

AUSTRALIA

LAND OF LIVING FOSSILS

Produced by the Cartographic Division
National Geographic Society

ROBERT E. DOYLE, PRESIDENT

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WASHINGTON FEBRUARY 1979

Wedge-tailed
Eagle

Red-tailed
Black
Cockatoo

Gouldian
Finches

Crimson
Finch

Sugar
Glider

Lumholtz's
Tree
Kangaroo

Freshwater
Crocodile

Sulphur-crested
Cockatoo

White
Ibis

Emu

Galah

Rainbow
Lorikeet

Bustard

Agile Wallaby

Brolga

Frilled Lizard

Red Kangaroo
(female)

Euro

Red Kangaroo
(male)

Dingo

Rabbit-eared
Bandicoot

Exmouth Gulf

L. McLees

Shark Bay

Dirk Hartog I.

Roebuck Bay

King
Is.

Dampier
Land

G r e a t
S a n d y
D e s e r t

W E S T E R N

WESTERN AUSTRALIA

P L A T E A U

Gibson Desert

Lake
Mackay

Amadeus Depression

Ayers Rock

Mt. Woodroffe

Tanami
Desert
NORTHERN

390 Mt. Macdonald

1440 Mt. Woodroffe





Three
Reading
Land of
Living
Fossils

Reading Land of Living Fossils

Maps do not appear in our hands by magic, but as the result of a sequence of actions. A book has to be removed from a shelf; pages have to be turned. The map is the third in a series of maps, or it is the seventh. Or it is surrounded by text to which it is related. The way we approach the map—or it approaches us—constructs a frame, and this

frame encourages us to see the map this way or that. Perhaps we had to open the newspaper. The map accompanies this article. It is on that page; it is attached to this ad. It is a locator map; it is a weather map. Or the map was handed out at a public hearing—an usher counted the number for each row, they were passed down. The map pertains to the hearing. It is a legal document. Or it was handed out at a briefing. It is the map of a target; it shows the sites to be bombed. In our case, the map had to be unfolded. We came across it riffling through a bin of maps in a used bookstore. The map had been divorced from its original context—its epimap (the pages of an issue of the *National Geographic*)—and any it had, it now carried with itself, in its perimap and in the way it allowed itself to be revealed as it was opened. This is true of most *National Geographic* maps: they tell you how they want to be read by the way they unfold themselves.

UNFOLDING “LAND OF LIVING FOSSILS”

“Australia: Land of Living Fossils” (figure 3.1) begs to be unfolded. One attraction is the whiff of the aboriginal wafting from “Australia.” It comes from the way the letterforms whisper *hand drawn* and the way the word is printed in a “natural dye” brown (hinting of nut shells). Inside each letter its form is picked out again in white as if to say “Primitive X-ray Art.”

Below the title, credits, and publication information (National Geographic Society, 1979), three birds have been posed: an emu (still exotic in 1979), a galah, and a wedge-tailed eagle. The galah blazes in phosphoric pink. It has a white comb and a faintly yellow nib. The neck of the emu glows with an opalescent blue.

Living fossils!

Everything here—title, letterforms, birds—plays with this paradox which, *simply by being paradoxical*, is removed from our everyday, our hum-drum world. It would be hard not to be thinking, “Australia—not an everyday place!” The tip of the wedge-tailed eagle’s wing wraps out of sight around the right fold. The feet of the emu dip around the fold below. Like a barker at a carnival the cover pleads, “Unfold me!”

The first fold gives up a pair of cockatoos (one sulphur-crested), a gaggle of multicolored Gouldian finches, a rainbow lorikeet, and an agile wallaby; the next fold a colony of koalas, the superb lyrebird, a bustard, a brolga, a white ibis, a royal spoonbill, a pied goose, a sugar glider, a spotted cuscus, a tree kangaroo, and a freshwater crocodile (figure 3.2). Do *all* these illustrate the paradox? Certainly they’re exotic, colorful. Only the next fold, unveiling the central portion of the supplement, reveals . . . the *map*, this of a tan and green Australia surrounded, *guarded*, by totemic kangaroos, dingoes, a black swan, a variety of other birds, a hairy-nosed wombat, a truly prehistoric-looking frilled lizard, and, falling off the bottom of the page (inviting the final unfolding), a kookaburra with a common black snake twisting in its bill.

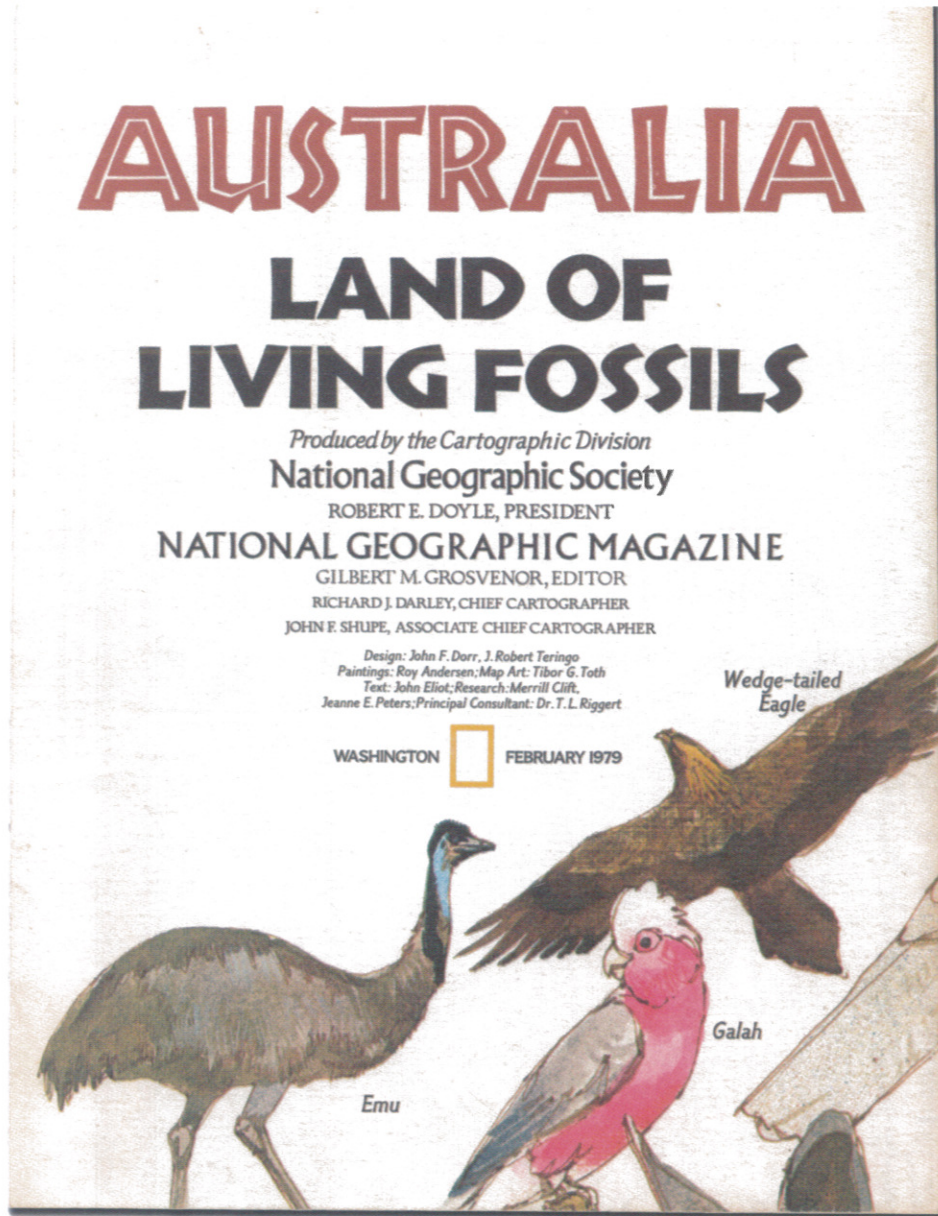


Figure 3.1
Cover of “Australia: Land of Living Fossils,” supplement to *National Geographic*, February 1979.

Figures 3.1–3.4 courtesy of Roy Anderson/National Geographic Image Collection.

With the final fold, a platypus, an echidna, a Tasmanian devil, more kangaroos, another wallaby, another ibis (figure 3.3).

Wow!

Swarmed by the fury of fur and feathers, the map comes off as little more than an excuse for the animal portraiture. And indeed there is that about the map too, a suggestion of portraiture, as if the continent had sat for, perhaps even commissioned, this lush, gorgeous, almost tactile rendering in tawny shades of khaki and sand and lightly done toast. The colors slip through old ivory and olivesheen and citron to conclude in a deep grass-green, minty, almost viridian in the shadows of the

Atherton Tableland (the northeast highland region, figure 3.4). There is a ripeness about the rendering, a swelling, a fullness. A production house notorious for the lavishness of its type has here restrained itself as though type ill comported with portraiture: seven retiring province names; a few features picked out, but in the smallest type imaginable; in a larger face, but so widely spaced as to sink into the land, the names of a single plateau, lowland, and range of mountains. This *virginal land* (of living fossils) has yet to be conquered by nomenclature.

There is a text, but it's unlikely that it's read before the map is flipped over. If you've ever subscribed to the *National Geographic*, you



Figure 3.2
Unfolding "Australia: Land of Living Fossils."

