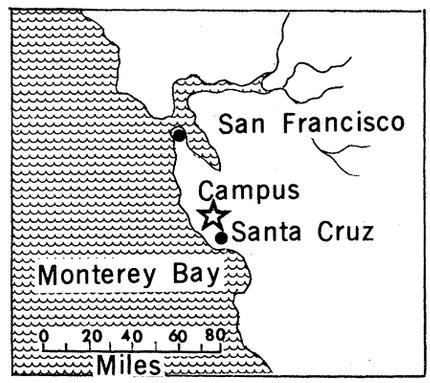
group, only to find that because of the lack of feedback the process is not self-supporting and self-strengthening. Obviously, we are much too far away from understanding the biochemical differences between the bona fide situation and the synthetic one to hazard any analysis of why one is constructive and the other destructive. The lesson from the hypothesis, however, is that unless we can provide the bona fide techniques of transition, unless we can provide the healthy addictions, disaster will eventuate. Individuals may stay too long in the multiple mode, where in addition to enjoying the rich variegation of the world of feeling, they will also substitute, permanently, the important irrational absurdities of politics, committees, and boards, for the discerning rationality that can exist only in the mode of the singular-man. Even if they do not become drug addicts, they are in danger of becoming habituated to the slap-happy excesses that are as valid for the multiple-man as are magnificence and grandeur.

It occurs to me as we explore, there are indeed many lonely souls trapped in the *second* mode, the mode of singular-man. I suspect that alcohol enables many of them to make the transition to the first mode of multiple-man. In the few days during which these ideas have been crystallizing, I have found them very useful in understanding the mysteries of the Iagos and the Judases; the astonishing number of small betrayals by men of honor; the eternal paradox of the politician as a man of honor at one moment and of low credibility at the next; the deadly conclusions of decent souls when they gather together to make decisions; the alternations between inspired insight and unbelievable stupidity of a handful of brilliant scientists en masse; the magnificent elation that we can feel together; the kind of transcendency that we can achieve when we are a group, and the evil that we can perpetuate—all this is an antithesis not between God and the devil, but between singular-man and multiple-man, both of which we are and between which we must learn early in life to migrate skillfully.

NEWS AND COMMENT

U. of California at Santa Cruz: New Deal for Undergraduates?



Santa Cruz, California. The opening of a new campus of the University of California here in the fall of 1965, less than a year after the beginning of student upheavals at Berkeley, seemed a limited but hopeful response to a desperate need. This new institution, designed to allow growth without loss of intimacy and to restore the undergraduate to first-class citizenship, looked like the answer to some critical problems of the "Multiversity."

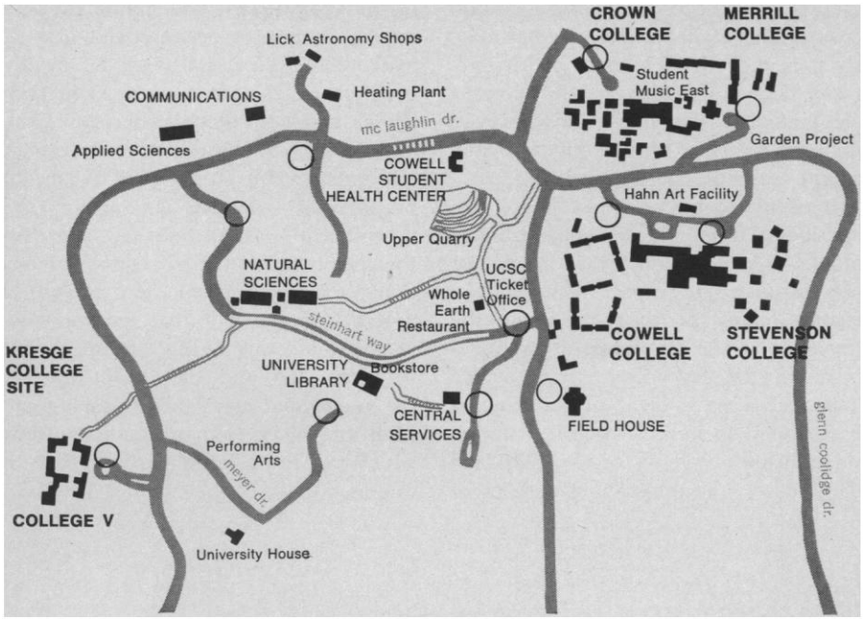
Today, only 5½ years since its birth, the University of California at Santa Cruz (UCSC) is still a fledgling. Already, however, if one may judge from only a brief visit, the Santa Cruz experience offers two important object lessons. First, it reveals that, regardless of the idyllic visions of campus planners, many students will spurn the living accommodations offered them unless these reflect the revolution in student tastes in such matters. Second, it shows that there is still no proven formula for breaking with academic tradition and building innovative and coherent programs of general education for undergraduates.

