SLAC BEAM LINE

If the Lord Almighty had consulted me before embarking upon
Creation, I should have recommended something simpler.
—*Alphonso X, King of Castile and Leon, 1221-1284*

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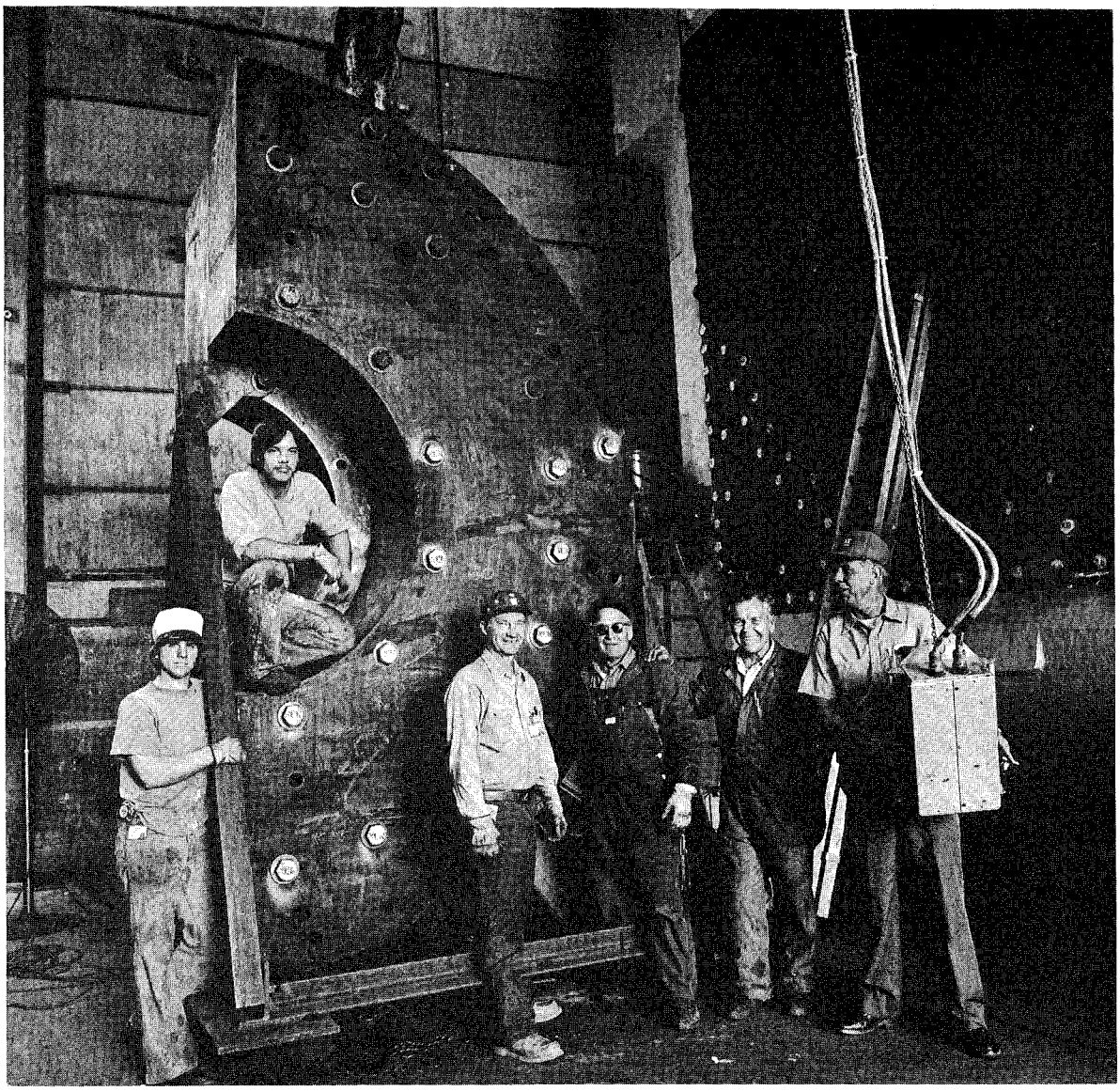


In This Issue

(Cover photo: see page 2)

CORNELL EVIDENCE FOR FIFTH QUARK

[Reprinted from *Science*, 5 September 1980]

The most widely held view among elementary particle physicists is that the fundamental constituents of matter are entities called quarks and leptons and that there are six varieties of each. The existence of four of the quarks is well established, whereas evidence for the fifth is incomplete and no sign of the sixth has yet appeared. At the 20th International Conference on High Energy Physics, held in Madison, Wisconsin, in July, physicists working at Cornell University's electron-positron colliding beam storage ring, CESR, presented evidence that should nail down the case for the fifth quark, provided that additional substantiating data are obtained in the next several months. Physicists give quarks whimsical names. The first four are called up, down, strange and charm quarks; the fifth is the bottom or b quark, and the sixth, if found, would be the top or t quark.

Physicists believe that quarks never occur as free, isolated particles but only in combination with other quarks. The particle detected at Cornell was therefore not the bottom quark itself but a meson consisting of a bottom quark and a second quark of another variety, probably an up or down quark. (Quarks also occur in combinations of three to make up the heavier subnuclear particles such as the proton and neutron, which are called baryons.) Discovery of the B meson was not at all unexpected and, in fact, high energy physicists generally assumed that it would be found at Cornell because CESR provides collisions of just the right energy to produce the particle. It may be a year or more before experimenters can collect enough data of the type needed for detailed analysis of the properties of the B meson and thereby be certain of their finding.

Cornell's storage ring was completed just over a year ago. At that time, groups working at the Fermi National Accelerator Laboratory near Chicago and the Deutsches Elektronen-Synchrotron Laboratory in Hamburg, West Germany, had already established the existence of the upsilon family of particles which they conjectured to consist of a bottom quark and a bottom antiquark bound together. Confidence in this interpretation was buoyed by the strong similarity between the family of upsilon particles and the exhaustively studied family of psi particles known to consist of charmed quark and antiquark pairs. But the bottom character could not be directly verified because its appearances in the quark and antiquark cancelled out each other.

In January of this year, two groups working at Cornell (one consisting of researchers from Cornell, Ithaca College, the University of Rochester, Rutgers University, Syracuse University, and Vanderbilt University; and the other consisting of investigators at Columbia University and the State University of New York at Stony Brook) confirmed the existence of the three upsilon particles found earlier. Then in April, the two Cornell groups announced the discovery of a fourth upsilon at a still higher energy. The fourth particle had a much shorter lifetime than the other three, indicating that it was decaying rapidly by a pathway forbidden to the others. By analogy with the charm quark system where the same pattern occurred, the investigators reasoned that the fourth upsilon was energetic enough to decay into two B mesons, one containing the bottom quark and one containing the bottom antiquark. The first three upsilons presumably did not have enough energy to create the extra up or down quarks needed for the creation of the mesons and therefore decayed by another mechanism in which they were transformed into other varieties of lighter particles.