AUSTRALIA

LAND OF LIVING FOSSILS

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National Geographic Society

EDITOR: W. H. BENTLEY, PRESIDENT
NATIONAL GEOGRAPHIC MAGAZINE

EDITORIAL BOARD: GEORGE P. BROWN, EDITOR
EDWARD S. MERRILL, EDITOR
JOHN W. HARRIS, EDITOR

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WASHINGTON FEBRUARY 1978



FURRY ANIMALS with ducklike bills that lay eggs? Girding possum? Creatures that tote babies in belly pouches and jump like grasshoppers? Pursued, navigated James Cook, who saw the now familiar jumper on Australia's coast in 1770, wrote, "...a bear so sort of resemblance to any European animal I ever saw."

Here is a toasty-torty menagerie that fishbargued Europe's zoologists. Some of them roared and snarled from the land down under as taxidermic fishes. But slowly a fascinating tableau unfolded, of life forms isolated for millions of years.

The continental-drift theory suggests how Australia—mainland Australia and surrounding islands—became a living museum of odd species. Migrants from South America may have spread across then warm Antarctica into the region at a time when the landmasses were joined. After Australia split off tens of millions of years ago, it became a biological island, slowly evolving many unique species. Some have made extraordinary adaptations to a climate that,

in certain areas, can remain rainless for many years and then unleash floods. Kangaroos, for instance, can digest tough, drought-resistant plants. The map's topographic hues reflect the barren deserts, bushlands, and grasslands of the interior that contrast dramatically with lush coastal forests.

The world's most primitive mammals, the platypus and the echidna, or spiny anteater, are the only living monotremes, an order of animals whose females deposit their young in eggs. Hatchlings are nourished by milk that seeps from the mother's mammary glands.

Inhabiting eastern coastal regions, the platypus probes streambeds for worms and crayfish with its colorless bill—soft, decidedly unbirdlike, and studded with sensitive nerves. Little wonder that an early naturalist named the platypus "paradise." A cousin, the spiny anteater, ranges the continent. With its powerful claws, it can bury itself in seconds to escape predators.

The stars of the middle cavalcade—the marsupials, numbering about 170 species—harbor their fetuses in wombs, but only briefly. The extremely small newborn young must crawl through its forelimbs to find mother's pouch and

a life-giving teat within. Across the continent bounds the major marsupial clan, the kangaroos and relatives with names Aboriginal in flavor: wallaby, wallaroo, euro, quokka, and others, totaling some fifty species. Giant red or grey roos may tower seven feet. Other kinds are but inches in length. Tree kangaroos have returned to the branches, probable ancestral homes of all kangaroo species.

Specialization earmarks many other marsupials. Cuddly-looking koalas dine almost exclusively on leaves of certain species of eucalyptus. Once slaughtered for their soft fur, they have made a comeback with the aid of strict protection measures. Assorted tree-dwelling possums, or phalangers, include sugar gliders that swoosh between boughs and sluggish, prehensile-tailed opossums. Badgerlike wombats eat grasses, gnaw roots, and dig burrows as long as a hundred feet. Squirrel-size antechinus called numbats feast on plentiful termites.

Many pouch bearers, especially bandicoots that scurble for insects, and

Tasmanian devils, powerful prowlers that gobble lizards and birds, were victimized by an invader, the dingy. Among Australia's few placental mammals—those that gestate their young like humans—these wild dogs possibly came from the Malay Archipelago with early human migrants about 8,000 years ago. More recent introductions include cats that have become feral predators with native species for prey. But the most serious threat comes from ever-expanding grazing lands for sheep and cattle.

As exotic as the mammals, Australia's spectacular birds features raucous kookaburras and flightless emus, which can stand six feet tall and sprint at 30 miles an hour. Superbly bred and ardent sailors, darters and spread two-foot-long tails of shimmering blue. A gaudy gaggle of parrots comes from fifty species—praries living color.

Here lies the world's only black swan, the pied goon, and the once endangered Cape Barren goose, rescued by conservationists. Now Australia has set aside some 3 percent of their nation as preserves for the rare creatures of a land that time forgot.

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Figure 3.3
"Australia: Land of Living Fossils," full map. But "map" is used loosely here, as the animals are clearly meant to overshadow the subtle map in the center. Even the *Geographic* concedes it's better called a "poster."



Figure 3.4
Detail of "Australia: Land of Living Fossils."

know how these map supplements work. On one side is an elaborate graphic like our painted menagerie (small type in its margin even calls it a poster). On the other side is The Map (the "real" one), what in our introduction we called the main map (small type in *its* margin even calls it a "map"). This map *is* in the house style. An all but white Australia—Easter-egg tones shadow the borders—is washed by the palest of blue waters and just *covered* with type (figure 3.5). There's not a kookaburra in sight: in its place, a dense spiderwork of roads and railroads, homesteads, airports, oil fields, water holes, ports, stock routes, towns, cities, metropoli, *stippled in type*, nomenclature nailing everything. Even the boundless waters are named: the Timor Sea is distinguished from the Arafura, the Tasmanian from the Coral, and all from the Indian Ocean.

What modulates smoothly on the poster-side map from the palest of Caucasian winter-skin "whites" to watermelon-rind green, goose-steps on the main-map side from Western-Australian pink to South-Australian purple to Queensland yellow. What on the poster-side map was a "self-distinguishing" landscape of gradually varying landforms (mountains, valleys, plains), is severed, on the main map, into land *status types*: aboriginal lands (bounded by a black line shadowed in gray); and wildlife sanctuaries, nature reserves, and national parks (bounded by dashed lines and filled with green). What on the poster side explodes from the map in abundant profusion (animals, which is to say, nature) is on the main map corralled, bordered, set apart (in parks). Everything else is white, which is to say . . .

Which is to say . . . everything else is, precisely, *what?*

The topography that forms the *surface* of the poster-side map slips *beneath* it on the main map. The main map's surface is made of type. Beneath it the signs for swamp, desert, and dry salt lake lie like a layer

of dust. In barely distinguishable grays only ghosts of relief can be made out. Yet the maps are not contentious. Instead of suggesting a state of schizophrenia, the day face of a Dr. Jekyll on the one side and the night face of a Mr. Hyde on the other, the map as a whole—that is, the two-sided sheet taken as a unit ("*Hand me that map of Australia, will you?*")—asks us to imagine that these worlds are separated for no more than (technical) reasons of legibility, that in fact they somehow *imply* each other.

Correspondingly the map's text—ten paragraphs on the poster side (figure 3.7)—situates its "topsy-turvy menagerie" in a historical context of loss and survival among introduced species (dingoes, cats, rabbits, sheep, and cattle) that very much *takes for granted* the Australia mapped on the nomenclatural side. In describing the "fascinating tableau" of this "living museum of odd species," the text does not hesitate to refer to the slaughter of the koala for its soft fur, the victimization of the Tasmanian devil by the introduced dingo, and the competition given native species for forage by the more recently introduced rabbits, sheep, and cattle. Indeed, tragic as this history might have been, today koalas "have made a comeback with the aid of strict protection measures," and "the once endangered Cape Barren goose" has been "rescued by conservationists." Without a trace of irony the text concludes that "Now Australians have set aside some 3 percent of their nation as preserves for the rare creatures of a land that time forgot."

Though it wasn't forgotten altogether, as the text's introductory paragraph reminds us, recovered as Australia was for history (for *time*) at least as long as 230 years ago by James Cook, if not in fact 8,000 years before that, as the text further reminds us, by the human migrants from the Malay Archipelago who introduced the dingo. "Forgot" only means to say forgotten in the mainstream of *our* history, which is why



Figure 3.5
 “Australia” (verso of “Land of Living Fossils”) is what we call the main map of the supplement. It grounds the fur-covered map on the front side.

Figures 3.5 and 3.6 courtesy of Ng Maps/National Geographic Image Collection.



Figure 3.6
 Detail view of “Australia.”

FURRY ANIMALS with ducklike bills that lay eggs? Gliding possums? Creatures that tote babies in belly pouches and jump like grasshoppers? Perplexed, navigator James Cook, who saw the now familiar jumper on Australia's coast in 1770, wrote, "... it bears no sort of resemblance to any European Animal I ever saw."

Here is a topsy-turvy menagerie that flabbergasted Europe's zoologists. Some of them rejected skins and skeletons sent from the land down under as taxidermic fakes. But slowly a fascinating tableau unfolded, of life forms isolated for millions of years.

The continental-drift theory suggests how Australasia—mainland Australia and surrounding islands—became a living museum of odd species. Migrants from South America may have spread across then warm Antarctica into the region at a time when the landmasses were joined. After Australia split off tens of millions of years ago, it became a biological island, slowly evolving many unique species. Some have made extraordinary adaptations to a climate that,

in certain areas, can remain rainless for many years and then unleash floods. Kangaroos, for instance, can digest tough, drought-resistant plants. The map's topographic hues reflect the barren deserts, brushlands, and grasslands of the interior that contrast dramatically with lush coastal forests.

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The stars of the wildlife cavalcade—the marsupials, numbering about 170 species—harbor their fetuses in wombs, but only briefly. The extremely small newborn young must crawl through a forest of fur to find mother's pouch and

a life-giving teat within.

Across the continent bounds the major marsupial clan, the kangaroos and relatives with names Aboriginal in flavor: wallaby, wallaroo, euro, quokka, and others, totaling some fifty species. Giant red or gray roos may tower seven feet. Other kinds are but inches in length. Tree kangaroos have returned to the branches, probable ancestral home of all kangaroo species.

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Copies of this poster, printed one side only on heavy chart paper, may be purchased from the National Geographic Society, Washington, D.C. 20036. Write for complete map list.

Figure 3.7
The descriptive text found in the lower left corner of "Land of Living Fossils."

