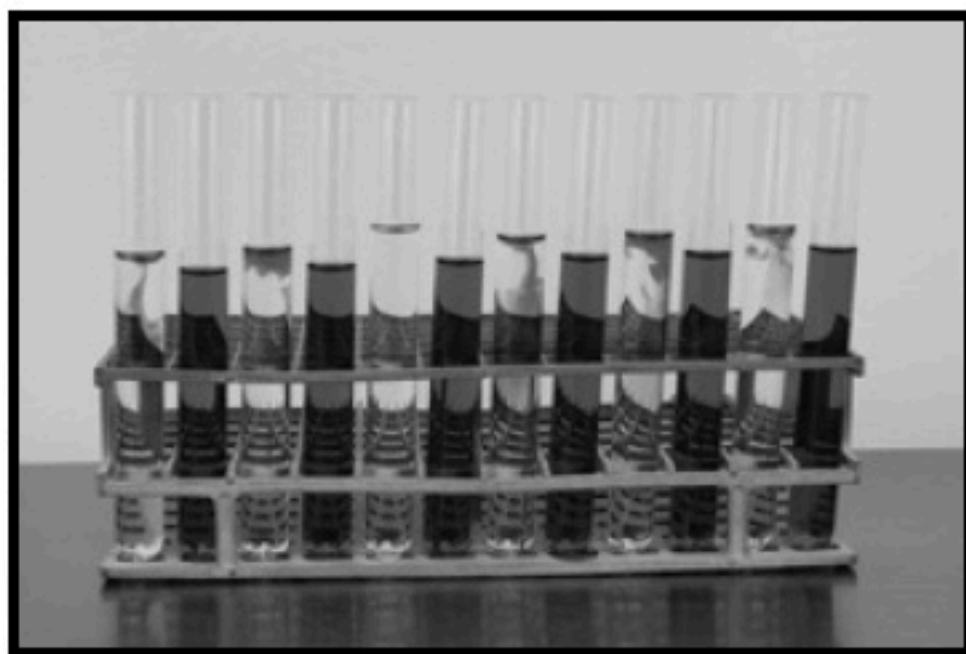


# Seeing and Knowing

*Professor Robert Pollack*

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*"Our sight is suffused with knowing, instead of feeling painfully the lack of knowing what we see. The principle to be kept in mind is to know what we see rather than to see what we know."*

– Rabbi Abraham Joshua Heschel's distinction between knowing and seeing, from his 1962 book *The Prophets*

**H**ere are seven examples of how this principle may have guided me—though not consciously—during my time at Columbia.

1959

I am a sophomore, a Physics major, working in a laboratory in the Physics Department. The laboratory is directed by Charles Townes, and he, in turn, is part of the intellectual world created in Pupin Hall by Isidore Rabi. When I am not in class or in my room in Hartley, I am in a lab on the 8th floor of Pupin. My research advisor is a graduate student who recently arrived from City College, Arno Penzias. Our work involves the newly invented technology of coherent microwave radiation, precursor to the laser. We are building antennas capable of picking up very low levels of microwave and infrared radiation from the moons of Jupiter. Townes has

permitted Penzias to hire me on a Defense Department grant to the lab.

The previous year, the United States and the Soviet Union had initiated a thaw in relations that led, among other things, to an exchange program between the Journalism School at Columbia and that at Moscow University. As a result, University officials give a visiting journalism student, Oleg Kalugin, a tour through the laboratories. I am very impressed to meet him; my parents are hard leftists, and in my house, nothing since the fall of Nazi Germany had made any difference to them in their support of the Soviet Union. I invite him to visit my parents. He does.

Later during the semester, Kalugin finds me and asks me to have a cup of coffee with him. He tells me that my father has informed him that I would be glad to share the details of my lab's work with him, because he—my father—very much wants me to do that.

First, I see what I know: My father has put me in a spot. I am embarrassed but still, I should do what my father has asked of me in his awkward way.

Second, I know what I see: This man may be a spy. So I say to him, "No." He is very angry with me. I choose to ignore that, to ignore my father's equally angry response and also, to say nothing to anyone, because if he is a spy, then I cannot turn him in without also turning in my father, and that I cannot do.

