

Georges Cuvier and the Power of Rhetoric

Rosemary Lloyd

The year 1830 brought France not only a change of political regime but also a highly public debate between two scientific colleagues, Georges Cuvier and Étienne Geoffroy Saint-Hilaire. It was an argument fueled by hostility between, on the one hand, supporters of what later became known as *fixisme* (the conviction that species were created and unchanging, and that the earth had been transformed by a series of catastrophes which had wiped out all species, forcing life on earth to be created afresh) and, on the other, proponents of *transformisme* (the theory that species develop over time, evolving away from the models left by the fossil record).¹ The following year French novelist Honoré de Balzac offered a remarkable salute to the power of such scientific rhetoric as that exemplified in the debate. In *La Peau de chagrin* he devotes a magnificent passage to Cuvier's writings, in which he pays tribute to the scientist's rhetorical skills by transforming him, through a curious but characteristic act of legerdemain, into a great poet:

Vous êtes-vous jamais lancé dans l'immensité de l'espace et du temps, en lisant les oeuvres géologiques de Cuvier? Emporté par son génie, avez-vous plané sur l'abîme sans bornes du passé, comme soutenu par la main d'un enchanteur? En découvrant de tranche en tranche, de couche en couche, sous les carrières de Montmartre ou dans les schistes de l'Oural, ces animaux dont les dépouilles fossilisées appartiennent à des civilisations antédiluviennes, l'âme est effrayée d'entrevoir

des milliards d'années, des millions de peuples que la faible mémoire humaine, que l'indestructible tradition divine, ont oubliés et dont la cendre, entassée à la surface de notre globe, y forme les deux pieds de terre qui nous donnent du pain et des fleurs. Cuvier n'est-il pas le plus grand poète de notre siècle?²

[Have you ever thrown yourself into the immensity of space and time while reading Cuvier's geological studies? Carried away by his genius, have you floated over the boundless abyss of the past, as if held aloft by a magician's hand? In discovering from slice to slice, layer to layer, under the quarries of Montmartre or in the schist of the Ural mountains, those animals whose fossil remains belong to civilizations that flourished before the Flood, the soul glimpses with terror billions of years, millions of tribes that the fragile memory of humans and the indestructible tradition of God have forgotten and whose ashes, piled up on the surface of our globe, forms those two feet of soil that gives us our bread and our flowers.

Cuvier must surely be the greatest poet of our age.]

Balzac, the reader of societies, clearly wants to draw on Cuvier, the reader of fossils, to evoke the vast sweep of time encapsulated within the different objects and layers of the second-hand store visited by his protagonist, Raphael. Moreover, in doing so he pays Cuvier the enormous compliment of assuming that readers of fiction will also be familiar with his scientific tracts and will have been carried away by his genius, his inspired ability to evoke the passage of enormous periods of time. In comparison with this, Balzac goes on:

Lord Byron a bien reproduit par des mots quelques agitations morales; mais notre immortel naturaliste a reconstruit des mondes avec des os blanchis, a rebâti, comme Cadmus, des cités avec des dents, a repeuplé mille forêts de tous les mystères de la zoologie avec quelques frag-

ments de houille, a retrouvé des populations de géants dans le pied d'un mammouth. Ces figures se dressent, grandissent et meublent des régions en harmonie avec leurs statures colossales. Il est poète avec des chiffres, il est sublime en posant un zéro près d'un sept. Il réveille le néant sans prononcer des paroles artificiellement magiques; il fouille une parcelle de gypse, y aperçoit une empreinte, et vous crie: « voyez! » Soudain les marbres s'animalisent, la mort se vivifie, le monde se déroule!³

[Lord Byron has certainly reproduced in language perturbations of a moral nature, but our immortal naturalist has reconstructed worlds out of bleached bone, has like Cadmus rebuilt cities from teeth, has restored to a thousand forests all the mysteries of zoology with a few fragments of coal, has rediscovered populations of giants in a mammoth's foot. These shapes arise, grow and populate regions in harmony with their colossal stature. He is a poet working in numbers. He is sublime in setting a zero next to a seven. He reveals the void without pronouncing words, whose magic is artificial. He digs into a parcel of gypsum, detects an outline in it, and cries out to you: "Look!" Suddenly marble becomes animal, death returns to life, the world unfolds!]

Bringing life to stones and reading the traces of the past, Cuvier becomes, in Balzac's eyes, another kind of novelist, and one whose skill and success legitimize the thirty-two-year-old Balzac's own ambitious and sweeping endeavor to read and record the present in all its complexity. And yet, in terms of his sociological arguments, there is little doubt that Balzac's thinking was closer to that of Cuvier's archenemy and main opponent in the 1830 debate, Geoffroy Sainte-Hilaire.⁴ What Balzac admires is less the scientific theory that Cuvier was straining all his oratorical skills to convey, than those oratorical skills themselves.

