldt and Bonpland:	during their stay in Mexico City
Coordinates:	19°26'02" N / 99°08'02" W
Altitude:	2,256 m a.s.l.

Humboldt and Bonpland stayed in Mexico City from April 1803 to February 1804 (Schwarz, undated) where they visited the main monuments in and around the city, including the pyramids of Teotihuacan, the mines of Pachuca and the Jorullo volcano. Later their interest turned to the Pyramid of Cholula, the Cofre de Perote and the city of Jalapa (Martinière & Lalande, 2010: 97). Mexico City, with 150,000 inhabitants, was in those days the most important city on the American continent. During several months, Humboldt and Bonpland lived in daily contact with the Mexican and Spanish scientists, artists and scholars of the capital.

Humboldt gives us a very brief description of Mexico City, full of charm and interest (1810: 7-9).

Humboldt's Text

Humboldt begins by describing how Mexico City, the ancient Tenochtitlan, capital of Anahuac, founded in 1325, was destroyed by the Spanish in 1521 and rebuilt following the same previous street alignement. In his account, he interweaves the description of Mexico City as he saw it, with a series of considerations on its history in the centuries between its foundation and destruction, lingering on its beauty, comparable to the most beautiful cities in Europe. He then goes on describing the Plaza Grande, paying much attention to the equestrian monument of Charles IV (known as "El Caballito", today in Calle de Tacuba after having being moved in various locations) by M. Tolsá and noticing the position of the Aztec buildings that once stood in the area.

Humboldt's Plate (Fig. 57)

Plate III (Humboldt, 1810) depicting the Gran Plaza in Mexico City, unlike the other landscape plates presented in these cards, is not based on a field sketch, but is drawn by the artist Raphael Ximeno Y Planes (1759-1825), director of the painting class at the local Academy of Fine Arts, as indicated by the the caption "Dessiné par Raphael Ximeno, à Mexico" under the plate itself. Humboldt writes: "La gravure que je publie est une copie fidèle d'un dessein fait dans les dimensions plus grandes, par M. Ximeno, artiste d'un talent distingué et directeur de la classe de peinture à l'académie de Mexico" (Humboldt, 1810: 9) The panel was the subject of a study by Elisa Garrido (2015: 54-67) who examined the image of Humboldt's Plate III "dessiné par Raphael Ximeno" and another plate by Ximeno dated 1797, prior to the erection of the equestrian statue which took place under the eyes of Humboldt himself in 1803. The sculptor Manuel Tolsá (1757-1816), director of the sculpture class at the local San Carlos Academy in Mexico City and supervisor of city drainage and water supply systems, casted the statue "d'une grande pureté de style, et de la plus belle execution". Humboldt dwells on it with great admiration, providing information on its transport, weight, height, location and the bronze covering it, and adds: "Comme les édifices qui entourent la place sont en général peu élevés, on voit la statue projetée contre le ciel; circonstance qui, sur le dos des Cordillères, où l'atmosphère est d'un bleu très foncé), produit l'effet le plus pittoresque". Concerning the intensity of the blue of the sky which increases with the rise in altitude and the increase in the transparency of the air see Saussure (1790).

Ferrario' Text

Ferrario resumes and translates Humboldt's text (1810: 7-9) and adds (Ferrario, 1820: 600-614) plenty of information on Nueva España from the *Essai politique sur le Royaume de la Nouvelle Espagne* (Humboldt, 1811: 45-46, 48-49, 286, 330).

Ferrario' Plate (Fig. 58)

In Plate 87 Ferrario (1820) reproduces Humboldt's Plate III and paints the equestrian monument in olive green, as Humboldt himself wrote in his description, thus highlighting it, although the horsememan does not look very royal. The change in the arrangement of the figures should also be noted; Ferrario divides them into two groups: on the right the natives together with an European, possibly Humboldt himself, and on the left two Europeans. It can finally be observed that none of the all depicted figures is looking at the monument.

Figs. 57-58 – 57) Above, Humboldt's Plate III (1810), *Vue de la grande place de Mexico.* 58) Below, Ferrario's Plate 87 (1820), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

BUSTE D'UNE PRÊTRESSE AZTÈQUE ET IDOLE AZTÈQUE EN BASALTE, TROUVÉE DANS LA VALLÉE DE MEXICO
(Nueva España - Mexico)

The plate illustrates two Aztec stone monuments. The upper one is a representation of the Goddess of Terrestrial Waters, Chalchiuhtlicue ("She of the Jade Skirt"), proceeding from the Aztec city of Tlatelolco and today held at the British Museum (Am,St.373). Among the distinguishing attributes of the goddess we can observe the tasselled headdress, the plied paper ornament on the back of the head (*amacuexpalli*) and the triangular shirt (*quechquemitl*) with tasselled edges. The lower figure merges the attributes of Chalchiuhtlicue and Chicomecoatl ("Seven Serpent"), a feminine aspect of maize who was a goddess of nourishment and earthly fertility. The feminine figure wears Chalchiuhtlicue's tasselled headdress and *amacuexpalli* and is holding two maize ears in each hand, a trait typical of Chicomecoatl. The cavity on the figure's chest probably contained a greenstone. The Chalchiuhtlicue-Chicomecoatl sculpture is today in the collection of the Ethnologisches Museum, Staatliche Museen zu Berlin (IV Ca 2).

Humboldt's Text

In the text associated to plates I and II, illustrating the Chalchiuhtlicue sculpture, Humboldt states that it pertained to the collection of "M. Dupé", that is, the Luxembourgish Guillermo Dupaix (1746-1818), a Capitan of the Dragons who was put in charge of the "Real Expedición Anticuaria" in New Spain (1805-1807) by the Spanish King Charles IV. According to Humboldt, the drawing of the sculpture was traced by a student at the Mexican Academy of Painting, most probably José Castañeda, who also took part in Dupaix's expedition. After the publication of Humboldt's works, the sculpture changed hands multiple times to finally end up at the British Museum in 1865, after the death of its last private owner Henry Christie (Le Brun-Ricalens, López Luján, Wey, 2020; López Luján, Le Brun-Ricalens, Wey, 2020).

Humboldt focused his first comments on the figure's headdress, noticing – in line with his extensively comparative approach – the similarity of the tasselled headdress with those worn by Egyptian deities and especially by the figures on the capitals of the temple of Dendera. He also mentioned various Egyptian artworks he had the opportunity to see (both as actual objects and book reproductions) during his Italian voyage, in the Library of Villa Ludovisi and in the collection of Cardinal Stefano Borgia. On commenting the figure's headdress, Humboldt thought it was embellished by pearls, which he speculated could have been imported from the coast of California. He also commented on the tassels of the shirt, stating that they "rappellent les petites pommes et les fruits de grenade qui étoient attachés à la robe du grand-prêtre des Hébreux". Surprisingly enough, Humboldt misinterpreted the hands of the figure as crude representations of the feet, suggesting that they demonstrated "l'enfance de l'art". Interestingly, it was the Italian archaeologist Ennio Quirino Visconti who pointed out the error to Humboldt in a letter published as an appendix to the *Vues* (1810: 299-304). Humboldt was also surprised by the lack of pupils in the eyes, a trait he interpreted as backward and in contrast with the presence of pupils in a "Oaxacan" bas-relief (actually a Classic Maya artwork, see Figs. 63-65). Humboldt, who clearly never saw the actual sculpture, thought that it was sculpted in a black basalt (actually a purplish andesite) and marvelled at the ability of the artist that he (erroneously) thought could have employed bronze tools similar to those he had seen in Peru. The Prussian scholar interpreted the figure as a priestess but also considered the hypothesis that it could have been a goddess. In the concluding section of the text, Humboldt went back to inter-cultural comparisons, stating that he did not believe in hypotheses on possible historical contacts between Egypt and Mexico but, rather, he cautiously proposed that the similarities observed among artworks of different areas of the world could be due to their common origin from an ancestral Central Asian civilization.

In the brief text commenting upon the "Aztec idol" (1810, Plate XL) Humboldt himself related it with the "Aztec Priestess" of Plates I and II, noticing the similarity of the headdresses and the presence of "Californian" pearls. Humboldt incorrectly supposed that the cavity on the figure's chest was aimed at receiving offerings of incense. Unable to recognize the two maize ears in the figure's left hand, Humboldt arrogantly blamed Aztec art, again accused of "infancy": "J'ignore ce que la figure tient dans sa main gauche les formes sont de la plus grande incorrection, et tout annonce l'enfance de l'art" (Humboldt, 1810: 239). At the beginning of the text Humboldt stated that he himself had brought the sculpture from Mexico to Berlin, where he gave it to the Cabinet of the Prussian King.

Humboldt's Plates (Figs. 59, 60 and 61)

Plates I and II of the *Vues* (Humboldt, 1810), engraved by Massard in Paris, must have been quite faithful reproductions of Castañeda's drawing, since they are excellent representations of the original sculpture. The only elements which were unfaithfully reproduced where the hands (especially the thumb of the left hand), an inaccuracy that led Humboldt to misinterpret them as feet.

