Linnaean Botany and Spanish Imperial Biopolitics

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Science and Empire are cause and effect of one another: they are not identical; each determines and is defined by the other. Indeed, it is vital for scientists and administrators to share the illusion that the stuff of nature can be captured in words, figures, lines, shading, gradients, or flows-- in short, that nature can be rendered in an outline, that those sketches can be set out on pieces of paper, and in the process the raw materials, the procedures, and the place are properly catalogued: they become a piece of paper in a filing-cabinet. This reducing of nature to representation is necessary, but it is not enough. What distinguishes a geographer, a botanist, or an astronomer from an archivist is the former's role as "witnesses," as experts in the field. These are savants who study their objects *in situ,* experts who move data, instruments, papers, in addition to themselves, and who "bear witness" to the appearance of natural objects. All this lends authority to travelers' observations and notes, and convinces those who commission them and who listen to them of the truth of their work. When travelers return they, as well as those who sent them, share the belief that these papers—these representations of nature--can lead to an exact knowledge of nature despite the great distance of its remove from the metropolis: knowledge, in other words, becomes manifest in a network.

A network projects the range of sight and extends the reach of the hand. So, it is a *technoscope* that depends on Empire and at the same time underpins it: in short, it is a

device used to know at-a-distance[1]. Distance, however, poses serious problems of scale, since the diversity of places and the multiplicity of things are too great to be collected together. Thus, people must invent principles of order to contend with the tendency towards the polyphony and proliferation that threatens every undertaking. It is an age-old problem that geographers traditionally solved with "*à la carte"* cartography –as if made to order, like in a restaurant: that is, by playing with the scale of maps.

Decisions about the scale of a representation not only determine the data to be shown but also the conceptual matrix in which they are to be organized. Scale thus molds the relationship between a network of points or, to put it in a more provocative way, we might say that geographers, rather than describing reality, invent it and then depict it[2]. This network of points, at first unconnected, reaches the reader as a coherent whole, pre-existing and independent from the observer. Not all maps inscribe the same phenomena, in the same way that not all networks use the same scale, nor are they equally efficient. And what we are saying about territories also applies to plants, since for Linnaeus there was a clear analogy between natural history and *Geographia Naturae*.

Our aim is to show how the discussion about the most suitable scale for imperial scientific policies conditioned the type of botany that was to spread throughout the colonies. Thus we want to explore the shift between two conflicting types of biopolitics: the botanical policy of the Metropolis and the political botany in the colonies. This is a distinction that refers to the shift from an organizational model based on the production of data towards one that assigns and redistributes values. They both emanate from the plant world. The first biopolicy seeks to take advantage of the domain through its floristic resources; the second, in contrast, tries to ensure that the qualities of the plants, by digestion, should improve the moral stature of the community. The

Empire demands a policy to organize plants, while in the colonies they need a type of botany to create the *polis*.

Disputes of scale

Here we will explore the scale at which scientific practices acquire the authority that underpins the phenomenal success of that undertaking we call science. The concept of a science-of-scale is a useful tool to differentiate, among a multiplicity of cognitive practices, those practices that are sought by a particular political apparatus –like a court, an empire or a town- until they become socially and culturally viable.

During the first half of the eighteenth century Spain hosted scores of institutions. However, these institutions were scattered throughout the country and, lying outside of any network, tended to function in line with age-old tradition and within a narrow range. Things were to change when the Spanish court came to view America again as Panacea, when, in other words, there was a change of scale at which social and political problems were considered. The colonies were considered the source of all solutions but at the same time the cause of all the problems, for in practice the control of such vast possessions meant massive military and administrative expenditure. For this reason the extent of governmental apparatus reached nearly planet-wide levels. This change of scale logically affected naval, sanitary, and educational policies and, of course, changed the conception of the management of American resources, be they vegetable or mineral. Imperial expansion fostered many new reformist projects that had to share a common language to allow the interchange of coherent information between the different imperial centers. In many cases this intention resulted in the creation of new scientific institutions, since it was easier to govern nature or the territory with a single botanical and/or cartographic system than to leave these matters in the hands of local leadership.

The overseas expeditions served as the mainstay for the metropolitan project[3]. Institutions that understood these newly emerging requirements gained levels of influence and cultural profiles unthinkable a few decades earlier. Their function ceased to be courtly and became imperial[4]. Their savants no longer resembled collectors or antiquarians, but became instead agents in charge of governing Nature.