In this essay, I want to explore some of the aspects of Cuvier's writerly craft that so inspired that master manipulator of prose. My focus will be on two works. In *Discours sur les révolutions du globe*, a lengthy treatise first published in 1825, Cuvier amply defends and illustrates his thesis that the multiple disasters that have struck the earth in the course of its long history have forced multiple gradual acts of creation,⁵ and that the fossils, rather than suggesting anything like the evolution that Lamarck had adumbrated, reflect species that no longer exist, grim testimony to those past catastrophes. As he argues elsewhere: "Les animaux de l'ancien monde différaient tous de ceux que nous voyons aujourd'hui sur terre"⁶ [all the animals of the ancient world were different from those we see on earth today]. The second work under scrutiny will be the study for which Cuvier is perhaps best known among scientists and historians of science: *Le Règne animal distribué d'après son organisation*, first published in 1817. This is the treatise in which he divides the animal world into four categories: Vertebrata, Articulata, Radiata, and Mollusca. Of these works, *Le Règne* is more scholarly, setting out to convince other scientists, while *Le Discours* aims to attract a wider, less erudite audience. As a result, the rhetoric of the first is dryer and more scholarly while the second is far more creative and closer to that of fiction.

A virtuoso of rhetoric as well as a popular lecturer, Cuvier was used to directing his arguments not merely to students of paleontology but also to the general public, who flocked to hear his lectures. Unlike his great rival Geoffroy Saint-Hilaire, Cuvier knew how to draw his audience in from the start, how to hold their attention, and above all how to convince them that he, and he alone, was right. While in the famous 1830 debate with Geoffroy Saint-Hilaire he ferociously accused his rival of resorting to rhetoric, the way in which he expresses the rebuke itself reveals the great orator's control of the very devices he professes to despise:

Si [...] au lieu du langage simple des mots propres, rigoureusement exigés dans les sciences, on emploie des métaphores et des figures de rhétorique, le danger est bi-

en grand. On croit se tirer d'embarras par un trope, répondre à une objection par une paronomase, et en se détournant ainsi de sa route directe, on s'enfonce promptement dans un labyrinthe sans issue.

[If, instead of the simple language of correct words, rigorously demanded in the sciences, you use metaphors and rhetorical figures, the risks are considerable. You think you can extricate yourself from a difficulty by using a trope, or reply to an objection with paronomasias, and in so turning away from the straight road, you promptly flounder in an endless labyrinth].⁷

Although it could be argued that he does flounder in an enclosed labyrinth of sources when he tries to establish the antiquity of the earth in the second part of the *Discours sur les révolutions du globe*,⁸ it remains true that in general Cuvier rarely moves away from the direct line he has set himself. Nevertheless, in traveling along that line he carries with him a significant baggage of rhetorical resources. Indeed, it was largely due to Cuvier's powerful rhetorical skills that Charles Darwin's theory of evolution was so slow to take hold in France, for it was widely held in France that the celebrated 1830 debate between Cuvier and Geoffroy Saint-Hilaire had resolved the matter once and for all in favor of *fixisme*.⁹

Central to Cuvier's purpose, and a vital component in his rhetorical weaponry, is his verbal precision. At the beginning of *Le Règne animal*, for example, he offers a series of linguistic definitions that, while ostensibly facilitating the reader's task, also, and in at least one case more importantly, direct that reader's gaze away from possibilities Cuvier himself has rejected. Thus, in defining the word *Nature* Cuvier specifies that, in addition to its other nuances – characteristics present from birth as opposed to those acquired later, the group of beings constituting the universe – the word also signifies the group of laws that control those beings, adding significantly: "C'est surtout dans ce dernier sens que l'on a coutume de personnifier la nature et d'employer par respect son nom pour celui de son auteur." [It is above all in this last sense that we habi-

tually personify nature and, as a mark of respect, use its name for that of its creator] (*Règne*, 1).