Courtesy of Roy Anderson/National Geographic Image Collection.

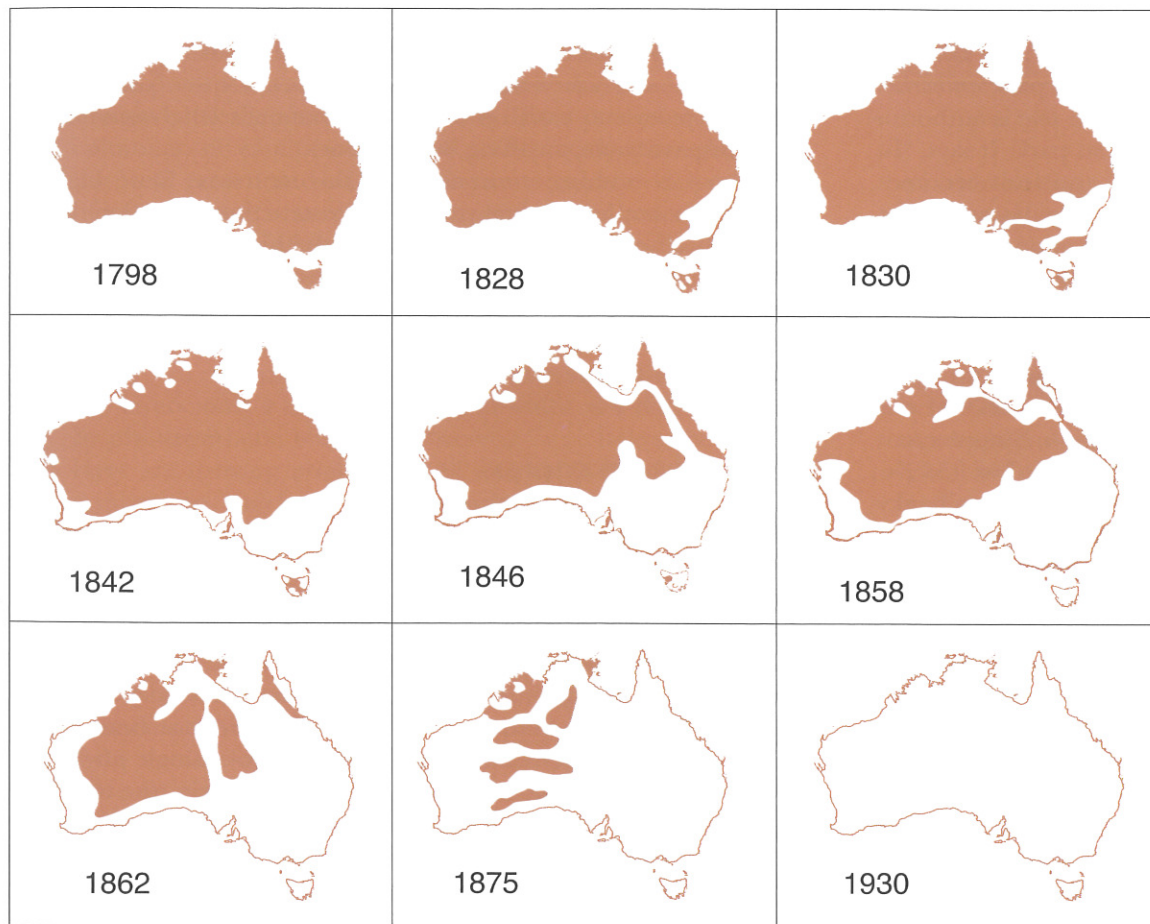


Figure 3.8
These maps track the expansion across Australia of the British, who ultimately arrogated to themselves the entire continent. It is this arrogated land that appears in white on "Australia."

our zoologists were “flabbergasted” by the “topsy-turvy menagerie” of “furry animals with ducklike bills”; even as “forgot” ignores the fact that today Australia is very much in history, and populated by recent, European immigrants who have arrogated to themselves a continent they initially claimed by . . . naming.

The white on the main map we asked about a page ago? That white is all the land arrogated by the British through the magic of naming not “returned” or “set aside” for the rare creatures (including aboriginal humans) of this land that time forgot.

COMPARING THE TWO SIDES OF THE MAP

The two sides of the map are connected in precisely this way: the land of living fossils—the poster side, the wild and wacky animals, and the wild and wacky terrain they imply (the lushly painted land of the poster’s map)—are subsumed within the bounded and often rectilinear areas of green on the—how to say this?—more “comprehensive,” more “real-world” main map of Australia, which while not a USGS topo quad is almost as authoritative. In the terminology of our introduction, nature as cornucopia (theme of profligacy) is subsumed within nature as park. Simultaneously, nature as park takes on the color of the profligate. In other words, nature as park *authorizes* nature as cornucopia. It says, “I am authoritative, so *that* is authoritative.” Nature as cornucopia *colors, perfuses* nature as park. It says, “In Australia nature is bountiful, it is extravagant,” and so it becomes hard to see the shape of Australia without seeing koalas, wallabies, kangaroos. But this effect occurs in our heads. It’s not on the paper.

It is the purity of each of the maps—their complete independence—which potentializes this effect. The two sides, in fact, seem to have been produced within the Geographic’s cartographic division by entirely separate units. The main map, again, *called* a map (“Copies of this map, printed one side only on heavy chart paper, may be purchased . . .”), carries in its upper right the designation, “Supplement to the National Geographic, February, 1979, Page 152A, Vol. 154 No. 2—AUSTRALIA.” There is no hokey type, funky colors, or hanky-panky X-ray art. Among the credits are none for art or design. None but the society president, magazine editor, and chief and associate chief cartographers are named; they and the projection: the Chamberlin Trimetric. The scale is given in four forms. The graticule is marked every four degrees.

None of this is true of the poster, which, again, is *called* a poster (“Copies of this poster, printed one side only on heavy chart paper, may be purchased . . .”). The poster carries no designation as a supplement to the magazine. The type of the title is *cute*. Beyond the names of president, editor and chief, and associate chief cartographers, credit is given for *design, painting, map art, text, research, and principal consultant*. The projection is *not* named. There is no scale or graticule. There is no ocean either, and therefore no reefs. There is no sea life among that of the land that time forgot. The *poster’s* Australia stops at the water’s edge.

The Australia of the main map slips *into* the water. Here the “outer limit of the continental shelf” is marked. The offshore waters are thick with reefs and banks and shoals. A block of text describes the Great

Barrier Reef as, “Containing the widest variety of marine life found anywhere, the barrier is the world’s most extensive stamping ground for coral fancier, shell collector, underwater explorer, and student of marine biology.” Another text on the map describes the 400,000 square miles of Australia’s Coral Island Sea Territory. These waters *connect* Australia to the rest of the world—Indonesia dips into the map at the upper left, Papua New Guinea into the upper right—and so *imply* the rest of the world. This map’s border less demarcates *an entity* than frames *a piece of the world*. Indeed, *this is the world*, we have merely zoomed in on one part of it for a closer look, we could pull out, the Pacific would reveal itself, it’s all *real*.

It is precisely the absence of these features that permits the poster map to be a portrait, an essay, an opinion piece (to be cute). This map’s border (which stops at *land’s* end) less frames a piece of the world (a piece that *contains* Australia) than brings a world into being (“the land of living fossils”). It is this exemption from the burden of “objective reality” (from the burden of the authoritative) that licenses the map “art” with its “living” color and somewhat breathless topography (any “art” on the main-map side is confined to the elaborate decorative mini-kangaroo border that emphasizes the *undecorative* quality of the main map itself—see figure 3.12). It is this same exemption from the burden of “objective reality” that licenses the riot of animals that surrounds the poster map, especially the “unscientific,” indeed *popular* emphasis on birds and mammals (the main map is coolly dispassionate, anything but popular).

There is nothing unusual about this structure. State highway maps, for example, the ones produced by state transportation departments, have two sides too. On one side is the highway map itself (this is its main map). On the other side (the “poster” side) is a heavily illustrated inventory of points of interest. As the main map tells us how to get there, the poster side tells us where to go. As in “Australia: Land of Living Fossils,” the main map *authorizes* the rest.¹

A CUDDLY CORNUCOPIA

In introducing nature as cornucopia we characterized it as the nature of the small and the soft, the fuzzy and the warm. We said it was the nature of fur and feathers, and in fact the poster has it that the land of living fossils is largely inhabited by birds. Forty have their portraits here, forty birds, twenty-two mammals, and three reptiles, one of which is hanging from the bill of a kookaburra. Australia may have “slowly evolved many unique species” but the evidence here is that these confined themselves to a couple of classes of a single phylum of animals. The birds are colorful, the mammals are furry (the text even refers to “cuddly” koalas), but . . . *what do they eat?* Where are the echinoderms, the gastropods, the crustacea and the insects, the numerous worms and sponges? How about the corals for which Australia is so renowned? And this is to enumerate only a few of the *animals*, it’s not to get started on the other kingdoms.