So how did this turn out?

My time in the Pupin lab taught me what first-class science looked like. Townes got a Nobel Prize for his work on lasers and masers, and Penzias got one for using a microwave detector to pick up the 3 degrees-above-absolute-zero radiation left over from the Big Bang 13.7 billion years ago.

Oleg Kalugin became the New York correspondent of "Radio Moscow" while he was at Columbia, went back to Russia in 1961, and later became the head of Khrushchev's KGB for North America.

I did not mention this episode to anyone but Amy (who married me nevertheless) until I was invited by Columbia's President in the spring of 1982 to be the next Dean of Columbia College (Pollack, R., illustrated by A. Pollack, "Surrendering Secrets." *Kol Hadash* September/October 2011). I told him everything, because I did not want my story to embarrass the College. He asked me, "So did you do anything?" I said, "No, absolutely not." He said, "So, anyone complains, ignore them; you're the next Dean." (Only he did not use the word "ignore.")

## 1961

I have finished up my four years in the College as a Physics major. I have decided to switch my graduate plans from getting a PhD in Physics, to getting a PhD in Biology. I have the summer of 1961 to make the transition. Brandeis University has accepted me as a graduate student in their Biology/Biophysics graduate program. I will have only \$1,200 to live on, but the stipend will go up when Amy and I get married, all the way to \$1,600. First, though, I have to get

a B or better in Organic Chemistry in the summer of 1961. No B, no fellowship.

I am spending the summer in a room in the Single Residence Only flophouse now called Hogan Hall. The lectures and quizzes in Orgo are not too bad; after all, I did just finish four years of physics and math, albeit without one course in chemistry or biology. But the lab! Orgo lab in the summer: I am the only non-pre-med there, and it is really hot in Schermerhorn. The culminating work is to synthesize acetylsalicylic acid from salicylic acid. Salicylic acid is taken from the bark of the willow tree (Latin: *Salix*). As Wikipedia puts it: "Salicylic acid ... also known as 2-hydroxybenzoic acid. It is poorly soluble in water (2 g/L at 20 °C). Aspirin (acetylsalicylic acid or ASA) can be prepared by the esterification of the phenolic hydroxyl group of salicylic acid with the acetyl group from acetic anhydride or acetyl chloride."

Get it? We are synthesizing aspirin. The product of synthesis is drawn up into a thin glass tube and assayed for its melting point as a measure of its solubility and purity. My yield is a light brown crud whose melting point is not quite what it should be, but, I turn in my data and before I go home, I look around.

First, I see what I know: My yield should have been the white powder that we know as aspirin. I am really worried that I have screwed up.

Second, I know what I see: My classmates' yields range from lighter brown than mine, to bright white shiny stuff with precisely the right melting point. Odd, but hey, I got what I got.

So how did this turn out?

I got a B in Orgo, went on to Brandeis, married Amy that winter, we had a daughter and I got my PhD. A good start, all around.

I also found out soon after the course was over that the lab itself was an experiment—one carried out by the TAs, with the students as subjects. The starting material was C14-labeled salicylic acid. The yields were all assayed for radioactivity in a Geiger counter. Brown ones like mine had lots of radioactivity, because whatever contaminating crud we had, we also had made acetylsalicylic acid from the C14-labeled material. The lighter-brown yields had some radioactivity, but not much because they were produced by doping the yield with a little crushed Bayer aspirin. And the really clever ones with the beautiful white powder yields that were all Bayer? Those guys got an F in the lab.

#### 1974

I get my PhD from Brandeis in 1966, and Amy gets her second degree in Art as well. We come back to New York City with our little girl. I am a postdoctoral Fellow at NYU Medical Center where I work in the Pathology Department on an interesting project having some relevance to cancer. In the summers, we go out to Long Island to the Laboratory at Cold Spring Harbor, where I teach a course on how viruses can transform normal cells into cancer cells. We spend the academic year 1969-70 in Israel, at the Weizmann Institute, and then come back to a life at Cold Spring Harbor, where I run a lab, and find myself reporting to James D. Watson, the

Laboratory's new director. Yes, *that* James D. Watson.