From the time of the Orinoco Expedition in 1752, in which Linnaeus' disciple Pehr Löfling took part, all Spanish botanical expeditionaries adopted the Linnaean system. Although in the peninsula there were rival systems, the fact is that it suited the Crown that all documentation- manuals, inventories, images – should be expressed in the same code. Thus the Linnaean system was imposed by the Crown on all scientific institutions, including traveling ones, such as botanical expeditions[5]. Linnaeus' system was very efficient, since among its merits was its ability to disregard local circumstances, without renouncing its claim to be describing a natural, or universal, order. The climatic, soil and ethnographic environments were irrelevant. This method stressed the idea of Nature as the set of laws and rules that allows the government of an Empire. For Casimiro Gómez Ortega, a strong supporter of Linnaeanism and the kingpin of botanical expeditions, there was no room for argument: "All natural bodies form as it were an extended Empire, governed by the unalterable laws imposed on them by the Creator"[6]. The Spanish doctor and academician Francisco Bruno Fernández put it more clearly, distinguishing between Universe as the collection of natural beings and Nature as its sovereign[7]. A very convenient distinction, since it ensured the viability of Spanish policies despite the great diversity in plants or peoples around the world. Gaston Bachelard was right: he who seeks the exceptional, he who is moved by the sight of Nature, is not on the side of science but rather among the obstacles which stand in the way of its disciplinary institutionalization. Simply put, in this conception

operating in the eighteenth century, there is no Nature without Empire. This idea of Nature supports the ontological value of the concepts of *species*, in so far as Nature is the field of repetition and resemblance. For this reason it is a concept that should not be confused with the sum of the creatures and plants that inhabit it, nor with the sensations that these beings provoke in us. Rather Nature is comprised of the species that inhabit it, the meteorological phenomena that govern it and the machines used to measure them. Nature only exists when machines (i.e. instruments, books, maps, tables) mediate the sensations of the subject and the object towards which they are directed. Nature is the figures and charts produced by these measurements, in such a way that weather becomes meteorology, and water or parsley become H_2O and *Petroselinum sativum* respectively. Nature, then, is a world that distances itself from common experience. As things are geometrized, tabulated and named, as order is given to data (soon called "facts" by the supporters of this cataloging task), scientists proclaim themselves the only reputable witnesses[8]. As D. Haraway pointed out, natural history, and Nature itself, have been created on the basis of shortage.

So the metropolitan botanists reached the colonies satisfied by two very simple ideas. The first was that of the species, a concept embodying the belief that the whole animal and vegetable kingdom can fit into a table (organisms now becoming specimens). The other was the idea that species could be determined by differences in morphology. The idea of species permitted the unification of all knowledge concerning flora and fauna, minimizing distances between near and far, between Europe and America. Nature could be depicted as a continuous mantle of plant life inhabited intermittently by forms that, although described in ordinary words, would in the end be trapped in Linnaeus' binomial net. Nature, in short, became a structure of data, and expeditions became a tool of biopolitics, whose objective was not to appreciate local

peculiarities but rather to process them into information, by whatever botanical system that was able to homogenize diversity. To put it in modern parlance, the Linnaean system worked as an interface between morphology and nomenclature. Thus, nearly everyone was happy since, as Foucault has shown, the grand project of the Enlightenment was to render objects part of a logical order[9].

There were, however, scholars on both sides of the Atlantic who were wary of these conjuring tricks. The objections of Georges-Louis Leclerc, Comte de Buffon, could be heard in Paris and London, and in Philadelphia, Mexico City, and Lima. José Antonio de Alzate y Ramírez (1738-1799), the ironic and brilliant agitator of public opinion in New Spain[10], shared several of Buffon's reservations concerning Linnaeus' system: a system characterized by its insensitivity to local circumstances. Alzate did not consider it necessary to disregard what was known about a plant's location, environment, flowering season, or soil characteristics in order to understand it. Spanish Creoles from all parts of the New World found the Linnaean system lacking. They knew a lot about plants and little about scales. This stubborn Mexican priest wrote, "[...] it is a remarkable thing that the short-sightedness of one man, be he ever so painstaking and observant as we suppose Linnaeus to be, should seek to review the whole globe in order to index it, impose new names, and allot them their proper place"[11]. Alzate's remarkable insight reveals the gaping disparities between the vastness of the world and the smallness of the laboratory. Linnaeus' study in Uppsala, its brilliant occupant, and its Heaven-knows-how-many filing cabinets, were too small to contain the world. These days we no longer dispute these incongruities, but seen from a distance, they seem poignant. Alzate complained of a series of injustices that botanists sent from the metropolis claimed not to understand: he lamented the high cost of new instruments and the waste of time implied by not being able to collect plants except in the flowering

season; and he bemoaned the obscenity of the sexual system[12] and its incompatibility with local knowledge and hierarchies.