Plate XL (Humboldt, 1810), engraved by F. Arnold in Berlin, is an extremely faithful reproduction of the original sculpture, since the artist had the opportunity to see the actual object in the Prussian King's Cabinet (as also stated at lower left of the image) and not a graphic reproduction of it. Arnold reproduced three views of the sculpture, with the front and back carefully traced in chiaroscuro, while the (right) side view was left as a simple sketch.

Ferrario's Text

Ferrario (1820: 549-550) repeated almost verbatim most of Humboldt's comments on the "priestess" sculpture, even maintaining the pronoun "we" when recording Humboldt's interpretive proposals. Interestingly, even if adhering to Humboldt's misinterpretation of the hands as feet, Ferrario recorded in a footnote that Ennio Quirino Visconti had written to Humboldt to correct his error.

Probably induced by Humboldt's text, Ferrario decided to conflate Humboldt's plates I, II and XL in a single plate of his work (Fig. 62). For this reason, his comment on the figure of Humboldt's Plate XL immediately follows the one about the "Priestess" and is a literal translation of the Prussian scholar's text, also including his harsh judgement on the "infancy" of Aztec art.

Fig. 59-60 – 59) Left, Humboldt's Plate I (1810), *Buste d'une Prêtresse aztèque*. 60) Right, Humboldt's Plate II (1810), *Buste d'une Prêtresse aztèque*. *Vû pas derriere.* (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

Fig. 61 - Humboldt's Plate XL (1810), *Idole aztèque en basalte, trouvée dans la vallée de Mexico*. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

Ferrario's Plate (Fig. 62)

Plate 69 (Ferrario, 1820), engraved by Gallina, is an uneven reproduction of the images published by Humboldt. The upper figure shows a rather crude understanding of the facial traits of the sculpture and an even cruder reproduction of the figure hands, thus further increasing their "feet-like" appearance that already tainted Humboldt's plate. Gallina also misreproduced the *amacuexpalli*, increasing the number of plies.

Both the upper "priestess" and the lower "idol", whose three views were copied by Gallina who also "finished" the sketchy side view, were represented with a smooth, almost shiny surface, in stark contrast with the extremely porous texture of the original sculptures.

Fig. 62 - Ferrario's Plate 69 (1820), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

RELIEF MEXICAIN TROUVÉ À OAXACA
(Nueva España - Guatemala/Mexico)

The plate reproduces a stucco bas-relief representing a richly-attired classic Maya king of Palenque (Chiapas, Mexico), towering over two men whose submissive posture – with an arm bent over the shoulder – characterizes them as war prisoners.

The today-lost polychrome stucco bas-relief used to embellish Pier E of House A, a section of the Royal Palace built in A.D. 662 during the reign of K'inich Janaab' Pakal, when Palenque (the ancient Lakamha', "Big Water") was the capital of the powerful kingdom of B'aakal ("Place Where Bones Abound").

Humboldt's Text

Humboldt's Plate XI (1810) is the earliest published image of a classic Maya monument but, paradoxically, in the associated text Humboldt misattributed it to the Zapotec region of Oaxaca (an error that was later corrected). Commenting on the image, Humboldt stressed the elongated shape of the bodies, stating that "le dessin, assez correct, n'annonce plus la première enfance de l'art", an infancy that would have characterized other Mesoamerican artworks, with stout bodies, only 5-heads tall. The presumedly "evolute" character of the image led Humboldt to wonder if it could have been traced after the first Spanish landings, when "les sculpteurs indiens avoient déjà connoissance de quelques ouvrages d'art des Européens"; actually, the 7th century bas-relief is, by far, the most ancient Mesoamerican artifact among those illustrated in the *Vues*. After putting forward a rather incredible hypothesis on how Christian sacred images could have reached Oaxaca in the aftermaths of the European arrival, Humboldt suddenly interrupted his speculation, admitting that he was unable to comment upon a monument he had not even actually seen.

Humboldt correctly interpreted the image as a scene of prisoners' submission and commented on the large noses, comparing them with those of Mesoamerican pictorial manuscripts he had seen in Vienna, Rome and Velletri. He pondered if the large Roman nose was a racial character or an artistic convention due to the Indigenous valorisation of a "symbole de la puissance et de la grandeur morale". Humboldt then commented on the shape of the heads, stating – with a language tainted by racial categories – that ancient Mexicans would have emphasized a natural trait of the "American race". In the final part of the text, Humboldt commented in detail upon the costumes, comparing them with those of Aztec imagery. The text concludes with an ironic notation: "Il seroit facile de reconnoître, dans ce relief, le bonnet phrygien et le tablier des statues égyptiennes, si l'on vouloit suivre les traces d'un savant, qui, emporté par une imagination ardente, a cru trouver, dans le nouveau continent, des inscriptions carthaginoises et des monumens phéniciens".

Humboldt's Plate (Fig. 64)

As said, Plate XI of the *Vues* (Humboldt, 1810) is – notwithstanding Humboldt's misattribution – the earliest published image of a Classic Maya monument. Humboldt himself stated that the plate, engraved in Rome by Pinelli, was based on a drawing that he had obtained from "un naturaliste distingué, M. Cervantes, professeur de botanique à Mexico […]. Les personnes qui ont envoyé ce dessin à M. Cervantes, lui ont assuré qu'il étoit copié avec le plus grand soin, et que le relief, sculpté dans une roche noirâtre et très-dure, avoit plus d'un mètre de hauteur". Humboldt's correspondent was Vicente Cervantes (1755-1829), a Spanish botanist who founded Mexico City's botanical garden, taught at the university and also had an archaeological collection known to Guillermo Dupaix (López Luján, 2012: 90-92). Cervantes' drawing, which reproduced a stucco bas-relief and not a stone sculpture, was actually a copy of the drawing traced by José Luciano Castañeda (a member of the expedition to Palenque led by Capitan Guillermo Dupaix in 1807), in his turn copying an earlier field drawing by the Guatemalan artist Ricardo Almendáriz, traced during the expedition to Palenque led by Capitan Antonio Del Río in 1787.

The comparison between Almendáriz's original drawing (Fig. 63) – which would be published only in 1822 as an engraving by Jean-François de Waldeck (Del Río e Cabrera, 1822) – and the *Vues*' plate shows how the sequence of copies, beside "transforming" the stucco bas-relief in a stone sculpture, impoverished the rather accurate (at least, for the standard of the time) drawing by Almendáriz. Various decades later, Frederick Catherwood made a new field drawing of the bas-relief, then published as a woodcut by Rawdon, Wright, Hatch & Smillie in the famous account of J.L. Stephens' and F. Catherwood's travels (Stephens, 1841: vol. 2).

The "genealogy" of Plate XI, as well as the associated text, is a clear example of Humboldt's debt toward Spanish and Iberoamerican intellectual networks.

Ferrario's Text

Ferrario (1820: 540-541) accurately synthetized Humboldt's text (including the cultural misattribution and the erroneous description of the artwork as a stone sculpture), also mentioning the fact that the drawing had been supplied by Cervantes. Ferrario's interest in costumes, led him to an almost literal translation of the final section of Humboldt's text, leaving aside references to specific monuments, the awkward comparison that Humboldt did between the "slaves" and the saints of Hindu iconography, as well as the closing, ironic notation on the Phrygian cap.

Ferrario's Plate (Fig. 65)

Plate 66 (Ferrario, 1820) was engraved by Bonatti Klemi, who accurately copied the image published by Humboldt. The use of chiaroscuro gave the figures a tridimensionality that, paradoxically, recalls the one which marked Armendáriz's original and that was subsequently lost along the series of copies. Inevitably, Bonatti also reproduced the errors, representing in an even more realistic way the non-existent stone slab on which the image was thought to have been sculpted.

Fig. 63 - Drawing by Ricardo Almendáriz (1787). (Courtesy Jay I. Kislak Collection, Library of Congress, Washington, D.C. <https://upload.wikimedia.org/wikipedia/commons/6/6e/PalenqueAc.jpg>).

Fig. 64 - Humboldt's Plate XI (1810), *Relief mexicain trouvé à Oaxaca*. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

Fig. 65 - Ferrario's Plate 66 (1820), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

BAS-RELIEF AZTÈQUE TROUVÉ À LA GRANDE PLACE DE MEXICO (Nueva España - Mexico)

Plate XXI (Humboldt, 1810) illustrates the so-called Stone of Tizoc, an Aztec sacrificial stone found in the central square of Mexico City on 17 December 1791, and currently held at the local Museo Nacional de Antropología (inv. 10-62). The large basalt monument, 2.65 m in diameter, was sculpted during the kingdom of Tizoc (A.D. 1481-1486). Its upper side is decorated by a bas-relief representing the Sun, while the outer surface records fifteen different military conquests: the king and a series of Mexican warriors, dressed as god impersonators, subjugate the patron gods of the conquered communities, whose names are recorded by means of logophonetic hieroglyphs. The lower margin of the band shows a stylized image of a terrestrial reptile, while the upper one is embellished by symbols of the night sky, including stars as disembodied eyes. Since the sculpture lacks the stone bar of the *temalacatl* where prisoners were tied during the "gladiatorial sacrifice", it was probably a *cuauhxicalli* ("Eagle Vessel"), that is, a receptacle for hearts taken from sacrificial victims. It was possibly located in the patio of the Temple of Yopico, dedicated to the god Xipe Totec ("Our Flayed Lord").

