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Naming and framing 'Nature' in *Photographie Zoologique*

JEFF ROSEN

'For natural history to appear,' wrote Michel Foucault in *The Order of Things*, our collective understanding of nature did not have to grow progressively more dense and obscure, amassing authority under an 'opaque weight' of unexplainable facts and scientific calculations. Instead, Foucault believed the opposite had to occur: 'it was necessary,' he wrote, 'for History to become Natural.'¹ Foucault distinguished between the archaic tasks of the seventeenth-century collector of curiosities, who amassed specimens because they were interesting or rare, and the nineteenth-century natural historian, who collected specimens in order to discover deep structures that linked together diverse species, ultimately forging conceptual links between those specimens and the origins of mankind.² While the former examined, named and classified phenomena using both a terminology he considered neutral and an approach he believed unmediated, the nineteenth-century natural historian had no illusions that his task was anything but historical and contextual: his primary activities involved incorporating the texts of his predecessors and making historical commentaries about natural phenomena while constructing the new lexis of the scientific catalogue.

Conceived as a process of naming and framing, photography has many affinities with the actual activities of the natural historian. Both photography and the natural historian's scientific catalogue emerged as new, objective fixtures of the modern era, complete with their related structural affiliates, the table, the index and the archive. The scientific textbook, itself profusely illustrated with line engravings made from an artist's drawings, collected together this growing archive of knowledge, and is emblematic of the broad range of efforts to bring that knowledge to life through visual representations. But scientific knowledge was transformed forever after 1839, when the archive met the ultimate index, photography, and for this reason photography was quickly embraced by practitioners of science.

As Foucault wrote, natural history, like photography, emerged as 'a new way of connecting things both to the eye and to discourse.'³ But before new institutions were created to help solidify visual perception as a normalized structure or accepted phenomenological approach, diver-

gent attitudes about photographic objectivity were awkwardly forged together with new discursive strategies explaining photographic truth. By the end of this period, members of the *Muséum d'histoire naturelle*, the *Académie des sciences*, and the *Société française de photographie* had accepted the view that photographic subjectivity was not self-evident, but instead recognized that it was constructed according to certain ideological requirements and emerged according to institutional needs. Similarly, the establishment of natural history as a mature intellectual discipline also emerged by the end of the nineteenth century, complete with its structural subsets, such as zoology and botany, as well as its important institutional frameworks, such as academic and museum departments.

This essay explores the chief discursive structures that were developed during the century that actively connected scientific objectivity and photography; as we shall see, academy and museum members used photography to help classify both superficial and structural similarities and differences among zoological species, and made social and scientific inferences from the photographic evidence. Although its institutional roots were long-established in the *Muséum d'histoire naturelle* and the *Académie des sciences*, natural history grew dependent upon the new photographic technologies to 'naturalize' its structure as a discipline, and relied upon photographic mass production and dissemination in order to acquire both a persuasive and pervasive authority during the century.

If zoology appeared from within 'the space opened up in representation by an analysis which is anticipating the possibility of naming' as Foucault wrote, representation, then, must assume the chief burden of framing that discourse. For Foucault, the objects of natural history must first be visualized, because the discipline is coherent only when 'it [results from] the possibility of *seeing* what one will be able to *say*.'⁴ The task for both natural history and for photography at mid-century therefore appeared coeval: language must be brought as close as possible to the observing gaze, and things observed brought as close as possible to words, since 'natural history,' concluded Foucault, 'is nothing more than the nomination of the visible.'⁵

Photographie Zoologique was announced in 1852 in the midst of many competing discourses surrounding the institutional discipline of zoology and the emerging art and technology of photography.⁶ The project initially assembled six photographic plates of zoological subjects in a single portfolio; the prospectus announced the organizers' intentions to offer regular installments of this size. The photographic specimens included a wide range of animal subjects, including shells belonging to land and sea creatures, insects, mammalian skulls and bones, and reptiles. As displayed in the drawn marginalia of the title page [figure 1], a horse and antelope skull, a monkey and wren, an alligator and dinosaur-like creature surround Roman-like portrait medallions of the museum scientists, suggestively representing the exotic types of animals pictured within; similarly, tantalizing glimpses of a far-away or exotic life were also promised in the representations of the obelisk, pyramids, and Great Sphinx of Egypt above the title, as well as the unnamed island paradise below. As we shall see, the project was unfortunately disbanded before it could make good on the many promises of its title page.

Then as now, the 'nomination of the visible,' or what I

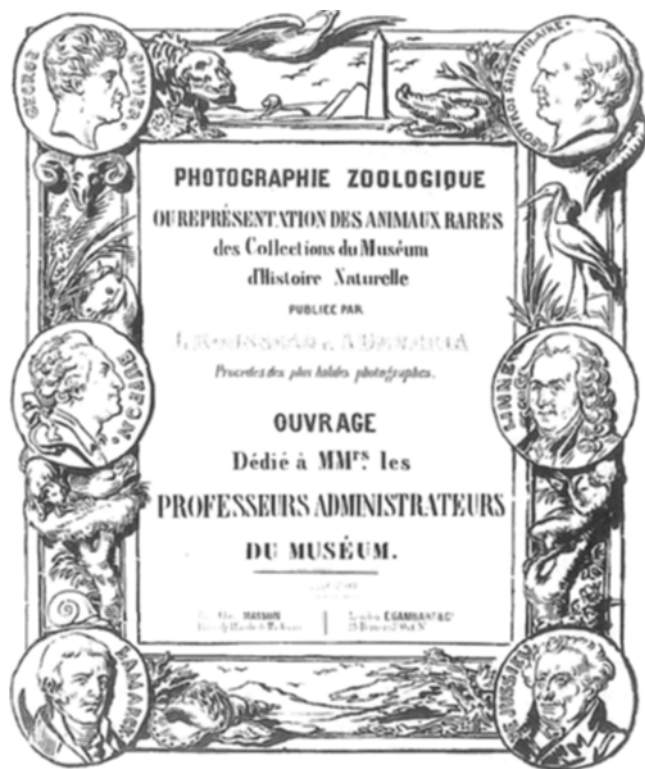


Figure 1 Title Page, *Photographie Zoologique, ou représentations des animaux rares des collections du Muséum d'Histoire Naturelle, publiée par L. Rousseau et A. Devena. Procédés des plus habiles photographes*, 2^{ème} livraison, c.1854. All figures © Bibliothèque Centrale du Muséum National d'Histoire Naturelle

shall refer to as strategies of naming and framing, proved to be an unstable terrain upon which inventors and publishers vied for control over the means of production, and over which scientists and artists debated the limits and boundaries of representation. These competing strategies were apparent when the publication reached its first large audience, at the Exposition Universelle of 1855. Displayed publicly for the first time in the Palais de l'Industrie, *Photographie Zoologique* was heralded as the harbinger of a new age in visual representation by important institutional voices claiming that it had broken significant new ground: for one, *Photographie Zoologique* was identified as the first cooperative venture between the Académie des sciences and the Muséum d'histoire naturelle to use photography to assist in their scientific investigations, in particular the act of classification and then, later, cataloguing.⁷

It was further promoted during the Exposition Universelle as the first systematic application of photography to replace line drawings that were conventionally used as the basis of printed engravings, pointing the way toward the eventual replacement of such engraving by photography for illustrated zoological texts. Additionally, *Photographie Zoologique* was advanced at the Exposition as the first attempt to apply new means of photographic mass production to make the work available to a broad audience. Graphic art printers, as well as political economists and industrialists, used their respective trade journals to promote the project as the first practical test for photogravure. This recently invented photographic application made feasible photographic mass production, a technique which, during 1852–7, stood head to head in competition with photolithography for the scarce resources allocated to the developing photographic technologies. Finally, officials of the Muséum d'histoire naturelle also promoted *Photographie Zoologique* as the first institutional attempt to apply the medium of photography to a systematic cataloguing effort.

The project therefore occupied more than one seat at the table of new photographic applications: *Photographie Zoologique* was claimed both by scientists and by publishers, as it was the product of scientific investigation and graphic art. It was simultaneously displayed as both a printed publication and a framed exhibition of prints, possessing neither a conventional publication history nor a conventional exhibition record. And *Photographie Zoologique* was acclaimed, sanctioned and promoted by different agencies of the French state and by representatives of the commercial world of graphic art and publishing. Owing to its origins, therefore, as a hybrid project of the Académie des sciences and the Muséum d'histoire naturelle, and to the many institutional contexts later claiming credit for its publication, no single institutional frame adequately contains the conflicting ideological voices advancing the project.

Moreover, the many individual institutions promoting the project unwittingly obscured the collaborative ways in which *Photographie Zoologique* actually contributed to an emerging ideological construct connected to the collection of species from around the globe. Ostensibly set in motion to advance disinterested scientific inquiry, zoological collecting activities, whether on behalf of creating zoos or completing research cataloguing projects, also worked hand in hand with colonial exploration to advance the discursive practice of imperial control and domination. In order to explain the role of *Photographie Zoologique* within this development, I shall isolate several of the conflicting voices advancing the project, and therefore have divided this study broadly into three sections, to examine better *Photographie Zoologique* in the context of the ideology of progress, the ideology of objectivity and the ideology of collecting. In this way, I hope to examine the dominant institutional contexts in which the project appeared, and sort out the competing claims upon its meaning and impact.

PROGRESS

Photographie Zoologique was the product of artistic and scientific collaboration, viewed as essential by the Société Héliographique if real progress was to be accomplished in photography. By 1852, 'real progress' was defined in technical and commercial terms by the industrialists actually supporting photography's growth and by political economists providing the theoretical mandate. Inventors were working to take photography out of its dark ages, characterized by fickle and unstable prints, laboriously produced, that faded quickly upon exposure to sunlight or that turned into unwanted shades of pink, purple or yellow-green. Their efforts were directed to creating means of fixing stable and durable positive prints in order to help photography attain the kind of permanence associated with older forms of graphic art. Commerce firmly guided the direction of these early developments: institutional groups of economists and industrialists, such as members of the Société d'encouragement pour l'industrie nationale and the Conservatoire des arts et métiers; photographers, for example members of the Société Héliographique; and scientists, such as those attached to the Académie des sciences and the Conservatoire des arts et métiers, offered prizes, sponsored competitions, and made outright grants to inventors to devise reliable means of creating inalterable prints, leading to photographic mass production.⁸ Technological determinism therefore defined an important aspect of the ideology of progress attached to photography; economic growth, political economy, and the institutional structures supporting such development sustained this ideology in practice.

