States is expected to double, at least, in the next decade, the number should not be any less. Consideration of the number of experienced operating groups that could undertake sizeable projects of this kind, plus the size of the burden that would be placed on the instrumentally-inclined astronomers, sets an upper limit."

Similar considerations guided the panel in its recommendations for smaller optical instruments. In the 60- to 84-inch range, it recommended the construction of four general-purpose telescopes to supplement the five now in operation at good climate sites in this country. In the 36- and 48-inch range, it proposed the construction of eight telescopes, basing this recommendation, in part, on "an estimate of the number of astronomy departments that are likely to come forward with meritorious proposals." In this case the panel again made clear that it considered itself to be thinking small. It pointed out that at the end of the decade, eight may turn out to be too few, but that if the number should turn out to be 12, "the added cost would still be only a small percentage of the total expenditure recommended by the Panel, and well within the margin of error." The panel also recommended that after design work had been completed on the three large telescopes, $1 million be spread over four years to consider design of the "largest feasible optical reflector, in the 400–600 inch range."

In all, the recommendations for optical telescopes were set at a total of $68.2 million, and it was estimated that annual operating costs would be about 4 percent of this sum.

Radio Astronomy

The panel's examination of needs in radio astronomy produced the conclusion that the problems in this field are different from those in optical astronomy. It isn't the lack of observing time with "frontier" instruments that is limiting progress in radio astronomy, it found; rather, the problem is that existing and planned instruments fall short in angular resolution. "There is no natural barrier that prevents building radio telescopes on the ground with angular resolution far beyond that yet achieved," the panel stated. The problem is that they haven't been built.

In its specific proposals for the next 10 years in radio astronomy, the panel called for a $97-million construction program, to include construction of a large, very-high-resolution array with about 100 separate antennae, each perhaps 85 feet in diameter. The cost of this array was placed at $40 million. It also recommended two additions to the interferometer at the Owens Valley Observatory of the California Institute of Technology, $10 million; two fully steerable 300-foot paraboloids, $16 million; approximately 15 smaller, special-purpose instruments, $2 million each; and $1 million for design study of the largest feasible steerable paraboloid. As for operating costs, the panel concluded that radio astronomy, because of the large areas and the complex and changing electronic facilities needed for its activities, requires about 10 percent of construction costs.

The report also recommended that $1 million a year be devoted to the development of instruments for astronomical research, and, harking back to NASA's seeming affluence, it concluded that NASA's fellowship program, which is projected ultimately to support 4000 graduate students, "may be counted . . . as one of the sources of support that will sustain the current rapid expansion of interest in astronomy in the universities."

Repeatedly, the panel stressed that it had taken a conservative approach to the need for new facilities. For example, it argued that proposals to provide facilities to double the number of observers "cannot be considered rash." And it added that "there will surely be more than enough astronomers waiting to use the new instruments." Another argument that it chose to rely upon was national supremacy. When the cold war was in a fiercer state, this argument indeed went a long way, but it is becoming doubtful whether this still has its old power to move Congress. Nevertheless, the panel expressed concern at several points about efforts in astronomy abroad. In regard to radio telescopes, it stated that "it cannot be said that the American position is dominant." It made reference to the need for a "U.S.-controlled" telescope of major size in the Southern Hemisphere, whatever other countries may do.

And, finally, the panel shied away from the prickly question of where the proposed facilities should be located. "Such designations by the Panel," it stated, "could have created conflict-of-interest situations that would have prevented qualified astronomers from serving on the Panel." It said that quality and competition should govern the geographical decisions, but, since the panel consisted entirely of university or foundation-supported astronomers, it was perhaps inevitable that it should offer the opinion that "there is already danger of an imbalance between the strong federal support given to the national center for radio astronomy [supported by the National Science Foundation at Green Bank, West Virginia], on the one hand, and, on the other hand, the support given to the varied activities in the same field in the universities."