Since April, the investigators have been analyzing their data for evidence to support this proposition. According to Edward Thorndike of Rochester, one telltale sign of bottom quarks was the presence of leptons (electrons and muons) among the decay products. Karl Berkelman of Cornell, who reviewed the results from CESR at the conference, said the mass of the B meson is between 5.18 and 5.28 billion electron volts (GeV) and its lifetime is less than 3×10^{-11} second, in agreement with theoretical predictions.

This is not the first report of finding the B meson. Last summer an international collaboration working at the European Organization for Nuclear Research (CERN) near Geneva said it had evidence for the particle in experiments with CERN's largest accelerator, a proton synchrotron. During the next several months, the group increased its amount of data by a factor of 4, but the signal for the B meson had disappeared. In the Cornell case this is not likely to happen. A real effect has been observed; it is only the interpretation that is not yet ironclad.

—Arthur L. Robinson

Cover photo: IR-6 Coordinator Jim Nolan (far right) and his coworkers (L to R: Craig Walsh, Greg Black, Bob Brown, Jake Jacobson and Les Rice) pause before installing the last piece of iron in the 2000-ton magnet of the HRS facility at PEP. With the iron assembly now complete, the HRS collaboration (Argonne, Indiana, LBL, Michigan, Purdue, SLAC) will install the shower counters, map the magnetic field, and install the drift chambers. The detector is expected to be ready for installation in PEP this spring. The photo was taken by Joe Faust.

—Steve Gray

JOHN HIRST: 1919-1980

On October 5, 1980, we lost a very good friend and coworker, John Hirst. About five months earlier, it was discovered that John had lung cancer, but a subsequent operation and radiation therapy did not arrest the disease.

Little is known about John's background because he preferred not to talk about his early life. We know he was born in Pennsylvania and graduated from high school in Philadelphia. He served proudly in the Marine Corps during World War II and the Korean War. His education included courses in various Navy schools, in aeronautical engineering at the University of Minnesota, in psychology and teaching at New Jersey State Teachers College, in salesmanship and marketing at Northwestern University, and in electronics at Foothill College.

John joined SLAC in 1965, first working for "Shorty" Frietas in the Electronics Fabrication Shop. About a year later he transferred to the Accelerator Electronics Maintenance Group at Sector 10. This was followed after another year or so by a transfer to the Thyratron Tube Test Facility in the Test Lab, where John had since been responsible for the testing of thousands of the large thyratron tubes that are the heart of our 250 main modulators.

John's interests included photography, hiking, hunting, fishing, boating, camping, gardening and cooking Chinese dishes. Next year John would have been 62, and he was planning to retire and live on property he had purchased in Hawaii. We are saddened by his untimely passing. He will be missed by his many friends here at SLAC.

—Carl Olson

DONNA WIGHT LEAVES SLAC

Since February of 1978 Donna Wight has added a unique sparkle to the Plant Office. Many people have depended upon Donna to do everything from issuing keys to getting black widow spiders killed. Donna's unfailing courtesy, good cheer and common sense have greatly enhanced the services rendered by the Plant Office, and she will be sorely missed by many people here at SLAC.

Donna is leaving to accept new responsibilities as Subcontract Secretary at Acurex in Mountain View. She goes with our good wishes for her continuing success, and she leaves behind a record that will be hard to equal.

—Carol Heineman

GAO CHONG-SHOU RETURNS TO CHINA

Gao Chong-shou of the SLAC Theory Group returned to the People's Republic of China on September 20. Dr. Gao had suffered severe head injuries in a bicycle accident near the SLAC entrance on Sand Hill Road on the evening of July 31. He was hospitalized for more than six weeks at Stanford Hospital for treatment of multiple skull fractures and paralysis.

Throughout his hospitalization, the local community of PRC scholars took 12-hour shifts and maintained an around-the-clock vigil at his bedside. Their presence was invaluable to the medical staff, especially in the early critical days after the accident, when Dr. Gao temporarily lost his ability to speak English. Dr. Gao's wife, Cie Bai-qing, came from China to be with him during the latter part of his hospitalization. Her trip was sponsored jointly by SLAC and Stanford University.

Dr. Gao appears to be making a remarkable recovery. By the time that he and his wife returned to China, his mental faculties were completely restored, and he was walking with the aid of a leg brace and walker. In a recent letter he states that he is continuing his rehabilitative therapy, and that his health is improving every day. After several more months of therapy and rest, he hopes to return to SLAC to complete his visit to the Theory Group.

Dr. Gao, his wife, and the officials at Beijing University have all expressed their gratitude for the care he received after his accident. We look forward for his early return to SLAC.

—Nina Adelman

ANNUAL SLAC FOOTRACE

December 2 was overcast, cold and windy, with a threat of rain, but 65 hardy souls turned out for the ninth annual running of the SLAC footrace. This was the largest field of runners we have had since the race was inaugurated. The field included 40 men and 3 women from SLAC, as well as 18 men and 4 women from other parts of the local running community. Fortunately for the spectators, the skies cleared as the race progressed, and the runners crossed the finish line in bright sunshine.

The course is a little over 3.8 miles in length. The first finisher was Geoff Bodwin of the SLAC Theory Group in a time of 19 minutes and 19 seconds (19:19), a new course record. Eve Kovacs, also of the Theory Group, was the first SLAC woman to cross the finish line. (Perhaps the theorists ought to challenge the experimentalists to a footrace instead of a softball game next year.) Vivian Soderholm-Difatte was the first woman finisher in a time of 25:33.

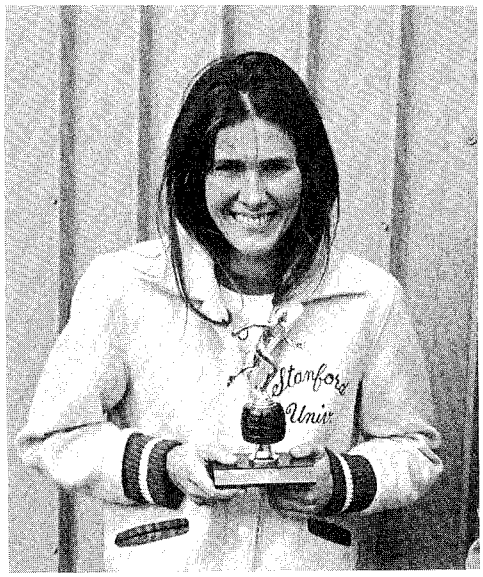
The race committee wishes to thank the SLAC Amateur Radio Club, who manned communications posts along the course, and also the other volunteers who helped with registration and officiating to make the event a success.

