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perimentally the two molecular arrangements of varieties of ordinary light weight hydrogen (atomic weight 1) which are known as parahydrogen and orthohydrogen.

To a large extent the work on atom theory for which the 1933 physics Nobel prize is divided between Profs. Schroedinger and Dirac is built upon the foundations of Heisenberg's work. The French physicist de Broglie, also a Nobelist, conceived the idea of the wave mechanics brand of physics which was utilized by Prof. Schroedinger who, by a different route, carried that idea much further.

Prof. Dirac was doing his graduate work at Cambridge when the great blaze of theoretical advance was set alight by Heisenberg's first paper of the autumn of 1925. Developing his own mathematics, using unconventional methods of remolding the mathematical methods of physics, as exemplified by his invention of "q numbers," Prof. Dirac produced a still more advanced system of quantum mechanics. Perhaps his most strikingly original and successful contribution is his relativistic theory of the electron. When just over 30 years of age Prof. Dirac was appointed to the highly prized Lucasian chair of mathematics at Cambridge.

Although until recently the Vienna-born Prof. Schroedinger held the chair of theoretical physics at the University of Berlin, to which he was appointed in 1927, he now finds work at Oxford more congenial than in the present atmosphere of Berlin. He made an enforced departure from Germany due to the present political regime and last month he was elected to fellowship in Magdalen College at Oxford.

Science News Letter, November 18, 1933

ARCHAEOLOGY

149 Old Shoes Found in One Prehistoric Apartment

A ROW of 149 old shoes would make an impressive sight, anywhere. When you find 149 old shoes worn in prehistoric times, and all collected from a single dwelling, that is something to stir the imagination. Who wore all those shoes, and when?

This exact number of worn-out sandals has been discovered by University of Texas archaeologists who explored the earthen floor of a prehistoric rock shelter apartment. The address of the apartment, which has long been unoccupied, is in Seminole Canyon, near the Texas border, in Val Verde County.

Trenching into the floor, through suffocating clouds of dust, the archaeologists brought up long-buried skeletons of some of the old inhabitants of the apartment, and various scraps and remnants of their clothes and useful possessions—including the large stock of their footwear.

Square toes were the style in this Texas canyon, a thousand years more or less before Columbus found America. Shoes were made sandal fashion, and were of fiber from the yucca plant. Many of the sandals still had tie strings in place when found.

As for the wearers, it is reported that most of them pretty well wore out their shoes. The sizes range from a child's five-inch foot to an Indian brave's ten-inch foot. The archaeologists found only a few obvious "rights" or "lefts."

The people who wore these shoes are so new to science that they have not yet received a name. Prof. J. E. Pearce and A. T. Jackson, who reported their exploration of the apartment in the canyon wall, consider this canyon a sort of melting pot for several kinds of early Indian culture. Here were blended ideas from the Basket Maker Indians in Arizona and other parts of the Southwest, ideas from the Big Bend region, and from Central Texas.

Besides the shoes, almost 5,000 articles in all stages of dilapidation have been recovered from the depths of the cave floor. The trash ranged from flint axes and hoes, wooden fire drills, and bone needles, to mussel shell spoons, baskets, a grass bed, and pieces of fiber string. From such fragments of household belongings, many time-worn almost beyond recognition, the life and the appearance of the ancient Texans begins to be understood.

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NATURE RAMBLINGS by Frank Thone

ENTOMOLOGY

Insects, Bugs and Such

THE WORDS "insect" and "bug" are most persistently made to carry more than their legitimate loads of meaning.

Probably the widest understanding of these two terms is that insects and bugs are the same thing, and that any small creeping thing with a lot of legs is an insect or bug. Thus spiders, centipedes, ticks, and sometimes even worms and small crustaceans are lumped as insects. The bigger crustaceans—lobsters, crabs, shrimp and crayfish—we usually exclude from this classification, yet with a feeling that they are "something like insects," too—a sympathy with the Irishman of the anecdote who refused to eat a lobster, because it was "a boog."

It is too bad that this confusion should have arisen, for the words have clear-cut and exact meanings, and properly designate groups of creatures much smaller than their common use covers. An insect is, properly speaking, a small animal with an outside skeleton, six legs, one pair of antennae or "feelers" and four wings. The wing item is a little troublesome, for some insects have but one pair of wings and some none at all; but the basic insect pattern calls for four, and insects with fewer may be regarded as having lost them in the course of evolution. But the three pairs of legs and the one pair of antennae are sure marks of an insect.

All bugs are insects, but not all insects are bugs. In the strict sense of the term, a bug is an insect with a piercing bill folded back under its chest when not in use, and its outer pair of wings modified and usually somewhat shortened, so that the name of the group in the older classifications was Hemiptera, or "half-wing." Typical true bugs are

squash-bugs, box-elder bugs, giant water-bugs and the cicadas, often mistermed "locusts," that shrill interminably in the summer trees.