One of my administrative tasks is to help manage the Lab's program of summer courses and meetings. So it should not be the surprise it is when I learn from the Israeli scientists, whom we have invited to attend a meeting, that they cannot attend as the event is to fall on Rosh Hashanah. This does not carry much weight at all in terms of my life then, but it seems pretty clear that the Lab has a problem if it has invited people who cannot attend because of our choice of schedule. So I go to Jim and lay out the problem. His response is simple, so simple I can remember it to this day:

"You people own the banks, and you own the newspapers, but you don't own me."

First, I see what I know: Jim Watson is my mentor, and he is the most important living scientist I am likely ever to know.

Second, I know what I see: There is no point in trying to please such a bigot. I am in a toxic situation, and I must get out, fast.

So how did this turn out?

I looked about for an alternative job, with only one requirement: it must have academic tenure, because I had learned how vulnerable I was without that shield. Stony Brook Medical School had recently opened, and I was offered a tenured associate professorship in Microbiology, which I then accepted. On the one hand, this allowed me to avoid the hazing associated with life as an untenured assistant professor, but on the other hand, Eastern Suffolk County was not really a place that made us feel wholly at home.

So, when the Fairchild Life Sciences Building opened in 1976, I wrote to the Chairman of Biological Sciences at Columbia and asked if I could move my lab there and—yes!—it worked. I came as a full professor in 1978 and have been at Columbia ever since, thanks to knowing what I saw in the words of my former mentor James D. Watson.

## 1985

We arrive on campus and after a while we move our family into a Riverside Drive apartment. I run a lab in Fairchild from 1978 until 1982 when, as I have already mentioned, I am asked to be Dean of Columbia College. Three years later, with the first two co-educational classes admitted and doing well, the world comes to my door. Students and community groups protesting Columbia's investment in American companies doing business in South Africa have occupied the steps in front of Hamilton Hall, blockading the doors, and putting up a cardboard plaque to rename the building Mandela Hall. Jesse Jackson comes to make a speech, and a banner flies from some John Jay windows: "Hello Jesse, welcome to Hymietown."

I can access my office in 208 Hamilton through the tunnels, but there's really no way to make believe this is okay: classes in Hamilton cannot meet and there is no way for me to point out that the Dean of the College does not have authority over the endowment policies of the University. Student marchers follow me around chanting, "Apartheid kills and Pollack pays

the bills." Of course, those with the authority to make changes to the University's investments—the Trustees—have also taken notice, and I am spending more time in the President's Office than my own. At first, the president considers a public relations coup: we have awarded Bishop Desmond Tutu an honorary degree *in absentia*, so let's ask him to intervene. The president makes the call and we all listen over the speakerphone. He explains the problem, and the bishop replies, "Oh, how wonderful. Please let me talk to the students, so I can congratulate them."

The president then turns to the legal option—a court order to stand down from the blockade and police intervention if it is not followed. I say, "No, we know from 1968 what it looks like when police break up student demonstrations on this campus." To my amazement, my case is heard, and I arrange a meeting of the president and me, with leaders of the blockade, in my office in Hamilton.

The day comes and I am in my office with the student leaders. The president arrives, and I see in the lobby of Hamilton a number of serious-looking guys who have walked him over, hovering about. There's a knock on my door, and I open it to see an earnest face. "I'm Reverend Calvin Butts, Minister of the Abyssinian Baptist Church. The students have asked me to join them."

First, I see what I know: The students have set me up. The president's guys are hovering very close outside the door, and if I give the word, Reverend Butts will be escorted out.

Second, I know what I see: These are my students, and they need Reverend Butts with them.

So, I say, "Come on in, Reverend Butts." We all sit down in my office, and Reverend Butts proceeds to negotiate directly with the president: "I would like to help these students understand that they should step down in the face of an injunction, in order not to be arrested, or worse. Mr. president, are you aware of the terrible condition of the nurses' residence next to the Abyssinian Baptist Church? This is the residence for nurses in Harlem Hospital, and your University provides that hospital with its physicians." The president does not skip a beat: "Reverend Butts, we will see to it that Columbia fixes up the residence hall where these nurses live." Reverend Butts then says nothing to the president, but instead turns to the students: "I think you should see that you have made your point, and that you should step down peacefully."

