friends whom he knew socially had little idea of his prominence as a scientist.

Smith resembled his predecessor, D. H. Campbell, in his love of travel. From the North Cape in 1920 to Indonesia in 1956, he and his wife covered most of the globe, with the exception of the interior of Asia, the eastern Mediterranean, and Antarctica. His reputation and his wide correspondence made him a welcome visitor to botanical laboratories everywhere.

As his health deteriorated during the last two years, Smith's courage was an inspiration. For one accustomed to relying on himself, physical weakness must have been more difficult to bear than pain, yet he continued to come to his laboratory despite the great effort involved, and during his last days, when he was able to speak only with difficulty, he continued to direct the activities of his assistant from his hospital bed. The passing of such a man leaves a void that can never be filled by a research team.

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Science in the News

Permanent Space Committee Established by United Nations

The United Nations General Assembly approved on 12 December the establishment of a permanent Committee for International Cooperation in the Peaceful Uses of Outer Space. The new committee was set up as the result of a resolution passed earlier in the day by the U.N. Political Committee. The vote was 74 to 0; the Dominican Republic abstained, and seven members of the committee were absent.

Functions Described

The Political Committee proposal to the General Assembly stated that the space committee's responsibilities would be to:

"(A) Revise, as appropriate, the area of international cooperation, and study practical and feasible means for giving effect to programs in the peaceful uses of outer space which could appropriately be undertaken under United Nations auspices, including *inter alia*: (i) assistance for continuation on a permanent basis of the outer space research carried on within the framework of the International Geophysical Year; (ii) organization of the mutual exchange and dissemination of information on outer space research; and (iii) encouragement of national research programs for the study of outer space, and the rendering of all possible assistance and help towards their realization.

"(B) Study the nature of legal problems which may arise from exploration of outer space."

The permanent body will not take up the regulation of the military uses of outer space. Neither the United States nor the Soviet Union is willing to have it do so.

Membership Balance Controversial

The East-West balance of membership on the committee has long been a controversial issue. A temporary space committee was established a year ago, but it could not be effective because it was boycotted by the Soviet Union. The temporary body had 12 Western members, three neutral (Sweden, India, and the United Arab Republic), and three members of the Soviet bloc (the U.S.S.R., Poland, and Czechoslovakia). Two of the neutral members, India and the United Arab Republic, refused to participate in committee activities last spring because of the Soviet boycott.

During the negotiations in recent weeks several of the Western delegates indicated that their governments would not agree to more than five seats for the Soviet bloc on the permanent committee. They held that even this number was too many, since it was disproportionate to the strength of the Soviet bloc in the United Nations. The Soviet bloc has nine members out of 82.

