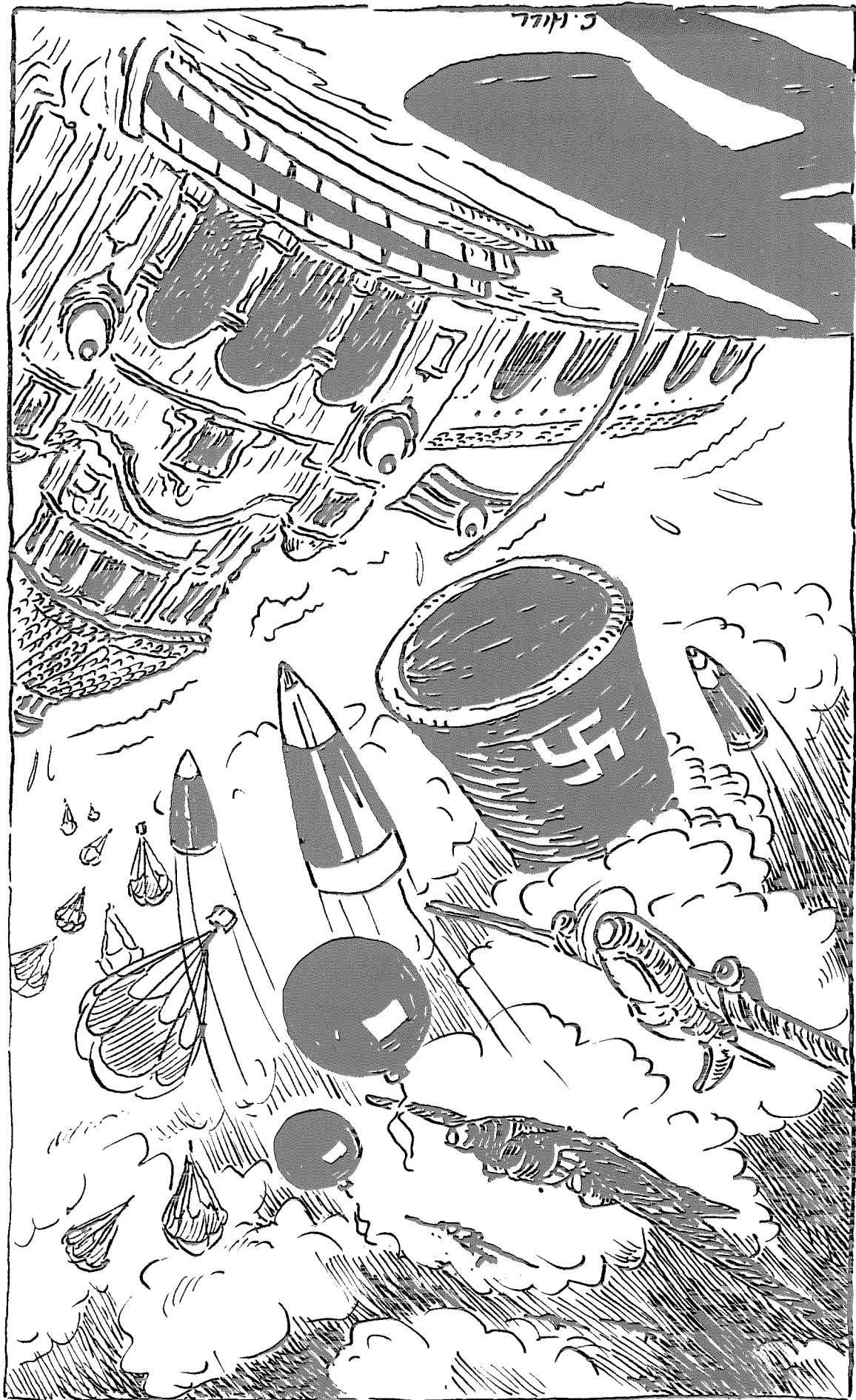


5. 11. 77



The Committee

by John H. Rubel

In December 1941 I was living out my senior year at Caltech in Dabney House, where water bombs were the current rage. But on Sunday, December 7, the real bombing of Pearl Harbor forced us to put such adolescent craziness behind us. A new kind of craziness was about to begin.

