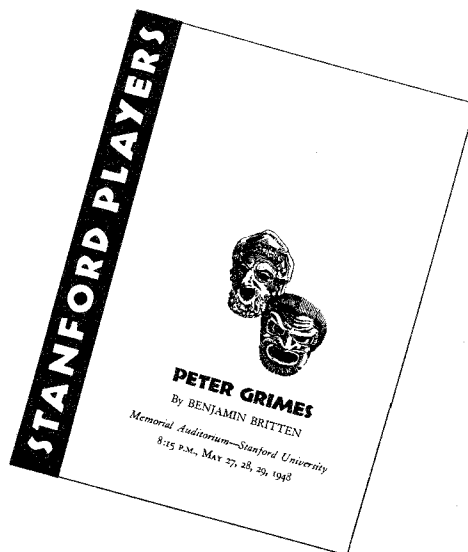
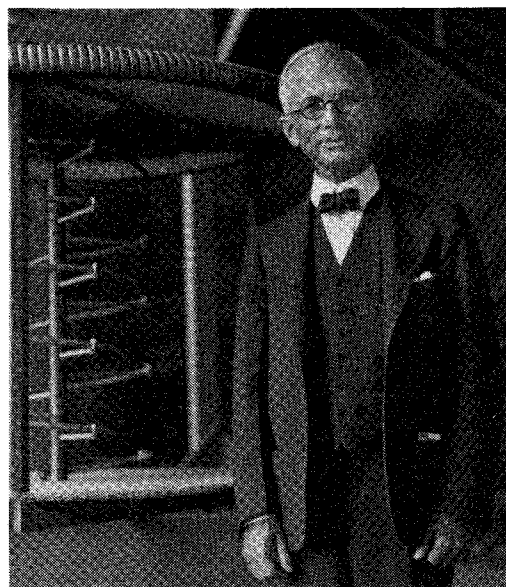
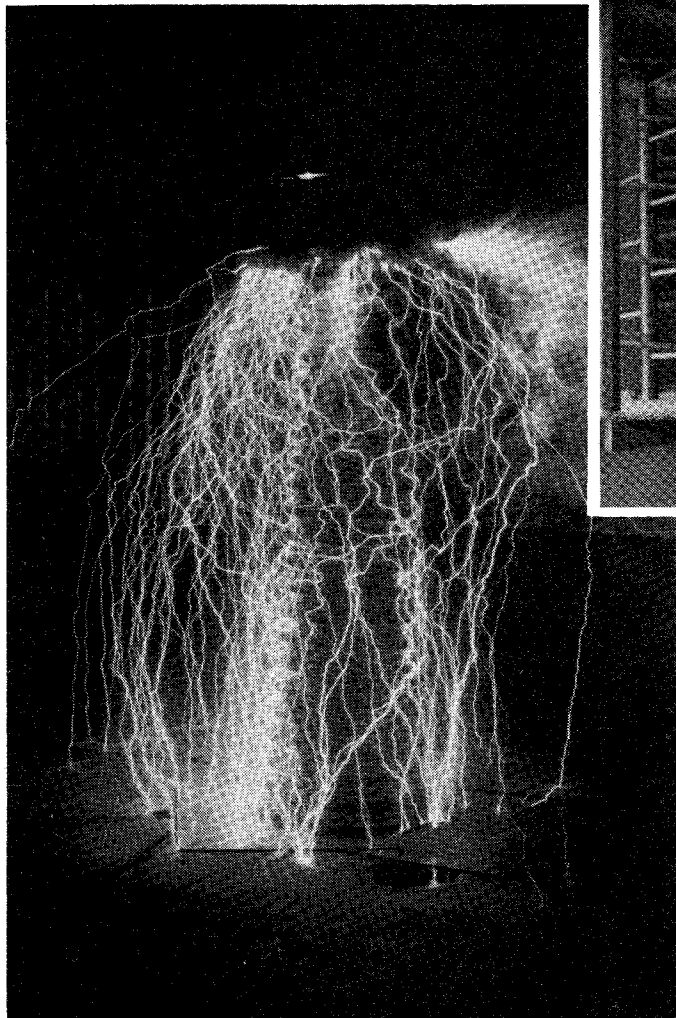


Sandstone and Tile



They made lightning at Ryan Lab

40 years ago, an opera premiere

COVER: At the top, Prof. Harris J. Ryan and a nine-foot tall, 857,000-volt flash-over in the famous Stanford laboratory that bears his name. The story begins on the opposite page. Bottom right, the cover of the program for the West Coast premiere at Stanford of Benjamin Britten's opera *Peter Grimes*. The story begins on page 8.