Photographie Zoologique was introduced at a time when two new processes, photolithography and photogravure,

had just been announced. The many communities following these developments in trade journals such as *La Lumière*, *Annales de l'imprimerie* or the *Bulletin de la Société d'encouragement pour l'industrie nationale* recognized immediately that the two new graphic art forms linked photography to engraving and lithography in important ways. For one, the new photomechanical images were produced in ink and, like any ink-based print, did not fade. Moreover, they were produced in established graphic arts workshops, relying upon an already existing organization of labor and system of distribution. Finally, their actual costs of reproduction per piece declined (compared with conventional salted-paper photographs) as the size of a print run increased; such economic principles had guided the production of the older graphic forms.⁹

Institutional cooperation was essential to French technological progress, and also helps us comprehend the origins of *Photographie Zoologique*. This is the skeleton of the project: Louis Rousseau, a preparator at the Muséum d'histoire naturelle, and Achille Deveria, a curator at the Cabinet des estampes, devised the blueprints. Both men drew upon their attachment to these state agencies: Rousseau relied upon the support of his colleagues at the museum, principally Henri Milne Edwards, in order to organize and assemble the objects to be photographed, and Deveria drew upon his connections in the arts to secure the Bisson frères as photographers and the printshop of Lemer cier et Compagnie, the largest and most respected graphic arts firm in Paris.¹⁰ Together, they established scientific support, sought funding from governmental and other institutional groups, and found distributors in Paris and London.¹¹ Deveria and Rousseau were also highly successful, at least initially: various journals tracked their progress throughout 1852 as they displayed the fruits of their labor before members of the Académie des sciences.¹² In December 1853, the project won an important subvention of 2000 francs from the Academy, a significant vote of approval. This award was the first important grant in the Second Empire in support of the industrial development of photography, and the first such award conferred upon any photographic project since the introduction of the Daguerreotype that had never been publicly displayed in a photographic or industrial exposition.¹³

Rousseau and Deveria also secured the talents of the most able persons in the graphic arts, kept abreast of new printing technologies and devices used in representation, and, most important for the ideology of progress, modified the project itself over time in order to incorporate ever-new technologically advanced photographic means of mass production. For example, although the project began in 1852 as salted-paper prints, as in a photograph of shells (figure 2), by December 1853 such prints were deemed unsuitable by Academy members for the purposes of mass

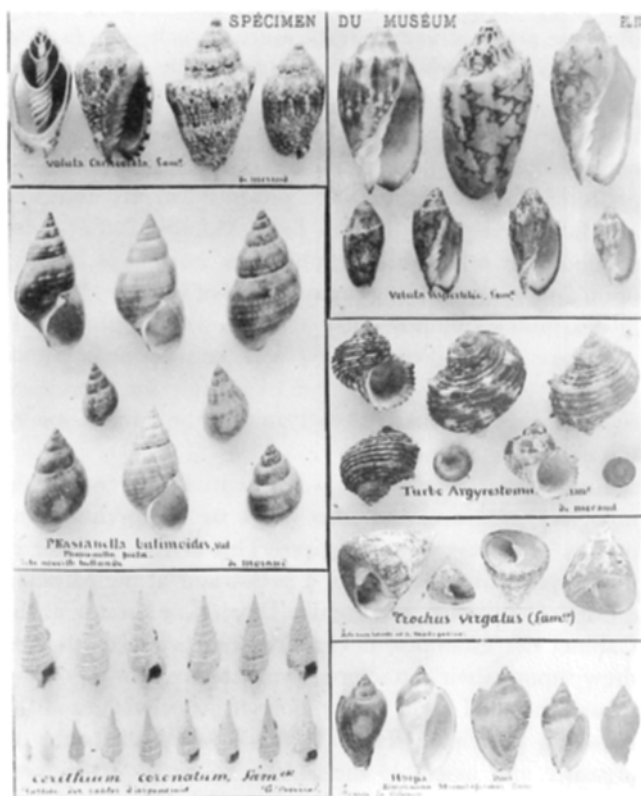


Figure 2. 'Spécimen du Muséum,' [shells], from *Photographie Zoologique*, 1^{er} livraison, c.1852 (salted paper print)

production. The Academy's major award, then, was not in support of continued conventional printing. Instead, it instructed the project's directors to adopt photogravure as the best hope for mass produced ink-based printing, a process used for an image of insects (figure 3). This new process was recently introduced by Claude Marie François Nicpce de Saint-Victor, nephew of Joseph Nicpce, one of the original inventors of photography.¹⁴

With their second *livraison*, composed of photogravures rather than salted-paper prints, Rousseau and Deveria announced their new publishing venture, declaring their intention to produce a total of ten installments of six prints each, offered to the public at 9 francs per *livraison*.¹⁵ By January 1854, the transformation was complete: photogravures replaced the salted-paper prints of the first *livraison*, Lemercier et Compagnie had been replaced in favor of the photo-engravers Riffaut and Mante, and the project itself, now redefined as the first to employ photogravure, was promoted and illustrated in the pages of the *Bulletin* of the Société d'encouragement pour l'industrie nationale as one of the two new photomechanical processes to revolutionize the graphic arts (figure 4).¹⁶ To the Société d'encouragement, *Photographie Zoologique* heralded a new day in French publishing, where the pre-industrial, hand-

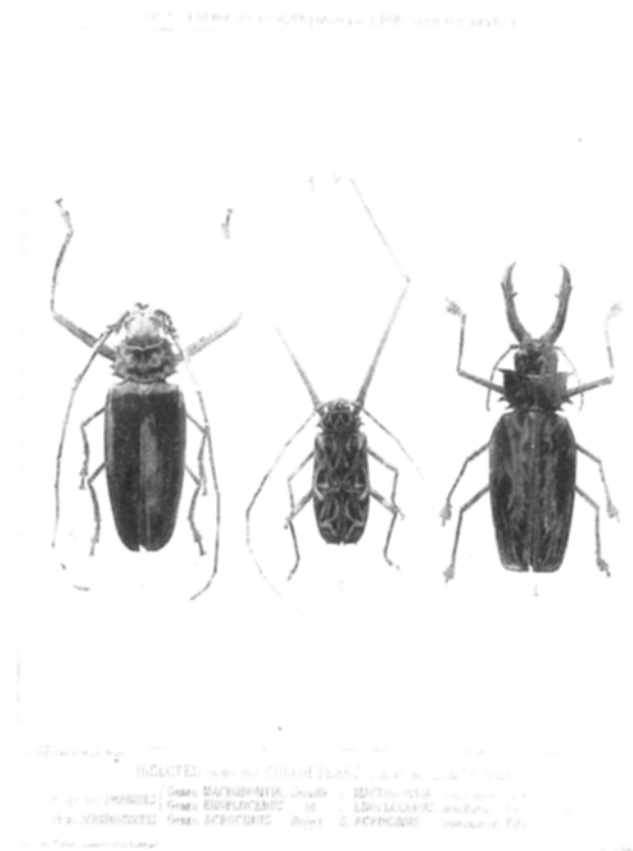


Figure 3 'Insectes Ordre des Coleopteres Famille des Longicornes,' from *Photographie Zoologique*, c 1854 (photogravure)

made processes were declared obsolete, replaced as they were by more cost-effective and efficient industrial means of production.¹⁷

As photography was shown to be useful to science as a form of 'applied art,' the ideology of progress itself was extended beyond simply demonstrating that a team approach could help advance either the technology of photography or the capacity of scientific representation; technological determinism was also served, as was the ability of social and political institutions like the Académie des sciences and the Société d'encouragement to deliver the economic goods and potential. In the process, science's faith in objectivity, or the so-called 'truth of the image,' was given new focus. In the introduction to the second installment, Rousseau and Deveria declared their success at representing the world as 'naturally,' or 'truthfully' as possible, claiming that the photographic representations in the *livraisons* were 'so faithful that a magnifying glass alone will render perfectly distinct all those qualities which escape the naked eye.'¹⁸ With this professed faith in the truth of the photographic image, we turn our attention to the content of the imagery, and the discourses surrounding the ideology of photographic objectivity.