Part of Cuvier's skill lies in his unquestionable ability to give his readers the impression that they are immediately brought into the thinking process. For example, by deploying the universal "on" he is not merely suggesting the customary impersonality of the scientist, but much more insidiously and therefore powerfully, he implies that we all see what he sees, and even more importantly still, that we cannot see it otherwise. "On comprend" he asserts, in a manner both magisterial and genial that is characteristic of his oratory, we understand that when the nature of the water changes, primarily according to the particles dissolved in it, the animals nourished by those liquids cannot remain the same. While to modern ears, this sounds like a preparation for an argument predicated on evolution, Cuvier moves quickly to occupy an entirely different theoretical position, one based on partial catastrophes leaving a greatly impoverished fauna behind them:

Leurs espèces, leurs genres même, changeaient avec les couches; et quoiqu'il y ait quelques retours d'espèces à de petites distances, il est vrai de dire, en général, que les coquilles des couches anciennes ont des formes qui leur sont propres; qu'elles disparaissent graduellement pour ne plus se montrer dans les couches récentes, encore moins dans les mers actuelles où l'on ne découvre jamais leurs analogues d'espèces.¹⁰

[Their species, even their genera, would change with each stratum, and although there might be the odd return of a species across short distances, in general it is true to say that the shells of the ancient strata have shapes that are unique to them, and that they gradually fade away without reappearing in the recent strata, far less in today's seas, where we never discover species analogous to them.]

We should note in passing that the word *analogues* is far from neutral here: it functions as a specific rejection of Geoffroy Saint-Hilaire's ar-

guments in which *analogues* is a vital, if somewhat overloaded, term, central to his depiction of the workings of *transformisme*, the theory that species develop over time, evolving away from the models left by the fossil record, and that they do so through a series of forms that are similar but not completely identical. But we should also note that while Cuvier appears to be guiding us through the process, he is keeping a very tight rein on our access to that process and ensuring, through the way in which he uses such terms as *analogues*, that we accept his conclusions as truth rather than mere theory.

While Cuvier frequently uses the more scientific "on" as a term embracing both himself and his reader, whom he is quite willing to flatter by references to "un lecteur intelligent" [an intelligent reader] (*Discours*, 70), he is also prepared both to indicate moments when something can be detected only by the trained naturalist, and to intensify the reader's sense of seeing things through Cuvier's eyes by deploying the more familiar "nous":

Élevons-nous encore; avançons vers les grandes crêtes, vers les sommets escarpés des grandes chaînes: bientôt ces débris d'animaux marins, ces innombrables coquilles deviendront plus rares, et disparaîtront tout à fait; nous arrivons à des couches d'une autre nature, qui ne contiendront point de vestiges d'êtres vivants. Cependant elles montreront par leur cristallisation, et par leur stratification même, qu'elles étaient aussi dans un état liquide quand elles se sont formées; par leur situation oblique, par leurs escarpements, qu'elles ont aussi été bouleversées; par la manière dont elles s'enfoncent obliquement sous les couches coquillières, qu'elles ont été formées avant elles; enfin, par la hauteur dont leurs pics hérissés et nus s'élèvent au-dessus de toutes ces couches coquillières, que ces sommets étaient déjà sortis des eaux quand les couches coquillières se sont formées. (*Discours*, 12)

[Let's go yet higher, moving up to the great crests, toward the craggy summits of the great mountain chains.

Soon this rubble of marine creatures, these countless shells, will become less common and disappear altogether. We reach strata of another type, containing no vestige of living creatures. Nevertheless they will reveal through their crystallization and their very stratification that they too were in a liquid state when they were formed; through their oblique situation and their escarpments, that they too have been turned topsy-turvy; from the way in which they sink at an angle under the shell-bearing strata that they were formed before those strata; and finally through the height of their bare, weathered peaks standing above all these shell-bearing strata that these summits had already risen from the waters when the shell-bearing strata were formed.]

In the masterful unfolding of this extraordinary final sentence, with its multiple clauses rolling out inexorably from the repeated “par” [through], the reader is pulled along not only by the exuberance of the writing and its inexorable logical progression, but also by its strikingly visual quality. It is not just that it is hard not to be convinced by such verbal skill but also that it is almost impossible for any kind of critique to gain a purchase on such a polished and fast-moving surface.

Cuvier is also willing, when he judges the time is right and especially in prefaces, to speak in the first person, bringing the reader more specifically into the scholar’s study and revealing what decisions he as an individual rather than paleontologists in general had to make, and suggesting some of the problems encountered. This, indeed, is how he opens both the *Règne animal* and his *Discours*, in powerful introductory paragraphs that Balzac would have particularly admired for their direct address to the reader, their skillful evocation of the paleontologist’s task, and their accelerating avalanche of accumulated clauses. In *Discours*, he begins with a disarmingly simple and admirably clear summation of his earlier work: “Dans mon ouvrage sur les *ossements fossiles* je me suis proposé de reconnaître à quels animaux appartiennent les débris osseux

dont les couches superficielles du globe sont remplies" [in my work on the *fossil bones* I set myself the task of determining to which animals the bony debris that fills the upper strata of our world belonged] (*Discours*, 1). He then introduces one of the major tropes he will deploy in *Discours*, that of the scientist as explorer walking through new territory (or indeed seeing familiar territory with fresh eyes): "C'était chercher à parcourir une route où l'on n'avait hasardé que quelques pas" [it was as if you were to walk the full length of a track before you had risked only a few steps] (*Discours*, 1). This allows him to launch himself into a far more complex sentence, pulling his reader along in the excitement of discovery:

Antiquaire d'une espèce nouvelle, il me fallut apprendre à la fois à restaurer ces monuments des révolutions passées et à en déchiffrer le sens; j'eus à recueillir et à rapprocher dans leur ordre primitif les fragments dont ils se composent, à reconstruire les êtres antiques auxquels ces fragments appartenaient, à les reproduire avec leurs proportions et leurs caractères; à les comparer enfin à ceux qui vivent aujourd'hui à la surface du globe: art presque inconnu, et qui supposait une science à peine effleurée auparavant, celle des lois qui président aux co-existences des formes des diverses parties dans les êtres organisés. (*Discours*, 1)

[Like a new kind of antiquarian, I was obliged to learn both how to restore those monuments of past revolutions and to decipher their meaning. I had to gather up the remaining fragments and recreate their initial order. I had to reconstruct the ancient creatures to which those fragments belonged and to reproduce them with their correct proportions and their characteristics. And finally I had to compare them to those that live today on the earth's surface. This was an almost unknown art, one that demanded knowledge that had scarcely been touched on

beforehand, the knowledge of the laws that preside over the coexistence of the shapes of the various parts to be found in organized creatures.]

Similarly, *Le Règne animal* opens with a powerful first-person explanation, remarkable for its limpid clarity and forthright in its assertion of both the absolute novelty and the incontrovertible necessity of the intellectual direction the author will take:

M'étant voué par goût, dès ma première jeunesse, à l'étude de l'anatomie comparée, c'est-à-dire des lois de l'organisation des animaux et des modifications que cette organisation éprouve dans les diverses espèces, et ayant depuis près de trente ans consacré à cette science tous les moments dont mes devoirs m'ont permis de disposer, j'ai eu pour but constant de mes travaux, de la ramener à des règles générales, et à des propositions qui en contiennent l'expression la plus simple. Mes premiers essais me firent bientôt apercevoir que je n'y parviendrais qu'autant que les animaux dont j'aurais à faire connaître la structure seraient distribués conformément à cette structure même, en sort que l'on pût embrasser sous un seul nom, de classe, d'ordre, de genre, etc., toutes les espèces qui auraient entre elles, dans leur conformation tant intérieurs qu'extérieure, des rapports plus généraux ou plus particuliers. Or c'est ce que la plupart des naturalistes de cette époque n'avaient point cherché à faire et ce que bien peu d'entre eux auraient pu faire quand ils l'eussent voulu, puisqu'une distribution pareille supposait déjà une connaissance assez étendue des structures dont elle devait être en quelque sorte la représentation.¹¹

[From my early youth, personal taste led me to devote myself to the study of comparative anatomy, that is to say the laws governing the organization of animals and the modifications that organization undergoes in the different

species. Moreover, for nearly thirty years I had consecrated to that science every moment that my duties allowed me. As a result, my constant aim in my work was to reduce that science to general rules and to propositions that expressed them in the simplest way. My first attempts soon made me realize that I would only achieve my goal in the measure to which the animals whose structure I had to make known were distributed in conformity to that very structure, such that one could gather together under a single name, of class, order, type and so forth all the species that revealed connections in their inner and outer conformation, whether those connections were more general or more specific. Well, this is something that the majority of naturalists of that time had not attempted to do and something that very few of them could have done had they wanted to, because such a distribution presupposed a fairly extensive knowledge of the structures that distribution was meant to represent.]

The clarity in which Cuvier expresses his aims here is heightened and enhanced by the autobiographical elements that underpin his claim to knowledge in this area, and by the apparently unquestioned assumption that the complexity of the animal world can be reduced to rules. This rhetorical call on the reader's attention is further strengthened by the revelation of what demands such a task places on the scientist. Such an aim, he announces in the opening pages of his preface, demanded that he harness to the task both anatomy and zoology, dissections and classifications, that he seek out better distributions of animals than those he had previously offered, use these to reach new judgments and improve the classifications, and finally exploit what he terms this fertilization of one science by another to give birth to a zoological system capable of providing guidance in the field of anatomy and an anatomical doctrine capable of developing and explaining a zoological system (*Règne*, vi-vii). Although he insists that this work is to be studied rather than read, he is, as

these passages suggest, constantly eager to convince his readers, to guide them through his own thought processes, and determined to reject through the force of his unrelenting control of language any arguments that do not tally with his own. Requesting his reader to study may be an essential step in his program, but facilitating and enhancing that study through the power of rhetoric remains a skill as essential to him as those of the anatomist and zoologist.