Admittedly, microbial mats are less picturesque than such “stars of the wildlife cavalcade” as the koalas and giant red kangaroos. Microbial mats are hard to embrace, to pet. They’re less obviously responsive, they don’t sit up and beg. (They’re bacterial scums.) But

their absence from the “the land of living fossils” gives precisely the lie to the phrase, reveals it for the cute “hook” that it is. For if anything in existence merits the description “living fossil,” certainly it is the microbial mats—the stromatolite reefs (figure 3.9)—in Shark Bay several hundred miles north of Perth on Australia’s west coast.² Here the stromatolites flourish as they have for more than three and a half *billion* years, their appearance little changed since the Isuan Era of the Archean Eon. Comparatively rare in the earlier Archean, stromatolites owned the Proterozoic Eon, “the Age”—in Steven Stanley’s phrase—“of Prokaryotes.”³

This Age of Prokaryotes lasted from somewhere around two and half billion years ago until the onset of the Paleozoic nearly two billion years later. (The Paleozoic began approximately 570 million years ago.) It is a large chunk of the earth’s history, and the stromatolites were a big part of it. Not only were stromatolites the most abundant form of life throughout the Precambrian, they were also responsible for building up the oxygen content of the atmosphere to its present levels; that is, for making modern life possible:

The clearest evidence of the lives of ancient and extensive bacterial confederacies, however, are stromatolites. Stromatolites were to the Proterozoic landscape what coral reefs are to the present ocean: rich and beautiful collectives of intermingled, interdependent organisms. These domed, conical, columnar, or cauliflower-shaped rocks, found throughout the fossil record and still in existence today, are composed of rock layers that were once microbial mats. Communities of bacteria, especially photosynthetic cyanobacteria, lived and died atop one another . . . Some of the ancient stromatolites exceeded thirty feet in height.

Today—in restricted parts of the world—we can see that the top layers, only a few centimeters in width, are dominated by photosynthetic blue-green bacteria . . . Below the top layer are thriving populations of anaerobic purple photosynthesizers, which are sulfur depositors. Beneath them are dependent microbes, living on the produce of the bodily remains of the others.⁴

The cyanobacteria (blue-green algae) precipitate calcium carbonate, which binds with sediments trapped in the microbial mat to build up the rock base. The organisms continually migrate upward through the sediments to maintain their access to the sunlight, which fuels the life of the cyanobacteria. These are the oldest lifeforms extant. That they have no place in “Australia: Land of Living Fossils” simply begs the question, why not?

A possible answer, that when our map was published in 1979 the significance of stromatolites was unrecognized, does not bear much scrutiny. The *Geographic* itself had published a photo of stromatolites in its May 1978 issue;⁵ and J. William Schopf’s article, “The Evolution of the Earliest Cells”—largely about stromatolites and indeed including a photograph of the living stromatolites in Shark Bay—was published in *Scientific American* in September of 1978, which is to say, their significance was already acknowledged in the popular press. Schopf



Figure 3.9
Stromatolite reefs are a true example of “living fossils.”

had been writing about stromatolites since the early 1970s, but the groundwork for this recognition had been laid as long ago as the 1950s with the realization that even the most ancient sedimentary rocks contained fossils, and in the 1960s with the growing recognition that the greatest division among organisms was not between plants and animals, but between those with and without cellular nuclei. We recognize this distinction today as that between eukaryotes (with nuclei) and prokaryotes (without). Among the prokaryotes are both eubacteria and archaeobacteria and what used to be called blue-green algae, but are now better known as cyanobacteria.⁶

To seriously entertain this answer is, however, to overlook the absence on our map of yet another “living fossil,” Australia’s great saltwater crocodile (figure 3.10), which the *Geographic* itself had called—and only the year before—“Survivor of the Dinosaur Age,” noting that “crocodiles have been around for nearly 200 million years,” and that “crocodiles survived while their close kin the dinosaurs died out.”⁷ If these too are not exemplars of “living fossils,” it is hard to imagine what could be. It is even harder to understand why the *Geographic* would include among its “topsy-turvy menagerie” a very small image of the far less significant *freshwater* crocodile when a year before it had called the Australian *saltwater* croc “the biggest and some say the most dangerous of crocodiles.” In the 1978 article, author Rick Gore goes on to say that “Fishermen in Queensland once hauled in one that reportedly measured 33 feet,” adding that the crocodiles are “revered as a totem in parts of northern Australia” by contemporary Aborigines. Such an animal would certainly seem to qualify as a *Geographic* totem.

Except that it’s *not* cuddly. “They’re not cuddly,” Wayne King said in his epigraph to Gore’s article. “They don’t have big soulful



Figure 3.10
Australia's great saltwater crocodile, another living fossil. Again, none can be found in our *National Geographic* map!

Courtesy of St. Augustine Alligator Farm, 2004.

eyes like seals. Most of the animals the world is concerned with are beautiful, or they tug at your heartstrings. Crocodiles have a pretty toothy leer. They eat dogs in Florida—sometimes even people. Who could love them?" Yet at least crocodiles *have* eyes. Stromatolites lack even those, don't move, just sit there, in the shallows, like the cold, black, near-rocks that they are.

This marginalization, not to say rejection, of the cold and dark and hard by our map serves to construct an idea of nature as *warm and bright and soft*, though as a glance at the "living museum of odd species"—forty birds, twenty-two mammals, three reptiles—makes clear, still more is at stake than this. The issue, as King understood, is *cuddlesomeness*, which may be reduced to the question: *what would it come to as a stuffed animal* (as a Teddy bear)? Filling the upper-right corner of our map is a family of koalas (figure 3.11). A baby clings to its mother's shoulders. Completely dominating the left side of the sheet, and better than a third its height, are a pair of red kangaroos, a male and a female. Commanding the lower right? A platypus, its fur so lushly rendered you can almost sink your fingers into the plush.

In fact, the reigning images on the sheet *are* stuffed animals, and in each corner there is as well an added hint of *domesticity* (in addition to the family of koalas in the upper right, the platypus partially obscures a gray kangaroo and her nursing baby). The cuddly, the caressable, the kissable. These are all, or are all presented as being, things to hold close for warmth or comfort or in affection, which is to say, things to care for. No surprise, then, to recall that "Australians have set aside some 3 percent of their nation as preserves for the rare creatures of a land that time forgot." As for the crocs? In 1978, Australian biologist Gordon Grigg said, "If a child is taken at a beach, say, it will become almost impossible to defend our efforts to conserve the crocs."⁸



Figure 3.11
"Australia: Land of Living Fossils" detail. Imagine these as stuffed animals.

Courtesy of Roy Anderson/National Geographic Image Collection.

It is *not* about conservation. (How can we conserve animals when there is not a hint of the ecosystems required to sustain them?) It is *not* about rare creatures. (It is about our furry and feathered friends.) It is about . . . what *is* it about?

THE GEOGRAPHIC'S CONSTRUCTION OF SOCIETY

This is *not* about the National Geographic Society. Or, rather, it is. But only because it was the Society that produced "Australia: Land of Living Fossils." Without diminishing the (enormous) significance of the Society as a force in American geographic consciousness, it needs to be said that what we are attempting to trace here is a very general state of mind, almost a Foucauldian episteme or, more precisely, an aspect of an episteme. The deeply conflicted ideas of nature that legitimate only certain discourses are not the product of any single institution, however dominant, but are broadly developed. We could be looking at the greeting card industry—which has its own instincts for conceptualizing nature—but we happen to be looking at maps, of which the National Geographic Society is an important, but as our canvassing of the terrain in our introduction must have suggested, by no means unique producer. That said, there can be no coming to grips with this map or the natures it proposes without some understanding of the organization that produced it.

The late 1970s nearly coincided with a peak in the *National Geographic's* circulation of close to eleven million.⁹ Some eleven million copies of "Land of Living Fossils" were distributed to the magazine's readership. After slipping the map from the magazine's pages, these readers, as we did, unfolded it to the koalas, unfolded it again to the kangaroos and the simple map image—over which they lingered

for a second—and finally unfolded it to the platypus. They glanced at the text in the lower left, and turned the map over. Their eyes roved over the main map. Maybe they mouthed the names of the states—“Western Australia,” “Queensland”—and looked to make sure they knew where Sydney was before turning the map back over. Here they glanced again at the “stars of the wildlife cavalcade” and maybe read a paragraph or two of the text before folding the map up and slipping it back into the pages of the magazine, where it remained until the used-book dealer extracted it to add to his map bin.¹⁰

This was the fate of almost every one of these maps. What in the world were they produced for?

Frankly, they were produced as the primary form of the cultural capital whose possession certified the class position of the *Geographic* family; that is, the readership and the staff that produced the magazine and, with it, the effect of a certain kind of cultured life, a life with maps and globes, pipes and booklined-studies, knowledge, and therefore wisdom, and since wisdom, the right to wield social power that, despite the changes afoot at the *Geographic* in the late 1970s, amounted nonetheless to a powerful conservatism.¹¹ The magazine, with its unmistakable yellow border, was the lever, but the fulcrum was the map, for the pretense here was far from a simple consumption of knowledge, but the *participation*—as a supporting member—in a scientific organization that *produced* geographic knowledge that, as everyone knew, was ultimately codified in the form of a map.¹²

Even today, when the *National Geographic* can be purchased at newsstands, one cannot *subscribe* to the magazine. One *joins* the Society and receives the magazine as a benefit of membership. Members receive membership cards, which they are encouraged to “keep handy” (a signature line implies that another might want to steal one’s membership rights). The card, says the Society, “distinguishes you as a member of the world’s largest nonprofit scientific and educational organization.” The Society spells this out again and again: “You have the satisfaction of supporting,” it elaborates, “the Society’s program for improving the geographic literacy of youngsters; important worldwide research and exploration, exemplified by the work of scientists and explorers such as Jane Goodall, Sylvia Earle, Will Steger, and Robert Ballard; quality family programming on public, network, and cable television; [and] the development of educational materials for schools in the United States and Canada.”¹³ That this is all good is taken for granted—family, quality, education, public television, Jane Goodall—but nothing certifies its reality like the map.