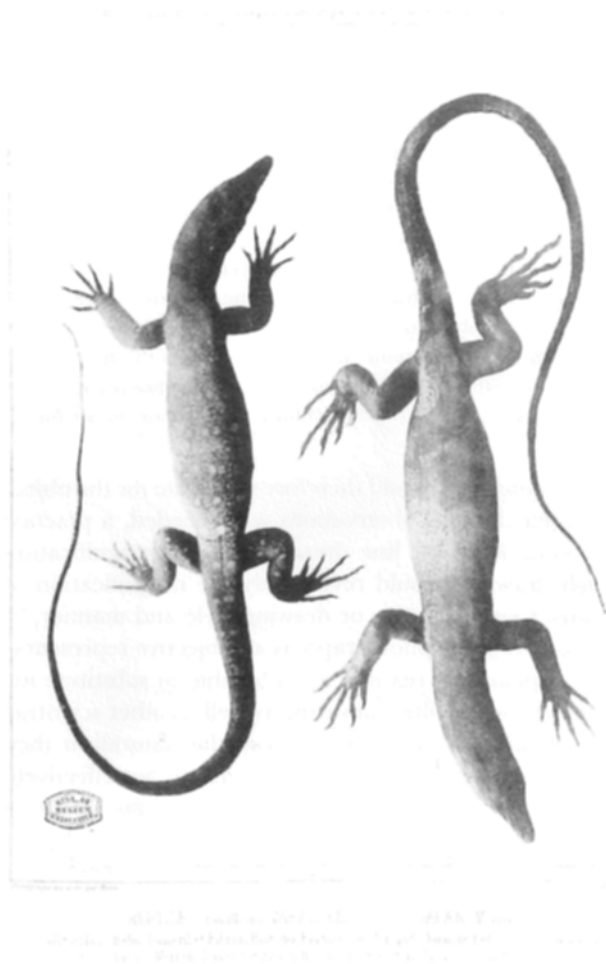


Figure 4 'Repules,' from *Photographie Zoologique*, c 1854 (photogravure)

OBJECTIVITY

Whereas political economy and technological determinism were instrumental in directing the engines of photographic progress, objectification in the emerging scientific disciplines was accomplished by the development of new theoretical and discursive concepts; these ideas were applied in practice as strategies of naming and framing. Following Foucault's claim that science was the 'nomination of the visible,' the 'natural world,' then, could only *appear* natural when normative codes and discourses were institutionalized, thereby providing internal coherence within the discipline.¹⁹ According to Frederic Jameson, however, the authority provided by its seeming internal coherence is revealed as subjective and constructed: strategies of naming and framing become 'strategies of containment,' as the generative act of structuring discourses (or visual frames) simultaneously erects new boundaries and limits, disguising or eliminating in the process all contradictions and historical contingencies.²⁰ By contrast, by exposing these historical processes as strategies of naming and

framing, the institutional adoption of photographic objectivity within the discipline of zoology becomes problematized, and the representations themselves become subject to new historical investigations.

One of the ways in which photographic objectivity was normalized as an adequate form of knowledge and accepted in scientific terms was through the institutional support the medium received as a chemical and mechanical process. As photography was dependent upon the physical properties of light and optics, the chemical properties of silver salts, and the mechanical operations of the camera, it was presented as an objective recording medium.²¹ But such chemical and mechanical characteristics did not define the many uses to which early photography was put. In a recent provocative study, Jonathan Crary investigated the creation of those discursive strategies that yielded early photographers the semblance of creating 'objective' imagery and that conferred upon the photographed objects themselves the appearance of an internal coherence. In his *Techniques of the Observer*, Crary examined ways in which the 'realistic' effects of nineteenth-century photographic imagery were based upon 'a radical abstraction and reconstruction of optical experience.'²² Further elaborating upon Foucault's methods of understanding ways in which dominant social institutions promoted certain forms of knowledge as normative, Crary focused on ways in which new disciplines made use of certain optical devices to normalize their control over new forms of knowledge. Chief among these were those 'techniques for the management of attention, for imposing homogeneity, anti-nomadic procedures that fixed and isolated the observer,' such as the camera obscura.²³

Zoology and photography were unified as a result of three interconnected developments: the normalizing of photography as an objective means of representation through supposed guarantees of optical truth; the translation of zoological classification schemes into a photographic vocabulary; and the introduction of an optical device in the mold of those discussed by Crary, one able to codify and normalize 'the observer within rigidly defined systems of visual consumption.'²⁴ Objectification was therefore a construction, promoted in the field of zoology through the scientific method and the system of classification and categorization, and advanced as a 'natural' by-product of the chemistry, optics, framing, and mechanics of photography.

Even before the nineteenth century, classification was well established as the principal activity of the zoologist.²⁵ Since 1793, when the Muséum d'histoire naturelle was created, zoological classification received direct forms of state support. But the greatest event to shake French zoology after that point occurred in a series of disputes that culminated in 1830, when the leaders of two opposing schools of thought, Georges Cuvier and Étienne Geoffroy

Saint-Hilaire, publically debated the ultimate goal of classification.⁴⁶ In brief, Cuvier asserted that all of nature could be classified within four basic structural types, or 'plans of organization' called *embranchements*: the vertebrate, articulate, mollusk, and radiate plans. To Cuvier, an organism's function determined its classification, following his belief that an animal's practical needs in the world determined its physiological structure. Geoffroy, in contrast, led a group contending that nature was simply too diverse to classify, and that all such schemes were arbitrary. His method of 'philosophical anatomy' stressed commonalities among organisms, explored their structure over their function, and looked to discover formal and abstract resemblances, or homologies, among them.

The debate extended into mid-century, when a new approach synthesized chief principles of the two earlier methods. The so-called school of 'physiological zoology,' led by Henri Milne Edwards, offered this new synthesis. According to Toby Appel, 'Milne Edwards combined on the one hand a commitment to the four *embranchements* as the cornerstone of zoology, and a theoretical belief in the primacy of function over structure, with a search for morphological regularities in nature.'⁴⁷ Importantly, Milne Edwards also seized upon photography as his visual medium of choice, believing it far superior to line drawings, which had been employed for centuries as the basis for engravings used to illustrate zoological texts. (Compare the photographic images with an engraving of 1681 used to illustrate Buonanni's *Natural History*.) In 1853, in fact, Milne Edwards reported to the Académie des sciences that photography was the most effective means to further the zoologist's search for visible regularities among animals and other organisms; photography not only advanced his research, it made earlier forms of illustration obsolete. According to Milne Edwards,

Ainsi, les corps de zoologistes a besoin de représenter offrent souvent une multitude de détails qui échappent à l'oeil nu et qui sont cependant nécessaires à montrer. Pour les mettre en évidence, le dessinateur est obligé de les grossir comme si c'était à travers une loupe qu'il les voyait, et les figures amplifiées ainsi obtenues ont rarement l'aspect de ces objets tels qu'ils se présentent d'ordinaire dans la nature. Pour en donner une idée exacte et suffisante, le zoologiste a donc presque toujours besoin de deux sortes d'images: de figures d'ensemble non grossies et de figures de certaines parties caractéristiques plus ou moins amplifiées.⁴⁸

Zoology was therefore constrained, according to the scientist, by being forced to rely upon two different types of hand-drawn imagery, as the general view was inadequate for showing detail, and the magnified view unsuitable as an artist's distortion. By contrast, in a *single photograph* of an organism, Milne Edwards found, the zoologist possessed both types of illustration *in one image*. First, the general view preserved a specimen's ordinary appearance, and

moreover, when *the photograph* was examined under a *loupe* or magnifying-glass, it provided a realistic close-up view:

Dans des planches photographiques bien faites, telles que les planches de l'Euryale, de l'Agaricie et des Fongies, présentées à l'Académie par MM Rouseau et Dévéria, on n'aperçoit, pas plus que dans la nature, les détails de structure lorsqu'on les regarde à la vue simple, et les objets représentés conservent alors leur aspect ordinaire; mais lorsqu'on vient à examiner ces planches à l'aide d'une loupe, on y voit tous les détails que cet instrument ferait voir dans l'objet lui-même, et, par conséquent, ici *une seule et même image* peut tenir lieu des deux sortes de figures dont nous venons de parler comme étant généralement nécessaires dans les ouvrages exécutés au pinceau ou au burin. (emphasis added)⁴⁹

One photograph could therefore substitute for the object itself when close-up observations were needed, a practice never considered for line drawings, as the magnification of such drawings would reveal only the magnification of the artist's visual syntax, or drawing style and manner.⁵⁰

In accepting the photograph as an objective representation, so apparently realistic as to be able to substitute for the object itself, Milne Edwards, as well as other scientists in the Académie, not only accepted the naturalism they found inherent in the camera-based image but effectively promoted the power of photography to *define content* in photographic terms.⁵¹ When framed photographically, the specimen, or subject of the image, was contained and defined by the camera in ways unlike hand-drawn imagery. As John Szarkowski wrote much more recently,

To quote out of context is the essence of the photographer's craft. His central problem is a simple one. what shall he include, what shall he reject? The line of decision between in and out is the picture's edge. While the draughtsman starts with the middle of the sheet, the photographer starts with the frame. [Consequently,] [t]he photograph's edge defines content.⁵²

Although the role of framing now forms an important problem for postmodern theory in questioning the dominant role of the center of an image and in revealing the constructed and fragile nature of the work of art, its border or edge, and its context, early photographic practices relied upon a defining frame precisely in order to determine the content of the image. Many nineteenth-century manuals of photographic practice called their readers' attention to the importance of framing the camera obscura carefully in order to create an artful composition within its borders, especially in preparing objects to be photographed or for other forms of 'copy work.'⁵³ Framing and objectivity were interconnected. Photographers were instructed to use the framing device of the camera as an important semiotic indicator to construct a visual field, to provide a picture with depth or with geometry, or to give internal coherence to a diverse array.⁵⁴ In accepting the

dominant role of the photographer's frame to define content, then, Milne Edwards and others in the Académie and Muséum effectively naturalized the representation of that content through the photographer's frame. Consequently, animal parts and other zoological fragments, seen photographically, were framed as specimens through the way they were photographed; in the process they were defined as camera-based representations (for example, figures 2 and 5). When Milne Edwards addressed the effectiveness of photography to aid the scientist, he accepted as a given the realism and truthfulness of the camera-based image. Later, when he proposed modifications to *Photographie Zoologique*, these addressed ways to enhance the critical framing used to represent the specimens, as we shall see below.

