Genius at Work

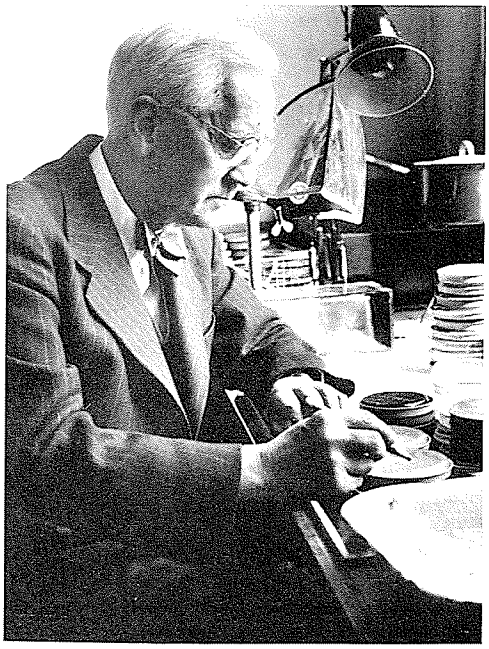
"Setting the Stage for Discovery" by Robert S. Root-Bernstein, in *The Sciences* (May-June 1988), New York Academy of Sciences, 2 East 63rd St., New York, N.Y. 10021.

A common truism about science is that many great discoveries occur as a result of fortunate accidents. Sir Alexander Fleming (1881–1955), for example, is said to have discovered the bacteria-killing enzyme lysozyme (present in tears, mucus, and saliva) after drippings from his nose killed germs in a Petri dish Fleming was examining.

Such "accidents" have led several philosophers of science, notably Austria's Karl Popper, to insist that while *proof* of a new scientific hypothesis requires reason and logic, the *method* of discovery itself cannot be rationally explained.

Root-Bernstein, a Michigan State physiologist, disagrees. To suggest that new scientific advances happen accidentally leads to the false notion that rigorous disciplines (such as mathematics) are founded on "illogical processes." Moreover, implicit in the idea of "accidental discovery" is the dubious thesis that *anyone* who witnesses the chain of events leading to a scientific advance can reach the same conclusions that a great scientist can. Did Fleming's laboratory assistant see the lysozyme-laden Petri dish as the first clue to a new type of enzyme or simply as a spoiled experiment? The answer is obvious.

Great scientists, Root-Bernstein suggests, think of their work as fun.



Sir Alexander Fleming examining cultures in the laboratory. Fleming enjoyed "painting" with microorganisms; by arranging different-colored germs in a Petri dish, he could portray a house or a mother nursing a baby. "Life was essentially a game to him," Root-Bernstein writes, "and so was research."

They thrive on chaos. Fleming let experiments pile up in his laboratory for three weeks at a time, in the hope of collecting interesting types of bacteria. A scientist must also be capable of leaping to grand conclusions from trivial premises. Biochemist Albert Szent-Györgyi based his discovery of how organisms use oxygen on the fact that, when bruised, lemons stay yellow and bananas turn brown. The reason: Lemons have ascorbic acid (vitamin C), which reacts with oxygen to prevent decay. From this premise, he extended his research to a formulation of how respiration works. "Discovery," Szent-Györgyi wrote, "consists of seeing what everybody has seen and thinking what nobody has thought."

The best scientists learn how to "surprise themselves purposely." Hence, Root-Bernstein deplores the fact that today most U.S. science courses test students' abilities to reach *predictable* conclusions. How can the next generation of scientists make discoveries, he asks, when all they are taught is how to verify what is already known?

RESOURCES & ENVIRONMENT

Back to Nature?

"From Promenade to Park: The Gregarious Origins of Brooklyn's Park Movement" by Daniel M. Bluestone, in *American Quarterly* (Winter 1987), Johns Hopkins Univ. Press, 701 West 40th St., Ste. 275, Baltimore, Md. 21211.

Most scholars have assumed that urban parks were established to satisfy city-dwellers eager to create pastoral oases in the middle of the bustling metropolis. For example, Lewis Mumford, in *Sticks and Stones* (1924), argued that such parks were designed as a "means of escape" from "the soiled, bedraggled works of man's creation."

Bluestone, a historian at Columbia University, disagrees. Urban parks, he contends, were established to help city-dwellers enjoy crowds, not avoid them. Witness the genesis of parks in 19th-century Brooklyn, New York.

There, during the early 1820s, the preferred Sunday recreation was the "promenade," a stroll along the shore of the East River in semirural Brooklyn Heights. As Brooklyn Heights became built up, however, new landowners put up fences, denying promenaders access to the once-communal waterfront. Led by the *Long Island Star*, citizens began to call for a *public* promenade. Otherwise, warned an 1830 *Star* editorial, Brooklynites would have "nothing to give us a unity of feeling."

The promenade was never built; but 11 public squares were created, and, in 1847, after a campaign led by poet Walt Whitman (then editor of the Brooklyn *Daily Eagle*), a park was established at Fort Greene. When it proved too small for Brooklyn (America's third largest city in 1855), officials hired architect Frederick Law Olmsted (1822–1903) to design a larger communal site.

Olmsted, the noted planner of Manhattan's Central Park, envisioned Brooklyn's 526-acre Prospect Park, which opened in 1866, as a *mixture*