The attack mobilized public outrage and aligned public sentiment in a readiness to fight World War II. It also aroused—especially on the West Coast—dread of sabotage or attack, both of which were instantly and widely imagined in a multitude of forms. Robert Millikan quickly appointed a Committee charged with taking measures to diminish the exposure and increase the security of the Caltech campus, and in a day or two I was notified that a group of seniors, including me, had been chosen to guard critical buildings. Service was voluntary, but if we elected to serve we would be excused from final exams, and so far as I know, no invitee declined to join up. We were organized into squads of about a dozen, spaced out so that every part of Guggenheim and Kellogg was always under surveillance by someone, and given a schedule of six hours on duty and six hours off, which somebody said was how the Navy did it. Why, we wondered, would the Japanese be interested in sabotaging the 200-inch Hale Telescope mirror then being ground in the optical lab back of Guggenheim? We never thought about the wind tunnel in Guggenheim as a military target (and maybe that wasn't it), and we knew nothing then about what was going on in the lower part of Kellogg (see *E&S* Spring 1991).

There was a delay in getting started while the

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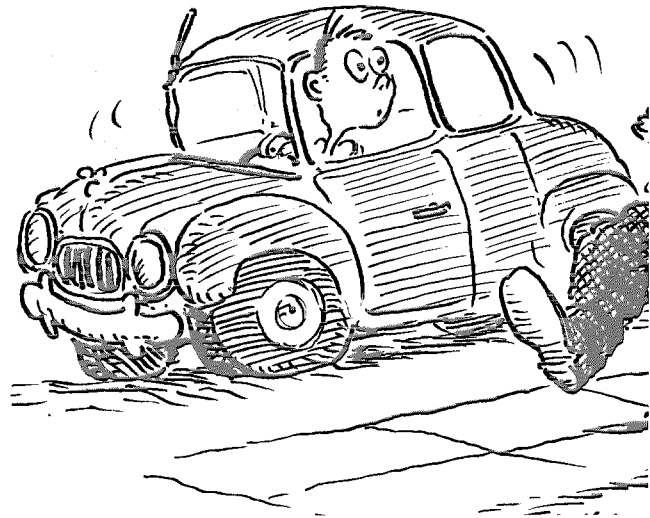
Powers That Be decided how we were to be armed. Rumor had it that we would be furnished with rifles. There were arguments against rifles, not the least of which was that few or none of us had ever held a rifle in his hands. The thinking went that squads of armed seniors would probably be more dangerous to one another and certainly to innocent bystanders than to any would-be saboteur. The next day the Powers That Be were said to have settled on pistols, but as it turned out, much to our regret, pistols also ended up on the Too Dangerous list, and when we reported for duty we were issued ax handles that someone had bought at the local hardware store. We were told to shoulder our ax handles as if they were rifles and to stay on the qui vive—ready, by implication, to do something terrible to the would-be saboteur who had made his way to the portals of Kellogg or Guggenheim, presumably armed to the teeth, equipped and determined to blow it to Hell.

On the night of our first patrol along California Boulevard, we lined up in back of the optical lab near the driveway leading into the campus between Kellogg and Guggenheim, looking, I thought in a seditious flash, like some apparition from a modern parody of *A Midsummer Night's Dream*. Of course, it was not summer; it was the middle of a California winter, and crisp enough to make us want to get moving, which we shortly did. But after only a few paces Professor of Geology John Buwalda stopped us cold. "Not like that!" he commanded. Remarkably enough, the war had already altered his usually professorial demeanor. "Don't just march around! Look!

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Look in the bushes! Look in the shadows!” So we resumed, each of us making conspicuous searching movements as we walked, peering here and bending there. I wondered briefly what motorists might think was going on at Caltech if they happened to notice our straggly band of students armed with ax handles writhing along California Boulevard in the middle of the night, but I was soon caught up in the spirit of the thing, and patrolled my assigned circuit for the next six hours that night, and for a number of subsequent patrols. Ultimately the Committee made more permanent security arrangements, and we all had to get back to our books.

