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The Enlightened Image of Nature in the Dutch East Indies: Consequences of Postmodernist Doctrine for Broad Structures and Intimate Life

ABSTRACT

Eighteenth-century natural-history illustration in the Dutch East Indies reveals verisimilitude as a goal shared between colonial artists and their counterparts in Europe. Natural-history images more generally exhibit common styles in the world settled and dominated by Europeans. Apparently dramatic differences in the local settings of the artists produced only trivial variations in representing nature pictorially, in just the way that astronomy and physics in the European colonies and spheres of influence departed hardly at all from European practice. The overwhelming strength of disciplinary norms, in science and in art, is the standard explanation for this circumstance. An alternative explanation from social history is proposed. It centers on the hypothesis of a homology between households in colonial settings and in Europe. The alternative explanation implies that both the observatory and the artist's workshop were insensitive to superstructural variation in costume and architecture, as well as variation in climate and cuisine. The hypothesis behind the alternative explanation, designated by the term *complementarity*, derives directly from the postmodernist dictum that ideas are extrusions of social interactions. Nevertheless, just as the strength of disciplinary norms is unresolved in postmodernist doctrine, so complementarity directly challenges the postmodernist predilection for affirming the distinctiveness of colonial cultures.

KEY WORDS: postmodernism, art, painting, social history, exact sciences, nature, imperialism, relativism, colonial exceptionalism

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VERISIMILITUDE

More than two generations ago, the great historian Jacob Cornelis van Leur, himself victim of an imperialist war, concluded that the eighteenth century as a category is “useless as an instrument for ordering the facts” of Indonesian history. “None of the essential elements of the category in Europe find any reflection in Asia. Two equal civilizations were developing separately from each other, the Asian in every way superior quantitatively.” Van Leur continued, offering what has become a standard explanation for Western dominance of the world: “The equality remained as long as the magic poison of modern capitalism had not yet enchanted Europe and northeastern America to produce steam, mechanics, and grooved cannon.”¹ Many of our deepest interpretations of European imperialism extend back to his analysis.²

With apologies to Van Leur, the following pages consider one feature of the Dutch enclaves in Indonesia that, in the last decades of the East India Company, progressively extended their political influence. The focus, however, is on neither steam nor cannon. It concerns science and art, with special reference to the natural world in the Dutch East Indies. I emphasize the similarity between Enlightenment images of the Dutch East Indies and the Low Countries, a similarity also seen in the exact sciences. In the background are Enlightenment values, as they are represented in the late Dutch Republic. In the foreground is a commentary on nearly twenty years of postmodernist writing. I contend that, to account consistently for the similarity of artistic and scientific expression, postmodernists, if they reject the dominant role of norms in learned disciplines, must acknowledge a close resemblance between particular kinds of social relations in the colonies and in Europe.³ The latter homology, however, necessarily challenges the postmodernist view that colonial societies were fundamentally distinct from European society.

The following pages connect natural-history imagery with conclusions regarding the exact sciences. In the instances examined here—undertakings by

1. J. C. van Leur, *Indonesian Trade and Society: Essays in Asian Social and Economic History*, trans. James S. Holmes and A. van Marle (The Hague: W. van Hoeve, 1955; Dordrecht: Foris, 1983), 284–85.

2. The literature is best entered by reading the pages of the periodical *Itinerario*, edited at the Institute for the History of European Expansion, University of Leiden.

3. Ernst Breisach, *On the Future of History: The Postmodernist Challenge and Its Aftermath* (Chicago: University of Chicago Press, 2003), provides a balanced discussion. For present purposes, postmodernism maintains the denial of universals, whether with regard to human values or truths about nature.

Europeans—the enterprises of both art and science seem to be largely independent of place. This circumstance in the realms of scientific experiment and calculation has been explained by the strength of disciplinary norms. The alternative proposal made presently is that the circumstance would also follow from a homology in particular living conditions, notably the expression of authority in the observatory and in the family. If the latter point is admitted—if relations of “power” on an intimate level are comparable in Europe and in the European colonies—then a good deal of colonial and postcolonial exceptionalism must be abandoned. Such an argument, appropriately extended, would help explain the distinct manifestations of modern science in China and Saudi Arabia.

Connecting imagery with exact reasoning, currently receiving much attention, is not a new project.⁴ It recalls, for example, George Sarton’s view, expressed in his early obsession with Leonardo, that art and science are complementary poles of creative expression. Connecting culture with society also extends back into the twentieth century (for example, the writings of Antonio Gramsci and Raymond Williams). A number of works of recent scholarship, to be discussed shortly, jump back and forth between culture and society, an ecumenical sensibility that may be the most significant scholarly legacy of the past generation.

I begin with a focus on verisimilitude during the eighteenth century. During the Enlightenment, there was a clear desire to display the qualities of the world *in puris naturalibus*. One expression of the desire is found in the detailed description of complex machinery in the *Encyclopédie* and in other works, allowing a careful artisan to construct the object in question. Another expression of the desire, and the one under discussion in the following pages, is the enterprise of capturing a likeness of objects and places as they might be recognized by a traveler. Just as the exact proportions of glass globes or wooden frames depicted in Denis Diderot’s anthology might not be found in any particular machine, so the static, two-dimensional landscape image of a harbor or a city might not have featured the animated people and moving conveyances, the rising dust and windblown branches, the sudden passage of clouds before the sun, the continual ebb and flow of reality in the raw that confronted the artist at a particular instant in time—even if creating such an illusion were the artist’s goal. Enlightenment science and art, in their disciplines, used particular

4. Peter Galison, *Image and Logic: A Material Culture of Microphysics* (Chicago: University of Chicago Press, 1997), for a recent study of measuring instruments in the twentieth century.

instances—whether astronomical observations, laboratory experiments, anatomical dissections, or botanical illustrations—to generalize.

Verisimilitude recovers the notion of *imitatio*, in its medieval, Christian form and its classical expression. In the famous formulation of Erwin Panofsky, before the fifteenth century, the function of painting was “the reproductive imitation of reality,” which the Renaissance “extended to the rational organization of form” according to the secret doctrines of the ancients. Panofsky called the process a “re-creative imitation of nature.”⁵ Panofsky’s contemporary Hans-Georg Gadamer elaborated: “Imitation is a concept that originated in antiquity, but it attained its aesthetic and cultural peak in the French classicism of the seventeenth and eighteenth centuries before then exercising an influence on German classicism. This movement focused on art as the imitation of nature.” Imitation embodied “the conviction that in a perfect work of art the very forms of nature should appear before us in all their purity, and the belief in the idealizing capacity of art to perfect nature.” Gadamer discounted “the trivial theory associated with extreme naturalism, according to which the meaning of art lies in straightforward faithfulness to nature. This idea has nothing to do with the traditional concept of imitation.”⁶

Widespread interest in verisimilitude, late in the eighteenth century, is revealed in the popular manuals for artists published by John Robert Cozens and Robert Hills, providing illustrations of trees and animals “for use of paintings and drawings” (1771) and “for the embellishment of landscape scenery” (1806–1816).⁷ It is true that, in the 1840s, John Ruskin argued precisely for extreme naturalism, for “the necessity as well as the dignity, of an earnest, faithful, loving study of nature as she is.” Yet Ruskin’s own paintings, in their harmony and generality, derive from the eighteenth-century tradition of verisimilitude.⁸ Ruskin’s contemporary John Constable, with his meticulous study of clouds, was also a painter of verisimilitude. Constable’s representation of the Salisbury Cathedral, for example, exists in several versions under a distinct mood of the sky.⁹

5. Erwin Panofsky, *Renaissance and Resuscitations in Western Art* (New York: Harper & Row, 1972), 27–28.

6. Hans-Georg Gadamer, *The Relevance of the Beautiful and Other Essays*, ed. Robert Bernasconi, trans. Nicholas Walker (Cambridge: Cambridge University Press, 1986/2002), 94.

7. David Lank, *Paintings from the Wild: The Art and Life of George McLean* (Toronto: Brownstone Press, 1981), 17–18.

8. Malcolm Andrews, *Landscape and Western Art* (Oxford: Oxford University Press, 1999), 183.

9. John E. Thornes, *John Constable’s Skies: A Fusion of Art and Science* (Edgbaston: University of Birmingham Press, 1999), 126–28.

To contend that everything we talk about is negotiated, to say that all is interconnected, would be unhelpful. People in the Enlightenment knew, as we know, that a daffodil is not a rose, and a robin is not a falcon; that to take prey on the run is to aim an arrow or point a musket where the prey shall be; that sailing home safely to port requires a knowledge of wind and how to catch it. For those who claim that verisimilitude is merely a cultural artifact, the challenge remains to show how things could have been otherwise. Are late eighteenth-century herbals seriously flawed for having been conceived and executed in Europe?

A review of portraiture, still-life, and landscapes in the Dutch Republic reveals a fervent desire to represent the human and the natural world accurately and pleasingly. By the eighteenth century, Dutch canvases showed that the world and its forces were large compared with human accomplishments, but there was a harmony of form between buildings, trees, sky, and water. Nature was a system, whether Newtonian, Cartesian, or Linnaean, as regular in its beat as a pendulum clock. The system conformed to human sensibilities, in the manner of dikes and sluices controlling the countryside. Harmony was evident even in tempests and in battles.

It might be contended that harmony in composition subverts mimesis in the elements of design. This approach to commentary on European art, however, makes little sense before High Modernism, when the premise of two-dimensional art as imitating three-dimensional reality was contested, when, in the opinion of Peter Gay, “painters had subverted the ancient imperative of replicating nature” and when sculptors “discarded any intentional resemblance as an abject surrender to outworn neoclassicism.”¹⁰ Erich Auerbach famously commented that the literary interpretation of reality through imitation, mimesis, extends back to Dante and Plato. Auerbach’s extension backwards, where he identified high, middle, and low realism, the same as Gay’s projection forwards, is not directly relevant for addressing eighteenth-century verisimilitude.¹¹ The aesthetic of harmony as it would appear in verisimilitude, to apply the view of Michael Lynch and

10. Peter Gay, *Modernism, The Lure of Heresy: From Baudelaire to Beckett and Beyond* (New York: Norton, 2008), 170, 173.

11. Erich Auerbach, *Mimesis: The Representation of Reality in Western Literature*, trans. Willard R. Trask (Princeton, NJ: Princeton University Press, 1953), 554. Auerbach continues to excite the critical imagination: Robert Doran, “Literary History and the Sublime in Erich Auerbach’s *Mimesis*,” *New Literary History* 38 (2007): 353–69; Frank R. Ankersmit, “Why Realism? Auerbach on the Representation of Reality,” *Poetics Today* 20 (1999): 53–75. Realism in belles lettres is not addressed in the present text.

Samuel Y. Edgerton, Jr., regarding late twentieth-century astronomy, “is the very fabric of realism: the work of composing visible coherences, discriminating differences, consolidating entities, and establishing evident relations.”¹² What shall be relevant in the present context is the observation that autochthonous art in Southeast Asia, during the eighteenth century, differed dramatically from art in the European tradition.

In the Enlightenment, artifice represented nature, whether in the picture of an animal or flower, on the one hand, or in a marvelous mechanical toy (air-pump, fountain, or electrical machine), on the other hand; visual representations located precisely what in the world one wished to talk about.¹³ The association of verisimilitude and the Enlightenment recalls Ernst H. Gombrich’s analogical elaboration of realism in painting and Hayden White’s affirmation that “the nature of ‘realistic’ representation . . . is *the* problem for modern historiography.”¹⁴ Enlightenment verisimilitude is captured by Martin Rudwick’s comment that pictures of nature then were made “with all the realism of contemporary still-life art,” and Claudio Greppi’s emphasis on the “new spirit of observation” in painting from nature over the early Romantic period, referenced in a remark by the court artist of Ferdinand IV in Naples, about landscape artists “reproducing nature without mannerisms.”¹⁵ Robert Hoozee recently summarized:

12. Lynch and Edgerton, 1988, quoted in Elizabeth A. Kessler, “Resolving the Nebulae: The Science and Art of Representing M51,” *Studies in History and Philosophy of Science* 38 (2007): 477–91, on 489.

