



Sun

H, He

H⁺, H₂

One of the Best

When a scientist like Robert Christy clenches his jaw and announces, "I can do it, dammit!" you generally see some fruitful results.

Robert Christy has always been a questioner of authority. Now that he has been elected chairman of the Caltech faculty for the next two years—a position of considerable authority—no one expects him to change his ways.

"If I'm involved in something," Christy says, "I like to understand the whys of it. So, in various Caltech matters, from time to time I have questioned authority simply because it wasn't clear to me why we were taking a certain course. From a faculty point of view, we should question the administration if we feel it isn't making something clear. It's up to the people running things to be able to explain. If no one can, possibly it's wrong."

The faculty—and the administration—should be in for an interesting two years.

Christy, a 53-year-old physicist, is not a man who invites familiarity. A general air of reticence, accentuated by an Olympian height and bearing, manage to keep most people a good arm's length away. But, though few feel an intimacy with him, no man is more respected.

"Bob is very much his own man," says a faculty friend. "But if I had a problem, there's nobody I'd sooner go to."

Christy came to Caltech in 1946 when Tom Lauritsen and Willie Fowler, continuing their prewar work in experimental nuclear physics, needed a theoretical physicist who was interested in their field. They asked Tom's father, Charles, who would be good for the spot, and he referred the question to J. Robert Oppenheimer, who promptly recommended Robert Christy as "one of the best in the world."

Christy's student and professional life has been characterized by the phrase "one of the best." He graduated first in his class from the University of British Columbia in 1935. After taking a master's degree in physics with a mathematics minor, he was accepted into Oppenheimer's group of graduate students at Berkeley.

At that time Oppenheimer was one of the few physicists in the world with a school in what is now called modern particle theory or quantum mechanics. It was a rare campus that was untouched in some way by the excite-

“Bob likes to get on with matters at hand, and he can be impatient with people who let problems float around.”

ment generated by Oppenheimer and his students.

Christy was one of 20 in this talented group. The new concepts were intoxicating enough, but, in addition, Oppenheimer himself magnetized his students and even imprinted them to the point where they unconsciously absorbed his mannerisms—the way of walking, talking, gesturing, holding a cigarette.

Christy describes that master-student relationship as “an unequal friendship.” The research students thought of Oppenheimer as larger than life, a superbeing. “Under such circumstances,” says Christy, “students find it hard to acquire any real feeling of intimacy.”

In the late 1930’s, when Oppenheimer held a joint appointment at Berkeley and Caltech, Christy was one of the students who accompanied him to Caltech on two occasions to continue working in Pasadena during the summer months. This yearly migration prompted a Caltech mathematician to describe the group as “the mother hen and all the little chickens.” During one of those summers the Oppenheims occupied the Richard Tolman house at the corner of Michigan and Lura (now the residence of Provost and Mrs. Robert F. Bacher). Christy and another “little chicken” lived in the guest house, rent free except for occasional duty as rug beaters for Mrs. Oppenheimer.

Christy got his PhD in 1941 at the end of the depression, when even an Oppenheimer PhD found work scarce. He was elated to get an Illinois Tech job as an instructor at \$2,400 a year.

At the end of that year an offer came to join the University of Chicago’s Metallurgical Laboratory, the forerunner of the Manhattan Project. For a young scientist, this move meant progress toward the company of the great, which included not only physicists in this country but brilliant refugees from Europe as well.

It was obvious to everyone in the Laboratory that one of the ultimate results of their work could be a super bomb. But Christy, as a fledgling scientist—and he suspects this was true of the other young physicists—focused all his attention on the immediate objective of

accomplishing a self-sustaining nuclear reaction.

“The ultimate goal of a bomb was far in the background so far as we were concerned,” he recalls, “although of course this was not the case with the project leaders.”

The work in Chicago culminated in the world’s first self-sustaining nuclear reaction on December 2, 1942. A few months later Oppenheimer invited Christy to Los Alamos to work on the atomic bomb project, and in March 1943 he and his wife, Dagmar, were among the first to arrive.

“We got to Santa Fe before there were any places for us up on the Mesa, and for a few weeks we lived in a former school building filled with double-deck bunks for incoming scientists and their families. You just crawled over bodies at night until you found some vacant bunks.”

During this period he met Richard Feynman, a fellow bunk-crawler. Later, when Christy was responsible for analyzing implosion calculations, Feynman organized and expedited them on the extremely crude computing machines that followed the effect of a spherical explosion on the material within.

