

[Georges Cuvier \(1769-1832\)](#) ^[1]

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[Georges Cuvier](#) ^[4], baptized Georges Jean-Léopold Nicolas-Frédéric Cuvier, was a professor of anatomy at the National Museum of Natural History in Paris, France, through the late eighteenth and early nineteenth centuries. Scholars recognize Cuvier as a founder of modern comparative anatomy, and as an important contributor to vertebrate paleontology and geology. Cuvier studied the form and function of animal anatomy, writing four volumes on quadruped fossils and co-writing eleven volumes on the [natural history](#) ^[5] of [fish](#) ^[6] with Achille Valenciennes. Moreover, Cuvier constructed a system of classification based on specific and well-articulated principles to help anatomists classify animal taxa. Cuvier had public debate in 1830 with Étienne Geoffroy Saint-Hilaire, a dispute centered on whether form or function matters most for the study of anatomy and whether the transmutation of organic forms can occur over time. Cuvier's opinions influenced the development of biology in France, and his arguments against transmutation of types influenced the reception of [Charles Darwin](#) ^[7]'s theory of [evolution](#) ^[8] by [natural selection](#) ^[9] among many French naturalists.

Cuvier was born 23 August 1769 into a middle class family in the French-speaking community of Montébeliard, located in the Jura Mountains. At the time, Montébeliard was not yet under French jurisdiction, but it was part of the Duchy of Württemberg. Cuvier's mother, Anne Clémence Chatel, and father, Jean [Georges Cuvier](#) ^[4], a lieutenant in the Swiss Guards, were devout Lutherans. Cuvier attended the Karlsschule academy in Stuttgart, Germany, from 1784 to 1788. While at the academy Cuvier learned how to dissect animals from Carl Friedrich Kielmeyer, a founder of the German school of [Naturphilosophie](#) ^[10] who promoted an early version of the theory of recapitulation. The academy, founded by the Duke of Württemberg, aimed to educate future civil servants. However, after learning German, Cuvier decided to study economics, administration, law, chemistry, mineralogy, botany, and zoology, and he followed an academic path. After graduation from the Academy in 1788, Cuvier became a tutor to the noble family of the Comte d'Héricy in Normandy, France.

Cuvier took shelter in Normandy during the most violent periods of the French Revolution and developed his interests in [natural history](#) ^[5]. In 1795, Cuvier took a position at the National Museum of Natural History in Paris, working as an assistant to the ailing Jean-Claude Mertrud, a professor of anatomy. Geoffroy Saint-Hilaire extended the invitation to Cuvier after hearing of Cuvier's skill in dissecting animals. Cuvier later engaged in a public dispute with Geoffroy Saint-Hilaire in 1830. Cuvier succeeded Louis-Jean-Marie Daubenton in 1799 as professor in the Collège de France. In 1802, Cuvier replaced Mertrud as chair of animal anatomy at the Paris Museum.

Cuvier spent much of his scientific career at the Paris Museum, where he produced a book on the classification of animal anatomy, *Le Règne animal distribué d'après son organisation, pour servir de base à l'histoire naturelle des animaux et d'introduction à l'anatomie comparée* (The Animal Kingdom Arranged after its Organization; Forming a Natural History of Animals, and an Introduction to Comparative Anatomy), published in 1817. Cuvier insisted that the functional parts of animals ought to guide their classification, because animal anatomy displays functional integration—organs work together to function. To classify animals, Cuvier emphasized the principle of the subordination of characters/parts, a principle already used by botanists to classify plants. The principle prioritized those parts of an organism that researchers thought were essential for its mode of life, such as the nervous system, the circulatory system, and the respiratory system; over those parts that researchers considered subordinate, or secondary, characteristics.

Cuvier prioritized function over form in taxonomy. He further advocated for his position with two principles for anatomical studies: the principle of the correlation of parts and the principle of the conditions of existence. The correlation of parts describes the functional relationships that must exist between organs to produce a [viable](#) ^[11] organism. For example, historian Peter Bowler explains that using this principle, if one were to discover the fossil remains of sharp claws, one could infer that they belonged to a carnivore, and further infer that it would have teeth with the structure necessary to seize and tear up prey. The principle of the conditions of existence reinforces functional integration between parts of animals by further requiring that these parts be in harmony with the animals' environments and their modes of life. In other words, there must be an accord between the organism, its environment and its mode of life. Cuvier described those principles in several of his works, including *Leçons d'anatomie comparée* (Lessons on Comparative Anatomy) published between 1800 and 1805, and *Le Règne Animal* (The Animal Kingdom) published in 1817. Cuvier's scientific principles reflect a teleological approach to the life sciences and [natural history](#) ^[5], influenced by [Aristotle](#) ^[12] and by Immanuel Kant, an eighteenth century philosopher in Prussia.