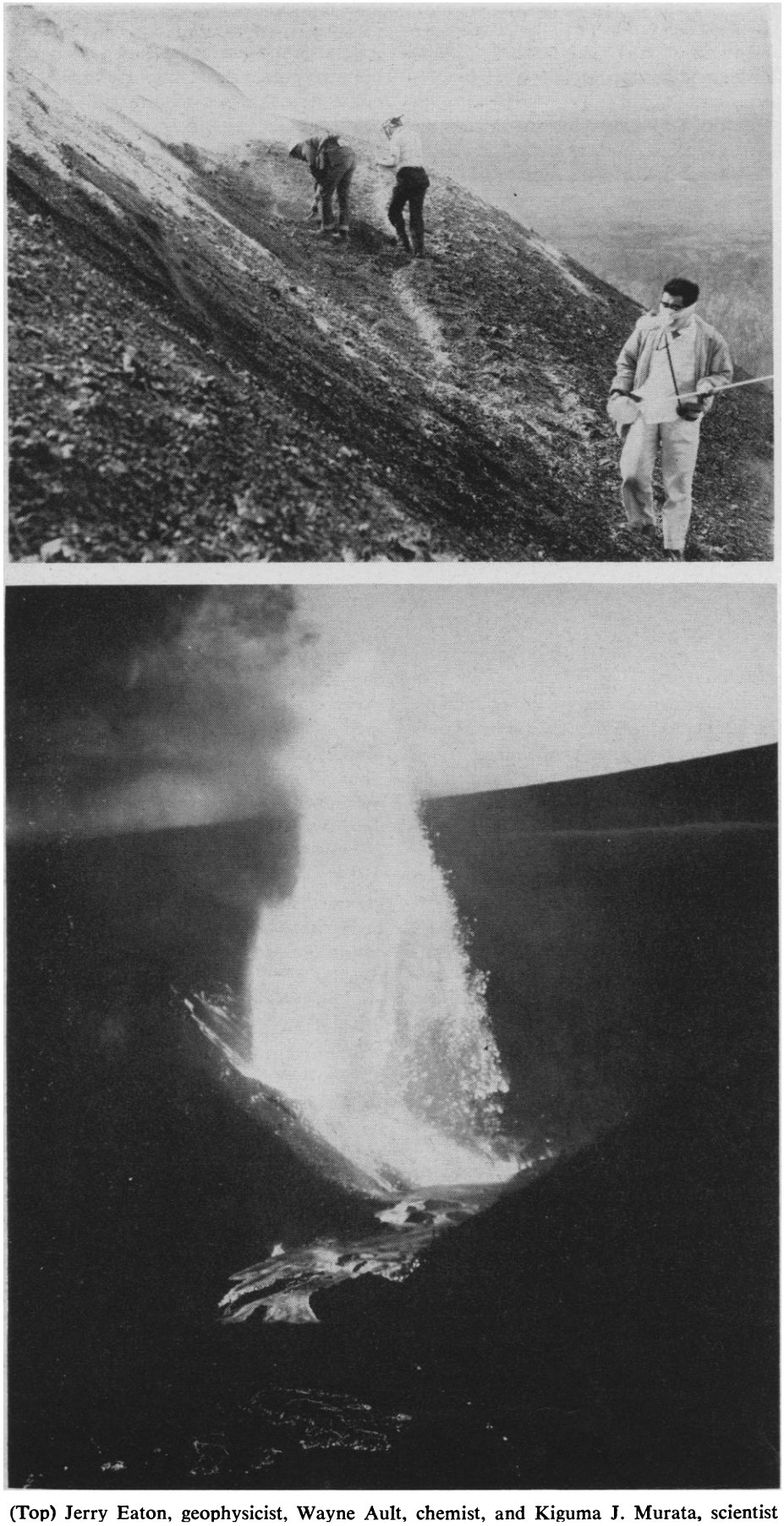
The new 24-member space committee is composed of 12 countries that are members of joint defense agreements against possible Soviet aggression, seven members of the Soviet bloc, and five neutral countries. The members follow: Albania, Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Czechoslovakia, France, Hungary, India, Iran, Italy, Japan, Lebanon, Mexico, Poland, Romania, Sweden, the U.S.S.R., the United Arab Republic, the United Kingdom, and the United States.

The Political Committee's space proposals to the General Assembly included a resolution calling for an international conference in 1960 or 1961 "for the exchange of experience in the peaceful uses of outer space." Participation is limited to members of the United Nations and its specialized agencies.

The U.N. does not plan to establish any new permanent agency to administer the outer-space program, as it did for atoms-for-peace. Instead, the program will operate through COSPAR, a body that was set up in October 1958 within the framework of the International Council of Scientific Unions to continue the cooperation and exchange of data in space research that had developed during the International Geophysical Year. The national adherents to COSPAR are scientific academies, not governments.

