



NO COMPETITION

The bright stars of winter shine this month without having their splendor dimmed by the light of the planets.

at a distance of 94,424,000 miles. At first glance, one might think that we should have warm weather when the sun is closest, but there are other factors that much more than compensate for this change. Because the earth's axis is inclined, at about 23 degrees, to the plane in which it revolves around the sun, the northern half of the earth leans away from it in winter and towards it in summer. This in turn affects the sun's height, as we all know it comes near to the zenith at noon in June, but now its noon-day height is less than a third of a right angle. Thus, its rays of heat are spread over a much larger area than when they fall directly downwards, and the heating effect is much less. In the southern hemisphere conditions are reversed, of course, for when the sun is low for us it is high for them. Consequently the people in Australia and South Africa are now enjoying mid-summer.

No Planets

The glorious stars of the winter sky shine in their full splendor this month, without competition from the planets, none of which can be seen during most of the evening hours. As soon as darkness falls, Mars and Saturn can be seen low in the southwest, but both are faint, and they set soon after the sun. On January 16, Mercury is at its greatest distance to the east of the sun, when it sets latest, then it may be glimpsed in the western twilight. Venus and Jupiter are close together in the constellation of the Scorpion, which rises about 4:30 a. m.

At ten o'clock on the first, nine on the fifteenth and eight on the thirty-first, the times for which the accompanying maps show the skies, Orion is the most conspicuous constellation, high in the

south. It is easy to recognize because of the three stars in a row that form the belt of this heavenly warrior. The two stars north of the belt, Betelgeuse and Bellatrix, form his shoulders, while to the south are two others, Rigel, the brighter, the Saiph, the fainter, which mark his legs. A curved row of stars to the west of Bellatrix represents one of the giant's arms over which is thrown a lion skin, and the stars just above Betelgeuse are supposed to outline the other arm, in which he is brandishing a club. And well might he need this defense, for next to him, to the right, is Taurus, the bull, charging towards him.

Horns and All

The red star, Aldebaran, is the bull's eye, and the Hyades, the V-shaped group of which it is part, outline his face, while the two stars just above Orion are the tips of his horns, as shown on the old star maps. In the shoulders of the bull are the Pleiades, the "seven sisters" of mythology, though most people can only see six stars there with the naked eye.

The part of the sky in and near Orion contains more bright stars than in any other similar area, which is the reason that the evening skies of winter seem so much more brilliant than those of summer. Below and to the left of the warrior is the brightest star in the sky (except, of course, for the sun) Sirius, the dog star, part of Canis Major, the greater dog. This star is bright, not because of great intrinsic brilliance, but because it is very close. In fact, from northern countries no closer star can be seen, except with the aid of a telescope. But so far are even the nearest stars that the light of Sirius, travelling at the speed of eleven million miles a

minute, takes more than eight years to reach the earth. Higher in the sky is the lesser dog, Canis Minor, with the star Procyon. Still higher, and almost due east, are the twins, Gemini, with Castor and Pollux. Capella, in Auriga, the charioteer, is in the zenith.

Standing on one corner in the west are the four stars called the "great square of Pegasus," though the uppermost, Alpheratz, is in the neighboring constellation of Andromeda. This, in turn, is next to Cassiopeia, seen in the north, and shaped like a letter W on one side. In the northeast is the great dipper, the handle hanging downwards. The uppermost pair of stars are the pointers, and a line from them to the left indicates the direction of Polaris, the pole star, close to the north pole of the sky, and always, therefore, appearing in about the same place. Polaris is at the end of the handle of the little dipper. If you follow the direction of the pointers in the other direction, you will come to Regulus, in Leo, the lion, seen at this time of evening rising in the northeast. Low in the northwest Deneb can be seen, all that now remains visible of Cygnus, the swan.

Science News Letter, December 28, 1935

ENGINEERING

New Radio Device Detects Leaks in Water Mains

OTHMAR W. Pies, valveman in the Water Department in Cincinnati, has perfected a device to detect leaks in water mains and pipes. As patented, his apparatus consists of a set-up of radio tubes with a very sensitive microphone pick-up which detects and locates the leaks. He connects his device with a fire hydrant, valve or ordinary house stop-cock having a direct connection with the main or house line.

A leak is disclosed by a sizzling sound which grows into a roar as the equipment nears the leak. By taking a reading on each side of the leak by use of a graph, he is able to find the exact location. He has seldom missed finding the leaking valve or pipe.

Science News Letter, December 28, 1935

ZOOLOGY

Immersed Beavers Can Stop Hearts and Hold Breath

BEAVERS held under water can apparently stop their heartbeats as well as hold their breath for considerable periods of time, experiments by Dr. Laurence Irving and M. D. Orr of the Uni-

versity of Toronto indicate. (*Science*, Dec. 13)

The two physiologists had a full-grown beaver, weighing forty pounds. They pushed the animal's head under water. Immediately the beaver relaxed and lay with its head on the bottom. It made no effort to escape for fully five minutes, but then struggled to come to the surface.