Things had settled into a manageable routine but the novelty had not yet worn off when, close to midnight a few nights later, I heard my classmate Alf Landau shouting at the top of his lungs somewhere around the Old Dorm. There he was, a rifle pointed at the foundations of the decrepit old building, yelling in his German accent “Come out! Come out, whoever you are!” Landau had served in the Austrian tank corps before the *Anschluss* hastened his departure for America and Caltech. Normally there wasn’t anything military about him, but this night there was, especially as he fingered the rifle he had managed to come by. He shouted some more. Silence. Then, sure enough, in that midnight silence you could hear a rhythmic, metallic tapping, as if someone were hammering on iron pipes. A small crowd gathered while Landau shouted more guttural commands into the otherwise silent night, until we realized that the steam pipes under the building were making their usual noises, and



Landau went off in search of other dangers. Meanwhile, the Caltech switchboard lit up with callers who had begun to fear that the other enemy had arrived ahead of the Japanese. (Landau later served with the U.S. Army, impersonating Germans behind enemy lines as the U.S. forces advanced across the Rhine.)

But clearly there were many dimensions to the business of protecting the campus. Millikan’s Committee asked for student help, and Bill Hicks, our student-body president, appointed me the student representative to it, to organize whatever student assistance and participation the Committee decided to require. The Committee met in a small room somewhere on the second floor of Throop, empty, as I recall, except for a library table and a few armless chairs around it. Its first chairman was William Michael, associate professor of civil engineering. He was well known on campus, even to those who had never taken a course from him, for his yearly lecture on the scientific aspects of trout fishing—how the fisherman looks to the fish, given the index of refraction of water and air, how the wind affects its vision, the effects of light and shadow, etc. The Committee members included—besides John Buwalda—Joseph Koepfli, research associate in chemistry; J. Wallace Sterling, associate professor of history; and Wesley Hertenstein, head of buildings and grounds. Fritz Zwicky, associate professor of theoretical physics, spent a lot of time on Committee concerns, but he came to few meetings and was not officially a member of it, as I recall.

As the weeks passed I discovered that some



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members brought their own expertise and interests to bear on one or another aspect of campus protection, often with singular insistence and persistence.

Professor Buwalda, for example, focused on certain sequelae of the 1923 Tokyo earthquake. There, he said, people had fled a vast conflagration started when the earthquake upset charcoal stoves in highly combustible houses, fleeing with all the possessions they could pile on wagons or carry on their persons, and stopping to rest at the first large open space they came to. "Then," he intoned on the many occasions when he repeated this disquisition, "surrounded by the highly combustible materials with which they had fled, they were consumed by the flames that overtook them." This experience, he thought, would inspire a Japanese tactic. "So," he would conclude, "the Japanese will drop incendiary bombs on the foothills on a night when the prevailing winds from the north will blow the resulting flames toward the city. A great conflagration will ensue. The people will flee their homes carrying with them as many of their possessions as they can. The Caltech campus will be the first large open space which they will encounter, and they will tend to stop here with their combustible burdens. We must prevent that by posting patrols that will keep the crowd moving south. Otherwise the fire will catch up, their possessions will be ignited, and everyone will perish in the flames." So we organized student squads that would keep people fleeing flames from the north moving on to the south. Of course, just across California Boulevard to the south was Patton

Field, where even more people could stop in their flight, surrounded by combustibles. But then, our job was only to protect the campus.

Professor Koepfli, the chemist, feared attack by poison gas. First, he said, the Japanese would drop high-explosive bombs. Having shattered the windows, they would then drop poison gas. The Caltech basements were a logical place to shelter people from the high explosives, but would be a bad place if poison gas were dropped, since these agents are heavier than air and would seep to the lower levels. Besides, water mains would probably be hit, and water would flood the basements unless major control valves were turned off. Some Committee members thought we should consider keeping people out of Caltech's basements, but others argued that since they were considerably safer than ground-floor shelters against high-explosive bombing, we could hardly deny access to them. So we organized a student-operated system to insure that there was always a team on campus familiar with (and possessing the keys to) the valves that would have to be shut off if the mains were broken on the campus side of the valves. We could do nothing about it if mains were broken on the city side of the cutoff valves, but at least we were prepared to deal with what we could do something about.

