

ALEXANDER VON HUMBOLDT'S VISUAL SCIENCE

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Alexander von Humboldt (1769-1859) displayed the greatest interest in the visualization, in many different ways, of the aspects of nature². He moreover spent a considerable amount of his outstanding worth in order to provide his printed works with iconographic supplies of the highest quality, taking advantage of the best artists and engravers of his time. He practiced drawing too, and in his books many illustrations are based upon the sketches he drew during his amazing voyage to America in the years 1799-1804.

In 1789 Humboldt became acquainted with Georg Forster (1754–1794), the naturalist who had taken part, together with his father Johann Reinhold Forster, in captain James Cook's great second journey in the Southern Seas in the years 1772–1775. During the journey he made various illustrations of the animals observed during the expedition, and wrote a noteworthy *Voyage round the World*³, an account of that extraordinary experience. No doubt that this acquaintance fueled Humboldt's interest in journeys and scientific illustration. Source of inspiration, in his own admission, were also the paintings of exotic sceneries by William Hodges (1744–1797), the artist that took part together with the Forsters in Cook's voyage.

In his journeys Humboldt practiced his skill in careful observing and interpreting nature in the field of geography, in the widest meaning of the term, as a complete “description of the Earth”, in every respect. It is worth observing that in the etymology of “geography” there is a reference to writing, since the Greek γραφία (grafia) means “writing”, but also “sign” and “drawing”, that is visible description. Geography, anyway, at the service of *geognosie*⁴, the knowledge of the Earth, a term often used by Humboldt. Likewise, in zoological studies drawing had in his works the role of showing the appearance of the animals, but there are also illustrations showing internal anatomical structures, useful to clarify some physiological aspects; for instance the description of South American howler monkeys (*Alouatta* sp.) is accompanied by excellent illustrations of the animal (Figure 1), but also by a careful drawing of the anatomy of the larynx

¹ Naturalist, author of *Viaggi e scienza: esploratori della Terra e della biodiversità*, WBA Project, Verona, 2019.

² See CANADELLI Elena 2018, *Illustrare i Quadri della natura. La scienza visuale di Alexander von Humboldt*, in FARINELLI Franco (a cura di) 2018, *Alexander von Humboldt Quadri della natura*, Codice edizioni, Turin. The title of the present article is traced over that proposed by Dr Canadelli, whose participation was programmed in von Humboldt Day Forum of October 1st 2019. Elena Canadelli teaches History of science and scientific museology in Padua University; due to institutional appointments that showed up, she proposed as a substitute teacher in the Forum the author of the present article.

³ *A Voyage round the World*, London 1777, followed by a German, widened, edition, *Reise um die Welt*, Berlin, 1778-80; II ed. in 1784. An Italian version of this last edition is MERKER Nicolao (ed.) 1991, *Georg Forster, Viaggio intorno al Mondo*, Laterza, Roma-Bari.

⁴ See. FOCHER Federico, *Alexander von Humboldt. Schizzo biografico “dal vivo”*, Il Prato, Saonara (PD), p.13. In addition to the excellent book by Federico Focher I point out, about Humboldt, WULF Andrea 2015, *L'invenzione della natura*, Luiss University Press, Roma.

and hyoid bone⁵, that enable the impressive vocalizations of these primates (Figure 2). The drawing of the dissection of an electric eel (“*Gymnotus electricus*”, today *Electrophorus electricus*)⁶ is linked to Humboldt’s great interest – fashionable at the time, after Luigi Galvani’s experiments about “animal electricity” – in the phenomena of electricity related to living beings (Figure 3).



