containing both scientific and Cofan plant names, to preserve local knowledge and to reinforce understanding of the traditional uses and importance of local plants (see the figure, previous page).

Museums must raise their public profile and undertake an ambitious search for funds to support the capital investment, technology, and human resources required to sustain successful conservation programs. No longer can we countenance the disconnect between critical conservation needs and the significant lack of funding for conservation.

Natural history museums must exercise scientific leadership. They hold a position of relative objectivity and scientific authority that enables them to act as both consensus builders and catalysts to convene productive partnerships for conservation. Also, as specialized scientists with decades of experience, museum researchers often have access to policy-makers to whom they can effectively convey inventory data and recommendations for conservation action.

Now more than ever, scientific leadership is necessary to meet the world's conservation needs. By contributing the underlying scientific rigor of research and engaging talented local and international partners, natural history museums have moved beyond being storehouses of knowledge and have become active participants in the struggle to investigate, to preserve, and to restore biologically and culturally important areas of the world.

When science informs conservation, the results are dramatic. Last year, the Field Museum, with many Peruvian and international partners, conducted a rapid biological inventory of the northern Cordillera Azul range in the Andean foothills of Peru. The scientific team identified at least 28 species that are new to science, along with registering dozens of new records for the country. Armed with critical scientific data, the Peruvian government worked hard and fast to create the 5212-square-mile Cordillera Azul National Park, roughly the size of Connecticut, barely 8 months after the team left the field.

An advocacy role is a delicate one that must be exercised appropriately. Scientists, rather than policy-makers or lobbyists, populate the laboratories of natural history museums. Our strength lies in the scientific light we can shed on targeting priorities for conservation and on designing effective plans of action. Access to basic science and the skills to apply it—when combined with an ability to form partnerships and to build local capacity—uniquely enables museums to extend their resources into conservation action. Time is running out: the sixth great extinction,[#] caused by *Homo sapiens sapiens*, is already under way.

*P. H. Raven, E. O. Wilson, *Science* **258**, 1099 (1992).
†Because organic materials decompose, museums must invest in state-of-the-art storage facilities to protect their collections.
‡Specimen-based databases assembled by natural history museums contain distribution and other data that can be readily verified.
§Work undertaken at the Centre for Biodiversity and Conservation Research at the Australian Museum, to test the reliability of collections data, promises to make conservation predictions based on museum data even more robust.
‖R. M. May, *Nature* **347**, 130 (1990).
¶Rapid biological inventories (RBIs) involve documenting visible taxa as proxies for less conspicuous and little-known species. RBIs provide critical biological data within the narrow time frames required by decision-makers, but they are not a substitute for comprehensive biological inventories.
#E.O. Wilson, *The Diversity of Life* (Harvard Univ. Press, Cambridge, MA, 1992), p. 32.

ESSAYS ON SCIENCE AND SOCIETY

Romanticism, Race, and Recapitulation

Ontogeny recapitulates phylogeny.

Haeckel's parallel between the development of individual organisms and the hierarchy of species ranks with other outmoded doctrines of the 19th century.* The analogy, which may serve as the epitome of Romantic biology, concerns the evolution of organic form, such that each successive stage in growth, from the tiniest gamete to the mature adult, mirrors the increase in complexity in the phylogenic order. To visualize the idea we need only recollect that sequence of images presented in school science texts: the human embryo compared with a tadpole's, a chick's, a deer's, etc. As a theory of development it seems embarrassingly antiquated, like exercises with Indian clubs or ruler slaps on the palm.

Recapitulation nonetheless remains a powerful idea, and if it no longer aids the modern discipline of embryology it persists in our contemporary conception of race. I want to examine why this is so, first by looking at the history of recapitulation in Romantic racial theories, and second by reflecting on the ends that the idea of race still serves. My thesis is that the notion of race preserves in nature the social idea of class. In a world where Darwinian struggle seems ubiquitous, this desire for order is hard to relinquish.