Spiders, centipedes, "thousand-leggers," scorpions, ticks and a number of other frequently rather disagreeable creeping things are lumped together in a rather miscellaneous class called arachnids. All of them differ from the insects in having more than six legs (spiders, with eight, have the fewest), and in not having a head distinct from the thorax or chest, as in insects.

There is one all-inclusive word for this whole array, insects, arachnids, crustacea, and all. It is "arthropods"—Greek for "jointed legs." But the word is itself many-jointed, somewhat harsh-sounding, and a bit professorial in appearance. So it has never found its way into common speech. So we continue to say "insect" or "bug" when we mean arthropod—to the sustained distress of entomological purists.

Science News Letter, November 18, 1933

MEDICINE

Thyroxine Replaced In Treatment of Gland

A NEW chemical preparation that can be used instead of thyroid extract for the treatment of one type of thyroid gland disorder is reported by Dr. A. B. Anderson of University College Hospital, Prof. C. H. Harington of London University and Prof. D. M. Lyon of Edinburgh University in *The Lancet*.

The new preparation has the scientific name 3-5-diiodothyronine. It has been used successfully in the treatment of myxedema, a condition due to underactivity of the thyroid gland characterized by dropsy-like swelling especially of the face and hands, dulling of mental activity, drying and wrinkling of the skin, falling hair and general sluggishness.

Daily doses of the new medicine relieve the symptoms of this disease without producing any ill effects. It is given by mouth and produces results comparable to injections of thyroxine, the thyroid gland preparation generally used to treat this condition.

Science News Letter, November 18, 1933

Snake charmers have no supernatural powers, says a zoologist; they simply understand the psychology of the poisonous snakes.

ASTRONOMY

Aluminum-Coated Mirrors New Aid to Astronomy

STARS THAT are hotter and brighter than science ever conceived, which make our own sun-star look like a candle beside a powerful beacon, have been "captured" in the aluminum mirrors of the Boothroyd expedition, just returned to Cornell University from a mountain peak in Arizona.

For the first time, the ultraviolet spectra of about 80 stars have been photographed, opening up an entire new field to astronomers in the study of stellar matter and stellar temperatures.

This feat was accomplished as the result of a new process developed by two young Cornell physicists, by which chrominum and aluminum can be deposited on glass. The silver-coated mirrors hitherto used in reflecting telescopes have been able to capture the spectrum only as far as the yellow-green region, and were unable to catch the high wavelength of the violet emnations, which tell more than anything else about the temperature and condition of the stars.

Prof. S. L. Boothroyd, head of the Cornell Astronomy Department, who organized the expedition to Arizona to put the new invention to practical test, reported on his return that not only did their spectrograms confirm previous ideas on the hotness of certain stars, but indicated that some of the so-called "dim" stars are in reality brighter, photographically, than those hitherto considered the brightest.

These tremendously hot stellar bodies are called "blue stars," as contrasted with red and yellow stars. They are dim, if not wholly invisible, to the human eye, because their ultraviolet rays escape the eyesight. The aluminum-coated mirror, however, proved much more effective than the human eye.

The Cornell scientists were given cooperation by the Lowell Observatory at Flagstaff, Ariz., and made use of the observatory's mountain station, 11,500 feet above sea level on Schultze Peak, some ten miles north of Flagstaff. This location was chosen because of the clearness of the atmosphere and the comparative absence of dust, which absorbs much of the ultraviolet spectrum at lower levels.

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Fog Loses Its Peril To Aviation

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his satisfaction with the new aids to aeronautic navigation and said that it was the greatest single achievement in recent aviation history. With the research work being carried forward by the Bureau of Standards, engineers predict that airplane schedules will become increasingly regular and that bad weather will no longer be a reason for delay.

This group of workers has struggled with these problems and has put up a winning fight against Nature's perverseness. Leading them in this battle is Dr. J. H. Dellinger, chief of the radio section of the Bureau of Standards. His principal collaborators have been Harry Diamond and F. W. Dunmore, research scientists at the Bureau. James L. Kinney, the Department of Commerce pilot assigned to this development, succeeded Marshall H. Boggs who was killed in an accident while temporarily assigned to other duties on the West coast. Colonel Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, was the government director of this work under the Hoover administration, and is succeeded by E. L. Mitchell, who will carry on the plans for its coming commercial use. Research will continue, on a lesser scale due to the economy cuts, under the direction of Major J. C. Cone, Assistant Director for Aeronautic Development of the Aeronautics Branch of the Department of Commerce, Dr. L. J. Briggs, Director of the Bureau of Standards, and Dr. Dellinger.

At present the blind landing apparatus is installed only at College Park and at Newark but engineers feel that it is only a matter of time before it will spread over the airways just as the earliest light beacons have done. Then the mail will go through regardless of weather.

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