As we have seen, speaking directly to the reader through the use of the first person is a central feature of that rhetoric. A further example of the power of the first person is provided by the way in which, in *Discours*, he explains his classification system:

Il ne faut pas croire cependant que cette classification des divers gisements soit aussi nette que celle des espèces, ni qu'elle porte un caractère de démonstration comparable: il y a des raisons nombreuses pour qu'il n'en soit pas ainsi. D'abord toutes mes déterminations d'espèces ont été faites sur les os eux-mêmes, ou sur de bonnes figures; il s'en faut, au contraire, beaucoup que j'aie observé par *moi-même* tous les lieux où ces os ont été découverts. Très souvent j'ai été obligé de m'en rapporter à des relations vagues, ambiguës, faites par des personnes qui ne savaient pas bien elles-mêmes ce qu'il fallait observer; plus souvent encore je n'ai point trouvé de renseignements du tout. (*Discours*, 76)

[Nevertheless, you mustn't think that this classification of the various strata is as clear cut as that of the species or that it can be demonstrated with comparable conviction. There are numerous reasons why this should be so. First, all my judgments about species were made as a result of observing the bones themselves, or good drawings, whereas it is far from being the case that I *myself* have observed all the sites where these bones were discovered. Very often I was obliged to rely on vague and

ambiguous accounts made by people who themselves had no clear idea of what they needed to observe. More often still I found no information whatsoever.]

The style here is so radically different from some of the more overtly rhetorical passages of the *Discours* that it is, on first blush, difficult to realize that the wily master of the trope is here making use of the device known as *captatio benevolentiae*, the call on the reader's goodwill that is all the more persuasive for being so apparently simple in its expression. Bringing the reader on board by these devices is a relatively easy trick, but it is one that Cuvier clearly does not disdain to use.

As Balzac suggests, Cuvier's ability to play on his reader's imagination has much of the novelistic about it, however much the great paleontologist himself might dismiss such a claim as unscientific. Take for instance one of the opening paragraphs of his argument in *Discours*, headed, blandly enough, "Première apparence de la terre":

Lorsque le voyageur parcourt ces plaines fécondes où des eaux tranquilles entretiennent par leur cours régulier une végétation abondante, et dont le sol, foulé par un peuple nombreux, orné de villages florissants, de riches cités, de monuments superbes, n'est jamais troublé que par les ravages de la guerre ou par l'oppression des hommes en pouvoir, il n'est pas tenté de croire que la nature ait eu aussi ses guerres intestines, et que la surface du globe ait été bouleversée par des révolutions et des catastrophes; mais ses idées changent dès qu'il cherche à creuser ce sol aujourd'hui si paisible, ou qu'il s'élève aux collines qui bordent la plaine; elles se développent pour ainsi dire avec sa vue, elles commencent à embrasser l'étendue et la grandeur de ces événements antiques dès qu'il gravit les chaînes plus élevées dont ces collines couvrent le pied, ou qu'en suivant les lits des torrents qui descendent de ces chaînes il pénètre dans leur intérieur. (*Discours*, 4-5)

[When the traveler wanders through these fertile plains

where tranquil waters sustain through their regular flow an abundant vegetation and whose soil, trodden by numerous feet, embellished by flourishing villages, rich cities and superb monuments, is never disturbed by the ravages of war or by the oppression of those in power, he finds it hard to believe that nature too has had its intestinal wars, and that the surface of the globe has been turned topsy-turvy by revolutions and catastrophes. But those ideas change as soon as he sets about digging into that soil which today is so peaceful, or when he climbs up to the hills that border the plain. These hills grow as it were with the view of the plain, they begin to embrace the whole extent of it and reveal the grandeur of those ancient events as soon as he clambers up to the highest chains whose hills cover its feet. Or else he sees it when he follows the beds of those streams that come down from the hills and thus penetrates into the interior of the mountain chains.]

Popularly known for his extraordinary ability to identify and describe entire animals and their lifestyles from a single bone,¹² Cuvier here extends that ability and invites his readers to adopt his own vision of the world in which they live, a vision which constantly seeks to extrapolate from the visible and the concrete in order to find the underlying causes. Moreover, he draws on experiences with which his first readers would be perfectly familiar, here specifically that of the French Revolution and the Napoleonic wars. He could have chosen another word for violent change here: convulsion, catastrophe or disaster, for instance, but *révolution*, especially combined with *guerres intestines*, comes with a charge both of familiarity and of unquestionable power to which none of his contemporary readers could have been insensitive. While some might not have experienced the 1789 Revolution at first hand, all would have had family members who had been touched by it, and their own lives had been immeasurably altered by it. In addition, this powerful opening draws on a

familiar trope of eighteenth century novels, that of the voyager bringing fresh eyes to bear on what has grown so familiar as no longer to stimulate the questioning that leads to a deeper understanding.