After the Spanish conquest, the Tizoc Stone was unearthed between 1562 and 1565 during the edification of the Christian cathedral, as described by Diego Durán in a text penned between 1565 and 1570; in his description of the stone, the Dominican friar already noticed the blood drainage crudely dug on the upper surface of the monument on an unknown date, maybe in early colonial times. Left visible on the main square, the monument was mentioned by various European authors during the 16th century. Reburied in the following century, it was rediscovered in 1791, when it was described and drawn by Antonio de León y Gama and Guillermo Dupaix. On September 3, 1793, the monument was reburied again in front of the Cathedral, leaving its upper surface at the level of the ground and thus causing an extensive erosion. During the 19th century the stone was moved again, at first in the patio of the University (1824) which, in 1825, became the seat of the Mexican National Museum. In 1873 the stone was moved to new location of the museum, in Casa de la Moneda. Finally, in 1974, the museum (and the Tizoc Stone) where moved to their actual location in Chapultepec (López Austin & López Luján, 2012).

Humboldt's Text

The text associated with Plate XXI (Humboldt, 1810: 118-122) describes the Aztec Templo Mayor – then believed to lie underneath Mexico City's Cathedral – and the accidental discovery, in 1791, of three famous Aztec monuments, today known as the Coatlicue, the Sun Stone and the Tizoc Stone. The narrative of the discovery was drawn, probably through the mediation of Guillermo Dupaix ("M. Dupé" in Humboldt's spelling), by the account published by Antonio de León y Gama (León y Gama, 1791). In describing the Tizoc Stone, which he called "pierre des sacrifices", Humboldt exaggerated its measurements and focused his attention on the figure of a bearded warrior, noticing that Mexican natives had more beard than those from other regions of the Americas and wondering if the image depicted an actual beard or a postiche one. Following Dupaix and using Codex Mendoza as a comparative element, Humboldt described the capture scenes (which he erroneously counted as twenty instead of fifteen, despite his claim of having checked the drawing against the actual monument), not understanding that the victors are grasping the hair of their prisoners and misinterpreting the spearthrowers of the latter as flowers' bouquets offered "comme un gage de son obéissance". He also mentioned the toponymic hieroglyphs and erroneously interpreted the blood drainage as an original trait of the sculpture. Humboldt then stressed the difference between the sculpture and the sacrificial stone that according to the historical sources was located on top if the main temple. Based on the so-called Anonymous Conqueror – an anonymous and rather mysterious Italian text published by Giovan Battista Ramusio in 1556 and attributed to a "Gentleman of Fernando Cortéz" (Ramusio, 1556, Vol. III: 304-310) – Humboldt interpreted the monument as a *temalacatl* and described the gladiatorial sacrifice. In describing the figures of the Mexican warriors, the Prussian scholar misinterpreted the shape of their left feet (a smoking mirror, an attribute of the god Tezcatlipoca, "The Smoking Mirror") as a defensive weapon. This error, and the fact that the "weapon" only appeared on the left foot, led Humboldt to a rather disconcerting analysis of how weapons were held in Aztec iconography, arrogantly concluding that "Cette bizarrerie de confondre la droite avec la gauche [which he also noticed in Egyptian art] caractérise d'ailleurs le commencement de l'art". Wondering on how the images could have been sculpted – and not believing they could have been done with stone tools – Humboldt repeated the erroneous hypothesis regarding the supposed usage of bronze tools (similar to the Peruvian ones) which he had already put forward in the text associated to Plates I and II.

Humboldt's Plate (Fig. 66)

As stated in Humboldt's text, Plate XXI (*Vues*, 1810), engraved by Massard, was based on a drawing traced by Guillermo Dupaix, arguably between 1803 and 1804. The plate reproduces two of the capture scenes but, strangely enough, they are illustrated in a modified sequence: Indeed, from the far left, one can see the toponym of Xochimilco (pertaining to a non-represented capture scene further on the left), followed by the capture of a bearded warrior from Chalco and then by the one of a warrior from Acolhuacan (or Acolman). In the actual monument, in between these last two scenes there is an intervening one that, for unknown reasons, Humboldt (or maybe Dupaix in his lost drawing) decided to drop. The figures are quite stylized, with inaccurate renderings of details such as the hair (imaginatively portraited as helmets), the weapons, or the smoking mirrors on the victors' headdresses.

Ferrario's Text

Ferrario's text associated with Plate 67 (1820: 542-544) is an almost literal translation of Humboldt's text, repeating his inaccuracies regarding the number of scenes and the iconographic interpretations. Ferrario also de-

scribed the gladiatorial sacrifice in another section of his book (1820: 562), illustrated by Plate 73.

Ferrario's Plate (Fig. 67)

Ferrario's Plate 67 (1820), engraved by Domenico Bonatti Klemi, is a fairly accurate reproduction of Humboldt's Plate XXI, including its inaccuracies. The Italian artist further emphasized the chromatic contrast between the light figures and the dark background, already present in Humboldt's image. The Tizoc Stone is also represented, in a much more inaccurate way, in Ferrario's Plate 73, illustrating the gladiatorial sacrifice.

Figs. 66-67 – 66) Above, Humboldt's Plate XXI (1810), *Bas-relief aztèque trouvé à la grande place de Mexico*. 67) Below, Ferrario's Plate 67 (1820), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

RUINES DE MIGUITLAN OU MITLA DANS LA PROVINCE D'OAXACA; ÉLÉVATION (Nueva España - Mexico)

Plate L (Humboldt, 1810) illustrates a building from the archaeological site of Mitla (Oaxaca, Mexico), a long-occupied Zapotec settlement in the Tlacolula Valley which flourished during the Postclassic period (ca. A.D. 900-1521) when the area became the arena of sustained Zapotec-Mixtec interactions. The current name of the site derives from *Mictlan*, the Nahuatl name of the Place of the Dead, almost a literal translation of the original Zapotec name *Lyobaa*, "Place of Tombs".

The pre-Hispanic buildings at Mitla, organized in five groups with both residential and funerary structures (Grupo de las Columnas, Grupo de las Iglesias, Grupo del Arroyo, Grupo de los Adobes and Grupo del Sur), are characterized by refined geometrical frets that resemble textile patterns and which were created by juxtaposing small trachyte blocks, like in a monumental mosaic. Complex mural paintings, today barely preserved, also embellished the buildings.

Mitla was visited and occupied by European colonizers since the 16th century, as attested by various colonial buildings. Nevertheless, the early 19th century "rediscovery" of its archaeological ruins and their publication by Guillermo Dupaix, who visited twice the site before 1807, marked an important moment in the birth of Mexican archaeology.

Humboldt's Text

Humboldt begins his comments on Plate L (1810: 270-273) by expressing his satisfaction in presenting, after many "barbarian" monuments, a building "couvert d'ornemens d'une élégance très-remarquable". After providing information on the site's location and names, Humboldt interpreted the site as the resting place of Zapotec kings. He stated that the map of the building (Plate XLIX, not illustrated here) had been done by the Mexican architect Luis de Martín and then provided a rather detailed description of the building reproduced in Plate L, engraved by Massart after a drawing of Martín and Coronel de la Laguna in 1802. Even if in a previous passage he had written that "L'architecture du palais de Mitla, l'élégance des *grecques* et des labyrinthes dont ses murs sont ornés, prouvent que la civilisation des peuples Zapotèques étoit supérieure à celle des habitans de la vallée de Mexico" (1810: 49), when describing the building's columns as lacking capitols he contradicted himself, stating that they witnessed "the infancy of art", an often-repeated formula in the *Vues*. Humboldt clarified that the Martín-de la Laguna drawings were in the hands of the New Spain's Viceroy Miguel de la Grúa Talamanca, Marquis of Branciforte. Humboldt then described in detail the stonework technique employed to create the frets and mentioned, as an example of a recently found ancient city, the Maya site of Palenque, which he attributed to the Toltecs and the Aztecs. Rather paradoxically, being unaware of it, Humboldt himself published the very first image of a Palenque monument in the *Vues* ((1810: Plate XI) misattributing it to the region of Oaxaca. With his usual widely comparative approach, he then noticed that "Les grecques du palais de Mitla présentent, sans doute, une analogie frappante avec celles des vases de la Grande-Grèce et avec d'autres ornemens qu'on trouve répandus sur la surface de presque tout l'ancien continent; mais j'ai déjà fait observer, dans un autre endroit, que des analogies de ce genre prouvent très-peu pour les anciennes communications des peuples, et que, sous toutes les zones, les hommes se sont plu à une *répétition rhythmique* des mêmes formes, répétition qui constitue le caractère principal de ce que nous appelons vaguement *grecques*, *méandres* et *arabesques*".

Humboldt text on Mitla shows various similarities with the content of Guillermo Dupaix's manuscripts on Mitla, thus suggesting that the two scholars had exchanged information on the site (cfr. López Luján, 2012, 2015; Achim, 2020).