13. A large literature discusses connections between artistic style and science, in particular times and places, but the terrain is only beginning to be known. Is Impressionism or is Symbolism in painting related at all to the high-point of classical mechanics in the nineteenth century, with its overwhelming concern for precise measurement and for defining physical constants? With respect to one style in the background of the present text, the Baroque has been identified as antithetical to modern science. Jens Høyrup, *Baroque Mind-Set and New Science: A Dialectic of Seventeenth-Century High Culture*, preprint no. 359 (Berlin: Max Planck Institute for the History of Science, 2008).

14. For an update on Gombrich, Dominic Lopes, “Pictorial Realism,” *Journal of Aesthetics and Art Criticism* 53 (1995): 277–85; Hayden White, *Metahistory: The Historical Imagination in Nineteenth-Century Europe* (Baltimore: Johns Hopkins University Press, 1973), 3. Gombrich’s debt in *Art and Illusion* to Karl Popper discussed in Ernst Gombrich, Hayden White, Allen W. Wood, Theodore M. Brown, David I. Grossvogel, and Robert Matthews, “Interview: Ernst Gombrich,” *Diacritics* 1, no. 2 (1971): 47–51. Gombrich’s analogical approach to realistic painting in G. McIntosh, “Depiction Unexplained: Peacocke and Hopkins on Pictorial Representation,” *British Journal of Aesthetics* 43 (2003): 279–88, on 287.

15. Martin Rudwick, “Picturing Nature in the Age of Enlightenment,” *Proceedings of the American Philosophical Society* 149 (2005): 279–303, on 303; Claudio Greppi, “‘On the Spot’:

The observation from which painters of both grand and more everyday landscapes drew their strength and originality involved great attention to detail and to natural phenomena, which kept pace with the empirical sciences. . . . The isolation of landscape details was a direct way of approaching the motif and studying it as an autonomous fact, outside the usual classic formulae.¹⁶

The great attention to detail in nature was, from the eighteenth century into the early nineteenth century, a virtue to be possessed in books and prints as well as in paintings, leading to the extraordinary publications of flowers and animals by Pierre-Joseph Redouté and John James Audubon. Handasyde Buchanan has written about the great florilegia: “The rapid exploration of the world provided the *raison d’être*, the occasion for the flower book; the wealthy and cultured patrons furnished a ready market; the mechanical processes provided the physical possibility. . . . The combination of money, interest, leisure and lack of distractions was never again present all at the same time.”¹⁷

By the first decade of the nineteenth century, the system of nature was based on both *elements* and *processes*. On the one hand, elements are clear in the legacy of two “els,” Linnaeus and Lavoisier. The system of nature could be harvested and cured or transformed to produce mood-altering ingestibles: spices, tobacco, cocoa, coffee, sugar, gin, and rum, along with Paracelsian laudanum. Much of this sensual delight, with Amsterdam as an epicenter of distribution, became widely available during the Enlightenment. On the other hand, processes are found in the writings of a third “el,” Laplace, and in a concomitant desire to announce eternal laws of nature. From this desire to dispossess God as law-giver, it can be concluded, came the *dénouement* of classical mechanics and the principles of thermodynamics.

Charlotte Klouk has contended that scientists and artists made common cause in observing and accurately representing each part of nature.¹⁸ To describe painting in the eighteenth and early nineteenth centuries, she prefers the

Traveling Artists and the Iconographic Inventory of the World, 1769–1859,” in *Tropical Visions in an Age of Empire*, ed. Felix Driver and Luciana Martins (Chicago: University of Chicago Press, 2005), 23–42, on 32–35.

16. Robert Hoozee, “Observation of Landscape,” in *British Vision: Observation and Imagination in British Art 1750–1950*, ed. Hoozee (Brussels and Ghent: Museum voor Schone Kunsten/Mercatorfonds, 2007), 180–85, on 183.

17. Handasyde Buchanan, *Nature into Art: A Treasury of Great Natural History Books* (New York: Mayflower, 1979), 78.

18. Charlotte Klouk, *Science and the Perception of Nature: British Landscape Art in the Late Eighteenth and Early Nineteenth Centuries* (New Haven, CT: Yale University Press, 1996).

term *phenomenalism* to the term more commonly used by art historians, *naturalism*. Among British painters, she proposes a change, across these years, from a static or “classical” view of nature in equilibrium, represented in Thomas Gainsborough’s landscapes, to a personal view of nature from the painter’s eye, in John Constable’s work. She rejects the notion that painters sought to represent nature, distinct from our perception of it, as it “really is.”

The contrast between Gainsborough’s *Wooded Landscape with a Seated Figure* (1747) and Constable’s *Flatford Mill* (1817), which sets the tone for Klontk’s analysis, is better seen as a distinction between Gainsborough’s idle, undeveloped forest observed by a gentleman in knee breeches, on the one hand, and Constable’s active, interventionist picture of English industrialization, on the other hand. The mill in Constable’s painting lies vaguely in the distance. What Constable shows us is a canal with locks—the highway of the Industrial Revolution—in which a man is poling a barge to be connected with a towline; a child in trousers is mounted on the horse that shall pull the barge. The open land on the sides of the canal features only the remnants of a forest. The significant point is that neither of these two paintings offers trees as either medieval formulas or twentieth-century abstractions. In each case a story is being told, but angels and demons are noticeably absent from it.¹⁹

Charlotte Klontk offers no grand explanation for the flowering of phenomenalism.²⁰ From the present perspective, industrialization surely must be taken into account. So, too, Lavoisier and Laplace, who are nearly absent from Klontk’s study, with their focus on exact measurement of nature and the description of nature by continuous, differential equations.²¹ However these epoch-making innovations are understood (we know them as classical chemistry and classical mechanics), they aimed to eliminate a subjective or perspectivist approach to understanding nature. Klontk’s treatise is able to get as far as it does because, in it, science centers on the qualitative, quasi-theological speculations of geologists, which hinged on fractious and fragmentary evidence.

When Romanticism washed over Europe, a new relation between painting and the scientific representation of nature occurred. Much of science, notably

19. José M. López Piñero, *Juan Bautista Bru de Ramón: El atlas zoológico, el megaterio y las técnicas de pesca valencianas 1742–1799* (Valencia, Spain: Ayuntamiento de Valencia, 1996), for the persistence in the eighteenth century of formal zoological representations and of describing fantastic paradoxes—in striking contrast to the new interest in verisimilitude.

20. Klontk, *Science and the Perception of Nature* (ref. 18), 2–3, 149; see also p. 89 for passing mention about the central image of a steamboat in Turner’s *Staffa, Fingal’s Cave* (1832).

21. *Ibid.*, 150–51, for an allusion.

in the mathematical and physical disciplines, rejected Johann Wolfgang von Goethe and Samuel Taylor Coleridge, driving art toward a spiritual and technical *Sonderweg*. Verisimilitude became the domain of science, rather than art— notwithstanding the claims of radical painters to have captured what they saw. John Ruskin defended J. M. W. Turner's impressionistic painting *Snow-Storm* as an exemplar of naturalism, suggesting that, even as painters left verisimilitude behind, they enlisted Nature as an ally.²² The imitation of reality promised to improve the life of ordinary people, who purchased natural-history illustrations and likenesses of famous figures, later photographs, issuing from technical innovations like lithography and steel engraving.²³ Scientific verisimilitude is found in late nineteenth-century natural-history dioramas, which offered museum visitors a three-dimensional illusion of seeing plants and animals in a typical environment.²⁴ Scientific verisimilitude is exemplified in Etienne-Jules Marey's chronophotography, which revealed for the first time the mechanics of animal gait and feathered flight.²⁵

Verisimilitude is central to William Eisler's survey of art depicting the South Pacific in the seventeenth and eighteenth centuries, where Eisler sees a "freshness and intensity which is absent from studies of a later time."²⁶ It is not far from

22. Andrews, *Landscape* (ref. 8), 182. The irony of Ruskin's credo, leading into the hyperrealism of Ford Madox Brown and the Pre-Raphaelites, is captured by Timothy Hyman in "Between the Meticulous and the Mad," in Hoozee, ed., *British Vision* (ref. 16), 17–19. John Theodore Merz imagined that Ruskin, along with Goethe, could reunite the "two distinct and seemingly different aspects of nature" represented by nineteenth-century science and art. Merz, *A History of European Thought in the Nineteenth Century* (Edinburgh: William Blackwood and Sons, 1904–1912; New York: Dover, 1965), 3: 626.

23. Lewis Pyenson and Susan Sheets-Pyenson, *Servants of Nature: A History of Scientific Institutions, Enterprises, and Sensibilities* (London: HarperCollins; New York: W. W. Norton, 1999), 229–34.

24. Karen Wonders, *Habitat Dioramas: Illusions of Wilderness in Museums of Natural History* (Uppsala: Almqvist & Wiksell, 1993), the dioramist rejection of Impressionist and *plein-air* techniques on 199.

25. Marey's stop-action photography is the subject of periodical retrospectives among art historians. Marta Braun, *Picturing Time: The Work of Etienne-Jules Marey (1850–1904)* (Chicago: University of Chicago Press, 1992); Dominique de Font-Réaulx, Thierry Lefebvre, and Laurent Mannoni, eds., *E. J. Marey: Actes du colloque du centenaire* (Paris: Arcadia, 2006). Robert M. Brain, "Representation on the Line: Graphic Recording Instruments and Scientific Modernism," in *From Energy to Information: Representation in Science and Technology, Art, and Literature*, ed. Bruce Clarke and Linda Dalrymple Henderson (Palo Alto, CA: Stanford University Press, 2002), 155–77, focuses on Marey's laboratory instruments for graphing (the illustrations of Marey's graphing devices are in the line of verisimilitude).

26. William Eisler, *The Furthest Shore: Images of Terra Australis from the Middle Ages to Captain Cook* (Cambridge: Cambridge University Press, 1995), 156.

the interpretation by H. Walter Lack and Victoria Ibáñez of mimetic color and design in the works of three distinguished, eighteenth-century illustrators who were active in the colonial ambit, and verisimilitude is echoed in Luciana Martins's expression of the eighteenth-century and nineteenth-century desire "to embrace the world by rendering its image faithfully on paper."²⁷ Felix Driver concludes a long survey of recent scholarship about painting and colonial extension with the mimetic impulse: "What we witness from the mid-eighteenth century . . . is the refinement of a whole methodology of field observation, designed to ensure that reliable and unvarnished information could be collected, stored and eventually transmitted back to the centre" of empire.²⁸

When Europeans overran the world, they brought along their sensibilities, and verisimilitude is surely one of these. For William Beinart and Lotte Hughes, "most nineteenth-century art by settlers and travelers is seen to reproduce European styles in new environments."²⁹ Their view is shared by George Stocking, Jr., who, in a revealing discussion of social Darwinism in nineteenth-century British colonies, observes "a close articulation, both experiential and ideological, between the domestic and the colonial spheres of otherness." Colonial missionaries, colonial civilizers, colonial exploiters, and colonial warriors all carried with them the social relations and the prejudices that were current in Great Britain. "Both those who traveled overseas and those who read the literature they produced reacted to the experience of 'savages' abroad, whether direct or vicarious, in terms of prior experience with the changing class society of Great Britain."³⁰

This interpretation of European painting fits seamlessly with painting by Europeans in eighteenth-century and early nineteenth-century Java. The images of Johannes Rach, H. J. Wardenaar, and Jan Brandes, all active in the Dutch East Indies, are in form indistinguishable from European landscapes.³¹ In the way of

27. H. Walter Lack and Victoria Ibáñez, "Recording Colour in Late Eighteenth Century Botanical Drawings: Sydney Parkinson, Ferdinand Bauer and Thaddäus Haenke," *Curtis's Botanical Magazine* 14, no. 2 (2003): 87–100; Luciana Martins, "A Bay to Be Dreamed Of: British Visions of Rio de Janeiro," *Portuguese Studies* 22 (2006): 19–38, on 37.