An equally complex mingling of evocative description and terms freighted with contemporary convictions and prejudices occurs in his descriptions of human beings in *Le Règne animal*, where he attempts to account for disparities in industrial progress in geographically different regions of the world. Combining novelistic oratory and scientific pithiness he wraps up vast reaches of the globe in a single powerfully constructed sentence that builds up inexorably to its ineluctable and damning final clause:

Les immenses plaines sablonneuses ou salées du centre de l'Asie et de l'Afrique sont couvertes de peuples pasteurs et de troupeaux innombrables; ces hordes, à demi-civilisées, se rassemblent chaque fois qu'un chef enthousiaste les appelle, et fondent sur les pays cultivés qui les entourent, pour s'y établir et s'y amollir, jusqu'à ce que d'autres pasteurs viennent les y subjuguier: c'est la véritable cause du despotisme qui a écrasé dans tous les temps l'industrie née dans les beaux climats de la Perse, de l'Inde et de la Chine. (*Le Règne*, 79)

[The immense sandy or salty plains of central Asia and Africa are covered with herdsmen and countless flocks; these half-civilized hordes gather together whenever an enthusiastic leader summons them and pour down on the cultivated lands that surround them, settling there and growing soft, until such time as other herdsmen come to subjugate them: this is the true cause of the despotism that has throughout the ages crushed any industry born in the pleasant climates of Persia, India or China.]

Above all, perhaps, Cuvier is able to bring together, like a tennis-player skillfully interchanging rapid-fire volleys and long base-line rallies, both an accelerating accretion of expressions such as *donc*, *on ne*

peut plus douter, cela est facile à prouver [thus, there can no longer be any doubt, that is easy to prove] and extended descriptions inspired by an exceptional ability to make these catastrophes come alive in the reader's imagination. Take for instance the following extract in which emotive terms such as *victimes*, the sharp contrast between aquatic creatures and those of the dry land, and the disparity between the image-rich language of the first part of the sentence and the stark simplicity of its close all enhance the underlying argument:

Des êtres vivants sans nombre ont été victimes de ces catastrophes: les uns, habitants de la terre sèche, se sont vus englouties par des déluges ; les autres, qui peuplaient le sein des eaux, ont été mis à sec avec le fond des mers subitement relevé; leurs races mêmes ont fini pour jamais, et ne laissent dans le monde que quelques débris à peine reconnaissables pour le naturaliste. (*Discours*, 11-12)

[Countless living creatures have fallen victim to these catastrophes. Some, inhabiting the dry land, were washed away by the floods; others, who populated the waters, dried out when the bottom of the sea suddenly rose up. Their very races disappeared forever and left nothing behind on earth but a few remains that the naturalist can scarcely recognize.]

One can't help wondering whether Victor Hugo's cosmic poems found inspiration in Cuvier's more terrestrial evocations, with their ability to start with something very small and move rapidly and convincingly to focus on the immense. The opening passage to a section titled "Alluvions" provides a typical example in that it describes a mundane process in a manner that has nothing of the mundane about it:

Les eaux qui tombaient sur les crêtes et les sommets des montagnes, ou les vapeurs qui s'y condensent, ou les neiges qui s'y liquéfient, descendent par une infinité de filets le long de leurs pentes; elles en enlèvent quelques parcelles, et y tracent par leur passage des sillons légers.

Bientôt ces filets se réunissent dans les creux plus marqués dont la surfaces des montagnes est labourée; ils s'écoulent par les vallées profondes qui en entament le pied, et vont former ainsi les rivières et les fleuves, qui reportent à la mer les eaux que la mer avait donné à l'atmosphère. (*Discours*, 19)

[The water that fell on the crests and mountain peaks, or the mists that condensed there, or the snow that melted there, run down their slopes in an infinite number of trickles. In doing so they remove a certain amount of earth and trace their passage in light furrows. Soon the trickles gather together in the steeper hollows that have gouged the mountain's surfaces. They flow along the deep valleys that dig into the mountain's foot and thus form streams and rivers, carrying back to the sea the water that the sea had given to the atmosphere.]

