

Dr. R. A. Millikan, winner of the Nobel prize for physics last year, declared that no experiments on the production of gold from mercury have been made or planned in the Norman Bridge Laboratory, Pasadena, California, of which he is director. He points out that "reliable results are very difficult to obtain because traces of gold are practically always found in mercury anyway".

Prof. W. D. Harkins of the University of Chicago, well known for his work on atomic structure, declares that in the mercury vapor lamp, with which Prof. Miethe claims to have produced gold, the energy brought to bear upon the atoms of mercury is exceedingly small in comparison with the amounts of energy in all actual artificial disintegrations thus far accomplished.

"According to accepted theories it also seems probable," he says, "that such small amounts of energy would not be able to penetrate the outside of the atom to get at the nucleus at all. Prof. Haber found gold in Miethe's mercury and this is undoubtedly accurate but Haber disclaims all knowledge of how the mercury got in. Experts in this field will not trust any reports of atomic disintegration by large or small currents, unless voltages of millions of volts have been used, until they are supported by experimental work carried out with the most extreme precautions in such a way as to give definite evidence that the results claimed have been obtained. It is possible that Miethe has such evidence. I have not repeated his experiments.

"Mercury would be converted into gold if a hydrogen nucleus were lost from or an electron added to mercury's nucleus. I have bombarded argon nuclei by helium nuclei with an energy corresponding to five million volts without their disintegration. The voltage used in a mercury vapor lamp is small."

The products of Prof. Miethe's first experiment were analyzed in the laboratory of Dr. Fritz Haber, famous for his work on nitrogen fixation. Prof. Haber, when in this country recently, informed a Science Service representative that silver as well as gold was found in the samples submitted. This is taken to indicate that both silver and gold were present as original impurities of the mercury, since they are usually associated together in mercury ore.

Dr. Frederick Soddy, the English chemist at Oxford, stated in a British scientific publication that even in advance of the German announcements, it appeared to him that not only was such a transmutation possible but that it was inevitable unless our present views of atomic structure are radically at fault. He believes that the chemical detection of the gold produced, not the transmutation, would probably be the more formidable experimental difficulty.

ORION RETURNS TO EVENING SKY

By Isabel M. Lewis,
U. S. Naval Observatory.

Orion, the Warrior, the most popular and widely known constellation in the heavens, visible from all corners of the world because of its position on the celestial equator, has returned once more to the evening sky and may be seen towering majestically above the eastern horizon by nine o'clock in the evening.

The quaint star maps of the ancient astronomers pictured Orion with uplifted club in his right hand, its tip close to the horns of Taurus the Bull which he faces

and with a lion's skin thrown over his uplifted left arm. Four brilliant stars outline the hero's huge form. Two, ruddy Betelgeuse in the right shoulder, and, blue-white Rigel diagonally opposite in the left foot, are of the first magnitude. The remaining two, Bellatrix in the left ^{shoulder} and Saiph in the right knee, are of the second magnitude. The left foot of Orion rests upon Lepus, the Hare, the small constellation directly below Orion, and his head is marked by a group of three faint stars. At his heels follow the two dogs, Canis Major, which contains Sirius, the brightest star in the heavens, and Canis Minor, further north, with its first magnitude star Procyon. Depended from the Belt of Orion, which is marked by three stars of the second magnitude in a straight line slanting toward the southeast, is the famous Sword of Orion, containing a line of faint stars, the central one rather fuzzy in appearance. Viewed through the telescope this fuzzy, star like object is transformed into what is generally considered to be the most magnificent object in the heavens, the Great Orion Nebula, a glowing mass of luminous gases of enormous size and extent which includes in its ramifications the entire constellation.

The Orion Nebula is most brilliant in the neighborhood of the multiple star Theta, which is embedded in its heart. This star and its surrounding nebulosity is the fuzzy stellar object that is visible to the naked eye. Small telescopes break this star up into a system of four stars but more powerful telescopes show that it is really a sextuple star, that is, six gigantic suns forming one enormous system.

According to the latest investigations the luminous gaseous nebulas of which the Great Orion Nebula is the most illustrious example owe their luminosity either to the reflected light of stars associated with them or to electrical excitation produced in some way by these stars or to both causes. It is probable, then, that the multiple star Theta in the heart of the Great Orion Nebula is largely responsible for the brilliancy of its surrounding nebulosity.

The most reliable estimates place the typical Orion stars, such as the brilliant Rigel, the three stars in the Belt of Orion, and the stars in the Sword of Orion, at a distance of approximately six hundred and fifty light years from the earth, or nearly four thousand trillion miles. All of these Orion-type stars are intensely hot with temperatures of ten or twelve thousand degrees Centigrade or over and with the element helium conspicuously present in their spectra.

The red variable star Betelgeuse, which has been in the past few years one of the most talked of stars in the heavens because of its huge size, is not a member of the Orion group of stars. Its distance from the earth is less than two hundred light years or about one-third that of the true Orion stars. It is merely seen projected against the background formed by the more distant stars in a convenient position to complete the outlines of this celestial figure which man has fashioned out of the stars and which will some day lose its distinctive form as surely, if not as fleetingly, as the forms we picture in summer clouds.

Betelgeuse owes its great brightness to its enormous size and the extent of its light-giving surface for its temperature is low for a star, as is to be expected from its reddish color, scarcely 3,000 degrees Centigrade. If it were much less the star would scarcely shine by its own light. Unit for unit of area, Betelgeuse is far inferior in light-giving power to the magnificent Rigel which outshines it though a much smaller body and three times more distant. The brilliant diamond-like intensity of its light proclaims Rigel to be an intensely hot sun at the peak of its evolution with tremendous light-giving power.