Critics responding to the 1855 Exposition Universelle found the display of plates from *Photographie Zoologique* there doubly remarkable, first for their optical fidelity and second, for their objective accuracy. The photographic press assured, and the scientific press confirmed, that the photogravures were 'purely photographic,' that is, unre-

touched photographic examples of zoological specimens which could be relied upon for their unquestioned truthfulness. As one reviewer of the photogravures put it:

Nous voudrions expliquer avec assez de force et de manière à porter la conviction dans tous les asiles de la photographie, que le principal mérite des productions de cet art est la vérité, la sincérité. Une photographie sans retouche est un compte rendu sans mensonge. Eh bien! toute retouche, fût-elle exacte, éveille le soupçon, l'incertitude, et produit l'incrédulité. Personne, de reste, n'a exécuté de plus beaux ouvrages sans retouches que M. Riffaut, ses collections d'histoire naturelle sont de parfaites gravures: les deux lézards, le polype, les scarabées, coquillages, crabes, tapir, tortue, méritent les plus grands encouragements.³⁵

The photographic process, beginning with the optical fidelity of the camera and the careful framing of zoological specimens, to the creation of mass-produced prints using unretouched methods, therefore helped to inscribe the mark of objectivity; 'truth' was constructed by the frame of the camera's optical viewfinder and further extended into the production of positive prints by supposed guarantees, such as the emerging taboos outlawing retouching. Importantly, these taboos were applied almost as a kind of requirement for scientific photography, but they were willingly transgressed by self-described photographic artists, such as Charles Nègre, Edouard Baldus, Camille Silvy, or Gustave LeGray, who were commended for extending the artistic boundaries of photography in the photographic press.³⁶

Although the printed photograph replaced the line drawing standard in scientific publications, it was less effective in disposing of hand-drawn illustrations in popular texts. Initially, the arrangement of the zoological objects in the individual plates of *Photographie Zoologique* conformed to the standard forms of zoological illustration existing prior to photography, which is to say that specimens were depicted as if they were arranged in a cabinet or museum display case, the frame of the case delimiting the boundaries of the image (figure 5). By contrast, commercial or popular texts illustrating zoological subjects, which were largely aimed at middle-class audiences, portrayed living animals in their 'natural' surroundings as much as possible.³⁷ While illustrations in scientific texts were most certainly clearly ordered images, all depicting a related structural or homological grouping, none corresponded to the cluttered arrangement characterizing graphic renderings of the collections of older museums, such as the famous interior view of the Museum of Worm, for example. Moreover, scientific illustrations strived for purity; sometimes they could be so refined as to eliminate perceptual clues, such as figure/ground relationships; the isolated detail, or section view of a tissue sample, may be seen as one example. Popular audiences, on the other hand, were lured with vignettes and colorful inserts, and

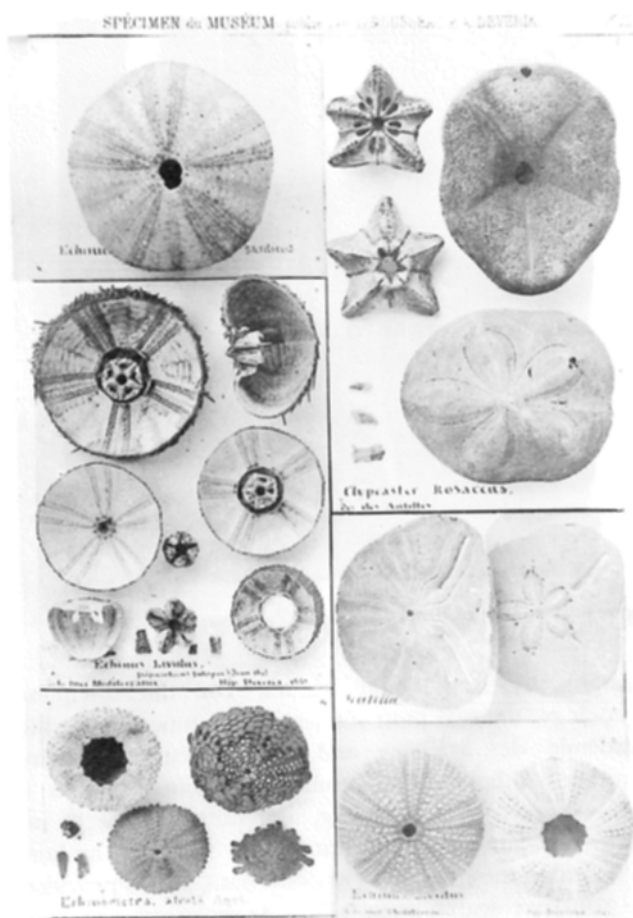


Figure 5 'Spécimen du Muséum publié par I. Rousseau et A. Deveria,' [shells], from *Photographie Zoologique*, c.1853

such publications always contextualized the imagery, often mixing interesting, unusual or environmentally related plant and animal forms together in a single illustration.³⁸

As classification ruled science, and order ruled its representations, new devices were created during the century to help normalize vision and extend the public's faith in photographic accuracy; new photographs of microscopic organisms or of telescopic views of celestial bodies were important examples of these applications, as was the introduction and widespread use of stereoscopic photography.³⁹ In fact, as early as 1853, Milne Edwards suggested one such device himself. Having observed that the first experiments with zoological photography were limited by the photographer's need to stand specimens upright so that they would be well lit before the camera, Milne Edwards declared this method unsuitable for depicting the soft bodies of spineless creatures as they appeared in nature. In order to solve the problem, the scientist proposed that photographers place such specimens below the lens, if necessary over a kind of light box, and take the camera's eye to a new position directly overhead the specimen; special prisms could also be devised to focus light directly on the object. Milne Edwards therefore was comfortable rearranging his specimens in order to convey their naturalness in photographic terms, and experimented willingly with the mobility of the photographic apparatus to help him achieve those ends.⁴⁰ He called the new instrument a *chambre obscure renversée*, and worked with Rousseau and Deveria to give it immediate application in *Photographie Zoologique*: examples include photographs of the intestines of an earthworm, and a cross-section of a human head (figures 6 and 7). Both images were exhibited in 1855 at the Exposition Universelle and commented upon favorably by reviewers.⁴¹

The application of this new device to the evolving project itself illustrates further how institutional cooperation led to advances in techniques of photographic representation. But it also was evident that photography was being used to help naturalize zoology. First, the photographic frame was accepted as an essential element both determining the image's structure and defining its content; in this most basic way, zoology was defined in objective, photographic, terms. But zoology also became 'natural' when its raw materials were accepted as photographically constructed; in other words, as a product of the *chambre obscure renversée*, the photographed zoological specimens acquired a new authoritative weight as *representations*.

COLLECTING

Photography and natural history were linked together through an additional social force, the role of collecting, and we therefore move from examining the naturalizing of content by the camera's frame to the construction of

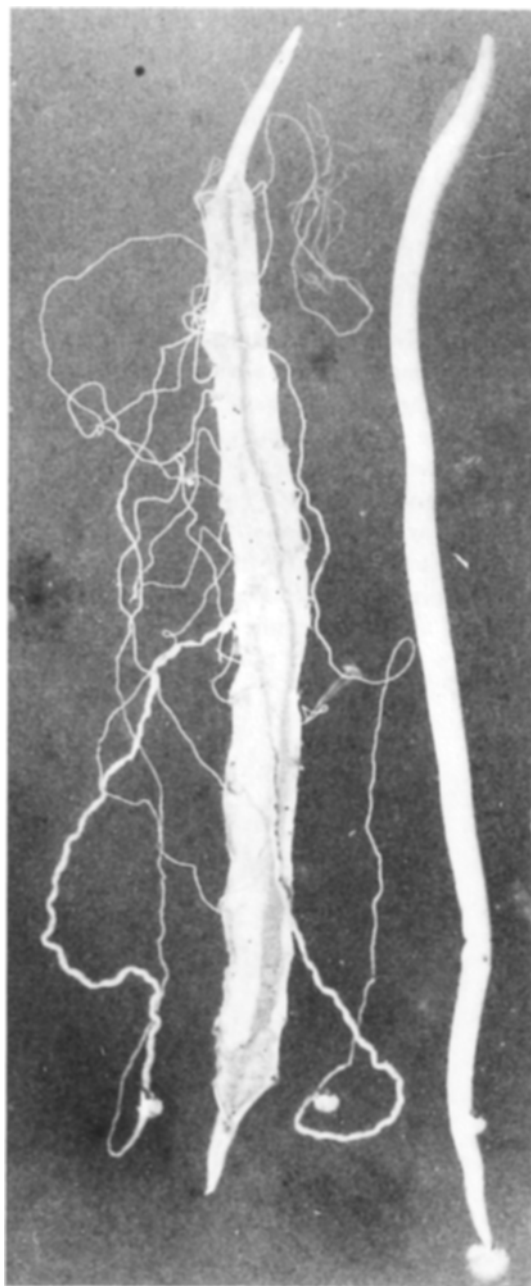


Figure 6. [Earthworm], from *Photographie Zoologique*, c.1854

meaning by institutional frames. For the discipline of zoology, the two most influential institutions were the Académie des sciences and the Muséum d'histoire naturelle. Although both embraced photography as a means of possessing, knowing, and studying objects, no matter how familiar or how remote, the Muséum's authority rested on the strength of its collections, which provided the primary research materials for its professors and drew the attention of interested zoologists throughout the world.⁴²

During the Muséum's first three decades, the institution grew from a small collection of preserved objects into the

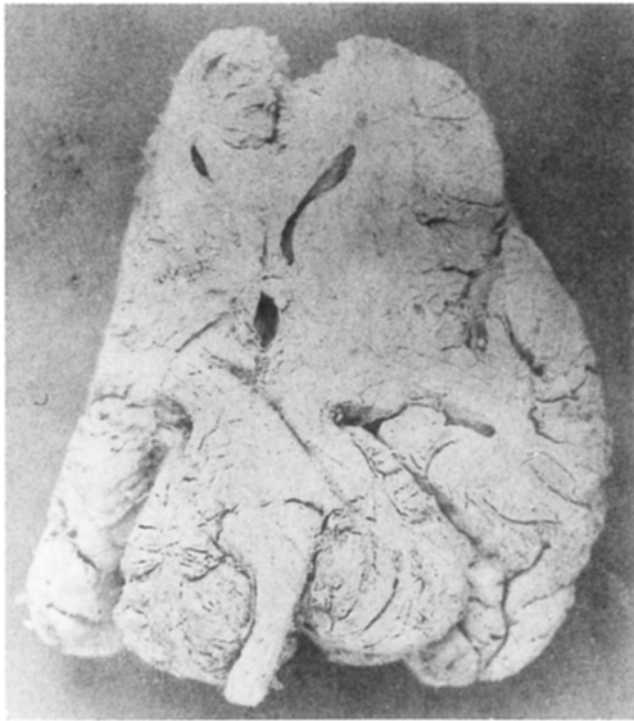


Figure 7 [Cross section of a human head], from *Photographie Zoologique*, c. 1854

world's largest zoological repository; by 1822, it was estimated that the Muséum conserved more than 1500 mammals; 6000 birds; 1800 reptiles; 5000 fishes; 25 000 species of arthropods; and an unspecified number of mollusks and zoophytes.⁴³ Further, the Muséum's dominance in French science was demonstrated by virtue of its financial strength: compared with the levels of state financing of other scientific groups in France, the Muséum's annual budget allocated for building its collections and for promoting research was consistently double that of comparable educational institutions such as the Collège de France or the École Normale Supérieure.⁴⁴ As a result, the Muséum's promotion of photography as a reliable and objective form of illustration therefore amounted to substantial and influential patronage.