The accompanying photos were taken by Fran Unze and Joe Faust.

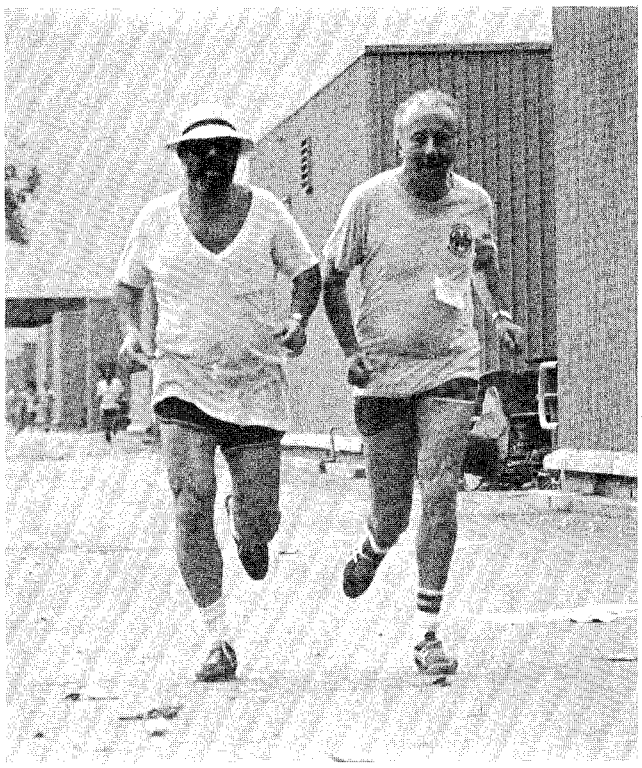
—Herb Weidner, Tom Knight, Ken Moore

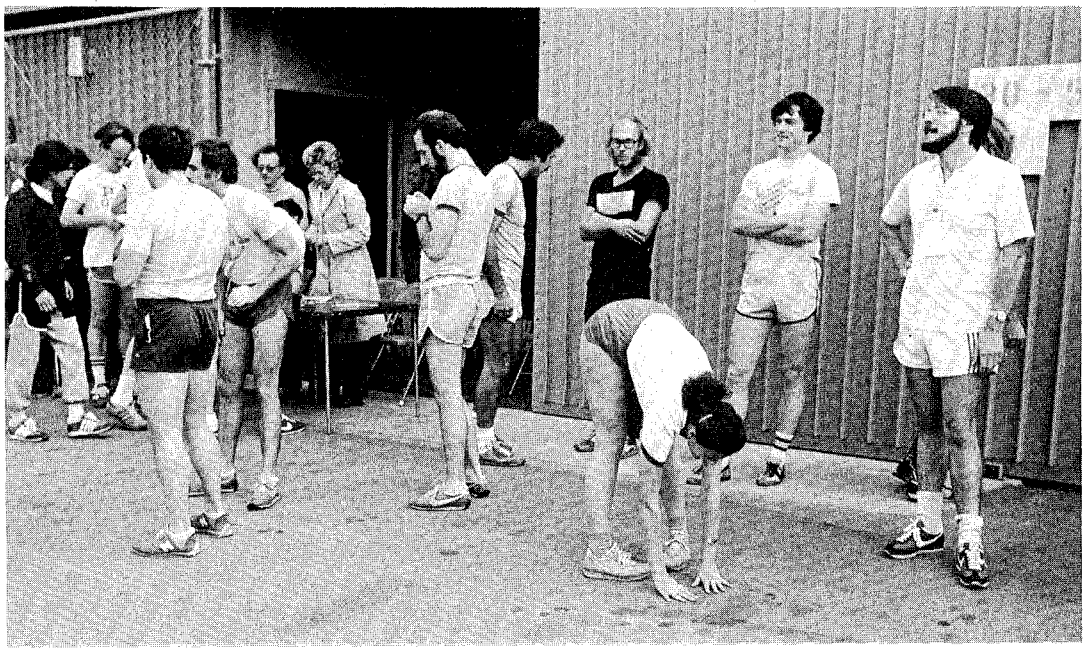
RACE RESULTS

Place	Time	Runner
1	19:19	Geoffrey Bodwin
2	20:02	Scott Kinzy
3	20:27	Weston Press
4	20:44	Eron Flory
5	21:13	Ron Batie
6	22:01	Joe Quesada
7	22:44	Frank Smith
8	24:23	Rudy Maldonado
9	24:26	Palmer Pinnen
10	24:55	R. Cottrell
11	25:02	Bill Moss
12	25:05	David Bostic
13	25:07	Steve Rock
14	25:09	Todd Curry
15	25:14	Brian K. Hentsley
16	25:18	Ron Sax
17	25:21	Al Lisin
18	25:32	Carlos Ramirez
19	25:33	Vivian Soderholm-Difatte
20	25:44	Ray Mason
21	26:07	Paul Zorabedian
22	26:08	Robert Hettel
23	26:20	Ed Schulte
24	26:39	John Rowlands
25	26:40	Ken Moore
26	26:47	Judd Henson
27	27:06	Herb Weidner
28	27:13	Kim Bloomfield
29	27:20	Zenon M. Szalata
30	27:28	Pat Banglos
31	27:36	Jon Garfield
32	27:51	Bernard Stevens
33	28:00	Bob Gex
34	28:01	Harold Hanerfeld
35	28:02	Mary Dageforde
36	28:03	Peter Bosted
37	28:08	Mike Frankowski
38	28:24	Matt Allen
39	28:24	Herman Winick
40	28:46	Yoshinobu Unno
41	28:48	Jerry Ehlers
42	29:02	Joe Polchinski
43	29:16	Don Groom
44	29:18	John Brown
45	29:18	Steve Mac Kenzie
46	29:22	Joe Faust
47	29:24	Ken Witthaus
48	29:45	Eve Kovacs
49	30:09	Steve Leffler
50	30:11	Peter Gallego
51	30:17	Stephen John
52	30:19	Forentino Deguzman
53	30:27	Bob Adamson
54	30:30	Finn Halbo
55	30:36	Ed Tillmann
56	30:41	Charlie Hoard
57	30:53	Dan Wright
58	31:27	Bob Laughead
59	31:28	Harold Ito
60	31:58	(not identified)
61	34:07	Jan Adamson
62	34:10	Ronald Pacheco
63	35:07	Wilhelmina De Haas
64	37:09	Robert M. Fritts
65	41:25	Marie Nava



