SCIENCE NEWS

Science Service, Washington, D. C.

THE SECOND INTERNATIONAL POLAR YEAR

THE successful conclusion of the Second International Polar Year was celebrated at Washington on August 29 and at numerous other special observatories established a year ago, mostly in the north Polar regions, in a world-wide attempt to discover how the atmosphere as a whole circulates.

The Mount Washington Observatory, which, with the exception of the automatic station on Mount Wachusett, in Massachusetts, was the only weather station in the United States established for the Polar Year work, holds the distinction of being America's only high mountain meteorological station. It was established as a private venture under the direction of Joseph B. Dodge, Hut Manager of the Appalachian Mountain Club, and generously supported by contributions from scientific and other organizations, firms and individuals. The meteorological program was under the general supervision of the Blue Hill Meteorological Observatory, of Harvard University, which also participated in the Polar Year work in Milton, Massachusetts.

The regular observations and automatic records consisted of temperature, humidity, wind direction and velocity, and atmospheric pressure, also precipitation, cloudiness and intensity of sunshine and skyshine. A similar, but less ambitious, program was also carried out at the base of the mountain on both east and west sides, and, during the summer, at numerous other stations strung along the heights of the White Mountains in the vicinity of Mount Washington, with an additional base station ten miles to the west at Twin Mountain airport.

A special effort was made to obtain wind data from levels above the mountain top, which is at 6,293 feet above sea-level. Pilot balloons, small rubber spheres filled with hydrogen, were released in the rather infrequent intervals when the mountain peak was neither in the clouds nor the wind too strong to stand up against anything under 70 or 80 miles an hour! Since last October, when the station was established, 150 ascents were made.

Detailed observations were also made of cloud forms and motions at the different levels, adding greatly to the information yielded by the pilot balloons. Additional aerological observations were made when practicable throughout August by means of meteorological kites, flown by S. P. Fergusson from the top of the mountain, and airplane meteorograph equipment, loaned by the Massachusetts Institute of Technology, from Twin Mountain. These means brought down records of temperature, humidity and pressure to heights of nearly a mile above the top of the mountain. Pilot balloons released from Twin Mountain during the airplane flights provided data on the wind directions and velocities to even greater heights.

Mount Washington was one of ten special aurora observation stations through the northern United States, cooperating in a much more intensive program which was carried on in Arctic Canada and Alaska at the eight special Polar Year stations established there.

STUDY OF THE RELATIONSHIPS OF ANIMALS

USING centrifugal forces some four hundred thousand times the force of gravity to study the relationships of animals is the latest achievement of Dr. Theodore Svedberg, of the University of Upsala, Sweden. In a lecture at the Woods Hole Marine Biological Laboratory, he described the application of this method to studies of blood of various animals.

The carriers of oxygen in the blood are colored substances, called blood pigments. They are different in different animals, possessing differing molecular weights and structures. Therefore, if shaken up with a water solution they tend to fall to the bottom at different rates. To study these different rates at times short enough to be measurable it is necessary, however, to use forces that greatly exceed the force of gravity.

Dr. Svedberg has managed to produce this force by means of what is known as the ultra-centrifuge, a cell that holds the liquid to be tested, and is revolved at the terrific speed of 75,000 rotations per minute. To reduce friction it is necessary to have the entire rotating part of the apparatus in an atmosphere of pure nitrogen at a pressure only about one thirtieth that of the atmosphere. It is as though an automobile were to keep turning a corner at a speed of about three hundred miles an hour.

Pictures are taken through crystalline quartz windows as the centrifuge revolves, and these pictures are then run through an instrument which measures exactly the density of the image, thus giving a more precise knowledge of where the blood pigment being tested was in the cell at the moment the picture was taken than is possible to the eye.

From these studies it has been found that the blood pigments of some of the lower organisms are much more complex than man's, having molecular weights of the order of a million, as contrasted with the comparatively low one of 64,000 which is possessed by hemoglobin.

Dr. Svedberg suggests that the method may be used to tell different species apart in cases where the study of the form of the animal does not exactly place it in relation to the other animals of the same group.

Using a centrifuge that revolves at such high speeds is quite dangerous, for should some accident occur, the tremendous speed will result in an explosion.

Dr. Svedberg says that in the explosions he has experienced, the rotor has stayed inside the casing. This casing is made of special alloys, as are the other parts of the instrument, and is so constructed that the force of an explosion will be distributed partly to the foundation of the building.

Dr. Svedberg has carried back with him to Sweden for further study specimens of blood of several American marine animals.