Geological Survey Volcanologists Study New Series of Eruptions at Hawaii's Kilauea

New eruptions of the volcano Kilauea in Hawaii are being studied by the staff of the U.S. Geological Survey's Hawaiian Volcano Observatory, which is located in Hawaii National Park on the rim of Kilauea. Surface activity thus far has been limited to a portion of the crater called Kilauea Iki or "Little Kilauea." Between 14 November and 5 December Iki erupted five times, its lava fountain rising to a height of 1650 feet or more and dying abruptly after



(Top) Jerry Eaton, geophysicist, Wayne Ault, chemist, and Kiguma J. Murata, scientist in charge, sampling hot gases on the first stage cone in Kilauea Iki. Note the gas-sampling bulbs and the improvised protection against choking vapors. (Bottom) View of the fountain, 600 to 900 feet high, from Byron's Ledge (a narrow separation between the main crater and Kilauea Iki). Lava in the lake is approaching the level of the fountain.

varying periods of time. The first phase of activity lasted for a week, but in the fifth phase the fountain, which reached a temperature of 2170°F, subsided after only 9½ hours.

Lava Forms Lake

The main bulk of the erupting lava flows first northwestward to a high-level pond, then eastward to the main floor of the Kilauea Iki pit. During the first phase the rate of delivery was estimated at about 50 cubic yards per second. Pegs driven into the side of Kilauea Iki's main pit on 17 November to keep track of the level of the lava pond, which is about 35 acres in area, disclosed a rise of 25 feet overnight; by 20 November the level was rising at a rate of 4 feet per hour. On 21 November, the pond reached a depth of 350 feet, forming a fiery lake estimated to contain 40 million cubic yards of material.

During each event a vast amount of lava, perhaps as much as 10 million cubic yards, flows back into the vent. However, there is a net gain in the amount of lava in the pond after every phase of activity. Calculations are not yet complete, but Survey scientists have arrived at an approximate figure of 55 million cubic yards for the net output to date.

Seismologic instrumentation and tiltmeters have made it possible to follow the course of the current activity ever since its beginning several months ago at a depth of approximately 36 miles. When in mid-October small, shallow earthquakes were being recorded at a rate of several hundred a day at a single observation station, extra manpower was called into action to keep a close watch on the network of tiltmeter stations.

Tiltmeters record bulges and subsidences on the surface that would not otherwise be noticeable. Ordinarily, a continually rising bulge (like the one that preceded the eruption of Kilauea in 1955) is a prelude to an eruption of lava surging upward from depth. However, the activity does not always reach the surface because rising lava may be drained off laterally into quiet rift zones capable of containing an entire flow. After the period of upwelling, the volcano contracts and the slopes tilt inward.

The Survey Team's Work

The Survey's observation program is headed by Jack Murata, who has been

submitting regular reports to Washington. Members of the Hawaii staff have been working all hours of the day and night on their special projects since the period of intense activity began. They meet early every morning for a conference, discuss their observations, determine what should be done next, establish a plan of action for the day, and then leave for the crater. Duties change from day to day as new objectives are indicated.

Increased heat radiation, strong gas emission, and smoke from burning trees are making the work difficult. However, unlike Kilauea's principal fire pit, which is lined by vertical walls, Kilauea Iki can be entered without too much difficulty. So far the eruptions have been confined to the crater, so that there is no danger yet to the surrounding area and buildings.

In addition to keeping continuous seismological and tiltmeter records, the staff members are performing certain tasks like lava collection and gas sampling on a regular basis. A series of gravity surveys is also being launched, and a network of gravimeter stations has just been established to study the changes in the force of gravity as the lava shifts underground.

Tentative Findings Reported

Early this month Murata reported that a rough correlation seems to exist between the olivine content and the temperature of the erupted material. The iron-magnesium mineral olivine apparently sinks rapidly in the magma so that a strong flushing action from deep down is required to bring it to the surface. It is during such periods of strong flow from depth that the highest temperatures can be expected.

During periods dominated by the formation of pumice, temperatures appear to be lower. There have been two periods of pumice eruption and two of picrite eruption; this suggests that the activity has a cycle pattern that is independent of the timing of the individual phases. (Picrite is a lava of high olivine content.)