28. Felix Driver, "Imagining the Tropics: Views and Visions of the Tropical World," *Singapore Journal of Tropical Geography* 25 (2004): 1–17, on 7, 14. Extensive discussion of map-making and its ills in Lewis Pyenson, *Empire of Reason: Exact Sciences in Indonesia, 1840–1940* (Leiden: Brill, 1989); and Lewis Pyenson, *Civilizing Mission: Exact Sciences and French Overseas Expansion, 1830–1940* (Baltimore, MD: Johns Hopkins University Press, 1993).

29. William Beinart and Lotte Hughes, "Empire and the Visual Representation of Nature, 1860–1960," *History Compass* 6, no. 5 (2008): 1177–93, on 1183.

30. George W. Stocking, Jr., *Victorian Anthropology* (New York: Free Press, 1987), 234.

31. Their paintings in Seymour Slive, *Dutch Painting, 1600–1800* (New Haven, CT: Yale University Press, 1995); Kees Zandvliet, ed., *The Dutch Encounter with Asia, 1600–1950* (Amsterdam and Zwolle: B. V. Waanders, 2002); Max de Bruijn and Remco Raben, *The World of Jan Brandes, 1743–1808*

European painting, their mood is variously celebratory, didactic, or somber; their perspective is one-point; their faces are not masks; their verdure is green. Other styles and moods stood before these artists, whether in sacred or secular settings; Wardenaar portrayed indigenous styles, notably stone carvings, in his paintings,³² and Brandes captured Javan celebrations. The artists represented these moods and designs without capitulating to local traditions, without transforming their canvas into an abstract batik, without representing the world as if it were populated with *wayang* puppets (Figs. 1a and 1b). We see nothing at all comparable to the African style that emblazoned Pablo Picasso's early twentieth-century painting.³³

Wardenaar, commissioned by the governor of Java's North-East Coast to record the countryside in 1805, included himself in an illustration of the highlands of the Probolinggo Regency (Fig. 2). In the image, he sits in a fine chair of European design, dressed in fashionable European attire, sketching distant mountains. There is a nearby carriage. A Javan, elegantly attired with a kris in his waistband, bends over the worktable. A servant holds a parasol and cares for a large dog. Next to the artist at work is a large stack of baled sugar cane. Before him are cane fields. In the middle distance is a town, and in the far distance the cone of a volcano. Palms are the dominant vegetation. We may read the painting as a record of wealth and order, for the artist is the guest of a local regent. The painting is conventionally European. In form if not in execution, it resembles more accomplished images from other European travelers of the period, for example, artists on the expedition of Jean-François Galaup de Lapérouse.³⁴

A sense of naturalism comes from a painting of the garden of the regent of Probolinggo, attributed to Wardenaar (Fig. 3). The regent was the autochthonous aristocrat who cooperated with the Dutch administrators in the way that European aristocrats cooperated with invading, European conquerors. The regent is possibly the figure standing next to Wardenaar in Figure 2. The central pavilion in the painting, in its undulations and arches, is clearly not a Dutch

(Amsterdam and Zwolle: B. V. Waanders, 2004); Max de Bruijn and Bas Kist, *Johannes Rach 1720–1783: Artist in Indonesia and Asia* (Jakarta: National Library; Amsterdam: Rijksmuseum, 2001).

32. Sarah Tiffin, "Java's Ruined *Candis* and the British Picturesque Ideal," *Bulletin of the School of Oriental and African Studies* 72 (2009): 525–58, for the picturesque modification of Wardenaar's illustration of a temple ruin by the British artist of Thomas Stamford Raffles's *History of Java*, on 537–40; the modification suggested that Java had a grand past which could have been revived productively by the British, on 555.

33. Laurence Madeleine and Marilyn Martin, eds., *Picasso and Africa* (Cape Town: Bell-Roberts, 2006).

34. John Dunmore and Maurice de Brossard, eds., *Le voyage de Lapérouse 1785–1788* (Paris: Imprimerie nationale, 1985), 2 vols., the images made by *lieutenant de frégate* Blondela and *dessinateur de figures et paysages* Gaspard Duché de Vancy.



FIGURE 1A. *Wayang kulit* puppet, silhouette, Bima. Source: © The author.



FIGURE 1B. *Wayang kulit* puppet, silhouette, possibly Arjuna, one of the Pandawa family.
Source: © The author.



FIGURE 2. H. J. Wardenaar, "Tekening in aanzicht van het gebergte van het regentschap Probolinggo," color aquarelle, 1805. *Source:* Nationaal Archief, Amsterdam, no. G1.20.

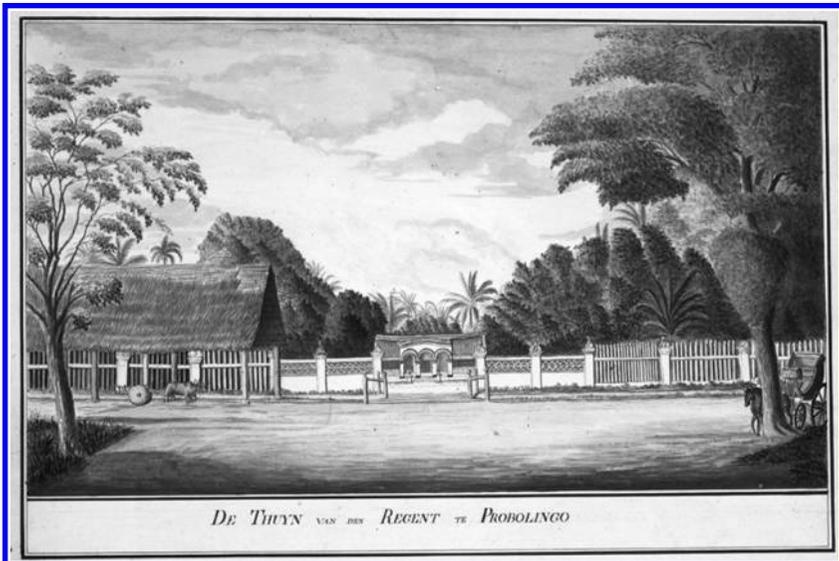


FIGURE 3. Collection of Nicolaus Engelhard, attributed to H. J. Wardenaar, "Tekening in aanzicht van de tuin van de regent te Probolinggo," early nineteenth century, color aquarelle. *Source:* Nationaal Archief, Amsterdam, no. G1.16.



FIGURE 4. Johannes Rach, "Het gezigt van Indramago boven Buytenzorg," 1770. *Source:* Rijksmuseum, Amsterdam, no. NG-400-O.

design; nor is the geometrically adorned fence. A carriage and a tandem cart provide a sense of perspective. Trees in the regent's garden seem to grow this way and that. Some of the large palms behind the pavilion are laden with fruit. Wardenaar seems not to have been a transient, for ten years later he was listed as a clerk to the civil architect in Batavia.³⁵

A generation earlier, Johannes Rach produced similar kinds of illustration for West Java. His image of Indramago near Buitenzorg (Bogor) shows an equestrian colonial with several groups of Javans and colonials awaiting the arrival of a carriage, preceded by mounted trumpeters. Buildings are roofed and fenced in traditional fashion. The trees are, it seems, Javan (Fig. 4). Rach portrayed the scene in Buitenzorg differently. The governor's residence occupies the center of the image, and it substitutes for the presence of Europeans. In the foreground is a Javan farmer herding buffalo. There are orderly plantings behind a wall. Enough detail is provided so that some of the cultivars can be identified (Fig. 5). The composition for the governor's residence is also used in Rach's drawing, from the early 1770s, of the astronomical observatory of Johan

35. *Java Half-Yearly Almanac and Directory for 1815* (Batavia: A. H. Hubbard, Government Press, 1815), for the entry.

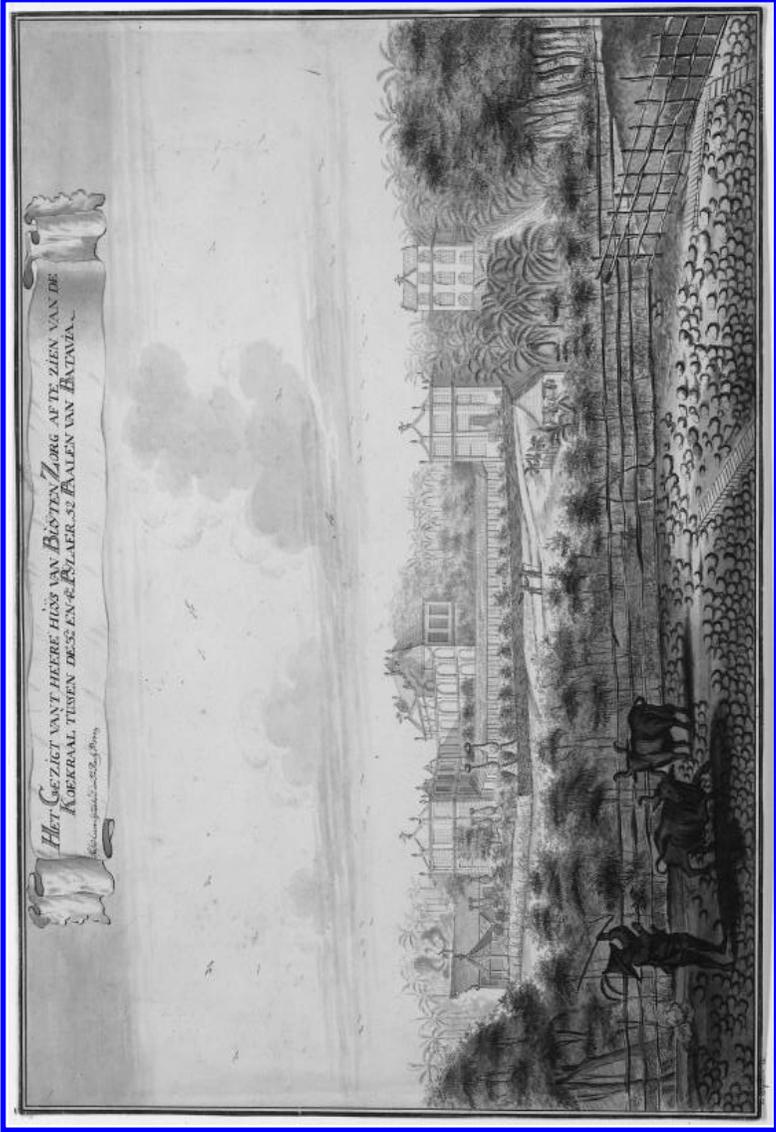


FIGURE 5. Johannes Rach, "Het Gezicht vant heerhuys van Buytenzorg," 1771. Source: Rijksmuseum, Amsterdam, no. NG-400-U.



FIGURE 6. Afghani colored tile, early nineteenth century. Reinhold Loeffler informs me that tiles of this design are presently offered in Iranian markets. *Source:* © The author.