Just as he brings his reader into the task of interpretation, so, like another great master of persuasion, Sigmund Freud, Cuvier is perfectly willing, when the weight of his arguments has gathered sufficient momentum, to address potential counter-arguments, and he typically does so by seeming to allow his antagonist a voice:

Pourquoi les races actuelles, me dira-t-on, ne seraient-elles pas des modifications de ces races anciennes que l'on trouve parmi les fossiles, modifications qui auraient été produites par les circonstances locales et le changement de climat, et portées à cette extrême différence par la longue succession des années? (*Discours*, 77)

[Why, you will ask me, can't today's races be modifications of those ancient races that are found among the fossils, modifications that could have resulted from local circumstances and climate change, and in which the great changes came about over the long succession of years?]

And here he has the confidence to bring in the transformists' arguments, but only to dismiss them abruptly by laying bare what he sees as an internal flaw in their own system: if the species have changed by degrees, he asserts, using an argument that has become only too familiar, you should be able to find traces of these gradual changes. Since none have been found, he insists, the theory is evidently false.

Underpinning that confidence are not merely Cuvier's anatomical knowledge but also his superb descriptive skills, which make even the long lists of mammals in *Le Règne animal* a pleasure to read.¹³ Cuvier's ability to suggest subtle nuances in color, the sharpness with which he differentiates the beaks of different birds, the clarity of his expositions on the links between an animal's feeding patterns and its dentition or bone structure all add to the considerable pleasure of reading him, and therefore to his ability to persuade. Take for instance his opening remarks on woodpeckers:

Sont des oiseaux bien caractérisés par leur bec long, droit, anguleux, comprimé en coin à son extrémité, et propre à fendre l'écorce des arbres; par leur langue grêle, armé vers le bout des épines recourbées en arrière, qui, poussée par les longues cornes élastiques de l'os hyoïde, peut sortir très avant hors du bec? (*Règne*, 448)

[Are birds clearly characterized by their long, straight, jagged bill, narrowing to a point at the end, and by their thin tongue, which is armed toward the tip with spines that curve backwards and, driven by the long elastic horns of the hyoid bone, can be thrust out far beyond the bill?]

The clarity of the description combines with the muscular concision of the sentences to create a language that is both compelling and convincing.

What is remarkable about Cuvier's writing is that what he was able to make so compelling and convincing was precisely and in the last analysis the excitement of scientific reasoning. Where Geoffroy's excitement is palpable in a prose that is nevertheless frequently opaque to the uninitiated and where other scientific writers, for all their clarity, fail to con-

vey and share that sense of challenge and adventure, Cuvier's writing consistently sparkles with the sense of discovery. Thus, in the opening pages of his *Discours*, he raises a series of questions that not only pull his reader swiftly into his argument but more importantly still convey to us the powerful attraction of the discoveries he is about to reveal to us. Noting rather wistfully that historians and astronomers have moved more swiftly than those in the natural sciences, he nevertheless surges optimistically forward, undaunted by the competition and unshakably convinced of what can yet be achieved:

Si l'on met de l'intérêt à suivre dans l'enfance de notre espèce les traces presque effacées de tant de nations éteintes, comment n'en mettrait-on pas aussi à rechercher dans les ténèbres de l'enfance de la terre les traces de révolutions antérieures à l'existence de toutes les nations? Nous admirons la force par laquelle l'esprit humain a mesuré les mouvements de globes que la nature semblait avoir soustraits pour jamais à notre vue; le génie et la science ont franchi les limites de l'espace; quelques observations développés par le raisonnement ont dévoilé le mécanisme du monde: n'y aurait-il pas aussi quelque gloire pour l'homme à savoir franchir les limites du temps, et à retrouver, au moyen de quelques observations, l'histoire de ce monde et une succession d'événements qui ont précédé la naissance du genre humain? (*Discours*, 2-3)

[If we find it interesting to follow in the childhood of our species the all but obliterated tracks of so many nations that no longer survive, how can we not find it equally interesting to seek in the shadowy childhood of the earth the traces of revolutions that took place before all those nations even existed? We admire the force with which the human spirit has measured the movements of spheres that nature seemed to have withdrawn once and for all from our sight; genius and knowledge have broken

through the limits of space; observations developed through the power of reason have unveiled the mechanism of the world: would there not also be some measure of glory for mankind to learn how to break through the limits of time and rediscover, through a handful of observations, the history of this world and a succession of events that preceded the birth of the human race?]

Why, he wonders, should natural history not have its own Newton? While he clearly sees that cap as fitting his own head, he is also able to stir in his reader if not the desire to emulate him at least the conviction that the answers to such questions are of vital importance.