The genesis of UCSC goes back to 1957 when the University of California Board of Regents authorized the establishment of a new campus in the "south-central" coastal region, below the San Francisco Bay area. Later, in 1961, the regents chose as the campus site a remarkably scenic 2000-acre tract of meadows and second-growth redwoods overlooking Monterey Bay and Santa Cruz, a resort town now having some 30,000 inhabitants.

Clark Kerr, then president of the University of California system and formerly chancellor at Berkeley, was all too familiar with the major flaws found, especially on the larger campuses, in American university education: the bureaucratic confusion, the impersonal atmosphere, and the emphasis on research at the expense of undergraduate teaching. He wanted these shortcomings to be avoided at Santa Cruz. Kerr's assistant for academic planning, Dean E. McHenry, was appointed chancellor of the new campus, and plans for UCSC began taking shape.

Central to the Santa Cruz plan was the concept that a university that might have over 27,000 students by the end of the century could be begun in modular fashion by establishing a number of small coeducational undergraduate "colleges." To each college some 650 students would be assigned, with about two-thirds of them expected to live there, the rest to live off campus. Every UCSC professor would be a Fellow of one of the colleges, and at each college a few Fellows as well as the college provost would live in residence. Each college would be architecturally distinct and have its own classrooms, dining room, commons, faculty offices, reading rooms, walkways, and plazas. A freshman or sophomore would have most of his classes in his own college, regardless of his major. In sum, the college was to be a "scholarly village," a place with a relaxed atmosphere and a sense of community.

Another major purpose of the Santa Cruz plan was to have the Fellows of each college working together, across disciplines, to develop strong programs of general education. The program emphasis would vary from college to college. For instance, Cowell College, the first college to be established, would emphasize humanistic studies, particu-



Map of the Santa Cruz campus.

larly history. In other colleges, the emphasis would be on such subjects as the social sciences, the natural sciences, the arts, or even the "Third World."

From the start it was realized that strong collegiate programs would never be developed unless the colleges demanded of their Fellows as much loyalty as that claimed by the traditional academic disciplines. Accordingly, faculty members were to be expected to devote nearly half of their teaching time to giving courses developed as part of college programs.

The college was to share influence with the disciplinary "boards of studies"—UCSC's equivalent of academic departments—in offering incentives and dispensing rewards. Furthermore, graduate teaching and research would be kept to a modest scale so that faculty attention would not be diverted from undergraduate education. One measure of the commitment to this primary mission was the faculty's decision to grade students on a "pass-fail" basis —and hence to undertake to know them well enough to give thoughtful, written evaluation of their work.

The Santa Cruz plan is ambitious but UCSC has had much going for it. The physical setting, dominated by the splendid stand of redwoods, has lent itself superbly to the plan, and private donors have put up some $3 million needed for special college facilities for which public funds could not be spent. The first five of the colleges have been established and a sixth will open next fall. Talented architects, working in contemporary designs, have fitted the colleges and central facilities such as the library and the science buildings in among the hills and redwoods in such a way that everything seems to belong. Even an old abandoned rock quarry has been turned to advantage by its conversion to an amphitheatre. The Whole Earth Restaurant, where students serve up leafy meals of organic food, is near the center of things and somehow seems to symbolize the benign atmosphere of the campus. At Santa Cruz, a student can "turn on" without drugs, although some try it both ways.