So how did this turn out?

The students did step down; the police were not called in, and I regret only that I did not manage to save the Mandela Hall plaque.

The president convened a faculty panel chaired by Law Professor Louis Henkin and me, to consider investment policies for companies doing business in South Africa. We proposed that the Trustees act to divest if and when the situation became even worse than it was. With the first subsequent acts of repression by the regime, the University divested (Pollack, R., Henkin, L., Bell, J., Butler, G., Forde, K., and Van Rees, C. "Report of the Ad Hoc Committee on Investments

in Companies with Operations in South Africa." *Columbia University Record* 10: Dec. 14, 1984).

The weekend following our meeting, Reverend Butts invited Amy and me and the president and his wife to services at the Abyssinian Baptist Church. There I knew what I saw a second time. We were made to feel completely welcome by a room with thousands of African-American neighbors whom we had just met under the most difficult circumstances. I was left to ponder whether I could be sure of assembling a room with a few thousand European-American neighbors and colleagues, who would make an African-American family feel so welcome so quickly and so completely.

### 1999

I have been back as a Professor of Biological Sciences since stepping down from the Deanship in 1989. In the decade since, I have become the co-Chair of the Jewish Campus Life Fund, the organization that funded the Office of the Jewish Chaplain in Earl Hall since its formation in 1929 by Arthur Hays Sulzberger, the great-grand-nephew of King's College trustee Gershom Mendes Seixas, and the grandfather of the current publisher of the *New York Times*. As co-Chair, I am working very hard to find a way to get Columbia to allow us to build a building of our own.

We seem to be making good progress and we get a big boost when Columbia Trustee Robert K. Kraft offers to designate a previous \$3 million gift to the University, to our planned building. We are able to propose a six-story building on 115th Street for a total of \$6 million, and we are able to assure Mr. Kraft that his gift will allow the building to be named as he wishes. To close the deal, the president convenes a meeting in his office with Mr. Kraft, the provost, my co-Chair, myself and our friend and mentor, Herman Wouk. Author of *Marjorie Morningstar* and *The Caine Mutiny*, Herman is one of Columbia's most famous alumni. He has flown in from California to grace and bless the moment.

Thinking this is a piece of cake, I make the pitch and the president replies, "The provost has shown me that the footprint of this site permits construction of twelve stories. You need only six. Would you be willing to raise the funds to build the full twelve, and donate six floors for the University to use? We are very tight for space, as you know." Mr. Kraft is frowning, and I can easily imagine him putting away his wallet as the naming rights go out the window. The room is silent.

First, I see what I know: We will have to raise another six million and build the full twelve stories, or give up the project.

Second, I know what I see: I've been here before, with Jim Watson. But this is not Jim Watson and I do have tenure. This time I speak up: "I say that this building is to repair an historical injustice, but it is not a reparation. We want to heal the past, and you, Mr. president, cannot heal the past by charging a 100% Jew Tax." A long silence, and then Herman Wouk gives me a big kick under the table. More silence, and then the president says, "OK, build it for six."

So how did this turn out?

Look around. Not bad.

It took another year, but we held out for the Trustees to accept our gifts for the building, as gifts to Columbia. This meant we were picking this secular institution in America as a place that could reasonably be trusted to maintain a home for its Jewish constituency, in perpetuity. That's why alumni of any Columbia school can get credit for their gifts to the Hillel, as gifts to Columbia.

#### 2014

Throughout the 1990s and into the first decade of the 21st century, I am a Professor of Biological Sciences, and a member of the faculty of the Earth Institute. In 2010, I am elected the fifth Director of University Seminars, succeeding my freshman humanities instructor and mentor of sixty years, Robert Belknap, Professor of Slavic Studies.