Crater Rim Road, which is to leeward of the Kilauea Iki vent, is now buried under 100 feet of pumice, and more is accumulating. During the periods of pumice eruption, only a minor amount of lava runs from the vent and spreads slowly out over the chilled surface of the lava pond.

Murata has also reported that an analysis in mid-November of a sample of fresh lava showed it to be 49.5 percent silica, indicating, he said, that the magma was "definitely more primitive than anything that came out during the 1955 eruption." The primitive composition correlates with the rising temperatures measured. Jack Murata commented:

"This is a case of very rapid delivery of undifferentiated material to the surface. Our group had developed a concept of the effect of speed of ascent and cooling of the magma on the composition of the lavas, and this eruption seems to bear us out."

The long-range objective of the Hawaiian observatory's program is to learn enough about the geochemistry and geophysics of volcanos to be able to accurately predict eruptions, thus lessening destruction of human life and property. Since seismological tremors are continuing at Kilauea, termination of the present unusually interesting series of eruptions is not in sight.

Scientific Sections of Exchange Agreement with Soviet Union

On 21 November in Moscow the United States and the U.S.S.R. signed an agreement for cooperaton in exchanges in the scientific, technical, and cultural fields in 1960–61. The agreement included as an addendum the text of the Memorandum on Cooperation in the Field of the Utilization of Atomic Energy for Peaceful Purposes, which was signed in Washington, D.C., on 20 November [*Science* **130** *(4 Dec. 1959)*]. *Abstracts from the text of the new exchange program follow.*

Section II. Scientific Exchanges

1) The two parties, attaching great significance to the development of scientific exchanges between both countries, will take all appropriate measures in order to achieve fulfillment of the agreement for exchanges in the field of science concluded July 9, 1959, between the Academy of Sciences of the U.S.S.R. and the National Academy of Sciences of the U.S.A.

2) Additional visits by scientists of one country to the other country may also be agreed upon through diplomatic channels or between appropriate organizations as approved by each party.

Such visits, whether for the purpose of participating in scientific meetings, exchanges of experience, conducting studies, or delivering lectures shall take place on a basis of reciprocity.

3) Cooperation in the field of utilization of atomic energy for peaceful purposes. Both parties agree that in the field of the peaceful uses of atomic energy they will provide for reciprocal exchanges of information and visits of scientists and will explore the desirability of joint projects. To that end, specific proposals will be developed between the United States Atomic Energy Commission and the Main Administration for the Utilization of Atomic Energy under the Council of Ministers of the U.S.S.R. which will be subject to approval by the two governments in the usual manner, and which may be appended to this agreement as an addendum.

4) Both parties are in favor of having the Academy of Sciences of the U.S.S.R. and the American Council of Learned Societies come to an agreement on exchanges, on a reciprocal basis, of scholars in the social sciences and the humanities, such as historians, economists, philosophers, specialists in literature, and linguistics.

Both parties are in favor of having the Academy of Sciences of the U.S.S.R. and the American Council of Learned Societies provide for participation, on a reciprocal basis, by scholars of both countries in joint seminars and symposia and consider joint research projects.

5) Both parties agree to provide for an exchange of delegations of geographers of four to six persons for three to four weeks, with a program to be agreed upon by appropriate organizations. . . .

Section IV. Exchanges in the Field of Agriculture

1) Both parties will provide for an exchange of delegations of specialists in agriculture, consisting of three to six persons each, for a period of three to four weeks, in specific fields as follows:

Soviet Delegations to the U.S. (a) Food processing (meats, grains, and canning crops). (Number of persons in the delegation as previously agreed upon.) (b) Fertilizers, insecticides, and weed killers. (c) Poultry-husbandry, study of broiler production and methods of hybridization. (d) Agricultural science and information. (e) The breeding and hybridization of cattle and pigs. (f) Complex mechanization of cultivation and harvesting of sugar beets and potatoes.

U.S. Delegations to the U.S.S.R. (a)