As one campus administrator puts it, "Santa Cruz is not a place of high tension." No marked student turbulence or unrest has occurred here and this is probably not solely attributable to the fact that, with a current enrollment of 3300, UCSC is still small. Ugly incidents have occurred at smaller institutions. This campus, along with all others in the California system, was closed briefly last May after the U.S. invasion of Cambodia. But student opposition to the war was expressed mainly in rap sessions with townspeople.

The best current measure of UCSC's promise is its success in attracting excellent students. So keen is the competition for admission here that UCSC draws heavily from the top 5 percent of California high school graduates, recruiting students who once probably would have opted for such pressure cookers as Berkeley or Harvard.

Yet the pastoral calm and ivory tower atmosphere that may help entice students here appears to give some a sense of isolation. Students have left the college dormitories in unexpectedly large numbers to live in town, sometimes in communal arrangements, which are becoming increasingly popular with students everywhere. Fifteen percent of the dormitory space has become vacant, thus reducing the rental revenues necessary to pay off bonds and causing embarrassment when the state must be asked for the capital outlay funds needed for UCSC's continued development. And, with students pooling their rent money, they outbid retired pensioners for the scarce housing available in Santa Cruz and aggravate town-and-gown relations.

Some 60 percent of UCSC students still live on campus, but, should the proportion living in the dorms ever fall much below 50 percent, the collegiate program obviously will no longer fit the original village-of-scholars concept. Under a new policy, effective next fall, new UCSC students ordinarily will be expected to live at the college for at least 1 year. When Kresge, UCSC's sixth and newest college, opens in September, dormitory space will be provided for only half of its students. And half of the space offered will be in apartments where students can live in small groups and do their own cooking. The dormitories of UCSC's seventh college, which is as yet unbuilt, will consist exclusively of apartments. And in some existing colleges experiments will be undertaken to convert parts of dormitories into "cooperatives" or communal living facilities, each large enough for 20 students.

The difficulties over living arrangements may be overcome more easily than UCSC's other major problem, which involves a paradox. The strong faculty that Santa Cruz has built primarily for undergraduate teaching turns out to be tied to a professional value system that frustrates the desired commitment to such teaching. Courses given as part of the colleges' programs of general education represent only about one-fifth of the total faculty teaching time, rather than the one-half supposedly required by the Santa Cruz plan. Moreover, those courses that are given generally do not make up a coherent program, although the work offered in Western Culture at Cowell College may be an exception.

As a new institution, UCSC has been allowed some "baby fat" and not until its tenth year, in 1975, was it supposed to have essentially the same student-faculty ratio that prevails at established institutions in the UC system. Because

of budgetary stringencies, however, the baby fat has been sweated off and Santa Cruz already is approaching the higher ratio. Consequently, the boards of studies, or departments, feel that most of the available faculty teaching time should be devoted to course work offered students majoring in the disciplines. This conflict existed at UCSC even when the student-faculty ratio was more favorable. As Chancellor McHenry sees it, to demand a larger teaching effort now in the collegiate program at the expense of teaching in the disciplines would damage UCSC's academic reputation.

To help resolve this dilemma, UCSC has applied for, and expects to receive, a $250,000 foundation grant from which to support curriculum development in the colleges. Although part of the money would go to new colleges for their inaugural planning efforts, the rest would be awarded competitively by the chancellor, with grants made to those colleges presenting the best proposals. Grant McConnell, the executive vice chancellor, has explained why the special funds are needed:

> In the development of courses and projects for undergraduates, a Board of Study has an inevitable advantage in its inheritance of its field's own structure. . . . By contrast, the development of a new interdisciplinary course by a college is a substantial intellectual undertaking and must necessarily involve joint effort by busy scholars to accommodate to unfamiliar parameters. . . . [B]y sheer attenuation of college zeal the boards of studies may unwittingly become more and more the heirs of the entire curriculum. . . . General education has long been a cause inspiring the efforts of fine minds in American education. Its record at universities such as Chicago and Columbia has been distinguished. Nevertheless, we have seen, even at these institutions, a movement, if not outright repudiations, at least of severe retrenchment, as the vision there has faded. It would be sad if the new undertaking at Santa Cruz were to fall victim to a similar development.