But the role of photographing the Muséum's own objects introduced it to a new institutional role, the role of a repository of photographic collections. Photographs were especially valuable where they could complement the existing displays within the institution, or better yet, actually substitute for the primary objects themselves. In this way, photography was conceived by its promoters outside the Muséum as able to 'return the favor' to the Muséum by extending its influence and by adding to its collections. Conceived in this way by Ernest Lacan, editor of *La Lumière*, photography was promoted as a new collectible, able to serve the Muséum either by taking the place of the primary objects themselves, or by donating 'photo-

graphic raw materials' in lieu of acquiring additional primary specimens. The first area where such photographic cataloguing could begin, suggested Lacan, was in the area of collecting examples of human racial types:

Si la photographie prend au muséum d'histoire naturelle ses richesses pour les vulgariser, elle peut, en échange, ajouter de précieux spécimens à ses galeries. L'étude des races humaines est une de celles qui intéressent le plus la science. Combien de types le moindre photographe portraitiste ne réunit-il pas dans ses portefeuilles! Nous l'avons dit, on fait de la photographie dans tous les pays du monde, les portraits faits dans l'Inde, en Afrique, en Amérique, en Russie, partout enfin, suffiraient à composer une ample collection de types des races vivantes, en supposant qu'on ne fit pas des épreuves spécialement destinées à cet usage. Quant aux races qui ont disparu, M. Rousseau a pris soin de reproduire lui-même les crânes qui sont entre les mains des anthropologistes.⁴⁵

Unstated in the call to 'restock' the Muséum's collections with photographic examples of different human races was a profound belief that the various forms of photographic evidence were essentially equivalent. To Lacan and others, there was no difference between photographs of the world's many races and photographs of shells or insects.

Indeed, one outcome of *Photographie Zoologique* was its influence upon the Muséum to collect and conserve such ethnographic images. As a result, *Photographie Zoologique* reproduced photographs of a living male and female example of the African tribe Hottentots Bochimans, which were believed by Europeans at the time to portray the lowest form of *Homo sapiens*, a kind of ancestral human race, or 'missing link' (figures 8 and 9).⁴⁶ In *Photographie Zoologique*, these photographs are accompanied by another racial example in the photograph of a preserved decapitated head of a Russian, called 'Caucasian' (figure 10); taken together, these three photographs were perceived by Lacan and others as equivalent to Rousseau and Deveria's photographs of human and animal skulls, valuable contributions to the study of natural history (figure 11).⁴⁷ 'Knowledge,' at least as constructed with these forms of visual evidence, as bound together in this photographic portfolio, and as collected by this institution, scientifically 'explained' zoological equivalence. Using racial terms connected to perceived states of their primitive development, the human examples in *Photographie Zoologique* were accorded an 'objective' place along the scientific continuum upon which all animal species were then being plotted. Therefore, the equivalence believed to exist between these images was not solely a result of the now-normalized objective science of photography, but instead was a product of the ideological processing of those representations as adequate forms for organizing information, that is, in the context of an authoritative publication of the state-run museum.



Figure 8. Three-quarter view of [Hottentot], from *Photographie Zoologique*, c 1854

In his analysis of the importance of photography to André Malraux's *Museum Without Walls*, Douglas Crimp wrote that 'photography not only secures the admittance of objects' and fragments to the museum, but also it functions as 'the organizing device; it reduces the now even vaster heterogeneity to a single perfect similitude.'⁴⁸ The semblance of such a perfect unity within a collection was called by Walter Benjamin a 'magic circle' of 'completeness' that was always strived for but which never could be attained.⁴⁹ And although both Malraux and Crimp were concerned with photography's homogenization of diverse art forms as just so many formal styles, we may see that a similar reductive process occurred for zoological objects in the Muséum d'histoire naturelle. *Photographie Zoologique* produced adequate substitutes for the actual craniums, jawbones, fossils or living persons within the Muséum, a substitution that relied upon the mimetic function of photography to replace the actual specimen, and a metonymic acceptance of the fragmented state of the object as it was represented in the museum.⁵⁰ Not until the late nineteenth century did ethnographic museums attempt to compensate for this fragmentation



Figure 9. Profile of [Hottentot], from *Photographie Zoologique*, c 1854.

by developing installations that recreated an object's missing context, while the photography of colonized peoples, as foreseen by Ernest Lacan, was reduced to collections of stereotypical examples.⁵¹

Thus did photography move from zoology to anthropology, constituting the prime raw material of the ethnologist. According to Louis Figuier, a scientist who reviewed *Photographie Zoologique* at the 1855 Exposition Universelle (which was itself intended to promote French technological and cultural superiority over the rest of the world), photography helped to naturalize every remote or foreign difference, and was able to account for even the rarest of human curiosities:

Un peintre photographe, voyageant dans les différents pays du monde, peut y former la plus riche des collections ethnologiques. Déjà les galeries de notre Muséum se sont enrichies de beaucoup de ces spécimens. Quelquefois même, sans qu'il soit nécessaire d'aller les chercher en leurs régions lointaines, on peut profiter des visites que nous font, par intervalles, quelques individus appartenant aux races étrangères, pour en recueillir et en conserver les types.⁵²

All of these potential examples of photographic racial cataloguing could then become 'naturalized,' as collectible objects, within Benjamin's 'magic circle' of public acquisition and ownership. To Figuier, regular museum visits

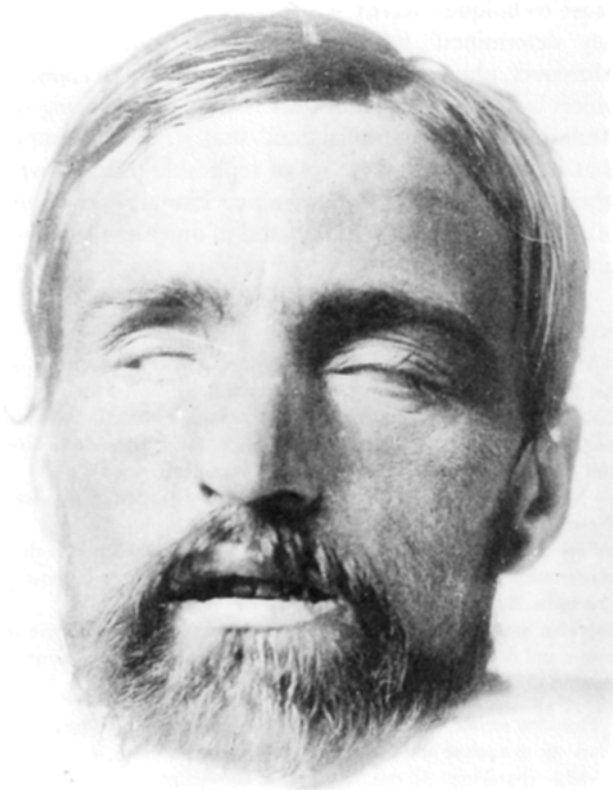


Figure 10 'Caucasian,' from *Photographie Zoologique*, c. 1854

could even help visitors reclaim 'the thrill of acquisition,' as well as, of course, the 'scientifically proven' myth of their own superiority.

Figuier's musings were not unfounded, as he recognized that *Photographie Zoologique* helped to maintain one of the century's most notorious cultural myths in its representations of the Hottentots, which had been represented by Europeans since the seventeenth century as the most 'primitive' of world races.⁵³ This stereotype had dominated popular conceptions since 1810, when a female member of the tribe was brought to London and Paris for a grotesque circus-like sideshow and displayed as the 'Hottentot Venus,' where she was publicly ridiculed and degraded for her body size and shape. Finally ending her life as a scientific curiosity, she was examined anatomically by Cuvier when alive and, several years later after succumbing to an unknown malady, was dissected by him when dead. Actual body parts (in particular, her sexual organs), were removed and presented to another scientific group, the Académie Royale de Médecine. Thus she ended up a scientific paper in the *Mémoires du muséum d'histoire naturelle* of 1817.⁵⁴ In comparing the hand-drawn illustrations of this memorable Hottentot Venus more than 40 years earlier with Rousseau's photographs of 1853,



Figure 11 'Skull of a 12-year-old boy,' from *Photographie Zoologique*, c. 1854

Figuier, among others, found the 'indifference of science' able to confirm 'objectively' (his terms) the peculiar body proportions believed to typify the race, against the unscientific beliefs of the crowd: 'We may recognize in the photograph,' wrote Figuiet, 'the particularity of the body structure distinguishing this race, and be assured, *de visu*, of the authenticity of the anatomic protuberance belonging to this tribe.'⁵⁵ Ironically, the plates reproduced in *Photographie Zoologique* of the Hottentots did *not*, in fact, reproduce the 'posterior view' so caricatured in the English press; Figuiet's apparent confidence was therefore a further mark of his certainty in the photographic process, and less a conclusion drawn upon such evidence.