There remained the more formidable problem of what to do if poison gas were used. Whatever was to be done, there needed to be a cadre of people who knew something about poison gases and what to do about them. There were several foreign-born chemists and biologists around, Frits Went among them, who knew a lot about poison gases and gas warfare, and Koepfli got them to set up a brief but quite comprehensive course on the subject. Many students, including me, volunteered to take the gruesomely interesting course. The professors made up small quantities of several agents so that we could learn what they smelled like in low concentrations. As we learned more about them it got pretty scary to think about what would happen if there ever were a gas attack! Even gas masks would be quite inadequate against some of them, and anyway, a survey had recently disclosed that Pasadena possessed only one gas mask, and it belonged to the Pasadena fire department. If anybody else in town had one, nobody found out about it. Even one small poison-gas bomb, dropped in a residential neighborhood, could contaminate just about everything in sight, especially if something as bad as Lewisite were dropped. It would penetrate raincoats or other garments made out of rubber, and only a sophis-



You would put the bag over your head, tie it around your neck, put the “raspberry” in your mouth, soak the bag in water and immerse yourself in the bathtub up to your neck.

ricated gas mask would protect against it. Lewisite creates terrible burns not only in the lungs, but on the skin wherever you touch it or it touches you, and it could hang around a long time while helpless people were horribly burned inside and out with ghastly consequences, usually ending in death.

So something would have to be done, Koepfli insisted, to decontaminate infected areas before things like that happened, and to that end he designed a decontamination unit, consisting of a truck with a large tank containing decontaminating chemicals in a water solution to wash the streets down, and a large propeller on top of the tank that would blow a mist of decontaminant into the surrounding air, cleansing the atmosphere as the mist settled. A team of men, dressed in special gas-proof clothing and trained to rescue people from their homes, wash them down, administer first aid, and provide other emergency services, would operate the truck.

But this scheme faltered on the logistical details. Eventually nothing came of the decontamination-truck idea, although the students from the poison-gas course were ready to man it if something did.

Even if all this came to pass and you had a really good decontamination unit and crews to man it ready to go, **protecting the population** still loomed as an overwhelming problem. What was needed was a simple, cheap gas mask that anyone could make on his own, and Zwicky thought he had invented one. I was working with him on some other projects at the time when, one day, he told me his idea. The gas mask would

consist of two small flour sacks (in those days you could buy flour in cloth sacks just about the right size to fit over your head), which would be sewn together like a quilt in vertical seams, leaving finger-sized spaces to be filled with bicarbonate of soda. A transparent window made of unexposed, developed film would be sewn in the bags so that you could see out, and a “raspberry” (that common rubber gadget with a wooden mouth-piece for delivering a loud blast of disapproval at baseball games) would be sewn in opposite your mouth. You would put the bag over your head, tie it around your neck, put the “raspberry” in your mouth, soak the bag in water and immerse yourself in the bathtub up to your neck. Air would be filtered through the wet bicarbonate of soda as you breathed in. You would breathe out through the raspberry.

Zwicky got someone to make a first version of the device. When the afternoon of the decisive experiment arrived, he told me his plan—to put the mask on, immerse himself in water up to his chin, get someone to release chlorine gas into his bathroom, and then to breathe in through the wet sodium bicarbonate. He gave me a short demonstration, putting the mask over his head, with the raspberry device in his mouth. Then he vigorously sucked in and blew out. The bag, still dry and not tightly tied around his neck, collapsed gently around his face as he breathed in, and the raspberry made a horrendous noise when he blew out through it. After a few breaths he took it off smiling somewhat impishly. He left the campus that afternoon with his potentially revolutionary mask and a small tank of com-

pressed chlorine gas. The mask would be tested that evening.

The next morning I went to see him in his office. Now, Zwicky was a great scientist and a memorable personality. In the previous four years he had discovered 18 supernovae (only 12 had been discovered before him in the history of astronomy), and in his early forties he was a man of immense physical energy, radiating personal vitality. He told me, among a number of things even more memorable, that in winter he shoveled snow around to make a run so that he could ski over the Mount Wilson observatory, which, if I visualized the feat correctly, required a *lot* of energy. But Zwicky was rather subdued when I encountered him on the morning after his gas-mask experiment, and had a bad cough. "Nah, zomezing was wrong," he said in his Swiss-German accent. "Maybe a leak. Maybe dze seams need to be sealed. Maybe it chust doesn't vork." That was the beginning and, so far as I know, the end of Zwicky's gas-mask days. The Pasadena population went unprotected.

