say solid-state physics or microbial genetics, rather than in the general area of physics or biology?

The danger of transferring the concept of critical size from the number of atoms of uranium-235 to the number of scientists in a given discipline or subdiscipline is that quality is left out. Even though Rochester and Harvard and Caltech may apply this concept to recruitment, I am very skeptical about smaller colleges and universities that claim to be subcritical, and think that if only the number of faculty could be increased, everything would be jolly. What they may end up with are large third-class departments.

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Compliments

Bragg's very helpful advice on "The art of talking about science" (30 Dec., p. 1613) was conveyed most forcefully in the address by Eyring at the AAAS meeting and by the article adapted from that talk (30 Dec., p. 1609). Reading the article, prepared with Dr. Eyring's usual clarity and expertise, certainly educates the reader and provides him with a "storehouse of information" (Bragg). However, the more rewarding experience, by far, was attending the brilliant, live presentation; Dr. Eyring's amusing explanatory gesticulations and adventures in anthropomorphism will not be easily forgotten. And more important, his principal message—the "leaky" mechanism of membrane processes—was as firmly ingrained as any message could be.

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Illness prevented Sir Lawrence Bragg from delivering the address upon which the article "The art of talking about science" was based. Unfortunately, there was not time to correct the footnote statement that the lecture was delivered on 28 December 1966.—ED.

Diversity and Hindsight

Diversity, indeed! (J. Platt, 2 Dec., p. 1132). What a refreshing, stimulating prospect, and what a contrast to Hindsight! (News and Comment, 18 Nov., p. 872).

Just open to the latter reference and look at it for a moment. Don't bother to read it.

I think the best applicable comment for this is Werner Heisenberg's (*1*):

> The task of pure science at any given time is to clear and prepare the ground for the growth of technical development. Since this ground is quickly taken over, it is important that it should be continually extended, and in this theoretical research plays its part. The interaction between technical development and science is in the last resort based on the fact that both spring from the same sources. A neglect of pure science would be a symptom of the exhaustion of the forces which condition both technical progress and science.

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Reference

1. *Naturwissenschaften* **40**, 669 (5 Oct. 1934).

Platt's excellent and interesting article on "Diversity" (2 Dec., p. 1132) provides much food for thought. Diversify and then make a great discovery in a new field sounds great, but it is easier said than done. Pioneer work is not that easy. Take Platt's own example, the laser. In Maiman's first laser, the output looks very much like noise, and in fact, his paper was rejected by *Physical Review Letters*. It took Bardeen's genius, the expert assistance of Cooper and Schrieffer, and more than 20 years of work to solve the superconductivity mystery. The searchers for quarks and magnetic monopoles have not yet succeeded despite intensive efforts.

The BCS superconductivity theory is indeed worth 20 years of labor, but a lesser man can work for 20 years on the problem without getting anywhere. After winning his Nobel Prize, Purcell can afford to work on a long-shot experiment such as the magnetic monopole, but a starving graduate student struggling for his Ph.D. (or a young assistant professor hoping for his tenure) cannot afford to do so. Here failure means practically lifetime banishment from the scientific community.

When a lion makes a kill, the vultures gather. Let us be honest, few scientists are acting like lions. Many of us are facing a dilemma; we do not want to act like vultures, but we are also afraid of being banished.