

ASTRONOMY

Astronomers Push Study Of Atmosphere on Planets

Other Atmospheres Do Not Reveal Oxygen, Important And Common on Earth; Carbon Dioxide Abounds on Venus

TO THE PERENNIAL discussion of the possibility of life on the planets other than the earth, recent researches at Mt. Wilson Observatory are presenting new data. As yet the astronomers are not considering the "life" question, but with telescopes and thermocouples they are attempting to discover the nature of the atmospheres of the planets.

Whether a planet can hold an atmosphere or not depends very critically on its size and its temperature. For example, an atmosphere which might remain practically unchanged on a planet at 100 degrees absolute ($-173^{\circ}\text{C}.$) would escape in a few months if the temperature were increased to 300 degrees absolute, which is about the surface temperature of the earth.

Temperature measurements of the planets have been made by Dr. S. Nicholson of the Mt. Wilson Observatory so that we have a good idea which planets have an atmosphere and which have none. Thus, excepting Mercury and Mars, all the planets might well have a gaseous envelope which we call an atmosphere.

Moon in Vacuum

Incidentally our own satellite, the moon, is too small and becomes too warm to retain an atmosphere. The surface of the moon is therefore in a vacuum and not even liquids can exist there unless they be of extremely high molecular weight.

Even those planets which have atmospheres will differ greatly from the earth. Drs. W. S. Adams and T. Dunham, Jr., of the Mt. Wilson staff are investigating the composition of the various atmospheres. One of the most striking conclusions of their observations is that oxygen, which plays such a vital role in the earth's atmosphere, does not show itself in the other atmospheres. Elements like nitrogen, hydrogen, helium and argon are much more difficult to observe, so it is not surprising that they do not appear in the planetary atmospheres.

Venus has an extraordinary amount of carbon dioxide. This gas, which occurs to the extent of less than one tenth of one per cent. at sea level on earth and which because of its weight must be practically absent at high levels of the earth's air, gives an intense spectrum in the atmosphere above the clouds which hide the surface of Venus from our view. Only recently has Dr. Dunham succeeded in getting enough carbon dioxide into a tube to get a trace of those bands which come out so strongly in Venus. He estimates it would take a tube at least a mile long filled with CO_2 at atmospheric pressure to duplicate the spectrum of Venus.

Gases Unknown Here

The outer planets are much colder than Venus. Carbon dioxide would scarcely be a gas on them, but it would mostly condense to a solid. The analysis of the atmospheres of the outer planets is difficult. These planets are so much farther out that they reflect at least fifty times less of the sun's light into the powerful telescopes. Astronomers are forced to be satisfied at present with mere indications. The chemical compounds which would be gaseous at the temperatures of Jupiter ($-135^{\circ}\text{C}.$), Saturn ($-150^{\circ}\text{C}.$), Uranus ($-180^{\circ}\text{C}.$) and Neptune (*Turn to Page 108*)

CHEMISTRY

Three Rare Earth Elements Proved to be Radioactive

THREE NEW rare earth elements can now be listed among the radioactive substances of the earth as the result of experiments by W. F. Libby, University of California teaching fellow, and Prof. W. M. Latimer, also of the University of California faculty.

They are lanthanum, neodymium and samarium. Except for samarium which was proved radioactive by independent European research a few months ago, this is the first time that these elements

were known to spontaneously disintegrate in a manner similar to radium and uranium.

Transmutation occurs when lanthanum, neodymium and samarium disintegrate, some of their substance flying off and leaving as a residue other elements, cerium, illinum and neodymium, respectively.

The radioactivity was detected by putting the elements into a container filled with low pressure helium and recording through a radio amplifier the clicks of atomic collisions that occurred. The radioactivity of the elements increased the normal number of collisions.

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ARCHAEOLOGY

Girl Explorer Adds Ancient City to Map

RUINS of one of the remote, prehistoric cities of Mexico, familiar to its Indian neighbors for many centuries, but never located on the official map of Mexico's 1,200 archaeological sites, have been explored by Emma Reh, correspondent of Science Service in Mexico. Miss Reh earlier explored the ruins of another ancient city, Teposcolula, 18 miles away.

The city bears the Aztec-sounding name of Hualmelulpan. It lies in the mountainous mazes of the region known as the Mixteca (*Turn Page*)



THIRTEEN STONE KNIFE

The squared stone is believed by Miss Reh to be the first dated monument reported in the Mixtec region of Oaxaca. It bears the date "Thirteen Stone Knife." Beside it stands a six-foot figure with grotesquely heavy mouth and curling fangs.

because of its Mixtec Indian inhabitants. The Mixteca is in the State of Oaxaca, in southern Mexico.

