Two thousand and five hundred delegates from farmers' organizations in Washington, Oregon and Idaho in session at Seattle on June 13 subscribed $20,000 toward a fund for building a temple of agriculture in Washington, D. C.

UNIVERSITY AND EDUCATIONAL NEWS

THE sum of £200,000 is being provided by the Victorian government to enable Melbourne University to complete its buildings.

THE Goldsmiths' Company has given £5,500 to the University of Cambridge for the purpose of extending and equipping the department of metallurgy.

DR. LEVERETT D. BRISTOL has been elected dean and professor of bacteriology and public health of the University of Tennessee College of Medicine at Memphis.

DR. L. J. GILLESPIE, of the Bureau of Plant Industry, has been appointed professor of physical chemistry in Syracuse University.

FREDERICK RASMUSSEN, who has been appointed Pennsylvania state secretary of agriculture, has been succeeded in the professorship of dairy husbandry at the Pennsylvania State College by Andrew A. Borlaw, of the extension department.

AT the University of Chicago John A. Parkhurst, of the department of astronomy and astrophysics and Elbert Clark and George W. Bartelmez, of the department of anatomy, have been promoted to associate professorships.

PROFESSOR C. R. MARSHALL, professor of materia medica and therapeutics, in the University of St. Andrews has been appointed Regius professor of materia medica in the University of Aberdeen, vacant by the resignation of Professor Theodore Cash.

DR. BOON, has been appointed to the chair of chemistry at Heriot-Watt College, Edinburgh.

MR. R. W. H. HAWKEN has been appointed to succeed Professor A. J. Gibson as professor of engineering in the University of Queensland.

DISCUSSION AND CORRESPONDENCE

THE VALLEY OF TEN THOUSAND SMOKES

UNDER the caption "The Katmai National Monument" in the issue of SCIENCE, January 3, several observations and comparisons are made relative to this wonderful natural phenomenon. Among these occurs the following:

> Rock strata superheated since the great eruption underlie Katmai near enough to the surface to turn to instant steam the spring and drainage water of many a surrounding mile of foot hills. Thus originates the steam which bursts from the myriad valley vents.

An acquaintance with this remarkable volcanic area would convince the writer of the above observations that his explanations are quite inadequate to explain the phenomena occurring there and an examination of the gases evolved would still further convince the writer that he was dealing with something much more closely related to the molten magma than an area of residual superheated strata—presumably so heated in 1912 and slowly cooling off. Although steam is the principal constituent of the emanations yet there are many vents in which steam is but a small percentage of the issuing gases, the main portion of the vapors being highly corrosive acids, volatile metallic chlorides, sulphides and oxides.

It is quite true that the local surface drainage disappears as it attempts to find its way down the valley and some of the lesser conspicuous features of this valley are dumps of volcanic débris vomited out from the throats of vents into which the surface storm drainage had poured it. But the most active area of the whole valley lies right on the peninsular axis itself and no one seeing the vast quantities of vapors being evolved would for a moment consider their origin to have been up-grade surface infiltration from the distant "foot-hills."

The peninsular axis is not yet in equilibrium with the volcanic forces. In 1917 avalanches of rocks were being precipitated down the perpendicular face of Falling Mountain. Gases were issuing from crevices distributed from the bottom to the top 2,000 feet above

the level of the valley. Fifteen miles to the eastward a similar disintegration of a mountain in the peninsular axis was taking place but without the accompanying gaseous emanations. It is reasonable to assume that this axial disturbance is attributable to slow upthrust due to volcanic pressure from the underlying magma.

It is somewhat difficult to reconcile the idea of a cooling-off mass of material such as lies on the slope of Mount Lassen as the origin of the activity in the Valley of Ten Thousand Smokes. The activity is too pronounced, too constant and too evidently magmatic to admit of any explanation other than the direct volcanic origin of the gases. This valley is just as truly volcanic to-day as are the craters of Vesuvius and Kileaua. The superficial liquid lava alone is absent.

The character of the gaseous emanations points to their magmatic origin. I found that the gases as they issued were not in chemical equilibrium but continued to react after being collected, the total volume increasing. Moreover, these gases far from being spent products of volcanic action contain some of the most chemically active gases found issuing from any volcano on the face of the globe. The secondary products of these gases, that is the sublimates, etc., formed by their action on the rocks through which they pass to the surface are of a kind and quantity found only in the most active volcanic areas. Dikes of volcanic sublimates and incrustations several feet high and hundreds of yards in length mark the outlet of these subterranean emanations.

There are huge tunnels running horizontally beneath the surface of the mud flow, tunnels formed by the solvent action of the issuing gases. At the upper end of the valley seventy-five feet below the surface is a horizontal tunnel large enough to drive a team and wagon through. There are no incrustations on the walls of this passage but they are baked a brilliant brick red. It is only near the surface that the cooling off of the gases permitted the deposition of incrustants on the walls of the vents, and even here the temperature is at times so high—several hundred degrees centigrade—that little matter is deposited and the gases only become visible several feet above the opening of the vent.

