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Eric Doolittle ^a

^a University of Pennsylvania

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THE NEW STAR IN PERSEUS.

BY ERIC DOOLITTLE, INSTRUCTOR IN ASTRONOMY, UNIVERSITY OF
PENNSYLVANIA.

PERHAPS the most remarkable astronomical discovery of the year 1901 was that of the brilliant new star which on the 21st of last February was seen to be shining in the constellation Perseus. On the night of its discovery, this star was nearly as bright as the brightest of the stars of the Great Dipper, and two evenings later it had become the brightest of all the stars in the sky. Yet from a photograph made at the Harvard College Observatory on the 19th of February, it was perfectly certain that no star was then in existence in the portion of the sky afterward occupied by the new body, for no trace of any such star appeared on the plate, though stars so faint that 2,000 of them together would not emit so much light as the new star were very clearly visible. Thus, in four days at most, this new body had increased in brightness from invisibility until it was the brightest of all the fixed stars.

Since February 23d, the new star has been slowly and irregularly fading away, until now it is at the extreme limit of visibility to one not possessed of a telescope.

It is well known that the stars are merely suns, or, in other words, that our sun is but one of the innumerable host of stars. The sun is 1,300,000 times larger than our earth, and at present is at a temperature not far from 18,000 degrees Fahrenheit. It is slowly contracting under the influence of its own gravity and as it contracts, it grows at first hotter and hotter, but finally it will become cold and

dark as our earth has done. There are probably great numbers of these cold, dark suns moving through the realms of space.

What it was which caused the sudden appearance of this new sun is as yet wholly unknown. It may be that it resulted from the collision of two dark suns, rushing toward each other under their mutual attractions with an inconceivable velocity. The impact would have been sufficient to vaporize and raise to incandescence much of the material of which the bodies are composed.

Or, it may be that two suns having a more or less solid crust passed near each other, merely. In this case their mutual attractions would distort their figures and break up the crust of each star, thus liberating the pent-up, superheated gases within, which would then burst forth with great energy.

It is also possible that the crust of a dark star became torn and broken simply through the natural shrinkage of the star itself, and that the imprisoned gases rushed out and by their glow, combined with that produced by chemical union with the atmosphere of the body, created a great outburst of light.

And finally, to these several theories may be added another explanation, equally plausible, namely, that the outburst was caused by the passage of a dark star through a cloud of cosmic material. Such clouds exist in great numbers in the sky, and it is at least possible that the friction would have been sufficient to raise the mass of cold matter to white heat and then to change it into an incandescent vapor and possibly into the dissociated gaseous state, all in a few weeks or days.

On September 20th, Mr. G. W. Ritchey, of the Yerkes Observatory, secured a photograph of the new star, which showed it to be surrounded by a nebulous cloud extending to an enormous distance from the centre. Fig. 1 is a copy of this photograph. Six weeks later, Professor Perrine, of the Lick Observatory, secured a similar photograph, and when the two plates were compared, it was discovered that the nebula was in inconceivably rapid motion away from the central star. Even were the star as near as the nearest of the fixed stars, this motion would be so great as 1,640 miles a second. But measures of the parallax, by means of the micrometer and heliometer, indicate that the distance is at least sixty or seventy-five times as great as the velocity of light. It has been suggested that the central star may be surrounded by a nebulous cloud and that the particles of which this cloud is composed become visible to us as they are suc-

cessively illuminated by the light emanating outward from the central star. In other words, that we here actually see the light travelling outward with the inconceivable velocity of 186,330 miles a

PHOTOGRAPH OF THE NEBULOSITY ABOUT NOVA PERSEI, SEPT. 30, 1901. BY C. W. RITCHEY, TWO FOOT REFLECTOR, YERKES OBSERVATORY. EXPOSURE 3 HR. 50 M.

The concentric rings of nebulous matter are very strongly marked; it was from the measures on the sharper points to the right, that the remarkable motion was discovered from this photograph. The rays of light emanating at right angles from the principal star are merely an optical effect arising from interference of rays in the reflecting telescope.

second. Whether this is the case or not, it seems improbable that it can be actual material which is being ejected from the central star with this velocity.

The sudden formation in the heavens of such a nebula has never been observed before. The problem of the origin of this new body is still unsolved; a certain explanation of the inconceivably rapid motions and changes which have been observed is still to be found. Careful measurements and observations upon this unique object will continue to be made by astronomers, and its future behavior will be watched with much interest.

SUMMER COURSES IN GEOGRAPHY.

SOME time since the *Editors* of the *JOURNAL* sent out letters of inquiry to the leading institutions of higher education in the country asking for announcements of summer courses in geography for 1902. Replies have been received from nearly every institution addressed, showing that at the colleges and universities geography will receive a due share of attention during the coming summer, while on the other hand the subject will receive a small share of attention at normal schools. Inquiries were not sent to the many summer schools given at places where educational work is only carried on during the summer, and hence no mention of such work will be included here. The *Editors* believe that better and more satisfactory work in all branches can be given at places where the regular equipment used during the academic year is also used during the summer. This is especially true in geography, in which valuable work depends so much on material equipment and apparatus. Many good teachers are to give short courses in geography at temporary educational centres during the summer of 1902, which probably will give inspiration to many teachers who have never been awakened to the needs, the opportunities, and the value of geography work. Such courses fill an important place in the educational world; but valuable and permanent results in geography, as in other subjects, come from definite courses, followed as studiously and carefully by summer students as by students following the work in an academic course.

A study of the courses outlined below shows that the subjects that will receive the larger proportion of attention in the summer courses this year are physical geography, including several courses in special branches of physical geography, and the physical and politi-