The practice of 'scientific photography' of non-European races by Europeans continued beyond *Photographie Zoologique*, of course. In this project, however, which we might now claim as the first example of state-sponsored anthropology, we may see how the colonized status imposed on these people was institutionalized by the museum and reinforced by its use of mass-produced photography. The Muséum d'histoire naturelle helped affix onto such imagery both an 'archival dignity' (to use Edward Said's term⁵⁶) and an institutional authority, helping it acquire the status of a 'cultural fact.' In 1878, many of these cultural archives were divested, as the Muséum d'histoire naturelle helped to create the Musée d'ethnographie du Trocadéro.⁵⁷ Such a dissemination of objects was not unusual. As Douglas Crimp reminds us, the modern, specialized type of museum collection did not evolve; rather, it was dispersed, as larger *Wunderkammern* divested their curiosities into smaller, unique institutions.⁵⁸ Therefore, as the objects and formations of 'natural

history' became normalized and its professional discipline institutionalized, the Muséum d'histoire naturelle was able to 'spin off' other, specific collections. One consequence of this divestment is the problem of the shifting cultural identity of the museum objects themselves in their new institutions, an essential problem for the discursive practice of photography, whether considered documentary evidence, ethnographic record, fine art object, or an abstract collectible itself.⁵⁹

In *Imagined Communities*, Benedict Anderson examined the role of the modern museum in relation to Europe's imperial conquest of the world and its institutionalization of forms of colonial authority and control.⁶⁰ According to Anderson, such forms of control are epitomized by the representations of the Hottentots in works such as *Photographie Zoologique*, functioning as the product of the state and its sponsored affiliate, the modern museum. It is intriguing that *Photographie Zoologique* is contemporaneous with Ernest Renan's study of Semitic languages (finished in 1847, published in 1855). As Said has observed, Semitic was studied by Renan as a foil to celebrating the logic of Indo-European linguistics. For Renan, Semitic was a degraded form of linguistics; one could establish that as a cultural fact, according to Renan, if one looked to the authority of the library and the museum.⁶¹ Within these particular institutions, Renan believed he could exhibit, investigate, and analyze the supposed eccentricities and irregularities of Semitic languages and culture. Moreover, Renan believed the very model for both undertaking such a scientific inquiry and for its visual display could be found in Paris, at the Muséum d'histoire naturelle.⁶² For Renan, Semitic was unquestionably primitive, symbolizing the Indo-European dominion over the Orient, a divisive and ideological formulation which he maintained as late as 1882, as seen in his famous essay 'Qu'est-ce qu'une nation?'⁶³

In *Photographie Zoologique*, the institutional support from the Muséum d'histoire naturelle and the Académie des sciences helped to create a structure capable of imposing a 'totalizing classificatory grid' upon representations of colonized peoples. According to Anderson, 'The effect of the grid was always to be able to say of anything that it was this, not that; it belonged here, not there. It was bounded, determinate, and therefore – in principle – countable.'⁶⁴ The Muséum d'histoire naturelle used *Photographie Zoologique* adeptly to promote national differences and racial characteristics among the world's populations while asserting its own objectivity in making those claims. While masking its tendentious presentation of 'primitive' human racial types alongside those of animal bones, skulls, and shells, it became possible for scientists, photographers, and state officials to assert their scientific equivalence. The project also advanced the abstract cause of 'scientific knowledge' by making use of new photo-

graphic forms of naming and framing, as opposed to using those techniques overtly when representing the 'scientifically determined' inferior status of colonized peoples. Moreover, photography was used effectively as a collectible object by the Muséum d'histoire naturelle, advancing what Anderson termed 'serialization,' that is, 'the assumption that the world was made up of replicable plurals,' where 'the particular always stood as a provisional representative of a series.'⁶⁵ And even today, and in much the same way, photography is still used to name and to frame 'nature.'

NOTES

– Versions of this paper were delivered in 1994 at the Association of Art Historians annual meeting in Birmingham, UK, and at the Colloquium in Nineteenth-Century French Studies in Santa Barbara, CA. I would like to thank Martin Kemp, J. V. Field, Dean de la Motte and Jeannene Przyblyski for their helpful comments.

1 – Michel Foucault, *The Order of Things*, trans. of *Les Mots et les choses* (New York: Vintage, 1970), p. 128.

2 – For Foucault, the 'sovereignty of the gaze' was established in the nineteenth century as a result of the institutional authority of those structures. As he explains in *The Birth of the Clinic*, trans. A. M. Sheridan Smith (New York: Random House, 1973), p. 89, 'the eye that knows and decides, the eye that governs' is predicated upon scientific classification schemes first adapted to natural history.

From the second half of the seventeenth century, natural history had set out to analyse and classify natural beings according to their visible characters. All this 'treasure' of knowledge that antiquity and the Middle Ages had accumulated . . . had become marginal knowledge for naturalists. What remained to be discovered, however, were 'structures,' that is, forms, spatial arrangements, the number and size of elements: natural history took upon itself the task of mapping them, of transcribing them in discourse, of preserving, confronting, and combining them, in order to make it possible, on the one hand, to determine the vicinities and kinships of living beings (and therefore the unity of creation) and, on the other, to recognize rapidly any individual (and therefore his unique place in creation).

As we shall see, photography plays an instrumental role both in creating the actual structures of discovery and in filling those structures with 'photographic evidence' taken to be truthful renderings of nature as captured by an objective recording device.

3 – Foucault, *The Order of Things*, p. 131.

4 – Ibid, p. 130.

5 – Ibid, p. 132.

6 – For an overview, see Jeff Rosen, 'The printed photograph and the logic of progress in nineteenth-century France', *Art Journal*, 46/4 (1987), pp. 305–11.

7 – Roger Fenton began his tenure photographing for the British Museum in 1855, but limited his output to viewing rooms and displays; no systematic photographic cataloguing effort connected to a state-sponsored museum occurred in England prior to *Photographie Zoologique*. Christopher Date and Anthony Hamber, 'The origins of photography at the British Museum, 1839–1860', *History of Photography*, 14/4 (1990), pp. 309–25.

8 – These institutions were instrumental for the commercial development of the graphic arts as a whole. For a discussion of the interrelated institutional forces supporting these developments prior to the Second Empire, see Jeff Rosen, 'The political economy of graphic art production during the July Monarchy', *Art Journal*, 48/1 (1989), pp. 40–5. During the Second Empire, the institutions acquired even

greater authority and state support. By 1855, in fact, different (and as yet, unperfected) processes vied for attention at the Exposition Universelle. Also that year, the Société française de photographie announced a prize competition for a perfected means of mass producing the camera's image using printers' ink. The ultimate goal was to unite text and image in one print run, an achievement that would prove elusive until the late 1880s, with the invention of the half-tone block.

9 – Photographic printing enterprises of the 1850s were in fact patterned after earlier graphic arts workshops. As Louis Désiré Blanquart-Evrard declared in 1851, referring to the establishment of his new 'imprimerie photographique' in Lille,

En admettant une usine bien montée, un type [cliché négatif] peut fournir 2 à 300 épreuves par jour, et on pourrait en faisant marcher trente types par jour, dégager 5 à 6000 épreuves très facilement. Le prix de revient de l'épreuve obtenue ainsi industriellement serait de 5 à 15 centimes, suivant la dimension.

La Lumière, 13 April 1851, pp. 37–8. See also Rosen, 'The printed photograph'.

10 – Louis Bisson (1814–76) and Auguste Bisson (1826–1900) had established a thriving portraiture business in Paris during the 1840s, when they used exclusively the Daguerreotype process, winning many awards and governmental commissions. In 1851, the brothers were among the first to turn from Daguerreotypy to the wet-collodion negative and albumen-positive process. The two helped to found the Société française de photographie in 1854. In 1855, they achieved prominence for their photographic reproductive works of Rembrandt and Dürer, and later gained fame for scaling Mont Blanc and making a series of views of the Alps. In 1860, the brothers were appointed official photographers to Napoleon III. Rose-Joseph Lemerrier (1803–87) was the chief proprietor of Lemerrier et Compagnie between its founding as Lemerrier, Bénard, et Compagnie in 1842 and his death. He was the first President of the Chambre des imprimeurs-lithographes, the lithography industry's first trade organization, and a founding member of *Le Lithographe*, the first trade journal devoted solely to graphic arts printing. He regularly won awards for his artistic abilities from numerous groups and institutions, esteem from artists for his collaborative efforts on their behalf, and praise from the commercial world for his economic savvy and technical development of chromolithography. Around 1851, Lemerrier took up photography, inviting the Bissons into his studios. Just one year later, together with three scientists, Lemerrier invented photolithography, a process that he manipulated in one form or another throughout his lifetime. See Jeff Rosen, 'Lemerrier et Compagnie: photolithography and the industrialization of print production in France, 1837–1859', Ph.D. dissertation, Northwestern University, Evanston, IL, 1988.

11 – The project was sold in 1853 'chez Masson, place de l'École de médecine, 17,' and was distributed by Gambart in London.

12 – The Belgian journal *Cosmos* reported regularly on the activities of the French Académie des sciences, for example noting the photographic activities of Rousseau and Deveria as early as 27 March 1852 (p. 413).

13 – *La Lumière*, 7 January 1854. For an overview of the award system of the Académie des sciences during the Second Empire, see Elisabeth Crawford, 'The prize system of the Academy of Sciences, 1850–1914', in *The Organization of Science and Technology in France, 1808–1914*, eds Robert Fox and George Weisz (London: Cambridge University Press, 1980), pp. 283–307. In the same years that the Academy of Sciences sponsored the Museum of Natural History's zoological project, it also financed projects to capture telescopic pictures of heavenly bodies photographically in order to help advance astronomy, as well as photo-microscopic depictions of micro-organisms to help advance microbiology. No matter the actual size of the object being reproduced, living or dead, near or far, photography homogenized

vision as a 'technology of miniaturization,' helping people master their world, as Walter Benjamin asserted 'A short history of photography'. in *Classic Essays in Photography*, ed. Alan Trachtenberg (New Haven: Leete's Island, 1980).