Maurits Mohr at Batavia. There, the observatory is a distant tower set in a park, while our attention is drawn to strollers in the foreground.³⁶

One can imagine an alternative history, where images drawn by Europeans absorb Asian style. Consider Figure 6, a coarse clay tile from early nineteenth-century Afghanistan, glazed and painted with the image of a parrot, possibly

36. Huib J. Zuidervart and Rob H. Van Gent, “A Bare Outpost of Learned European Culture on the Edge of the Jungles of Java: Johan Mauritz Mohr (1716–1775) and the Emergence of Instrumental and Institutional Science in Dutch Colonial Indonesia,” *Isis* 95 (2004): 1–33, on 12; a closer view by Rach of the observatory in Robert H. van Gent, “Observations of the 1761 and 1769 Transits of Venus from Batavia (Dutch East Indies),” in *Transits of Venus: New Views of the Solar System and Galaxy*, ed. D. W. Kurtz (Cambridge: Cambridge University Press, 2005) [*Proceedings of the International Astronomical Union Colloquium*, 196], 67–73, on 69, also in De Bruijn and Kist, *Johannes Rach* (ref. 31), 52.

the little green parrot described by George Edwards in 1751.³⁷ The image was common in Persian ceramics of this time, and parrots were entirely familiar to Enlightened Europeans, to judge from the character Papageno in Mozart's *Magic Flute*.³⁸ In the event, European painters on Java did not appropriate Javan styles.³⁹ Furthermore, the verisimilitude we see in their images cannot be ascribed to an appeal for patronage. Brandes, for example, had no artistic patrons, for his painting was avocational (and has only in our own time been made public).⁴⁰

In High Postmodernity, Alex Soojung-Kim Pang examined burgeoning interest directed toward the role played by pictures in science. The historians whom he surveyed found the role vexacious and indeterminate. Pictures drawn by hand are evidently not exact copies of what they portray, and their exaggerations, their omissions, their emphases, their perspectives—the view of the artist—testify to the make-up of the portrayer, sometimes in ways that the portrayer would have been unable to verbalize. This was so with Galileo, the

37. Adair Stuart Mason, *George Edwards: The Bedell and His Birds* (London: Royal College of Physicians, 1992), 32, where Edwards guessed at a West Indian origin for the parrot, which spoke in a language he did not know; he kept the bird in the Royal College of Physicians.

38. Parrots are an eighteenth-century staple: Manushag N. Powell, "Parroting and the Periodical: Women's Speech, Haywood's Parrot, and Its Antecedents," *Tulsa Studies in Women's Literature* 27 (2008): 63–91; Louise E. Robbins, *Elephant Slaves and Pampered Parrots: Exotic Animals in Eighteenth-Century Paris* (Baltimore, MD: Johns Hopkins University Press, 2002), 122–55, on parrots; Fatma Müge Göçek, *East Encounters West: France and the Ottoman Empire in the Eighteenth Century* (New York: Oxford University Press, 1987), 72.

39. An argument can nevertheless be made, in the reverse sense, for the fusion of European and Asian styles in the art of the nineteenth-century painter, traveler, and paleontologist Raden Sharif Bustuman Saleh. Merle C. Ricklefs, *Polarising Javanese Society: Islamic and Other Visions (c. 1830–1930)* (Singapore: National University of Singapore Press, 2007), 176. H. J. de Graaf, "Het Semarangse geslacht Bustam in de 18e en 19e eeuw; afkomst en jeugd van Radèn Salèh," *Bijdragen tot de Taal-, Land- en Volkenkunde* 135, nos. 2/3 (1979): 252–81, on 274–79. Of interest here is Raden Saleh's painting of the eruption of Mount Merapi in 1865. Peter Carey, *The Power of Prophecy: Prince Dipanagara and the End of an Old Order in Java, 1785–1855* (Leiden: Koninklijk Instituut voor Taal-, Land- en Volkenkunde, 2007), 514. The brilliant commentary of Werner Kraus, treating Raden Saleh, has much to commend it: "Chinese Influence on Early Modern Indonesian Art? Hou Qua: A Chinese Painter in 19th-Century Java," *Archipel* 69 (2005): 61–86. Cf. Staffan Müller-Wille, "Joining Lapland and the Topinambes in Flourishing Holland: Center and Periphery in Linnaean Botany," *Science in Context* 16 (2003): 461–88, for an influence of the European colonial world on early eighteenth-century taxonomy.

40. Contrasting styles of illustration from the decades around 1800—European and Indonesian—are provided in the copiously illustrated masterwork by Peter Carey, *Power of Prophecy* (ref. 39): Johannes Rach's view of the Stadthuys in Batavia (1789), on 708–09, is usefully compared to an illustration of Pangéran Dipanagara instructing followers under a tree, on 138–39.

pioneering early modern for whom the book of nature was not portrayed in images but written in mathematics, who knew the possibilities of the art he employed. Limners did not share a universal set of assumptions or techniques, and they were unfaithful copiers of each other's work. They generally drew and painted for the expectations of their patrons. Pang concluded his survey with the hope that more attention could be directed to "show in greater detail how visual records are crafted and used in the sciences, and how the records change over time." Fascinated by writings in sociology of science, he called for "an enriched understanding of the links between science and culture by showing how artistic and scientific interests, skills, and technologies meet, clash, and combine." Pang sought "a history at once sophisticated, skeptical, and moderate, that allows equal weight to social and professional interests, aesthetics, technology, and nature."⁴¹

Pang's reasonable conclusion was based in the apprehension that there indeed has been such a thing as science; that it departs from technology; that aesthetics is not merely a matter of individual taste; that there is a social world beyond science, where ambition and passion may figure; and that nature, no mere ephemeral construction of the human mind, is something to be fathomed. The thirteen years since his survey appeared have not been kind to his approach, especially in the matter of images of nature beyond Europe. We turn now to learned commentary on pictures in European colonies and spheres of influence.

THE POWER OF IMAGES

A generation of writers in art history have focused on power relations (that is to say, the authority of the state and its favored classes) as the *fons et origo* of ideas and, by extension, graven images. In this tradition, sometimes traced to Michel Foucault, understanding of nature is manifest through the press of power. Reality depends quite entirely on the community of perceivers.⁴²

41. Alex Soojung-Kim Pang, "Visual Representation and Post-Constructivist History of Science," *Historical Studies in the Physical and Biological Sciences* 28, no. 1 (1997): 139–71, quote on 171.

42. Lewis Pyenson, "Forward into the Past," *Studies in History and Philosophy of Science, A* 39 (2008): 211–19, for discussion. Klonk, *Science and the Perception of Nature* (ref. 18), 152, identifies the limitations of W. J. T. Mitchell's view that "landscape is best understood as a medium of cultural expression." Cf. Mitchell's revised essay, "Imperial Landscape," in his collection, *Landscape and Power* (Chicago: University of Chicago Press, 2002), 5–34, which I do not follow. Of all the notions figuring in modern physics, power seems the one most refractory, by virtue of its

Martin Kemp, an apostle of relativism, writes about one of the great botanical patrons of the eighteenth century:

If we look at [Joseph] Banks's illustrations, we can see the results of his drive for the direct, uncomplicated recording of botanical specimens. The graphic media are exploited by his artists with high skill and considerable elegance—in a consciously disciplined and restrained manner—to convey as precise an effect as they knew how of the unadorned presence of a real specimen, much as contemporary anatomical illustrations aspired to a virtuoso style that carried “the mark of truth” (to quote [anatomist and numismaticist] William Hunter).

Then Kemp adds: “This manner of eighteenth-century British scientific illustration was itself a ‘style,’ as much as any other, with its own conventions, decors, and even mannerisms.” Postmodernists are fond of discounting the possibility of truth, of calling it merely a style, but what Kemp means to say appears in sentences following. It is that Banks needed funds to create art and to sell his productions, and so he appealed to the taste of people with money, in government and beyond it.⁴³

Kemp's message has been elaborated by Peter Hanns Reill, who urges us, following Kemp, to be wary of appearances. When something looks like an accurate representation of the natural world, start asking questions and it will turn out to be false, he seems to say: “The new botanical representations, which sought to recapture the wilderness, the unadorned state of nature, were as culturally determined as any other cultural product.” *Any* other cultural product? Are the

pre-modern appeal: The Foucaudiens favor power over force (as the latter word is used in “Star Wars,” or in *Compañía Nacional de Fuerza Eléctrica* in Argentina). The ascent of “power” correlates with the decline of “influence,” a word currently in disrepute among academics. Paul Forman, “(Re)cognizing Postmodernity: Helps for Historians—of Science Especially,” *Berichte zur Wissenschaftsgeschichte* 33 (2010): 157–75, on 166 for the decline of “influence.”

43. Martin Kemp, “‘Implanted in Our Natures’: Humans, Plants, and the Stories of Art,” in *Visions of Empire: Voyages, Botany, and Representations of Nature*, ed. David Philip Miller and Peter Hanns Reill (Cambridge: Cambridge University Press, 1996), 197–229, on 199. Cf. Jan Romein's evaluation of Byzantine style: “Their style, which was indeed the perfect expression of their state; their state, which measured by ideal criteria was everything except perfect, but which showed a degree of stability that makes it understandable those taking part in it should have believed it to be perfect.” Romein, cited in Van Leur, *Indonesian Trade* (ref. 1), 279. Romein, a Marxist, knew how to separate artistic style from science: Jan Romein, *The Watershed of Two Eras: Europe in 1900*, trans. Arnold Pomerans (Middletown, CT: Wesleyan University Press, 1978), which fundamentally concerns ideas, among them scientific ones. A sympathetic (but not uncritical) reading of the postmodernist identification of truth with style is found in Breisach, *On the Future of History* (ref. 3), 106–22.

pictures inaccurate? Are the colors and proportions dramatically wrong? Do the images depart from what might be called “the bounds of honesty”?⁴⁴ What, indeed, is one to make of Reill’s acceptance, at face value, of Alexander von Humboldt’s condemnation of “French” physics—the “authoritarian regime” of Laplacian theory?⁴⁵ Does Reill mean to discount categorically all quantification of the biological, especially the botanical world? Does he deny that Enlightened savants examined plants with metrological and chemical precision?⁴⁶ The enterprise of quantification and precision is neither whimsical nor conspiratorial. It is an attempt to achieve general understanding.

The relativist view of learning is expressed by Miles Ogborn, who, in a recent study of the publications issuing from the East India Company in London, affirms:

Knowledge is social because adjudication on truth is a matter of the social order that guarantees how truth can be arrived at and secured. Knowledge-making is political because this attention to social order necessarily both requires and suggests modes of ordering that differ over the organization of power. This, it is argued, is not merely about public pronouncements or the ideological positioning of science. The politics of knowledge works right down to the most basic level of practice. Which instruments and techniques are used, how they are used, and by whom they are used are also matters of political and social order and are vital to the making of scientific truth.⁴⁷

Certainly one writes for patrons, one scrambles for dough, and one watches one’s back, even if one knows, as do the rude mechanic and the illiterate plowman, that actions produce reaction, that momentum is not to be toyed with, and that, pronouncements in Latin to the contrary, one does not rise from the dead.

44. The quotation is the measure used by a fictional portrait-painter, possibly in eighteenth-century America, in novelist Julian Barnes’s short story, “The Limner,” *New Yorker*, 5 Jan 2009, 61–65.

45. Peter Hanns Reill, “Seeing and Understanding: A Commentary,” in Miller and Reill, *Visions of Empire* (ref. 43), 293–301, on 295, 299.

46. Frederic Lawrence Holmes, *Eighteenth-Century Chemistry as an Investigative Enterprise* (Berkeley: Office for the History of Science and Technology, 1988), 61–83; on Linnaeus, see Gunnar Broberg, “The Broken Circle,” and John E. Lesch, “Systematics and the Geometrical Spirit,” and on Joseph Gottlieb Koelreuter, see James Larson, “The Most Confused Knot in the Doctrine of Reproduction,” all in *The Quantifying Spirit in the Eighteenth Century*, ed. Tore Frängsmyr, J. L. Heilbron, and Robin E. Rider (Berkeley: University of California Press, 1990), 45–71, 73–111, 267–89.

47. Miles Ogborn, *Indian Ink: Script and Print in the Making of the English East India Company* (Chicago: University of Chicago Press, 2007), xxi–xxii.