Christy stayed at Los Alamos until 1946, then joined the University of Chicago faculty. During their short stay there, the Christys and the Edward Tellers shared an old rented mansion, which became an impromptu hostel for a whole string of physicists and their families coming through Chicago from Los Alamos.

At Caltech, as Fowler, Tom Lauritsen, and their group became acquainted with Christy, they marveled at his ability to do experimental work and to work with his hands. In fact, they sometimes referred to him as the “housekeeper.”

“I wouldn’t give most theoretical physicists a paper clip,” says one of the old group, “because they’d hurt themselves. But Christy’s amazing. He’s even built a swimming pool. And he can do all kinds of complicated work around his house—not as a hobby, mind you, but as a challenge. If something breaks down, he’d rather fix it than have to say he can’t.”

Jesse Greenstein observes that when a scientist like

Christy clenches his jaw and announces, "I can do it, dammit!" you generally see some fruitful results. That, he adds, is in the best Caltech tradition.

In 1961 Oppenheimer, who was now director of the Institute for Advanced Studies in Princeton, asked Christy to spend a year there. Towards the end of his stay, he was asked to give a seminar on the work of Fowler's nuclear astrophysics group at Caltech. Having been away from the Kellogg lab for almost a year, Christy thought he'd better read up for the seminar. In doing so he came on a well-known astronomical puzzle that had been kicking around for almost 50 years. It had to do with how some types of stars vibrate.

"I found a solution I thought might work," he says, "and the nature of the computation was related to those I'd been familiar with at Los Alamos. It was a calculation never applied to a star before. What struck me was that this kind of calculation would enable one to follow, in great detail, what went on in a spherically vibrating star. If I could follow it in enough detail, I might be able to see whether the particular mechanism I was interested in would actually make the star vibrate."

If he hadn't been at Los Alamos, Christy wouldn't have known that the problem could be worked out by computer. The only hitch was that he had never confronted a computer.

He started with an hour's lesson on the basics from a computer man at Princeton, got the hang of doing simple problems, then started a growing and sometimes frustrating relationship with computers on his return to Caltech. He became increasingly immersed in astrophysics, and five years later he had solved much of the mystery of the variable stars. In 1965 he was elected to the National Academy of Sciences, and in 1967 he was awarded the prestigious Eddington Medal of the Royal Astronomical Society of London for his calculations.

"It's characteristic of Bob that he has developed such beautiful computer programming," Fowler says. "He's helped all the rest of us, teaching us about the efficient and economical use of computers. He has raised the

general level of their use at Caltech tremendously."

The bundles of computations stacked in Christy's top floor lair in the new Downs physics building today are a symbol of only one part of his contribution to Caltech. He has been on the faculty board, the academic policies and the academic freedom and tenure committees, and more recently was a member of the presidential selection and the aims and goals committees.

He is considered by his peers to have, as one division chairman describes it, "a marvelously independent, incisive, and adventurous mind."

Last year he became executive officer for physics, and since then he has been conferring with other physicists, trying to get some idea of what the future of research and teaching in Caltech physics might be.

As a teacher Christy is as demanding as any, but he has some doubts about Caltech's—and particularly the physics department's—rigorous required courses.

"Our freshmen and sophomore 'Feynman' physics courses are too difficult for many of our students. We shouldn't force all our students to take this very advanced and beautiful—but bewildering to some—treatment of physics.

"What's most important in education is not what you force the student to do, but what you can get him enthusiastic about doing on his own. If we sacrifice some of the formal course content doing this, I wouldn't consider it a serious loss."

In 1967 Christy spent six months at Cambridge University, partly to see how a good school in another country operates. He came back feeling that some aspects of the Cambridge tutorial system should be introduced at Caltech.

"They seemed to have less trouble than we do with students who lose interest and give up working. Students can get a tremendous education at Caltech if their interest doesn't flag. But too many of them give up. I don't think we're treating this kind of student right. They're not getting out of Caltech what they should."

Christy, dissatisfied with some kinds of instruction at Caltech, is not likely to turn his back on the problem. Jesse Greenstein observes that "We faculty members are a diverse, splintered, individualistic bunch, and we have a tendency, sometimes, to deal with a problem by tossing it to a committee and hoping that it'll give up and go away. Bob likes to get on with matters at hand, and he can be impatient with people who let problems float around. In the next two years we may all get more done than we bargained for."