

Women in Business: Special pull-out section

• **MENLO PARK** may start using a high-tech 'PhotoCop' device that automatically detects, photographs and cites speeders on downtown streets.

3

• **AUTO BURGLARS:** A growing number of auto break-ins has created a booming business for repair shops. Local experts tell how to avoid being the next victim.

10

• **JAMES FERGASON:** Menlo Park's pioneer in liquid-crystal display technology is recognized as a 'distinguished inventor.'

13



• **SUPER MOMS** who are also entrepreneurs: how they do it. Jan Earle hopes to start a support group for this rare breed.

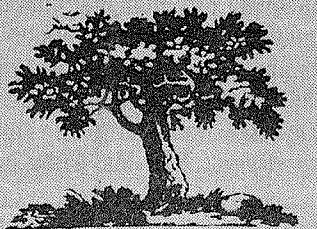
43

25¢

Continuing the Menlo-Atherton Recorder
hometown newspaper service for over 64 years

Controlled circulation postage rates paid
Redwood City and Menlo Park post offices.

Country Menlo Park's Almanac

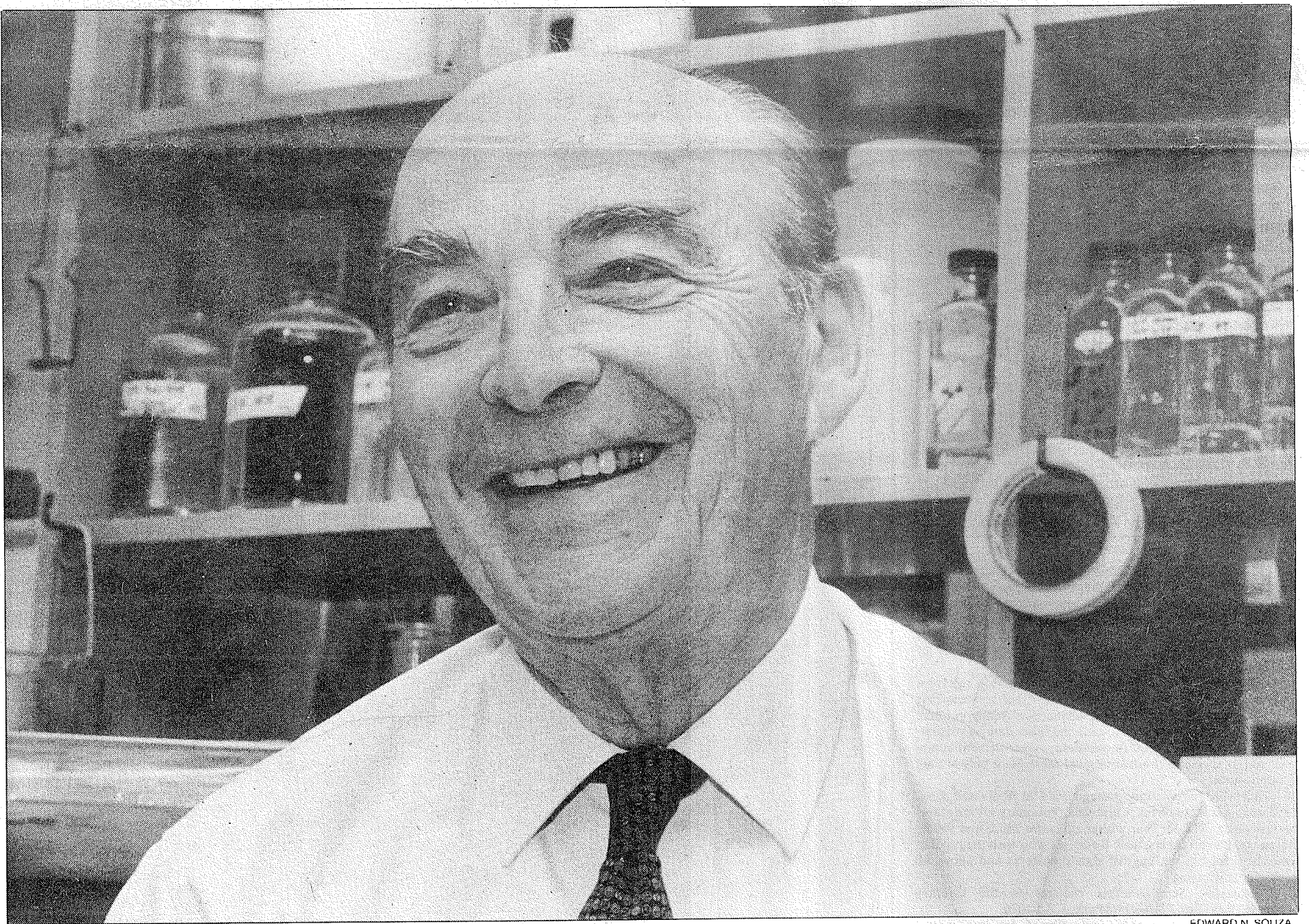


Vol. 67, No. 22 May 31, 1989

855 Oak Grove Ave., Menlo Park, CA 94025

Phone: 328-1600

Probing the chemistry of life



EDWARD N. SOUZA

ARTHUR KORNBERG of Portola Valley, 30 years after he won the Nobel Prize for DNA research, has written a book to tell both his personal story and the story of the biological revolution that gave rise to genetic engineering.

"For the Love of Enzymes: The Odyssey of a Biochemist," describes 40 years of research on the little "creatures" that make the processes of life work. For more on Dr. Kornberg, see page 17.

ARTHUR KORNBERG: ENZYME HUNTER

BY MARION SOFTKY

"I've never known a dull enzyme," says Dr. Arthur Kornberg.

Thirty years after he won the Nobel Prize in medicine, Dr. Kornberg is still in love with enzymes—the "wondrous" molecules that catalyze biochemical reactions and drive the functions of life. At 71 he is still working as a biochemistry professor at Stanford to advance the scientific revolution that was launched when he first manufactured DNA—the molecule of heredity—in a test tube.