Humboldt's Plate (Fig. 68)

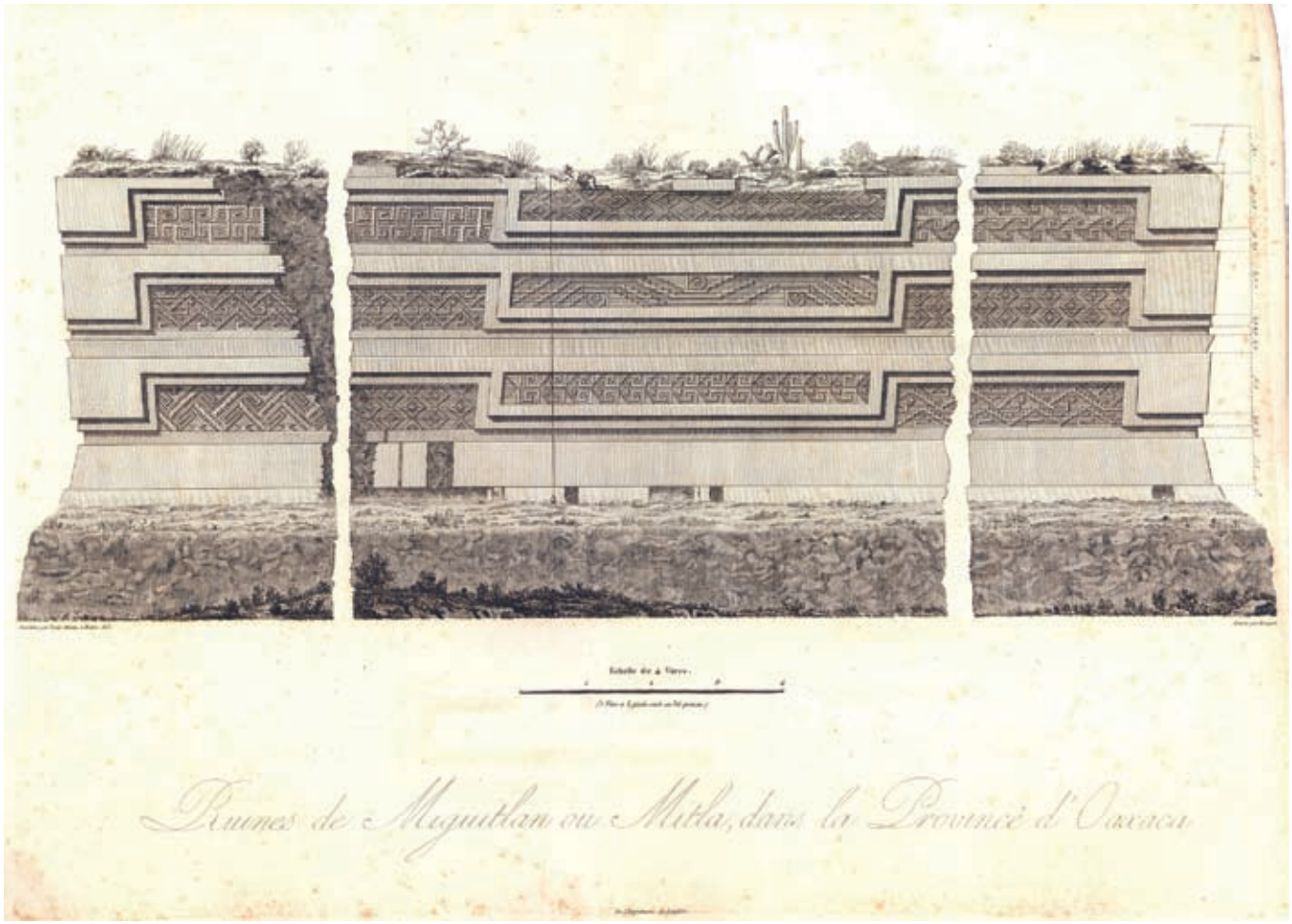
Humboldt's Plate L (1810) is a fine view of three sections of one of the buildings of Mitla, characterized by a fine and accurate rendering of the different stone frets. A person, arguably Luis Martín, Laguna or some other person who helped them, is represented on top of the building while measuring, thus visually testifying the reliability of the architectural drawing, based on field investigations. Such field measurements were the base for the metric data seen on the right of the building, as well as for the scale visible in the lower part of the page, over the Plate's title.

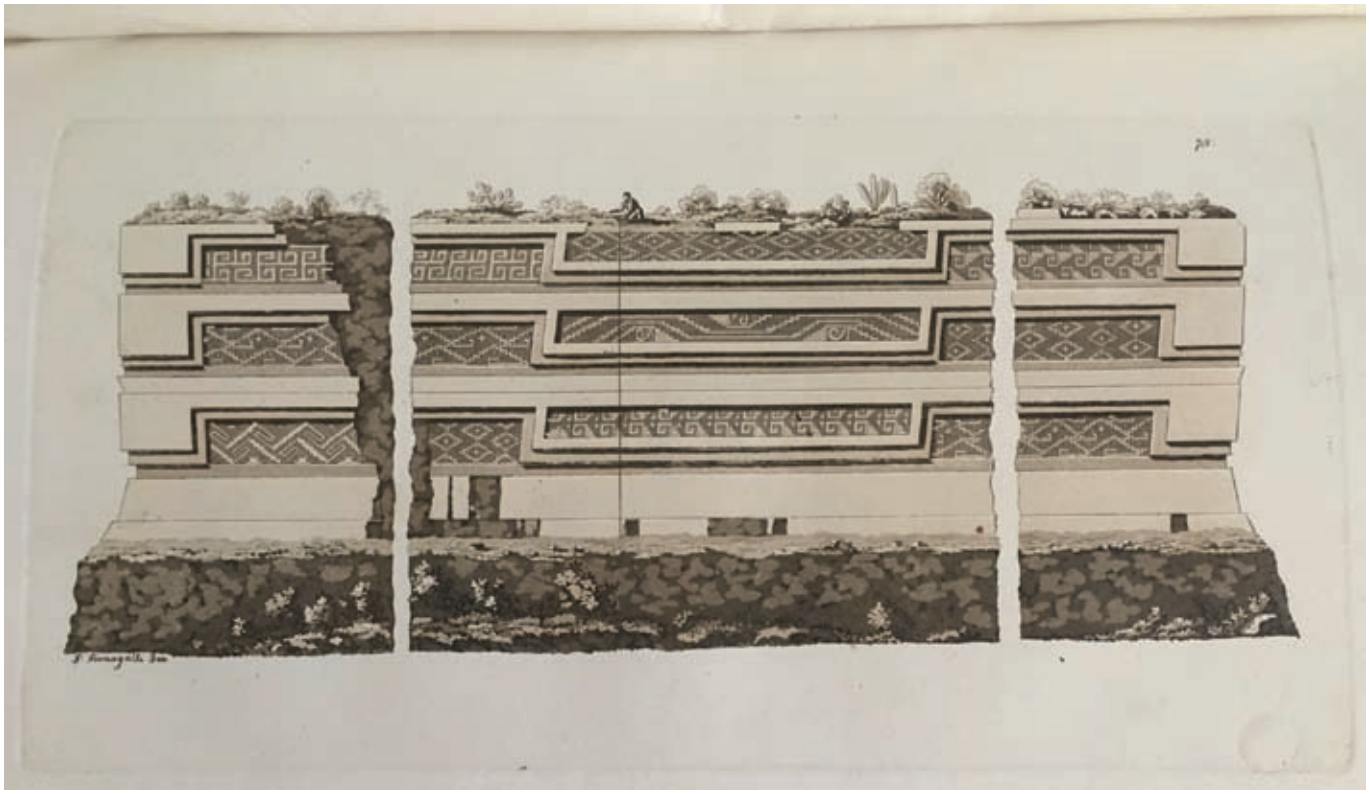
Ferrario's Text

Ferrario's text associated to Plate 75 (1820: 568-570) is, as usual, an almost literal translation of Humboldt's text. Nevertheless, Ferrario dropped the information regarding the authors of the original drawing, thus obscuring the role that Luis de Martín and de la Laguna had in assembling the information on which the plate was based.

Ferrario's Plate (Fig. 69)

Ferrario's Plate 75 (1820), engraved by Fumagalli, is a rather simplified version of Humboldt's Plate L. The rendering of the stone frets is much less accurate and the Plate lacks any metric data and scale. Curiously enough, the person measuring the building was represented in a different position and without the hat he sports in Humboldt's plate.





Figs. 68-69 – 68) Above, Humboldt's Plate L (1810), *Ruines de Miguitlan ou Mitla, dans la province d'Oaxaca; élévation*.
69) Below, Ferrario's Plate 75 (1820), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

MANUSCRIT HIÉROGLYPHIQUE AZTÈQUE, CONSERVÉ À LA BIBLIOTHÉQUE DU VATICAN (Nueva España - Mexico)

Humboldt's Plate XIII (1810) reproduces plates 49 and 50 of Codex Vat. Lat. 3773 of the Biblioteca Apostolica Vaticana, commonly known among Mesoamericanists as Codex Vaticanus B (Anders *et al*., 1993; Mikulska, 2020). This Central Mexican Late Postclassic (early 16th century) codex, one of the few extant pre-Columbian Mesoamerican manuscripts, is one of the five members of the so-called Borgia Group, composed by five mantic pictorial manuscripts probably proceeding from the Eastern Nahua region of Puebla/Oaxaca. Held at the Vatican since at least the end of the 16th century, Codex Vat. Lat. 3773 was probably brought to Italy by the Dominican friar Domingo de Betanzos in 1532-1533 (Domenici, 2016). Besides being mentioned by various early modern authors, a plate of the codex was reproduced by the Jesuit Athanasius Kircher in his *Oedipus Aegytiacus* (1652-1654). Recent scientific analyses of the manuscript's colours, traced on a screen-folded deerskin band covered by a white imprimiture, shed light on its complex history of partial repaintings, some of them maybe done in early colonial times in a cultural milieu characterized by sustained interactions between Nahua and Mixtec groups (Domenici *et al*., 2019, 2020).