Small wonder, given the high rhetorical standards set by Cuvier, that Balzac acknowledged his influence, or that, much later, Walter Benjamin, whose *Arcades* project frequently refers to Balzac and notes the importance both Cuvier and Geoffroy Saint-Hilaire had for him, should draw his own links not just between contemporary Paris and the far past, but also, implicitly, between literature and scientific discourse:

As rocks of the Miocene or Eocene in places bear the imprint of monstrous creatures from those ages, so today arcades dot the metropolitan landscape like caves containing the fossil remains of a vanished monster: the consumer of the pre-imperial era of capitalism, the last dinosaur of Europe. On the walls of these caverns their immemorial flora, the commodity, luxuriates and enters, like cancerous tissue, into the most irregular combinations. A world of secret affinities opens up within: palm tree and feather duster, hair-dryer and Venus de Milo, prostheses and letter-writing manuals. [...] These items on display are a rebus: how one ought to read here the birdseed in the fixative-pan, the flower seeds beside the binoculars, the broken screw atop the musical score, and the revolver above the goldfish bowl – is right on the tip of one's tongue.¹⁴

Benjamin's hesitations, which fed so prolifically into postmodern thinking, would however have been completely alien to Cuvier, whose tongue was always ready to tell how the riddles set by ancient remains should be read.

University of Adelaide

Notes

¹ For studies of the debate between Cuvier and Geoffroy Sainte-Hilaire, see in particular Toby Appel, *The Cuvier-Geoffroy Debate: French Biology in the Decades before Darwin* (Oxford: Oxford University Press, 1987), Goulven Laurent, *Paléontologie et évolution en France de 1800 à 1860: Une Histoire des idées de Cuvier et Lamarck à Darwin* (Paris: Editions du C.T.H.S., 1987), Patrick Tort, *La Querelle des analogues* (Paris: Editions d'aujourd'hui, 1983), and my "The Crocodiles of Caen and the Molluscs of the Museum" forthcoming in proceedings of the 2007 *Société Dix-Neuf* conference.

² Balzac, *La Comédie humaine*, X, ed. Pierre-Georges Castex (Paris: Gallimard, Pléiade, 1979), 74-75.

³ Balzac, *La Comédie humaine*, X, 75.

⁴ On this, see for instance Richard Somerset, "The Naturalist in Balzac," *French Forum*, vol. 27, No. 1 (Winter 2002), 81-111.

⁵ According to Cédric Grimoult (*Evolutionnisme et Fixisme en France: Histoire d'un combat 1800-1880* (Paris: CNRS Editions, 1998), 89: "Pour Cuvier, le Créateur a changé par étapes la forme des êtres vivants, en fonction des différents environnements dans lesquels ils étaient placés" [Cuvier believed that the Creator gradually changed the form of living creatures according to the different environments in which they lived]. Grimoult clarifies this by asserting that Cuvier proposed a hypothesis of partial catastrophes, leaving behind an impoverished fauna after each revolution, while after Cuvier's death Alcide d'Orbigny put forward the idea of repeated creations (43).

⁶ "Notice sur le squelette d'une très grande espèce de quadrupède inconnu..." *Magasin encyclopédique*, 2 année 1796, t. 1. 310.

⁷ Tort, *Querelle*, 128.

⁸ Charles Lyell's influential *Principles of Geology*, which showed that the earth was far older than previously believed, did not appear until 1830, the year of the debate.

⁹ On this see Yvette Conry, *L'Introduction du Darwinisme en France au XIXe siècle* (Paris: Vrin, 1974) and Patrick Tort, *La Querelle des analogues*.

¹⁰ Georges Cuvier, *Discours sur les révolutions du globe* (Paris: Firmin Didot frères, 1861), 9. Henceforth *Discours* in the text. I have modernized the spelling. This work has been made available on line at the following URL: http://home.datacomm.ch/biografien/sources/cuvier_revo.htm.

¹¹ Cuvier, *Le Règne animal distribué d'après son organisation* (Paris: Dèterville, 1829), v. This is the second edition, the first being published in 1817, and is available on line through Google books. Henceforth *Règne* in the text.

¹² Dorinda Outram, *Georges Cuvier: Vocation, Science and Authority in Post-Revolutionary France* (Manchester UP, 1984).

¹³ Of course lists do have their own intrinsic fascination, quite apart from subject matter. On this see Robert Bellknap's captivating article, "The Literary List: A Survey of its Uses and Deployments," *Literary Imagination* 2.1 (2000): 35-54 and his book *The List: The Uses and Pleasures of Cataloguing* (Yale UP, 2004).

¹⁴ Walter Benjamin, *The Arcades Project*, tr. Howard Eiland and Kevin McLaughlin (Cambridge, MA: Belknap Press, 1999), 540. On collections see also the remarkable work by Maurice Rheims, *La Vie étrange des objets: Histoire de la curiosité* (Paris: Plon, 1959).

