acteristics (religion, income, education, and so forth) of people who practice birth control as opposed to those who do not, we are virtually ignorant of the social psychological processes which impel one family to adopt family planning and another not to.

But serious attention to the population problem is new. The Population Council, the principal organization devoted to supporting research in this area, is only 11 years old and as late as 1960 had a total budget of only $2.7 million (although this had increased to $5 million by 1964). The major foundations have announced significant support for population research only within the past few years. In 1961, the National Institutes of Health, which expended $880 million on control of fatalities, expended only $1.3 million on research relating to fertility control. Only a handful of universities are producing demographers, and virtually no psychologists, anthropologists, or political scientists have turned their attention to population problems. American government agencies are only beginning to give official recognition to the problem, and international agencies such as the United Nations and the World Health Organization are circling the problem seriously, but gingerly.

In short, major attention to population dynamics is in its infancy. In the next decade we can expect breakthroughs not only of a scientific nature, but in successful national programs of population control.

Venture into Politics: Scientists and Engineers in the Election Campaign (I)

One week before election day, Lyndon Johnson was campaigning in Albuquerque when he saw a sign that read, "New Mexico Scientists and Engineers Welcome LBJ." Pointing to the sign, the President declared that "about the best supporters I have are the scientists and engineers."

Campaign hyperbole and the presence of a good number of people from nearby research facilities may have combined to inspire this compliment, but the fact is that the last political campaign energized the American scientific and engineering communities to a pitch of unprecedented political activity, virtually all of it in support of Lyndon Johnson. In 1956 and 1960, in what was the first conspicuous emergence of scientists and engineers into elective politics, a handful of them contributed their names and position papers and briefings to the presidential candidates, but the campaign that has just ended brought forth something altogether different: the establishment of a nationwide network of political action centers, organized, financed, and almost exclusively staffed by scientists and engineers, ranging from Nobel laureates and high-level administrators to undergraduate science majors and laboratory technicians.

In mid-July, when Senator Goldwater received the Republican nomination, these centers did not exist, and there was no plan to set them up. Within 45 days, headquarters, bearing "Scientists and Engineers for Johnson-Humphrey" signs, had sprung up in prominent downtown sections in all but two or three states; almost all employed at least one full-time paid executive or secretary and scores of volunteer workers, drawn from the scientific and engineering community, and they operated 7 days a week, 12 to 18 hours a day. Before the campaign was over they had listed over 50,000 scientists and engineers on their membership rolls; had raised some $500,000; had written and financed over 100 newspaper advertisements, 3000 spot radio broadcasts, and a half-hour nationwide TV show; and had elicited hundreds of column inches of newspaper notice. But, most important of all, by skillfully combining their energy and resources with deliberate exploitation of the prestige of science, engineering, and medicine, and the respect with which the public generally regards them, they contributed to burdening Senator Goldwater with the image that appears to have contributed most to his overwhelming defeat—namely, that he was unfit to control the nation's nuclear forces.

The electorate's repudiation of Goldwater was so overwhelming that it is impossible to establish that any one campaign effort, or that even the entire campaign, was of any significance in determining the outcome. But whether it was self-destruction or outside assault that did most to bring down the Senator, it is clear that the scientific and engineering communities brought remarkable political fervor to the campaign. And though it can be reasonably argued that this venture into political action did no more than add a few pebbles to a predestined national avalanche, it is clear also that, within the boundaries of science and engineering, the involvement in the campaign was an extraordinary event.

How and why was this activity organized, and what can be said of its significance as a phenomenon in the life of the American scientific and engineering communities? The answers, based on interviews throughout the country during the past few weeks, can perhaps best be developed by looking at the great network of institutions and individuals that comprise these communities, and tracing what happened when it became obvious that Senator Goldwater was unstoppable in his quest for the Republican presidential nomination.

Justifiably or not, a lot of people were profoundly disturbed by the prospect of the Senator's nomination and wanted to do something about it, and among them was a 33-year-old physical chemist, Donald M. MacArthur, who manages the chemical and life sciences research center at Melpar, Inc., in the Virginia suburbs of Washington. MacArthur, who holds a B.Sc. with honors from St. Andrews, in Scotland, where he was raised, and a doctorate from Edinburgh, had had no previous experi-

ence in elective politics; but he had two important things going for him in his desire to turn his concern about Goldwater into political action: he knows his way around the scientific community, and he is married to Mrs. Lyndon Johnson's niece, the former Diane Taylor—a relationship which gave him easy access not only to the upper echelons of the administration and the Democratic Party but also to the President himself.