Although more funds for collegiate curriculum development may help, the colleges and the boards of studies will continue to compete for faculty time —and to measure faculty effectiveness by different yardsticks. The provosts and Fellows of the colleges have influenced the selection of new faculty by taking part in screening candidates. But, even at Santa Cruz, where the collegiate system demands time that might otherwise be free for research, a reputation for scholarship in a conventional discipline is the most negotiable currency one can hold. Whenever there has been disagreement between one of the boards of studies and a college over who should be promoted or given tenure, the board has prevailed.

Two professors of economics at UCSC, Robert F. Adams and Jacob B. Michaelson, who have written a paper about the collegiate program as part of a Ford Foundation study of university administration, suggest why the faculty has not made the effort necessary to develop programs of general education. In their view, faculty members are (i) apprehensive about stepping beyond their special fields of competence; (ii) "quite uncertain whether they will be adequately rewarded for doing so"; (iii) convinced that, in any case, "such an investment of effort cannot be easily moved, as it were, to another university." Further, Adams and Michaelson surmise that individuals who would nevertheless take these risks imposed by the incentive system fear that their colleagues would hold back, with the result that their own efforts would come to nothing.

Yet, since every professor at Santa Cruz belongs to a college as well as to a board of studies, the concern felt for undergraduate education must be greater within the boards than it would be within a conventional academic department. A number of academicians with distinguished credentials in research have been attracted to Santa Cruz *because* of the emphasis here on undergraduate teaching. For instance, Robert S. Edgar, a 40-year-old molecular biologist, left the California Institute of Technology last year to come here as a college provost. For the chance to help build a program more responsive to student needs than the one he knew at Caltech, Edgar is willingly accepting a hiatus of several years in his research career.

Matthew Sands, vice chancellor for natural sciences, came here year before last from Stanford, where he was deputy director of the Linear Accelerator Center. Once active in the Federation of American Scientists and as a consultant to the Department of Defense and the Arms Control and Disarmament Agency, Sands is now disenchanted with efforts to find big solutions to world problems. If there is room for hope, he believes one must look to the student generation—hence his new commitment to undergraduate education. "In my deep pessimism I can't be 100 percent absolute," he remarked to a recent visitor. "Perhaps the new generation can turn things around."

Whatever its problems, the collegiate program has delivered on one of its primary goals—that of bringing faculty

Courtyard at Cowell College.

and students close together through informal encounters, college committee work, and relatively small classes. Some large lecture sections exist, but more than half of all the classes conducted at Santa Cruz up through the spring of 1969 had fewer than 16 students—although classes of such small size will become rarer as student-faculty ratios continue to increase. Independent study is encouraged here, and last fall nearly 80 students were abroad studying or doing fieldwork and another 50 were carrying out field projects in the United States. A Merrill College student specializing in Third World studies may be out, say, with some migrant workers in California or teaching in a primary school in Upper Volta or Peru.

Credit requirements here are the same as those at other University of California campuses, but, with the advice of the college faculties, Santa Cruz students can devise their own interdisciplinary majors. Considerable student interest is evident in the new interdisciplinary program in environ-

Visitors Ask M.I.T. Faculty to Renounce Military Research

Cambridge, Massachusetts. Eight members of the New York chapter of Scientists and Engineers for Social and Political Action (SESPA) piled into two cars on 8 January and drove up to Cambridge, to demonstrate in front of the Massachusetts Institute of Technology. SESPA is a national organization of about 3000 scientists and engineers, devoted to ending military research projects.

The 5-hour demonstration was small and subdued in the 20-degree Cambridge weather, but the issue it sought to dramatize is crucial to politically active members of the scientific community at M.I.T. and elsewhere. The key question is whether antimilitary groups at M.I.T. and around the nation will continue to focus primarily on efforts to dissuade the government from sponsoring military research projects or whether they will redirect their efforts inward, urging scientists themselves to refuse to conduct such research.