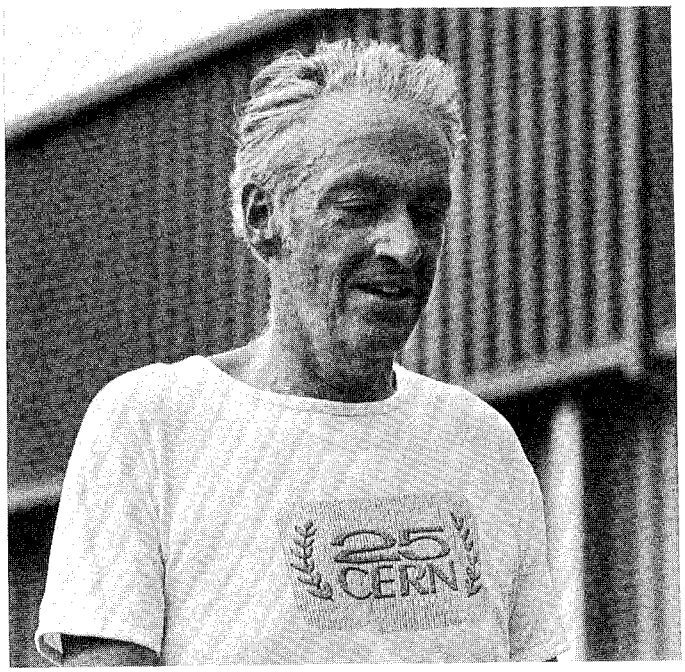
Above: Adele Panofsky and Geoff Bodwin
Left: Eve Kovacs
Below: Herman Winick and Matt Allen