Ogborn's discussion is illustrated by a painting of Robert Boyle, seated, bewigged, and pointing to an open book, and also by an undated illustration of a possibly hermaphrodite European prince, conventionally South Asian in appearance, with long flowing hair, displaying an open book and a sword. The suggestive symmetry is unsubstantiated in Ogborn's text. From Ogborn's unfalsifiable peroration, which ascribes neither magnitude nor consequences for any enunciation, one might expect that, in the chemistry of Robert Boyle of the Royal Society, a central actor in the East India Company, there is a clear trace of Indian reasoning, Indian evidence, or Indian sensibility. But Ogborn's analysis reveals none of it. We are led to conclude that Boyle's chemistry would have turned out just as it did even if Boyle had been a principal of an East African company or a Cheapside company; the discipline of his reason owes nothing to extra-European customs or norms. Ogborn's is a book about allusion, and the argument consists of desire. Boyle the natural philosopher is front-and-center in the early pages of the book, but science is entirely absent in the concluding chapter. It is important to be clear. Ogborn's book is, in its scholarly detail, traditional and apparently trustworthy; in its argument, which exhibits an affinity to the historical tropes emphasized by Hayden White only in its pretension, it is false.⁴⁸

The use of images to dress up, but not to explain, grandiose rhetoric is found in a study by Beth Fowkes Tobin about attitudes toward the colonial world in British literary society. Tobin sets out to examine

the mystifying practices of poets, painters, natural historians, and botanists, their decontextualizing and aestheticizing practices that, in the process of offering up beautiful images of discrete items, erased the conditions under which tropical commodities were produced, and in the process substituted their own literary and artistic efforts in the place of local producers' work.⁴⁹

Precisely what science seeks to do: abstract and generalize, the better to predict; make the observation as independent as possible of the observer, allowing observations of experiments and circumstances to be reproduced by observers of distinct backgrounds and in diverse settings. In all the illustrations Tobin reproduces, only one may have originated in a drawing by an autochthone

48. Hayden White, *Figural Realism: Studies in the Mimesis Effect* (Baltimore, MD: Johns Hopkins University Press, 1999), 1–26, for a recent statement.

49. Beth Fowkes Tobin, *Colonizing Nature: The Tropics in British Arts and Letters, 1760–1820* (Philadelphia: University of Pennsylvania Press, 2005), 11.

raised beyond the cultural orbit of Europe, “an anonymous artist employed by the Calcutta Botanic Gardens.” It is an unremarkable illustration, displayed in the conventions of Europe, of *Caesalpinia sappan*, or, sappanwood, depicting leaves, flowers, and seed-pods, with a sectioned pod showing seeds and a sectioned stalk showing thorns.⁵⁰ Tobin’s interest in sappanwood (a form of brazilwood) is ephemeral; there is no suggestion in the book that a consideration of sappanwood since Antiquity would reveal that its properties were well-known to civilizations both in and beyond Europe.⁵¹ Not for lack of desire is there no persuasive connection between images and postmodernist rhetoric. Rather, as in Kapil Raj’s consideration of an eighteenth-century Indian botanical manuscript following conventions in the *Hortus Malabaricus* by Hendrik Adriaan van Reede tot Drakenstein, there is simply no documentary record of an appeal to Asian taxonomy, language, and experts.⁵²

In a recent book about art in the tropics, Nancy Stepan contends that “there is no single map or picture of the natural world that increasing knowledge progressively fills in, but rather many different maps and representations, articulated and shaped by numerous factors of politics, culture and aesthetics, by beliefs about reality, codes of seeing and representations conventions.”⁵³ In her view, the pictures of science are conjuring tricks.⁵⁴ “Nature is always culture before it is nature.” She summarizes the contention of knowledge-deniers: “This idea that our view of the natural world is always historical, constituted by human material and perceptual interactions, so that our understanding of it is always a form of social knowledge, has become almost a cliché of contemporary historical studies.”

50. *Ibid.*, 173.

51. Sappanwood, an antibacterial and anticoagulant simple from Southeast Asia, produces a red dye. It was a staple of East Asian trade for more than a thousand years. Citilli López and Patricia Shanley, eds., *Riches of the Forest: Foods, Spices, Crafts and Resins of Asia* (Desa Putra, Indonesia: Center for International Forestry Research, 2004), 82–84; Andrew Dalby, *Dangerous Tastes: The Story of Spices* (Berkeley: University of California Press, 2000), 29; Gerrit J. Knaap and Heather Sutherland, *Monsoon Traders: Ships, Skippers, and Commodities in Eighteenth-Century Makassar* (Leiden: Koninklijk Instituut voor Taal-, Land- en Volkenkunde, 2004), 74.

52. Kapil Raj, “Surgeons, Fakirs, Merchants, and Craftspeople: Making L’Empereur’s *Jardin* in Early Modern South Asia,” in *Colonial Botany: Science, Commerce, and Politics in the Early Modern World*, ed. Londa Schiebinger and Claudia Swan (Philadelphia: University of Pennsylvania Press, 2005), 252–69.

53. Nancy Leys Stepan, *Picturing Tropical Nature* (Ithaca, NY: Cornell University Press, 2001), 14.

54. Barbara Maria Stafford’s study of Enlightened scientific illustration, *Artful Science: Enlightenment Entertainment and the Eclipse of Visual Education* (Cambridge, MA: MIT Press, 1994), contends that science is closely connected with trickery. The book is a tour de force of creative ambiguity, with little connection between the text and its many fine pictures.

The authority directly preceding this judgment is Simon Schama, who is, in fact, not at all categorical. Stepan quotes Schama: “Even landscapes that we suppose to be most free of our culture may turn out, on closer inspection, to be its product.”⁵⁵ Maybe, perhaps, in some cases. The rocks, rivers, and forests of Schama’s magnificent book, *Landscape and Memory*, are real. We see paintings and sketches of them, which are not monstrously perverted. We see artifice inspired by them. Schama again: “The cultural habits of humanity have always made room for the sacredness of nature.” (Here nature is represented independently of our perception of it.) Exploring the sacredness is essential, Schama reminds us, for it separates allusion from exactitude: “If the entire history of landscape in the West is indeed just a mindless race toward a machine-driven universe, uncomplicated by myth, metaphor, and allegory, where measurement, not memory, is the absolute arbiter of value, where our ingenuity is our tragedy, then we are indeed trapped in the engine of our self-destruction.”⁵⁶ In Schama’s words there is an exaggerated identification of technology with science (characteristic of postmodernity), and there is also allusion to the diverse climates of sensibility that produce, notwithstanding their various norms, a consensus about reality.⁵⁷ Schama knows what is natural and what is constructed by human labor, for he distinguishes the Alps from artificial grottos in French and English gardens.⁵⁸

It has become fashionable, over the past generation, to embrace skepticism about universal human rights, of the kind expressed in the United Nations declaration of 1948. But universal inanimate nature? Are there no craters on Mars?

55. Stepan, *Picturing Tropical Nature* (ref. 53), 15.

56. Simon Schama, *Landscape and Memory* (New York: Vintage, 1995), 18, 14. The position is elaborated, to my mind unreasonably, by François-Marc Gagnon in his essay, “The Forest, Niagara and the Sublime,” in *Expanding Horizons: Painting and Photography of American and Canadian Landscape 1860–1918*, ed. Hilliard T. Goldfarb (Montreal: Montreal Museum of Fine Arts/Somogy Art Publishers, 2009), 33–36, on 33: “Representations of the landscape . . . sought to disguise its true nature by invoking the theme of the sublime as defined by the philosophers of the eighteenth century and reconstrued in the nineteenth.”

57. Paul Forman, “The Primacy of Science in Modernity, of Technology in Postmodernity, and of Ideology in the History of Technology,” *History and Technology* 23 (2007): 1–153.

58. A more appropriate anthem for Stepan comes from Umberto Eco’s collection of images pleasing to the eye: “What is considered beautiful depends on the various historical periods and cultures.” Aesthetics is based, for Eco, on “the orgy of tolerance, the total syncretism and the absolute and unstoppable polytheism of Beauty.” Eco, *History of Beauty*, trans. Alastair McEwen (New York: Rizzoli, 2004), 12, 428. In his imaginary writings, Eco affirms the relativity of time, indeed of natural law.

No geysers on the moons of distant planets? No coastal erosion in Louisiana? The pictures, and the numbers to back them up, are for all to see. The proposition is shared even by subtle thinkers like Hayden White, who finds doubt about certainties like the Holocaust unfathomable; the “facts of the matter” are beyond dispute—the meaning of the matter is what historians contest.⁵⁹

Nancy Stepan does recognize the importance of a generally verifiable representation of nature when she comments on John Gould’s hummingbird prints (“limited-subscription editions for well-off and discriminating buyers . . . beyond the reach of the general public”). Popular natural-history illustrations, in her view, “sustained cultural claims to the tropics by evoking the sensual experience of tropical nature, the shapes and colours of distinctive fauna and flora, the utility of tropical products, the adventure of stalking and capturing wild animals or hunting rare orchids, and the scientific principles surrounding their production.”⁶⁰ That is to say, in the absence of a general validation of veracity, no prestige would attach to the pictures. Certainly, in their mimetic aspect, Stepan’s pictures depart from the paintings of Robert Rauschenberg.⁶¹

Kärin Nickelsen has recently studied botanical illustrators in eighteenth-century Europe. The illustrations, she observes, are not direct mirrors of specimens. Rather, they are archetypes. “The pictures idealize, simplify, schematize, exaggerate and combine in an unrealistic way the impressions one would gain from observing living specimens.” Archetypes were understood by a community of initiates holding a common paradigm: “One rightly assumed that one’s colleagues would correctly understand an image in a certain way.” The upper part of a leaf, for example, was colored darker than the lower part, and it was understood that the stages of development of one plant, when displayed on a

59. White, *Figural Realism* (ref. 48), 69–70.

60. Stepan, *Picturing Tropical Nature* (ref. 53), 35. In one respect, Gould’s hummingbird prints were entirely non-mimetic: the portrayal of the birds in flight. That changed only with stop-action photography, the starting point for Lorraine Daston and Peter Galison’s study of pictures in science, “The Image of Objectivity,” in “Seeing Science,” special issue, *Representations* no. 40 (1992): 81–182.

61. Stepan is most persuasive when she focuses on the imaginative side of representational art and twentieth-century landscape designers, for example, Roberto Burle Marx. Stepan, *Picturing Tropical Nature* (ref. 53), 208–37. Quasi-representational is perhaps a better description of Burle Marx’s art. Brazil is not unlike Canada, with its Group of Seven landscape artists, in whose paintings of sky, rock, water, and tree, it is only sometimes possible to identify genus and species, also the case with Paul Gauguin’s leaves and flowers. Denis Cosgrove, “Tropic and Tropicity,” in *Empire* (ref. 15), 197–216, Gauguin, on 211–12; Beinart and Hughes, “Empire and the Visual Representation” (ref. 29), Group of Seven, on 1184.

single page, are taken at various times of the year, conventions that, Nickelsen emphasizes, were unknown by Asian copyists. Color could be used to exaggerate certain structural features. For all these stylistic choices, nevertheless, eighteenth-century botanists were much concerned with “the correctness of an illustration,” with how clearly it represented specimens that could be found in nature. Nickelsen asserts that the correctness of a picture, its truth, is determined relative to a given theory.⁶² But even to our eye, more than two hundred years later, there is clear differentiation among the images Nickelsen introduces: sweet vernal grass, meadow saffron, and grapevine. Their leaves are not all colored red and blue; the dentation is not whimsical; the shaft diameters are not out of proportion. The images could figure in herbals published during our own time.

Which pictures of the world receive wide approval depends, of course, on fashion and taste; which pictures appear in print at all depends on cupidity and vanity, friendships and rivalries, prejudice and whimsy.⁶³ It would be false, however, to conclude that the authority of every knowledge-producer is nothing more than the sum of these things. To imagine so is to give credence to a fractured view of scientific knowledge. E. C. Spary contends that, in the eighteenth century, botanical authority did not extend from Europe to the European colonies, where “travel disrupted [European] individuals’ patronage relations and thus caused the sources of their scientific expertise to be destabilized.”⁶⁴ As a result, writings were not received in the colonies as they were received in Europe. But why stop there? What about traveling from London to the Midlands, or from Paris to Provence? The German public received Darwin differently from the American public, but did the popular reaction in Hannover or in Savannah necessarily affect Darwin’s labor at Down

62. Kärin Nickelsen, *Draughtsmen, Botanists and Nature: The Construction of Eighteenth-Century Botanical Illustrations* (Dordrecht: Springer, 2006), 99–100, 104, 154–55, 183, 233. Jed Z. Buchwald drew my attention to Nickelsen’s book.