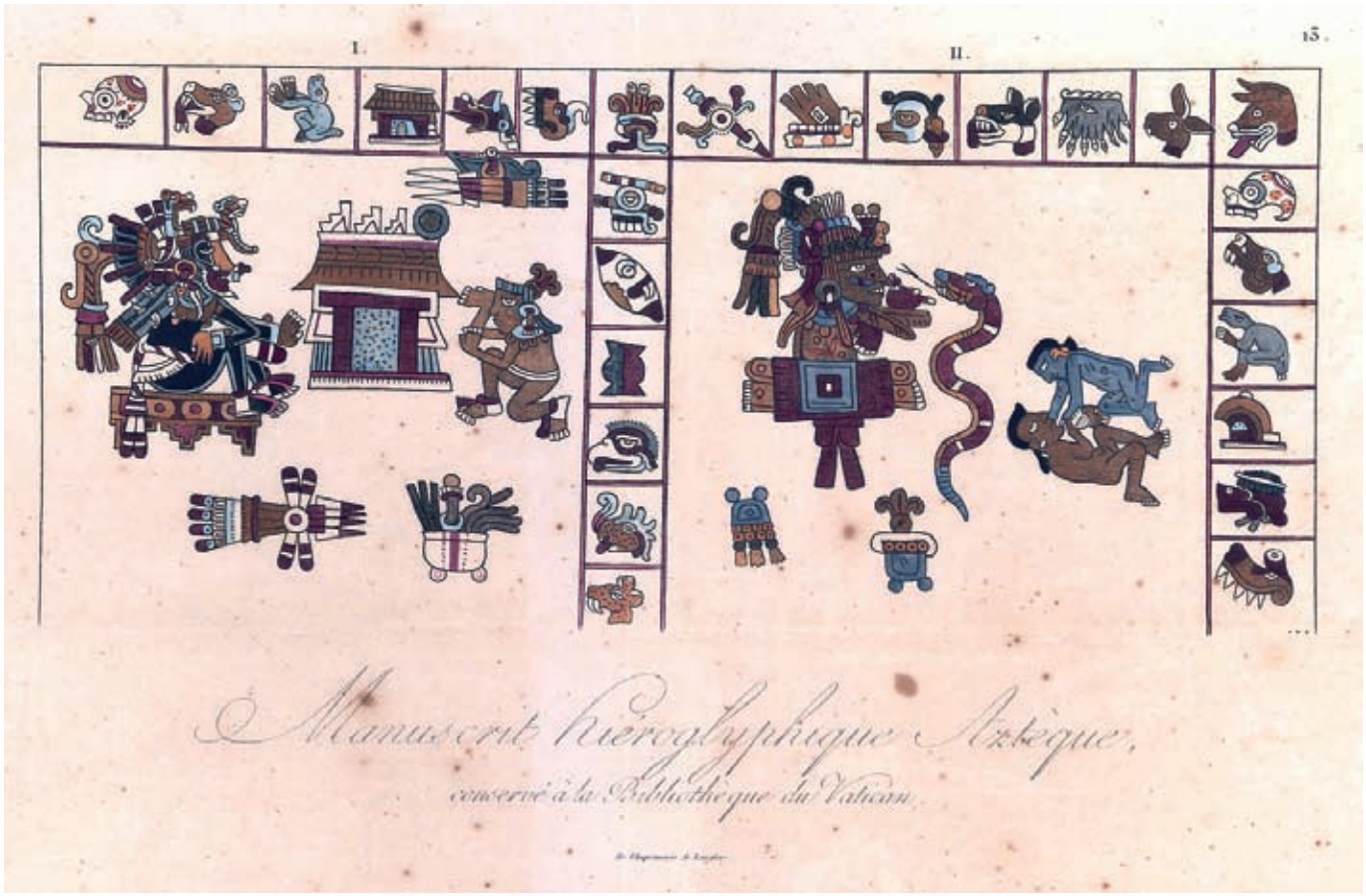
Plates 49 and 50 – the first two of the manuscript's verso, read from right to left – represent the gods Tonacatecuhtli ("Lord of Our Sustenance") and Quetzalcoatl ("Plumed Serpent") as patrons of groups of thirteen days (*trecenas*) of the 260-days divinatory count, whose names are represented along the margins of the page. Each *trecena* was associated to a patron god and a cardinal point (East and North, respectively, in the case of the first two *trecenas* represented in the plate). In front of the gods, mantic images were employed by soothsayers to formulate their omens.

Humboldt's Text

In the lengthy text associated to Plate XIII (Humboldt, 1810: 56-89) Humboldt dealt with the much-debated topic of Mesoamerican hieroglyphic writing. Following a longstanding tradition – and in line with his comparative approach – Humboldt compared Mexican hieroglyphs with those of other regions of the world, such as Ethiopia, Egypt and Central Asia, stating that the "Tartarian" origin of Indigenous American peoples could explain the presence of hieroglyphic writing among the "demi barbares" of the New World, who nevertheless, in Humboldt's evolutionary lexicon "ne s'étoit élevé à cette analyse des sons qui conduit à l'invention la plus admirable, on pourroit dire la plus merveilleuse de toutes, celle d'un alphabet". After a long review of several writing systems, Humboldt mentioned the usage of phonetic signs in Aztec writing, which he conceived as tainted by an "imperfection extrême". He then went on in describing the physical structure of Mexican manuscripts, as well as their contents. Humboldt commented the manuscripts he had the opportunity to see in Velletri, Bologna, Roma, Vienna and Mexico: "au premier abord on les croiroit copiés les uns des autres: tous offrent une extrême incorrection dans les contours, un soin minutieux dans les détails, et une grande vivacité dans les couleurs, qui sont placées de manière à produire les contrastes les plus tranchans: les figures ont généralement le corps trapu comme celles des reliefs étrusques; quant à la justesse du dessin, elles sont au-dessous de tout ce que les peintures des Hindoux, des Tibétains, des Chinois et des Japonois offrent de plus imparfait". With a notable arrogance, Humboldt described Indigenos Mexicans as "Un peuple montagnard et guerrier, robuste, mais d'une laideur extrême, d'après les principes de beauté des Européens, abruti par le despotisme, accoutumé aux cérémonies d'un culte sanguinaire, est déjà par lui-même peu disposé à s'élever la culture des beaux arts: l'habitude de peindre au lieu d'écrire, l'aspect journalier de tant de figures hideuses et disproportionnées, l'obligation de conserver les mêmes formes sans jamais les altérer; toutes ces circonstances devoient contribuer à perpétuer le mauvais goût parmi les Mexicains". He then commented on the supposed usage in Mexico of knotted cords similar to the Andean khipus and discussed a hyper-diffusionist hypothesis tracing to Asia the origin of the Toltecs, who – in his view – could have also contributed to the founding of the Inka empire. In the final part of the text, Humboldt mentioned the Mexican manuscripts then known in Europe and in the Americas, showing a detailed knowledge of the relevant literature and commenting that "On sera étonné de remarquer combien sont devenus rares ces monumens précieux d'un peuple qui, dans sa marche vers la civilisation, paroît avoir lutté contre les mêmes obstacles qui s'opposent à l'avancement des arts chez toutes les nations du nord et même de l'est de l'Asie". In the final part of the text, Humboldt focuses his attention on the plate reproducing part of Codex Vat. Lat. 3773 (where he erroneously calls the codex as 3776 and considers the plate as the 96th of the codex, thus misunderstanding its reading order). Basing his observations on the works of the Danish archaeologist Jörgen Zoega and the Mexican Jesuit Lino Fábregas, Humboldt correctly pointed out the glyphs of the day names, interpreted the scene on plate 50 as an "adoration scene" and misidentified the god on plate 49 as Cihuacoatl ("Serpent Woman"), "l'Eve des peuples sémitiques", stating that the two figures on the left "rappellent le Caïn et l'Abel des traditions hébraïques", again returning to discuss diffusionist hypotheses (such as the one identifying Quetzalcoatl and St. Thomas) to explain the perceived similarities, concluding that "Malgré ces rapports frappans entre les peuples du nouveau continent et les tribus tartares qui ont adopté la religion de Bouddah, je crois reconnoître dans la mythologie des Américains, dans le style de leurs peintures, dans leurs langues, et surtout dans leur conformation extérieure, les descendans d'une râce d'hommes qui, séparée de bonne heure du reste de espèce humaine, a suivi, pendant une longue série de siècles, une route particulière dans le développement de ses facultés intellectuelles et dans sa tendance vers la civilisation".