Cuvier's principles led him to classify the animal kingdom into four main classes, or *embranchements*^[13] (branches), and also to deny the possibility of transmutation, what was later called *evolution*^[8], between species. Before Cuvier, many naturalists and anatomists divided the animal kingdom into two main groups: the vertebrates and invertebrates. Cuvier's research and theories—especially his scientific work on molluscs, *Mémoires pour servir à l'histoire et à l'anatomie des mollusques* (Memoires to Serve as the History and Anatomy of Molluscs) published in 1817—led him to divide the invertebrates into three additional branches: Articulata (arthropods and segmented *worms*^[14]), Mollusca (which included all the bilaterally symmetrical invertebrates), and Radiata (cnidarians and echinoderms). Cuvier insisted that the four categories represented natural groups in the animal kingdom, and that individuals in one category could never transform into another category over time. As a result, Cuvier criticized the contemporary transmutationist theories defended by Jean-Baptiste Lamarck and Geoffroy Saint-Hilaire, who were both contemporaries of Cuvier at the Paris Museum. Cuvier believed it was contrary to all of his principles to think that an organism could change one part of its structure over time, without any repercussions to its functionally integrated whole. Based on his principles, if an organism's structure could evolve piecemeal and slowly transform into new forms, as Lamarck and Geoffroy Saint-Hilaire suggested, it wouldn't survive in its environment.

Cuvier also studied fossils. Near the end of the eighteenth century, scholars disputed whether fossils represented life forms that no longer existed, or whether—as the Comte de Buffon, at the Jardin des Plantes in Paris, believed—the fossils found in Europe and America represented animals that had migrated to the tropics. Buffon argued that God would not have let his creations go extinct. In 1796, Cuvier presented a paper to the National Institute of Sciences and Arts in Paris, in which he compared the anatomy of living and fossil elephants, thus proving extinction to be a fact, as the fossil elephants had not been seen by recent *humans*^[15]. In the following years, Cuvier continued to document the extinction of animals such as the giant ground sloth, the Irish elk, and the American mastodon.

Cuvier's research on extinct forms led him to investigate the causes of extinction. He proposed a catastrophist geological history of the earth. In 1825 Cuvier published his *Discours sur les révolutions de la surface du globe* (A Discourse on the Revolutions of the Surface of the Globe), in which he proposed that a series of catastrophic events could explain the changes in the surface of the earth and the succession of the different fauna found in the fossil record. After his death, Cuvier's theory was challenged by Charles Lyell's uniformitarian theory of earth's history. Lyell, a geologist from Scotland who studied with Cuvier in Paris in 1823, believed, in opposition to the catastrophist theory, that gradual, uniform processes altered the surface of the earth. Lyell's theory helped persuade *Charles Darwin*^[7] that minute differences between organisms could suffice to produce drastic changes in form, so long as enough time had passed.

In addition to his scientific work, Cuvier occupied several administrative positions in Paris, serving as the Inspector-General of the Imperial University, Vice Rector of the Faculty of Sciences, and the State Councillor. Several historians highlight Cuvier's ability to keep these influential administrative positions under the radically different French regimes of the late eighteenth and early nineteenth centuries. In 1806, Cuvier was appointed to the Royal Society of London as a foreign member. And, in 1812, he became a foreign member of the Royal Swedish Academy of Sciences. Cuvier was later knighted and became a Baron of France. He died on 13 May 1832.

Sources

1. Appel, Toby A. *The Cuvier-Geoffroy Debate: French Biology in the Decades before Darwin*. New York/Oxford: Oxford University Press, 1987.
2. Bourdier, Franck. "Cuvier, Georges." *Complete Dictionary of Scientific Biography* 3: 521–8.
3. Bowler, Peter J. *Evolution: The History of an Idea* (revised edition). Berkeley: University of California Press, 1989.
4. Burkhardt, Richard W., Jr. "Cuvier, Georges." *Europe 1789–1914: Encyclopedia of the Age of Industry and Empire*. Eds. John Merriman and Jay Winter. Vol. 2. Detroit: Charles Scribner's Sons, 2006: 598–9.
5. Coleman, William. *Georges Cuvier*^[4], *Zoologist: A Study in the History of Evolution Theory*. Cambridge: [Harvard University Press](#)^[16], 1962.
6. Cuvier, Georges. *Leçons d'anatomie comparée* [Lessons on Comparative Anatomy]. 5 Vols. Paris: Baudouin, 1800–1805. <http://www.biodiversitylibrary.org/item/104564#page/12/mode/2up>^[17] (Accessed January 2, 2013).
7. Cuvier, Georges. *Recherches sur les ossemens fossiles de quadrupeds* [Researches on Quadruped Fossil Bones]. 4 Vols. Paris: Deterville, 1812. <http://www.biodiversitylibrary.org/item/123713#page/10/mode/1up>^[18] (Accessed January 2, 2013).
8. Cuvier, Georges. *Mémoires pour servir à l'histoire et à l'anatomie des mollusques* [Memoires to Serve the History and Anatomy of Molluscs]. Paris: Chez Deterville, 1817. <http://www.biodiversitylibrary.org/ia/mmoirespourser00cuvie#page/9/mode/1up>^[19] (Accessed July 10, 2013).
9. Cuvier, Georges. *Le Règne Animal Distribué d'après son Organisation, pour Servir de Base à l'Histoire Naturelle des Animaux et d'Introduction à l'Anatomie Comparée* [The Animal Kingdom Arranged after its Organization; Forming a Natural