Botanical nomenclature was also a matter of political *nomenklatura:* the exclusion of native names from the field of science defined new power relations. It acknowledged the authority of imperial botanists and belittled local herbalists and herbal practitioners. Nomenclature, indeed, displaced traditional wisdom: Nahuatl came to be considered as an unintelligible, garbled language, fit (as was remarked in 1788 by Vicente Cervantes (1755-1829) the botanist appointed director of the Botanic Garden in Mexico *) "...to be spoken in public places and small groups, with Indian women selling herbs and vegetables, but not in academies of the learned"*. However, at least until the controversy took the autism of the polemicists to extremes, Martín Sessé, a doctor settled in Mexico and director of the Royal Botanic Expedition to New Spain (1787-1803), cited his knowledge of the native language as a qualification for his inclusion in this expedition[13]. In the hands of the imperial botanists, the new Linnaean system seemed also to widen the split between botany and medicine: a worrying tendency, for everyone would be affected if usefulness were no longer the criterion for interest in plants. The Creoles (élite of European origin born in the Americas) turned their bewilderment into a struggle to conquer public opinion. For them, what was needed --what tradition and common sense dictated --was just the opposite, subordinating taxonomy to what was tangible, and what was tangible to what was useful. Moreover, they argued that a plant name should express not a logical but a functional order.

Trying Biopolitics

Creoles in New Spain disagreed with many aspects of Linnaeus' system. The majority of those disagreements centered on the notion of natural diversity. Alzate

wrote in 1788 *"*. . . in New Spain there are products of nature that refute and overturn all theories and botanical systems hitherto devised"[14]. We can find the same position in Lima, where Hipólito Unanue (1755-1833), an influential Peruvian physician with a profound knowledge of and admiration for Linnaeus' work, would endorse it when he said: "All the systems drawn up in Europe on this subject [natural history] are subject to a thousand elaborations when their theories are applied here"[15]. The message was clear: America was luxuriant, too biodiverse for any scheme of classification. It would not fit into a simple tabulation: just to imagine that it could, was again to degrade a continent, already stigmatized by Buffon, William Robertson (1721-1793) and other Europeans as imperfect due to its immaturity[16].

Metropolitan botanists accepted that America was rich in plant varieties, but still held the belief that these varieties could be treated as specimens of larger *taxa*. They had no wish to argue against the importance of knowing the usefulness of plants, but they were horrified by the idea that plants' properties could be conditioned by local circumstances, reasoning that "the earth supplies no nutrition to plants, merely serving as a means to support them, and it is thus not absolutely necessary for plant life." "The smell, color, taste, lushness or other accidents of plants," these Spanish botanists continued, "are of no use when setting out their specific differences; . . . the same applies to their uses or virtues, which therefore should not be taken into account for this purpose"[17]. These were serious arguments, for the foregoing were theses set for the students of the Botanic Garden of Mexico to be defended in public before their colleagues and the local dignitaries.

The same happened in Guatemala, where students were asked to try to determine the properties of a plant from its morphological characteristics. In other words, the Linnaean system was credited not only with descriptive and denominative qualities, but

also with the capacity to make predictions. On the occasion of the opening of the Cabinet of Natural History (1796), José Mariano Mociño (1757-1819), a Mexican disciple of Cervantes, and then botanist of the Royal Expedition to Nueva España, asked his student Ortiz de Letona ". . . although [Nigella Damascena] is not known to have any particular virtue, according to Linnaeus' system and in view of its morphological characteristics, what use or powers could it have?" [18]. Again local criticisms were put forward, this time by the examiners, to the effect that botany should cease to be seen as a discipline of "haughty savants", and denouncing the unbridgeable gulf between the day to day use of certain plants and the theoretical proposals defended by those coming from Spain. Therefore, as we see, metropolitan politics firmly repressed any argument that might serve to lay claim to particular cultural experiences independent from those of the European.

To "de-anthropologize" the knowledge of plants, also involved "de-locating," or better still, "de-territorializing" it. Botany was emerging as a science separate from medicine, but also from chorography as territory became a vegetal mantle, a sort of carpet for plants to lie upon. It was, then, a matter of finding out to what extent a change of soil could produce a new floral variety. On this point there was also considerable local opposition. It is difficult to persuade a farmer that the land, his land, is not a decisive factor. The *Sociedades Económicas de Amigos del País*, private associations dedicated to the promotion of knowledge relating to agriculture, technology, and industry that emerged in Spain after 1763 and then spread all around Spain and Hispanic America[19], were not groups of farmers but of patriots who were less interested in taxonomy than in production. Made up of the most active members of local élites committed to economic utilitarianism, the priorities of association members had more to do with the acclimatization of plants and technical innovation than with botanical

classification and the study of mechanics. They may not have known much about labels or calculations, but they did know the land was temperamental, that general principles were for books only, and that crops were produced by miracles, not theorems. For these worthy people, being a patriot meant securing the stability of plantations and reducing the care of each new planting to a few indispensable and locally variable rules.