This is to say, *the map is the evidence of the production of the knowledge* that transforms Society membership from a magazine subscription into a really significant form of cultural capital (the map is a knowledge fetish). The magazine, whatever its éclat, does not have this power, because every magazine subscription brings with it a magazine. Only *Society* membership brings with it a map, and this map is the fulcrum that enables the magazine to be leveraged to another level—ultimately to that of reference authority.

One can imagine the Cartographic Division of the National Geographic Society bristling at the imputation, but it is exceedingly difficult to imagine to what use the main map of one of the Society maps can be put. The poster-side is easier to understand: it can go up on the bulletin board of a classroom. In the case at hand, the wildlife

cavalcade if nothing else is highly decorative. Even if they fall into no other category, the animals all live in Australia where many, if not all, are emblematic. The connection between the large forms of the koalas, kangaroos, and the platypus and the lushly portrayed Australia would be clear even from the back of a classroom, and this is precisely the sort of middlebrow knowledge treasured by classroom teachers and exploited in popular games and game shows like *Trivial Pursuit*, *Jeopardy!*, and *Who Wants To Be a Millionaire?*

But the main map is devoid of animal portraiture, and as we have seen not only is its land buried in type, but the whole is burdened with an elaborate “scientific” apparatus not only invisible from the back of the classroom—or for that matter any distance at all—but rarely the subject of quiz games. It is indeed of an intimidating and arcane nature: a graticule marked every four degrees (mysterious references lines); the scale in four (occasionally incomprehensible) forms; and the name of the projection (completely opaque). Fourteen symbols are distinguished, and it is noted that elevations and soundings are shown in meters. The miles used on one of the scales are *statute* miles.

Earlier, imagining how this map might be handled by Society members, we wrote, “Their eyes roved over the main map. Maybe they mouthed the names of the states—‘Western Australia,’ ‘Queensland’—and looked to make sure they knew where Sydney was before turning the map back over.” As their eyes roved over the map what they took in were all these signs of the admirable science that their membership underwrote, *the more admirable precisely the less readily understood, the less evidently useful*. Consider the graticule. What are we to make of it? It pretends to be an aid to location, but vis-à-vis what? Is it credible that “Longitude East 140° of Greenwich” is meaningful to many when only about every other American can identify New York State on a map of U.S. states?¹⁴ (Indeed in more recent years the locator function of the graticule has been taken over by inset maps of the globe.) Certainly the graticule cannot help find places *on the map*, for despite the division of the surface into a grid, there is no index of names to take advantage of it. In fact, there is no way to access any of the plethora of names, hundreds, perhaps thousands, which make the main map a nomenclatural gray. The lack of an index renders the maps useless. (Literally: what can you do with it?¹⁵)

The kangaroos around the edge of the map that constitutes its border—there are 1,080 of them—emphasize this (figure 3.12). At the same time that they point out the undecorativeness of the map they circumscribe, they thoroughly undercut any “scientific” pretension the graticule might have claimed. They are an element of the playful that turns science into a plaything—into a Thing of Science¹⁶—in company with the lettering of “Indian Ocean” and the signature pastels of the state borders. Each of these elements must open a cognitive space, cue a context into which the map must be mentally slotted, or draw on a different domain of general knowledge. The pastels, type, and lettering of the oceans, for example, must be slotted into a “history of cartography.” The signs will speak with greater force the better this history is understood, but it is not necessary that the reader know any of it for the signs to work. All that is required is that the reader recognize them as “antiquarian” vis-à-vis design norms established, among other things, in the layout of the magazine, the design

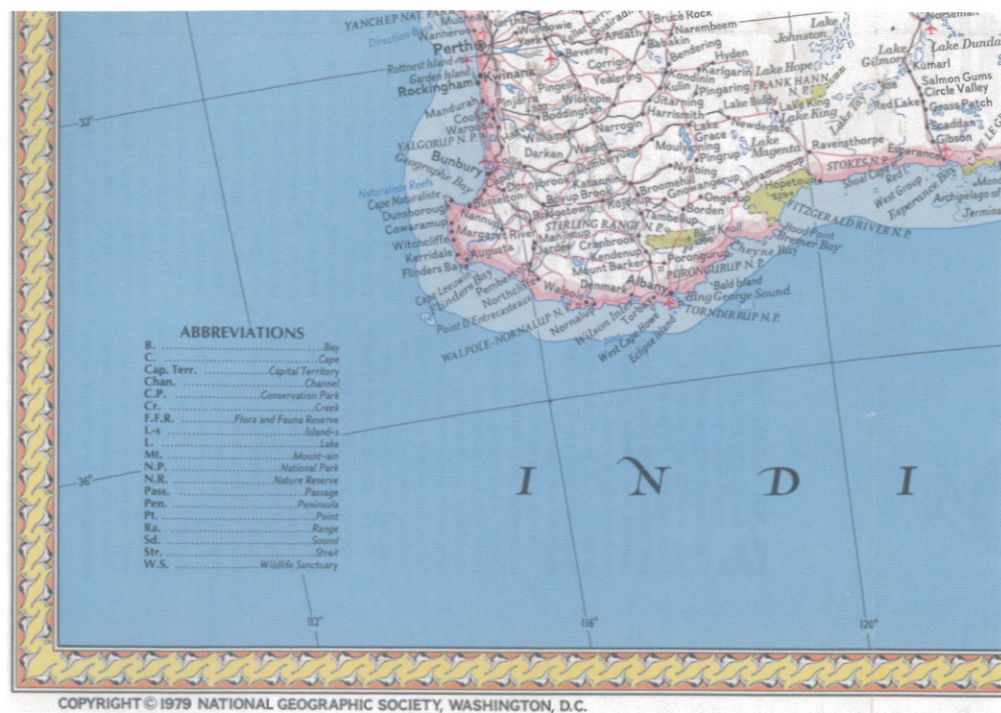


Figure 3.12

"Australia" border detail (verso of "Land of Living Fossils"). There are 1,080 kangaroos hopping around the map's edge.

Courtesy of Ng Maps/National Geographic Image Collection.

of the advertisements, and graphic "life" in general. In this context, the pastels recall the hand watercoloring of maps; the type over the land the era of wax engraving; the letterforms used for the oceans an even earlier calligraphic age.¹⁷ This echo of a history draws attention to the present, to the map in hand—to the wealth of names, the precision of the graticule, the luxury of the four forms of the scale; and this comparison bespeaks progress, foregrounding the progressivism of the *National Geographic* of which the reader is a part, a supporting member (and therefore progressive), a foregrounding that makes of this particular map an emblem of progress, and for the reader a badge of his or her progressiveness.¹⁸

Though the reader can't use it, because it is a progressive map, it is a map that *could* be used for science *even though it is not intended for science*, but rather for the schoolroom or for the study of the professional who supports the Society (the study of the reader, the schoolroom of his or her children). That is, the map is "scientized," not scientific. It is schoolbookish. It is a middlebrow fetish. It says of the members, "We are the sort of people who have these kinds of things, who think these kinds of thoughts; we are not frivolous." So the graticule, the names, the colors, the typeface, even Australia, finally, come to be understood not as content, but as instructions about how this content is to be construed. All the content of this map, the carefully accumulated locational details, the endlessly rechecked spellings of exotic names, all is no more than a peg on which to hang a mass of procedural code. "Australia: Land of Living Fossils" makes concrete the reader's seriousness and the reasonableness of taking his or her opinions seriously ("I read *National Geographic*"). Any subject would have served this purpose.

In the end, the map is nothing but a set of instructions about how to think about oneself: *with satisfaction*. (You deserve a Cadillac

[and there used to be an ad for one right up front, though these days it's a Toyota, a Range Rover].)

NATURE IN ITS NARROW PLACE

Implicit in all of this is an attitude toward nature. Not that it is articulated as such. On the contrary, the word "nature" does not appear on "Australia: Land of Living Fossils," anymore than it does in the contemporaneous statement, "Reaffirmation of Editorial Policy," that the *Geographic's* then-editor, Gilbert M. Grosvenor, agreed to print by way of concluding the contretemps his publication of stories about Harlem, Cuba, and South Africa had stirred up among the more conservative members of his Board of Trustees: "The mission of *National Geographic* is to increase and diffuse geographic knowledge. Geography is defined in a broad sense: the description of land, sea, and universe; the interrelationship of man with the flora and fauna of earth; and the historical, cultural, scientific, governmental, and social background of people."¹⁹ Unnoticed in the anxiety aroused by the political situation the statement resolved was the *Geographic's* taxonomy of nature: land, sea, universe, flora, fauna.

Though we have already run into the limitations imposed by "flora and fauna" (stromatolites are neither) it was less in the taxonomy per se than in its selective presentation that the *Geographic* revealed, indeed insinuated, its pervasive ideology. En route to concluding that the phrase "Land of Living Fossils" was a cute hook for a schoolroom poster intended to teach students to associate selected mammals with Australia, we observed: (a) a profound bias toward animals, and among these, birds and furry mammals; (b) a marginalization, among "living fossils," of the cold, dark, and hard (stromatolites, crocodiles);²⁰ (c) a valorization of the warm, bright, and soft, of the cuddly (birds, koalas, kangaroos); (d) a commitment to the domestic; and (e) a complete absence of ecosystemic consciousness. We characterized this as no more than an *idea* of nature, but if an ideology is the body of ideas reflecting the social needs and aspirations of an individual, group, class, or culture, as most dictionaries have it, then this idea was an important component of the Society's *ideology* of nature.

