ences, transportation and environmental management. Nixon has urged development of "new methods of treating the mentally ill"; new sources of cheap energy, especially breeder reactors; and new emphasis on lasers, pollution research, and computer technology.

As noted above, Humphrey's science-policy statement was partly aimed at winning over disaffected members of the academic establishment. Last week the Humphrey camp took another step in the same direction by distributing a 69-page booklet, *"The Citizen's Choice: Humphrey or Nixon,"* written by Nelson W. Polsby, professor of political science at the University of California, Berkeley, and published by the Public Affairs Press. Polsby, who is a Humphrey supporter, credits Humphrey with "towering achievement" and concludes that Nixon, as congressman, senator, and vice president "made little or no impact on public policy. So he is as close to an unknown quantity as we are likely ever to see as the Presidential nominee of a major American national party." Significantly, Polsby devotes a good portion of his book to arguing that liberal idealists (who seem to abound in academia) will be making a mistake if they sit out the presidential election and fail to vote for Humphrey.

On the vote-seeking front, both camps claimed major strides in lining up support from members of the research and development community. The Nixon forces claimed that more than 100 "groups" of scientists and engineers have formed to support Nixon, though their press release did not indicate how large, active, or cohesive these groups might be. The press release did include a "partial list" of some 126 "new" Nixon supporters—in what appears to be an effort to counteract the initial impression that Humphrey had a larger and more prestigious group of scientific backers than Nixon (*Science*, 4 and 11 October). The Nixon camp now claims the support of three Nobelists and more than 42 members of the National Academies of Science and Enginering.

The Humphrey camp, meanwhile, by early this week had increased its list of Nobelists to 13, and its stable of Academy members to about 130, so Humphrey would still seem to be ahead in the "numbers game." The Humphreyites were particularly elated at snaring Aihud Pevsner, professor of physics at Johns Hopkins, who was chairman of the executive committee of Senator Eugene McCarthy's scientific group. They also claimed financial contributions were pouring in at a $400-a-day clip and that "well-organized, functioning local groups" were springing up around the country.—PHILIP M. BOFFEY

Birth Control: U.S. Research Advances Despite Papal Edict

"Of Human Life," the encyclical issued by Pope Paul VI on 29 July, condemning the use of contraceptives, has not checked the trend toward increasing involvement by the United States Government in programs concerned with family planning and population control at home and abroad. In fact, some observers believe that, within the United States at least, the encyclical has served chiefly to arouse greater public interest in the world population crisis. "It has given us $10 million worth of free publicity," says an official of one of the voluntary agencies in the birth-control field.

In Congress, where birth-control measures were highly controversial just a few years ago, there is now strong support for such proposals. For example, though Congress gutted this year's foreign aid budget, it insisted that $50 million of the funds it did provide be earmarked for the Agency for International Development's population programs, or $15 million more than it appropriated for that purpose last year. And Congress has, moreover, given the National Institutes of Health $2.5 million to start a program of directed contract research for the development of new contraceptives and for population research by behavioral scientists. The behavioral science studies will include investigations of such things as the effect on fertility trends of various actual or hypothetical welfare programs, family allowances, and tax policies.

This contract research program will be carried out by the new Center for Population Research, established last August in the National Institute for Child Health and Human Development (NICHD). In his health message of 4 March, President Johnson announced plans for the center, and observed: "Two vital fields long neglected by research are population and human reproduction. . . . A wide range of scientists must bring to these problems their specialized disciplines—biologists, behavioral scientists, biochemists, pharmacologists, demographers, experts in population dynamics. . . . The center will serve to give new energy and direction to the research activities of all federal departments in these fields."

Just how the center will "give direction" to the population research being done by AID, the Children's Bureau, and other agencies is not yet clear, but it seems certain that the center's contract research program is marked for rapid growth. By mid-November, the President's Committee on Population and Family Planning (set up in July under the cochairmanship of Secretary Wilbur J. Cohen of Health, Education, and Welfare and John D. Rockefeller III) is due to report, and is sure to recommend major increases in federal support of population research. Establishment of the new NICHD population center is viewed by some people in the population field as the first step toward creating a "National Institute for Population Research" in NIH.

At the moment, the center is quite small, its staff consisting of only six professionals, including the director, Philip Corfman (a Harvard-trained obstetrician-gynecologist), and the deputy director, Arthur A. Campbell (a leading demographer). Two key positions, those of chief of the contraceptive development branch and chief of the behavioral sciences branch, are as yet unfilled. The center will not wait for researchers to propose projects but will actively seek investigators to work in the areas which it and its review panels have identified as particularly promising. By means of progress reports, site visits, workshops, and the like, the center expects to oversee and direct the research.