63. Daston and Galison, “Image” (ref. 60), emphasizes idealizations of natural-history illustration as the way to obtain “truth to nature,” notably 86–87: “All atlas makers must solve the problem of choice: Which objects should be presented as the standard phenomena of the discipline, and from which viewpoint?” Before the late nineteenth century, in their view, atlas makers were not shy to proclaim their judgment and “the breadth and depth of experience in their field upon which those judgments rested.” This observation is not incompatible with a desire for verisimilitude. One may contrast eighteenth-century landscapes with those of, say, Hubert and Jan van Eyck on the one hand and Georges Braque on the other hand.

64. E. C. Spary, “Of Nutmegs and Botanists: The Colonial Cultivation of Botanical Identity,” in *Colonial Botany*, ed. Schiebinger and Swan (ref. 52), 187–203, on 203.

or his authority among the sharp and productive people in his field who mattered? Does popular Creationism affect procedures in university laboratories? Apparently so, for Simon Schaffer, who writes: “The implication of a more sensitive cultural history of natural history is that it will be more difficult to contrast politically loaded accounts of other societies with the supposedly disinterested pictures of nature provided by Europeans’ sciences.”⁶⁵ Examples can be found to substantiate Schaffer’s proposal, but it is so much simpler to say that optimistic and inquisitive people everywhere in modern times embraced Western views of nature when these were advantageous to them, as was often the case.

James R. Ryan urges us to examine how “identities and senses of self of both European travelers and indigenous people challenged, negotiated and transformed through discourses of tropicality and spaces of contact.”⁶⁶ Examine astronomy and physics, and there will be little to see. All Brazilian professors, so far as is known, have lectured on physics beginning with $F = ma$, rather than the square root of ma . No European astronomer in Morocco or Algeria scanned the stars in the hopes that Copernicus was wrong about the solar system.⁶⁷

James Ryan alludes to the question of exoticism, the quality of foreign experience, at once alluring and disturbing. In their analysis of the word *exotic*, postmodernists suggest an imperializing or triumphalist zeal. But ordinary people know the value of classifying and using new experiences, whether chemical reactions or cultures. They understand that, to arrive at general truths, knowledge of things not apparent in the course of daily living is vital. The point is clear in the mind of an archetypical modernist, George Sarton, who, living in poverty in Washington, D.C., found the zoo a marvelous respite from grim reality (his view extended from zoos to art museums).⁶⁸ It is a point in the genesis of nineteenth-century zoos.⁶⁹

65. Simon Schaffer, “Visions of Empire: Afterword,” in Miller and Reill, *Visions of Empire* (ref. 43), 335–52, on 348.

66. James R. Ryan, “Views in a Warm Climate: Reflections on Images of the Tropics,” *Singapore Journal of Tropical Geography* 25 (2004): 18–22.

67. Lewis Pyenson, “Western Historians of Science and Oriental Science in the Age of Imperialism,” *Historia Scientiarum* 15 (2005): 97–124.

68. Lewis Pyenson, *The Passion of George Sarton: A Modern Marriage and Its Discipline* (Philadelphia, PA: American Philosophical Society, 2007), 264.

69. Annelore Rieke-Müller, “Angewandte Zoologie und die Wahrnehmung exotischer Natur in der zweiten Hälfte des 18. und im 19. Jahrhundert,” *History and Philosophy of the Life Sciences* 17 (1995): 461–84; Pyenson and Sheets-Pyenson, *Servants of Nature* (ref. 23), 150–72.

That place affects meaning is what Henry Watson Fowler, in his *Dictionary of Modern English Usage*, would have called a “sturdy indefensible” idiom.⁷⁰ A sturdy indefensible appears when D. Graham Burnett writes about mapping British Guiana: “Ideas, instruments, whole disciplines appear to have been carried back to Europe in the mental and physical baggage of European travelers as often as they were borne dutifully the other way.”⁷¹ Ernest Rutherford and William Henry Bragg brought remarkable innovations to England from Canada and Australia, innovations stemming from and accepted by a mature discipline formed in Europe, where Rutherford and Bragg were trained; the society in Canada and the Antipodes where they circulated (notably their household) was a small copy of European society.⁷² It is true that oppression of autochthones distinguishes Rutherford’s and Bragg’s colonial society; but this oppression seems to have left no trace in the early years of quantum physics and nuclear physics, leading us to imagine that it is not different in kind from the oppression of the working class in Europe.

Graham Burnett seeks to show that, notwithstanding their precision—their conformity to reality—maps are products of the imagination. “Here is a truth essential for understanding this book: for all their importance, those fixed points on their own were *useless* for the geographical construction of the colony” of nineteenth-century British Guiana.⁷³ Maps tell stories, represent various parts of reality (just as science does): Some maps show roads and rail, others show rivers big and small, still others show towns, farms, mines, forests, and mountains. But, clearly, no map-maker would place British Guiana on the west coast of South America. There are grounds for universal agreement, and maps, as nineteenth-century poet Emily Dickinson affirmed (“I never saw a moor”), are among the surest grounds. For the exact sciences in the nineteenth century, and for many of the sciences in our own time, precision is paramount—a virtue, but mostly a skill that invites independent verification.⁷⁴

70. H. W. Fowler, *A Dictionary of Modern English Usage*, rev. Ernest Gowers (Oxford: Oxford University Press, 1968), 594.

71. D. Graham Burnett, *Masters of All They Surveyed: Exploration, Geography, and a British El Dorado* (Chicago: University of Chicago Press, 2000), 7.

72. Mario Bunge and William R. Shea, eds., *Rutherford and Physics at the Turn of the Century* (London: Science History, 1979); John Jenkin, *William and Lawrence Bragg, Father and Son: The Most Extraordinary Collaboration in Science* (Oxford: Oxford University Press, 2008).

73. Burnett, *Masters of All They Surveyed* (ref. 71), 15.

74. Cf. *ibid.*, 99–100, where we are invited to imagine that an emphasis on precision is a cultural trick. For a survey of maps and imagery, notably in their allegorical guise, Antonio Sánchez, “Ciencia y cartografía en el mundo moderno: El dominio de la cultura visual,” *Asclepio*

A high-water point of postmodernist indecision about precision and reality is recorded by the seventeenth U.S. poet laureate, William Stanley Merwin, in a reconsideration of Joseph Banks's naturalist-illustrator, Sydney Parkinson, who sketched and painted creatures and botanicals from carcasses and cuttings. Linnaean taxonomy, represented on the expedition of James Cook and Joseph Banks by Linnaeus's disciple Daniel Solander, is Merwin's Enlightened villain. The classifying urge reflected a desire to command "a pattern of existence that they alone understood, and therefore they alone, in the long run, would control." The system "is itself an illusion, and the perfection it aspires and pretends to is bound to life primarily through its source in the unsatisfied nature, the innate imperfection of human desire, ambition and anxiety."⁷⁵ Merwin does not easily accommodate lesser minds and shakier pens, but it is worth observing that his own writings and his own fortune have depended heavily upon the dedicated labors of historians. He acknowledges the debt in an inspired recounting of the unfortunate expedition of Lapérouse, the explorer who, before perishing in a shipwreck, wrote of his disenchantment with the Enlightened notion that civilizations uncontaminated by the West lived in a state of Edenic perfection. Notwithstanding his disparagement of discoveries by Europeans and his condemnation that their voyages prepared the ground for colonial occupation, Merwin readily admits that Banks's Linnaean shipmate "Solander seems to have done remarkably well. The names that he arrived at reveal again and again that he knew what he was looking at, what classification was appropriate to it in the Linnaean system, what its nearest of kin were."⁷⁶ As with science and colonial oppression of autochthones, not everything in imperialism is of imperialism. We know that Einstein's covariant general relativity, his conquering of the known universe brought to final form at Berlin in 1915, is unrelated to the war aims of imperial Germany.

Citing with approval the words of Mary Louise Pratt, Beth Fowkes Tobin writes that Banks's botanizing had the effect of taking "possession without

60 (2008): 281–312. Just as a distinction is made between toys and scientific instruments, so a distinction is usefully made between maps as ornament and maps as practical tools. Gerard L. Turner, "Presidential Address: Scientific Toys," *British Journal for the History of Science* 20 (1987): 377–98. One hopes that one's surgeon does not use children's toys when cutting on one's belly, and one imagines that veteran navigators did not use imaginary maps when cruising around the Caribbean.

75. W. S. Merwin, *The Ends of the Earth* (Washington, DC: Counterpoint, 2004), 150–51.

76. *Ibid.*, 206, 253, 154, the disparagement of discoveries on 152; Lapérouse's observation on Noble Savages in Lewis Pyenson, "Over the Bounding Main," *Historical Studies in the Physical and Biological Sciences* 20, no. 2 (1990): 407–22.

subjugation and violence.”⁷⁷ Banks’s illustrations played a role in managing imperial information and transforming imperial territory. The conclusion, which Tobin avoids, is clear: If the illustrations had no ring of dispassionate truth, if they related in no way to general knowledge, if they were not reliably mimetic, no prestige would attach to them. Without accurately representing the thing they claimed to represent, they could not serve as pieces in the game of authority over lands and civilizations. Acting in this role over peripheral territory, late eighteenth-century natural-history and landscape illustrators resembled scientists: By claiming to have achieved results that transcended language and culture, the enterprises of illustration and of science legitimized the extension of the metropolitan source that animated them.⁷⁸

SOCIAL ANTECEDENTS IN COMMON FOR COMMON REPRESENTATIONS OF NATURE

Hegel might have affirmed that modern times, emerging in the decades around 1800, elevated one particular vision of nature into a moral imperative. This impulse was clear in the tropics during the last quarter of the eighteenth century: the Batavian Society of Arts and Sciences in 1778; the Asiatic Society of Calcutta in 1784; the Cercle des Philadelphes of Cap François, Haiti, in 1785; and the Institute of Egypt in 1798. Modern times are about nothing so much as the universality of reason, and the publications of these assemblies demonstrate the point by being copies of what issued from analogous European assemblies. To consider the New World, with very few exceptions—Benjamin Franklin is the sterling one—investigation into nature was a direct, if pale, reflection of European practice. If additional examples are required for the uniformity of scientific expression, we may cite the writings of Antonio de Ulloa—sometime governor of Louisiana, director of the mines in Huancavélica, and scientific colleague of Charles-Marie de la Condamine in Ecuador. Only Franklin, among everyone situated beyond Europe, was the peer of de Ulloa in the eighteenth century.⁷⁹

77. Beth Fowkes Tobin, *Picturing Imperial Power: Colonial Subjects in Eighteenth-Century British Painting* (Durham, NC: Duke University Press, 1999), 175.

78. Among many other statements: Lewis Pyenson, “Science and Imperialism,” in *Companion to the History of Modern Science*, ed. R. C. Olby, G. N. Cantor, J. R. R. Christie, and M. J. S. Hodge (London: Routledge, 1990), 920–33.

79. Lewis Pyenson, “The Comparative Natural History of Antonio de Ulloa,” in *The Cultural Interbreeding in Ethnopharmacology: From Indigenous to Scientific Knowledges*, ed. José Luis Fres-

Paintings of Java by Europeans strongly resemble paintings in the Netherlands, and in the modern-world system, following Immanuel Wallerstein, the sciences, or at least the exact sciences, are one, not many.⁸⁰ Painters and painting seem to resemble astronomers and astronomy closely. According to the standard explanation for this homology in science, the endeavors were insensitive to social context, with the norms of discipline overpowering local conditions. That is to say, by extension, art studios, physics laboratories, and astronomical observatories ran in essentially one way, whether in Paris or Tananarive, Utrecht or Batavia, Leiden or Bandung, Göttingen or Apia, Berlin or Qingdao, Ann Arbor or La Plata, the Vatican or Riverview. Only allegorical evidence has been provided to support the contrary view, that these enterprises were fundamentally distinct in a peripheral, imperialist setting.⁸¹

quet Febrer and Carla Pilar Aguirre Marco (Valencia, Spain: CITA Publicaciones y Documentación, 2005) [*Revista de Fitoterapia* 5, suppl. 1], 86–90.