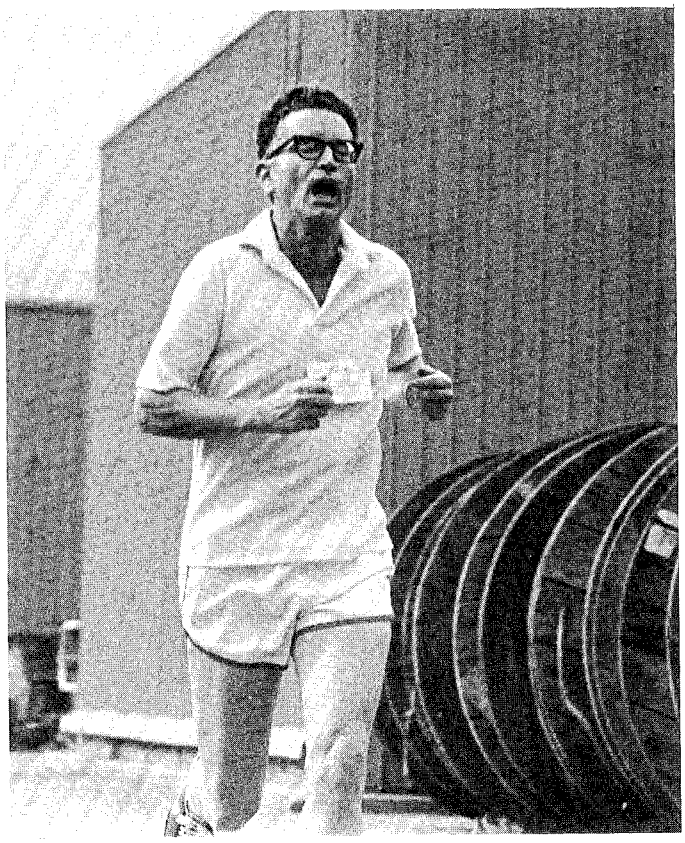


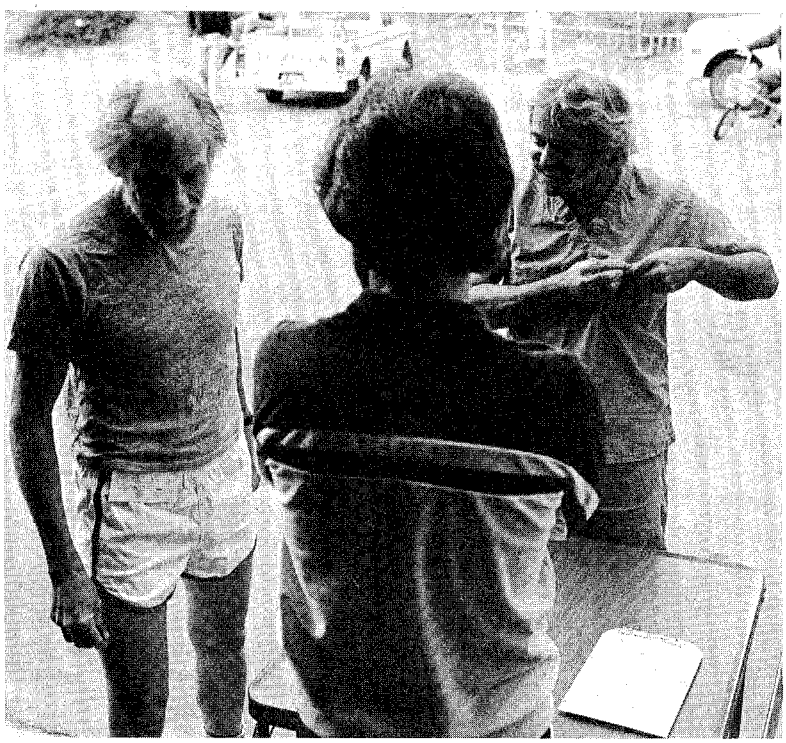


Below: Joe Faust

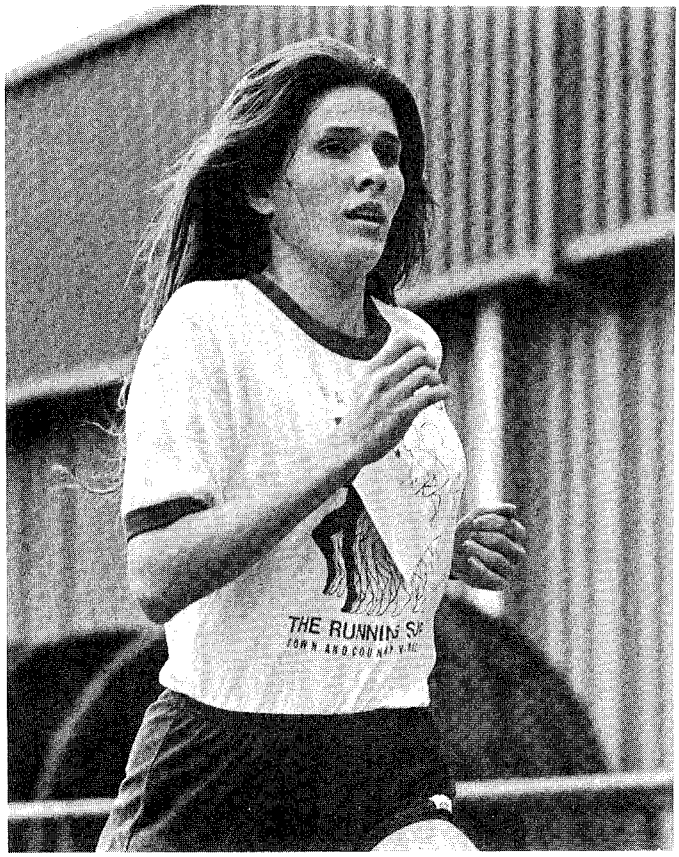
Right: Charlie Hoard

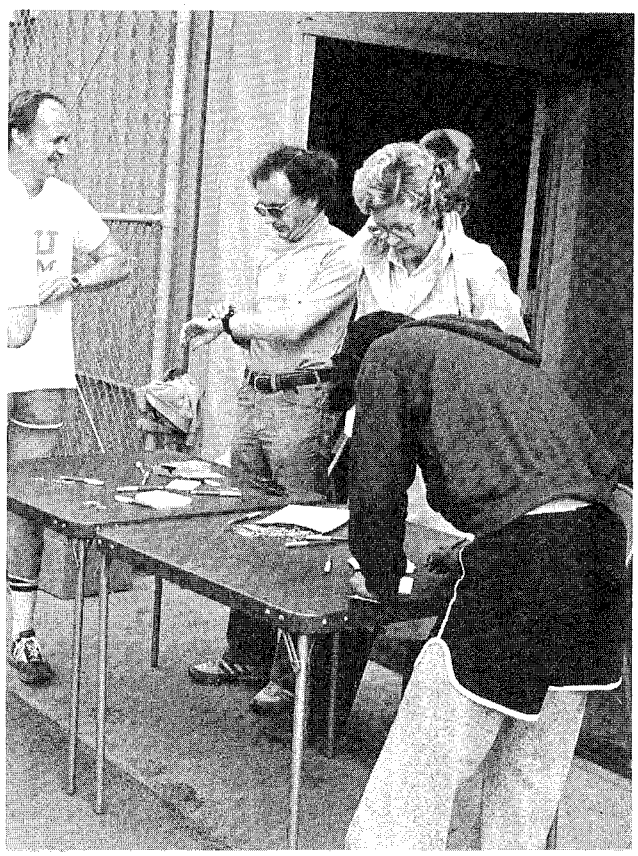






Upper left: Herb Weidner and Bob Adamson
Upper right: Scott Kinzy
Lower left: Vivian Soderholm-Difatte





TEN-YEAR SERVICE AWARDS

On November 5, ten-year service awards were presented to the following SLAC people:

Lester W. Alldredge	Rogelio A. Llampallas
Sal R. Alvarado	James D. McDonald
W. B. Atwood	Peggy A. Malley
John Broeder	Ken Martell
Barbara Brooks	Howard L. Martin
Harriet Canfield	Juan M. Miranda
Norman Chuck H. Chin	Ronald F. Pacheco
Johnnie B. Clarkston	Mary L. Parish
Percy M. Clay	Cliff Peek
Gerard J. Collet	Rhea D. Price
Aaron C. Coverson	Robert Roddick
Abel de la Cerda	Georgia Row
Al Gallagher	Erik A. Sorensen
James A. Hay	Marcy Stengel
Emmitt Henderson	Ralph E. Thompson
Larry Henderson	Alford O. Triplett
Beatrice M. Hull	Ilse Vinson
Casey James	James S. Wahl
Lucille A. Janasik	Calvin E. Williams
Jerry L. Jobe	Faye M. Williams
Lewis P. Keller	Charles R. Wilson
Philip Larrick	James L. Wright

BLOOD DONOR INFORMATION

On November 12, the Stanford Blood Bank brought their mobile unit to SLAC during the morning to receive donations. After four hours the total was 60 donors. This represents a 100% increase during the past two years. During this time, there has been a gradual transition from the Red Cross to the Stanford Blood Bank. This has proceeded quite smoothly. However, some questions have arisen concerning "credit" policy differences.

The Stanford Blood Bank is currently negotiating with Kaiser so that participants may credit one unit per year to a Kaiser account. There will be a credit system for other health plan participants which will allow the individual donor to direct each unit to any hospital in the U.S. that will take blood replacements. This policy goes into effect on January 1, 1981. The TakeCare program automatically enrolls participants in their Donor Club.

We will continue to have mobile units come to SLAC on a quarterly basis for the convenience of SLAC employees. The Stanford Blood Bank is scheduled to return to SLAC on the following mornings: February 24 and May 27, 1981.

The Peninsula Memorial Blood Bank will be at the Menlo Park Recreation Center between noon and 5:00 PM on the following dates: January 16, April 17, July 17 and October 16, 1981.

Whether individuals donate through Red Cross, Peninsula or Stanford is a matter of personal preference. It is recommended that employees schedule their donation times to coincide with the SLAC mobiles so that they can use this convenience when they choose.

If you have any questions regarding the various donation alternatives, or about receiving credits for hospitalization, please call Nina at ext. 3113.

—Nina E. Adelman
Blood Drive Coordinator

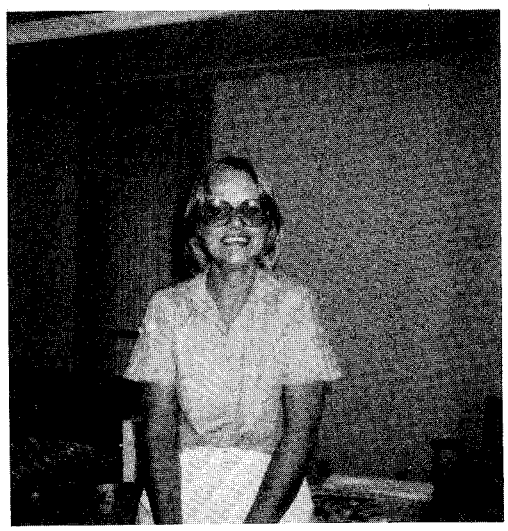
DOE OFFICE

With the completion of the PEP construction project, the Department of Energy will no longer sustain a full-time office here at SLAC. However, Stan Stamp of DOE will continue to be responsible for SLAC affairs, and he expects to visit here on a weekly basis. His present plan is to come to SLAC on Wednesdays, although this will vary somewhat depending upon specific meeting schedules. Stan's main office is now at SAN, the DOE's San Francisco Operations office in Oakland, and he can be reached at 273-7963. His SLAC extension and bin number remain the same as before.