HYDROGEN AND THE CORROSION OF METALS

HYDROGEN, the lightest gas known to man, is the sole defender against the ravages of corrosion. That hydrogen was the limiting factor in preventing wholesale corrosion of metals exposed to dampness was the opinion expressed by Professor Oliver P. Watts, of the University of Wisconsin, before a meeting of the Electrochemical Society in Chicago on September 7.

The slow but certain eating away of water pipes and minerals by salt and acid water is adding an enormous amount to the cost of modern civilization. Engineers are studying the theories of corrosion because it is only through a more complete understanding of the fundamental process that they will be able to diminish this loss.

Thirty years ago Dr. R. W. Whitney, now vice-president of the General Electric Company, announced that the corrosion of metals was an electrochemical process and this view is generally accepted to-day. When a metal is in contact with an acid solution corrosion takes place by the chemical process of the metal replacing the hydrogen in the acid. The acid dissolves the metal and hydrogen is released.

This released hydrogen coats the metal surface with an electrically charged layer that prevents the chemical reaction from continuing at the initial rate. If the hydrogen layer is built up to a sufficient thickness the reaction is practically stopped. However, under natural conditions, the hydrogen combines with the oxygen of the air to form water and the dissolving of the metal goes on at a rate that is limited by the amount of oxygen available to remove the protective coat of hydrogen.

Impure metals are corroded more quickly than pure metals. Electrochemists believe that this is due to the impurities taking up the hydrogen. Contrary to the popular belief that pure metals are subject to corrosion under the action of certain acid solutions, Professor Watts has shown that if oxygen is absolutely excluded copper will not corrode in a solution of sulfuric acid, a reaction that is very rapid in the open.

The survey of the electrochemical theory by Professor Watts was based on replies to queries to eleven investigators prominent in the field of corrosion in England and the United States.

OLD AGE

CULTIVATE your best abilities, practise the things in which you are most interested, if you wish a happy and contented and useful old age. This advice was proffered in an address by Professor W. R. Miles, psychologist of Yale University, at the Chicago meeting of the American Psychological Association.

Professor Miles has conducted an extensive survey of the skills, interests and mental attitudes toward life of 2,000 persons of all ages from 20 to 80, and on the data thus obtained he has based his conclusions.

Greatest energy and alertness, he found, are displayed by the youth of 20. At 30 a slight slowing down shows itself, but is more than made up by increases in confidence and skill.

The man of 40 is at a crucial crossroad. He can compensate for the more perceptible slowing down in his physical abilities by maintaining his still high manual skill, at the same time broadening his mental horizon by reading and mature conversation. If he does not do this, he will find himself slipping, and with no compensations he may at times put on desperate spurts to prove that he is "as good as he ever was"; with disastrous results when he fails, as he almost inevitably will.

As the decades pass and the man advances into middle age, the physical decline becomes more marked, but the mental compensations of the man who chose the wiser course at 40 continues to give an adequate offset. By now, if the man has chosen well, he has outside interests that takes his mind off the humdrum routine by which he earns his daily bread.

The more adequately prepared man of 70, and even of 80, does not need to fear the onset of genuine old age, with its great decline in physical power and even the troubles of ill health. If he has stocked his mind when he was in his mature years he can draw on this accumulated knowledge and experience and still play a satisfying rôle as counsellor to the new generation of young people.

Professor Miles' address, given under the auspices of Science Service, was sent out over the network of the Columbia Broadcasting System.

ITEMS

THE Lowell Observatory, at Flagstaff, Arizona, has notified the Harvard College Observatory that a new white spot has been observed on the ringed planet, Saturn, near its equator. It was seen on the planet central meridian at about midnight the night of August 28 and 29 and it was confirmed photographically.

OXYGEN needed by the roots of plants may be to some extent supplied by the plants themselves, from the oxygen generated as a by-product in the manufacture of food in the leaves. Evidence on this point has been obtained in experiments by Professor W. A. Cannon, of Stanford University, who has made preliminary reports to the Carnegie Institution of Washington and to the technical journal *Plant Physiology*. Professor Cannon set jars containing leafy shoots of willow and other plants in darkness and in light, and compared the rates at which their roots used up oxygen. He found in the larger number of cases that the illuminated shoots needed less oxygen from the outside, and therefore reached the tentative conclusion that the extra supply of the needed element was being provided for internally.

COMMON peat, which exists by the billions of tons in ancient bogs in this country, promises to become an important factor in the fertilizer industry, if researches conducted by Dr. R. O. E. Davis and Walter Scholl, of the U. S. Department of Agriculture, result in a practical manufacturing process for what they call ammoniated peat. The two chemists enclosed samples of peat in strong metal vessels along with ammonia synthesized out of the air and subjected the mixtures to high pressures and a considerable range of temperatures. The result was a fertilizer containing a high percentage of available nitrogen, the most expensive of the elements used in commercial fertilizers.