In addition to Whitford, the members of the panel are:

R. N. Bracewell, Radio Astronomy Institute, Radioscience Laboratory, Stanford University;

Frank D. Drake, department of astronomy, Cornell University;

Frederick T. Haddock, Jr., Radio Astronomy Observatory, University of Michigan;

William Liller, department of astronomy, Harvard University;

W. W. Morgan, Yerkes Observatory, University of Chicago;

Bruce H. Rule, California Institute of Technology; and

Allan R. Sandage, Mt. Wilson and Palomar Observatories, California Institute of Technology, Carnegie Institution of Washington.—D. S. GREENBERG

Sartre: French Philosopher Is Model of Literary Intellectual by "Two Cultures" Definition

By rejecting this year's Nobel prize for literature even before it was awarded him, the French philosopher and man of letters Jean-Paul Sartre not only caused a furor in the press but provided a footnote to the Two Cultures discussion.

Sartre's work and his fame in the past two decades emphasize the degree to which science and traditional forms of philosophy have diverged, and also how the split continues to be reflected in contemporary philosophy.

Since World War II, Sartre has maintained an international reputation as the chief exponent of one form of existentialism. He ended his career as a professional philosopher in 1942, but continues to work at the technical exposition of his ideas. Sartre is better known, however, as a novelist, playwright, literary critic, giver of contro-

versial public lectures, and partisan of the Left in postwar French politics.

As a philosopher, Sartre stands in the tradition of European philosophers who proclaim the primacy of human will rather than reason. An atheist existentialist, he has sought to create an ethical system not dependent either on religion or on any sort of determinism, historical or scientific.

He has said that the first principle of existentialism is that man is nothing but what he makes himself. This, in an oversimplified way, is what is meant by the existentialist catch phrase, "existence precedes essence."

Sartre's literary works, notoriously grim in tone, are chiefly explorations of the conditions of "anguish" and "forlornness," words which he uses in a special sense in his philosophical writings to mean that the individual defines himself by his choices of action and is without a refuge in religion or an excuse in determinism.

Existentialism has been called more an attitude than a philosophy, and certainly many in France and in Europe were receptive to ideas which asserted the freedom and responsibility of the individual after a war in which nearly all the nations of Europe had been submerged in defeat and occupation.

The existentialism which became fashionable after the war was, of course, a dilute form of Sartre's doctrine. Centered in the cafés and caves of the Latin Quarter in Paris, it mixed elements of Left Bank bohemianism, romantic individualism, and the spirit of *épater la bourgeoisie*. There were existentialist singers and existentialist movies. In those shortage days, the existentialist stereotype called for beards for the men, long stringy hair for the girls, and black clothes and blank expressions on everyone. It was, however, a time when philosophy was anything but purely academic.

Sartre's gospel of engagement, which extends to political affairs, was no doubt reinforced by his experience in the French Resistance. And it is not surprising that he is sympathetic to the revolutionary. Sartre is committed to socialism, and on most issues since the war he has been ranged on the side of the far Left against the rest in French politics, and with the East against the West. He has been critical of the Communists' suppression of individual freedom, however, notably after the Soviets put down the Hungarian Revolt. He has also rejected orthodox Marxist philosophy. With its foundations in dialectical materialism and its claims to scientific certainty, Sartre appears to find that the Marxist analysis leaves too little scope for individual choice.

The Marxists have accepted his help as an ally but have chided him for his errors, which they see as putting a new face on old-fashioned liberal and utilitarian ideas.

Sartre has also been treated with coolness by the majority party among Western academic philosophers. Sartre has undertaken the formidable task of building a philosophic system which would give human life meaning and coherence. Modern philosophers have tended to abandon efforts to find grand designs through ethics and metaphysics and instead to examine the nature and limits of human knowledge, primarily through mathematical logic and the analysis of language. It might be said that philosophy, the mother of sciences, has gone to live with the children.

In the beginning, of course, philosophy and science were one. Aristotle wrote on biology, physics, ethics, politics, and metaphysics, and his *Poetics* makes him, in the language of the Two Cultures discussion, the first of the great literary intellectuals.

