

Pandora's box of fossils which would eventually—more than 50 years later—turn upside-down the orderly Darwinian theories of evolution.

The Burgess Shale—"little taller than a man, and not so long as a city block"—is a rock slab containing a plethora of early life: creatures with more different body plans than there are in all the oceans, rivers, and lakes on the Earth today. The shapes of fossil-creatures from the Burgess Shale are more than passing strange. Close your eyes and imagine the *Opabinia*, a worm with five eyes on stalks, back claw, and a vacuum-cleaner nozzle up front. Or try to picture a huge *Anomalocaris*, two feet long, also with stalk eyes, a triangular and undulating fluted body, teeth, and curved, front-feeding appendages—a true terror from the deep.

Darwin described evolution as an inevitable progression from worse to better, the weak giving way to the fit, extinct species having "fathered" the superior creatures we know today. But the Burgess Shale creatures are nobody's ancestors, and their body plans are unreflected in any existing species. One morning half a billion years ago, an underwater landslide or some similar catastrophe buried them. Yet Walcott, who spent years studying these strange creatures, was determined to classify them as primitive ancestors of existing animals. Convinced that evolution was both linear and progressive, Walcott had no choice but to "shoehorn" his bizarre finds into existing categories.

Now let a half-century pass (not much time, after all, when you're dealing in billions of years), and in 1972 three Cambridge University paleontologists—Harry Whittington, Derek Briggs, and Simon Conway Morris—decide to take a new look at the Burgess Shale fossils. They bring to the task new "theories about the basis of natural order" and a healthy appreciation of chance and catastrophe in nature's course. Aided by new techniques for reconstructing the shapes of crushed fossil forms in three dimensions, they find not Walcott's traditional arthropods and mollusks but a myriad of unimagined forms. In *Wonderful Life*, Harvard biologist Gould shows how this reclassification undermined the old Darwinian assumptions. "The history of life is a story of massive removal followed by differentiation within a few surviving stocks," says Gould, "not

the conventional tale of steadily increasing excellence, complexity, and diversity." The Burgess Shale is thus appropriated as evidence for the theory of evolution which Gould espouses, called "punctuated equilibrium": Contingency, as much as "survival of the fittest," determines evolution. When a catastrophe occurs, when an ice age commences or an asteroid plows into the planet, some species perish and the luckier survive.

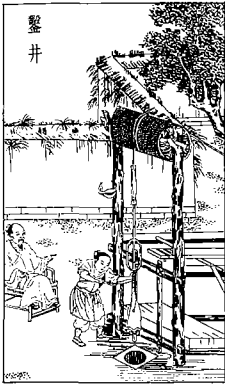
Gould writes for non-specialists, and he makes the Tale of the Shale an entertainment. But besides the entertainment is the sobering reminder of how scientific theories make facts quite as often as facts make scientific theories. By revealing how, in the Burgess Shale interpretation, intellectual climate was as influential as actual evidence, Gould challenges the comfortable notion of science as being strictly scientific, an objective ordering of facts.

MACHINES AS THE MEASURE OF MEN.

Science, Technology, and Ideologies of Western Dominance. By Michael Adas. Cornell. 430 pp. \$29.95

When Europeans in the early 16th century ventured to far-off places such as China, India, and Africa, they were fascinated by the tools and weapons they found. But, from the earliest contacts, the European explorers judged these devices inferior to their own technological instruments. Such a comparison was not innocent; nor was it without political consequences. As Adas, a Rutgers historian, relates, "scientific and technological measures of human worth . . . dominated European thinking on issues ranging from racism to colonial education" for centuries and served as the irrefutable justification for the "civilizing-mission" ideology that led to Europe's global hegemony in the 18th and 19th centuries.

Instead of admiring China for its refined culture, Europeans viewed the "Chinese failure to develop the full potential of such key inventions as gunpowder and paper" as an indictment of the stifling, "despotic Chinese government." By the same token, the "perceived lack of inventiveness and scientific curiosity on the part of the Africans" allowed Europeans to consider them as biologically inferior, an attitude



that rationalized the slave trade.

These feelings of superiority persisted into the 20th century, Adas notes. Their legacy has prompted many emerging nations to try to develop the very technology used so long to dominate them. After World War I, the European powers began sharing their technical (as well as organizational) know-how with their former colonies. Adas suggests that "greater sensitivity to African and Asian thought systems, techniques of production, and patterns of social organization" might have enhanced the chances for economic success in the emerging nations. But the first generation of leaders with Western-style educations, such as Jawaharlal

Nehru (1889–1964) of India, hardly proved champions of their own countries' historic systems of production. Nor did they heed developmental constraints imposed by local traditions and resources. Instead, they pushed for full-scale industrialization, deeming it essential for social and economic reconstruction.

Adas closes by arguing that, given the toll it would exact on diminishing ecological resources, world-wide industrialization "might not be in humanity's best interest." Adas thinks the West should convince African and Asian peoples that more modest strategies of development, rooted in their own traditions, are every bit as valid. Yet he realizes that, to Third World peoples, his argument may seem "obviously self-serving." And he admits that neither he nor anyone else has a truly workable "system to propose as a replacement for the scientific-industrial order." Technology became the "measure of men" centuries ago; today humanity must deal with the consequences.

ANNUAL STATEMENT OF OWNERSHIP

Statement of ownership, management, and circulation (required by 39 U.S.C. 3685) of *The Wilson Quarterly*, published four times a year at 370 L'Enfant Promenade S.W., Suite 704, Washington, D.C. 20024 for October 6, 1989. General business offices of the publisher are located at 370 L'Enfant Promenade S.W., Suite 704, Washington, D.C. 20024. Name and address of publisher is Warren B. Syer, 370 L'Enfant Promenade S.W., Suite 704, Washington, D.C. 20024. Name and address of editor is Jay Tolson, Woodrow Wilson International Center for Scholars, Smithsonian Institution, 370 L'Enfant Promenade S.W., Suite 704, Washington, D.C. 20024. Owner is the Woodrow Wilson International Center for Scholars, Smithsonian Institution Building, 1000 Jefferson Drive S.W., Washington, D.C. 20560. Known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of exempt status for federal income tax purposes have not changed during the preceding 12 months (Section 411.3, DMN). The average number of copies of each issue during the preceding 12 months is: (A) Total number of copies printed: 86,720; (B) Paid circulation: (1) Sales through dealers and carriers, street vendors, and counter sales: 1,600; (2) Mail subscriptions: 80,808; (C) Total paid circulation: 82,408; (D) Free distribution by mail, carrier, or other means: 2,612; (E) Total distribution 85,020; (F) Copies not distributed: (1) Office use, left over, unaccounted, spoiled after printing: 200; (2) Return from news agents: 1,500; (G) Total: 86,720; The actual number of copies of single issue published nearest to filing date is: (A) Total number of copies printed: 72,600; (B) Paid circulation: (1) Sales through dealers and carriers, street vendors, and counter sales: 1,600; (2) Mail subscriptions: 67,070; (C) Total paid circulation: 68,670; (D) Free distribution by mail, carrier, or other means: 2,330; (E) Total distribution: 71,000; (F) Copies not distributed: (1) Office use, left over, unaccounted, spoiled after printing: 100; (2) Return from news agents: 1,500; (G) Total: 72,600. I certify that the statements made by me above are correct and complete.

(signed) Suzanne Turk, *Business Manager*