I write books—most recently a book with Amy on evolution and its moral consequences—and I establish an organization for students who wish to do their own projects that involve elements of science, service, and subjective self-awareness. Today this organization is called The Research Cluster on Science and Subjectivity.

In the last year of Professor Belknap's life we become even closer friends, and at one point before Thanksgiving, I capriciously decide to rib him about his ancestors. "Belknap" is a Mayflower name. So I ask him: "Bob, how many years has your family celebrated Thanksgiving?" I figure he'd say 350 years, or some such. He looks at me quizzically and says, "I am not sure, 5,000 years, 10,000 years, maybe." I am dumbfounded. How can this be? "Well," he says, "you don't want me to remember my Mayflower ancestors and forget my Native American ancestors, do you?"

And with that lesson, Bob Belknap made me see what we must all see: I may not forget my Polish and Ukrainian ancestors, any more than he may forget his Native American ancestors. All such denial and embarrassment is no more than avoidable, self-inflicted suffering.

#### Now

Today's story starts forty-four years ago, in 1971. I was, as you know, a young scientist running an NIH-funded laboratory studying tumorigenic transformation of cultured cells by small DNA viruses at Cold Spring Harbor. I was also the teacher of a summer course on the techniques of cell culture and transformation. In the class, a graduate student told us of new work from California: taking the tumor-virus of my lab, SV40, excising the T-antigen gene that encodes the virus's tumorigenic activity, recombining its DNA with the DNA of *E. coli* bacteria, and thereby generating a recombinant *E. coli* for research on T-antigen.

I called the chief of that lab, Paul Berg, that evening from home with great trepidation to ask whether he had thought he might be opening a new pathway for the emergence of colon can-

cer in those of his colleagues handling the recombinant bacterial strain, since *E. coli* is a part of normal gut flora, what we would today call our microbiome. He was unambiguously unhappy with my call, but he took me seriously and from that call emerged the Asilomar Conference a few years later, at which scientists in this and other fields involving recombinant DNA voluntarily agreed to suspend research while the matters of safety are resolved in highly protected laboratories at the NIH.

The resulting recombinant DNA guidelines remain in effect today and so far as I know, no one has suffered a serious disease from the technology, although a good case could be made that recombinant food plants carrying DNA-encoding pesticide resistance are a really good way to assure the emergence of pesticide-resistant weeds.

Now for today: In 2015, a group of nine scientists, led by one of the organizers of the Asilomar Conference, Nobel Laureate David Baltimore, publishes a paper in *Science* to argue that it is time to hold a "Second Asilomar," this time to consider whether there ought to be any boundaries set on possible work with the new Crispr-cas9 system for editing DNA.

That paper leads to a meeting held later that year in Washington DC. At that meeting, my colleagues resolve to make the distinction between uses of this technique to cure diseases and uses to edit human DNA in a way that would be inherited. Learning of the event through an article in *Science*, I write a letter to that journal, making a careful distinction (Pollack, R. (2015), *Eugenics Lurks in the Shadow of CRISPR*, *Science* 348, 871).

First, let's see what I know: I know this technology holds great promise for specific and precise gene modification with all the benefits that may imply for future generations.

Second, I know what I see (consider that what I see in this case is about the future, not about the past): I see that the best will in the world will not be able to remove the pain from those born into a world of germ-line modification, who will not have had a CRISPR-cas9 edit done on their zygote as an investment. These babies will emerge as we all did, with the complexity of a genome less orderly than what this technology will be able to define as "normal."

I am pleased to join my colleagues in this case, who say that only a complete and total ban on human germ-line modification will prevent this powerful force for rational medicine from becoming the beginning of the end of the simplest notion of being "endowed by our Creator with certain inalienable rights."

Rational eugenics is still eugenics.

ROBERT POLLACK (CC '61) was the dean of Columbia College from 1982-1989. He currently teaches courses in the Departments of Environmental, Evolutionary and Ecological Biology, Biological Sciences, and American Studies. He has been a Professor of Biological Sciences at Columbia since 1978 and Director of the Research Cluster on Science and Subjectivity since 2015. He also currently serves as Director of The University Seminars. Photo "Test Tubes" by Flickr user Shaun Fisher.