

## SCIENCE NEWS

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## THE COMPOSITION OF THE STARS

A NEW answer to the old question, "Twinkle, twinkle, little star; how I wonder what you are!" is supplied by Professor J. H. Jeans, the British astronomer, who suggests that stars may be largely liquid. Previously astronomers almost universally have supposed that with the high temperatures involved, stars could be nothing but great bubbles of gas.

In a communication to the Royal Astronomical Society, of which last year he was president, Professor Jeans points out that the fact that so many stars in the sky are double favors his theory. These double, or binary, stars, consist of two separate bodies that revolve around their center of gravity. It is supposed that many were originally single bodies, but that they divided in some way, thus producing two. Such a process of "fission" is similar to the way in which very simple animals, like the amoeba, reproduce. They merely divide into two, and then there are two amoebae where before there was only one.

If, however, the star was made of gas, such fission would not take place, but a certain part of the gas would be expelled from the star's equator. But if the star had a liquid core, such division could take place. In any condition, according to Professor Jeans, the outer part of the star would still be gaseous.

On the basis of this theory Professor Jeans has worked out a modification of the accepted ideas of the evolution of the stars. He thinks that at different temperatures the atoms of which the star consists are of different sizes. This is because they are "ionized," which means that the outermost of the rings of electrons of which they are partly made, are broken off. The star gradually contracts and gets hotter, thus stripping off more of the rings of electrons. Occasionally there may be short periods where the star is gaseous, but then the center becomes liquid again and is again stable for a time.

The final state of the star is what is called a white dwarf. In such a star the rings of electrons have been removed, and consequently there can be no further contraction. "This state of complete ionization," says Professor Jeans, "provides a sort of 'cold storage'—if the metaphor is not too inappropriate to temperature of about a thousand million degrees—in which stellar atoms, no matter how great their normal generating capacity, are preserved from decay."

"Possibly," he continues, "the nuclei of the spiral nebulae constitute vast storehouses of such matter which only begins to undergo annihilation and to emit radiation when first formed into stars." The life of a particular star, known as Plaskett's star, one of the white dwarfs, he says, "can hardly have been more than some 100,000,000,000 years, but the atoms of which it is composed may have previously lived an infinitely longer life, completely ionized at the center of a nebula, and there-

fore stagnant and immune from annihilation. As a corollary, it would be difficult to deny that all the matter of the universe may have been created at the same instant."

Though the normal evolution of a star seems to be from one stage to another, Professor Jeans thinks it possible that a star may slip and fall down several steps at once. "It is slightly disconcerting," he says, "to notice that our sun is perilously near to the dangerous left-hand edge of the main sequence, so that its collapse into a feebly-luminous white dwarf may start at any instant."

## TROPICAL OCEAN STORMS AND AMERICAN COLD WAVES

"NORTHERS," severe storms of the Gulf of Mexico and the Caribbean Sea, which are most numerous in the winter months, start as cold waves in the Dakotas, and wreak their havoc in the Middle West before going to sea. This is the statement of Willis Edwin Hurd, of the U. S. Weather Bureau, who has been studying these storms and their origin. "From the very nature of the norther," says Mr. Hurd, "one recognizes the fact that it is dependent for its strength and maintenance upon the magnitude, movement and relative positions of the high and low pressure areas crossing the United States and the waters to the southward."

Mr. Hurd describes the formation of the norther as follows: "A blizzard sweeps down from the northwest, the high wind blowing along the eastern wall of the anticyclone. The air is biting with intense cold and blinding with fine snow particles so thick that they obliterate all objects more than a few feet from the eye. Meanwhile, as the storm descends from the Dakotas, the air over the Texas plains is warm and humid, with a springlike balminess characteristic of many of the winter low-pressure areas of this region. Suddenly dark clouds, advancing slowly or with tumultuous rapidity from the northward, mark the southern squall line of the storm wave. Here comes the blizzard; but now, if we wish, we may call it a 'Texas norther.' The first blast of the squall is cold. If rain has been falling, the precipitation may quickly change to sleet or snow. This, with the sharp fall in temperature, is highly disagreeable to all living beings, even deadly if accompanied by too long exposure, while it is disastrous to tender vegetation. If there has been no precipitation preceding the burst, and none should happen to follow it, the norther may be classed as dry instead of wet.

"The anticyclone continues to advance southward, meanwhile spreading toward the east. It reaches the coast and enters upon the waters of the Gulf of Mexico. There great velocities may be developed, and squalls of even greater intensity may occur along particularly exposed portions of the coast. Meanwhile the line of frost also advances into the southland. A freeze threatens the

orange groves. The inhabitants of eastern Mexico, even of Honduras, the Florida Keys, and of Cuba, perhaps shiver under the influence of the unwonted chill. Small streams of the north flow over the Mexican passes of the Cordilleras into the Pacific, but the great main current passes on to the southward and eastward, into the Caribbean and toward the open Atlantic, not only cooling and disturbing the eastern littoral of the upper Central American States and adjacent waters to the West Indies, but finally perhaps venting the last feeble puffs of its energy upon the harbors of Panama and even the more distant coasts of Colombia. Thus, for this is not merely an ideal picture, has the fierce cold wave and blizzard of the Dakotas penetrated as a norther into the Equatorial Zone."