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Recapitulation in Race

The late 18th and early 19th centuries witnessed a boom of new writing on race. Three figures from this period, each of whom might be called Romantic, offer interesting case studies. Since historical styles are notoriously hard to define, let me highlight the main features of their thinking: argument by analogy, concern with polarity, and elision of the social and the natural.

Henrik Steffens (1773–1845) was probably the strangest of the group. A Dane born in Norway, Steffens studied natural history, mineralogy, and philosophy in Germany, where he went on to enjoy a successful career as a university professor. His writings, which mixed transcendental eschatology, geological speculation, and conservative nationalism, permanently alienated fellow scientists with their muddy bombast; nevertheless, Steffens enjoyed great popularity among students, drawing both

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teaches German, European, and science history at the University of Colorado at Denver. He is currently completing a biography of the physiologist and essayist Emil du Bois-Reymond (1818–1896) and is planning a book on German scientific exploration. His research concerns the role of science in 19th-century German society.

Emil du Bois-Reymond and Karl Marx to his lectures on anthropology. Steffens' thinking on race is hard to follow, being phrased in metaphor and abstraction, scattered among various publications, and larded with the downright weird, but it might be paraphrased as follows: four elements (nitrogen, oxygen, carbon, hydrogen) define four races (Negroid, Malaysian, Mongolian, American). These in turn mirror four physiological systems (cerebral, arterial, ganglial, venous); four temperaments (sanguine, choleric, melancholy, phlegmatic); four cardinal points (south, east, west, north); and four continents (Africa, Asia, Europe, America). Furthermore, the races correspond to the stages of life from childhood (Negroid) and youth (Malaysian) through maturity (Mongolian) and old age (American).

This last temporal progression suggests a cultural hierarchy. Steffens placed Europeans, a variety of Mongolians, at the peak of racial development, transforming his compass of nature (a geographical chart) into a ladder (a linear scale). Although typical of his exasperating slips of argument, this shift in imagery is not unique: the analogy between the history of an individual, on the one hand, and the history of racially determined civilizations, on the other, appears as a common trope in Romantic anthropology. Moreover, Steffens never separated culture from nature. Both obeyed the same laws of development, and both tended toward the same end of perfection. By Steffens' logic, culture, the highest that humans can produce, recapitulated mankind, the highest that nature can produce. Race merely served as the vehicle of cultural evolution, the true purpose of mankind.

Steffens' ideas reappear in the works of Carl Gustav Carus (1789–1869), best known to scientists for originating the concept of the vertebrate archetype, a seminal idea in the development of Darwin's theory.† A polymath nearly as impressive as his friend Goethe, Carus worked as a landscape painter, an art critic, a travel writer, a theorist of the unconscious, a professor of comparative anatomy, a privy counselor, and a court physician to the King of Saxony. Like Steffens he envisioned four gradations of race, but rather than order them by humor, Carus chose a circadian principle. In his system the peoples of the Earth separated into those of the day (Europeans), of the eastern twilight (Asians), of the western twilight (Americans), and of the night (Africans and Australians). Progress marched from east to west; likewise, the most advanced peoples of Europe recapitulated stages of development characteristic of their more primitive ancestors. Only peoples of the day possessed any real ability to conceive of the higher ideas of "beauty, love, and truth"; and over time "their light and power" would "gradually spread over all inhabited parts of the Earth."‡

Similar reasoning dominates the work of Gustav Klemm (1802–1867), a librarian in Dresden who amassed an ethnographic collection that drew praise from contemporaries like H. L. F. Pitt Rivers and E. B. Tylor. To expound his system of classification, Klemm wrote a 10-volume *General Cultural History of Humanity*, a work now remembered for being the first anthropological exposition of culture.§ It all sounds messier than it was. Klemm's understanding of race was reduced to a polarity: There are two kinds of peoples—the active, or manly, and the passive, or womanly. Just as in marriage, each needs the other. The strong, however, ultimately dominate the weak. By this token the Europeans will necessarily enliven the entire world, having recapitulated all stages of cultural evolution, from savagery through domestication to freedom.