A week after Goldwater's nomination, MacArthur spent 2 hours at the Pentagon with Harold Brown, Defense Director of Research and Engineering, seeking his opinion on whether scientists and engineers could be mobilized into a politically effective organization. Brown was confident that they could, and the next step was a call from Brown's office to Donald F. Hornig, the President's science adviser. Hornig reported that he had had several inquiries from scientists and engineers who wished to become involved in the campaign. Jerome B. Wiesner, M.I.T. dean of science who was Hornig's predecessor in the White House position, had indicated that he wanted to be active in support of Johnson, and so had two distinguished scientific figures with Republican affiliations: Deltev W. Bronk, president of the Rockefeller Institute, former president of the National Academy of Sciences, and long-time chairman of the National Science Board, and George B. Kistiakowsky, the Harvard chemist who served as President Eisenhower's science adviser.

White House Visit

Thus, MacArthur quickly found that support existed in the inner sanctum of the American scientific community, and that influential figures there shared his eagerness for activity against Goldwater, although it was not yet clear just what form this activity would take. It was at this point that MacArthur's political connections proved immensely useful. MacArthur next went to the White House, admission to which was no problem for him, and told Jack Valenti, one of the President's personal staff members, that a group of scientists and engineers were organizing to work for Johnson's election. The visit to Valenti was ostensibly for information purposes only, but it also served to tie the organization directly to the White House, thus avoiding the great bureaucracy that was being put together for the campaign by the Democratic National Committee. Then he went to see one of the seemingly eternal behind-the-scenes powers of American politics, James H. Rowe, Jr., who came to Washington as a New Deal lawyer, served as secretary to Oliver Wendell Holmes, and stayed on to become an adviser and confidante in the upper echelons of the government and the party. Rowe, who is in Lyndon Johnson's inner circle, was to serve during the campaign as national coordinator of Citizens for Johnson-Humphrey, the grass-roots effort to get out the vote. Thus, it would be necessary to get his support for the incipient organization, especially since he held the purse strings on the President's Club, a treasury of "seed money" initiated by the late President Kennedy to help citizens groups get organized in the early days of a campaign. Again, entrée was no problem. MacArthur and Rowe were well acquainted socially. But Rowe wasn't to be easily infected by the enthusiasm that had enveloped MacArthur. The President was indulging in the fiction that he wasn't a candidate until the Democratic convention, scheduled for 24 August, had actually nominated him; until then, no citizens groups were to come into the open, and, furthermore, the party professionals, of whom Rowe is perhaps the epitome, didn't look too kindly on ebullient amateurs who wanted to plunge unguided into the serious business of national politics. Rowe advised MacArthur to hang on until the party chiefs had sketched out the strategy for the campaign. MacArthur, it appears, listened good-naturedly to the counsel of his friend and then hurried out to lay his hands on the lease for campaign headquarters that the defunct Rockefeller organization was vacating on Connecticut Avenue in downtown Washington. He wrote a personal check for $750 for one month's rent, plus another of $200 as deposit for a telephone. Said Rowe, in looking back: "They got off running hard, and there wasn't much we could do about them after that." A few days later the President's Club made $12,000 available to Scientists and Engineers for Johnson, and it became the first Democratic citizens group to make its appearance in the 1964 campaign.

At this point, then, the organization was in business, with an office, a telephone, a bank account, and the nucleus of a staff: MacArthur, who had taken leave from Melpar; his wife, who resigned from her position as head of the Peace Corps' programs for North Africa, the Near East, and South Asia; and Rodney W. Nichols, a 27-year-old head of a systems analysis group in MacArthur's research center at Melpar. Nichols, who played a key role in formulating and carrying through the scientific community's first venture into large-scale political action, was joined by his wife, Carolyn, a sociologist, who, in effect, served as manager of what quickly was to become a frantic, night-and-day, 7-day-a-week office operation from early August through 3 November.