Miss Reh's own account of her explorations follows:

Hualmelulpan is an ancient Indian city in the Mixteca. The present town of San Martin Hualmelulpan of Mixtec-speaking Indians is built in the midst of the mounds and terraces of the ancient civilization. Old and new crowd one another.

A new road cuts an ancient stairway and penetrates an artificial mound. And on this mound the early Christian church of the village stands. Back of the church rise terraces above terraces of the old city, the last one surmounted by a pyramid. Treasure-hunting Indians have quartered the old pyramid.

The pyramid back of the village church, which Indians have excavated, contains a smaller pyramid within. From what can be seen of the inner structure its plaster-faced sloping walls are intact, which is unusual in such buried buildings. The treasure-seekers found an inner room in the pyramid, lined with smooth stone and a tunnel heading south. In these apertures, they say, were found idols and carvings.

These idols and carvings are now in the city hall. Most important is a slab over three feet high, carved with the date "Thirteen Stone-Knife," the numeral being expressed in the Mayan dot and-bar system.

Mayas and Indians Linked

This stone slab, found in the heart of the Mixteca region, is an important link in the mysterious relationship between the Mayan culture and Indian civilizations in the center of Mexico. The ancient pattern of Mexico is not yet known, and the finding of this mode of writing in this place is of great significance.

Another sculpture is a human form six feet tall. The big figure has slanting eyes, triangular nose, rounded mouth with curling fangs. Tigers with snarling mouths are among the smaller sculptures.

One exquisitely carved jade figure is among the pieces picked up by villagers in their cornfields on the mounds and terraces. Small pottery heads found in the fields are handiwork of various cultural types of ancient Mexico. They can be arranged from the "Archaic" people of early time to highly evolved "Mixtec" types.

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ANTHROPOLOGY

Colonial America Revealed As Melting Pot by 1790 Census

Less Than Two-Thirds of Pioneers Were English; Remainder Largely Irish, Scotch, German, French and Dutch

A WIDE assortment of the ingredients for the American melting pot were already in this country when the first census was taken, back in 1790.

This fact is brought out in a study of the make-up of America in nationalities, as shown in the approximately 4,000,000 names taken in the first census. The American Council of Learned Societies sponsored the research, and the American Historical Association has just published the results.

"Many prevailing impressions regarding origins of colonial America are contradicted by this study," says Howard F. Barker, research associate of the Council and one of the authors of the work.

Less Than Two-Thirds English

The colonial fathers, dames and children who were the people of George Washington's first administration, were of English, Irish, Scotch, German, French, Dutch, and Swedish extraction. Outlying regions also had Spaniards.

The survey shows that, of the 3,200,000 white settlers, the English constituted less than two-thirds, and English, Scotch, and Irish together not much more than 80 per cent. Germans account for nine per cent., Dutchmen three per cent., Frenchmen about two per cent., and Spaniards and Swedes each about one per cent.

No consistent records of arrival of settlers were kept in those times, Dr. Barker explains. No one questioned arriving immigrants as to their nationality or their ancestry. The best method that the research historians have hit upon to identify nationalities has been to study the family names in the census. The method calls for specialized knowledge of foreign names, languages, early American history. Even by 1790, the typically American process of revising names was going on. Non-English names, especially, were likely to be simplified or translated into names of English sound.

"It is incorrect to credit colonial

American population with a homogeneity which did not exist," Mr. Barker states. "But it is well to note that most of the earlyday Americans who were not from the British Isles were from the Rhine country."

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PHYSIOLOGY

Explains Why Raw Weather Is Painful to "Rheumatics"

COLD, MOIST AIR has a heat conductivity greater than that of cold dry air; it produces a "raw" feeling and excites the nerve endings which reflexly cause the tightening-up effect that leads to pain in rheumatic people. This is the explanation given by Sir Leonard Hill, British physiologist, in the London scientific periodical *Nature*, in answer to the query: "Why is damp cold weather unpleasant and peculiarly bad for those suffering from rheumatism?"

"Heat expands and softens the tissues, bringing more blood and lymph into the parts, while cold tightens them up," Sir Leonard said. He suggested that it is this change which leads to pain in rheumatic people.

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ASTRONOMY

Sunspots Hold Secret Of Understanding Stars

THE KEY to the problem of the sun's structure lies in explaining why the sun spots are giant magnets, Dr. Donald H. Menzel of the Harvard College Observatory, told the New England section of the American Physical Society. The sun is a star, similar to many that dot the heavens; and Dr. Menzel observed that it offers the only star surface that can be studied in detail.

During the past few weeks the sun has been extraordinarily spotted considering that the time of minimum of sunspots is approaching. Thirty spots in