Stanford's power line research pioneers

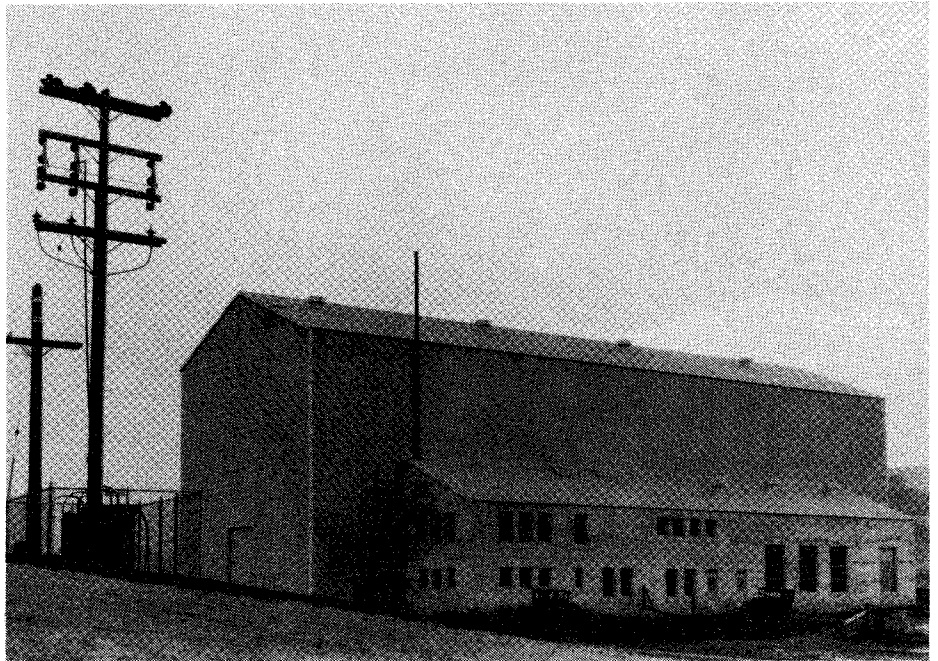
By Shannon Moffat

The massive grey hulk of Stanford's Ryan Laboratory rises behind a screen of tall eucalyptus trees just off Stanford Avenue. You could attend nearby Lucille Nixon Elementary School every day or live in one of the faculty homes around the corner on Raimundo Way and hardly be aware of its existence.

Once a place of great energy and activity — where the air would sometimes crackle with as much as two million volts of man-made lightning, and where critical equipment for the Boulder Dam power line was tested — it is now almost abandoned. Excess student chairs and desks from university classrooms occupy much of its floor space. Faculty artists Nathan Oliveira and Greg Lynch have studios there.

But mostly it sits neglected. Many of its windows are broken, boarded over, or both. There are gaps in its corrugated siding, stray pieces of wire hang outside, pieces of pipe and other litter are partly hidden by the winter grass. This winter the parking lot was the corporation yard for the company installing the new television cable system locally, but that was a temporary flurry of activity.

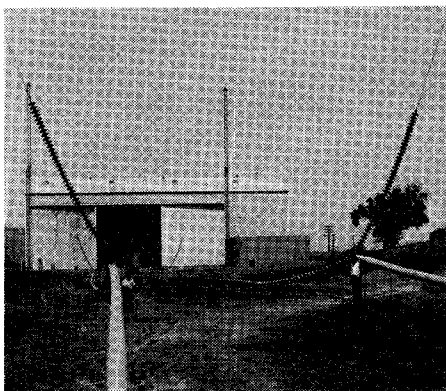
Ryan Laboratory will be demolished later this year because it has outlived its usefulness, but before that happens it is appropriate to acknowledge the major accomplishments that were associated with Dr. Harris J. Ryan and the building that



When Ryan Lab opened in 1926, it was all by itself, way out in the country.

bore his name. Probably few present campus residents are aware what a contribution it made to our daily lives.

It was in this building (and also in a predecessor lab near the present Roble Gymnasium) that Dr. Ryan, his students, and their successors in the Department of Electrical Engineering found solutions to many problems that stood in the way of efficient power transmission in the early decades of this century. Without their contributions, we might not have as much electric power as we do today



Power lines crossed open fields.

for everyday living in the major metropolitan areas of the west.

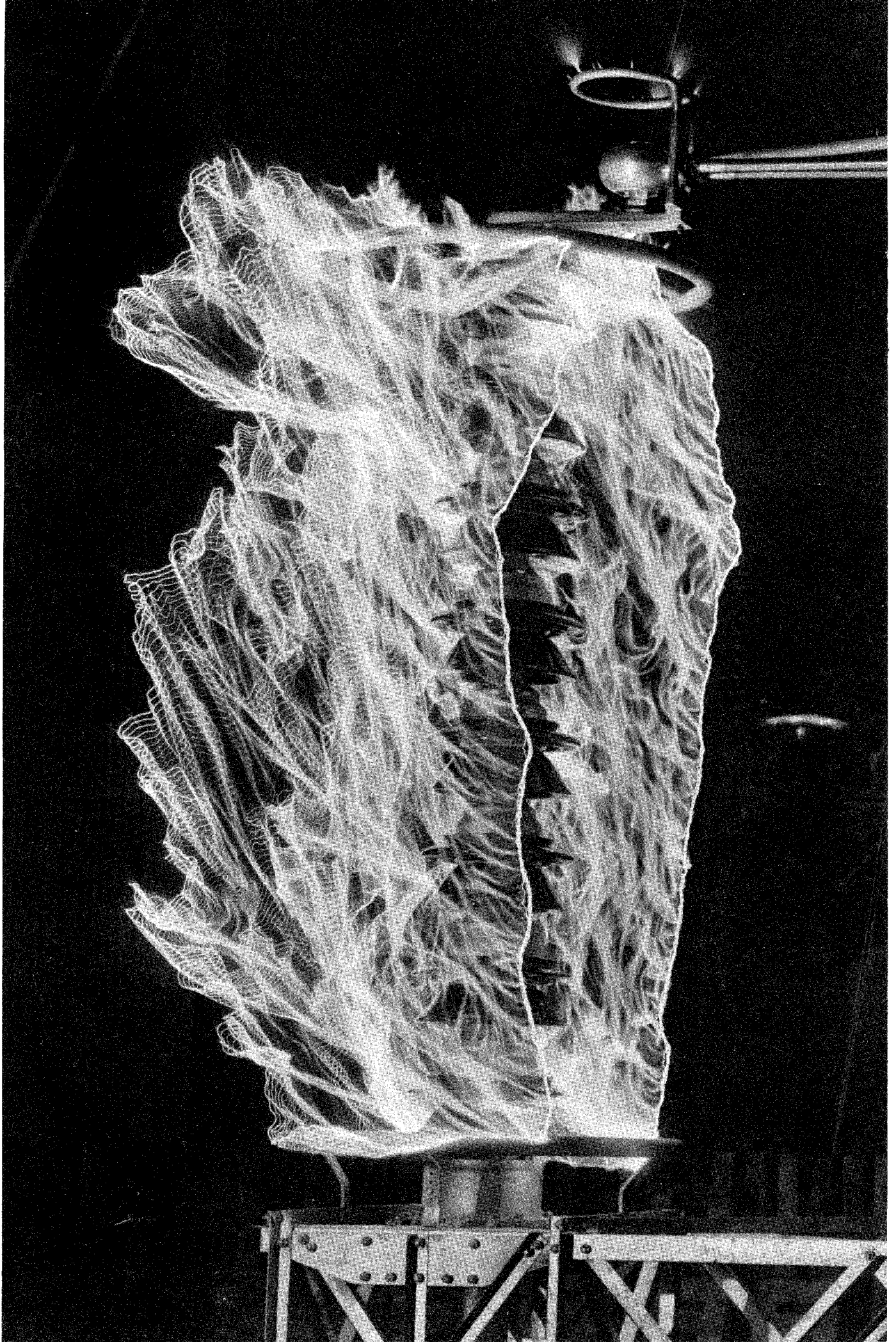
Emeritus Prof. Hugh H. Skilling, a student of Dr. Ryan's and later head of the department for a quarter of a century, put it this way: "All the ordinary transmission lines that run up and down the inland valleys of California, all are based on Ryan's work."