These concerns stood in direct opposition to those of Linnaeus' disciples: in the colonies, it was being suggested that the floral identity of a country could not be defined in terms of botanical species but as a function of the particular characteristics of soils. It was suggested, in other words, that the earth changes the properties of plants. José Antonio Liendo y Goycoechea (1735-1814), a Franciscan professor of philosophy in the San Carlos University in Guatemala, an intensely active intellectual, wrote amid the controversy over the quality of American indigo and the possibility of acclimatizing it in Europe: "foreigners cannot take home the weather, the climate, the land, the water, and other precious assets"[20]. As we have pointed out above, what was at stake was the prosperity of Creole lands and, while the American expedition members stood by Linnaeus, local Creoles propounded arguments that threatened the very structure of European botanical knowledge. Goycoechea wrote for practical people. He spoke continually of production and the circulation of goods; and rather than laying down fixed rules he devised a doctrine of resistance. "Let dealers in indigo be wary of everything," he wrote, "first, of the many practices that are adopted blindly; second, of the theories that are not based on facts and manifold experiments; and third, of this very treatise and notes". This was just one of a thousand ways of calling for common sense over authority, asking for experience in the face of artifice. And the word "artifice" could include any kind of artificial event, including, of course, experiments.

Why emphasize the importance of the soil? We have shown the main features of a disagreement over the place of local knowledge interpreted as an incompatible scale for imperial aims. The opposite approaches dealt, then, with two characteristic ways of symbolically appropriating America: the first one stresses its common features and denies any value to tradition and local sites; the second highlights native and practical knowledge as part of the peculiarities of each region. Both will have political and epistemological consequences insofar as they imply a very different understanding of botanical practices and knowledge. The way that asserts a claim to details, to tradition, and parochialism we shall discuss later. Here we turn to the relationship between imperial politics and systematic botany.

As we have seen, the core of the Creoles' criticism is that imperial botanists were exchanging diversity for taxonomy. Botany does not deal with things that change with time or place, but with organisms that are imagined to be perennial and stable: that is, with fixed abstract forms that can be transformed into data. In this sense, Linnaean botany has nothing to do with biology. It is a form of biopolitics, and the only thing that matters in what we might call "imperial biopower" is how to turn diversity, local variation, and *qualia* into data. At the same time, systematics represents a useful simplification of reality that enabled expeditions to finish the immense tasks with which they were charged in a reasonable length of time. It provides an efficient way to create an economy of space founded on a logic of resemblance, shortening the time and work needed to draw some conclusions of political consequence. Mociño, for example, noted extraordinary floral continuity between Mesoamerican and Guatemalan territories, which appeared to confirm the political unity enforced from Mexico City: "Having visited nearly the whole of the provinces of New Spain, we have examined the Kingdom of Guatemala, and on our last journey we have found regions not far different

from those found on our first expeditions. So then it can be of little wonder to anyone that the flora discovered in New Spain contains the whole catalogue of Guatemala, with the sole addition of a very few species not observed in our first incursions." It is worth noting that the Kingdom of Guatemala then included modern Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, and Belize. And Mociño's expeditionary route was limited to the Pacific coastline, because there was a passable road as well as a village for supplies[21]. Botanical homogeneity deduced from a partial survey confirmed political unity. From this point of view there was no perceptible break from region to region.

Linnaeus' system also helped the expeditions find short cuts to limit the hardships of their work. Finding new species could mean traveling to out-of-the-way places. Moving at the frontiers of the unexplored territories meant suffering torrential rain, bad roads, and shortage of supplies. Too many plants and too many hardships. Diversity, in short, was an obstacle. And if, seen from the comfort of viceregal offices or Jesuit classrooms, America seemed to be an orchard, viewed from the depths of the forest or the loneliness of the mountains this abundance seemed more like a punishment. Hipólito Ruiz (1754-1816), director of the Royal Botanical Expedition to Peru (1777-88), described his stay in Chacahuassi, a small Andean enclave, as a *"* . . . very deep, narrow dungeon, where the sun hardly enters except at midday and at night, if there were ever a break in the clouds at that time of year, the stars could [hardly] be counted, [. . .] we looked around this oppressive and gloomy place, [. . .] examining those three steep and inaccessible hills, covered from the top right down to the banks of the roaring rivers with tall trees, bushes and scrub*"* [22]. But in so far as species are not defined by their surroundings, one can avoid such ordeals by establishing beforehand botanical identities between administrative units. Considered in this way, the quest for new species could stop where regions became most inaccessible: "On 30th July I returned

from Xauxa to the town of Tarma", recounted Hipólito Ruiz, "confident that at no time would the valley and hills of Xauxa present enough materials for the members of the Botanic Expedition to work on. . . unless we went into the Mountains; from which we desisted, fully informed by experts and by the Missionaries of Ocopa that the Mountains of Tarma were as lushly covered in vegetation as those of Xauxa; and much easier and safer to cross for the collection of botanical specimens" [23]. The discovery of diversity, which had never been the purpose of the expeditions, also ceased to be a goal of their members. Then hunger (the desire to codify) joined with appetite (the wish to finish).