After Galileo, Fragmentation

With Galileo, the conflict between religion and science came into the open, and with the discoveries in mathematics and science of the Renaissance, the fragmentation of philosophy began. The breakup was neither immediate nor complete. Newton, for example, was as devoted to his work in theology and Biblical chronology as to that in "natural philosophy," and some very distinguished 20th-century physicists have been lured by mysticism and metaphysics. But the departure of mathematics, physics, chemistry, biology, and, later, of the behavioral and social sciences from philosophy had become inevitable.

While the territory of philosophy has been shrinking, some 20th-century philosophers have persisted in seeking an organizing principle to give coherence and purpose to human life. Notable among the system builders have been Bendetto Croce and Henri Bergson, a Frenchman who, like Sartre, sets will above reason. Bergson was a rebel against the logical and scientific tradition in philosophy. Bergson and Sartre are alike in having had an extraordinary impact on the intellectual life of their times. Both men reject the idea that scientific advance guarantees real progress. But while Bergson is overtly anti-science, Sartre appears rather to accept the effect of science but ignore it.

The Nobel affair and the publication of a first volume of autobiography, *The Words* (George Braziller, New York), have raised Sartre to another peak of celebrity in his two decades of fame. (Sartre refused the Nobel prize with the explanation that, since the war, he has accepted no awards which might influence the public in judging his work. He will not collect the prize money, but his name will be added to the Nobel rolls, just as was Boris Pasternak's in 1958 when he declined the Nobel prize for literature under pressure from the Soviet government.)

It may say something about the transcendental qualities of science that nobody has felt constrained to turn down a Nobel prize in physics, chemistry, or medicine. It also seems to be true that Nobel winners in literature are better known and better remembered by the general public than those in the sciences, which seems a little unfair since the scientists may well have a much greater ultimate influence on human life. But the scientists are separated from the public by the difficulty of understanding their work. And there is also the feeling that the scientist serves science and that in his special achievement he simply got there first, while the writer's achievement is regarded as unique.

Philosophers, like scientists, stand on the shoulders of the last generation. Philosophers who have won the Nobel prize, like Bergson (1927) and Bertrand Russell (1950) have been gifted writers who dealt with problems which directly concern society and the individual.

In his autobiographical work on his childhood Sartre portrays himself as a precocious, precious, and unpleasant little boy. His father died when he was an infant, and he grew up in a family in which there was a strong Catholic-Protestant tension. His education, though somewhat irregular, was a classical education in the French style. As a child he had an extravagant fantasy life fueled by his promiscuous reading, in which neither science nor even science fiction had much place.

Sartre, who in his major work displays little scientific training or influ-

ence, appears to qualify as a leader in one polar group in C. P. Snow's Two Cultures, the literary intellectuals. Certainly, Sartre has strongly influenced many writers on both sides of the Atlantic, but so have Darwin, Marx, and Freud and their followers. And just as the effect of science on philosophy has made it unlikely that the 20th century would produce another Hegel, with his grand and grandiose rationalist interpretation of reality, it may well be that Sartre represents a late flowering of what he calls the "bourgeois puritan individualism," which produced him and against which he rebelled.

—JOHN WALSH

Announcements

The Department of Commerce has announced the establishment of a **scientist exchange program** within the Department's technical bureaus. It is designed to afford staff scientists an opportunity to broaden their scientific, technical, and management abilities through 9-month assignments at different bureaus within the department. The scientists, in addition to working at new jobs, will be brought together for periods of study to include considerations of national and international issues involving science and technology.