Dr. Eric Shooter, a Stanford colleague and Portola Valley neighbor, says, "That experiment literally opened up the whole field of DNA. And since DNA is the stuff of life, you can see what an extraordinary achievement that was."

It was discoveries about enzymes that made possible the biochemical revolution that has given us genetic engineering and spectacular advances in medicine, agriculture, industry and the cure of disease. "Virtually all genetic engineering depends on enzymes to create and rearrange DNA into novel genes and chromosomes," Dr. Shooter says.

The very understanding of the age-old question—what is life?—is changing as a result of Dr. Kornberg's work. "We are coming closer to understanding life in chemical terms," he said recently during an interview at his hilltop home.

For more than 40 years, his research has relentlessly stripped the aura of mystery from the most fundamental processes of life, revealing marvelously intricate operations of enzymes and molecules that determine who we are and how we grow.

"Chemistry is rational; it's a universal language," Dr. Kornberg says. "It should be able to cope not only with metabolism—diabetes or atherosclerosis, disorders of that kind—but with human behavior and the working of the brain."

"This isn't pie-in-the-sky stuff. This is simply the steady effort to understand life in chemical terms."

Now Dr. Kornberg has written a book for biologists and the informed layman. *For the Love of Enzymes: The Odyssey of a Biochemist* tells both a personal and a scientific story.

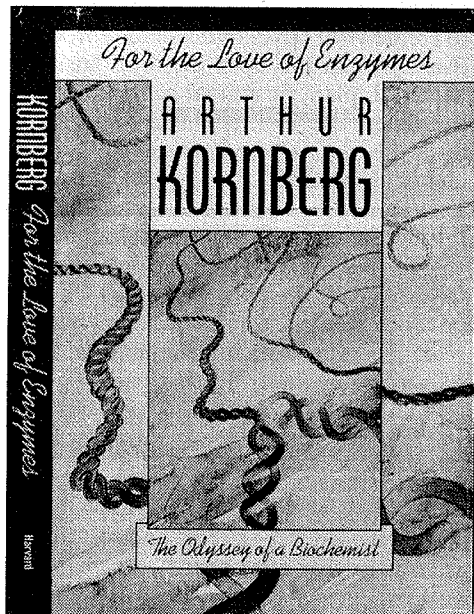
It is a tale of how the son of immigrant Jewish parents in New York grew to become one of the towering scientists of our time.

It is also the story of how biology progressed through a chain of discoveries from the pursuit of microbes and vitamins in the last century to the present manipulation of DNA to make new strains of wheat and cures for disease.