Humboldt's Plate (Fig. 70)

Humboldt's Plate XIII (1810), printed by the Imprimerie Langlois, is a very faithful reproduction of the



Figs. 70-71 – 70) Above, Humboldt's Plate XIII (1810), *Manuscrit hiéroglyphique aztèque, conservé à la bibliothéque du Vatican*. 71) Below, Ferrario's Plate 68 (1820), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

original manuscript's plates, to the extent that it must have been based on a drawing directly traced on the original. The main divergence with respect to the original regards the colours, often showing much darker tones, especially in the range of reds. Expectedly, the author of Plate XIII was also unable to understand that the mustard-like colour on the original is actually a degraded green. Another small difference can be appreciated in the mirror located on top of the temple at plate 50, whose interior was painted grey instead of black.

Ferrario's Text

Ferrario's text associated to Plate 68 (1820: 546-547) is an almost literal translation of Humboldt's four paragraphs devoted to the description of his Plate XIII. Understandably, Ferrario completely put aside the lengthy text where Humboldt indulged in his wide-ranging comparisons among ancient writing systems.

Ferrario's Plate (Fig. 71)

Ferrario's Plate 68 (1820) was obviously based on Humboldt's one with no checking against the original document, so that many details were slightly modified assuming a decidedly "non-Mesoamerican" appearance. The colours are also quite different from Humboldt's plate (and, even more so, from the original): both the mustard-like green and the brownish skin colours are rendered as a single pale brown.

Plates XIV (Humboldt, 1810) illustrates nine individuals portraited in a section of Codex Vat. Lat. 3738, also known as Codex Ríos or Codex Vaticanus A, today at the Biblioteca Apostolica Vaticana. The whole codex is a colonial manuscript, in the form of a European paper book, where the figures are accompanied by glosses in Italian. The paper is also Italian and it is unclear whether the manuscript was painted and glossed in Mexico or in Italy. Nevertheless, it must have been painted between 1562 and 1566, when it entered the Vatican collection, probably as a gift by the Dominican friar Juan de Cordova (Domenici, 2018). Parts of the manuscripts were copied from another colonial text, known as Codex Telleriano Remensis, while other parts were either original or copied from unknown sources. Among the latter there is the so-called "ethnographic section", whose texts are probably to be attributed to Juan de Cordova (Domenici, 2018) and which is the source of Humboldt's and Ferrario's plates.

After its entrance at the Vatican Library, parts of Codex Vaticanus A (both texts and images) were repeatedly copied, some of them being even published in two editions of Lorenzo Pignoria's appendix to Vincenzo Cartari famous iconographic repertoire (Cartari, Pignoria, 1626).

Humboldt's Text

Humboldt's text (1810: 87-89) explaines that the plate derives from what he calls Codex Anonymous 3738, whose drawings – said to be copies of original Indigenous paintings – he mistakenly attributed to the Dominican friar Pedro de los Ríos (who, in fact, participated in the creation of Codex Telleriano Remensis), complaining about the low quality of the copies: "Le père Rios, en copiant les dessins, paroit avoir été plus attentif au détail des costumes qu'à l'imitation fidèle des contours des figures. En comparant les peintures de la Planche XIV avec celles que renferment les manuscrits originaux qui sont parvenus jusqu'à nous, on voit que les figures copiées par le moine espagnol sont un peu trop allongées, ces altérations de forme se retrouvent partout où les artistes n'ont pas suffisamment senti combien il est important de conserver le style qui caractérise les productions de l'art chez des peuples plus ou moins éloignés de la civilisation".

Humboldt described each figure loosely drawing on the Italian text of Codex Vaticanus A, but heavily integrating it with information drawn from other colonial sources. At times Humboldt completely misunderstood some details, as when he described the weapon held by the third warrior (a wooden sword with obsidian blades) as a sling or when he understood the netted cape of the fourth warrior as a weapon similar to those employed by the *retiarii* in the ancient world. In describing the image of Moctezuma, Humboldt mainly drew on different sources but he also translated a passage from Codex Vaticanus A describing the objects that the king holds in his hands. Curiously enough, and going against the passage he had just translated, Humboldt misinterpreted the flower bouquet as if it was a vessel. When commenting the costumes of the two final women – which he wrongly assumed were both Huastec – he stated that the dress of the eighth figure (a typical, triangular *quechquemitl* such as the one worn by Chalchiuhtlicue in Humboldt's Plates I and II) resembled a European one, to immediately criticize his own words by noticing that similar garments were often represented in pre-Hispanic imagery. In short, it is clear that Humboldt had access to the Italian text of Codex Vaticanus A but, for whatever reason, he made a very limited use of the information it records. In the very final passage of the text, Humboldt had what at first sight seems an afterthought on Pedro de los Ríos skills in copying: "Quoique le père Rios, comme nous l'avons observé plus haut, paroisse avoir allongé un peu les figures, les extrémités, la forme des yeux, et celle des lèvres, dont la supérieure dépasse constamment le lèvre inférieure, prouvent qu'il a copié fidèlement". Interestingly enough, this statement seems more appropriate to describe the figures in Humboldt's plate than the original ones in Codex Vaticanus A (see below).

Humboldt mentioned "Codex Anonymous 3738" in various sections of his works, for example when discussing the sequence of eras recorded by Indigenous tradition (Humboldt, 1810: 202-211). In commenting the figures drawn from Codex Telleriano Remensis Humboldt was the first scholar to notice its similarity with Codex Vaticanus A (1810: 279).

Humboldt's Plate (Fig. 72)

The nine figures reproduced in Plate XIV (Humboldt, 1810) occupy eight different pages of Codex Vaticanus A (57v-61r) within the so-called "ethnographic section". Humboldt's publication marked the first reappearance of images form Codex Vaticanus A after the 1626 edition of Pignoria's work.

Humboldt's copy – differently from what happened with Plate XIII – shows significant variations in the figures' details and proportions when compared to the original; various elements of the individuals' bodies were significantly changed, paradoxically showing a strikingly more Mesoamerican appearance than those on the original codex, especially regarding physiognomic details such as faces, eyes, lips, hands, feet and nails. It seems like that, as he also did on Plate XXVI (also with reproductions from Codex Vaticanus A), Humboldt tried to "correct" the low quality of the codex's images, which he had complained about; if so, he must have carefully observed original Indigenous paintings, being able to perfectly grasp important aspects of Indigenous visual codes. This intriguing aspect of Humboldt's plates poses interesting questions about the working method of Humboldt and his collaborators, whose proper consideration would require much more space than allotted here.

As also occurred in Plate XIII, the colours are much darker than in the original.

Ferrario's Text

Ferrario (1820: 534-535) only translated the section of Humboldt's text referring to the portrait of Moctezuma. In a footnote he repeated Humboldt's observation about Pedro de los Ríos' inadequacy in copying the images.

Ferrario's Plate (Fig. 73)

Ferrario's Plate 64 (1820) is a rather faithful copy of the figures of Humboldt's Plate XIV, now rearranged according to a different layout. As also occurred in other plates, the colours hues are slightly different.

Figs. 72-73 – 72) Above, Humboldt's Plate XIV (1810), *Costumes dessinés par des peintres mexicains du temps de Montezuma*. 73) Below, Ferrario's Plate 64 (1820), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

FRAGMENT D'UN CALENDRIER CHRÉTIEN TIRÉ DES MANUSCRITS AZTÈQUES CONSERVÉS À LA BIBLIOTHÉQUE ROYALE DE BERLIN
(Nueva España - Mexico)

Humboldt's Plate LVII (1810) reproduces one of the fragments of Indigenous documents that Humboldt acquired in New Spain and then gave to the Royal Library of Berlin (now Berlin State Library), where they are still preserved. According to Humboldt himself, he acquired the documents at a public sale of the collection of Antonio de León y Gama, the astronomer who had published a famous work on the discovery of the huge Aztec sculptures in Mexico City's main square (León y Gama, 1792). Humboldt also stated that the fragments were originally part of the famous collection that the Italian Lorenzo Boturini Benaduci (1698-1749) assembled in New Spain since 1736 and then confiscated when Boturini was arrested in 1743. Part of the documents passed in the hands of Fernández de Echeverría y Veytia and then, in 1802, to León y Gama, who sold them to Humboldt.

More specifically, the plate reproduces only part of what is now known as "Humboldt Fragment XVI", an agave paper document (35 x 45 cm) inscribed with black ink. As demonstrated by Eduard Seler, the fragment – which was recorded by Boturini himself among his possessions – contains an Indigenous depiction of the fourteen articles of faith of the Roman catechism, as well as the ten Commandments (Seler, 1904).

Humboldt's Text

Humboldt's brief text associated to Plate LVII (1810: 283) interprets the fragment as a hieroglyphic calendar painted after the arrival of the Spaniards. Even if unable to correctly decipher the text, Humboldt recognized the Christian iconography and thought that the numerals were indicating the holidays. He cited a passage of his own *Essai politique sur la Nouvelle Espagne* in order to show how in the moment when the calendar was painted "le christianisme se confondoit avec la mythologie mexicaine; les missionnaires ne toléroient pas seulement, ils favorisoient même, jusqu'à un certain point, ce mélange d'idées, de symboles et de culte".

Humboldt had already mentioned the fragment in a previous passage of his work (1810: 81-82). He also illustrated and commented other fragments from his own collection in other sections of the *Vues*, as in Plates XII, XXXVI and XXXVIII.