This includes the Pit River 220,000-volt transmission line from northern California to San Francisco (opened in 1922) and the 270-mile, 287,000-volt line from Hoover Dam (then Boulder Dam) in Nevada to metropolitan Los Angeles (which began carrying power in 1934, after Dr. Ryan died). When the Boulder-to-Los Angeles line was completed it was "far and away the largest ever built." It was the longest and had the highest voltage to date, according to Skilling.

"Most power lines today are pretty much the same as those of Ryan's," Skilling said. It is not hard to imagine what life would be like in California without electricity from the great dams of the West.

These giant electric lines required many new developments. They fell

Shannon Moffat, a Palo Alto writer and one of *Sandstone and Tile's* editors, is former editor of *Insight*, The Associates of the Stanford University Libraries publication.



in two broad areas — equipment to carry the power and to deal with the weather. Ryan Lab engineers strung three different diameter cables, each a fifth of a mile long, on towers between the lab and Page Mill Road, to determine the best size line to use for Boulder. Later they had to test many different types of cables, made different ways and of different materials, to find out which would lose the least energy to the surrounding atmosphere (called “corona loss”). They found ways to design cables that would reduce such loss to one-tenth of one percent. Prior to that, corona loss had run as high as 10 percent.

The lab also made important contributions to the design of insulators to support high-voltage power lines. Working with power transmission engineers from Pacific Gas and Electric Company and the Southern California Edison Company in the 1920s, Stanford electrical engineering faculty had devised insulating support for the Pit River line and others. After the Ryan Lab was opened in 1926, they further refined their work.

What would happen to insulators exposed to desert sun and dust for months on end? Long before Boulder Dam was built, Dr. Ryan installed a variety of insulators in the Nevada desert and left them to the weather. Years later, after Dr. Ryan had died, an engineer from the Los Angeles Bureau of Light and Power found those same insulators and was able to



At left, the “lightning” formed a lace-like filament in an 830,000-volt sustained arc-over during a test of a huge Boulder Dam disconnect switch at Ryan. Above, a sign brags about “the highest voltage ever produced,” in another test at the Lab.



There always were extra cables in Ryan Lab's storeroom.

confirm that they would withstand desert sun and sand.

Another problem arises with insulators when there is no rain for long periods of time. Dust collects on them, and then when fog occurs in the fall or winter the dust may become “mud” that can cause short circuits. To learn how to combat this and other weather conditions, the Ryan staff once built a tube large enough to hold dozens of insulators, then subjected them to all sorts of climate situations.

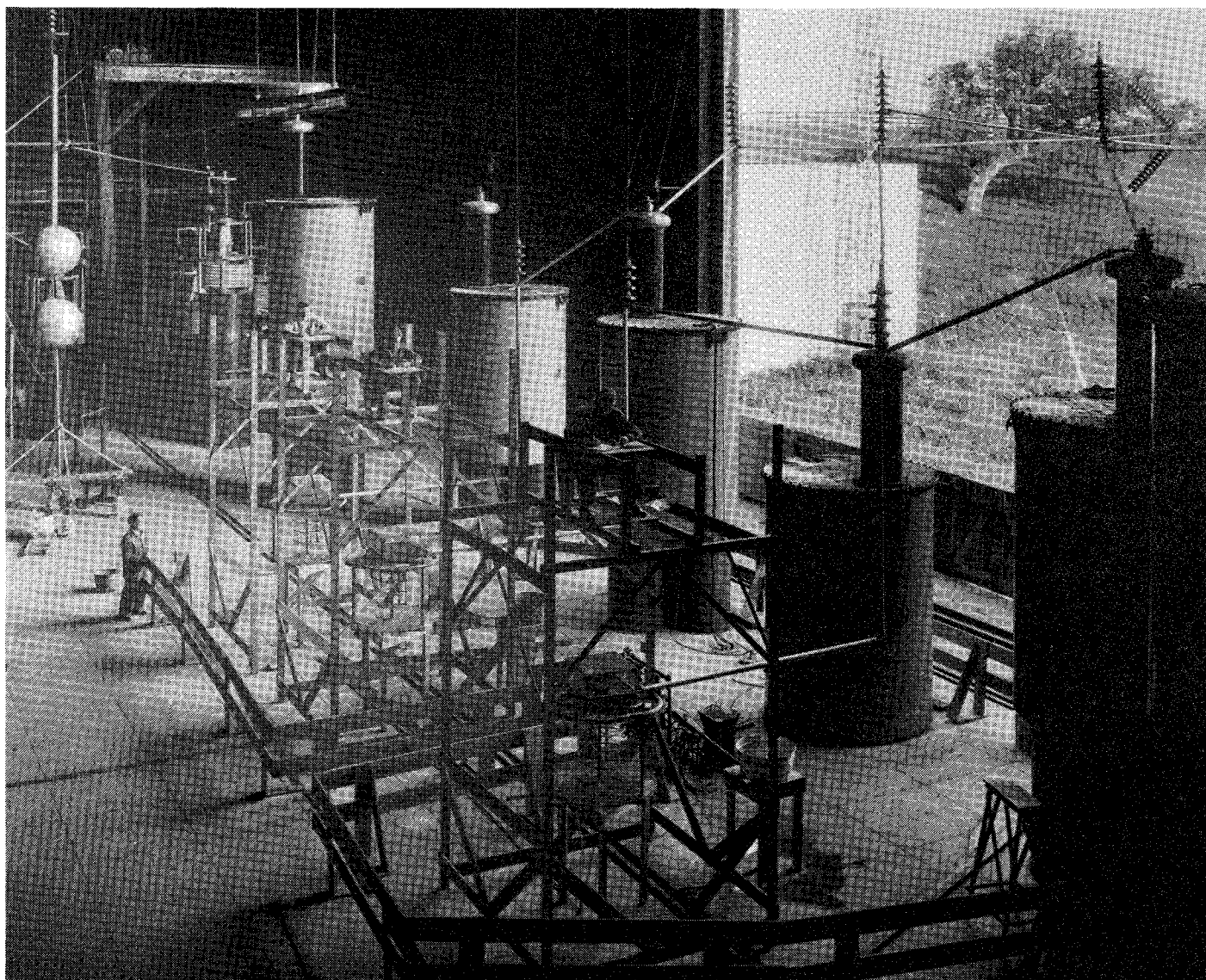
Lightning is another major hazard to power transmission. A lightning strike will add far more energy to the electric line than it usually carries and can put the line out of operation. Ryan Lab engineers had a lightning machine that could discharge more than 2 million volts of electricity. Data about the man-made lightning helped power companies learn how to divert all this power from their transmission cables. On the Boulder Dam line, two extra cables were suspended 30 feet above the power lines to attract lightning strikes so they could be fed to the ground through the transmission line towers.