Now, during the first week in August, there actively began the effort to draw large numbers of scientists and engineers into the campaign for Johnson's election. And, as the effort proceeded, two things became plain: (i) Scientists and Engineers for Johnson had a latent constituency that was overwhelmingly eager for someone to come along to show the way to political action, and (ii) the American scientific and engineering communities are, in fact, communities, so intimately linked across the nation by personal and professional relationships that a cause claiming any common denominator of appeal is swiftly communicated throughout the land—and, in this case, the appeal of anti-Goldwater activity seems to have been overwhelming.

Finding Support

Wiesner, Kistiakowsky, and Bronk, who, through their long government advisory service and professional activities can probably claim at least one good acquaintance at virtually every university, major laboratory, and technologically-oriented firm in the country, got on the telephone and in short order had rounded up a 42-member national organizing committee that read like a house of representatives of American science, engineering, education, and industry. As word spread that the committee was being formed, they found themselves receiving requests from others wanting to serve.

In general, the requests were granted, but, after consultation with the President, it was decided that Wiesner alone of the members of the President's Science Advisory Committee (PSAC) would be permitted to serve on the national committee, a decision which was a hedge against the possibility that Goldwater might win. It was recalled

that in 1961, when Kennedy succeeded Eisenhower, the apolitical nature of PSAC had made it possible for that body to continue without change under the new administration. In Wiesner's case, it was felt that he was publicly identified as a scientist with strong Democratic leanings, and, besides, his PSAC term would expire in a few months and he was so eager to get into the campaign that he offered to resign if Johnson desired. Thus, Wiesner stayed with PSAC and played an intensely active role in the campaign. But, for example, when Edward M. Purcell, the Harvard physicist who is a member of PSAC, sought membership on the founding committee, he was told that the White House felt it would be prudent for him and other PSAC members to play less conspicuous roles in the campaign. Purcell later served on the Executive Committee of the Massachusetts chapter.

Getting Organized

The next few weeks brought such a rush of meetings and cross-country communications that it is difficult to sort out the sequence of events with any precision. But, in general, it appears that three closely connected developments of major significance began to occur: news of the existence of the organization was rapidly communicated throughout the scientific and engineering communities; operating guidelines were worked out on the basis of a planning paper by Nichols, and at a meeting in Washington, on 10 and 11 August, of about a dozen members of the national organizing committee; and money started to come in from the fledgling organization's constituency. For example, Milton Harris, vice president of the Gillette Company, contributed $1000. Edward U. Condon, former director of the National Bureau of Standards and now professor of physics at the University of Colorado, sent $150. And $100 each was contributed by Herbert S. Gutkowski, head of the division of physical chemistry, at the University of Illinois; Emmanuel R. Piore, vice president and director of research for IBM; and Peter C. Goldmark, president of CBS Laboratories. Wiesner later contributed $500, as well as taking on speaking engagements in California, Ohio, Illinois, New Hampshire, New York, Tennessee, Georgia, and Washington. A $500 contribution was also made by Roger Revelle, the oceanographer who recently became head of Harvard's newly established center of population studies.

In addition, according to campaign records filed with the clerk of the House of Representatives, many industrial executives and philanthropists listed large sums contributed to Scientists and Engineers for Johnson; but the intricacies of campaign bookkeeping make it difficult to determine whether the money actually went to that organization or was only nominally routed there to get around the legal limitation of no more than $5000 to any one campaign committee. Throughout the campaign there was a bewildering transfer of funds between Scientists and Engineers for Johnson national headquarters and the national party headquarters, part of it in repayment of what eventually added up to $25,000 from the President's Club.

In any case, the records list a contribution to Scientists and Engineers for Johnson of $5000 from Henry Ford II, chairman of the Ford Motor Company. And Thomas J. Watson, Jr., chairman of IBM, and Mary Lasker, the medical philanthropist, were each listed at $3000, the maximum, according to one interpretation of the tax laws, that may be given free of federal gift tax. Some party professionals dispute this interpretation, but it serves to keep many major contributors at the $3000 level.

Guidelines for Action

The guidelines for the organization leaned heavily on Nichols' paper, which stated that the basic goals should be to "influence opinion on science-related campaign issues through public pro-Administration statements from prominent spokesmen representing the scientific and engineering communities . . . [and to] stimulate and support scientists and engineers across the country to organize to 'get out the vote for Johnson' groups." The paper also went into such practical political matters as the need to get "at least one woman and one Negro" to serve in positions of leadership. And it went on to advise that the organization should "assume . . . the role of a spontaneous citizens' surge for Johnson."

