

future planetary missions, and the potential for commercial uses."

He also points out that the Centaur engines are already very close to the theoretical maximum efficiency of a liquid hydrogen/liquid oxygen rocket; moreover, that fuel combination is about the most potent one available. Any new HEUS would just be a repackaging. It certainly would not be any cheaper. (In

fact, the cost of a new HEUS has been estimated at about \$1.5 billion.)

Besides, he says, the Air Force indulges in sole-source procurement all the time. And if Orr does not want to use Centaur, nobody is forcing him. The Air Force still has its IUS's.

So what is going on? It must be said that Flippo's district includes NASA's Marshall Space Flight Center in Hunts-

ville, Alabama. Marshall is the lead center for the IUS work, and will be the lead center for any new HEUS. However, the Centaur would continue to be handled out of NASA's Lewis center in Cleveland, as it has been for 20 years. Thus, there are jobs involved for Marshall.

It is also true that every aerospace company except General Dynamics has been lobbying hard against Centaur. "If they shoot down Centaur now, they all get a shot at a new HEUS," says a staffer in the office of Representative Bill Lowery (R-Calif.). Since General Dynamics assembles the Centaurs in Lowery's San Diego district, he has been in the thick of the fight. The Air Force, Lowery's assistant suggests, has a similar reason for opposing Centaur: "If Centaur is defeated, I guarantee you that a year from now the Air Force will be back asking for HEUS studies of its own—without having to share it with NASA." That is why the Air Force has been trying to whip up support for its position on the Armed Services committees, he says.

NASA, meanwhile, is split on the issue. In the late 1980's or 1990's the agency would like to build a reusable orbital transfer vehicle (OTV) that would ferry spacecraft from low earth orbit to GEO and back again. Eventually the vehicle might even be manned. From that point of view the Centaur is a dead end, because modifying it to be an OTV would cost more than starting from scratch. On the other hand, the Centaur would be an excellent HEUS in the interim.

The Galileo team could live with either an IUS launch or the Centaur, but they want a final decision on something. The endless flip-flops have been agonizing, wasteful, and demoralizing. Besides, work on the Galileo IUS ceased in July. If the Centaur is canceled now, the whole program will be months behind schedule.

NASA headquarters has managed to stay fairly neutral in all this (perhaps in part because administrator James M. Beggs was formerly a vice president of General Dynamics). Soon however, the agency will officially come out in favor of Centaur on the basis of its usefulness in scientific missions and the need to compete with Ariane. The various divisions are now drawing up lists of specific missions that could utilize Centaur, and the agency is talking to the Air Force about ways of sharing the cost.

Given the forces arrayed against Centaur, however, it seems unlikely that its fate will be decided anytime soon.

—M. MITCHELL WALDROP

## IOM Elects New Members

Forty-nine new members have been elected to the Institute of Medicine, raising the total active membership to 453 when their terms begin on 1 January 1983. In addition, six persons were elected to senior membership, bringing that roll to a total of 159.

**Lawrence K. Altman**, *The New York Times*; **Ralph L. Andreano**, economics, University of Wisconsin, Madison; **H. David Banta**, Office of Technology Assessment, Washington, D.C.; **Ben D. Barker**, School of Dentistry, University of North Carolina, Chapel Hill; **Karl D. Bays**, American Hospital Supply Corporation, Evanston, Illinois; **Richard E. Behrman**, School of Medicine, Case Western Reserve University; **Henrik H. Bendixen**, anesthesiology, College of Physicians and Surgeons, Columbia University; **Lionel M. Bernstein**, National Library of Medicine; **Robert L. Black**, private practice, pediatrics, Monterey, California; **R. Don Blim**, private practice, pediatrics, Kansas City, Missouri; **James A. Campbell**, Rush-Presbyterian-St. Luke's Medical Center, Chicago; **David S. Citron**, Family Practice Residency Program, Charlotte Memorial Hospital and Medical Center, Charlotte, North Carolina; **John J. Conger**, clinical psychology, School of Medicine, University of Colorado; **William C. Dement**, psychiatry and behavioral science, Stanford University School of Medicine; **Donna Diers**, School of Nursing, Yale University, New Haven; **I. S. Edelman**, biochemistry, College of Physicians and Surgeons, Columbia University; **Carroll L. Estes**, social and behavioral sciences, School of Nursing, University of California, San Francisco; **Richard G. Farmer**, The Cleveland Clinic Foundation; **Harvey V. Fineberg**, health policy and management, Harvard School of Public Health, Boston; **William D. Fullerton**, Health Policy Alternatives, Inc., Washington, D.C.

**Paul Goldhaber**, Harvard School of Dental Medicine; **Avram Goldstein**, Addiction Research Foundation, Palo Alto, California; **Morris Green**, pediatrics, Indiana University School of Medicine; **Joseph Hamburg**, College of Allied Health Professions, University of Kentucky, Lexington; **Margaret C. Heagarty**, pediatrics, Harlem Hospital Center, Columbia University; **Robert W. Jamplis**, Palo Alto Medical Foundation; **Ruth L. Kirschstein**, National Institute of General Medical Sciences; **Arthur Kleinman**, medical anthropology, Harvard Medical School; **Carl Kuper**, National Eye Institute; **Lester B. Lave**, economic studies program, The Brookings Institution, Washington, D.C.; **Philip Leder**, genetics, Harvard Medical School; **Mark H. Lepper**, Rush-Presbyterian-St. Luke's Medical Center; **Thomas E. Malone**, National Institutes of Health; **Donald N. Medearis, Jr.**, pediatrics, Harvard Medical School; **Duncan Neuhauser**, epidemiology and community health and medicine, Case Western Reserve University; **Dominick P. Purpura**, School of Medicine, Stanford University Medical Center; **Richard D. Remington**, public health, School of Public Health, University of Michigan, Ann Arbor; **Leon E. Rosenberg**, human genetics, Yale University School of Medicine; **Steven A. Schroeder**, general internal medicine, University of California, San Francisco; **William Silen**, surgery, Harvard Medical School; **Eliot Stellar**, physiological psychology in anatomy, School of Medicine, University of Pennsylvania, Philadelphia; **George H. Taber**, Richard King Mellon Foundation, Pittsburgh; **Robert E. Tranquada**, Medical School, University of Massachusetts, Worcester; **Ralph O. Wallerstein**, private practice, internal medicine, San Francisco, California; **Lewis W. Wannamaker**, pediatrics, University of Minnesota, Minneapolis; **Virginia V. Weldon**, medical affairs, Washington University, School of Medicine, St. Louis, Missouri; **M. Donald Whorton**, Environmental Health Associates, Inc., Berkeley, California; **Linda S. Wilson**, University of Illinois, Urbana/Champaign; **Michael Zubkoff**, community family medicine, Dartmouth Medical School.

Elected to senior membership: **Kenneth E. Boulding**, Institute of Behavioral Science, University of Colorado, Boulder; **George L. Engel**, psychiatry and medicine, School of Medicine and Dentistry, University of Rochester Medical Center; **Alfred Gellhorn**, School for Biomedical Education, City College of New York; **Neal E. Miller**, psychology, Rockefeller University; **David D. Rutstein**, preventive medicine and clinical epidemiology, Harvard Medical School; **Jonas Salk**, The Salk Institute for Biological Studies, San Diego, California.