Humboldt's Plate (Fig. 74)

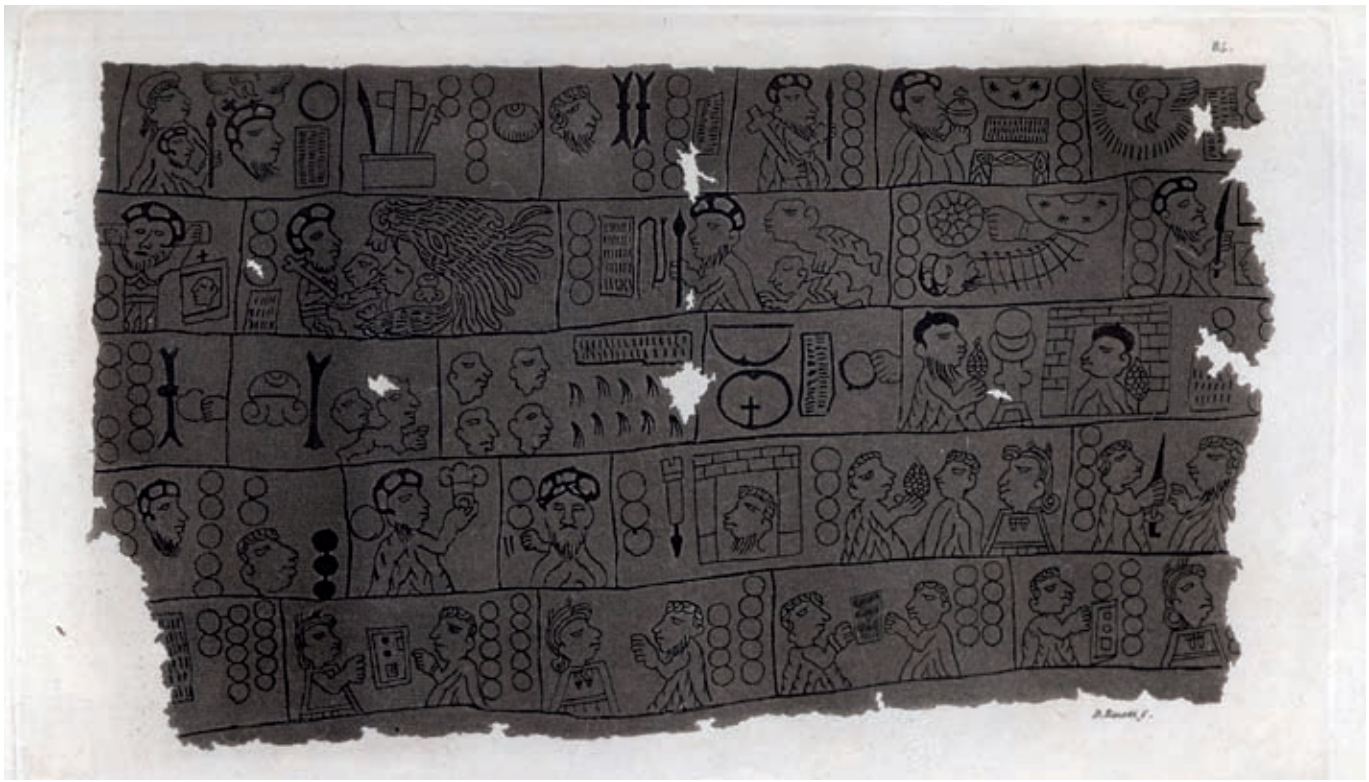
Curiously enough, Humboldt's Plate LVII (1810), printed by the Imprimerie de Langlois, does not reproduce the whole "Humboldt Fragment XVI" but only the central part of it, having deleted both the complete upper row of signs and the small extant excerpt of the lower one. To disguise this cut, the lower edge of the document in Plate LVII is fictionally represented as irregularly torn.

Ferrario's Text

Ferrario's text (1820: 595) deals with the Indigenous acceptance of Christianism and it is a literal translation on Humboldt's words.

Ferrario's Plate (Fig. 75)

Ferrario's Plate 84 (1820), authored Bonatti Klemi, is a very faithful reproduction of Humboldt's Plate LVII, with minor differences in small details.



Figs. 74-75 – 74) Above, Humboldt's Plate LVII (1810), *Fragment d'un Calendrier Chrétien tiré des Manuscrits Aztèques conservés à la Bibliothéque Royale de Berlin.* 75) Below, Ferrario's Plate 84 (1820), untitled. (Courtesy of Ministero della cultura, Pinacoteca di Brera, Biblioteca Braidense, Milano).

NOTES

[1] In this regard, see the letter of 8 March 1815 from Alessandro Volta to Lorenzo Luigi Linussio in which he wrote about Humboldt's texts: "Tali e tante Opere luminose sono invero costose molto, e pochi particolari vi si possono accostare [...] Qui a Milano le possediamo tutte nella Biblioteca pubblica di Brera [...] Trovasi presentemente in viaggio da Parigi la prima parte della descrizione del viaggio" (Volta, 1955: 293-295); and also Anonymous (1832: 206-218, n. 2) where the author states that the Brera Library owned all of Humboldt's works published up to that time, specifying that the total price was about Fr. 10,760.

[2] On Humboldt's conception of the role of science in a progressive sense and on the need to know nature and its laws in order to act in an improving and helpful way to human societies, see, among others, his *Carte qui presente les points sur les quels on a projeté des communications entre l'Océan Atlantique et la mer du Sud* (Humboldt 1811: 132-133), his *Considerations générales sur la possibilité de joindre la mer du Sud à l'Ocean Atlantique* (Humboldt, 1811: 223-261) and his proposals on the transformation of the marshlands between Panama and Portobello into cultivated fields and fodder meadows, in particular *Medicago sativa* (Humboldt, 1811: 251). As an example of his vision see also his criticism of the large-scale canalisation works around Mexico City to which he opposes his conception in favour of interventions with a lesser impact and intended to take account of possible improvements in local agricultural production and trade (Humboldt, 1811b: 217-261). For a general commentary see Milanesi 1975: 7-29; Guarducci & Rombai, 1996: 275-301; Minguet, 1997: 413-417.

[3] With regard to these diaries, it should be noted that from the beginning of 1802 Humboldt no longer wrote them in German but in French (Schwarz, undated).

[4] Thus Humboldt in his letter to Bonpland of 4 January 1806 (Hossard, 2004: 28).

[5] On Dupaix and his relationship with Humboldt see López Luján, 2015; Le Brun-Ricalens F., Wey C., López Luján L. 2020a, 2020b, 2020c.

[6] We have only referred to the plates presented in this paper. For an accurate listing of all the plates in the *Vues*, and furthermore of all the plates in Humboldt's works, see Lubrich & Bärtschi (eds.), 2014: 752-793. On the relationship between text and image in Humboldt's work, see the accurate observations of Péaud, 2015.

[7] For the intensity of the blue of the sky, which increases as the altitude rises and the transparency of the air increases, see Saussure, 1790.

[8] For a description of this plate see Moreno & Borchart de Moreno, 2010: 114; and Lubrich & Möhl, 2019: 84.

[9] A contrast that had attracted Humboldt during his trip to Italy and of which he says: "La beauté pittoresque de l'Italie a surtout pour cause le contraste agréable qu'offrent la roche pelée et inanimée, et, si l'on peut s'exprimer ainsi, les îles de végétations vigoureuses disséminées sur sa surface. Où cette roche moins crevassée retient l'eau sur la superficie couverte de terre, comme sur les bords enchantés du lac d'Albano, l'Italie a ses forêts de chênes aussi touffues et aussi vertes que celles qu'on admire dans le nord de l'Europe." (Humboldt, 1808: 19-20).

[10] For a description of this plate see Herrera Ángel, 2010: 93.

[11] With regard to Sonzogno's *Raccolta de' viaggi*, it should be noted that Humboldt had already briefly appeared in Milan through it in 1817, when the XXXV volume of the *Raccolta*, i.e. the *Viaggio in Norvegia, ed in Lapponia fatto negli anni 1806, 1807 e 1808 dal Signor Leopold von Buch* was published just one year after the original French edition preceded by an introduction by Humboldt himself and translated into Italian by Luigi Bossi.

[12] The list of associates, more than half of whom were from Milan and Lombardy, can be found at the end of the first of the four volumes of the first work published in the *Raccolta* (La Pérouse, 1815: nn.).

[13] Humboldt's increased knowledge of the abiotic sciences strongly influenced his scientific conception and his attempts to apply the methods of the abiotic sciences to the world of living beings. (Banfi & Visconti, 2020).

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PER LA CONOSCENZA IN LOMBARDIA DELL'OPERA DI ALEXANDER VON HUMBOLDT: I VOLUMI AMERICANI DEL *COSTUME ANTICO E MODERNO* (1815-1835) DI GIULIO FERRARIO

È noto che la Biblioteca di Brera fu tra le pochissime, forse l'unica, della penisola italiana ad aver acquistato tempestivamente i volumi del *Voyage aux Régions Équinoxiales du Nouveau Continent, fait en 1799, 1800, 1802, 1803 et 1804* (Paris, 1805-1834) che il famoso naturalista-esploratore prusssiano Alexander von Humboldt (1769-1859) veniva man mano scrivendo dopo il ritorno dal suo viaggio in America centro-meridionale (1799-1804). Ed è altrettanto risaputo che tra il 1816 e il 1817 il geologo di origine svedese Scipione Breislak (1750-1826) recensì per la rivista "Biblioteca italiana" alcuni di quei volumi.