14 – Claude Marie François Niepce de Saint-Victor. *Recherches photographiques* (Paris: Alexis Gaudin et frère, 1855).

15 – *Photographie Zoologique, ou Représentations des Animaux rares des Collections du Muséum d'Histoire Naturelle*, par L. Rousseau, Aide Naturaliste au Muséum, et A. Deveria, peintre, conservateur adjoint au département des estampes de la Bibliothèque impériale (Paris: chez Masson, 1853), 2nd livraison, Preface.

16 – Niepce de Saint-Victor earned the serious attention of the Société d'encouragement as early as April 1848, when he won a gold medal and prize of encouragement of 2000 francs for his method of photogravure; M. Seguier, 'Rapport sur le concours pour le perfectionnement de la photographie', *Bulletin de la Société d'encouragement pour l'industrie nationale* (April 1848), pp. 195–200. The experience of falling behind to Niepce de Saint-Victor, incidentally, caused Joseph Lemerrier to answer this new technology with his own, he rushed to promote his own process, photolithography, before the Academy and the Société d'encouragement 'Correspondance', Séance du 2 mai 1853, *Comptes rendus des séances de l'Académie des sciences* (1853), 1, p. 785. Both Niepce de Saint-Victor's process and Lemerrier's were promoted as industrial processes in the coming years. For example, two photogravures from the album *Photographie Zoologique* that were achieved from Niepce de Saint-Victor's process, and one photolithograph from the album *Lithographie* using the new process of Joseph Lemerrier, both appeared in the February 1854 issue of the *Bulletin* of the Société d'encouragement.

17 – According to the journal, the rivalry between photography and the older graphic arts would be founded upon the production capabilities of the different processes, and were not solely dependent upon the photographic qualities of the new medium. In this way, quantity production was reasserted as an indispensable commercial component necessary for the publishing world.

Pour faire apprécier l'utilité de cette nouvelle application, il suffit de rappeler que toute épreuve photographique est altérable et d'un prix élevé; qu'il est très-difficile, sinon impossible, de mettre au jour une publication régulière, tant l'inconstance des tirages d'épreuves est grande et la perte considérable, qu'au contraire, par la gravure héliographique, lorsqu'une plaque d'acier a reçu l'image et que celle-ci y est fixée, l'impression ordinaire remplace le papier photographique, et une planche peut produire 3,000 épreuves

'Photographie Zoologique', *Bulletin de la Société d'encouragement pour l'industrie nationale* (1854), pp. 119–20. The figure of 3000 prints per edition proved to be an optimistic goal, especially as any such print run would risk some amount of compression and wear to the photographic plate. Lemerrier's process of photolithography was offered in response to the metal plate of photogravure, promising even greater numbers per edition owing to the strength and durability of the lithographic stone. For a discussion of this rivalry, see Jeff Rosen, 'Lemerrier and Compagnie'. On the logic of scientific and technical progress, see Jürgen Habermas, 'Technology and science as "Ideology"', in *Toward a Rational Society*, trans. Jeremy J. Shapiro (Boston: Beacon, 1970), pp. 81–122.

18 – *Photographie Zoologique*, 2nd livraison, Preface.

19 – On the importance of the museum displays in the Muséum d'histoire naturelle for institutionalizing a discourse of 'making the invisible visible', and for extending the discursive structures from the Muséum to the whole of the natural world, at least through the eyes of Ralph Waldo Emerson, see Lee Rust Brown, 'The Emerson Museum', *Representations*, no. 40 (Fall 1992), pp. 57–80.

20 – Fredric Jameson, *The Political Unconscious* (Ithaca: Cornell University Press, 1981).

21 - For a historical overview of the question of 'objectivity' in science, see Lorraine Daston and Peter Galison, 'The image of objectivity', *Representations*, no. 40 (Fall 1992), pp. 81-128. On photography, the authors write

One type of mechanical image, the photograph, became the emblem for all aspects of noninterventionist objectivity. Nonintervention, not verisimilitude, lay at the heart of mechanical objectivity, and this is why mechanically produced images captured its message best. Images had always been considered more direct than words, and mechanical images that could be touted as nature's self-portrait were more immediate still. Thus images were not just the products of mechanical objectivity; they were also its prime exemplars. (p. 120)

22 - Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century* (Cambridge, MA: MIT Press, 1990), p. 9

23 - *Ibid.*, p. 18

24 - *Ibid.*

25 - Camille Limoges, 'The development of the Muséum d'Histoire Naturelle de Paris', in Fox and Weisz, eds, *Organization of Science and Technology in France*, pp. 211-40. On the importance of Georges Cuvier's structuralist methods for determining the structure of the Muséum, its displays and its collections, see Brown, 'The Emerson Museum'.

26 - For this brief discussion I am indebted to Toby A. Appel's fascinating study, *The Cuvier-Geoffroy Debate: French Biology in the Decades before Darwin* (New York: Oxford University Press, 1987).

27 - *Ibid.*, p. 220

28 - Henri Milne Edwards, rapporteur, 'Zoologie - Rapport sur un ouvrage inédit, intitulé *Photographie Zoologique*, par M.M. Rousseau et Déverria', *Comptes rendus des séances de l'Académie des sciences* (6 June 1853), 1, p. 992.

29 - *Ibid.*, my emphasis.

30 - The entire historical moment surrounding the development, promotion and choice of subject-matter for *Photographie Zoologique* helps to illustrate William Ivins' thesis that when line drawings were increasingly replaced by photographs, especially for the reasons outlined by Henri Milne Edwards, photography became the norm for truth and objectivity in visual representations. As Ivins wrote, 'A faith was put in the photograph that had never been and could not be put in the older hand-made pictures'. William M. Ivins, Jr, *Prints and Visual Communication* [1953] (Cambridge, MA: MIT Press, 1980), p. 94. This faith, moreover, was used both to promote photography's potential for recording specimens objectively and also to denigrate the draftsman's craft; of course, the magnification of the photograph reveals photographic 'grain', while the magnification of the line drawing reveals surface texture, visual syntax and erasures.

31 - According to physical scientist Chevreul, Rousseau and Deverria's photogravures were considered 'purely photographic', a euphemism used commonly in the pages of *La Lumière* for signaling the authentic 'true' objectivity of the camera's image, as it was created without the potentially distorting hand of the artist commonly found in retouched images. 'Les épreuves obtenues par des procédés purement photographiques exigent pour le tirage beaucoup plus de temps, plus de précautions, et rien ne prouve encore qu'elles ne soient pas susceptibles d'éprouver quelque altération de la part d'une action prolongée de la lumière.' M. Chevreul, 'Correspondance. Séance du lundi, 5 septembre 1853', *Comptes rendus des séances de l'Académie des sciences* (1853), 11, p. 409.

32 - John Szarkowski, *The Photographer's Eye* (New York: Museum of Modern Art, 1966), n.p. ['The Frame'].

33 - See, for example, contemporary manuals such as Philip Henry Delamotte, *The Practice of Photography* (London: J. Dundall, 1853), and Robert Hunt, *A Manual of Photography* (London: J. J. Griffin & Co., 1853), esp. pp. 197-9.

34 - Meyer Schapiro, 'On some problems in the semiotics of visual art field and vehicle in image-signs', *Semiotica*, 1/3 (1969), pp. 223-42. On

postmodern manipulations of the frame used to explode the seeming stability of this semiotic structure, see Jeff Rosen, 'Strategies of containment: the manipulation of the frame in contemporary photography', *Asterunage*, 17/5 (1989), pp. 13-17.

35 - J. Ziegler, *Compte rendu de la photographie à l'Exposition Universelle de 1855* (Paris: l'auteur, 1855), p. 28. See also Ernest Lacan, *Esquisses photographiques à propos de l'exposition universelle et de la guerre orient* (Paris: Grassart, A. Gaudin, 1856).

36 - On Nègre, see Françoise Heilbrun, *Charles Nègre, photographe, 1820-1880* (Paris: Éditions des Musées nationaux, 1980), on Baldus, see Malcolm R. Daniel, *The Photographs of Edouard Baldus* (New York: Metropolitan Museum of Art, 1994); on Silvy, see Mark Haworth-Booth, *Camille Silvy: River Scene, France* (Malibu: J. Paul Getty Museum, 1992); on Le Gray, see Eugenia Parry Janis, *The Photography of Gustave Le Gray* (Chicago: Art Institute of Chicago and University of Chicago Press, 1987). For an overview, see Eugenia Parry Janis and André Jammes, *The Art of the French Calotype* (Princeton: Princeton University Press, 1983).

37 - On zoological illustration, see David Knight, *Zoological Illustration: An Essay towards a History of Printed Zoological Pictures* (Hamden: Archon, 1977), and S. Peter Dance, *The Art of Natural History: Animal Illustrators and their work* (Woodstock: Overlook, 1978), on commercial illustration as distinct from scientific illustration, see Harriet Ritvo, 'Animal pleasures: popular zoology in eighteenth- and nineteenth-century England', *Harvard Library Bulletin*, 33/3 (1985), pp. 239-79.

38 - Harriet Ritvo, 'Animal pleasures'. See also Robert J. Bezucha, 'The renaissance of book illustration', in Museum of Art and Archaeology, University of Missouri-Columbia, *The Art of the July Monarchy: France 1830-1848* (Columbia: University of Missouri Press, 1990), pp. 192-213, and Henri-Jean Martin and Roger Chartier, eds, *Histoire de l'édition française*, vol. 3. *Le temps des éditeurs. Du romantisme à la belle époque* (Paris: Promodis, 1985).

39 - Crary, *Techniques of the Observer*.