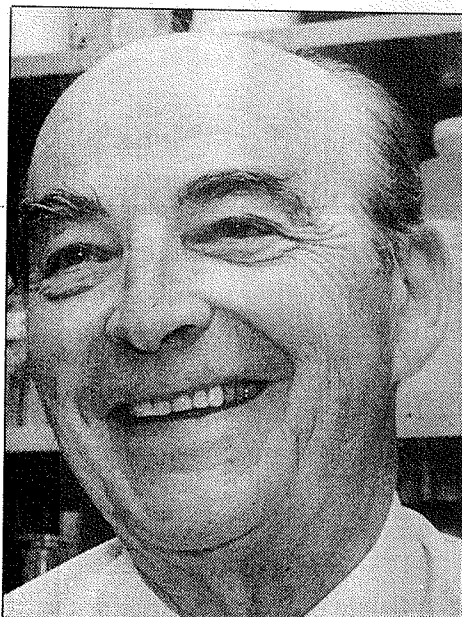
The book started as a personal project to share with his wife and colleague, Sylvy, during her final illness. "It was an exercise in recalling our scientific lives, which we shared," he said.

The illustrations of complicated molecular interactions were made by Dr. Kornberg's present wife. The former Charlene Levering is director of art and publications at Stanford.

Arthur Kornberg's is the classic American success story—only in science instead of business.



ARTHUR KORNBERG'S new book tells his personal story and that of the biological revolution that led to genetic engineering.



His parents both emigrated to New York in 1900 "to escape oppression and the bleak prospects for Jews in the small towns of Eastern Europe." His father, who had once managed a farm, labored in a New York sweat shop as a sewing machine operator. By such near-slavery he brought parents and relatives from Europe and later supported both them and his own growing family.

After his health broke, he and his wife opened a small hardware and furnishings store, and young Arthur helped wait on customers and maintain the inventory. Science was not part of his home life; he collected matchbooks.

A high school interest in chemistry carried Arthur—via a three-hour-a-day commute by subway—to the City College

of New York. "There were three Nobel Prize-winners in my class," he comments.

At college, too, he worked hard, earning \$14 a week as a salesman in men's stores. He saved enough to carry him partly through medical school at the University of Rochester, where he published his first scientific paper as a result of studying his own jaundice.

After a short stint as a ship's doctor in the Navy, Dr. Kornberg was called to the National Institutes of Health, partly because of his work on jaundice. There he studied nutrition in rats and became thoroughly hooked on research.

Dr. Kornberg became interested in the mechanisms by which enzymes use vitamins to catalyze the combustion of sugar in yeast and muscle. This com-

bustion then generates the energy which allows an organism—any organism—to grow and to work. "I fell in love with enzymes," he says.

Dr. Kornberg had become, as he calls it, an enzyme hunter. "I abandoned the animal nutrition laboratory when I realized that enzymes are the vital force in biology, the sites of vitamin actions, and the means for a better understanding of life as chemistry," he wrote.

After the war, Dr. Kornberg and his wife, Sylvy, learned biochemistry at New York University with Dr. Severo Ochoa, who later shared the same Nobel Prize for his synthesis of RNA, the carrier of the genetic message.

In 1953 Dr. Kornberg left his job as medical director at the National Institutes of Health. He moved his family, which now included three young sons, to St. Louis where he became chairman of the microbiology department at Washington University.

It was here that he did the work that led to synthesis of DNA and the Nobel Prize. At that time DNA—long, twisted strands of protein which carry the genetic code—had been identified but never made.

The research involved two of Dr. Kornberg's favorite "creatures"—the enzyme, DNA polymerase, and the bacterium, *e. coli*, which inhabits our intestines. Extracting the enzymes from the bacteria, one billion of which are smaller than a grain of sand, required incredible precision, skill and patience. "*E. coli* is a very impressive creature," he says. "It's been perfected over a period of some three billion years by trial and error. So it works."

In 1959, the year Dr. Kornberg won the Nobel Prize, he packed up his wife and three young sons and moved to Stanford to found a new biochemistry department in the medical school.

Most of his team at Washington University followed to create the nucleus of the biochemical revolution. In the next 30 years, Dr. Kornberg and his colleagues and students continued to unfold more and more of the secrets of the genetic code; they learned to use enzymes to manipulate DNA and RNA.

In his book he explains relationships that most people read about but few understand. "DNA and RNA provide the script, but the enzymes do the acting. For the cell, DNA is the construction manual, and RNA transcribes it into readable form, but the proteins, particularly the enzymes, carry out all the cellular functions and give the organism its shape."

In talking about DNA for the layman, Dr. Kornberg likens its functions to common mechanical devices. It reproduces itself; it proofreads what it has made and then corrects mistakes. Long molecules zip and unzip as on a molecular sewing machine.

In a 1967 breakthrough, Dr. Kornberg and his colleagues were at last able to assemble a chain of DNA identical to the DNA from a natural virus.

