Arno Allan Penzias

A runaway success

Arno Penzias, Robert W. Wilson and Pyotr L. Kapitsa won the Nobel Prize in Physics 1978. Penzias and Wilson's share was for discovering the existence of cosmic background radiation.

PROFILE

- Venture partner at New Enterprise Associates
- Born in Munich, Germany, on 26 April 1933
- When aged 5,years old Arno and his family were very nearly deported to Poland by the Nazis
- The family subsequently travelled to England and then to the United States in 1939
- Spent two years in the U.S. Army Signal Corps in the mid 1950s
- 1956 joined Columbia University to work for a PhD
- Joined Bell Laboratories on a temporary basis in 1961 — but would remain there for 37 years
- 1981 US anti-trust laws signal the breaking up of Bell Labs.

Are scientists are under-represented in politics? And do established scientists, especially Nobel laureates, have a duty to become active in politics and science policy?

Scientists rarely possess the skill sets needed for success in politics. All the more reason, therefore, for prominent scientists to become active in using that visibility for public good. Speaking personally: I feel that obligation, and have tried to act accordingly. I flew from Stockholm to Russia immediately after receiving my Nobel prize. I had arranged with a human rights organization to deliver my Nobel lecture to a gathering of 'refusnik' scientists in a Moscow apartment. Over time, each of them was granted the emigration permit they had applied for.

How can the public be convinced of the importance of fundamental research with no applications in sight?

We need to make the public more aware of how successful fundamental research actually works. Unfortunately, more than a few scientists fit the popular image of isolated specialists, working within the narrow confines of their area of interest. Rather than promoting fundamental research as an abstract concept, I think we do better when we focus upon support for research universities — and the problem-rich environments they create and nourish — as our civilization's most fruitful keys to progress. Examples of the social benefits abound, most visibly by the 'Silicon Valleys' that have sprung up around a number of them.

What is the one discovery that would herald a scientific revolution in the 21st century?

A scientific model of how mammalian genomes pack so much into so little space. Just think of the amount of information stored in a mere three billion base pairs, let alone all else these mere molecules must accomplish. Measured from a computer perspective, that's four bits of storage per pair — or about one tenth as much as a high-end iPod Touch. How can so little 'memory' store the exquisite details of our entire bestiary? Consider, for example, that experiments have shown that a newly-born mountain goat is wary of heights from the instant that it opens its eyes for the first time.

Bell Labs and other corporate research sites, which led to many Nobel prizes, are on the decline or have shut down. Is corporate, basic research critically needed or is research in academia sufficient?

Times have changed. In the past, giant corporations made most, if not all, of what they sold. The size and scope of a corporate research laboratory depends upon where its owner adds value, i.e., what kinds of components or systems its owner makes — rather than buys. In today's world, properly focussed in-house research can still provide both future and current advantage, generally on a smaller scale than in the past. Drug companies are a special case. Most have maintained their research laboratories, but face a unique problem: their labs are staffed by brilliant biochemists, ill equipped to provide advantage in a genomics-dominated era.

You must have experienced a lull at some point in your research career. What kept you going?

My primary driver has always been the example set by both my parents. No matter how difficult things were for them, they kept going.

As I've grown older, I've also learned to step back when I'm stuck, look around, and repurpose my skills to move in a new direction. When I became responsible for all of Bell Labs' research, for example, I needed to learn about computing; I wrote a book about computers and people from an outsider's perspective.

From your experience, what valuable advice would you give all young researchers who are starting their research life so as to become a good scientist?

Everyone must deal with self-doubt. Just remember that you are 'seeing' the outside of everyone else's head and comparing it to the inside of your own. Ask questions. Do not assume that everyone else is keeping quiet because the answer is obvious to each one of them—just not you!

I once read that Isidor Isaac Rabi's [who discovered nuclear magnetic resonance] mother asked him every day. "Have you asked any good questions today?" Sometime after I had won a Nobel prize myself, I told Professor Rabi that I thought that the other kids in his classes must have hated him: this well-scrubbed kid who embarrassed them with his questions. "Not at all," he replied. "There are questions which destroy, and questions which illuminate. I was taught to always ask the second kind."

Aside from as a Nobel Laureate, how would you want the world to remember you?

As a frightened young refugee who went on to live the American Dream.

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