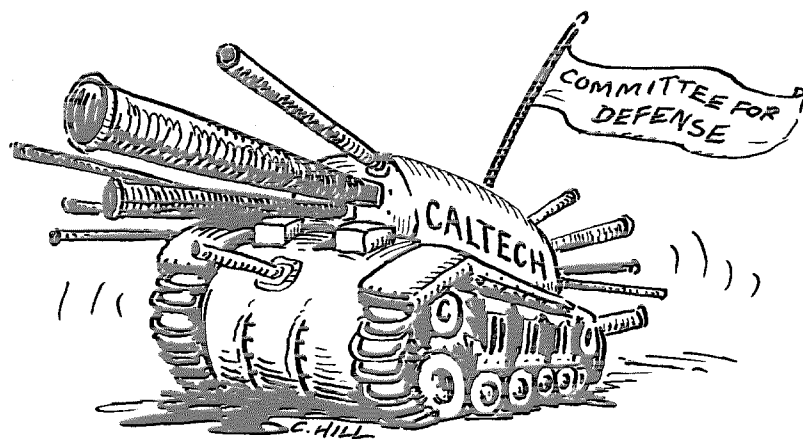
Meanwhile, Zwicky trained his energy on another problem. Early on there was concern about the danger of injuries from flying glass shattered by high-explosive bombs. I recall a conference on the subject where I sat near a large window as Zwicky described the problem of fishing myriad glass splinters out of someone unwise or unlucky enough to be in the path of a window blown in by a bomb. The British, he said, were gluing cellophane on windows with treacle to reduce the risk of flying shards. Nobody was sure what "treacle" was, although many of us recalled vague associations with Oliver Twist or David Copperfield or somebody. Some thought it was sugar water; the dictionary said molasses. Zwicky, however, decided we should make a paste out of flour and water and stick cellophane on all the windows. First, though, he wanted to do some experiments to answer a few questions, such as: What is the best color cellophane to use to reduce visibility in case bombers fly over before the lights are turned out? What is the best glue mixture to use? What is the best way to apply the cellophane to windows? And how long will it stay on in our climate?

Someone liberated a number of old French doors from somewhere around the campus, and we used various gluing mixtures to affix different species of cellophane to their many panes. Then we transported them to the steam tunnels somewhere under Bridge, hooked up some lights, and turned them over to Zwicky. He would go down there with a deflated football, stand back a few feet, and then hurl the football at a pane of



He would go down there with a deflated football, stand back a few feet, and then hurl the football at a pane of cellophane-covered glass.

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cellophane-covered glass. He didn't always hit the glass, but when he did the glass sometimes broke and sometimes didn't. Zwicky analyzed the results of this scientific experiment and came up with a protocol for selecting the cellophane and gluing it on. All that remained was to choose the right color.

One night he took a couple of students and a supply of cellophane and a powerful flashlight into the foothills north of the campus, while a few of us watched from a balcony in the student houses. He flashed the light at us without any filters over it, somehow we located it, and we then observed relative intensities when he covered the light with cellophane of various colors. Whether the color accounted for it or whether blue cellophane happened to have lower transmissivity than reddish colors, we concluded that any bomber that found itself flying around Pasadena would find it hardest to see Caltech's windows if they were covered with blue cellophane. We then secured a considerable supply of it, mixed up a lot of glue, and covered a number of student-house windows. The idea was to see how the stuff stood up to sunlight and weather. When the efficacy of the technique had been established, we would be ready to glue up every window on campus.

In the end, so far as I know, this part of the project never got beyond the testing phase, just as some others never even got beyond discussion, but I doubt that anything close to the scientific brainpower represented by Zwicky, Koepfli, Buwalda, Went, and many others, not to mention their worthy student assistants, was devoted

to such matters anywhere else in America during that spring of 1942.

Despite considerable activity and thought, the problem of saving the Old Dorm in the event of a fire remained unsolved. It had been a fixture on campus since World War I, when it was built as a "temporary" building, but ended up actually surviving for many years after World War II. It stood close to where Winnett Center stands today—a ramshackle, unpainted, two-story, shaky structure. The "Greasy Spoon" occupied the front; the rear was taken up by some spaces where aficionados practiced boxing and fencing; and most of the rooms, which housed a few graduate students, were located on the second floor. There probably was a fire hose somewhere inside the building, but there were no hydrants outside anywhere close, and the building would have burned like a large cardboard carton in a matter of a few explosive minutes if a fire ever got well started. Everybody knew it, but the best the Committee could come up with for its war preparedness was a bucket brigade of students using sand stockpiled nearby. The matter was discussed at length in several meetings of the Committee, but the idea presented the daunting problem, among others, of getting buckets of sand from the ground outside to a burning roof or to a second story fiercely ablaze, with nothing at hand but men on the ground holding the buckets. Since that problem had no practical solution and nobody could think of anything better, nothing was done.