Another device was planned to protect the Boulder Dam line, too. It was a “disconnect switch,” the largest ever built up to that time, that would break the circuit if it became overloaded. When the first of 36 such switches to be built was shipped to Stanford and subjected to high voltage, it withstood nearly three times the voltage that the Boulder line would carry.

Surprisingly, gale-force winds were not as much of a concern as gentle breezes of a few miles an hour. Blowing regularly, day in and day out, they would set the cables vibrating, until eventually the metal crystallized and the cables broke.

The Ryan Lab experts built a wind tunnel outside the building to test various cable designs until they found which designs suffered the least damage. They also improved upon the damping devices that were hung on power cables to reduce wind-caused vibration.

Even these accomplishments do not suggest the full drama of the work that was carried out at Ryan Lab. Prof. Theodore Geballe, director of the Center for Material Research at Stan-



Battery of six huge transformers which, when "souped up," develop a voltage of 2,400,000. To get an idea of the size of these transformers, note the men at the left.

ford, was asked about the laboratory recently. "When I was a kid," he said, "my mother took me to the Ryan Lab. I remember seeing them make electricity." Illustrated articles in the Stanford Archives capture some of Professor Geballe's excitement.

Frank J. Taylor, a widely-read journalist who wrote frequently about Stanford, published an article in the *Stanford Illustrated Review* about the lab during the early 1930's called "Harnessing High Voltage." Here is how he described the test of the giant disconnect switch for the Boulder Dam line:

They connected [the switch] with the high-voltage transformers and turned on the power.

As the voltage rose, with a hum mounting to a growl, sprays of corona spurted from the switch arm. Suddenly, with a crackling, blinding flash, a terrific ten-foot chain of lightning burst around the insulators. The arc-over was repeated time and again. It was good for 830,000 volts under normal operating conditions.

Another article in the *Stanford Illustrated Review* for October 1926 described a demonstration for visitors when the lab was first opened:

The pitch-dark laboratory has all the atmosphere of a seance chamber as [the] experiment begins.

Two brass plates, suspended from the rafters and resembling tarnished suns, are now taking on halos of light to the accompaniment of sputter and roar.

[As 2,100,000 volts are reached] the laboratory becomes a dark sky threaded with livid branches of lightning and the tumult is as of thunder.

Inside and out, Ryan Lab looks like a hangar for a small dirigible. It is 173 feet long (more than half the length of a football field), 60 feet wide, and 65 feet tall. When Taylor saw it, six mammoth transformers sat on the floor of the building. Each was roughly 10 feet tall and 6 feet in diameter.

Some stood taller than that because they rested on top of large cylinders of insulating material. Three floor-to-ceiling doors, each 40 feet wide, could be opened on the wall away from Stanford Avenue, facing Page Mill Road.

Two motor generators were housed in the two-story structure that looks like a lean-to on the Stanford Avenue exposure. At one end, four high windows face to the northwest and now provide good light for Professor Oliveira when he is painting. He says his studio was once the lab's machine shop. Oliveira will move out when the University has constructed the first of the new artists' studios planned for a site between the student astronomical observatory and the Stanford Golf Course. "It's been beautiful, but it's time to move," he said.

Today there are few reminders of the laboratory's glorious past. I was able to look around with the help of Lee Morgan of Operations and Maintenance, who took me inside. Used furniture is in piles on the main floor. I climbed the metal stairs to the walk half way up the wall, but I did not want to climb to the catwalk that still goes part way across the roof inside.