Gautier[1] shows that a cubic mile of granite if forced to give up its aqueous content, as by fusion, would release 100,000,000 tons of water. Another 20,000,000 tons would be supplied if the hydrogen contained in this mass of rock could be burned. Water at a high temperature and under pressure reacts actively with other compounds that are not appreciably affected by it at ordinary temperatures. Barus[2] found that at 210°, 50 grams of water dissolved over 200 grams of glass. With carbon dioxide it forms carbon monodixe, hydrogen, methane and free carbon. It decomposes metallic sulphides and no doubt reacts upon other compounds of the metals. Should it be dissociated into its elements as is quite possible at the temperature obtaining within volcanoes then it becomes at one and the same time an oxidizing and reducing agent of the strongest character.

A better explanatory postulate for the phenomena of the Valley of Ten Thousand Smokes is afforded by considering the origin of the gaseous emanations to be that of the chemical reaction between the water content of the crust in contact with the heated magma, and the secondary reactions consequent upon the chemical activity of the water under these conditions, gives rise to the variety of gases and sublimates found issuing from the surface vents. The explosion of June, 1912, may have ruptured the sedimentary rocks underlying the valley and permitted these gases to escape through the crevices so formed or a subsidence of the valley floor may have precipitated a mass of the crust into contact with a region sufficiently hot to fuse the rocks. The pressure of the gases so formed may have caused the explosion wrecking Katmai and the floor of the valley itself. There is little doubt but that the activity is far from subsiding for

[1] *Compt. Rend.*, Vol. 143, 1906.

[2] *Am. Jour. Sci.*, Vol. 9, 1900.

Falling Mountain in 1917 was still reacting from subterranean pressure and another mountain fifteen miles to the eastward was also sending down avalanches of rocks. The presence of the lava plug Novarupta upthrust 200 feet above the floor of the upper end of the valley in 1912 is another bit of evidence that the activity of the valley is not of a secondary nature.

No other volcanic region in America offers such an opportunity for the study of the products of volcanic activity as does this. The vents are easily approachable, the gases are issuing under pressure and are not in equilibrium, the salts within many of the vents are anhydrous due to the high temperature of the issuing gases. Sublimates are in evidence every where. The valley will be a fertile field of investigation alike for the geophysicist, geologist, chemist and mineralogist. It is to be hoped that the preliminary work already commenced will be prosecuted vigorously so that nothing will be lost through the lapse of time.

The setting apart of this valley as a national monument is a fitting climax to the expeditions of the National Geographical Society and to the persistent and untiring efforts of Dr, R. F. Griggs, director of the Katmai explorations.

J. W. SHIPLEY

WINNIPEG, MAN.

QUOTATIONS

THE CONDITIONS ATTACHED TO GOVERNMENT GRANTS FOR SCIENTIFIC RESEARCH IN GREAT BRITAIN

MAY I again direct attention to the conditions under which grants are made to individual research workers by the Committee of the Privy Council for Scientific and Industrial Research (London: H.M. Stationery Office, 1919. Price £6)? The matter is of some importance, as not only are those who refuse to accept these conditions debarred from participating in the grants made from the public purse for scientific research, but other sources which used to be available, and to which such conditions were not attached, are also being cut off. I understand, for example, that the Carnegie Trust for the universities of Scotland intends very largely in the future to discontinue its grants in aid of research, and to refer applicants to the government.

By accepting a grant under these conditions, a research worker undertakes not to publish his or her results without the consent of the committee, and gives up the ownership in the commercial rights of his discoveries, which otherwise, under the patent law, belong to him. It is the committee, not the inventor or discoverer, that is to determine to what extent and in what proportion the committee and those who have made the discoveries are to secure the ownership of the results by patent, presumably on the ground that the committee has provided the funds for the research. If that is the ground, ought not the committee to state precisely what is the share it claims, whether the share is limited to the amount of the monetary contribution, or if it intends to make a profit? I understand the money was given by Parliament to foster research, not to exploit it. As it is, a worker accepting a grant places himself absolutely, as regards the legal right to his own property, in the hands of a committee, and if, as is bound to occur, differences arise as to what is the share of the discoverer or who is the discoverer, the matter is not put into the hands of an impartial arbitrator to settle, but is settled by one of the parties in the dispute. In precisely the same way, with existing secret patents, if a dispute arises between a patentee and the government, it is the treasury, who pays for the use of the patent, that settles the dispute.

The condition is justified on three grounds. First, on the ground of national interest, especially in the present abnormal circumstances, and that it is not in the national interest that results of commercial value should be made available to other countries to the detriment of our own. As regards actual war conditions, patents containing any information likely to be of use to the enemy have not been published, so this is secured independently of the question of the ownership of the patent. As regards the future, one is justified in ask-