During its period of enforced immersion the experimenters felt carefully for its heartbeats. There were from six to ten normal beats at the start, but after that the observers could not detect any. When the beaver came up to breathe, its heartbeats became almost twice as rapid as they had been before its "ducking," although its breathing

rate showed very little increase. The animal was paying off its "oxygen debt," accrued while it was under water. The experiment was repeated several times, always with the same results. There was no cruelty involved so far as the beaver was concerned, since like all aquatic air-breathing animals it is used to staying under water for fairly long periods.

The absence of any detectable heart-beat of course does not mean that the heart has stopped entirely, but that it has greatly slowed down. The hearts of hibernating ground-squirrels and similar small animals in their winter sleep show the same slowing down almost, but not quite, to the point of complete stop.

Science News Letter, December 28, 1935

PHYSICS

Artificial Radioactivity From 8 Elements Reported

TRANSMUTATION of the elements and artificial radioactivity by high energy atomic bombardment were reported to the meeting of the American Physical Society from the laboratories of the host institution, the University of California, Berkeley, Calif.

Eight different chemical elements, ranging from sodium and chlorine, found in common table salt, to rare platinum and deadly arsenic, give off piercing radiation like that from radium, according to papers presented by investigators working in the laboratory of Prof. E. O. Lawrence. Tool of accomplishment for the many researches was the giant 85-ton cyclotron magnetic accelerator apparatus, invented and developed by Prof. Lawrence.

The investigators not only have the immediate purpose of telling how atoms are put together but hold the hope of realizing some cheap yet effective substitute for costly radium in the treatment of cancer and its allied diseases.

Gamma radiation, the type of rays used in cancer hospitals, was reported by J. R. Richardson as being given off from sodium, chlorine and aluminum with energies as high as 3,400,000 volts.

Platinum became radioactive under deuteron bombardment, said Dr. J. M. Cork and Prof. Lawrence, and yielded radiation having energy of 4,500,000 volts. H. G. Paxton described experiments with radioactive phosphorus hav-

ing a half life period of over 50 hours. Comparable experiments with zinc discussed by Dr. J. J. Livingood yielded artificial radioactivity having a half life of as much as 100 hours.

Most artificially radioactive elements retain their activity for only a few minutes at the most. The search, thinking of possible biological and medical applications, has been to find substances which would be active for longer periods. Radium, by comparison, has a half life of 1,600 years and, although costly, wears out, by disintegration, very slowly. The new reports on artificial activity lasting as long as five days are encouraging.

Science News Letter, December 28, 1935

GENERAL SCIENCE

Research Provides Defense Witness for Machinery

IN PLAYS, talkies, impassioned oratory and writings of all political hues, machinery is sometimes shown as a monster, forcing men out of jobs; and science, mother of machinery, shares her progeny's wicked reputation.

As defense witness for machinery, the National Industrial Conference Board presents a new study on machinery, employment and purchasing power. It combats the idea that the use of machinery in production leads to permanent displacement of labor and reduction of the

total employment opportunities of our population. Says the study:

"During the period of its most rapid introduction, from 1879 to 1929, machinery has been responsible for the establishment of many new industries; it has created new opportunities for employment; it has released workers from industries producing goods to trade and service occupations; it has stabilized employment by increasing the proportion of the gainful population engaged in trade and service industries; it has made possible an enormous increase in the total volume of production by increasing the output per man; it has reduced hours of work and child labor. In general, the use of machinery has been the chief cause of the great improvement that has occurred in the purchasing power and the standard of living of the masses of the people.

"From 1929 to 1935 the general contraction in business activity was accompanied by an even more severe decline in the production of machinery and machine tools. The increase of the output per man which took place during the years of the depression was not so much due to the introduction of machinery and technological improvements as to the great efficiency of the working forces and drastic economies introduced by management all along the line of production and distribution. Unemployment during the business depression was not due to the fact that goods were being produced by machines instead of by men, but to the fact that goods were not being produced in sufficient volume. The answer to the problem of unemployment does not lie in placing restrictions on the use of machinery but in increasing the volume of production, which would increase the purchasing power of the people and lead to full re-employment."

Science News Letter, December 28, 1935

A census of the Soviet Union is planned for December, 1936.

● RADIO

Tuesday, December 31, 1:30 p. m., E.S.T.
SCIENCE OF 1935—A review of this year's achievements and brief forecasts for 1936 by several scientists.

Tuesday, January 7, 4:30 p. m., E.S.T.
EXPLORING THE SEA — Commander Richard R. Lukens, U. S. Coast and Geodetic Survey.

In the Science Service series of radio discussions led by Watson Davis, Director, over the Columbia Broadcasting System.