SCIENCE NEWS

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MULTIPLE STARS

QUADRUPLETS and quintuplets in the sky may not be as rare as they are on the earth, but astronomers get nearly as excited about them. At the Cambridge meeting of the American Astronomical Society several papers dealt with multiple stars, among them a discussion by Mrs. Elizabeth Cornwall Tilley, of the University of Michigan, concerning the plain-seeming star known as 59D Serpentis.

Should 59D Serpentis be called single, as it appears to the naked eye? Or double, as it appears in a four-inch telescope? Or triple, as the spectroscope reveals one of its components to be? Or quadruple, as the sum of its parts would make it? But if quadruple is correct, the quads are not as nearly alike as they usually are among humans.

The star 59D Serpentis is also unusual in that two of its triplet stars are hot, white twins, while one is a cooler yellow star like our sun, only much larger.

One of the standard means for discovering doubleness among stars is to observe their spectra. If two stars are revolving around each other, some of their motion is probably toward and away from us, producing the well-known Doppler shift in their spectra. As one star approaches us along one side of the orbit, its spectrum is shifted toward the violet, while its companion's is shifted toward the red as that star recedes. Thus, two spectra are really being seen, and the lines in the combined spectrum appear double. These double lines gradually blend as the stars proceed along their orbits, then separate again. This is repeated twice for each revolution they make.

Sometimes one star is so much brighter than the other that the second star's spectrum is suppressed and only one set of lines is seen. However, the regular oscillation of these lines around a mean position proves the star to be a spectroscopic double in any case. In only two or three cases, including 59D Serpentis, are three spectra visible, and only for 59D have the details of the system been determined. The white twins revolve around each other once every 1.85 days, at a distance apart of only four million miles. Together, they revolve around the large yellow star, about 180 million miles distant, or the distance across the earth's orbit, in 386 days. These three form the triplet, around which the distant visual companion, also a white star, may require several thousand years to revolve.

The triple spectrum of 59D Serpentis was discovered independently in 1938 by McLaughlin at the University of Michigan and Tremblot in Paris, and in some cases they took spectrum photographs of the star on the same nights.—CHARLES A. FEDERER, JR.

MONAZITE SANDS

THERE are many important uses of the rare-earth metals, and their compounds, obtained from the honey-yellow colored monazite. The principal metals obtained are cerium and thorium. Minor metals obtained include lanthanum, erbium, didymium, beryllium, and others of little or no commercial value.

Lanthanum salts are used in beauty preparations because they give bactericidal action. Erbium salts are astringents. Didymium is used in optical glasses because it protects the eyes from harmful rays. Cerium and thorium are the two elements in monazite which, either in their metallic forms or in compounds, fill essential war needs.

Cerium compounds have many important uses. Cerium acetate protects textiles from mildew and moths, and makes the textiles waterproof. Cerium fluoride mixed with carbon gives arc-lights and searchlights greater luminosity. Cerium oxide is used in ceramics and in the glass industry. The nitrate serves a special function in the gas mantle and also in tanning leather.

Thorium products are equally essential. Metallic thorium or thorium compounds are used in tungsten-lamp filaments, gas mantles, high-temperature refractories, radio-tube filaments, and for other purposes including several in the field of electronics.

Monazite sand is the only commercial source of cerium and thorium, according to the U. S. Bureau of Mines. Our supply, nearly 3,000 tons a year, has come from British India and Brazil. Transportation difficulties have now arisen. The India supply is no longer available.

Monazite sands are found in several places in the United States, but there has been very little domestic production recently because economic operations were not possible when cheaper foreign sands were available. Until 1909 domestic production met American needs. In the war years, 1915–17, the United States relied mainly on home production. From now until the war is over Brazil will be the principal source, unless richer deposits than now known are found in the United States.

NEW DISEASE IN THE ARMY

A MYSTERIOUS disease for which no cause or method of getting it has yet been found turned up in some of the soldiers at Fort Bragg, N. C., late last summer, according to a report published in the *Journal* of the American Medical Association from Lieutenant Colonel Worth B. Daniels and Captain H. Arthur Grennan, two former Washington, D. C., physicians now in the Medical Corps, Army of the United States. They call the disease "Pretibial Fever."

Fortunately the disease was mild. There were no deaths and only forty cases. Because the men all were quartered near one another in a limited area of the reservation and had identical symptoms, it looked as if an epidemic of some sort were brewing.

Chief features of the sickness were fever, lasting about five days, and a rash, which appeared toward the end of the fever and was usually located over the inner, larger bone of the leg below the knee. This bone is the tibia, from which the disease gets its name, pretibial fever. As soon as the fever went down, the men got well rapidly, with no complications, weakness or depression.