Meno noto è invece l'uso che di una parte dei testi e delle illustrazioni raccolte nel *Voyage* venne fatto dal sacerdote, letterato ed editore milanese Giulio Ferrario (1767-1847) celebre per la sua partecipazione alla costituzione della "Società tipografica dei classici italiani" fondata con l'appoggio governativo nel 1802 allo scopo di pubblicare le "opere dei grandi geni italiani". All'attività della "Società" che tra il 1802 e il 1814, anno della sua chiusura, aveva pubblicato 249 volumi, Ferrario aveva preso parte con tenace impegno e sollecitudine in qualità di responsabile di tutti gli "oggetti letterari".

Forte dell'esperienza acquisita nel corso di questo immane lavoro, egli pubblicò tra il 1815 e il 1835, la grandiosa opera enciclopedica in 23 volumi recante il titolo il *Costume antico e moderno* da lui stesso edita e stampata a Milano. L'opera si configurava come un monumentale trattato enciclopedico, frutto della compilazione di materiali vastissimi, ricco di 1647 tavole illustrate che lo resero agli occhi dei contemporanei un'autentica miniera d'informazioni relative anche a territori a quei tempi largamente sconosciuti.

Ad agevolare la stesura dell'opera fu il ruolo professionale di direttore ricoperto da Ferrario all'interno della Biblioteca di Brera, dove egli poté allestire un vero e proprio laboratorio con la possibilità di accedere facilmente a ogni testo conservato in essa e ridurre notevolmente i costi per la produzione del suo trattato enciclopedico.

Per la ripartizione dei volumi del *Costume* l'autore scelse quella comunemente adottata all'epoca, ossia la suddivisione in Asia e Oceania, Europa, Africa e America. Ogni paese è illustrato secondo uno schema fisso descritto dall'autore nell'introduzione al I volume.

Venendo ora a ragionare dei materiali testuali che il letterato milanese ricavò dall'opera di Humboldt e che inserì nei tomi, *L'America* (1820) e *L'America meridionale* (1821) del *Costume*, possiamo notare come essi provengano perlopiù dal volume XV del *Voyage* che reca il titolo *Vues des Cordillères, et monumens des peuples indigènes de l'Amérique,* note anche con il titolo di *Atlas pittoresque,* (1810), che Ferrario, con la stesura dei suoi due volumi sull'America, fu molto probabilmente il primo a utilizzare e a diffondere presso il pubblico lombardo. Le *Vues*, costituite di 69 tavole incise e di testi ad esse riferiti, si inserivano nel solco aperto dallo stesso Humboldt con la pubblicazione delle *Ansichten der Natur/Tableaux de la Nature* (1808), mediante le/i quali il naturalista tedesco aveva iniziato a porre in essere il suo progetto inteso ad allontanare la borghesia tedesca dal proprio atteggiamento contemplativo per dotarla invece di un sapere in grado di garantirle la conoscenza della Terra. A tale scopo sia nei *Tableaux* sia nelle *Vues* i paesaggi ricopersero il duplice ruolo di suscitatori di godimento e di esortazioni verso la comprensione scientifica della natura.

Ma perché alla forma artistica si potesse sovrapporre il contenuto scientifico era necessario riuscire a rappresentare con la massima esattezza gli oggetti raffigurati. Di qui la decisione di Humboldt di far lavorare, sotto il suo attento sguardo, pittori e incisori di grande talento.

Tra le tavole delle *Vues* che ci sono parse maggiormente espressive dell'intento di Humboldt di condurre il lettore all'interpretazione razionale attraverso il concetto estetico, segnaliamo quella del *Chimborazo vu depuis le Plateau de Tapia*, incantevole veduta che cattura lo sguardo con la sua magnificenza; quella del *Passage du Quindiu, dans la Cordillère des Andes* che ci conduce in un grandioso scenario di montagne altissime; e la *Cascade du Tequendama* che riunisce in sé tutto quello che può rendere un sito pittoresco e nello stesso tempo oggetto di ricerca scientifica.

Diverse le questioni relative alle tavole raffiguranti le opere d'arte precolombiane. La loro analisi, infatti, rivela quanto Humboldt abbia fatto tesoro del lavoro di studiosi latinoamericani, ai cui contributi egli aggiunse i propri commenti al fine di intraprendere quelle comparazioni interculturali che lo portarono a formulare giudizi contrastanti sull'arte e l'estetica indigena. Al tempo stesso è anche evidente che il successo delle pubblicazioni di Humboldt, riccamente illustrate, conferì al lavoro degli studiosi latinoamericani un'enorme risonanza internazionale. Da intellettuali locali Humboldt acquisì anche documenti indigeni originali che portò a Berlino (dove oggi sono conservati e internazionalmente noti come "frammenti Humboldt"), come nel caso dei codici illustrati nelle tavole XII, XXXVI e XXXVIII. Humboldt, inoltre, accrebbe la sua conoscenza dell'arte precolombiana durante il suo viaggio in Italia, dove ebbe modo di consultare manoscritti indigeni in diverse collezioni locali, come nel caso del "Manoscritto di Velletri" (oggi noto come "Codice Borgia") illustrato nella tavola XXXVII.

Venendo ora ai testi e alle tavole americane del *Costume* si nota come gli scritti di Ferrario siano stati costruiti assemblando parti delle *Vues* di Humboldt e inoltre brani tratti da testi di altri autori; ne consegue pertanto che essi restituiscono al lettore un insieme non sempre sorretto da un progetto organico.

Per quanto attiene la qualità del materiale iconografico, le illustrazioni del *Costume* appaiono di livello assai più modesto rispetto a quelle delle *Vues*, fatto questo da addebitare con ogni probabilità all'arretratezza in cui versavano in questo campo le tecniche in uso a Milano e inoltre alla mancanza di conoscenza dei paesaggi e degli elementi naturali dell'America tropicale da parte degli artisti milanesi che per la prima volta si cimentavano con essi. Le tavole delle *Vues* erano invece, come abbiamo detto più sopra, state realizzate sotto l'occhio vigile di Humboldt. E tuttavia, nonostante queste manchevolezze, le illustrazioni di Ferrario risultano tutto sommato aderenti a quelle di Humboldt e gli oggetti rappresentati sono, ancorché non sempre in modo chiaro, perlopiù riconoscibili

e, in ogni modo, tali da sospingere il lettore a ricercare tra le pagine scritte gli elementi per la conoscenza razionale di quanto osservato nelle tavole.

Aggiungiamo che la scelta di Ferrario di inserire nei volumi americani del *Costume* i paesaggi delle *Vues* denota da parte del letterato milanese una notevole sensibilità alla pittura di paesaggio, un genere che a seguito del viaggio di Humboldt in America Latina aveva trovato nei tropici una fonte ricchissima di ispirazione.

Va rilevato infine che non solo per la Lombardia, ma anche per la penisola italiana, il *Costume* fu considerato dalla critica, all'atto dell'uscita sul mercato librario, come "la prima vasta opera fino ad allora mai immaginata", degna di essere posta tra quelle "fatte per onorare oltre che l'autore [...] anche il paese nel quale [erano] pubblicate e il secolo nel quale [vedevano] la luce".

Riguardo al successo del *Costume* ricordiamo che molte furono le ristampe in formato economico proposte al pubblico da diversi editori della penisola italiana, tutte quante caratterizzate però da un notevole abbassamento della qualità e del numero delle immagini, copiate dai volumi di Ferrario e non da quelli di Humboldt. Va riconosciuto tuttavia che tali ristampe, di prezzo assai contenuto, contribuirono a diffondere oltre che in Lombardia, anche in altri Stati della penisola, sebbene in maniera approssimativa, disordinata e riduttiva, parte del pensiero e dell'opera di Humboldt.

Arrivati a questo punto, possiamo affermare che, con i suoi due volumi sulle Americhe, Ferrario fu, con ogni probabilità come si è detto più sopra, il primo a diffondere e a mettere in circolazione presso il pubblico lombardo, e più in generale quello della penisola italiana, una parte dell'opera e della visione scientifica di Humboldt, e inoltre che egli seppe rendere la visione naturalistica dello scienziato tedesco in maniera soddisfacente, sebbene non sempre completa e talvolta semplificata.

Allo scopo di agevolare il paragone tra le immagini di Humboldt e quelle di Ferrario, presentiamo nella seconda parte di questo articolo una serie di 24 schede dove vengono mostrate e commentate le immagini dei due autori.

Infine segnaliamo quale probabile effetto della pubblicazione dei volumi americani di Ferrario, l'uscita (Milano 1827-1829) della traduzione italiana dell'*Essai politique sur le Royaume de la Nouvelle Espagne* (1811) di Humboldt. Segno questo della considerazione di cui lo scienziato tedesco cominciava a godere in quegli anni presso i lettori milanesi e lombardi, a seguito, come si è visto, delle tavole e dei testi dei volumi americani del *Costume*.

INDEX 111 (2) 2021