More specifically, at the 10–11 August meeting, and at several subsequent meetings, the following guidelines were worked out:

1) The primary objective was not to lobby in behalf of science and engineering; rather, it was to enlist these communities in behalf of Johnson and to turn their prestige against Goldwater.

2) Scientists and Engineers for Johnson would be a political action organization; it would not simply serve as a brain trust or as window-dressing for Johnson's candidacy. Immediate efforts were to be made to establish active chapters in every state; each was to be financially self-sustaining, with funds solicited from scientists, engineers, and the general public.

3) The organization was to be bipartisan and financially and operationally independent of other Democratic campaign groups. It was not to involve itself in any campaign issue but Johnson versus Goldwater. A conscious effort was to be made to provide a respectable political haven for Republican scientists and engineers opposed to Goldwater, particularly the engineers, whose political sympathies tended to be farther to the right than those of the scientists.

To cast the membership net as far as possible, the chapters were to remain aloof from local issues. This meant that, to the extreme annoyance of regular state and local Democratic organizations, the New York chapters were to avoid involvement in the hard-fought senatorial race between Robert Kennedy and Senator Kenneth Keating, and the California chapters were to stay out of the fight over that State's open-housing law and out of the senatorial contest between Pierre Salinger and George Murphy.

Publicity Problems

With these principles agreed upon, work now began to bring into existence a nationwide organization that had not even been under discussion a few weeks before. And it was here that the staff which was to carry out this ambitious plan encountered a shock. The press release announcing the formation of the organization sank without a trace into the nation's news media. (Written in a clumsy style that resulted from many cautious revisions at Scientists and Engineers for Johnson headquarters, and at National Committee headquarters, where the professionals felt uneasy about the burgeoning organization, it managed to elicit no interest whatsoever.)

MacArthur and Nichols then quickly sought out professional help—at $1000 a week—in the form of David L. Garth, a New York producer who had won TV's Peabody Award and who had

handled campaign publicity and organization for various political figures, including Adlai Stevenson, Representative John Lindsay, of New York, and Senator Abraham Ribicoff, of Connecticut. Garth arrived at the Washington headquarters 2½ hours after MacArthur called for his help, and thereafter he not only handled publicity, but rode the network of the scientific and engineering communities to provide the political and organizational know-how that were needed to turn enthusiasm into political action.

During 18 days Garth visited 30 states, to meet with scientists and engineers who had been drawn in by the founding group or who had independently called Washington for guidance. Actually, as Garth recalls it, the territory was immensely fertile, for word of this unprecedented political role for science and engineering had rapidly spread through an eager constituency.

Southern California

For example, it was a call from Detlev Bronk that had brought Harrison Brown, professor of geochemistry at Cal Tech, onto the national organizing committee. Bronk and Brown had become well acquainted while both were serving as officers of the National Academy of Sciences. And, when the Southern California chapter of Scientists and Engineers for Johnson was being organized, it was Brown who brought in Bruce Murray, a 33-year-old associate professor of planetary sciences at Cal Tech, who completely left his research for 7 weeks to serve as executive director of the Southern California chapter. Murray and others met with Garth, who set out the rules: get a headquarters; put up a big sign reading "Scientists and Engineers for Johnson"; (after the convention, this was changed to Johnson-Humphrey, and, in many communities, the organizations were enlarged to encompass physicians.) prepare mailing lists from university and corporate directories, and start raising money through mail solicitations; use that money to solicit more money through newspaper ads (no funds were to be had from national headquarters); seek to inspire newspaper stories indicating that scientists and engineers of both parties are opposed to Goldwater. And stay out of local issues.

It was a call from the Defense Department's Harold Brown that brought John H. Rubel into organizing the Southern California chapter. And Rubel, a former Defense research and engineering administrator, who is now vice president of Litton Industries, soon enlisted the support of a life-long Republican, Clark B. Millikan, director of the Graduate Aeronautical Laboratories at Cal Tech. Millikan at first protested that he had never voted for a Democrat, but before the campaign was over he and Mrs. Millikan had solicited some $3000 from their friends to help finance the Southern California chapter. Eventually the chapter signed up over 2000 persons and raised about $22,000.