Figure 1. “*Simia ursina*” now *Alouatta sp.* probably *A. seniculus*, Venezuelan red howler, in HUMBOLDT Alexander von BONPLAND Aimée 1811, *Recueil d’observations de zoologie et d’anatomie comparée faites dans l’océan Atlantique, dans l’intérieur du Nouveau Continent et dans la mer du Sud*, in HUMBOLDT Alexander von BONPLAND Aimée 1816-1823, *Voyage aux régions équinoxiales du Nouveau Continent* (Paris, 1811), vol. 1, plate 30, drawing by Huet jr., probably Nicolas Huet le Jeune (1770–1830).

⁵ “*Simia seniculus*” today *Alouatta seniculus*, the Venezuelan red howler: larynx and hyoid bone, in HUMBOLDT Alexander von BONPLAND Aimée 1811, *Recueil d’observations de zoologie et d’anatomie comparée faites dans l’océan Atlantique, dans l’intérieur du Nouveau Continent et dans la mer du Sud*, in HUMBOLDT Alexander von BONPLAND Aimée 1816-1823, *Voyage aux régions équinoxiales du Nouveau Continent* (Paris, 1811), vol. 1, plate 4, from a drawing by Humboldt. An Italian edition of the *Voyage* is VALLINO Fabienne O. (a cura di) 1989, *Alexander von Humboldt, Viaggio alle regioni equinoziali del nuovo continente*, Fratelli Palombi Editori, Roma.

⁶ *Gymnotus*, illustration in HUMBOLDT A. von BONPLAND A. 1811, *Op. cit.*, Vol. 1, Plate 10, drawing by Humboldt, engraving by Bouquet.

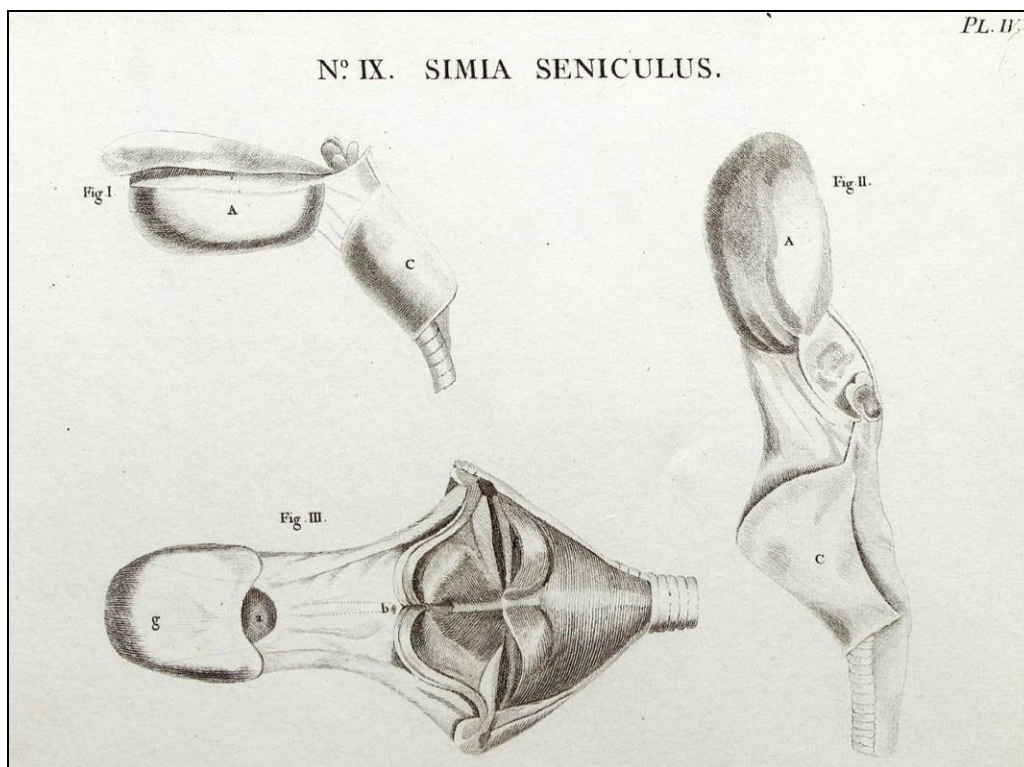


Figure 2. “Simia seniculus” now *Alouatta seniculus*: Larynx and hyoid bone, in HUMBOLDT A.von BONPLAND A. 1811, *Op. cit.* vol. 1, plate 4, from a drawing by Humboldt.