This spatial strategy tends to identify certain regions with some characteristic species. This allowed a selective fostering of farms and forestry in those areas rich in species of particular interest to the Spanish Crown. Plants ceased to be the business of experts and became the concern of politicians. Botany came to strengthen imperial politics.

Botanical policy developed into political botany and, just as we now talk of environmental crises, there was much talk then of the decadence of nature and the erosion of the empire. If political economy gave relevance to the historicity of resources and peoples, political botany ignored local features, while boosting monoculture and encouraging acclimatization mainly in the metropolis. The plants themselves and not their products became the stuff of trade, and what circulated through the networks were ideas on how to mobilize species and how to denature them. Botany began as a *technoscope* –a way to visualize at-a-distance- but, at the end of the eighteenth century, it was already a *teletechnique* –a way to act at-a-distance. Its success as an imperial undertaking was linked to the ability to set up an international network of professorships, gardens, expeditions and publishing companies able to produce a version of Nature easily put into words, and deducible from very little data.

Meteoric bodies

An emphasis on individuality hinders the formation of political consensus. This was a problem for which the local Creoles sought a solution. Indeed the complications posed by the Linnaean system and the political struggles over academic appointments associated with it made the obstinacy of its supporters hard to understand. Spanish scientific policy fostered not only scientific expeditions, but also the founding of new scientific institutions, such as the Royal Botanic Gardens, or Mining, Surgery and Naval Colleges. So the politics of appointments aroused great tensions, because in many cases the Creoles were relegated[24]. But in addition, disagreement over classification was linked to economic interests[25].

It did not matter what the subject was. Creoles started with species and ended up arguing about questions of space. If scientists from overseas made plants into a matter of politics, local savants politicized space[26]. Let us look at the details and turn to the topic of woods, ponds, and diversity.

Europe's demand for timber grew so fast that there was soon an awareness of depletion, if not of exhaustion, of resources[27]. These perceptions suggest two kinds of crisis in the American environment, with very different meanings. The first implied decline (of floral diversity), and the second mismanagement (of forest policy). Imperial agents were unwilling to see the difference. They needed timber for ships and decreed protectionist measures and administrative regulations. When Ordinances for the protection of the Guayaquil forests were approved, local officials complained that the measures implemented were out of proportion to the deforestation experienced and that the damage done by protectionism would wipe out any expected benefits. The first thing, local councilors suggested, was to get in touch with the implicit local knowledge

of the natives, since " ...as long as the laws of Nature do not fail, there will be more than enough forests in Guayaquil, without the help of decrees to provide for their conservation". Moreover, the decrees reveal the ". . . lack of knowledge of these lands and their climate"; such an attitude is so ignorant that it is comparable to those who would ". . . keep mosquito eggs for fear of losing the breed"[28] .

There were those who went further, declaring that "…it is morally impossible [that depletion] should happen within the natural order of things"[29]. The Creoles confidently argued that imperial policy was scientific but not at all natural. Savants and policy makers in the metropolis were not sensitive to this imperceptible shift between the languages of science and natural theology. What was at stake here was the very idea of Nature, and consequently the values underlying different political schemes.

Creoles used the same arguments when discussing the specialization of land use and the monopolization on the part of the Crown of some monocultures. The Gazette de Guatemala declared that this policy would lead to poverty and would destroy diversity: "What wretched value is set on our produce", these patriots wrote on 16th October 1797, "for hardly has it come onto the market than it disappears like lightning . . . I hear many people singing the praises of the riches contained in the natural products of this Kingdom; yet little or nothing is said about the conservation of those which, once a real inexhaustible treasure, now exist only as a pitiful memory" [30]. The protection of certain native species considered to be greatly important and/or profitable (as was proposed for certain varieties of cinchona or rubber) were an alternative which was of the greatest interest for the metropolis, but debatable in the colonies. Such a policy was highly protective of forestry business and less so of botanical diversity. And those who lived there protested: they were the only ones who would regret this impoverishment of their land. Such extreme statements did not square with imperial logic, for if the territory was

no more than a floral *continuum*, and species could be transplanted, acclimatized, and restocked, places were interchangeable. This imperial view directly opposed that of the Creoles, for whom everything was an argument for a change of scale. For them the goal was to abolish global viewpoints and recognize local perspectives.