80. Thomas D. Hall and Christopher Chase-Dunn, “Forward into the Past: World-Systems before 1500,” *Sociological Forum* 9 (1994): 295–306, for a significant assessment.

81. Lewis Pyenson, “Cultural Imperialism and Exact Sciences Revisited,” *Isis* 84 (1993): 103–08, where readers will find a concise response to critics; Pyenson, “Western Historians of Science” (ref. 67), for a more recent elaboration. Elizabeth Green Musselman has presented John Herschel’s astronomy as a derivative of South African culture: “Swords into Ploughshares: John Herschel’s Progressive View of Astronomical and Imperial Governance,” *British Journal for the History of Science* 32 (1998): 419–35. She offers not a single example of how, in their details, Herschel’s astronomical publications departed from those of British homologues, although it is fair to say that she *wants* to find such a difference. Musselman’s confusion finds a match in Alice L. Conklin’s study, *A Mission to Civilize: The Republican Idea of Empire in France and West Africa, 1895–1930* (Palo Alto, CA: Stanford University Press, 1997), 4. Vague hopes are also expressed by political historian Duncan Bell, who, in considering the British Empire late in the nineteenth century, writes that focusing on the use of science “to further the overseas political goals of imperial nations in their colonies and spheres of influence” is not of much interest because it “neglects . . . the fundamental prior effect that the shifting perception of nature, and of the spatiotemporal dimensions of the world itself, had on the political imagination.” No concrete examples are offered to show precisely how new scientific ideas generated at the ends of empire might have perturbed imperial masters in London. Bell moves abruptly from science to technology. In his view it is technology, not science, that challenges “limits placed by nature . . . on the boundaries of political association.” Duncan Bell, *The Idea of Greater Britain: Empire and the Future of World Order, 1860–1900* (Princeton, NJ: Princeton University Press, 2007), 65–66. Bruce J. Hunt also makes large, unsubstantiated claims for the separate status of the exact sciences in the British colonies: Bruce J. Hunt, “Doing Science in a Global Empire: Cable Telegraphy and Electrical Physics in Victorian Britain,” in *Victorian Science in Context*, ed. Bernard J. Lightman (Chicago: University of Chicago Press, 1997), 312–33, on 315. A clear picture of electrical-field theory and imperialism is found in Alain Canuel, *Les Rapports entre la radiophonie et l’impérialisme dans le contexte socio-politique canadien de 1901 à 1928* (PhD dissertation, University of Montreal, 1987). Itty Abraham explores how physicists in independent India used the Indian landscape to conduct research into

A recent study of early twentieth-century botany and agriculture on Java by Andrew Goss illustrates the dilemma facing critics of the standard explanation. Goss begins by affirming what no historian would deny: “A wide range of evidence from early-modern and modern science shows that scientific knowledge is always created in particular social and political contexts.” His next sentence is, however, a leap of faith: “In this sense, while scientists and some others may extol the ideal of pure knowledge, in practice there is no such thing.” (It seems to me that the fact that cuisine differs dramatically from one context to another does not in any way imply that the biochemistry of digestion differs dramatically from one context to another.) Goss proposes that “pure science . . . was an invention, which came to have authority because of its relevance to politics and society in the colony.” Would he contend that the periodical chart of the chemical elements, which hung on a wall of the Bandung Institute of Technology in the 1920s and 1930s, was merely a cultural artifact of pure science in Europe and did not express universal truths? Did Java have neither oxygen nor carbon, with the atomic weights indicated on the chart?⁸²

In a significant passage, Goss emphasizes the importance of examining the visions of colonial functionaries. He observes that although colonial scientists “attempted to portray themselves as sacred interpreters of nature, colonial officials did not see them in that way.” Then he succinctly paraphrases and affirms my conclusion of 1989. Goss writes that functionaries “in the 1920s . . . mostly appreciated that pure science allowed them to represent the colony as being administered by men with pure and civilized intentions.” He, in fact, agrees with my understanding completely: “Indeed, some of the content of the pure and exact sciences was not touched by colonial expediency, even if the institutions were paid for by the colonial government.” In a reversal of his prefatory remarks, Goss continues, perhaps referring to the political uses of Jacob Clay’s discoveries in the pure science of cosmic-ray physics: “Colonial officials and scientists collaborated to construct and invest a cultural form that facilitated Dutch political hegemony. The content of pure science was not about imperial exploitation and domination, but its practice was, in that it supported a civilizing mission ideology.” Goss emphasizes: “For the government, science’s greatest asset was its ability to shape civilization without being dirtied by politics. . . . For the Dutch

high-energy physics (cosmic rays): Itty Abraham, “Landscape and Postcolonial Science,” *Contributions to Indian Sociology* 34 (2000): 163–87.

82. Andrew Goss, “Decent Colonialism? Pure Science and Colonial Ideology in the Netherlands East Indies, 1910–1939,” *Journal of Southeast Asian Studies* 40 (2009): 187–214, on 189–90.

colonial government, promoting a pure science which crossed the political borders of nations and colonies suggested a decent colonial regime, which was actively bringing civilization to its borders.”⁸³ This colonial argument centered on prestige would be foolish without general agreement about disinterested learning. Early in the twentieth century, physics and astronomy were indeed the same around the world. It would be hard to ask for a more complete rejection of the postmodernist project.

The ambiguity apparent in the accounts of Goss and other writers suggests a desire to affirm that all ideas are extrusions from a social matrix. Let us, then, be generous and proceed by taking this desire seriously. Let us imagine for the moment that the details of pure science, along with mimetic pictures of the natural world, were the same on Java and in the Netherlands not because of the strength of disciplinary norms, but rather because social relations in Europe and in the colonies were remarkably similar.⁸⁴ It would follow that even small variations, those on the order of shading in natural-history illustrations, must derive from differences in interpersonal relations. This proposition, turning on its head the current wave of sympathy for colonial exceptionalism, implies that colonial societies were not dramatically different from European ones, all of which featured classes with varying degrees of freedom.

The proposition, which follows directly from postmodernist writings, may usefully be designated by the term *complementarity*: Situations represented in apparently different ways are really identical.⁸⁵ From this point of view, Irish

83. *Ibid.*, 193, 211. Pyenson, *Empire of Reason* (ref. 28), 175–81. The affirmation of both thesis and antithesis, without irony and without a resolution of the contradiction, appears in Gareth E. John, “Benevolent Imperialism: George Caitlin and the Practice of Jeffersonian Geography,” *Journal of Historical Geography* 30 (2004), 397–617: “While artists and scientists of the American west sought to represent the region’s ‘nature’ objectively, realistically and concisely in their descriptions and delineations, what constituted ‘the facts’ was necessarily informed by teleological systems of thought” (p. 602), followed by: “Caitlin . . . strove to apply the Jeffersonian scientific strategies of direct observation, clear and detailed description, and perspicuous illustration” (p. 604). Caitlin strove, that is to say, for Enlightenment verisimilitude.

84. I offered the notion, only to dismiss it, in “Imperium in Imperio: The Natural History of Natural Knowledge,” *Historia Scientiarum* 10 (2000): 1–15, on 11. I did not then distinguish between superstructure and base.

85. Radically divergent civilizations have arrived at convergent understanding of nature. One example is the Pythagorean relation, apparently discovered independently in Mesopotamia and China. Karine Chemla and Shuchun Guo, *Les neuf chapitres: le classique mathématique de la Chine ancienne et ses commentaires* (Paris: Dunod, 2004). The matter is evident in technology. Convergent evolution operates on the micro-level in multiple, independent discovery among Europeans during the modern period, for example, the conservation of energy. Eugene Garfield, “Multiple, Independent Discovery and Creativity in Science,” *Current Contents* (3 Nov 1980): 5–10, reprinted

servants in England were treated just as autochthonous servants in India were treated; there was a common condition of servants everywhere under eighteenth-century and nineteenth-century capitalism, whether in Louisiana, California, Algeria, Cuba, or Poland. In the present context, the proposition implies that the Dutch in the Indies during the eighteenth century projected a society paralleling the society of the Dutch Republic, with much latitude for enterprise and individuality, though within a class-bounded social structure, where mobility had clear limits. In particular, the Dutch were likely as racist in the tropics as they were in septentrional Europe. Of course, I do not mean to minimize the great atrocity of slavery, which progressively disappeared from Europe and, eventually, the Americas, although I do emphasize the great atrocities of a peasantry tied to the land and a proletariat worked to death in factories.⁸⁶

It is now commonplace to recognize and condemn the horror of European colonial rule at the end of the nineteenth century, whose pageantry and symbolism have been subjected to withering prose.⁸⁷ Recent scholarship about Dutch society and Indisch society (that is to say, people with both European and Asian ancestors) in the East Indies during the nineteenth and twentieth centuries discourages the notion of complementarity. For example, late nineteenth-century fiction emphasized the distinctiveness of Netherlandic and Indisch family life; one popular writer, Bas Veth, who lived on Java for twelve years, offered colonial society as the “degeneration, the ruination of European character”; another writer who condemned the fusion of autochthonous and European traditions, Paul Daum, feared a future dominated by cupidity and vice.⁸⁸

Just how differently Europe and the tropics have been portrayed in the eighteenth century may be gathered from Jean Gelman Taylor’s sophisticated study of *Mestizo* culture in Batavia, on Java. The key elements of this special social structure, Taylor writes, were “white men, Indonesian mistresses,

in Garfield, *Essays of an Information Scientist* 4 (Philadelphia: ISI Press, 1979–1980), 660–65; Pyenson and Sheets-Pyenson, *Servants of Nature* (ref. 23), 14–15.

86. Shearer Davis Bowman, *Masters and Lords: Mid-Nineteenth-Century U.S. Planters and Prussian Junkers* (Oxford: Oxford University Press, 1993); Friedrich Engels, *Die Lage der arbeitenden Klasse in England* (Leipzig: Otto Wigand, 1845).

87. For example, Patricia Spyer, *The Memory of Trade: Modernity’s Entanglements on an Eastern Indonesian Island* (Durham, NC: Duke University Press, 2000), 45, “the fetishism on the part of the colonizers of their own imperial forms of power and privilege.”

88. Joost Coté, “Romancing the Indies: The Literary Construction of *Tempo Doeloe*, 1880–1930,” in *Recalling the Indies: Colonial Cultural and Postcolonial Identities*, ed. Joost Coté and Loes Westerbeek (Amsterdam: Aksant, 2005), 133–72, on 141 and 149. *Tempo Doeloe* refers to the so-called golden times of the late nineteenth century.

Eurasian wives.” She emphasizes, “In taking young Eurasian wives with whom they shared neither cultural affinity nor language for weighty discourse, these men of the enlightenment defeated their own purpose of promoting Dutch culture in Asia.” And: “By the last quarter of the eighteenth century, then, Batavia’s elite . . . was more autonomous than before.”⁸⁹

With the research of scholars like Taylor firmly in mind, it is nevertheless useful to see if there can be a sense in which complementarity is acceptable. A recent study by Ulbe Bosma and Remco Raben is a good place to begin. They have made a strong argument for the special nature of colonial society. Yet they observe that social discrimination was based less on racism than on “class, exacerbated by the distinction made between newcomers and those born locally.” They emphasize that, unlike the conventional image of British India, “The society of the Dutch East Indies did not have a simplistic racial structure with whites (Totoks) at the top, mixed-blooded Indo-Europeans in between, and native Indonesians at the bottom.” Notwithstanding the fact that illegitimate births in nineteenth-century Batavia were some six times greater than in the Netherlands, upper-class society seamlessly integrated Indies-born people and Europeans.⁹⁰ Bosma emphasizes: “A separate Eurasian, or Indo, community was foreign to colonial Indonesia until the twentieth century.”⁹¹ A stern critic of colonial racism, Patricia Spyer writes about the East Indies circa 1900: “It is no surprise that the colonizer nation increasingly—if not consistently—assumed the place of an original with the colony defined as its copy.”⁹² Ann Laura Stoler, for whom “epistemic considerations [presumably sciences] . . . are of the colonial world and squarely in it,” nevertheless emphasizes that it was difficult to distinguish “between the ‘true,’ *echte* Europeans and those many who had never seen the Netherlands and for whom Dutch language expressions came less easily to their tongues and those of their children than Javanese and Malay.”⁹³

89. Jean Gelman Taylor, *The Social World of Batavia: European and Eurasian in Dutch Asia* (Madison: University of Wisconsin Press, 1983), 132, 92–93.