How else to make sense—other than as an ideology—of the bias toward birds and mammals? It was not, after all, as though there were anything unusual about the display on "Land of Living Fossils." It actually represents *Geographic* thinking with uncanny precision. Birds account for approximately 62 percent of the animals illustrated on "Land of Living Fossils," mammals for 34 percent, and reptiles for 5 percent. In the *National Geographic* index to its first hundred years (1888–1988), birds account for 69 percent, mammals for 27 percent, and reptiles for 4 percent of the entries devoted to those classes.²¹ With respect to these, then, our "topsy-turvy menagerie" nearly mirrors the magazine's biases during its first hundred years,²² a period, incidentally, not only renowned for the magazine's extraordinary circulation, but notorious for its abundance of articles about birds, as C. D. B. Bryan notes:

Through the decade that began with the Depression and ended in the midst of world war, *Geographic* readers could

still take comfort in birds - "Birds of the High Seas," "Birds of the Northern Seas," and "Birds that Cruise the Coast and Inland Waters." There were "Canaries and Other Cage-Bird Friends," "Crows, Magpies, and Jays," "The Eagle, King of Birds, and His Kin," "Far-Flying Wild Fowl and Their Foes," "Game Birds of Prairie, Forest, and Tundra," "Hummingbirds, Swifts, and Goatsuckers," "Parrots, Kingfishers, and Flycatchers," "The Shorebirds, Cranes, and Rails." There were "Thrushes, Thrashers, and Swallows," "Winged Denizens of Woodland, Stream, and Marsh," there were "Sparrows, Towhees, and Longspurs: Those Happy Little Singers Make Merry in Field, Forest, and Desert Throughout North America," and "The Tanagers and Finches: Their Flashes of Color and Lilted Songs Gladden the Hearts of American Bird Lovers East and West."²³

The problem, from the perspective of "increasing and diffusing geographic knowledge," or even from that of "the interrelationship of man with the flora and fauna of earth," is that birds ill represent the fauna, much less the flora and fauna or anything more comprehensive. The diversity of life on earth is a vexed subject, but it is broadly acknowledged that one and a half million species are currently known to exist, and that these represent no more than a tenth of those alive.²⁴ E. O. Wilson, a well-known biologist, is on record—often—as believing the number could be ten times larger, that is, that 100 million species could be living on the planet.²⁵ Because the smaller the organism the less we know about it, a vast portion of this unknown number is undoubtedly microbial. Wilson observes that "There may be up to 5,000 species of bacteria in a single gram of forest soil, almost all of which are unknown to science."²⁶ You never would have guessed this from reading *National Geographic*, and certainly not from looking at "Australia: Land of Living Fossils," but "in terms of metabolic impact and numbers, prokaryotes still dominate the biosphere, outnumbering all eukaryotes combined."²⁷ Prokaryotes are the most numerous organisms, and the most pervasive and necessary. Were prokaryotes wiped out, it would mean the end of us and all the rest of the eukaryotes; but were the eukaryotes to disappear, the prokaryotes would continue on much as they have for the past three and half billion years. Confining ourselves to known species, half are insects (we know 750,000 species of insects). Of the million known animal species, barely 4 percent are chordates, that is, animals with notochords like us. (Most animal phyla are aquatic worms of one kind or another.²⁸) Of these chordates, not even a quarter are birds (bony fishes are far more numerous²⁹). That is, birds account for less than a single percent of the known animal species. This is to take nothing from birds, but it does beg the question why the emphasis in the pages of the *National Geographic*.

A FAMILY PORTRAIT

It may not be irrelevant that mammals, birds, and reptiles all develop an amnion in embryonic life. This is the membrane that surrounds the sac filled with the fluid—the amniotic fluid—in which the embryo is suspended during gestation. The amnion's development

was the essential adaptation enabling terrestrial vertebrates—again, most vertebrates are bony fishes—to sever the remaining ties with their aquatic origins. Indeed reptiles, birds, and mammals make up a monophyletic group, which is to say they share an exclusive and unique ancestor. One could say of "Land of Living Fossils"—and indeed of *National Geographic* in general—that it constitutes a *family* portrait.³⁰

This still doesn't explain the emphasis on birds. There may well be nearly twice as many bird as mammal species (8,600 species of birds to 4,500 of mammals)—and so the "Land of Living Fossils" has that right—but there are also nearly as many reptile species (7,000), so the map—and the *National Geographic* in general—has that very, very wrong.³¹ If it is a family portrait, it is one in which the "black sheep" have been pretty much kept out of sight. Indeed, it is even clearer in this "family analysis" precisely how marginalized the cold, dark, and hard have been.³²

Comparison with a natural history is instructive. Right now we're flipping through *Australia's South East: A Natural History of Australia*,². It's a big, illustrated volume, beautifully printed, meant for the general reader, and if there is a flock of crested terns on the title page, there is a pair of male lace goannas "fighting with sharp and powerful claws" on the contents page. Facing the first text page is an orchid. The next photo features a grass tree. Then follow a blue-winged parrot, a mountain grasshopper, a flowering wattle, a smooth-barked eucalypt, a satin bowerbird, a mouse *Sminthopsis*, a long-horned grasshopper, the common wombat, a yellow-faced honeyeater, and another lace goanna. (The goanna is a large, marauding lizard.) Pages are devoted to sawfly larvae. There's a superb lyrebird, but *lots* of snakes. There are pages of flowers and butterflies. Shrubs. Ants. Wasps. The lungfish, a damselfly, a loggerhead turtle.³³

Yes, the emphasis remains on the macrobiota, but there seem to be no more birds than reptiles, there is an abundance of insects, in addition to plants—pages and pages devoted to the eucalypt alone—there are fungi. Everything's connected. There's a strong sense of the whole, of an ecosystem.

What was it with the *National Geographic*?³⁴

One thing was that the magazine's longtime editor Gilbert Hovey Grosvenor (from 1899 to 1949) loved birds, and since he felt that "what I liked, the average man would like," he ran articles about them. A 1943 *New Yorker* writer profiling Grosvenor wrote

This war, like the last one, has made the editor of the *Geographic* go easy on birds in his magazine, recent issues of which have featured articles on United States food production, the Alaska highway, the Coast Guard, army dogs, convoys, aircraft carriers, women in uniform, and military and naval insignia, but he knows that wars are fleeting affairs compared to birds and he does not propose to wait for the end of the conflict before again doing justice, editorially, to his favorite topic. "The Chief has been begging us to run a series of color photographs on the wrens of Australia for the past three years," a *Geographic* editor recently told an acquaintance. "Everyone conspires to keep him from using these goddam birds. We keep putting him off, but he'll sneak them in any month now."³⁵



Figure 3.13

"Australia" detail. The presence of the Lesser Sunda Islands assures us we are looking at but a piece of a much bigger picture, a piece of the world.

Courtesy of Ng Maps/National Geographic Image Collection.

The wrens ran in the October 1945 issue ("The Fairy Wrens of Australia: The Little Longtailed 'Blue Birds of Happiness' Rank High Among the Island Continent's Remarkable Birds")—but the real fact is that the *Geographic* had not been about diffusing geographic knowledge since shortly after its inception. Rather, as Catherine Lutz and Jane Collins have put it, it was about "popularizing and glamorizing geographic and anthropological knowledge,"³⁶ both of which are more readily achieved with our furry and feathered friends than with bugs. Even today, with our "improved" understanding, prokaryotes remain better known as germs; crocodiles and sharks as mankillers; snakes, spiders, and bats as menaces; and marine worms—ribbon worms (900 species), gnathostomulids (probably a thousand species), nematomorphs (240 species), spirunculans (or peanut worms, 300 species), spoon worms (140 species), annelids (5,500 polychetes alone), among many others—hardly at all. The *Geographic* does not bedeck its solicitations for membership renewals with pictures of priapulids (Latin *priapulus*, little penis), with their spines and warts and their retractable mouths flush with the bottoms of estuaries, but with polar bear mommas frisking with their cubs.

We like our nature as close to us as possible (we like to keep it in the family), and if we can't have it close, then decorative (butterflies, roses, sunsets). Key words are pretty, warm, bright, abundant, soft, cuddly. It is an *inescapable* idea of nature, and by playing into and nurturing it, the *Geographic* was able to position itself as "an arbiter of national culture."³⁷

The function of the map? To invest this idea (this ideology) of nature with the authority of the cartographic. In "Australia: Land of Living Fossils" what is in fact a highly arbitrary, limited, and patronizing vision of nature is passed off as *a straightforward fact of geography*. The map achieves this by securing the patent ideology within the ostensibly factual, by subsuming *nature as cornucopia* within *nature as park*: park authorizes cornucopia even as cornucopia tinctures park. Underwriting this effort, a fundamental claim: the world *is*. Of this, the main map frames a piece. We have said this before, but it is worth observing again that the pretension of the main map is that it *no more than* frames a piece (that's *all* it does). Here is the world: here is a frame around a piece of it. This says, "Yes, we have imposed a border, but no *filter*." The main map no more than *presents the facts*, these as postings, that is, as existence claims that *this is there*.

Because these claims are essential—*everything* depends on them (the Society's claim to being more than a popular magazine, our acceptance of its ideology of nature)—evidence is marshaled to defend them. We have already observed the way things incidentally caught in the frame of the main map—pieces of Indonesia, a snippet of Papua New Guinea—are emphasized rather than being eliminated (as they are from the poster's map). Thanks to this emphasis, the title, "Australia," is surmounted by golden flakes of the Lesser Sunda Islands (figure 3.13). This presence of the Lesser Sundas *guarantees* the continuity of the world, it *assures* the reader that we have merely zoomed in. Another sign of good faith: the water lapping against the map's border. The graticule offers a third: the acute angle at which it slices into the border articulates the border's irrelevance (the graticule's orientation is global, the map's frame a local, impertinent interruption). The *signs of science*—the multiple versions of the scale, the name of the projection, the statute miles—further assure us of the map's factuality. So, too, the endless postings: of internal borders, railroads, mountain heights (in meters), cities, towns, reefs, ranges, sounds, straits, homesteads, airports, roads, and names, names, names.