If imperial agents had their strategies in managing floral diversity, the Creoles also found a way to demonstrate the link between their history and their knowledge. It was a *topos* to which the Enlightenment gave the highest symbolic value. Mountains and forests were virgin territory and very soon became considered as the center of fertility. When, from New Granada, Francisco José de Caldas (1771-1816), a Colombian naturalist[31], discovered what we call biogeography, when he realized that each level of a mountain had its own different type of vegetation, he gave scientific form to something which had always been familiar to peasants but which was still unknown to botanists. "Andes" was a Spanish word derived from *andenes*, a term used by the colonists to denote terraced and irrigated mountain country. But he also seemed to be hinting at the recent theory that the Incas used land vertically, so that the administrative units of their empire unfolded in a V-shape from the sea to the peaks of the Andean range, and downwards to the depths of the tropical forest. To the Incas the mountains were a temple and also a living museum guarding all the diversity of flora. Moreover, the mountains were the greatest laboratory on the planet, for it was there that Nature had experimented with all forms of hybridization and acclimatization. The mountains contained all types of land, and all types of climate[32]. They also contained diverse cultures: each place had its population, adapted to its local environment. The mountains also represented the link between heaven (the climate) and soil (that is, the land with its nutrients and its peoples); and the substitution of a two-dimensional view of the territory (flat and zenithal) by a three-dimensional and stratified topography. This

latter reconceptualization traces the shift from the imperial and botanical to the Creole and biogeographical viewpoint.

Caldas recognized that, faced with the immensity of the Andes, it looked as if "plants have been sprinkled at random all over the surface of the Andes, and that confusion and disorder reign everywhere"[33]. Appearances. The mountains only need to be deciphered, and the key was in the climate. Without understanding climatic fluctuations, one could not understand flora. In order to appreciate the vicissitudes of climate, it was first necessary to change the scale of thinking. No-one explained this more clearly than Caldas himself when he addressed his compatriots: "It is no longer about an ordinary map: reduced scales and all that has the appearance of smallness and economy should disappear . . . Two square inches have to represent at least a league on the ground. Here are to be seen the hills, mountains, pastures, forests, fields, lakes, swamps, valleys, rivers, their twists and torrents, straits, waterfalls, fishing, all the settlements, agricultural concerns, minerals, quarries, in short every feature on the face of our land".[34] After all " . . . it is an error of judgment and reason", Unanue wrote, "to try to characterize a vast country by what is observed in one of its parts"[35]. This sort of reasoning was unstoppable. Within this language any attempt to generalize was taken as an abuse, a display of ignorance, which took no heed of the Creoles' wish for singularity, that is to say their fight against interchangeability.

This fight makes sense of Unanue's statement that "plants are more sensitive in the tropics than outside them" [36]. If plants are sensitive, then their positions are not interchangeable. Everything has its place and each country its own national forest. The same is true of all living beings, including people, for " . . . although all humans on earth are descended from the same Father, the difference in climates, customs and diet to which the first Diaspora reduced them has introduced such diversity into their

features and attributes that, comparing several nations at the same time, they all appear to have sprung from different origins"[37]. It was a commonplace in the eighteenth century that bodily differences arose from the climate. But our illustrious man from Lima was not concerned with race alone. Like many of the enlightened, what interested him were nations, and what was most unusual in this case was the inclusion of the diversity of vegetation among the fundamental distinguishing features of nations. It is not that he was particularly keen on the scent of flowers or the taste of spices, but he was imagining human beings as vegetable creations. He only had to look out of the window to see that those who chew coca adapted better to the land and were twice as resistant to hardship. To deny this relationship was to be ignorant of the world of the Andes, to turn one's back on the evidence[38].

And what was true of coca, the "tonic of tonics", may have been true of many other plants: perhaps of cocoa, tobacco, cinchona bark, pineapple, and coffee. These were all remarkable products, and their most tangible effects were immediately obvious. It was also reasonable for Unanue to suppose that all plants had a beneficial, or beneficent, function: for God had to fit into the explanatory machinery somewhere. But when the effect of any plant is not so evident, Unanue, who knew nothing of biochemistry, turns to physical reaction. He agreed with the *foodist* claim that *we are what we eat!*, but also uses physical reaction (taste, touch, smell, and common sense) as reliable sources of botanical knowledge. Local flora can tell us as much about bodies as bodies can tell us about the flora. What is more, regulating the use of plants could help to correct and direct human behavior. The explanation is simple: digestion is a process of annexation of the attributes of plants and, as a result, the character of a people may be influenced by what it eats. Managing a country is nothing more than selecting the plants to be produced and controlling the circulation of those that are consumed.

The patchwork of climate

The Creoles had discovered sociobotany: collective conduct is predetermined by the virtues of the plants we consume. They therefore felt no qualms in accepting the notion that a large part of what we are derives from what we eat. The Creoles knew nothing about evolution, but they had a mechanism that explained that the behavior of humans was closely linked to the characteristics of the plant life with which they lived.