Meeting Notes

Papers are being solicited for a seminar on **Fatty Acids**, scheduled 3–6 February at the Regional Research Laboratory, Hyderabad-9, India. It will be sponsored by the Council of Scientific and Industrial Research. Topics to be covered include recent advances in the field of fatty acids and their derivatives. Deadline for 5-page abstracts: *30 November*. (G. Satyanarayana Rao, Council of Scientific and Industrial Research, Regional Research Laboratory, Hyderabad-9, India)

Grants, Fellowships, and Awards

Travel grants are available to help U.S. scientists attend the 23rd international congress of **physiological sciences**, scheduled next 1–9 September in Tokyo. The allotments will cover round trip charter or group jet fares. Preference will be given younger scientists and persons presenting communications. Deadline for receipt of applications: *1 January*. (USA National Committee, International Union of Physiological Sciences, Room 256, 2101 Constitution Avenue, NW, Washington 20418)

The Medical Research Council of Sweden is offering two postdoctoral fellowships for a year's training in **biomedical sciences** in Swedish research institutions beginning in the fall of 1965. The fellowships, made available through the National Institutes of Health, offer training in either a basic or clinical field related to health, as well as a choice of Swedish institutions. Stipends have been set at two levels equivalent to salaries paid Swedish associate professors (30,000 Swedish crowns: approx. $6,000) and assistant professors (25,000 Swedish crowns). U.S. citizens who have been engaged in research in the U.S. for at least two of the past four years may apply. Deadline for receipt of applications: *1 January*. Information and forms are available from: Chief, Career Development Review Branch, Division of Research Grants, NIH, Bethesda, Md.

Applications are currently being accepted for two **Turtox Scholarships** for the 1965–66 academic year. The scholarships, established by General Biological Supply House, Inc., carry a stipend of $5000 each, and are open to any U.S. citizen who is, or has been, enrolled in a graduate school, and who plans to continue study for a Ph.D. in botany, zoology, or biology. Deadline for receipt of applications: *1 February*. (Frank A. Brown, Jr., chairman of the awards committee, Department of Biological Sciences, Northwestern University, Evanston, Ill.)

The U.S. Atomic Energy Commission has announced the availability of graduate fellowships in **nuclear science and engineering**. First, intermediate, and terminal year fellowships, with stipends of $2400, $2600, and $2800, respectively, are being offered. They also carry an additional $500 for a wife and each dependent. Other payments include tuition and fees, as well as an allowance for travel to the fellowship school, and applicants may choose one of 68 participating universities. Application deadline: *15 January*. (NSE Fellowship Office, University Relations Division, Oak Ridge Institute of Nuclear Studies, Oak Ridge, Tenn. 37831)

The Boris A. Bakhmeteff **research fellowship in fluid mechanics** is available through the Humanities Fund, Inc., New York. Applicants must be fulltime graduate students, working toward a master's or doctor's degree. The fellowship stipend is $3600. The recipient may work at the institution of his choice, but may not hold any other fellowship. Deadline for receipt of applications: *15 February*. (W. Allan, School of Engineering and Architecture, City College of New York, New York 10031)

Publications

Boston University Observatory has announced the publication of a *Catalog of Lunar Craters*. The 106-page catalog is a digital map of 5 percent of the visible surface of the moon. Information listed for each crater in the catalog includes a sequence number, the crater name, the position coordinates, the diameter, a description of degree of definition and shape, special notes on physical structure, and the number of the photograph on which measurements were taken. The majority of craters listed in the catalog were positioned for the first time and are designated by number. Copies are available to space researchers. Applications for copies should be sent on institutional letterheads. (*Catalog of Lunar Craters*, Prof. G. S. Hawkins, Physics-Astronomy Department, Boston University, 700 Commonwealth Avenue, Boston, Massachusetts.

The AAAS has announced publication of a new *Science Book List for Young Adults*. The 268-page annotated catalog of 1376 selected science and mathematics books for reference and collateral reading by secondary school students and college undergraduates replaces a similar 1959 list. (*The Science Book List for Young Adults*, AAAS Publications, 1515 Massachusetts Avenue, NW, Washington, D.C. 20005; $2.50 paperbound, $3.50 cloth)

The National Aeronautics and Space Administration has made available its recent publication, **"Unmanned Spacecraft of the U.S."** The 16-page booklet reviews the spacecraft which have been developed and flown, or are being developed in the U.S. by NASA: "scientific" satellites which are investigating the environment, and "application" sat-