The facticity *bleeds* through the sheet, it *infects* the map on the other side, forcing its reading as yet another *thing of science*. The logic is simple: if the main map is factual—and who could doubt it?—so is the poster's map. And if the poster's *map* is factual, so is the rest of it: "Why should they start lying now?" And indeed, they're not *lying*, per se, the picture is just (fatally) incomplete.

But . . . *bleed? infect?* Doesn't this language recall T. S. Eliot's "periphrastic study in a worn-out poetical fashion"? Doesn't it remind us of his, "Words strain, crack and sometimes break under the burden"? If they haven't snapped already, "bleed" and "infect" are about to.

But how else to put it? Well, cognitive linguists would view each of these "infections"—of the fauna by the poster map, of the poster map by the main map—as examples of *spreading*, which is a powerful cognitive mechanism that builds structure in mental spaces by allowing the transfer of large amounts of structure without explicit specification (a sort of wholesale transfer of knowledge). "Underlying forces in the discourse construction," writes Fauconnier, "have the aim of spreading structure across [cognitive] spaces, using minimal linguistic effort, through powerful default procedures. We find that Spreading happens in both directions, top to bottom, and bottom to top."³⁸ When the structure (or presuppositional knowledge) spreads from the top of

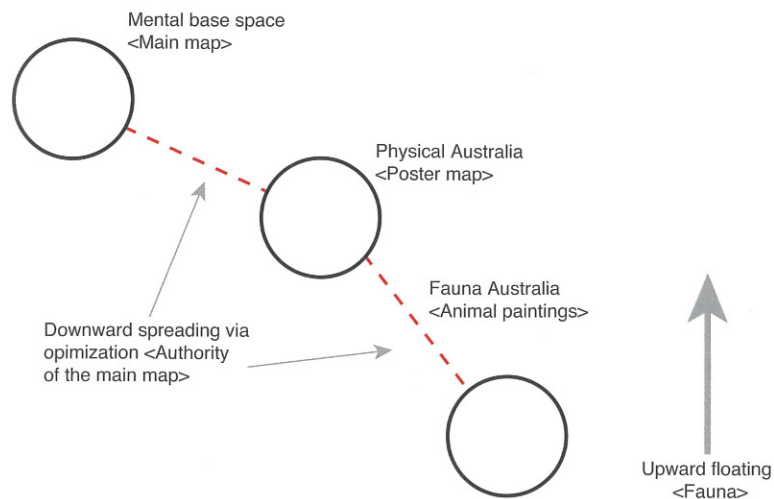


Figure 3.14

Cognitive structure of "Australia: Land of Living Fossils." The circle at the upper left symbolizes the mental space opened in the minds of readers who've unfolded and flipped over the map. In this space, they construct Australia as a nation and continent, drawing on all their general knowledge about Australia, and using it to structure their "reading" of the map. The middle circle symbolizes the mental space propagated by the first when readers flip the map back over and contemplate the poster map. Everything that's been built in the first space gets transferred down to this new space by optimization, while new structure from the poster map is being built. The third circle in the lower right symbolizes the mental space propagated by the second mental space as the readers' eyes move out to deal with the paintings of animals. These animals get "Australianized" by the structure that optimization builds here. The resulting new Australia, with all its animals, then rises back through the second to the first space via floating, embedding the animals in the authoritative main map.

the discourse construction (or *base*), it's called *optimization*. When it spreads upward from the, as it were, conclusion, it's called *floating*. The top-down bottom-up terminology reflects space grammar's formalism, which sites the base space (in our case the main map) at the top of the diagram (see figure 3.14). In our case, what spreads is the presuppositional knowledge embodied (and encoded) in the main map, which first spreads down to ("bleeds through the sheet" into) the poster map; and then spreads down to (out to) the faunal display (giving it the implicit authoritative structure of the main map), and all this through optimization. Then, through floating, the presuppositional knowledge embodied (and encoded) in the faunal display (living fossils) spreads bottom to top (infusing the main map with the cornucopial structure of the poster map).

We'll lay this out in greater detail as we go along. For the moment, we just want you to savor the grace with which an "infected" terminology can be supplanted by that of a model that promises a link straight into neuronal assemblies (the mental spaces *are* neuronal assemblies). However, "bleeds" or "spreads," the concepts constructed are identical:

Nature: soft, cuddly.

Australia: wacky but wonderful. (What else to expect of a land "down under"?)

NOTES

1. See our analysis of the 1978–79 North Carolina Transportation Map & Guide to Points of Interest—the North Carolina state highway map—in "Designs" (also available in Wood's *Power of Maps*). Incidentally, this map was also produced by two different units of state government: the map side by the Department of Transportation, the poster side by the Department of Commerce.

2. Grazed into extinction almost everywhere else, stromatolites also survive in similarly hypersaline environments—salt flats, shallow embayments

—in the Persian Gulf, the Bahamas, and the west coast of Mexico. See Margulis and Schwartz, *Five Kingdoms: An Illustrated Guide to the Phyla of Life on Earth*. 2nd ed. (New York: Freeman, 1988), 48.

3. Stanley, *Life and Earth through Time*. 2nd ed (New York: Freeman, 1989), 258. See also the treatment of the Proterozoic era and stromatolites in his *Exploring Earth and Life through Time* (New York: Freeman, 1993), 210–37, especially 210–20. Margulis and Schwartz, in *Five Kingdoms*, refer to the Proterozoic era as "the golden age of cyanobacteria," 48.

4. This from Margulis and Sagan's indispensable *Microcosmos: Four Billion Years of Microbial Evolution* (New York: Summit, 1986), 106–7.

5. Where it referred to them as "fossils formed from algae" in the caption to the photo, in Robin Davidson's "Alone: Daring the harsh and beautiful Australian outback, a young woman makes a remarkable journey across half a continent. This account is based on her diaries," 581–611.

6. As put, this is consistent both with the five-kingdom system almost universally used in contemporary biology texts, and Carl Woese's three domain system, prevalent in microbiology texts. In the realignment of our understanding of life represented by these systems (not to mention the six- and the eight-kingdom systems), the significance of microbial mats would be hard to overestimate. Read Margulis's rapturous paean in her *Symbiotic Planet* (New York: Basic Books, 1998), 69–70, or the enthusiastic description in Wilson's *The Diversity of Life* (New York: Norton, 1992), 183–6. The mats are the subject of an academic growth industry. See, among others, Zavarzin, "Cyanobacteria Mats in General Biology" in *Microbial Mats: Structure, Development and Environmental Significance*. Vol. 35 of NATO ASI Series G: Ecological Sciences, ed. Lucas Stal and Pierre Caumette, 443–52. (Berlin: Springer-Verlag, 1994), and indeed the whole volume in which it is found (*Microbial Mats*). (Among other things, Zavarzin is concerned with distinguishing cyanobacterial mats and stromatolites. Why do the former not lithify? Why did the latter become extinct—or nearly extinct—near the end of Proterozoic era? Or are these the same question? That is, do they both point toward a change in biogenic carbonate precipitation?)

7. Gore, "A Bad Time to Be a Crocodile," *National Geographic* (January 1978), 90–115.

8. The stromatolites, too, are threatened. Referring to those at Lake Clifton, also along Australia's southwestern coast, biologist Linda Moore

was quoted in a 1998 *Geographic* article as saying, "Their fate is hanging in the balance. If nutrients [from sewage and agricultural runoff] increase any more in the lake, the stromatolites could die. And once they're gone, they're gone for good. It's almost like watching their decline at the end of the Precambrian all over again" (in Monastersky, "The Rise of Life on Earth," *National Geographic* [March 1998], 54-81).

9. Lutz and Collins, *Reading National Geographic*, 37. This is a book about "the magazine and the Society as a key middlebrow arbiter of taste, wealth and power in America." For a related view, but one more tightly focused on the magazine's "imperialist" imagery, see Rothenberg's "Voyeurs of Imperialism: *The National Geographic Magazine before World War II*" in *Geography and Empire*, ed. Anne Godlewski and Neil Smith (Oxford: Blackwell, 1994) 155-72. Abramson's *National Geographic: Behind America's Lens on the World*. (New York: Crown Publishing, 1987) may have been the first extended critical take on the magazine. Despite their differences (and Lutz and Collins provide the most nuanced reading), the emphasis in all these is on the Geographic's photographs (especially of naked brown women) and their captions, and so on the magazine's construction of human culture. Our interest is in the magazine's construction of nature, especially as spatialized in its maps.

10. What the Society imagined members did with these maps is not known to us, but we do know that it was taken for granted that the articles were not read: "Aware that many readers simply looked at the *Geographic's* photographs and ignored the articles, M[elville]B[ell]G[rosvenor] structured photograph captions to provide distillations of the text they illustrated" (Bryan, *National Geographic Society: 100 Years of Adventure and Discovery*. Rev. ed. [New York: Abrams, 1997], 337). That class fraction of Americans capable of building cultural capital with a Geographic membership is not particularly well educated: they have had more formal education than the average American, and 30 percent of the readers can be categorized as upper and upper-middle class, but 43 percent of its readers have not attended college. See Lutz and Collins, *Reading National Geographic*, 221-3, who derived their statistics from the Simmons 1987 "Study of Media and Markets," a sample of over 19,000 Americans. To reach a similar conclusion, Paul Fussell needed no statistics. See his right-on characterization of the *Geographic* as middle-class, "nonideological," and "nice" in his *Class*, 144-5.