"Romantic biology soon succumbed to Darwin's theory."

The Sociogenetic Law

The racial theories of Steffens, Carus, and Klemm seem peculiar to us now. In its own time, Romantic biology soon succumbed to Darwin's theory. The change in thought lay not so much with the abandonment of analogy—after all, the very idea of natural selection presupposed the "hand of nature" picking and choosing.‖ Rather, Darwin shifted the argument from one of form to one of function: what mattered was not what species were, but what they did.

It has become commonplace to characterize Darwin's ideas as Victorian political economy written into nature. The whole displacement of form by function in 19th-century biology resembled the transformation of the middle classes themselves: defined less by place in the social hierarchy than by performance in the public sphere. So what happened to the idea of recapitulation? Interestingly, it survived into 20th-century theories of culture. Norbert Elias' *Civilizing Process* posited a "sociogenetic law" clearly modeled on Haeckel's hypothesis that the cultural development of the individual recapitulates that of society as a whole.¶ Put plainly, children begin as little savages and become more civilized as they grow up. A clear measure of this progress, according to Elias, can be seen in manners. Just as children learn to be polite, say, at the table, so, too, society has abandoned its more Rabelaisian habits.

The problem with Elias' theory is that it relies far too heavily on the idea of class. Anthropologists no longer conceive of culture in terms of high and low; nor do they characterize cultural evolution in terms of the popular adoption of elite practice. The arrow of cultural influence points from the bottom up, as well as from the top down. Equally doubtful is Elias' narrative of refinement. Here he has drawn clearly from his Romantic predecessors. Recapitulation implies individualization—after all, the whole point of climbing the ladder of cultural development is not to repeat others, but to distinguish one's self from them, the goal being the formation of a unique identity. Elias' "civilizing process" is measured by progress away from the common. Similarly, the thesis of Lévi-Strauss' *Tristes Tropiques* is of mixture as loss—everything, and everyone, turning the color of mud.# But why see things so darkly? If anything, Elias' and Lévi-Strauss' theories merely reveal anti-modern anxiety about the cosmopolitan.

The 19th-century German Romantic anthropologists Steffens, Carus, and Klemm made their prejudices plain: They all linked a chain of development from the natural to the social, one based on clear experiences of hierarchy. Contemporary society, in contrast, preserves no fixed order. The same dynamism appears to hold in nature: Darwinian evolution heads nowhere. This reality is unsettling. People long for a world of order, even if that means retaining outdated ideas of class as metaphors for hierarchies they wish existed in the natural world. Race is nostalgia.

*S. J. Gould, *Ontogeny and Phylogeny* (Belknap Press, Cambridge, MA, 1977).
†N. Rupke, *Richard Owen: Victorian Naturalist* (Yale Univ. Press, New Haven, CT, 1994).
‡C. G. Carus, *Denkschrift zum hundertjährigen Geburtsfeste Goethe's. Ueber ungleiche Befähigung der verschiedenen Menschheitstämme für höhere geistige Entwicklung* (Brockhaus, Leipzig, 1849), pp. 95–96.
§G. Klemm, *Allgemeine Cultur-Geschichte der Menschheit*, 10 vols. (Teubner, Leipzig, 1843–52), vol. 1, 195–205; vol. 4, 229–260.
‖The phrase is Darwin's own. See C. Darwin, *On the Origin of Species: A Facsimile of the First Edition* (Harvard Univ. Press, Cambridge, MA, 1998), p. 61.
¶N. Elias, *The Civilizing Process*, E. Jephcott, Transl. (1938) (Pantheon Books, New York, 1978), vol. 1, viii.
#C. Lévi-Strauss, *Tristes Tropiques*, J. and D. Weightman, Transl. (1955) (Penguin Books, New York, 1992).