We began by discussing the consequences of the ordered concept of Nature. Now we are talking about collective behavior. We have seen how Creole criticisms of the applications of a particular type of botany (Linnaean) imply a change in scale of political consequences. A closer look at the classification of vegetation and the social function of flora led not only to the destabilization of Botany, but also to a deconstruction of Nature as an easily handled notion, since it makes no mention of the behavior of the native communities. The final step in this path traced by Creole considerations of Botany, whose main aim was to define the physical and moral identity of all the inhabitants (animate or otherwise) of the different American territories, was climate: a hybrid like a patchwork, resulting from the stitching together of many different pieces. Most notable among these are traditional farming and pharmaceutical practices, new techniques of classification and nomenclature, or the general belief in the links between temperament, temperature and nurture. Caldas once again comes to our rescue, for his definition of climate is thoroughly pertinent: “By climate, I understand not only the degree of heat or cold in each region, but also the electrical charge, the quantity of oxygen, the atmospheric pressure, the profusion of lakes and rivers, the distribution of the mountains, forests and pastures, the level of population, or the

deserts, winds, rains, thunder, clouds, humidity, etcetera" [39] How can we conceptualize this new category, proposed by this Creole from New Granada?

Like any other hybrid, it expands its domain, becoming not just ambiguous but diffuse. It had the outward appearance of a scientific object, but there was no laboratory that could contain it: an object can only fit between walls when it is constructed following a finite and quantifiable set of values. And that was exactly contrary to the concept of climate at that time. In other words, it broke the rules of containment and became an object as much of politics as of science: an object to be smuggled over the border between nature and culture. It took in every possible factor that could make up a current picture of the nation as a natural construction. From now on, its members were to be defined by their changing physical reaction to food, flora and atmospheric phenomena. Government, of course, could only be seen as the shepherd of all living beings.

[1] John Law, "On the Methods of Long-distance Control: Vessels, Navigation, and the Portuguese Route to India", John Law (ed.) Power, Action and Belief: A new Sociology of Knowledge (London [etc.]: Routledge and Kegan Paul, 1986), 234-262

[2] Paul Carter, The Road to Botany Bay: An Essay in Spatial History (London: Faber, 1987).

[3] In the reign of Carlos III (1760-1788) 33 expeditions to the colonies were organized and 24 more in the time of Carlos IV (1789-1808). Most of them would contribute to a better knowledge of American flora. See Javier Puerto Sarmiento, La ilusión quebrada. Botánica, sanidad y política científica en la España ilustrada (Barcelona: El Serbal, 1988). .

[4] Antonio Lafuente, "Institucionalización metropolitana de la ciencia española en el siglo XVIII", Ciencia colonial en América, Antonio Lafuente y José Sala Catalá (eds.) (Madrid: Alianza, 1992), 91-118.

[5] Miguel A. Puig-Samper, "Difusión e institucionalización del sistema linneano en España y América" in Antonio Lafuente, Alberto Elena & María Luisa Ortega, eds. , Mundialización de la ciencia y cultura nacional (Aranjuez: Doce Calles, 1993), 349-359.

[6] Casimiro Gómez Ortega, "Curso Elemental de Botánica" (1785) quoted in Javier Puerto. Ciencia de Cámara (Madrid: CSIC, 1992), 262

[7] Francisco Bruno Fernández, Instrucciones para el Bien Público y Común de la Conservación, y Aumento de las Poblaciones (Madrid, 1769), 3

[8] Bruno Latour, L'espoir de Pandore. Pour une version réaliste de l'activité scientifique (Paris: La Découverte, 2001)

[9] Johannes Fabian, Time and the Other. How Anthropology makes its Object (New York: Colombia University Press, 1983)

[10] Nowadays Mexico, Central America, the Caribbean islands, and the states of California, Nevada, Arizona, New Mexico and Utah.

[11] José Antonio Alzate, "Carta satisfactoria dirigida a un literato por [...] sobre lo contenido en la Gaceta de México de 16 de Mayo de 1788", in Roberto Moreno, Linneo en México. Las controversias sobre el sistema binario sexual (1788-1798) (México: UNAM, 1989), 23

[12] The accusation of obscenity against the Linnaean system was fairly common at the time, but by no means general. Londa Schiebinger, "Gender and Natural History", N. Jardine, J. A. Secord & E. Spary, Cultures of Natural History (Cambridge: Cambridge University Press, 1996), 163-177.

[13] "[...] I propose, devoting myself to their most elegant language, to show that the [native] names infer the meaning of their use, in the same way as Greek. If, as I hope, I can master it [the Nahuatl language], for this advantage alone I shall be able to be a member of the proposed botanical expedition", (Letter from Sessé to Gómez Ortega, Mexico, 5-1-1786), Cited by Xavier Lozoya. Plantas y luces en México. La Real Expedición Científica a Nueva España (1787-1803) (Barcelona: El Serbal, 1984), 30.