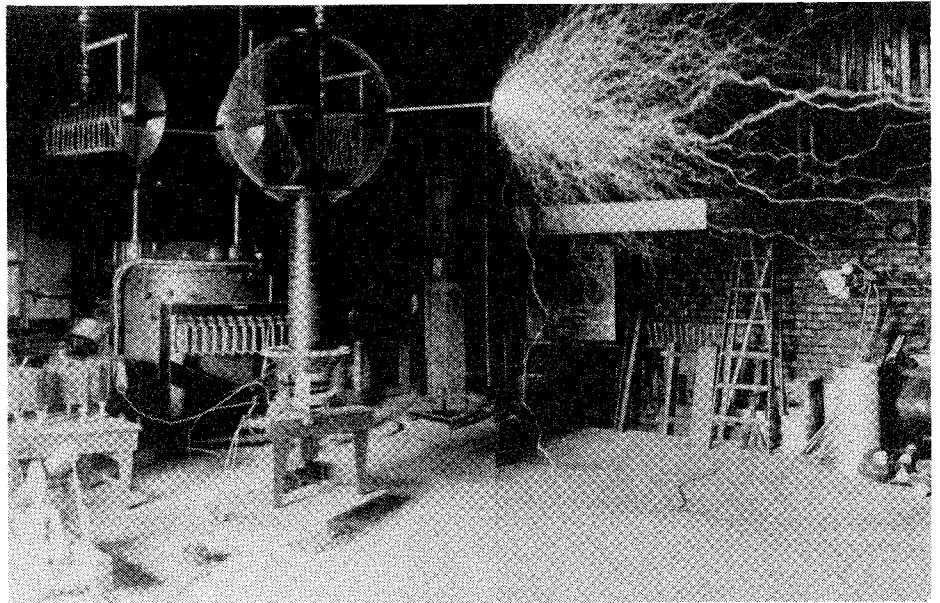
Sitting like a gun emplacement on the main floor is a concrete tank that once housed a small nuclear reactor which the Department of Mechanical Engineering used for teaching about nuclear power in the 60s and early 70s. The fuel was moved out in 1973. The only other obvious evidence a layman can see of the nuclear energy days in Ryan is a battered sign on an office door that reads

Radiochemistry
Caution Radioactive Material

You can walk up the stairs to a sort of "control room" behind the reactor tank, but the windows were smashed by vandals at one time and you don't feel like staying in there very long.

From the walk behind the tank you can see the 40-foot tall doors, now closed, but which rattle in the wind, Morgan says. "It's like having ghosts in the building."

If there are any ghosts in Ryan Laboratory, let's hope they are happy ones, content with the remarkable work that was carried out there. And



Above, man-made lightning took many strange forms in tests. Below, 10-foot stack of insulators, with Prof. Ryan.

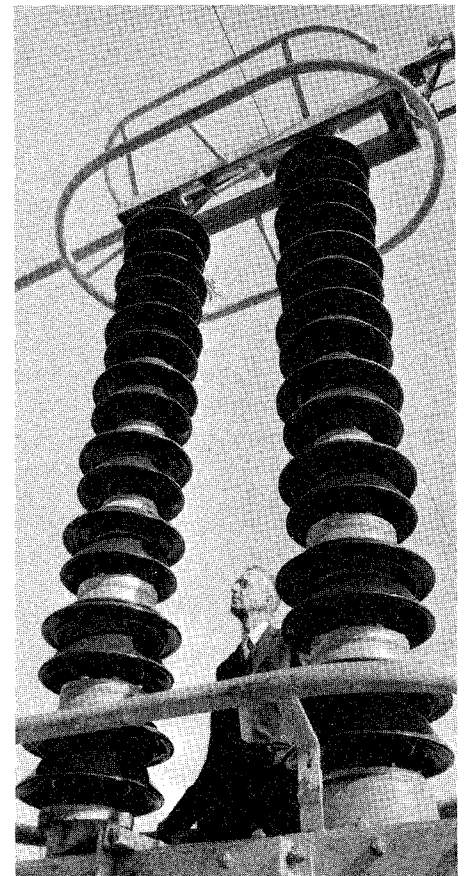
if they are like Professor Skilling, they will have no regrets when the big building is demolished. "I tried to find a use for it when I was head of department," he said, which was more than 20 years ago. "No, I can't feel very sad about that."

New housing

A 26-unit housing development for new Stanford faculty will be built on the site of the Ryan Laboratory after it is torn down (see adjoining story).

The new units, to be built as duplexes, are expected to be completed by September, 1989. They will be offered for sale to faculty who have been at Stanford three years or less. Extra units would be available for rent.

Total cost of the project is \$7,580,000.



Many of the facts for this article appeared originally in Frank J. Taylor's "Harnessing High Voltage," published in the Stanford Illustrated Review. The editors wish to thank the staff of the Stanford University Archives for making that and other material available, including the photos used here.

'Peter Grimes,' Jan Popper, and Stanford

By Peter Stansky

Some years ago I was doing research on Benjamin Britten, his early career, and most particularly the circumstances leading up to the first performance — in June, 1945 — of his first and perhaps greatest opera *Peter Grimes*. I had been asked to the Aldeburgh Festival, an annual event in Suffolk centered on the music of Britten, to give the first Prince of Hesse Memorial lecture. I was particularly pleased to have the opportunity to spend several days after the Festival working in the Britten-Pears Library, attached to the Red House, where Britten had lived and where his great friend and colleague, Peter Pears, still was residing.

I had no reason to think that there was any special connection between *Peter Grimes* and Stanford; hence I was fascinated to find a reference to such a connection in one document listing the early productions of *Grimes*: London, at Sadler's Wells, the world premiere on June 7, 1945; productions in Antwerp, Basel, Stockholm and the American premiere at Tanglewood, conducted by Leonard Bernstein in 1946; Berlin, Brno, Copenhagen, Hamburg, Milan and Covent Garden in London in 1947; and, in 1948, in New York at the Metropolitan on February 14, and then at Stanford.

Stanford! Naturally I was intrigued. And when the opportunity presented itself — not until some time later — I set about to discover more about these performances of *Peter*

Peter Grimes was the high point of Stanford's Opera Workshop when it was under the guidance of Jan Popper, who conducted the opera in its West Coast premiere on campus.



Grimes on May 27, 28, and 29, 1948 in Memorial Auditorium, a mere three years after it had first been performed. This was the first West Coast-originated production. (The Metropolitan had brought its touring version to Los Angeles a few weeks earlier.) What was the story of the performances at Stanford?

I discovered that the University, alas, had been rather erratic in its record-keeping. Neither the Music nor the Drama Department appeared to have its files for that period, and there was virtually nothing in the University Archives. Fortunately, some of the individuals who had been involved in the enterprise were willing to share their memories with me, and I had the pleasure of talking with Harold Schmidt, Leonard Ratner, Loren Crosten, George Houle, James Schwabacher, and Jan and Beta Popper. I am extremely grateful to them all.