90. Ulbe Bosma and Remco Raben, *Being “Dutch” in the Indies: A History of Creolisation and Empire, 1500–1920*, trans. Wendie Shaffer (Singapore: National University of Singapore; Athens: Ohio University Press, 2008), 218, 222, 225.

91. Ulbe Bosma, “The Indo: Class, Citizenship and Politics in Late Colonial Society,” in *Recalling the Indies*, ed. Coté and Westerbeek (ref. 88), 67–97, on 67; notably, “in contrast to the British colonies, metropolitan enclavement did not exist in the colony” (p. 70).

92. Spyer, *Memory of Trade* (ref. 87), 54.

93. Stoler’s colonial, sexual exceptionalism in *Carnal Knowledge and Imperial Power: Race and the Intimate in Colonial Rule* (Berkeley: University of California Press, 2002). Quotations from

In the Netherlands, illegitimacy was low in the eighteenth century, although it rose with the decline of the Dutch Republic.⁹⁴ There was, however, a significant aliquot of non-Dutch speakers. Immigrants to the Netherlands after 1620 originated primarily in Scandinavia and Germany. According to one study, they “were sufficiently numerous to account for one third of all persons marrying in Amsterdam in the seventeenth century and a quarter of all those marrying in the eighteenth century—183,000 immigrants in all.”⁹⁵ This fluid situation is a substantial nod in the direction of East Indies practice, and it leads us to ask, with respect to the weighty discourse of science: How many, if any, scientists in the Netherlands discussed mathematics and mechanics with their wife? On intimate matters, large households in the Netherlands ran on the labor of servants, who were frequently illiterate and who spoke in dialect. Men sought to make brilliant alliances in the Netherlands, just as they did on Java.⁹⁶

Given the differences of climate, cuisine, and costume, Jean Gelman Taylor finds it “odd” that, well into the nineteenth century, writers “should characterize their sojourn in Indonesia as basically the same as their life in Holland.” As evidence, Taylor cites Dr. Carel Willem Wormser’s reminiscences, and she discounts them. In her words, “It is easiest to pull apart that kind of record,”

Stoler, “Epistemic Politics: Ontologies of Colonial Common Sense,” *Philosophical Forum* 39 (2008): 349–61, on 351–52. The absence of an unambiguous trace of colonialist “epistemic considerations” in astronomical publications is fatal to Stoler’s exceptionalist thesis. Her argument, drawing primarily on Eurocentric social commentators, would not change if intimate life in the colonies mirrored intimate life in Europe. Stoler’s appeal to my own research (p. 350) misses the point that science was respected in the inter-imperialist realm precisely because imperialists shared a clear “epistemic frame” (p. 351), her words for paradigm or world-picture.

94. Simon Schama, *The Embarrassment of Riches: An Interpretation of Dutch Culture in the Golden Age* (New York: Random House, 1997), 438; A. M. van der Woude, “Population Developments in the Northern Netherlands (1500–1800) and the Validity of the ‘Urban Graveyard’ Effect,” *Annales de démographie historique* (1982): 55–75.

95. Jan de Vries, “The Population and Economy of the Pre-Industrial Netherlands,” *Journal of Interdisciplinary History* 15 (1985): 661–82, on 670.

96. With regard to patterns of intimacy and science, Jill H. Casid’s *Sowing Empire: Landscape and Colonization* (Minneapolis: University of Minnesota Press, 2005) postulates a connection between botanical transplantation in the eighteenth century and homoeroticism in England. There are broader claims (p. xiii): “*Sowing Empire* pays attention to colonization on the scale of the intimate, to the sexual and colonial politics of the small and apparently arbitrary remnant.” On the same page, Casid refers to a dream of botanist Hans Sloane’s as the “dream enterprise of colonization.” Notwithstanding its ambitious aims, the book discusses very little about rods and cavities in landscape design. Apples and maize, propagated by human intervention, make no appearance.

which omits Wormser's household of Indonesian servants.⁹⁷ From the present perspective, however, it is significant that Wormser, academically educated in science, is the distinguished biographer of the great nineteenth-century Indies naturalist Frans Junghuhn, himself a fierce defender of autochthonous Javan culture. Complementarity would have Wormser, and scientists generally, finding harmony between life in the Netherlands and life on Java. In fact, a recent essay by Elsbeth Locher-Scholten, which emphasizes racism, affirms a structural similarity between masters and servants on Java and in the Netherlands early in the twentieth century:

Whether these twentieth-century female authors were full-blooded Europeans or mixed-blood Indies women, their opinions about Javanese servants were quite similar. Regardless of their descent, all European women were involved in the process of Westernization of colonial society that took place in the first half of the twentieth century. A distinct sense of a "Netherlands in the Tropics" developed in the interwar years.⁹⁸

The similarity radiates from Pamela Pattynama's study of the Eurasian family setting in the twentieth century.⁹⁹

Complementarity extends the possibility of explaining variations in scientific illustration. Daniela Bleichmar observes that illustrations produced by the workshop of José Celestino Mutis in eighteenth-century New Granada, compared to European images, are flat, making limited use of shading.¹⁰⁰ Mutis's style does not seem to have compromised interdiscursivity; European botanists understood which specimens were being represented, insofar as they were familiar with the plants. It could be that shading is time-consuming and sophisticated, a technique not well-suited to the voluminous output of Mutis's workshop. The stylistic integrity emanating from the workshop, and its similarity to European prints, suggests that the workshop's staff and furnishings resembled the setting in a

97. Taylor, *Social World* (ref. 89), 136.

98. Elsbeth Locher-Scholten, "So Close and Yet So Far: The Ambivalence of Dutch Colonial Rhetoric on Javanese Servants in Indonesia, 1900–1942," in *Domesticating the Empire: Race, Gender, and Family Life in French and Dutch Colonialism*, ed. Julia Clancy-Smith and Frances Gouda (Charlottesville: University of Virginia Press, 1998), 131–53, on 133–36.

99. Pamela Pattynama, "The Indisch Family: Daily Life in Early 20th Century Batavia," in *Recalling the Indies*, ed. Coté and Westerbeek (ref. 88), 47–66, especially the section "Inner World, Outer World," pp. 56–59; Eurasians generally employed Javanese servants, p. 54.

100. Daniela Bleichmar, "Painting as Exploration: Visualizing Nature in Eighteenth-Century Colonial Science," *Colonial Latin American Review* 15 (2006): 81–104, on 94.

European workshop closely, but not identically, and it suggests a similarity, but not an identity, between social relations in the two settings.

If households were similar in New Granada and in Spain, and on Java and in the Netherlands, we are led to study the connection between intimate personal relations and both artistic expression and scientific discourse. Complementarity offers a new departure for discussing the slippery distinction between superstructure and base. What appears most distinctive in society can be least relevant. Turban or Trilby, soy or steak, matter less than servant and master, wife and husband. Rudyard Kipling expressed the view in the “Ballad of East and West,” as did Antoine de Saint-Exupéry in *Le Petit Prince*. It would follow that cuisine and costume are superstructural, while family size and divorce rate may be basic. In the vocabulary of Antonio Gramsci and Raymond Williams, for whom the economic means of production in the base generated the cultural superstructure, the organization of an observatory, workshop, or household certainly sustained the production of science and illustration.

European scientists took their worldview to the tropics. Just as significantly, a household in Batavia functioned like a household in many parts of the Low Countries. Complementarity leads to the view that climate, cuisine, and costume—parts of life differing dramatically between the tropics and the metropolis—are epiphenomenal in art and science. From complementarity, it follows that intimate social relations may be the key to understanding dramatic divergences in apprehensions of the world. An arrow from Cupid, a touch from the Muse, or a thunderbolt from Jove, these are the jolts that stimulate thought. It is of little consequence if one drinks *cachaça* or gin, wears *dhoti* or trousers, lives in a house of bamboo or brick.

Where might one look for foundational social and intellectual divergence? Obviously, in civilizations without contact to the modern world system. Just as clearly, we should expect to find new ways of seeing nature in civilizations that have undergone a revolutionary change in social relations. All indications point to such a social revolution between 1890 and 1920: As Virginia Woolf noted in 1924, “in or about December, 1910, human nature changed.”¹⁰¹ However one views the period 1890–1920—and this is one of the main points in Thomas Pynchon’s magnificent book, *Against the Day*—ordinary life in 1920 seems quite different from ordinary life in 1890. So, too, in an analogous way,

101. Alex Zwerdling, *Virginia Woolf and the Real World* (Berkeley: University of California Press, 1986), 145, for a sophisticated discussion.

the English revolution of the seventeenth century, which gave rise to the Merton theses about science and radicalism and about science and war, theses unextinguished by two generations of criticism.

Innovation occurred in many environments, and the identification of an apparently peripheral setting requires care. Philadelphia, a few decades after the time that Benjamin Franklin studied electricity there, was the second largest English-speaking city in the world, and Franklin was in direct contact with leading savants; so was Franklin's polymath contemporary, Antonio de Ulloa, in Huancavélica, Havana, and New Orleans. The Batavia of Christiaan Eijkman, when he studied beriberi, was in many ways a microcosm of the Netherlands. (His experimentation on prisoners had nothing to do with colonialist ideology; it follows a long line of Western experience, dating back to Aristotle.) The same goes for Julius Robert von Mayer, on his passage to the Dutch East Indies and with his treatment of patients in Batavia, as he pondered heat and mechanical work.

It remains to be seen if the postulate of common social structures in Europe and the colonial world can make a credible historical narrative. Such a narrative would follow directly from the writings of postmodernists, for they seem to require that similar forms of cultural expression should be generated by homologous social structures. If the generation of common artistic expression and scientific notions in apparently diverse cultures is granted, then postmodernists must embrace a form of convergent evolution with regard to fundamental social relations.¹⁰² Such a view, however, would be incompatible with an affirmation of the distinctiveness of colonial society. Alternatively, postmodernists can celebrate the separate paths taken by each modern civilization (however they would care to define the separation), although, if they do so, they would need to exclude images of nature and scientific discourse from other cultural expressions, such as music and costume. This reasonable decision, recognizing that natural knowledge is insulated against a great many

102. Historians who look for national or cultural variation in the exact sciences during the modern period often focus on trifles. Lewis Pyenson, "An End to National Science: The Meaning and the Extension of Local Knowledge," *History of Science* 40 (2002): 251–90, for the futility of seeking national science; cf. Johan Heilbron, "Qu'est-ce qu'une tradition nationale en sciences sociales?" *Revue d'histoire des sciences humaines* 61, no. 18 (2008): 3–16, for an affirmation of national traditions in the social sciences. A recent consideration of convergent evolution: Geerat J. Vermeij, "Historical Contingency and the Purported Uniqueness of Evolutionary Innovations," *Proceedings of the National Academy of Sciences* 103, no. 6 (Washington, DC: National Academy of Sciences, 2006): 1804–09.

social norms, would also subvert postmodernist sensibilities. Each alternative is fatal to postmodernism. Both the record of images and the record of words condemn the postmodernist project, allowing the historian once more to discuss ideas freely.

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