Leaflets passed out by the SESPA demonstrators asked M.I.T. students and faculty to sign a pledge, "That I will not participate in war research or weapons production. I further pledge to counsel my students and colleagues to do the same." The pamphlet said that SESPA was there "To remind you of your moral responsibility for your own profession and work place. M.I.T. is probably the most important military research center in the United States. SESPA aims to get the weaponeers to abandon their work. We try to assist all those committed to this change to find other work."

Since World War II, M.I.T. has been a major center of military and space research. Its affiliated "special laboratories," the Instrumentation Laboratory and the Lincoln Laboratories, had reached a combined budget of more than $120 million a year, or half the total M.I.T. budget. After a buildup of internal criticism about 2 years ago, the M.I.T. administration began shifting emphasis in the special labs away from military research.

The demonstrators were led by Seymour Melman, professor of industrial engineering at Columbia University. Melman is a leading proponent of converting scientific facilities and personnel from weapons research to more peaceful activities. "M.I.T. has done nothing about the problem of conversion," Melman said. He faulted liberal faculty members and students at M.I.T. for "avoiding responsibility for the professional character of your institution; doing nothing; public relations circuses instead of relevant professional action; saying that Pentagon control of research doesn't matter if you are pure in heart and try to do your own thing with the money."

The main target of the SESPA demonstration was the M.I.T.-based Union of Concerned Scientists (UCS), a peace action group concerned with putting pressure on the government to end the war and curb research on such projects as MIRV development. UCS does not support the SESPA pledge or attempt to bring any pressure on scientists to leave their weapons research jobs. Lee Grodzins, professor of physics at M.I.T. and chairman of the UCS, explained his group's opposition to the SESPA approach: "Absolute things like this pledge don't interest us," he said. "The defense problem is not such a cut and dried affair. I suspect no one in the UCS would work on MIRV, but as to the ABM, for instance, that depends on what kind of ABM. Probably about nine-tenths of us would work on a laser ABM." He characterized the UCS as "an essentially establishment organization."

Underlying the UCS–SESPA conflict is the problem of converting scientific resources and personnel from weapons research to peacetime activity. Melman feels that if institutions like M.I.T. would make the effort, they would find that such conversion is possible. He cited his own efforts at the New York Riverside Research Labs as an example. "We have been picketing in front of Riverside for a year now and have placed 18 to 20 of their engineers in new jobs." The job market for scientists is, of course, tight, but Melman feels that with the leadership of M.I.T. peaceful jobs could be found for thousands of scientists and engineers now employed in weapons research. "In areas like urban engineering the needs are great," he said, "but so far the institutions here have done nothing to convert their training programs."

SESPA's reception at M.I.T. was as cool as the Cambridge weather. "These are rigid, uptight, frightened people," Melman said. "Some of them were even afraid to take our leaflets."

There were, however, a few encouraging signs for Melman and his band of stalwarts. Noam Chomsky, professor of linguistics at M.I.T., said that he supported the demonstration, and Grodzins agreed to circulate the SESPA leaflets among the members of the UCS. In any case, SESPA members say they will continue to pressure their M.I.T. colleagues to take the pledge.

—THOMAS P. SOUTHWICK

The author was a Science *news intern last summer and is an undergraduate at Harvard University and executive editor of the* Crimson.

mental studies headed by Richard A. Cooley, a visiting professor of geography currently on leave from the University of Washington. In developing this program Cooley has had strong support from the chancellor and executive vice chancellor.

These officials are clearly sympathetic to faculty and student efforts to pioneer in new life styles and value systems, and are not noticeably put off even when those efforts take an odd turn. A once barren 4-acre hillside has been brought into bloom by some 20 students working faithfully under Alan Chadwick, an Englishman whom they regard as the repository of an immense store of classical organic gardening lore. Chadwick believes in planting by the right phase of the moon and he abhors use of artificial fertilizers. To many on campus Chadwick is a mystic, and one biologist even describes him as a "menace to the plant physiology program."