Even the Canal Zone is not exempt from northers, for some of the storms sweep down well into the tropical regions. The movements of the storms over the United States furnish warnings which are sent out by radio.

### RUBBER PLANTS IN MEXICO

BACKED by Thomas Edison, a rubber exploration of the semi-arid lands in southwestern Texas and the adjacent territory in Mexico has been carried on during the past few weeks. Dr. J. N. Rose, of the U. S. National Herbarium, has brought back to Washington a number of specimens of plants suspected of rubber-yielding possibilities.

"The plants I paid most attention to were those belonging to the milkweed and euphorbia or spurge families," said Dr. Rose. "The milkweeds have long been known to have rubber in their milky juice, but so far it has not been found in paying quantities. The euphorbias include such familiar plants as the Christmas thorn and the poinsettia, and are somewhat more distantly related to the Hevea, or Para rubber tree, now the chief source of our rubber.

"The most promising species I found was one member of the euphorbia group. A rough analysis of its latex, made by a local chemist, indicated a rubber content of nine per cent. Whether this will be confirmed by more careful examinations in specially equipped laboratories I have, of course, no way of knowing just yet.

"Of course, sensational promises of great rubber plantations in Texas would be nothing but pipe dreams. Mr. Edison has made it quite plain, I believe, that what he has in mind in his present program is the development of a potential emergency supply, which could be drawn upon if a war or other calamity should cut us off from the cheaper rubber of the tropics."

The Mexican part of Dr. Rose's expedition took him south along the Gulf Coast about a hundred miles beyond the border. This was during the time of the recent abortive revolution; but Dr. Rose reports that this part of Mexico was not affected by the uprising, and that in any case most of the region was uninhabited.

### HYPERPARASITES

GOVERNMENT efforts to fight the depredations of the gypsy and brown-tailed moths have been handicapped this year by the fact that one of the parasitic insects used to

prey on the moths and reduce their numbers has itself been destroyed to an alarming extent by parasites.

One of the most promising moth parasites, known as *Apanteles*, which feeds on the larvae, produces two generations each year and multiplies at such a high rate that it was hoped it would prove to be a great check on the moth pest. However, government experts have found that this species is itself a prey of parasites whose work, combined with other unfavorable factors, is so deadly that frequently not more than one per cent. of the second generation is likely to produce adults.

Parasites upon parasites are called hyperparasites and the studies made of the afflicted species show that some 35 kinds of hyperparasites prey upon it, 14 being responsible for about 90 per cent. of the total parasitism. Curious to note, these hyperparasites are in turn preyed upon by parasites, which scientists call tertiary parasites.

*Apanteles* is a somewhat discriminating feeder and preys on only the gypsy moth and a few other varieties, but the hyperparasites are not so particular, regularly attacking many parasitic insects. A short crop of *Apanteles*, therefore, does not mean that the number of its enemies will be reduced correspondingly the following year. However, when the *Apanteles* is scarce there usually is a pronounced reduction in the numbers of hyperparasites. A happier side of the situation is that the *Apanteles* in its native home is attacked as seriously by hyperparasites as is the case in America, but it continues to survive and at times is one of the chief enemies of the gypsy moth. There is a close relationship between hosts and parasites, hyper and tertiary parasites at all times.

### ITEMS

To test the claims that artificial silk cloth allowed large amounts of the health-giving, short wave-lengths of sunlight to pass through, various fabrics were submitted to test at the National Bureau of Standards. Cotton was found to be nearly as transparent to the ultraviolet light as viscose and cellulose acetate, and real silk had about the same transparency as cotton. The viscose artificial silk was more transparent than that made from cellulose acetate, but the maximum transparency measured was only 27 per cent. Dyes or the yellowing due to age was found to reduce the transmission to only about 5 to 10 per cent. and in most fabrics the threads occupy 95 to 99 per cent. of the total space. The experts conclude that the composition of the fabric is of less importance than the coarseness of weave.

THE chipped stones from the seacoast of Sligo, Ireland, which were recently described by the British archaeologist J. P. T. Burchell as implements made by early Stone Age men, have become the subject of scientific controversy. A committee of Dublin investigators, R. A. S. Macalister, J. Kaye Charlesworth, R. Lloyd Praeger and A. W. Stelfox, have reported to *Nature* that they have investigated the caves on the Irish coast and find that they are apparently of a much later date, geologically, than the Old Stone Age. They declare further that the chipped stones in question are of limestone, a most unsuitable material for implements, and that they can not find any evidence that the chipping is the result of anything but accidental fracture.