

JL interview with Phil Manning, for his book on lifelong learning for practising physicians.

Reedited 31 March, 1983; in response to Dr. Manning's questions in telephone interview.

Joshua Lederberg

I am not sure how far my own work and experience is a useful prototype for the practitioner. My role as teacher and administrator entails the need to know more than I do. As President of Rockefeller University, I spend much of my time learning what my scientific colleagues are doing, both at the University and throughout the world. Many of my colleagues go to numerous meetings to hear new information, but I generally prefer to read because I can better direct my attention than if I am at the mercy of the speaker.

Although my main responsibilities now are looking for interconnections, rather than specializing in any one subject, I use some pretty straightforward techniques to encounter new knowledge. Each week, I scan about 50 articles in the New England Journal of Medicine, Lancet, Science, Nature and the PNAS. Then I use a weekly reporting service, the Automatic Subject Citation Alert (ASCA), which identifies all articles that cite the authors with whom I have been principally engaged in my scientific career, including myself. Research that cites any of about three dozen other authors is likely to be among my central interests. And, of course, I scan for the publications authored by my colleagues at the University. From these prompts, I request reprints or photocopies of another 20 or so articles a

weak.

When I approach a specific problem, the first step is immersion: to ponder what the question really is, and to find out everything that might have some possible bearing on it. I try to identify myself with whatever phenomenon I am looking at, to put myself in the place of that person, animal, molecule, bug, organ, or whatever else is in the scene. What does the world look like from that vantage point? A lot of it is subconscious. Without consciously trying to find solutions, I can go to sleep, and the next morning find some new conjunction of ideas -- sometimes elusive and dream-like -- that can provide a different perspective. I hasten to write it down before it torments me like a lost dream. The same can happen whilst 'day-dreaming', and this sometimes even when I am attending to other matters. But the most difficult step in problem-solving is to find both the time and the will to drop other preoccupations and concentrate on a given issue.

I've read an interesting account of discovery about Neil Bartlett, who first described a true chemical reaction involving a noble gas. His group had developed a potent fluorinating agent in his laboratory. One of the group said that it was so powerful you might fluorinate oxygen with it! Someone else scoffed that if oxygen could be fluorinated, why not xenon too? It was intended as parody, but once uttered, someone asked, "How do you know you can't do that?" It was a very difficult question to assert -- against the weight of

tradition that had defined 'noble' gases as chemically non-reactive -- blurted out impulsively in an "I dare you" setting. Once articulated, however, it was open to rational examination. Our imaginations are usually fettered, as they must be for everyday life. The tension of creativity is to allow the occasional exception, but remain grounded in critical reality. We need social forms to legitimate fantasy, as well as to provide organized skepticism in the conduct of science.

One issue is sufficient immersion to permit the material of fantasy to intrude. The second is that stage of disinhibition that allows concepts, even though iconoclastic, to progress to a certain point. After that, of course, critical examination is needed, or you will have psychosis. This opening and closing of the gate is crucial, and it may not be possible to do it at will. If from the time we are eight or ten years old, we start with a given world set, we cannot expend our lives re-examining every detail of it. We must operate on a certain set of assumptions, some of which are wrong, and we do the best we can within that setting. To relax our reliance on the received truth within which we operate, we need a disinhibition mechanism. But it has to be coupled with reality often enough to provide a critical check.

Curiosity as well as vocational motivation are essential in continuing education. Curiosity has so dominated my life that I must discipline its diffusion to accomplish committed tasks. Unfortunately, too many youngsters have not been allowed

to express their curiosity early in life, or it was not reinforced.

It is difficult to capture the elements leading to creative development. My own interest in science started at a very early age: by the age of seven, I had expressed my determination to be a scientist. My parents responded with equal parts of encouragement and dismay; the encouragement was positive and the dismay was challenging. By the time I was eleven or twelve, I was reading college textbooks in chemistry and mathematics. The youngsters I see today rarely move with that intensity at that age. I cannot explain my intensity. At a certain point I was reinforced. My parents were proud of me; I did well at school; and my teachers were wise enough to leave me alone. In a classroom in which I was three to five years ahead of the rest, the other students did not pester me, and I did not pester them. I was very much self-taught, working by my own devices.

Not until I got to college did I find someone willing and able to provide some kind of structure to my education. That was my mentor, the late Francis J. Ryan, at Columbia. In his laboratory I learned about genetics and microbiology, out of which came my early research work. Ryan knew when to be tough and when and how to encourage me. He was a worthy debater; I had not had many opportunities to argue logically up to that time. He was also a superb teacher -- in his communicative skills and in his ability to identify with students -- and he was able to draw out my ideas without competing with me. His

style was to provide every encouragement for me to deal with a wide range of problems.

Applying that technique to the practice of medicine, physicians do best by discussing their cases with their colleagues and leaders at teaching institutions. Formal, mandatory CME, on the other hand, may get in the way of one's self-education. Outside, and there to supplement, high-technology subspeciality retooling, CME perhaps should lean towards the broader culture of medical science. The internist surely must keep abreast of surgery, pathology, and other specialties. But, there is no one recipe that will suit all specialties, all temperaments. The function of CME is not only to acquire instrumental facts but also to sustain the capacity for and exercise of critical imagination, and to stay in touch with the foundations of scientific understanding on which competent practice is built.