The systematic production of opera at Stanford, though it continued for some years and is still done from time to time, was a direction not taken. There appeared to be a feeling

in 1940, when the Opera Workshop was established, that though Stanford was not then a topflight university in the sciences, it might distinguish itself in the performing arts and the humanities. *Peter Grimes* was the highpoint of the Opera Workshop in the period 1940-1949, when it was under the guidance of the conductor, Herbert Jan Popper, who died this past September 3 at the age of 79.

Jan Popper arrived at Stanford in 1940, having come to America as a refugee from Czechoslovakia. There he had been a conductor at the Prague Opera and taught at the Prague Conservatory. In America he became acquainted with a businessman interested in music, James B. DePrau, who told Lucie Stern, a Stanford benefactor, of Popper's need for an academic connection. It was she who brought him to the attention of the then-president of Stanford, Donald Tresidder. Popper was hired by the Music Department — more accurately the Music Division; it did not become a Department until the academic year 1947-48.

Quite soon he formed the Opera

Peter D. L. Stansky, Frances and Charles Field Professor of History, also is Associate Dean of Humanities and Sciences.

Workshop, which gradually evolved into a group that would do an annual opera production in conjunction with the Stanford Players from the Drama Department. The inaugural opera was *The Bartered Bride* by the Czech composer Smetana. With that production, a close collaboration began between Popper, as conductor, and F. Cowles Strickland of the Drama Department, who would direct the operas. In successive years, they were responsible for the Opera Workshop productions of such operas as *The Merry Wives of Windsor*, *The Magic Flute*, *The Beggar's Opera*, *Der Freischutz*. On the whole these were ambitious undertakings for a student group; interesting to do but not too far removed from the standard repertoire. Certainly the most unusual and ambitious undertaking of the Workshop under Popper's direction was *Peter Grimes*.

I had a delightful lunch with Jan and Beta Popper last June and have spoken to others about the production. As far as I've been able to discover, it was decided to do *Grimes* because Popper knew the opera and felt that it was worth doing. (Certainly its emphasis on the importance of the chorus made it appealing for a largely student group.) Set in early 19th century England in a seacoast village (Aldeburgh), the story tells of a fisherman, Peter Grimes, at odds with the community because of his individualistic ways in general, and in particular because it was thought he drove his apprentices too hard.

The opera opens with a short prelude, a coroner's hearing into the death of the latest apprentice. Although there is no finding against Grimes, he is instructed not to take another apprentice. Since he cannot fish without a helper, however, he chooses to ignore the coroner's instruction, and the opera proper deals with the arrival of a new apprentice, the boy's death in suspicious circumstances, and Grimes' suicide. The grim story arises out of the question of the relationship of the individual to society, and, as in George Eliot's *Middlemarch*, the town itself is a major character. Its continuity, like that of the sea, which is presented musically in the famous interludes of the opera, goes on no matter



PETER GRIMES

By BENJAMIN BRITTEN

Memorial Auditorium—Stanford University

8:15 P.M., MAY 27, 28, 29, 1948

what Grimes' problems were.

The difficulties inherent in the project did not deter Popper from the ambitious task of staging a virtually new opera that thus far had been produced nine times, only twice in America. The Opera Workshop had become more exciting as the war ended and the country's campuses, Stanford among them, were revived by the influx of veterans, anxious

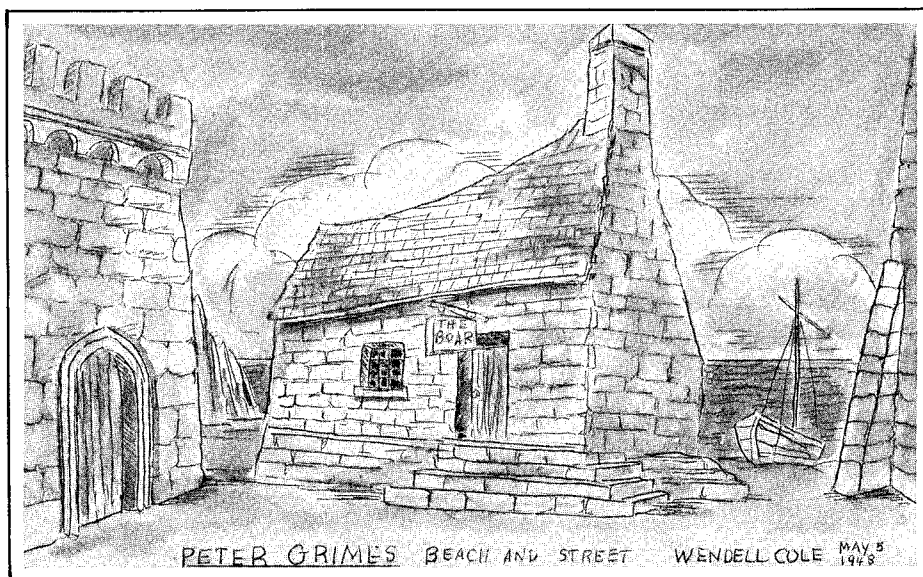
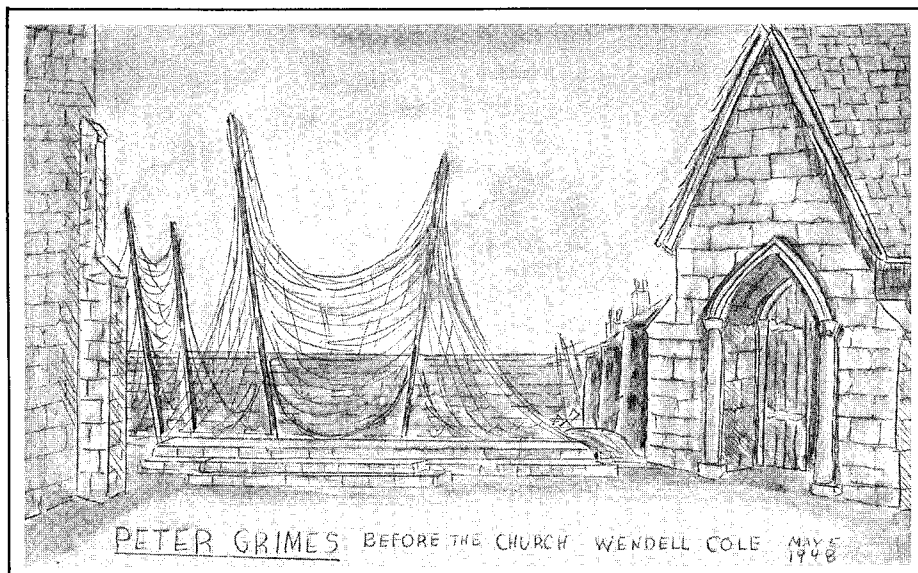
to acquire education and financed by the G.I. Bill of Rights. The Opera Workshop had not only regular Stanford students in the cast and orchestra, but also some players from Palo Alto. Leading roles might well be given to professionals or semi-professionals on the theory that it was a valuable experience for students to see and hear professionals at work and to participate in productions with them. Starting in January 1948 it was possible for up to 15 persons who satisfied an audition to register, on the payment of \$100, as extension students in the Workshop.