[14] José Antonio Alzate, "Botánica" (1788), Moreno, Linneo en México, 4.

[15] Unanue, "Una idea general del Perú", Obras científicas y literarias. V. 2. (Lima: CEM, 1975), 296

[16] On this controversy, see Jorge Cañizares-Esguerra, How to Write the History of the New World. (Stanford: Stanford University Press, 2001).

[17] These theses were defended by Vicente Cervantes' students in Public Exercises. See, "Ejercicios públicos de Botánica que tendrán en esta Real y Pontificia Universidad el Bachiller don José Vicente de la Peña, Don Francisco Giles y Arellano y Don José Timoteo Arsinas, dirigiéndolos don Vicente Cervantes, [...]. El jueves 11 de Diciembre a las tres de la tarde", Moreno, 49-52

[18] Quoted in José L. Maldonado, Las huellas de la razón. La expedición científica de Centroamérica (1795-1803) (Madrid: CSIC, 2001), 289

[19] See, Robert J. Shafer, The Economic Societies in the Spanish World: (1763-1821), (Syracuse: University Press, 1958).

[20] José Antonio Goycoechea, "Introduction to the notes", José Mariano Mociño, Tratado del Xiquilite y Añil de Guatemala. Annotated by J. A. Goycoechea (s.l. [Nueva Guatemala]: 1799), 36. His complete reply implied that even though there was agreement on the means- the practices and the methods- only those characteristics specified could guarantee the maintenance of the

uniqueness.
[21] José Mociño. Flora de Guatemala de José Mociño. Introductory essay and edition by José L. Maldonado (Madrid: CSIC-Doce Calles, 1996), 141.
[22] Hipólito Ruiz. Relación histórica del Viaje que hizo a los Reynos del Peru y Chile... . vol. 1 (Madrid: RACEFN, 1952) 349.
[23] Ruiz, Relación histórica, vol. 1, 113.
[24] Cfr. Juan J. Izquierdo, Montaña y los orígenes del movimiento social y científico de México (México: 1955)
[25] Gonzalo Hernández de Alba, Quinas amargas: el sabio Mutis y la discusión naturalista del siglo XVIII (Bogotá: Presidencia de la República, 1996), and also Cañizares' chapter in this volume.
[26] Antonio Lafuente, "Enlightenment in an Imperial Context: Local Science in the Late-Eighteenth-Century Hispanic World", Roy MacLeod (ed.), Nature and Empire: Science and the Colonial Enterprise, (Osiris, 15**:** 155-173, 2000)
[27] Luis Urteaga, La tierra esquilmada. Las ideas sobre la conservación de la naturaleza en la cultura española del siglo XVIII. (Madrid: Serbal-CSIC, 1987).
[28] Mª Luisa Laviana, "Los intentos de controlar la explotación forestal en Guayaquil: pugna entre el cabildo y el gobierno colonial", José L. Peset (ed.) Ciencia, vida y espacio en Iberoamérica. Vol. 2. (Madrid: CSIC, 1989), 406-407
[29] Consuelo Naranjo, "Los reconocimientos madereros en Cuba (1780-1810)", El bosque ilustrado. Estudios sobre la política forestal española en América (Madrid: ICONA, 1991) 110.
[30] Reproduced in Manuel Rubio Sánchez, Historia del añil o xiquilite en Centro América, vol. 1 (San Salvador: Ministerio de Educación, 1976),127
[31] On the work of Caldas and his relation with Humboldt, see Cañizares' paper in this volume.
[32] Unanue was emphatic on this point: "In this part of the torrid zone which runs along the coast of Peru from the Equator to the Tropic of Capricorn, we see rising to the east the enormous hills of the Andes range, from whose foothills rise in ranks, one after the other, all the climates of the Universe." Cf.: H. Unanue, "Observaciones sobre el clima de Lima", Obras científicas, V. 1, 12. Also Caldas: "It is enough to descend 5000 *varas* [14000 feet] to go from the moss of the pole to equatorial jungle. Two inches more on the barometer change the face of the empire of flora". Francisco José de Caldas, "Del influjo del clima sobre los seres organizados", Jeanne Chenu, Francisco José de Caldas. Un peregrino de las ciencias (Madrid : Historia 16, 1992), 311
[33] Caldas, "Del influjo del clima", 311
[34] Caldas, "Estado de la geografía del Virreinato de Santa Fé", in Chenu, Francisco José de Caldas, 295
[35] Unanue, "Observaciones...", Obras científicas, vol. 1, 12
[36] Unanue, "Observaciones...", Obras científicas, vol. 1, 54
[37] Unanue, "Observaciones sobre el clima", Obras científicas, vol. 1, 66
[38] Unanue, "Disertación sobre la Coca" (1794), Obras científicas, vol. 2.
[39] Caldas, "Del influjo del clima", Chenu, 301