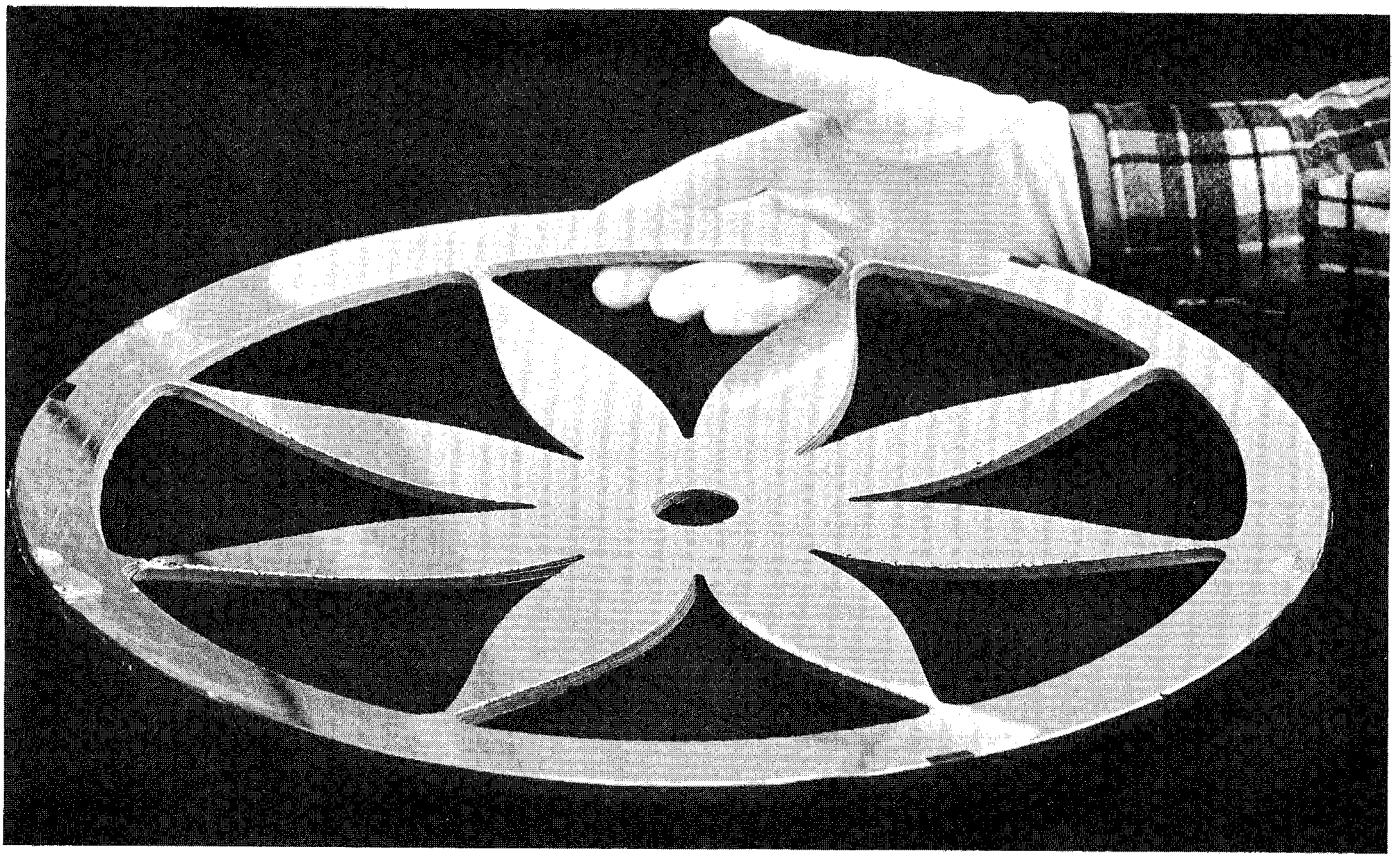
Clair Beighley is now responsible for the nuclear magnetic fusion program at the General Atomics Company. He will be relocating to the site office in San Diego.

Karen Anderson has accepted a position at the Electric Power Research Institute (EPRI) and is currently located at the Bayshore complex. The group working there will be relocating to the Hillview complex in the near future.

—Nina E. Adelman



Karen Anderson



FLOWER POWER

"Flower power" is the name given to a novel kind of Cerenkov counter invented by Professor Val Fitch of Princeton University. The name comes from the shape of an aperture mirror (shown in Joe Faust's accompanying photo) that is used in the counter.

Cerenkov counters have been used for many years to measure the speed of fast-moving elementary particles. A cone of bluish Cerenkov light is produced when charged particles pass through matter with a velocity that is greater than the velocity of light in that particular material. The cone of light is focused to a ring and is detected by photomultiplier tubes. The cone angle and the subsequent diameter of the ring of light give a measure of the particles' velocity.

Unfortunately, measuring the diameter of the ring becomes difficult and expensive when the particles to be measured are not all in a parallel beam. That's where "flower power" comes into play. Light rings of small diameter are mostly reflected by the mirror, whereas large-diameter rings mostly pass through the openings between the petals. The ratio of reflected light to transmitted light then gives a measure of the diameter of the ring and thus of the velocity of the particles. The advantage comes from needing only two phototubes, instead of many, to measure the size of the light ring.

The mirror shown in the photo was built by John Grant of SLAC for use in an experiment at Fermilab. The experiment is sensitive to detecting certain new heavy particles that may exist. Its success will depend upon how prolifically these new particles are produced (if they exist at all) and whether they live long enough to get to the detector. The experiment is scheduled to run during the coming year.

Al Brenner of Fermilab has seen the aperture mirrors that John Grant and Jack Schroeder of SLAC had previously built for the Single Arm Spectrometer at Fermilab. He called John to see if this more complex shape could be made. After consultation with Nick Vassallo of our Numerical Control Machine Dept., it was decided that there was a good chance the mirror could be made here.