A commission of experts assigned by the Surgeon General of the Army to investigate the disease was unable to find any germ cause or any method by which the men might have gotten it. Members of the commission were: Dr. John R. Paul, of Yale University Medical School; Dr. Norman H. Topping, U. S. Public Health Service, and Major Cornelius Philip, of the Army.

An outbreak of what may have been the same disease occurred in August, 1940, in Wrens, Ga.

SEPARATING WET FROM DRY GRAIN

AN ingenious method of separating wet from dry grain by use of an electrical condenser has been developed in England. T. A. Oxley, of the Department of Scientific and Industrial Research, and F. Y. Henderson, of the Imperial College of Science and Technology, have presented a method which may prove invaluable in preventing loss of grain through spoiling.

In both England and America large quantities of wheat are lost each year because of the development of fungi in the stored wheat. The fungi start in a moist, warm spot, often buried deep within the grain. It may either spread from there through the rest of the grain, or one such highly developed spot may be sufficient to taint the entire supply and make it unfit for milling. In order to preserve the crop, it is important to eliminate these wet danger spots. To do this by thoroughly drying the entire supply would be very expensive and in many cases impractical.

The more water in the grain, the poorer is electrical conductivity of the mass. As reported in *Nature*, use was made of this fact by passing the grain in a steady stream of uniform thickness between two metal plates acting as a condenser. If the grain is comparatively dry, it is sent down one chute. When the moisture reaches a certain percentage, the decreased electrical current causes a mechanism to divert the stream to another chute. Eventually, when the grain passing through becomes drier, it is automatically switched back to the first chute.

The moist grain is given priority in being dried. Not the entire harvest, but only the damper portions need be heated enough to eliminate the few highly moist spots. With the danger spots removed, all the grain can be safely stored until needed.

A NEW OPTICAL GLASS

BETTER cameras, spectacles and microscopes can be expected from use of a new lens glass developed after ten years' research, is announced by Dr. E. D. Tillyer, research director of the American Optical Company.

Sand, the principal ingredient of ordinary glass, is left out completely. According to Dr. Tillyer, omission of sand is the main reason for the superior optical properties of the new glass. Several common chemicals make up the formula of the new glass: boric acid, zinc oxide and aluminum hydroxide.

Another glass of the same type, but having different properties, is obtained by substituting cadmium oxide for the zinc oxide. This is the first time that the chemical element cadmium has been used as a major ingredient in glass.

In comparison with glass containing sand, the new glasses have higher light-bending power and less tendency to separate light into different colored rays, giving the often-observed rainbow effect. Although glass without sand is not new, these are evidently the first reports of such optical glass which shows commercial possibilities.

The new glass containing zinc oxide was developed by Dr. Tillyer, H. R. Moulton and T. M. Gunn. Mr. Moulton devised the kind containing cadmium. The product is still in a laboratory state of development and will not be available for some time.

ITEMS

A LARGE new double star has been discovered by Dr. J. A. Pearce, director of the Dominion Astrophysical Observatory, at Victoria, B. C. It is the spectroscopic binary, HD 34333, an eighth magnitude star in Auriga. Each part of this new system is a star having 23 times the mass of the sun and revolving around the other in slightly over 4 days, according to a report made by Dr. Pearce to the American Astronomical Society. Its orbital velocity is about 150 miles per second, and as one star passes between us and the other, it may produce a very slight partial eclipse, which Dr. Pearce predicts, but which has yet to be observed. Probably the light changes are small, but it is suggested that accurate observations of the star's light to see if there occur any periodic variations which would be caused by such eclipses. The present distance estimate places the system 3500 light-years from the sun.

PANCAKE diesel engines now powering Navy ships weigh less than a fourth as much as previous marine diesels of comparable power. They put out a horsepower for every four pounds of weight. Details of this new compact engine which occupies only a third the space of more conventional power plants was described at the Cleveland meeting of the Society of Automotive Engineers by J. C. Fetters, of the electro-motive division of General Motors Corporation. The nickname "pancake" stems from the four banks of 4-cylinder radial units stacked one on top the other. This light-weight 16 cylinder engine is upended on its gear box to keep space requirements to a minimum. Other radical departures in design required five years of cooperative research between Navy and General Motors engineers before the engine was ready. Then, just two months after Pearl Harbor, production got under way, and the pancake engines are now being installed in Navy ships.

HIGH-OCTANE gasoline, now available only for the military, will feed small, light peacetime autos, was reported by Dr. C. M. Larson, chief consulting engineer of the Sinclair Refining Company, to the Society of Automotive Engineers meeting in Cleveland. Production of this type of gasoline will probably be detrimental to diesel fuel ignition quality, and will force engineers to design diesel engines which will get the utmost out of low-cetane fuels. Dr. Larson believes that diesel fuels will be on the critical list by next year. He estimated that 1945 production ratio of gasoline to distillate fuel would be seven to one, compared with three to one at the start of the war.