In Northern California, a call in the middle of the night from Wiesner brought into the organization Russel Lee, president of the Palo Alto Medical Research Foundation. Soon afterward, Garth arrived with organizational instructions. Lee made available $4000 of his own money to get the chapter going, and made contact with Rogers Cannell, a Stanford Research Institute engineer and economist who was to become director of the Northern California chapter's two offices, in Menlo Park and Berkeley.

It was also a call from Wiesner that brought in Owen Chamberlain, a Nobel laureate in physics at the Berkeley campus of the University of California. Not long afterward, Chamberlain could be found addressing and licking envelopes at the Berkeley headquarters. By election day the Northern California chapter had raised $8700, sent out 60,000 mailings, put on 68 spot radio broadcasts, and financed a full-page color newspaper ad.

On the other side of the country, Kistiakowsky made at least 100 phone calls to colleagues and acquaintances throughout the country. And all 25 members of the Harvard chemistry department signed a letter which was sent to hundreds of persons, including former students. The letter stated, in part: "The members of the Department . . . representing a wide range of political conviction, conservative through liberal, Republican, independent and Democratic are *unanimously* committed to the view that Senator Barry Goldwater and Congressman William E. Miller must be resoundingly defeated in their bid to take over the highest offices in the land. We are convinced that our country would be presented with the clear prospect of disaster in the domain of foreign relations, and grave setbacks in economic, social, technological and political progress at home, under an administration led by these men."

Mrs. Frank Westheimer, wife of one of the chemistry department members, later became executive secretary of the Massachusetts chapter.

It was acquaintanceship with Wiesner that brought in Walter Rosenblith, an M.I.T. electrical engineer, who presided at the chapter's organizational meeting at the M.I.T. faculty club. Rosenblith became co-chairman, along with Arthur R. Kantrowitz, director of the Avco Everett Research Laboratory. The division of leadership between campus and industry was deliberately designed to cover the spectrum of the Cambridge area's science and technology. By election day the chapter had about 3000 members; it raised over $25,000, sent out 35,000 mailings, and financed a series of newspaper and radio advertisements.

Aid for Headquarters

It was through Rosenblith that Paul A. Kolers, a 38-year-old research psychologist at M.I.T.'s research laboratory of electronics, came into the organization. Kolers was put in touch with Rosenblith when he told a colleague that he was interested in working in the campaign. And, when Washington headquarters indicated that it needed willing hands, Kolers took leave to spend most of September at the Connecticut Avenue office. There his duties involved making use of his knowledge of the scientific community to find contacts for Garth, the touring organizer.

For example, when it came to setting up a chapter in Alabama, Kolers thought of Leland Clark, professor of biochemistry at the University of Alabama. Kolers had never met Clark, but he knew of him professionally, and, in addition, Clark's name was suggested by several persons. Clark agreed to set up an Alabama chapter, and he promptly called a meeting in Birmingham. In attendance were about 35 persons with whom Clark was acquainted personally or professionally at nearby Alabama institutions. Working in that troubled state, Clark and his colleagues signed up 200 members and raised about $400. For his efforts, Clark found himself the object of vile telephone calls, obscene letters, and midnight vandalism on the grounds of his home.

In St. Louis, a number of persons, including Peter Gaspar, assistant professor of chemistry at Washington Uni-

versity, had heard of the founding of Scientists and Engineers for Johnson. A call to Washington brought a visit from Garth. Between the beginning of October and election day the St. Louis chapter sent out 16,000 solicitations to scientists and engineers in Missouri, and raised $7500 for publicity of various kinds.

The North Carolina chapter signed up 550 members, ran quarter-page ads in six newspapers, covering an estimated 75 percent of the state's population. It sponsored 16 1-minute spot announcements and sent an airplane with a streamer, "We all win with Lyndon," over several football stadiums on the Saturday before the election.

The Southern Ohio chapter reported 500 members, a banquet at which Bronk was the principal speaker, numerous ads and newspaper reports of their activities. And it reported that its most active members were Republicans.

Throughout the country, these patterns were being repeated. And, at chapter after chapter, it turned out that many of the most active workers had previously taken no part whatsoever in political activity.