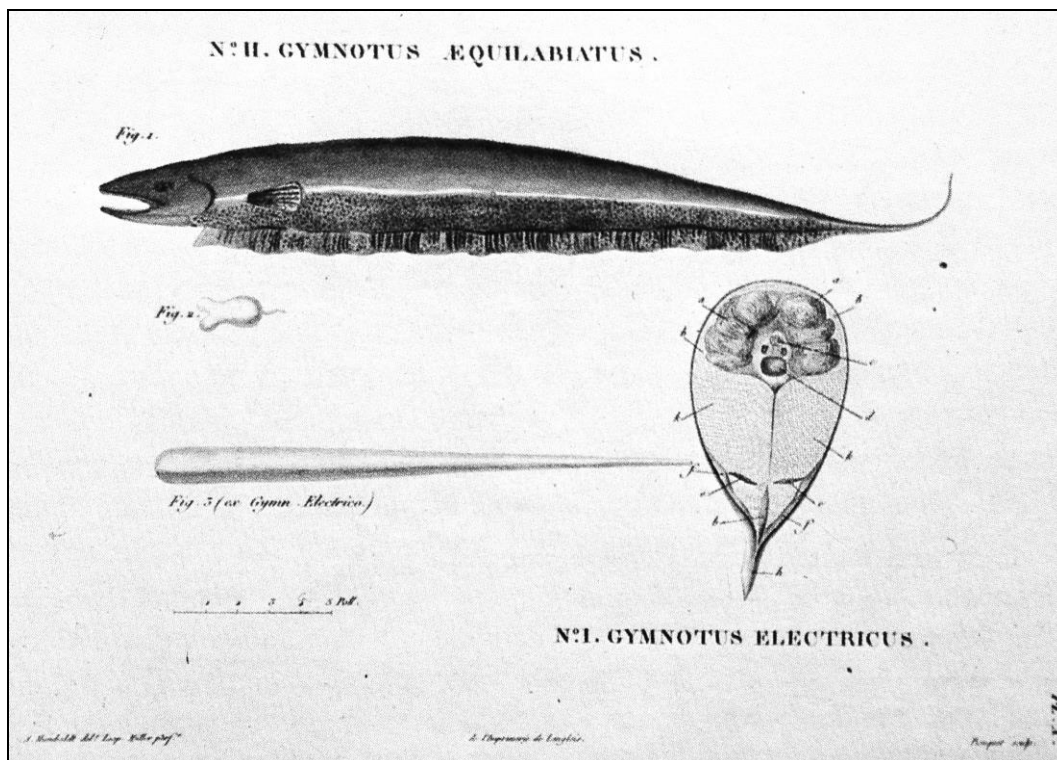


Figure 3. Electric eels. Plate by Bouquet from drawings by Alexander von Humboldt, published in *Recueil d'observations (...)*, 1811.

Humboldt employed some original and effective graphic expedients in order to visualize the spatial distribution of particular phenomena: for instance in cartographic representations he used isotherms, lines that connect points with the same temperature, in analogy with the invention by Edmond Halley (1656–1741), who, a century earlier, used isogones to show the values of the magnetic declination, the angular difference between magnetic North and geographic North. Today the use of isolines (isogons and isotherms, but also isohyets, level lines, isobars) is common in cartography.