40 - Ainsi, avec les instruments dont les photographes se sont servis jusqu'à présent, on ne peut guère obtenir l'image que de corps suffisamment rigides pour rester immobiles dans une position verticale, et, par conséquent, les préparations anatomiques des parties molles des animaux ne peuvent être convenablement disposées pour l'obtention de bonnes figures photographiques, mais, pour lever cette difficulté, il suffirait d'installer l'instrument dans une position verticale, ou d'y adapter un prisme pour recueillir le faisceau lumineux envoyé par la pièce anatomique posée à plat et à une distance convenable au-dessous de la lentille. Il y aurait aussi beaucoup d'expériences à faire relativement au mode d'éclairage des objets, et aux moyens à l'aide desquels on pourrait peut-être corriger l'inégalité d'action de certaines couleurs sur le papier sensible.

Milne Edwards, 'Zoologie - Rapport', pp. 993-4.

41 - According to Louis Figuer, *Les applications nouvelles de la science à l'industrie et aux arts en 1855* (Paris: Victor Masson et Langlois et LeClerq, 1856), pp. 215-16, 'Avec cette chambre obscure renversée, on peut évidemment prendre l'impression photographique des pièces anatomiques et autres dans les conditions qu'exige leur reproduction. C'est grâce à l'emploi des lentilles simples et de l'appareil renversé, que M. Rousseau a pu obtenir des résultats d'une haute importance pour les applications futures de la photographie aux études scientifiques.' Figuer credits Rousseau, and not Milne Edwards, for the new device. See also Ernest Lacan, *Esquisses photographiques*, p. 68, where the new technique is described, but not named.

42 - Toby A. Appel, *The Cuvier-Geoffroy Debate: Camille Limoges, 'The development of the Muséum d'Histoire Naturelle de Paris, c. 1800-1914'*, in Fox and Weisz, eds, *The Organization of Science and Technology in France*, pp. 211-40.

43 - 'The 1500 mammals were represented in 500 species, the 6000 birds in 200 species, the 1800 reptiles in more than 700 species; the 5000 fishes in more than 2000 species, see Appel, *The Cuvier-Geoffroy*

- Debate*, pp 22–36, where this information is largely distilled from J. P. F. Deleuze, *Histoire de description du Muséum d'Histoire Naturelle* 2 vols (Paris, 1823). See also Frank Bourdier, 'Le Cabinet d'Histoire Naturelle du Muséum, 1635–1935', *Sciences*, no. 18 (March–April 1962), pp 35–50.
- 44 – Limoges, 'The development of the Muséum d'Histoire Naturelle de Paris', in Fox and Weisz, eds, *The Organization of Science and Technology in France*, pp 217–19.
- 45 – Lacan, *Esquisses photographiques*, p 38.
- 46 – Ezio Bassani and Letizia Tedeschi, 'The image of the Hottentot in the seventeenth and eighteenth centuries: an iconographic investigation', *Journal of the History of Collections*, 2/2 (1990), pp 157–86; Sander L. Gilman, 'Black bodies, white bodies toward an iconography of female sexuality in late nineteenth-century art, medicine, and literature', in 'Race', *Writing, and Difference*, ed Henry Louis Gates, Jr (Chicago: University of Chicago Press, 1985), pp 223–61.
- 47 – Les épreuves exposées par M. Louis Rousseau ont donc un grand intérêt au point de vue scientifique. Les unes sont destinées à ouvrir dans ce grand livre qu'il commence (et donc chaque page sera tracée par la photographie), le chapitre des diverses races humaines. Ce sont des types de Hottentots, Bochimans, homme et femme, pris sur nature vivante, avec tous les caractères qui distinguent cette singulière tribu. La race mongolique est représentée par le portrait d'un des Chinois qui ont habité quelque temps Paris l'an dernier, et la race caucasienne, par une tête de Russe, d'après nature morte. D'autres spécimens donnent l'image exacte d'un spongiaire et d'un zoophyte de la classe des polypes. M. Louis Rousseau, qui comprend largement la puissance et l'étendue des moyens que la photographie offre à la science, ne s'est pas contenté de l'appliquer à l'histoire naturelle proprement dite, il a voulu montrer qu'elle pouvait être également utile à l'anatomie des diverses parties du corps, et, par là, à la chirurgie et à la médecine.
- Lacan, *Esquisses photographiques*, pp 67–8.
- 48 – Douglas Crimp, 'On the museum's ruins', in *The Anti-Aesthetic*, ed Hal Foster (Port Townsend: Bay, 1983), p. 50.
- 49 – According to Benjamin, '[The collector's] existence is tied . . . to a very mysterious relationship to ownership . . . , also, to a relationship to objects which does not emphasize their functional, utilitarian value. The most profound enchantment for the collector is the locking of individual items within a magic circle in which they are fixed as the final thrill, the thrill of acquisition, passes over them. Everything remembered and thought, everything conscious, becomes the pedestal, the frame, the base, the lock of his property.' Walter Benjamin, 'Unpacking my library', in *Illuminations*, ed Hannah Arendt, trans Harry Zohn (New York: Schocken, 1969), p. 60. On the role of the assembled collection to create 'objects of desire', a continual need for objects to be collected and consumed as souvenirs and 'collectibles', see Susan Stewart, *On Longing: Narratives of the Miniature, the Gigantic, the Souvenir, the Collection* (Durham: Duke University Press, 1993).
- 50 – On the mimetic and metonymic functions of museum displays and photography, especially in terms of the imperial world-view of representing colonial subjects, see Benedict Anderson, *Imagined Communities*, 2nd edn (London: Verso, 1991), esp. chapter 10 'Census, map, museum'; and Michael Taussig, *Mimesis and Alterity* (London: Routledge, 1993).
- 51 – For a historical overview of ways that natural history museums exhibited the fragment to stand for the whole, and how conclusions of 'primitiveness' were incorporated into museum displays of non-Western peoples, see Barbara Kirshenblatt-Gimblett, 'Objects of ethnography', in *Exhibiting Cultures: The Poetics and Politics of Museum Display*, eds Ivan Karp and Steven D. Lavine (Washington: Smithsonian Institution Press, 1991), pp 386–443; and Annie E. Coombes, 'Museums and the formation of national and cultural identities', *Oxford Art Journal*, 11/2 (1988), pp 57–68.
- 52 – Figuer, *Les applications nouvelles de la science à l'industrie et aux arts en 1855*, p 216.
- 53 – Bassani and Tedeschi, 'The image of the Hottentot in the seventeenth and eighteenth centuries', Gilman, 'Black bodies, white bodies', Mary Louise Pratt, *Imperial Eyes: Travel Writing and Transculturation* (London: Routledge, 1992), esp. pp 44–53.
- 54 – Richard D. Altick, *The Shows of London* (Cambridge, MA: Harvard University Press, 1978), esp. pp. 268–73; Gilman, 'Black bodies, white bodies', pp. 231–40.
- 55 – 'Ces deux individus figuraient dans les représentations de l'Hippodrome, où ils étaient assez peu remarqués. Mais la science avait des moufs d'être moins indifférente que la foule, et elle s'est empressée de relever le type de cette irrécusable postérité de la Vénus hottentote. On peut reconnaître, sur l'épreuve photographique, la particularité d'organisation qui distingue cette race, et s'assurer, de visu, de l'authenticité de la prééminence anatomique qui appartient à cette tribu.' Figuer, *Les applications nouvelles de la science à l'industrie et aux arts en 1855*, p. 216.
- 56 – Edward Said, 'Representing the colonized: anthropology's interlocutors', *Critical Inquiry*, 15 (Winter 1989), p. 207; *idem*, *Orientalism* (New York: Random House, 1978), esp. pp 38–45.
- 57 – These phrases are Said's, 'Representing the colonized', pp 211, 217. These cultural facts were established first by the Muséum d'histoire naturelle, long before such artifacts were moved from the Muséum d'histoire naturelle in 1878 to the new Musée d'ethnographie du Trocadéro. Nélia Dias, *Le Musée d'ethnographie du Trocadéro, (1878–1908), Anthropologie et Muséologie en France* (Paris: Centre National de la Recherche Scientifique, 1991). As Dias points out (p. 21), anthropology arrived at the Muséum d'histoire naturelle in 1855 in the person of the first Chair of Anthropology, Armand de Quatrefages. In 1859 an organized professional society was formed, and 9 years later an anthropological laboratory was established at the École pratique des hautes études. The year 1866 saw the first international congress of anthropology and archaeology in Neuchâtel; 1872 the first issue of the *Revue Anthropologique*, and 1876 the founding of the École d'anthropologie de Paris. The developments discussed here would seem to predate the 'colonial mission' of the Muséum d'histoire naturelle as it was described by Limoges, who traced the supposed origins of this historical activity to the 1890s; 'The development of the Muséum d'histoire naturelle', in Fox and Weisz, eds, *The Organization of Science and Technology in France*, pp 235–9.
- 58 – Douglas Crimp, *On the Museum's Ruins* (Cambridge, MA: MIT Press, 1993), p 225.
- 59 – The issue of an object's 'cultural identity' is addressed with respect to African objects in Sally Price, *Primitive Art in Civilized Places* (Chicago: University of Chicago Press, 1989), esp. pp 84–8. See also Marianna Torgovnick, *Gone Primitive: Savage Intellectuals, Modern Lives* (Chicago: University of Chicago Press, 1990).
- 60 – Benedict Anderson, *Imagined Communities*.
- 61 – Said, *Orientalism*, pp 140–2.
- 62 – According to Said, 'In his treatise [on Semitic languages], Renan adopted a tone of voice and a method of exposition that drew the maximum from book-learning and from natural observation as practised by men such as Cuvier and Geoffroy Saint-Hilaire *père et fils*. This is an important stylistic achievement, for it allowed Renan consistently to avail himself of the *library*, rather than either primitivity or divine fiat, as a conceptual framework in which to understand language, together with the *museum*, which is where the results of laboratory observation are delivered for exhibition, study, and teaching.' Said, *Orientalism*, p 141.
- 63 – Ernest Renan, 'What is a Nation?' trans. Martin Thom, in *Nation and Narration*, ed. Homi Bhabha (New York: Routledge, 1990), pp 8–22.
- 64 – Anderson, *Imagined Communities*, p 184.
- 65 – *Ibid*.