John first shaped the glass blank to a graphite mold. The rough "flower power" pattern was then cut through by sand blasting. The blank was then turned over to the N.C. Dept. to have the final shape cut with diamond tools on the N.C. milling machine. After the final shape was cut, it was coated on the front surface with an aluminum reflective layer.

The mirror has now been installed in the counter and tested in a beam line at Fermilab, where it has performed quite well.

—Stan Ecklund

NEW PARTICLE IN PHYSICISTS' CRYSTAL BALL

[Reprinted from *New Scientist*, 23 October 1980]

A recent flurry of papers from the Stanford Linear Accelerator Center has announced the long-awaited discovery of a new particle called the eta$_c$ [η_c, pronounced "eta-see"]. This particle is a strongly-interacting meson, like the pion, and consists of a charmed quark-antiquark pair bound together, making it a close relation of the famous J/ψ particle which in 1974 provided the first evidence for the existence of charmed quarks.

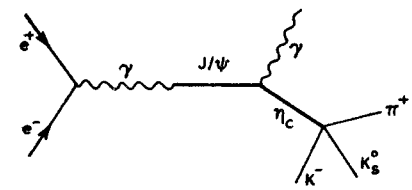
The difference is that in the J/ψ, the quark spins add up to give a total spin to the J/ψ of 1 (in units of Planck's constant, the quantum mechanical unit of angular momentum) and a mass of about 3.1 GeV (about 1 GeV is the mass energy of the proton). But in the eta$_c$ the spins are in opposite directions and cancel out, making it a spinless particle with a slightly lower mass.

The difference in the masses of the two particles represents the different energies of the respective quark configurations, and so provides a test of our ideas about the nature of the interquark forces. The so-called "charmonium" scheme summarizes the expected mass-energy levels of particles consisting of charmed quark-antiquark pairs in various spin and orbital angular momentum configurations. This scheme is like the energy levels of the hydrogen atom generated by the electromagnetic interactions.

One of the predictions of the charmonium scheme is that the eta$_c$ should have a mass of about 3.0 GeV. The detection of a candidate eta$_c$ state at 2.8 GeV by a group working at the DESY laboratory near Hamburg in 1977 caused some surprise as the mass difference involved was far too large to be accomodated comfortably within the charmonium scheme. So confirmation of the eta$_c$ has been keenly awaited.

The reaction in which the eta$_c$ can be observed is a two-stage process. First, an electron and a positron are made to annihilate into a photon loaded with just the correct mass-energy to allow it to transform into the J/ψ, and, secondly, the J/ψ may then decay into a real photon and the eta$_c$—which itself will then decay into other known mesons (see Figure). To discover the eta$_c$ it is necessary to observe the energy of the photon emitted in the second phase of the reaction. If one photon energy is observed more frequently than all possible alternatives, then a photon with that energy is taken as the signal of the decay, and the energy is taken as the mass difference between the J/ψ and the eta$_c$. Unfortunately, the experiment turns out to be difficult because the mass difference is so small that the resulting photon is difficult to detect.

The physicists at SLAC built a spherical detector to surround one of the collision points of the electron-positron storage ring SPEAR at the end of the linear accelerator to detect the eta$_c$. The Crystal Ball detector consists of an array of 672 sodium iodide crystals, each 40 centimetres long, mounted perpendicularly on the surface of a sphere of inner radius 25 centimetres.



An electron (e^-) and a positron (e^+) annihilate into a virtual photon (γ) with just the right energy for it to transform into the J/ψ meson. The J/ψ meson may then radiate a real photon and turn into its spin 0 counterpart the eta$_c$ (η_c). This new particle can then decay into strange mesons (K) and a pion (π).

The outside end of each crystal is viewed by a photomultiplier which can measure the amount of energy deposited in the crystal by the collision products. The purpose of the Crystal Ball is to achieve maximum angular coverage around the collision, together with an accurate measurement of the energies of the outgoing particles, especially photons (*SLAC PUB 2250* and *2530*).

The first achievement of the Crystal Ball was to disprove the existence of the the troublesome candidate eta$_c$ state from DESY. Next, a preferred photon energy was discovered implying the existence of the eta$_c$ with a mass of 2.98 GeV, in excellent agreement with the charmonium scheme. Once its mass was known, it became possible to investigate the decay products of the eta$_c$ (two strange mesons and a pion is one decay mode), and confirm that the total energy of these decay products is equal to the mass of the eta$_c$, thus establishing the particle's existence.

The discovery provides a reassuring indicator for physicists who believe that we are approaching a fuller understanding of the nature of the forces between the elusive quarks (*Physical Review Letters*, vol 45, pp 1146 and 1150).

We recently found that TIAA-CREF offers a service we hadn't heard about before. If you call (9) 800-223-1290, a recording will inform you of the latest CREF Accumulation Unit value and of the percentage of market value increase as of close of business of the previous day.