Who would staff and sing in the Stanford *Peter Grimes*? The production people were names of great and continuing familiarity to the University. Jan Popper was the musical director, assisted by Leonard Ratner, who conducted the backstage orchestra. The stage director was F. Cowles Strickland. Harold Schmidt, assisted by Herbert Nanney, conducted the chorus, and Schmidt played the rector, the Rev. Horace Adams. Wendell Cole designed the sets. Howard Ross, a Los Angeles singer and a member of the American Opera Laboratory



The stars of the opera: Marjorie Dickinson as Ellen Orford; Stanley Noonan as Capt. Balstrode; and Howard Ross as Peter Grimes.

Wendell Cole, emeritus professor of drama, was the opera's stage designer. He drew these illustrations of the sets especially for *Sandstone and Tile*.



there, was designated an artist-in-residence for the quarter and played the title role. He did extremely well, providing a more sympathetic interpretation than is generally found in American productions. (The two most famous interpreters of the role are Peter Pears, who sang it first; and Jon Vickers.) Stanley Noonan — who had sung a leading role in the touring company of *Up in Central Park* and has had a distinguished career singing at Temple Emanu-El in San Francisco — played Captain Balstrode, the retired skipper who is the voice of wisdom and good sense in the story — a role perhaps most famously interpreted by Geraint Evans. Marjorie Dickinson, active in previous operas,

played the leading feminine role, Ellen Orford, the schoolteacher who tries to befriend Grimes. She had been performing in a very successful offshoot of the Opera Workshop, an English version of Mozart's *Così Fan Tutte*, done far less frequently forty years ago than now. It had also starred James Schwabacher, a teaching assistant in the Music Department, who played Bob Boles, a fisherman, in *Peter Grimes*. Also in *Così* was Joel Carter, who sang Swallow the lawyer in *Grimes*. (Theodore Uppman was another of the young men in *Così*. Although not in *Grimes*, he would go on to a notable career, particularly associated with Britten. He sang the world premiere of the title role in *Bil-*

ly Budd at Covent Garden in 1951 and the American premiere in Chicago in 1970.) Beta Popper was also in *Così* and played the dreadful Mrs Sedley in *Grimes*. No doubt many would recognize names from the program; George Houle was in the orchestra playing not only the oboe but the English horn.

The performances at Stanford, presented by the Stanford Players and the Department of Music in May 40 years ago, were important not only in the musical life in the University, but also in introducing the work to the Bay Area years before it was performed by the San Francisco Opera. In the words of the *Daily Palo Alto Times* on May 14 it was "the most ambitious production ever attempted by Stanford." Rehearsals took place in Woodpecker Lodge, no longer in existence, then an abandoned gym. For the performances in Memorial Auditorium, there was a 54-piece orchestra made up mostly of students but with some local musicians, as well as a few professionals. The chorus, almost all students, had 43 singers. The three performances were sold out (all seats cost \$1.20) and a thousand were turned away from the first performance.

The production received excellent reviews. Marguerite Slater wrote about it in the *Palo Alto Times*: "It was the sort of production that leaves one speechless with wonder and excitement. The Metropolitan Opera Company, with its top professionals, la-

bored over the prodigiously difficult score for four months. The Stanford music and drama departments, with a cast and chorus drawn almost entirely from the student body, have succeeded in mounting this opera with a style and sparkle that challenges comparison with the highest standards of artistic production. . . . Jan Popper has done a tremendous job holding the colossal project together. . . . Stanford is very fortunate indeed to have a man of his calibre to carry through to a rousing success this ambitious and rewarding undertaking."

The *Chronicle* ran its review by music critic Spencer Barefoot as a news story, on the first page of the second section. "Stanford University . . . has just produced [its] greatest musical and dramatic success. . . . Popper led his musicians through the tortuously difficult Britten score with a certainty, a spirit and a musicianship that left you filled with admiration, excitement and no small amount of wonder." Alexander Fried, in *The Examiner*, while somewhat muted about the opera itself, was extremely enthusiastic about the production. It was particularly striking that two Los Angeles critics came to Stanford to see *Grimes*. Mildred Norton in the *Daily News* was very positive about all aspects of the opera. Albert Goldberg, the well known music critic of the *Los Angeles Times*, began his review by pointing out that it was unusual for a critic to travel 500 miles for a performance. And, as in the other reviews, there was great praise for Popper, Strickland, and Cole for his "distinct improvement on the Metropolitan mounting."