It was with a mixture of pleasure and

(Continued on next page)

What is it about enzymes?

Dr. Kornberg speaks about the molecules that make things happen in biological systems.

"Enzymes are extraordinary molecules.

"You take sugar. That sugar is going to sit there in that bowl as crystalline sugar for a thousand years. Take that sugar and mix it with an enzyme, and suddenly it becomes something utterly different. Take a step or two further with more enzymes, and you've got champagne or you've got bread or you've got life.

"So enzymes take molecules and direct them into being something that makes our lives possible.

"When you examine each of them, you find they are extraordinary creatures we still are so far from understanding. First of all, they will take a molecule apart or put two molecules together in an instant—and I mean a millisecond—that otherwise, left to ordinary physical forces, might take a thousand years and be done inexpertly.

"Secondly, they work as teams. As a team they make a cell operate so that

they not only do their individual thing, but they join physically together with other enzymes and carry out a whole assembly line of operations. They have a social as well as a catalytic face.

"In their catalysis they respond to signals in ways that make computers look rather feeble. They give signals that 'we've got enough of that; hold off,' or 'speed up because we need more of what you're going to do.'

"These are subtle but very decisive signals. And this is all within a molecule that you can synthesize.

"They have a three-dimensional shape with clefts and crevices, antennae derived from their amino acids that we really haven't fathomed. So within any enzyme there's a lifetime of study that can be very rewarding.

"You can be in awe of them, admire them, or simply ignore them. My concern is that students today pay less attention to them and are certainly not in love with them.

"I think it takes that kind of attachment to progress with any subject."

SHOP MENLO PARK

Raul's PET CENTER



SPECIAL ON IMPORTED JAPANESE KOI RESTOCK OR START YOUR POND

Large Koi 6" - 8"	1	\$19.50
reg. \$25.00	2	18.50 each
	3 or more	17.50 each

Scissors, Canine and Horse Clipper Blades Sharpened
Outdoor Pond Cleaning Service • Complete Pet Supplies
Grooming Service • Plenty of free parking

Tuesday-Saturday 8 to 5:30 • Monday 10 to 4
3401 El Camino Real, Atherton • 368-0284



Diet Ease WEIGHT LOSS CENTER

THE EASIEST Weight Loss Program Offers You:

QUALITY: All food made locally • Fresh frozen • Microwave ready • No chemical additives or preservatives

HEALTH: Low calorie • Low fat • Low salt • Choose from more than 60 delicious meals

SERVICE: Private weekly consultants • No group time-consuming meetings • Experienced friendly counselors

EASE: No meal plannings • No shopping • No cooking • Heat, eat and lose the weight • Ample parking • Credit cards

★ Partner/couple Discount Available
★ Short Term Program for 10 lbs. or Less

FREE: 21 MEALS

PRESENT THIS AD AND GET
One week of delicious food, FREE (\$59 value) when you join our Regular Annual Program • Good through 6/30/89

CALL NOW FOR YOUR FREE CONSULTATIONS: 324-0823
707 MENLO AVENUE, MENLO PARK

"GENERIC"

A Small Word That Can mean **BIG**
Savings For You On Many Prescriptions!

For information on our low prices call
GENERIC-ALEC PHARMACY

Serving Menlo Park Since 1962

324-1381

730 Santa Cruz Avenue, Menlo Park

Monday-Friday 9:30 to 6 • Saturday 9:30 to 5:30

Prescriptions • Vitamins • Health & Beauty Aids

Mastercard • Visa

**PRESCRIPTION PLANS: PAID RX • PCS • BLUE CROSS
PERSICARE • PCN • SECURE • HEWLETT PACKARD**

Kornberg

(Continued from previous page)

embarrassment that Dr. Kornberg greeted the announcement by President Lyndon Johnson: "Some geniuses at Stanford have created life in a test tube."

Was it really life? Well, sort of. Dr. Kornberg and associates had used DNA polymerase and a bunch of other enzymes to create viral DNA that would reproduce itself. Not in the open air, but "inside a bacterial, plant or animal cell, viral DNA can divert the host machinery into doing little else but making thousands of viruses identical to itself."

This discovery, and related ones to follow, led rapidly to the techniques of custom-building DNA molecules, which in turn led to "the most sweeping technical advance in the history of biology." Yet the scientists never anticipated the "tidal wave" of genetic engineering that came so fast and enveloped everything about us.