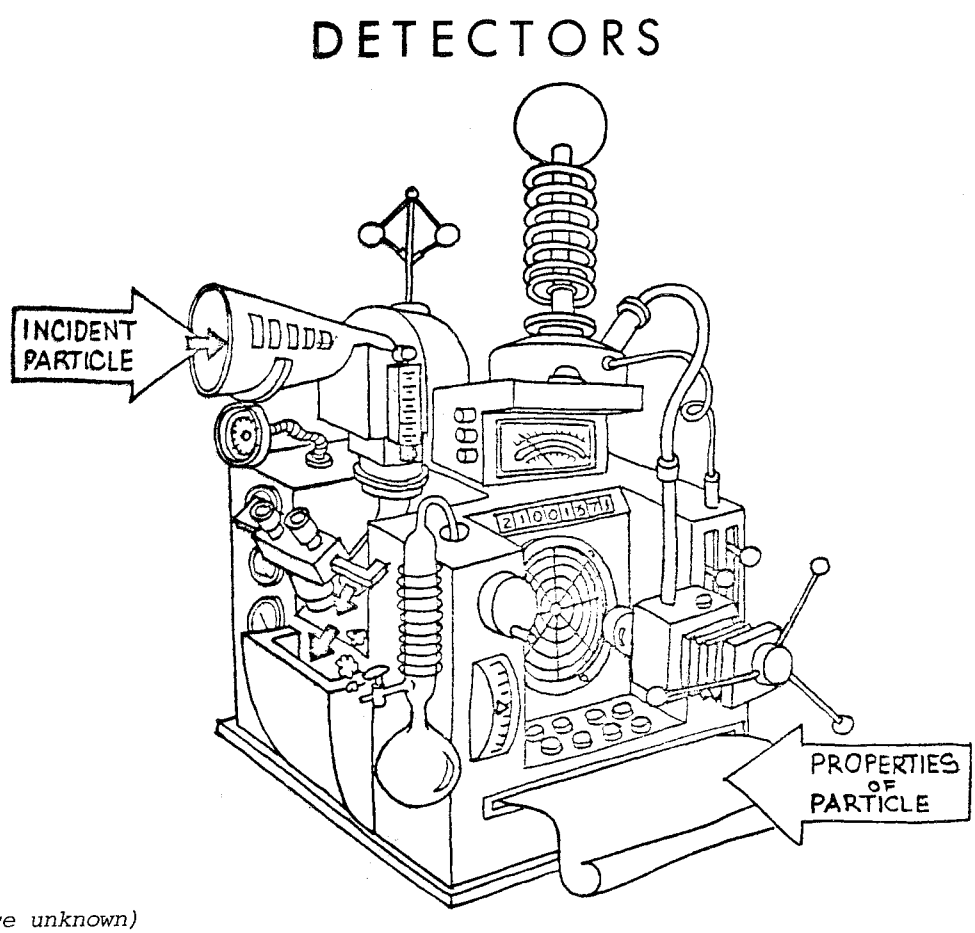
—Bernie Lighthouse

UC SANTA CRUZ: SCIPP GETTING OFF THE GROUND

After years of effort on the part of both physicists and the Campus Administration, the Regents of the University of California recently approved the formation of a new Institute of Particle Physics on its Santa Cruz Campus.

Acronymed SCIPP (the Santa Cruz Institute for Particle Physics), the new administrative unit builds on the strength of existing groups of theoretical as well as experimental particle researchers. Benefitting from its rare advantage of close commuting proximity to SLAC, the experimental group, started in 1970, has performed programs there on inelastic μN scattering, early charm searches in πN scattering, and dimuon production, all in collaboration with Experimental Group D at SLAC. In addition, a tagged photon scattering experiment was performed at Fermilab. The principal new enterprise of SCIPP is co-responsibility, along with SLAC Group D and groups from the Universities of Illinois and Washington, for the next generation SPEAR detector, called Mark III.

Senior fellows at SCIPP are theorists Richard Brower, Michael Nauenberg and Joel Primack; and experimentalists David Dorfan, Harmut Sadrozinski (visiting), Terry Schalk, Abe Seiden and Dennis Smith. Clemens Heusch is Acting Director. Serving on the SCIPP Advisory Committee are Geoffrey Chew and George Trilling, UC Berkeley; Sidney Drell, SLAC; Frederick Reines, UC Irvine; and Donald Osterbrock, Lick Observatory, UC Santa Cruz.



(Source unknown)

SERA AND THE WOLF

The SLAC Emergency Relief Association (SERA) was formed to keep wolves from doors. There are two basic questions: Is it really a wolf, or just a stray dog? And how big is it? The principal rules that SERA follows in answering these questions may suddenly be of interest to you someday.

First, SERA considers only members of the SLAC community. Second, it must be a real wolf —a real emergency, that is. People with financial troubles often find that food is the only flexible item in their budget, and postponing eating brings out a real wolf. What are the troubles? Illness or accident, especially with inadequate insurance; breakdown of the car that brings you to work; a funeral in the family; little problems that keep the rent or the mortgage from being paid; and so on.

Third, all other means of coping have been exhausted: credit unions, other loans, relatives, advances against salary, stretching out bill payments.

Fourth, the wolf must not have been invited. This rule generates certain taboos. SERA will not help with divorces, nor by buying personal property. And if someone applies to SERA a second time, he'd better bring a brand new wolf. (SERA's form requires a balanced budget to be shown for the future, so that if it is followed the original wolf tries another door.)

Fifth, SERA pays creditors, not the applicant.

All these rules don't make decisions easy. Some problems appear in many cases, and the rules don't always provide clear answers. Do people who can't or won't save up for a rainy day deserve the wolf? If the answer is yes, remember that for every size of door there is a larger size of wolf that may someday drop in.

Unlike most assistance organizations, SERA has no paid staff members, and no overhead costs. So where does the money come from? I'm glad you asked! From you, of course. Most SERA members use a painless payroll deduction, with $1.00 per month being the average contribution. A minimum deduction of 50¢ per month makes you a full SERA member, and you'll never miss it.

To join SERA, please use the form in the adjoining column.

—Charlie Hoard

SLAC EMERGENCY RELIEF ASSOCIATION

Use this form to join SERA or to change your payroll deduction to SERA. A deduction of 50¢ per month or more makes you a voting member. All contributions are tax-deductible.

Date: _____

I hereby authorize a payroll deduction of

_____ per month for the SLAC Emergency Relief Association until further notice.

Signature: _____

Name (pls. print): _____

Department: _____

Please send this form to Charlie Hoard, SERA Treasurer, Bin 70, SLAC.

I believe that this world is newly made: its origin is a recent event, not one of remote antiquity. That is why even now some arts are still being perfected: the process of development is still going on. Many improvements have just been introduced in ships. It is no time since organists gave birth to their tuneful harmonies. Yes, and it is not long since the truth about nature was first discovered, and I myself am even now the first who has been found to render this revelation into my native speech.

—Lucretius 99-55 BC
De Rerum Natura

SLAC Beam Line (Bin 80)
Stanford Linear Accelerator Center
Stanford University
Stanford, California 94305

Joe Faust, Bin 62, x2882 — *Photography*
Crystal Washington, Bin 68, x2502 — *Production*
Dorothy Edminster, Bin 20, x2723 — *Articles*
Herb Weidner, Bin 20, x2521 — *Assoc. Editor*
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	1-*24*	9-*3*	20-*32*	30-*46*	38-*3*	50-*18*	57-*29*	66-*16*	73-*13*	82-*9*	89-*14*	97-*91*
	2-*7*	10-*3*	21-*4*	32-*1*	39-*10*	51-*58*	60-*23*	67-*4*	74-*9*	83-*8*	91-*3*	98-*30*
	3-*6*	11-*15*	22-*15*	33-*27*	40-*107*	52-*19*	61-*20*	68-*10*	75-*3*	84-*9*	92-*2*	
	4-*19*	12-*115*	23-*23*	34-*4*	42-*12*	53-*47*	62-*35*	69-*54*	78-*26*	85-*27*	93-*0*	
	6-*18*	13-*29*	24-*18*	35-*10*	43-*30*	54-*0*	63-*15*	70-*1*	79-*94*	86-*6*	94-*33*	
	7-*2*	14-*4*	25-*3*	36-*17*	45-*1*	55-*46*	64-*19*	71-*26*	80-*7*	87-*16*	95-*36*	