GENERAL SCIENCE

What It Means to Be a Scientist

Biologists stand on the brink of magnificent achievements now just as physicists did some 300 years ago when Newton discovered the laws of motion.

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Excerpts from remarks at the 15th National Science Fair-International, Baltimore, Md., May 5.

➤ SOME OF THE BEST scientists would agree that just being well fed, watching a good program on television, and having the sharpest clothes money can buy are not enough in themselves to bring happiness.

It's not that scientists don't appreciate the good things of life. Not many of them of my acquaintance would volunteer for a life of cheerless poverty.

But most of them need something more in order to achieve what a scientist would consider happiness. And to obtain this something more the scientist might be willing to endure a great deal that other people would find burdensome and at times downright unpleasant.

Any of you who have read Charles Darwin's "Voyage of the Beagle" must have been struck by the tremendous labors of the young Darwin in his tireless observation of all forms of plant and animal life in the neighborhood of South America, the geographical and geological features of the lands he visited, and even the political and social character of the people in these lands.

Add to this the problems of gathering and preserving a multitude of specimens and recording in notes his detailed observations and you will find it almost past belief that one man could accomplish so much. Yet this is the same man to whom his father had said earlier in his life, "You care for nothing but shooting dogs and rat catching and will be a disgrace to your family." . . .

Exciting Experience

As everyone of you Science Fair winners knows, hard work can be the most exciting kind of experience if it absorbs your interest so completely you almost forget when mealtime comes, or it can be boring and distasteful if the chore is one which you would never have undertaken voluntarily.

Sometimes the chores imposed by hard necessity conflict with the basic curiosity of the budding scientist. Thomas Edison owed his deafness to such a conflict.

To earn his living, Edison as a boy sold candy on a train. He was deafened for life after an angry railroad conductor boxed his ears for loafing his time away on experiments when he should have been selling candy.

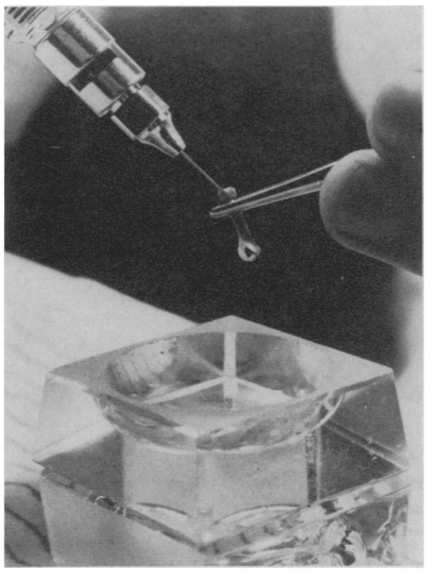
Certainly it was not laziness in Edison's case. For this great inventor who defined genius as "one percent inspiration and ninety-nine percent perspiration" could not have been called lazy. He tried out thousands of materials in his experiments to find a suitable filament for the incandescent lamp before he succeeded.

Let us take another example of this willingness to work beyond the limits of ordinary human endurance and to persevere despite the most discouraging circumstances.

Owe Much to Boole

Bertrand Russell may have exaggerated silghtly when he said "pure mathematics was discovered by Boole in a work which he called 'The Laws of Thought.'" But we nevertheless are indebted to George Boole for laying the foundations for Whitehead's and Russell's monumental work on symbolic logic, the "Principia Mathematica." This is on the pure side.

On the practical side, our rapidly developing technology based on automated production and the extensive employment of modern high-speed computers owes so much to Boolean algebra, the algebra of logic invented by George Boole, that he may be said to have written the language of this new technology. . . .



U.S. Atomic Energy Commission

BONE MARROW TRANSPLANT —Bone marrow from a mouse femur is being removed for transplantation at Oak Ridge (Tenn.) National Laboratory in a study of the treatment of whole-body radiation injury. The research is sponsored by the U. S. Atomic Energy Commission.

Seldom do scientists or mathematicians in our day find it necessary to undergo much privation in order to pursue their work, but the need for hard work as a basis for achievement is no less now than it ever was and only the rarest genius will reach the highest goals in science without expending his utmost effort. We want to know, then, what kinds of satisfaction can inspire a scientist to such efforts. What causes this satisfaction?

A factor of great importance is that the knowledge a scientist gains makes him feel more at home in the world whose laws he is able to fathom. With each new discovery, large or small, he understands the nature of his environment more clearly and achieves a more rewarding relationship to the things around him. In short, the more he knows, the more interesting his life becomes.

Satisfaction in Achievement

In the search for new knowledge there may be some modern counterpart of the age-old excitement of the chase, the satisfaction of overcoming great obstacles, not just the easy, trivial problems but the very difficult and complex barriers to greater knowledge.

For many great scientists and especially perhaps for those whose work lies in theoretical fields bordering on mathematics, there may also be an aesthetic satisfaction comparable to that enjoyed by the artist—the musician, the painter or the poet.

Certainly scientists like Einstein and mathematicians like Whitehead and Russell have found in their completed work the satisfaction of observing structures of great elegance, order and beauty. And for the scientist with a strong feeling of social responsibility there is certain to be great satisfaction in seeing his work applied for the betterment of society.

Conversely he may sometimes be deeply disturbed when the results of his work are applied to ends that turn out to be highly destructive and antisocial.

There is a place for almost every talent in the great democracy of science and no one need be discouraged if he does not have all the attributes we have been talking about. It is perhaps a rare scientist who has all of them in a strong measure.

Carl Frederich Gauss, who has been called the Prince of Mathematics, but who also made fundamentally important contributions to astronomy, geodesy and mathematical physics, may have most nearly approached the ideal of universality. . . .

Scientists of Today

At this point you are entitled to raise the objection that I have been talking about scientists of other generations—science as it existed before the 20th century. How have things changed? Do the scientists of today and tomorrow face the same kinds of prob-