11. For a Society-approved history of these changes see Bryan, *National Geographic Society*, especially 378-99. But also see Lutz and Collins, *Reading National Geographic*, especially 41-46; and for an attempt at integrating a related reading of the magazine into the "geographical imagination of America," see Schulten's *Geographical Imagination*.

12. In their analysis, Lutz and Collins (*Reading National Geographic*) see this construction as a function of the Geographic's sponsored research: "From the institution's second decade, the funding and conduct of research was always marginal to the institution's main role of popularizing and glamorizing geographic and anthropological knowledge, yet it was sufficient to establish and retain its reputation as a scientific and educational organization. This made it possible for the Geographic to speak with the voice of scientific authority, while remaining outside of and unconstrained by the scientific community" (24). We don't doubt this, but believe that this sponsorship was fetishized in the map, which the member could unfold, fold back up,

file, collect, and display. It is hard to do any of this with a heavily mediated sponsorship.

13. All this from the form conveying the membership card to one of us. Wood has been a member, with a brief lapse while he was getting his PhD in geography, since the late 1950s. In graduate school, far from being a form of cultural capital, membership in the National Geographic Society was . . . well, it would have been a stigma, but either no one was a member or no one admitted it. Certainly it was understood that the National Geographic had nothing to do with geography, which was (and is) published in the *Annals of the Association of American Geographers*, the *Geographical Review*, and other even more specialized journals. To a substantial extent, the Geographic's style was forged in direct opposition to the style of these journals (see the mythologizing surrounding the elder Grosvenor's publication of an "unintelligible" article by William Morris Davis [Bryan, *National Geographic Society*, 90]).

14. Only 55 percent could identify New York on an outline map of U.S. states in a survey Gallup conducted for the National Geographic Society in 1988. Regular readers of *National Geographic* did outperform nonreaders by a significant margin (and this despite the fact that the readership is not markedly well educated). From the 1988 *Geography: An International Gallup Survey* (Princeton: Gallup, 1988), 4, 33.

15. The one thing readers have regularly claimed they could do with Geographic maps was follow war on them. The following from a letter from Annabel Girard is only one example in a lineage of such readers: "Congratulations on the map of Afghanistan. The map stays where I watch television, and it is a pleasure to pick it up and document where the action is" (*National Geographic* [April 2002]: letters column). We hypothesize that the news stories—with their accompanying maps—supply the missing but necessary index function.

16. Things of Science was something Wood was involved with as a child. Every month a small, blue, cardboard box arrived in the mail. Inside were "things of science," small mineral samples, simple lenses, minute quantities of chemicals, and texts describing experiments. It was a like an "experiment of the month" club. It was science, but it was play, too.

17. These issues were frequently a concern for the magazine (especially given its deep and cherished conservatism), as when, for example, its photographic layouts began to be perceived as "old-fashioned" (see Bryan, *National Geographic Society*, 330-51).

18. We're arguing (very casually at this point) that the various map elements—graticule, pastels, four forms of scale, type—open mental spaces just as words or phrases do, to, in this case, construct the meaning "Scientific Map at the leading edge of Progress." From a broader perspective, this map is but part of a larger meaning construction involving the magazine, the article to which the map was attached, the Society, and indeed the context of other magazines, and so on.

19. The statement appeared on the contents page of the same issue that carried Rick Gore's article about the crocodile (January 1978). Grosvenor wrote the statement, although a Board committee wrangled with some of the wording, according to the account in Bryan, *National Geographic Society*, 395-9.

20. Part of the problem with marginalizing the cold, dark, and hard is that "living fossils" tend to be reptiles. A *Geographic* article about New Zealand—but from 2002 (October)—opens with a double-page portrait of a large lizard: "Clinging to life on an offshore crag, the tuatara wears the moniker 'living fossil,' its appearance little changed since the Jurassic" (75), not something that can be said of kangaroos and koalas.

21. There were 196 entries for the three classes according to *National Geographic: Index 1888–1988* (Washington, D.C.: National Geographic Society, 1989). The entries included all National Geographic products. Reptiles fared slightly better in the number of cross references under See also: there were 78 for birds (68 percent), 29 for mammals (25 percent), and 7 for reptiles (6 percent). The fact is, birds completely dominated the magazine's attention for years.

22. This is an admittedly crude measure of the magazine, one that fails, for example, to acknowledge the 65 entries under "fishes," the 38 under "insects," and so on. Nor does it take into account the length of the articles and the nature of their illustration. What such further probing does underscore, however, was the extraordinary emphasis during the early era on "birds," with more entries than all other nonhuman vertebrates combined, indeed than all other chordates combined.

23. Bryan, *National Geographic Society*, 219.

24. Numbers like these are only part of the story. For an ecological perspective on the issue of biodiversity see, for example, Ricklefs, *Ecology*, 3rd ed. (New York: Freeman, 1990) 708–27.

25. Wilson, *Diversity of Life*, 132–3 ff.

26. In an interview in Campbell, *Biology*, 4th ed. (Menlo Park, Calif.: Benjamin/Cummings, 1996), 485. The number could be much higher. Soil scientists feel lucky to be able to culture even 1 percent of the microbes found in a typical soil sample, of which the total number is truly astronomical. For a very readable introduction to the biota of the soil, see Wolfe's *Tales From the Underground: A Natural History of Subterranean Life* (Cambridge, Mass.: Perseus, 2001).

27. Campbell, *Biology*, 498.

28. Wilson, *Diversity of Life*, 136; Margulis and Schwartz, *Five Kingdoms*, 170.

29. "Of all vertebrate classes, bony fishes, of the class Osteichthyes, are the most numerous, both in individual and in species (about 30,000)," reports Campbell in *Biology*, 637.

30. It is probably not irrelevant that taxonomically birds and mammals should be subsumed in the class Reptilia, since a monophyletic taxon includes a common ancestor and all of its descendents. The distinction of birds and mammals into separate classes is generally justified on the grounds of convenience. See Campbell, *Biology*, 644.

31. The numbers of species are from Campbell, *ibid.*, 643, 648, 649. Other figures are regularly cited. In Morell's "Variety of Life," (*National Geographic* [February, 1999], 6–87) the figures given are birds, 10,000; mammals, 4,500;

reptiles and amphibians, 10,500 (22). (But why group reptiles with amphibians, which are not amniotes?)

32. We originally chose these adjectives with stromatolites in mind, but they turn out to have wide currency with respect to reptiles. Here is Judith Thurman—reviewing a Versace retrospective at the Victoria and Albert Museum—writing about the use in his clothing of Orotan, a brass and aluminum alloy: "Its 'intrinsic qualities,' Chiara Buss writes in a catalog essay, are 'symbols of the invincible woman.' They are also rather pointedly the attributes of a reptile: slinkiness, hardness, and 'impenetrability'" ("String Theory"). Of course, the correlation of reptiles and invincible women is preposterous.

33. Breeden and Breeden, *Australia's South East: A Natural History of Australia*. Vol. 2. Sydney: Collins, 1972. This was the second in a multivolume natural history intended for the general reader.

34. Here is the characteristic flavor: "The uniqueness of Australia is most strongly felt in the eucalypt forests and in the heaths . . . In Australia alone eucalypts grow in forests, and these forests are totally unlike those of any other continent. Associated with these eucalypts is a fauna which, equally, has no counterpart in any other part of the world" (*Ibid.*, 25). (Nor is it that the magazine's editors had never heard of the Breedens: they had been responsible for twenty-five pages of the February 1973 issue, "Eden in the Outback" and "Rock Paintings of the Aborigines.") In more recent years, the Geographic has striven for a greater sense of integration. Compare "Land of Living Fossils" to "Africa's Natural Realms," a map insert to the September 2001 issue. Running down the left side of the poster-side of the sheet are forty-two lifeform portraits, but they include plants (eleven) as well as insects (two) along with the mandatory birds (seven) and mammals (twenty-one). In keeping with the ecoregional theme of the poster, the portraits—which are only partial and overlapping, and so imply a kind of interdependence—have been keyed to four "natural realms." Note the continued avoidance of the cold, dark, and hard: among the paneled lifeforms, a single reptile, a geometric tortoise. An earlier example—with five reptiles!—would be "Amazonia: A World Resource at Risk" with South America on the map side from the August 1992 issue. To the objection that natural history wasn't the Geographic's brief, it needs to be recalled that when, in the first decade of the last century, the elder Grosvenor inaugurated the magazine's turn to natural history, "two distinguished geographers on the Board resigned, stating emphatically that 'wandering off into nature is not geography.' They also criticized me for 'turning the magazine into a picture book'" (Gilbert Hovey Grosvenor, as quoted in Bryan, *National Geographic Society*, 121). See also the discussion of the turn to natural history in Lutz and Collins, *Reading National Geographic*, 22–24. Our comparison, in fact, is exactly appropriate.

35. Quoted in Bryan, *National Geographic Society*, 118, 259.

36. Lutz and Collins, *Reading National Geographic*, 24. Our emphasis. See our note 121 for context.

37. *Ibid.*, 22.

38. Fauconnier, *Mappings*, 63. See his further discussion on 112–26. See also Kay, "The Inheritance of Presupposition," *Linguistics and Philosophy* 15 (1992): 333–81.