One day, after a couple of months marked by considerable activity preparing to save Caltech

from the horrors of war, but without much progress on the Old Dorm fire-protection problem, Professor Michael announced at the start of a Committee meeting that Millikan was going to attend for the first time in the Committee's brief existence. A somber silence descended over the group, a silence that gave me the impression that the group contemplated the imminent visit with foreboding. As we sat there each wrapped in his own thoughts I reflected on the men around the table, all of them well launched on distinguished academic careers, most old enough to be my father, several young enough to be Millikan's son, nervously musing on his arrival. He was then 74 years old, but he neither looked nor acted like the image I had then of a man that age. He was of medium height and build and, as I see him now in my mind's eye, trim and erect with an athletic bearing and radiating vigor, energy, and self-assured authority. He was, after all, America's most famous living scientist, a winner of the Nobel Prize, the man most associated with Caltech's quality and reputation (the Institute's achievements were entirely the result of his exceptional intelligence, vision, energy, and devotion), and a brilliant experimental physicist who knew how to operate in the world of non-scientific affairs. He commanded respect wherever he went, not least among subordinates a generation younger. What, I wondered, would these now-somber faculty leaders—eminent men, Committee-men—do when Millikan arrived?

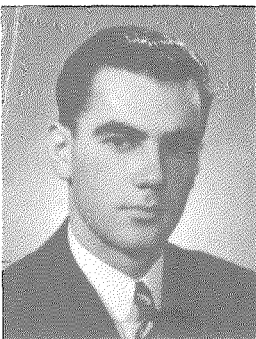
The door burst open and Millikan strode in looking neither right nor left. To a man we leaped to our feet, and in a flash the eminent professors crowded and shoved as each offered a chair to Millikan. He ignored them all until, with a few strides, he reached the head of the table, where he sat down in Professor Michael's seat and without any preliminaries, began to speak. "I am very displeased with the work of this Committee," he said. His chief concern turned out to be the danger of fire in the Old Dorm. "What has been done about that?" he demanded. Michael started to highlight the difficulties, but Millikan interrupted with a gesture of impatience. "It's all very simple," he declared. "There is even a book about it. You can buy it in any bookstore. They sell it in all the drugstores. It tells about civil defense and what to do in case of attack. All you have to do is fill the bathtub with water and have a bucket handy." Everybody except, evidently, Millikan knew that there were no bathtubs in the Old Dorm or that if there were they would be useless in the face of a major fire. He probably knew it, too, but nobody dared challenge him, nobody

said a word. Millikan soon got to the point: he replaced Professor Michael with Professor Sterling, whereupon he left as unceremoniously as he had entered.

With that change we carried on as before to the end of the quarter. Professor Sterling in the beginning stepped up the beat of the Committee's work. We got ourselves even better organized, but then the pace of activities gradually slowed to a virtual standstill. By the time graduation rolled around in June, the student organization for campus defense was an unexceptional fact of life. Some few last vestiges of cellophane hung in melancholy strips from dorm windows where the "treacle" had not yet entirely flaked off. The patrols had long been discontinued; nobody was excused from finals this time, and the students who had patrolled or knew where the water-main shutoffs were, or had learned about poison gases, or been involved with shatter-proofing windows, or selecting the right color for reduced nighttime visibility, left for the summer or graduated. Some of the class of '42 joined the Navy or the Army or the Army Air Corps; some worked on radar or electronic countermeasures or the Manhattan Project, but nearly everyone in the class survived the real war. Fortunately, no armed Nazis menaced the peace of Pasadena, no Japanese attacked, no crowds of refugees perished in the flames of their combustibles on the campus or anywhere else, and the Old Dorm met a peaceful end more than a decade later. □

John Rubel, believe it or not, went on to become assistant secretary of defense (research and engineering) in the early sixties. Along the way he also worked for G.E., Hughes, and Litton Industries. He's now retired in Tesuque, New Mexico, where he recently earned his MA in liberal education from St. John's College and is active in several literary groups. The inspiration to write down these reminiscences came from a talk by Archivist Judith Goodstein at the 50th reunion of the class of 1942.

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John Rubel, BSEE '42
(photo from *The Tech*
1942)