Dr. Kornberg's role in all of this? Dr. Shooter sums up: "What Arthur has been able to do is sense the important problems which needed to be solved and solve them year after year after year."

Dr. Kornberg's three sons have all built distinguished careers in the Bay Area and are still very close. Roger Kornberg is chairman of the cell biology department at Stanford. Tom Kornberg is a professor of genetics and biochemistry at the University of California at San Francisco. Ken Kornberg is not a scientist but an architect. He is a "guru of laboratory design," says his father proudly. He is also planning to build a home on a lot just below his father's that was bought with the money from the Nobel Prize.

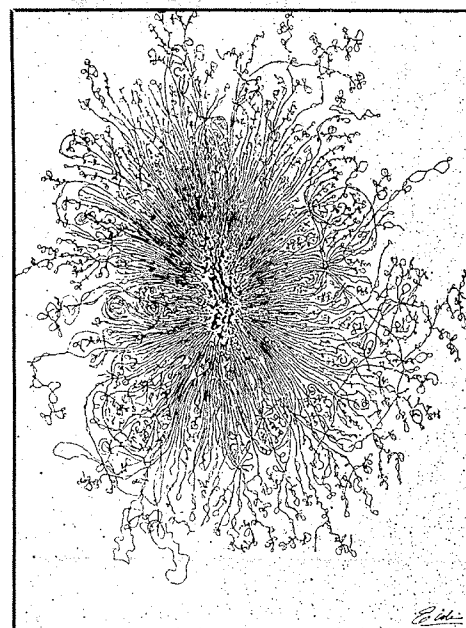
Possibly the greatest tribute to Dr. Kornberg as a scientist and as a man came on the occasion of his 70th birthday last year. Friends and colleagues organized a party and symposium in his honor in San Francisco. Of 154 graduate students and postdoctoral fellows who have worked with him over the years, 151 attended, says Dr. Shooter.

"It was a very happy occasion," says Dr. Kornberg. "These people have been part of a very impressive surge in medical science."

REFLECTIONS OF AN ENZYME HUNTER

After more than 40 years, Dr. Kornberg still speaks and writes about enzymes with love and wonder; he is still awed that their actions—"the basis of life"—have not changed over billions of years of evolution. "At these fundamental levels, there are few distinctions between a human, a mouse, and a yeast cell," he wrote.

His driving interest, which he pursues with single-minded focus, remains basic research. "What gives me the greatest pleasure is the search," he says. "The crusade for the cure of cancer or AIDS is not



THE CHROMOSOME of E. coli helped Arthur Kornberg make his world-shaking discoveries. (Electron microscopic view courtesy of Ruth Kavenoff.)

going to succeed unless there is knowledge of cells."

Reflecting on his amazing career, he says, "I am proudest of having remained a journeyman of enzymology, to have stayed with attention and devotion to this aspect of life and contributed along the way in a steady manner to advancing what we know about several different operations of cells."

"The revelation that the basic biochemistry of a cell is the same throughout nature is one of the great achievements of this century. I've enlarged that to show that it applies to genetic material."

Although he doesn't like politics and administration—they take too much time away from research—Dr. Kornberg has done his share of being department chief, serving on committees, and testifying before Congress.

Over and over he stresses that despite the advances in genetic engineering, basic research is still needed.

"Research is expensive, but disease is 10 or 100 times more costly," he repeats. "Instead of spending huge sums of money on defense against some theoretical enemy, why not spend it on defense against a real enemy like heart disease or Alzheimer's disease or AIDS."

"Many of the things that are used in cancer treatment, for example, come from understanding the pathways by which these (chemical) building blocks are assembled to make DNA," he explains. "The essence of cancer treatment is to prevent rapid growth of cells. Yet there's a narrow margin of safety between preventing healthy cells from growing and preventing cancer cells from growing."

Dr. Kornberg remains thrilled primarily by the search. "The more you probe, the more mysterious it gets. You don't know how these molecules work," he says. "Then you start speculating where it all started. The mechanisms of evolution are mysterious."



Space Planning □ Consultation □ Design
Sharon D. Kasser, Allied Member ASID
324-4194

AMERICORP

FINANCIAL GROUP
Americorp Securities, Inc. • Member NASD • SIPC

INVESTMENTS • LIMITED PARTNERSHIPS
VENTURE CAPITAL

H. Thomas Smullen, Vice President
2211 Camino A Los Cerros, Menlo Park

854-3061

JOAN PATCH INTERIORS

complete design services

Joan Patch, Allied Member ASID
By Appointment

854-0290