Humboldt's interests had no boundaries. In the sole scope of natural sciences he was deeply involved in botany, zoology, geology, physics, chemistry, meteorology, oceanography and astronomy and in these fields he produced illustrations that often give the connection between different aspects of the World, in an effort to find unity behind the variety of phenomena, the complex relationship of causes and effects underlying plant distribution, rock laying (Figure 4) and meteorological phenomena. Especially meaningful from this point of view is the wide table with the "Representation of the nature of the Andes"⁷ which illustrates his volume about the Geography of plants in tropical regions (Figure 5), written with the cooperation of his friend the botanist Aimé Bonpland, Humboldt's partner in the voyage to America. Humboldt takes advantage of the original graphic device of representing in a schematic way the elevation of the Andean Cordillera specifying, for the different altitudes, the names of the typical species of plants, and gives at the sides of the chart ample information about geology, climate and zoology.



Figure 4. Detail of "Rocher basaltiques et Cascade de Regla", engraving from a drawing by Wilhelm Friedrich Gmelin from a sketch by Alexander von Humboldt, in *Vues des Cordillères, et Monumens des peuples indigènes de l'Amérique* (Paris, 1810).

⁷ *Naturgemälde der Anden, in Ideen zu einer Geographie der Pflanzen nebst einem Naturgemälde der Tropenländer*, Tübingen- Paris, 1807.

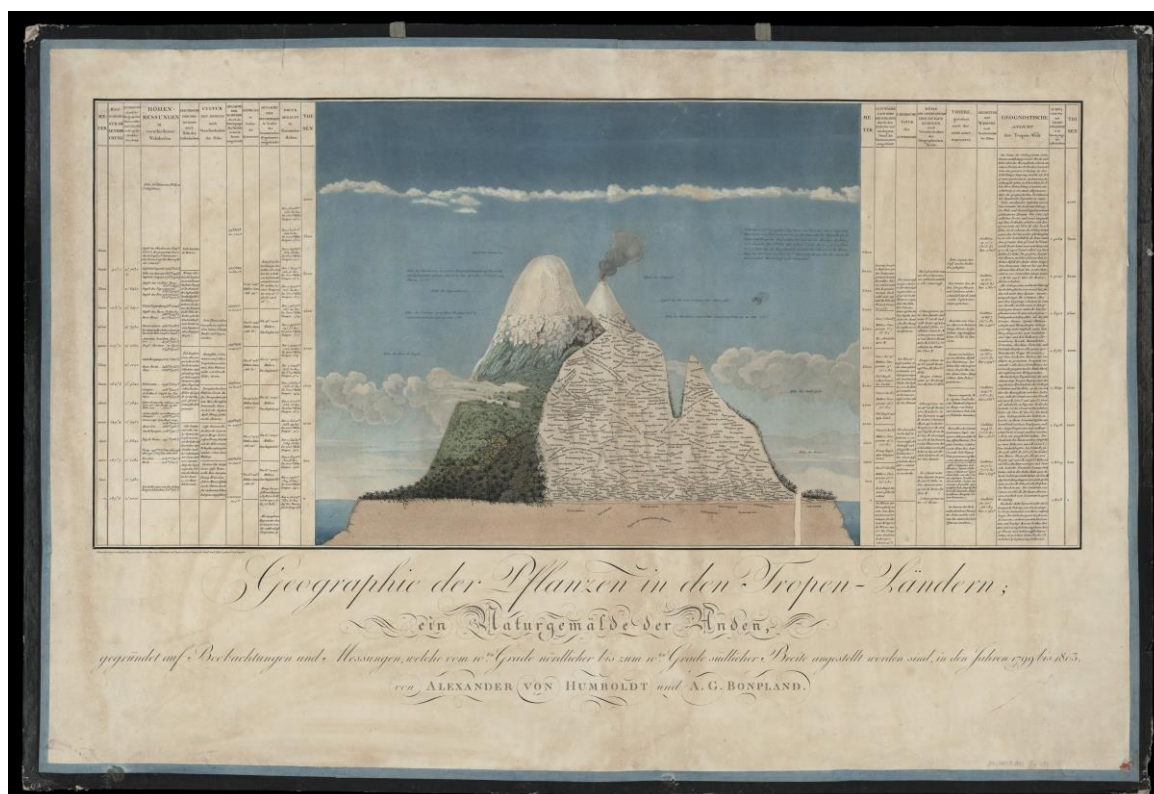


Figure 5. *Ideen zu einer Geographie der Pflanzen nebst einem Naturgemälde der Tropenländer*, Paris 1805, Chart about the Geography of plants in tropical regions: engraving by Bouquet from a drawing by Alexander von Humboldt.