Thus, less than 6 weeks after MacArthur went to the Pentagon to seek Harold Brown's views on whether scientists and engineers could play a role in the campaign, Scientists and Engineers for Johnson had come into being. It was a thriving, nationwide organization, and with shrewdness and diligence it served, as much as anything else, to convince the American public that Senator Goldwater was a poor choice for the presidency. As Garth said, "By the time we were through, any guy in Pittsburgh in a T-shirt with a can of beer in his hand knew that the smartest people in this country considered Goldwater unfit."

—D. S. GREENBERG

(This is the first in a series on the role of scientists and engineers in the presidential campaign.)

Announcements

Washington University has undertaken a 3-year study of the uses of computers in the selective **dissemination of medical data** to researchers and practitioners. The $333,000 grant from the National Institutes of Health also covers research and evaluation of methods of automated medical diagnoses. Investigators will attempt to develop computer-based systems for storing, retrieving, and selectively disseminating research data and publications to doctors and researchers. If successful, the computer will be able to identify articles of interest to individual physicians, by matchng a profile of their interest categories with the information content of recent research documents. The system will be set up to serve medical needs exclusively. Further information on the program is available from Richard A. Dammkoehler, associate provost for research, and director of University Computing Facilities, Washington University, St. Louis, Missouri 63130.

Yeshiva University, in New York City, has announced the establishment of a Dirac chair in physics, in honor of Nobel laureate Paul A. M. Dirac of Cambridge University, England. It is the second academic chair to be established in the department of physics at the Belfer graduate school of science.

Meeting Notes

The 1965 national conference on **ocean science and ocean engineering** is scheduled 14–17 June, in Washington, D.C. It will be cosponsored by the Marine Technology Society and the American Society of Limnology and Oceanography. Papers are being solicited for the conference, and may cover any aspect of oceanography or limnology; however, preference will be given papers focusing on technological developments, concepts, and applications. Deadline for 150- to 200-word abstracts: *15 January*. (Program Chairman, MTS-ASLO Conf., Marine Technology Soc., The Executive Building, 1030 15th Street, NW, Washington, D.C. 20005)

Papers are being solicited for the Polytechnic Institute of Brooklyn international symposium on **system theory**, scheduled 20–22 April, in New York. It will be sponsored by P.I.B.'s Microwave Research Institute, the Air Force Office of Scientific Research, the Office of Naval Research, and the Army Research Office. Areas to be covered are basic notions of system theory, mathematical representations of systems, dynamic systems (including finite-state machines), systems with random inputs, optimal systems, systems identification, and large-scale systems. Deadline for papers: *15 January*. (Symposium Committee, P.I.B., 333 Jay Street, Brooklyn, N.Y. 11201)

"Human Behavior in Relation to Computer Behavior" will be the theme of the sixth national symposium on **human factors in electronics**. It is scheduled 6–8 May in Boston, and will be sponsored by the Institute of Electrical and Electronics Engineers. General areas to be covered include man-computer interaction, computer simulation of human performance, human models for the design of computing devices, human communication with computers, computer communication with humans, human compatibility of input-output devices, man-computer systems, and psychological, sociological, and economic implications of computer technology. Deadline for papers in final form: *1 February*. (J. Degan, MITRE Corporation, P.O. Box 208, Bedford, Masachusetts)

A call for papers has been issued for a symposium on **signal transmission and processing**, to be held 13–14 May in New York. It will be cosponsored by Columbia University's department of electrical engineering and the Institute of Electrical and Electronics Engineers' circuit theory group. General topics to be included are signal theory—representation of signals and stochastic signal processes; systems and circuits for signal processing; and signal transmission systems. Deadline for 15-page manuscripts: *15 January*. (L. E. Franks, Bell Telephone Laboratories, 1600 Osgood Street, North Andover, Massachusetts)

Courses

Fisk University will sponsor a 3-week course in **Infrared Spectroscopy** to be given at the University of Sao Paulo, Brazil, 1–19 February. The Latin-American Fisk Infrared Spectroscopy Institute is designed to provide persons engaged in research in industrial and academic laboratories with instruction in the techniques, applications, and theory of infrared spectroscopy. (Director, Department of Scientific Affairs, Pan American Union, Washington, D.C. 20006)

Grants, Fellowships and Awards

The National Academy of Sciences and the Smithsonian Institution have announced a joint program to extend **postdoctoral research opportunities** to investigators in the U.S. and abroad. Under the program, visiting research