Kenneth V. Thimann, provost of one of the colleges, once tried, delicately and indirectly, to suggest to Chadwick that some science belongs in the Garden Project. This missionary effort was not successful, however, and probably could not have been. While escorting a visitor through the garden recently, a student leader of the project mentioned Thimann darkly as the researcher who did the basic science that made possible the defoliant 2,4-D.

"A lot of the Garden Project stuff is nonsense," Chancellor McHenry says, "but there is no harm in planting potatoes by the dark of the moon or in having a witch with a forked stick show you where to dig a well. The project brings an aspect to campus life that is very healthful." McHenry has approved a student application for a $60,000 National Science Foundation grant needed to start a 26-acre model farm.

At the moment, all is in flux at Santa Cruz, with a new college expected to be opened every year except one between now and 1980, when the enrollment will reach 10,000. One of the basic questions that must ultimately be decided is how large shall UCSC be allowed to grow. Everyone here seems to agree that its growth should be stopped far short of the 27,500 enrollment figure projected in the UC master plan. McHenry would prefer an enrollment of between 10,000 and 15,000, with Ph.D. programs—there are now ten and another five will be added—remaining relatively small. (Significant, if modest, research programs have been launched in biology, chemistry, and other fields and the graduate enrollment is increasing; by 1975, graduate students will make up 18 percent of the student body, as compared with 7 percent today.)

The radically new and superior kind of institution envisioned at Santa Cruz has not yet become a reality, but the vision has not receded. Many professors have come here in voluntary exile from the higher education Establishment, and few have left. Vice Chancellor McConnell, formerly of Berkeley and the University of Chicago, describes Santa Cruz as the "most exciting and hopeful place" on the academic map. He speaks extravagantly, but he speaks for many of his colleagues as well as for himself.—LUTHER J. CARTER

Luther J. Carter, a member of the Science *news staff since 1965, is taking leave to write a book on the general theme of the effects of development on the environment in Florida. He will be based at Resources for the Future in Washington, D.C.*

U.K. Science Press: New Scientist Absorbs Sibling Science Journal

London. The merger between *Science Journal* and *New Scientist*, two of Britain's most widely circulated science publications, has aroused questions about the social, as against the commercial, value of magazine publishing.

Both *Science Journal*, a glossy, well-produced monthly with some of the attributes of *Scientific American*, and the profitable weekly *New Scientist* are published by the International Publishing Corporation (IPC), the biggest British printing and publishing combine, whose cornerstone is the mass circulation tabloid *Mirror*. The IPC plans call for *New Scientist* to absorb *Science Journal* and, IPC hopes, its circulation. The January issue of *Science Journal* is its last, and the first issue of the combined magazine is scheduled for 21 January.

Science Journal was not hustled off to its end without unusually fierce protestations. For one thing, the British journalist, everywhere in Fleet Street and its environs, is ceasing to think of himself as a white-collar Bohemian, too respectable to take collective action, and too much in love with his art to resist exploitation; for another, there is deep suspicion of IPC's dominant position in the market, and its effects on the socially desirable but highly vulnerable business of magazine publishing. *Science Journal*'s staff succeeded in holding up the merger for 6 weeks, first by inspiring an offer of £80,000 from Britain's *Financial Times* group for *Science Journal*, which IPC eventually refused, and second by giving notice, under their trade-union house agreement with the management, of a dispute. The staff on 35 of IPC's business magazines in the same building also struck for a day in protest against the merger and the abrupt way it had been announced. The Magazine and Book Branch of the National Union of Journalists demanded "immediate steps to persuade the government to conduct an appropriate public inquiry into the dangerous monopoly situation at IPC." They refused, they said, to go on accepting the high social cost of the closing and merging of magazines.

None of this, of course, saved *Science Journal*; and Britain, say the supporters of this magazine, is now left without a monthly general science magazine. What particularly offended them was the refusal of IPC to sell to the *Financial Times* group. A rather more tentative bid had also been made by Macmillan. As one of the supporters said, "£80,000 was a very good offer for a magazine that wasn't supposed to be a success." The chairman of IPC Magazines, Edward Pickering, said in the London *Times* that the refusal was motivated by the fact that "we were convinced that our plans for merging the two journals not only provided continuing employment for the staff con-