This quest for connections, for unity in nature, is characteristic of *Naturphilosophie*, the cultural movement in which an eminent promoter was Johann Wolfgang von Goethe (1749–1832), Humboldt’s close acquaintance and friend. Goethe too, like Humboldt later, practiced drawing as instrument for getting knowledge of the natural world, for instance in the study of rock formations, one of the fields of common interest for both the German scholars, this an approach masterfully cultivated by Leonardo da Vinci three centuries earlier. Morphology, the study of form, either applied to rocks or to animals and plants, was a special feature of *Naturphilosophie*, and remained a field of excellence in the German culture of XIX century, expressed in wonderful scientific illustrations, like those, at the end of that epoch, of *Kunstformen der Natur*, “artistic forms of nature”, by Ernst Haeckel (1834–1919), a title in which the aesthetic value of the pictures that show the form of microorganisms, plants and animals is evident.

Alexander von Humboldt’s fascination for the visual aspect of science no doubt had an aesthetic basis too, and today his work’s illustrations (geological landscapes, botanical plates, zoological portraits) convey a visual pleasure and emotions typical of “fine arts”. Art and science have in those pictures a perfect confluence and integration. After all the title of the huge work *Kosmos*⁸, in which Humboldt summarizes the vast body of his historical and geographical researches, underlines the aesthetic side of the natural world, since the Greek term κόσμος refers to order, that is harmony, beauty (the term cosmetics has the same origin).

⁸ *Kosmos. Entwurf einer physischen Weltbeschreibung*, Stuttgart-Tübingen, 1845-1850.

Even Humboldt's fascinating writing presents in a very efficient way the visual aspect of natural landscapes; no wonder one of his important works is entitled *Ansichten der Natur*⁹, "visions of nature". The legendary ability of evoking exotic sceneries' awesomeness expressed in this and the other works by Humboldt was a source of inspiration for many other traveller scientists, such as Charles Darwin and Alfred Russel Wallace.

Likewise, in fine arts Humboldt's interest for drawing and painting as tools for investigating and providing documentary evidence in science found passionate enthusiasts. One of the more gifted landscape painters of his epoch, Joseph Anton Koch (1768-1839), was recruited by Humboldt to contribute in the illustrations of his *Views of the Cordilleras*¹⁰. Carl Gustav Carus (1789-1869), scientist and even painter of extraordinary ability, a friend of Goethe, who thought highly of him, produced noteworthy "geognostic landscapes" that provide great aesthetic effect as well as precise reproduction of rock forms of erosion and shapes. Frederic Edwin Church (1826-1900), inspired by the reading Humboldt's narrative in his *Voyage aux régions équinoxiales du Nouveau Continent*, travelled to the regions explored by the German scholar in order to paint those landscapes, producing a huge and very detailed picture (Figure 6), *The heart of the Andes*, which was exposed to the public in New York in 1859, the year Humboldt died.



Figure 6. *The Heart of the Andes* (1859), painting by Frederic Edwin Church, today in New York, Metropolitan Museum of Art.

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⁹ *Ansichten der Natur mit wissenschaftlichen Erläuterungen*, Tübingen, 1808. The third and last edition was published in 1849. An Italian recent edition is in FARINELLI F. (ed.) 2018, *Op. cit.*

¹⁰ *Vues des Cordillères et monumens des peuples indigènes de l'Amérique*, Paris, 1810-1813.