- History of Animals, and an Introduction to Comparative Anatomy]. Tome I. L'Introduction, Les Mammifères et Les Oiseaux. Paris: Deterville, 1817. <http://www.biodiversitylibrary.org/item/117542#page/12/mode/2up> ^[20] (Accessed January 2, 2013).
10. Cuvier, Georges. *Discours sur les révolutions de la surface du globe et sur les changements qu'elles ont produits dans le règne animal* (1822). [A Discourse on the Revolutions of the Surface of the Globe, and the Changes thereby Produced in the Animal Kingdom]. Paris: Christian Bourgeois, 1985. <http://archive.org/stream/adiscourseonrev00cuvigoog#page/n4/mode/2up> ^[21] (Accessed January 2, 2013).
 11. Grene, Marjorie. "Darwin, Cuvier and Geoffroy: Comments and Questions." *History and Philosophy of the Life Sciences* 23 (2001): 187–211.
 12. McClellan, Chris. "The Legacy of [Georges Cuvier](#) ^[4] in Auguste Comte's Natural Philosophy." *Studies in the History and Philosophy of Science, Part A* 32 (2001): 1–29.
 13. Outram, Dorinda. [Georges Cuvier](#) ^[4]: *Vocation, Science and Authority in Post-Revolutionary France*. Manchester: [Manchester University](#) ^[22] Press, 1985.
 14. Rudwick, Martin J. S. [Georges Cuvier](#) ^[4], *Fossil Bones, and Geographical Catastrophes: New Translations & Interpretations of the Primary Texts*. Chicago: [University of Chicago Press](#) ^[23], 1997.
 15. Rudwick, Martin J. S. "Cuvier, Georges." *New Dictionary of Scientific Biography* 2: 221–7.
 16. Russell, Edward Stuart. [Form and Function](#) ^[24]: *A Contribution to the History of Animal Morphology*. New York: E.P. Dutton, 1917. <http://www.biodiversitylibrary.org/item/15993#page/7/mode/1up> ^[25] (Accessed July 10, 2013).
 17. Taquet, Philippe. "Establishing the paradigmatic museum: [Georges Cuvier](#) ^[4]'s Cabinet d'anatomie comparée in Paris." In *Museum Revolutions: How Museums Change and Are Changed*, eds. Simon J. Knell, Suzanne MacLeod, and Sheila Watson, 3–14. New York: Routledge, 2007.

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[Cuvier, Georges, baron, 1769-1832](#) ^[26] [Anatomy](#) ^[27] [Muséum national d'histoire naturelle \(France\)](#) ^[28] [Anatomy, Comparative](#) ^[29] [Natural history](#) ^[30] [Extinction \(Biology\)](#) ^[31] [Lyell, Charles, Sir, 1797-1875](#) ^[32] [Geoffroy Saint-Hilaire, Etienne, 1772-1844](#) ^[33] [Zoology](#) ^[34] [Morphology \(Animals\)](#) ^[35] [Evolution](#) ^[36] [Paleontology](#) ^[37] [Zoology](#) ^[34] [classification](#) ^[38] [Extinction, Biological](#) ^[39]

Topic

[People](#) ^[40]

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- [2] <https://embryo.asu.edu/keywords/teleology>
- [3] <https://embryo.asu.edu/keywords/classification>
- [4] <https://embryo.asu.edu/search?text=Georges%20Cuvier>
- [5] <https://embryo.asu.edu/search?text=natural%20history>
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- [11] <https://embryo.asu.edu/search?text=viable>
- [12] <https://embryo.asu.edu/search?text=Aristotle>
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