The most dramatic testimony to the impact of the performance was the decision to perform it for one night at the San Francisco Opera House. Apparently Robert Watt Miller, the president of the San Francisco Opera, attended *Grimes* at Stanford and felt that it should come to the Opera House in the city. With a flexibility that is hard to imagine nowadays, the performance was arranged for June 29, sponsored by the musical impresario, Paul Posz. (There was a certain appropriateness in this considering that the San Francisco Opera had its start when Gaetano Merola produced

I Pagliacci, *Carmen* and *Faust* in the Stanford Stadium in June 1922.) The unions were cooperative, and some supplement of union employees in the stage crew and the orchestra was all that was necessary. A highly enthusiastic audience of 3000 was joined by the same critics who had seen it at Stanford and praised it again: Spencer Barefoot wrote that it was "one of the most exciting nights that house of music has ever witnessed." Marjory M. Fisher of the *San Francisco Call Bulletin* was equally praising: "Memory recalls no operatic performance which has gripped its audience with such intensity or been rewarded with so great an ovation as was 'Peter Grimes' last night." (There was no mention of the one mishap when the curtain went down in the middle of Act I at the end of the round "Old Joe Has Gone Fishing," but the music continued, and the curtain went back up.)

The production of *Peter Grimes* was a complete triumph and testifies in particular to the accomplishments of Jan Popper, Cowles Strickland, Harold Schmidt, Leonard Ratner, and Wendell Cole. It seemed to argue that there would be major new developments in music at Stanford, perhaps a four year opera school. All looked set for a dramatic new departure.

In March 1948 in *The Trumpeteer*, Jan Popper had written of his hopes for opera at Stanford. The Opera Workshop would provide students with "training in acting, foreign languages, English diction, fencing and body movement, and, of course, the necessary coaching in operatic roles."

The next year, in May, the Opera Workshop scheduled a production of Jaromir Weinberger's *Schwanda, the Bagpiper*, famous for its polka but rarely performed. Appropriately, it is a Czech opera. That production also was taken to the Opera House but was not the success that *Grimes* had been. It turned out to be the last opera production at Stanford under Popper's direction. He left that year to form an opera workshop at UCLA.

But in May 1948 he and all the many others who participated in the production of *Grimes* had made musical history at Stanford. A mere three years after *Grimes* was first presented, one of the greatest operas of the twentieth century had been brought to this University in an excellent production. It was a great feat of imagination and a considerable accomplishment to have done so before the opera had attained its present canonical status. It was a rare musical moment on the campus.

Hoover House to be quake-proofed

A second major campus building has been evacuated as an earthquake hazard.

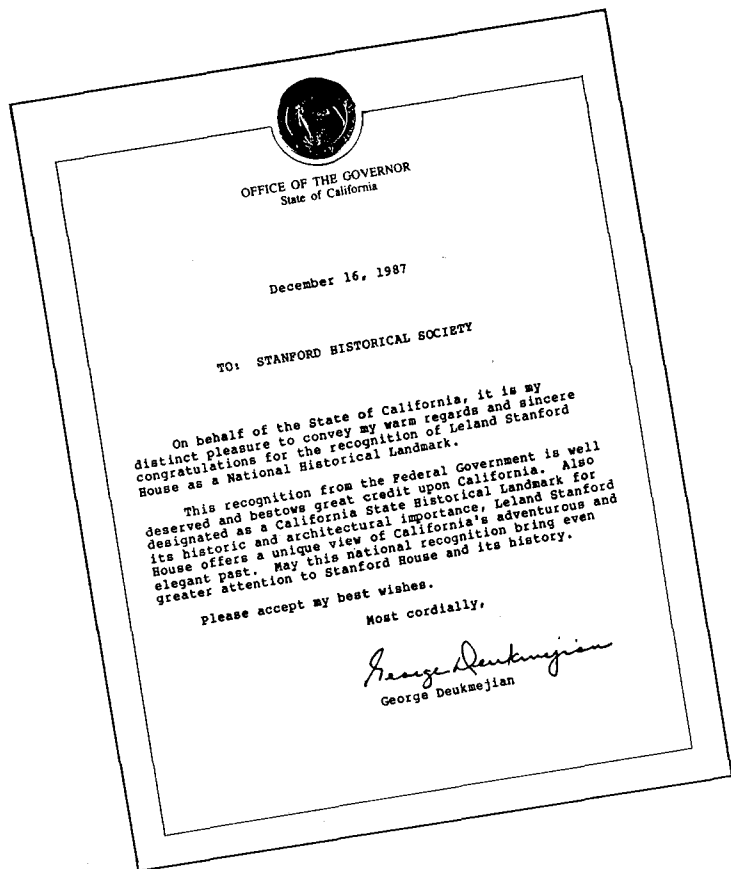
Lou Henry Hoover House, residence of President Donald Kennedy and his family, has been closed for possibly up to a year. The Kennedys are living elsewhere.

The Kennedys got the word Jan. 8, less than a month after Roble Hall's 294 residents were told their historic dormitory was unsafe (see earlier story in Fall issue). All of the students were re-housed elsewhere on the campus.

Records of both buildings showed similar construction — reinforced concrete with hollow tile walls. "In a major earthquake, [the tiles] would surely pop out," Birge Clark, the architect, wrote of the president's residence in his memoirs. The home was built for Herbert and Lou Henry Hoover in 1920.

Testing is being done to determine the future of Roble Hall. The president's house will be strengthened and reoccupied.

The Hoover House is a California State Historic Landmark and is on the National Register of Historic Places at the national level of significance.



A living museum

State Sen. Becky Morgan has proposed that the Stanford House in Sacramento should become a living museum where California's governor could entertain and house visiting dignitaries.

The 131-year-old house, just a block from the state capitol, is in the planning process for future total restoration by the Department of Parks and Recreation. Its official classification is Stanford House State Historical Park.

Morgan (R.-Los Altos Hills) said "California needs a Blair House and the Stanford House may just be that spot." Blair House, next door to the White House, serves a similar purpose in Washington.

California has no governor's mansion. Morgan said the Stanford House, which served unofficially as the governor's mansion in the 1860s, is "an American treasure and, more important, a California treasure."

Craig Hartzman, Gov. George Deukmejian's assistant for international visitors, said "We think this would be a perfect place" for functions held outside the governor's office.

Morgan acknowledged the work of Dorothy Regnery, a founding member of the Stanford Historical Society, who has been working since 1973 to save the house.

Parks and Recreation staff are working on a general plan for the house, which is expected to be completed by December. Then, according to Jack Harrison, chief deputy director of operations, funding will be sought "for restoration and future public use of the building."



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