Corfman believes that, in the field of contraceptive development, the center can play a role that no other agen-

cy, public or private, has been able to fill. Most contraceptive development is conducted by private industry and is necessarily product- and profit-oriented, Corfman says, whereas fully effective family planning programs are likely to require a variety of low-cost contraceptive methods, some of which may involve no product at all. The Population Council, the agency largely responsible for bringing the intrauterine device (IUD) into widespread use, is not concerned with profits and is continuing important work in contraceptive development; but, though it supports some fundamental research, the council must devote its limited resources primarily to research offering promise of early application, Corfman says. Accordingly, he adds, his center, uninfluenced by considerations of profit and drawing on the financial resources of the federal government, can contribute significantly by pursuing all promising ideas, from the most basic animal investigations on through the development of a contraceptive method or product (awarding contracts to industry for this final stage of the work).

"There is a great deal of information of a fundamental nature which must be obtained," Corfman says. "For instance, the hormonal relationships which control the normal menstrual cycle are incompletely understood. This is astounding considering that oral contraceptives currently in use by over 8 million American women work by interfering with this process." In his view, however, the field of reproductive biology has progressed sufficiently in recent years to lend itself to organized programs of research directed at the development of new contraceptive methods.

The center has identified four aspects of the reproductive process which it will investigate, though the areas of investigation are expected to change as research progresses, new insights are gained, and new ideas are presented. As described by Corfman, the four areas of research are as follows.

1) Maturation and fertilization of spermatozoa. The goal of this inquiry is the development of modern contraceptives administered to men or women which alter normal sperm development in the male reproductive tract or in the uterus of the female. This latter process, termed capacitation, is known to occur in certain animals and is the poorly understood obligatory change which occurs in sperm exposed to uterine fluids, making them capable of fertilizing the ovum. It is not known with certainty if this process occurs in primates, but, if it does, agents interfering with it may provide new methods of contraception.

2) Oviduct function and gamete transport. Important early events in the reproductive process, such as sperm penetration of the ovum, occur in the oviduct. For example, the oviduct has some differential effect on the sperm and ovum, which permits sperm to ascend the tube and ova to descend. It seems likely that means can be developed to interfere with the ductal musculature, the cilia which line the tube, or the normal composition of ductal fluid and thus prevent fertilization from occurring.

3) Corpus luteum function and implantation. The corpus luteum is a progesterone-producing structure which forms on the ovary shortly after fertilization and, in a number of animals, is known to be essential to the continuation of the reproductive process. There are now leads to several means of interrupting the function of the corpus luteum, either through the use of normally occurring leuteolytic agents derived from the uterus of certain animals or through the use of antiprogestational agents and other drugs. This approach is particularly attractive to organizers of family planning programs since it would require a woman to take a pill only once a month, at the time of her expected period.

4) The biology of the pre-implantation ovum. The fertilized ovum remains free in the uterine cavity for several days before it lodges in the wall of the uterus, and it seems particularly susceptible to treatment during this period. One method may be to interfere with the means by which this structure, the blastocyst, escapes from its surrounding membrane, the zona pellucida, which in many species is composed of highly polymerized neutral or weakly acid mucoproteins.

If a simple and reliable means of detecting ovulation were found, couples could practice periodic abstinence—thus following the rhythm method, the one contraceptive practice acceptable to the Catholic Church. The center believes, however, that much fundamental research will be necessary before progress in discovering such a method becomes possible. Though research in this area is not now being emphasized, the center indicates that, if promising new leads should develop, it will follow them up.

In the field of the behavioral sciences, the center also has selected four research areas in which it expects to concentrate its efforts. It will investigate contraceptive practices (for example, how many American women are using the pill? the IUD?) and fertility trends. It will also examine the processes and consequences of population change, investigating the social costs (overburdened schools, high unemployment among young people, and housing and city planning problems, to name a few) associated with inflated fertility trends such as the postwar "baby boom" in the United States.

Another area of investigation is that of the effects on fertility of family structure and patterns of sexual behavior. For instance, does the high U.S. divorce rate lead to greater fertility or to less? In other words, do divorced women usually remarry, and do those that do tend to have more or fewer children than women who marry and are never divorced?

Finally, the center plans to investigate the effects of government policies which, explicitly or implicitly, may encourage families to have more or fewer children. For example, does the $600-per-person exemption allowed under the federal income tax law have any effect on family size? What effect does the aid-to-dependent-children program have? And what new incentives or sanctions would lead families to have fewer children?—LUTHER J. CARTER

APPOINTMENTS

H. W. Riecken

B. H. Ketchum

Henry W. Riecken, vice president of the Social Sciences Research Council and head of the council's Washington office, to president of the council. . . . **Bostwick H. Ketchum**, associate director of the Woods Hole Oceanographic Institution, will take a year's leave of absence to become head of the Environmental and Systematic Biology Section, Division of Biological and Medical Sciences of the National Science Foundation; also at NSF, **Richard F. Johnston**, professor of zoology and curator of birds in the Museum of Natural History of the University of Kansas, will take a year's leave of absence to become program director of the Systematic Biology Program in the Environmental and Systematic Biology Section. . . . **John F. O'Leary**, chief of the Bureau of Natural Gas of the Federal Power Commission and former deputy assistant secretary of mineral resources of the Department of the Interior, to director of the Federal Bureau of Mines in the Interior Department.