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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

THE NEW STAR IN PERSEUS.

A sensation has been produced in the realm of stellar science by the recent discovery of a temporary star whose brightness exceeds that of any other object of that class which has been observed in the last three centuries. On February 21 Dr. T. D. Anderson, of Edinburgh, a well-known amateur astronomer, detected this celestial phenomenon in Perseus, a little south of Alpha and east of Beta in that constellation. Although the accounts regarding it are not altogether accordant, it would seem that at its maximum it exceeded Capella in brilliancy, and almost rivaled Sirius. And this culmination appears to have been reached on Sunday morning, February 24. Since that time the star has perceptibly diminished in splendor. During the early part of last week it was of about the first magnitude, and distinctly inferior to Capella, but brighter than its most conspicuous neighbors in Perseus, which are second magnitude stars. A little later even a novice could see that it had faded still farther. Upon receipt of news of the discovery the Harvard photographs of that region of the heavens made for a month previous were examined. The plate for February 19 showed the new star, but with a magnitude of less than 10.5. It also appeared on the plates of February 2, 6, 8, and 18.

It is necessary to go back to the famous outburst observed by Tycho Brahe in 1572 to find with certainty one which surpassed this in brightness. Tycho's star appeared in Cassiopeia, and is said to have equaled Venus at her best. Kepler saw another in 1604, but it is impossible to say whether it beat the new star in Perseus or not. Scarcely more than a dozen temporary stars have been reported since that time, and not one has matched the latest. Indeed, some of them have been invisible to the naked eye, or else, while bright enough to be seen without instruments, were detected only by the camera. The last discovery of a naked-eye temporary star occurred in January, 1892, and was made by the same Dr. Anderson who found "Nova Persei." It was in Auriga, only a short distance from the recent luminous outbreak, and not far from Cassiopeia, the site of Tycho's star. Pickering has called attention to the fact that nearly all of the fifteen stars which he enumerated appeared either in or near the Milky Way, a coincidence that he thought was not without significance.

Astronomers designate celestial developments of this kind "new stars;" but the phrase is misleading. Those who are versed in such matters do not imagine that these sudden appearances represent fresh creations, but suppose that something invisible before has become visible. But even so, the phenomenon presents a mystery of tremendous interest, both scientific and popular, and there has been much speculation as to its cause.

It has been suggested, for instance, that chemical combinations might occur in the atmosphere of an orb which had cooled down from incandescence to a barely luminous condition, and that these combinations would evolve enough heat to produce a vivid light for a short time. Zöllner conceived that a star with a thin crust over its molten mass might meet with an accident that would rupture the covering, and liberate an immense quantity of glowing material. Lockyer's notion has been that two vast swarms of meteoritic particles, flying in different directions, meet in space, and are made to glow by friction. Others have believed that two suns or stars, once hot and brilliant but since grown cold and dark, come into collision. Should such a thing happen the energy of motion would be converted into thermal energy, and the two bodies might be set on fire.

A theory somewhat akin to these last two was proposed by Wilsing a few years ago. Klinkerfues had previously tried to account for the flash of a certain class of variable stars on the hypothesis that the rotation of a satellite around its primary raised an immense tidal wave of obscuring atmosphere, sweeping it to one side and more fully revealing the partially hidden luminous surface below. Wilsing fitted this theory to temporary stars by supposing that some huge wanderer in space, like a dark sun, passed near enough to another body to produce similar effects, but on a larger scale. Seeliger has shown that tidal action could hardly last more than a few hours, but Scheiner remarks that it might serve as a trigger to liberate forces that would not exhaust themselves for a long time. The Klinkerfues-Wilsing theory commended itself more strongly than any of the others just mentioned to Sir William Huggins, the eminent English astronomer, although it has not been generally accepted.

A hypothesis advanced by Seeliger soon after the appearance of Nova Aurigæ has met with more favor, as it can be better reconciled with observed phenomena. According to this authority, only one solid body is concerned in the business, and this encounters a nebula. Now a nebula is supposed to be an exceedingly attenuated collection of matter, either gaseous or dust-like. Yet when one reflects on the almost inconceivable velocities at which the cloud and dark orb come together he can understand that a good deal of heat must be developed. The friction might be of short duration, and the effect on the invading body would not extend to any great depth, yet for the time being the result might be eminently pyrotechnic. The surface of the dead star would become incandescent, and possibly some of its material be vaporized. At the same time parts of the nebula would also be heated and caused to glow. Thus there would be two sources of light, though the latter would be temporary. There are strong reasons for suspecting that the recent outburst in Perseus represents an occurrence of this sort, and that the star and nebula will disappear from view after a few weeks or months.

The evidence on which this supposition is based is supplied by the spectroscope. That instrument showed conclusively that in Nova Aurigæ at least two objects were concerned, because there were two different spectra, one superposed on the other. There was the characteristic spectrum of a nebula, and the spectrum of an incandescent solid over which some incandescent metallic vapors floated. The same state of things was also indicated, but less distinctly, in the case of the temporary stars in the Northern Crown (1866) and the Swan (1876). And already the same combination has been imperfectly revealed in the observations of Nova Persei. Incidentally, it may be remarked that the nebular spectrum of the star in Nova Aurigæ lasted much longer than the stellar spectrum, and that when last observed with a telescope it presented the appearance of a ball-like nebula.

The spectroscope betrays motion as well as composition. And Campbell estimated that the two objects involved in the production of Nova Aurigæ moved toward each other at the rate of 550 miles a second! Lockyer is said to have put the combined motion in the new star in Perseus at 700 miles a second. Possibly this is an over-estimate, because Campbell reports that relatively to the solar system the star seems to be nearly stationary.

As yet the distance of Nova Persei from us cannot be guessed. It may be fifty light years away, and it may be a thousand. It has been in existence too short a time for any parallax work to be done with it. But the chief matter of interest is the nature of the event which the object reveals, and not the precise location of the scene.

AN IMPORTANT TELEPHONE PATENT DECISION.

The United States Circuit Court for the District of Massachusetts has just handed down a decision in the suits of the American Bell Telephone Company against the National Telephone Manufacturing Company, and the American Bell Telephone Company against the Century Telephone Company, for infringement of the famous Berliner patent, No. 463,569, dated November 17, 1891, for microphone attachment for telephones.

A few remarks concerning this patent, and its history and litigation, may be of interest at this time.

As is well known, the transmission of speech by telephony requires two instruments, the first, the transmitter, into which the speaker talks, and the second, the receiver, at which the hearer listens. Mr. Bell's patent of 1876 described an instrument which could be used interchangeably for either of these purposes. In 1878 Mr. Edison and Mr. Blake produced transmitters, both unlike Mr. Bell's, and differing from each other in detail, but operating on the same general principle. They both belonged to the class of transmitters called microphones, the distinguishing feature of which is that the undulations of the electrical current by means of which the sonorous vibrations of the air in the transmitter are caused to be reproduced in the receiver, are caused by variations of pressure between two electrodes remaining constantly in contact, which variations of pressure are caused by the vibrations of the diaphragm of the transmitter.

The Bell company acquired title to both these patents, and enjoyed the exclusive right to the use of said inventions during the life of the respective patents.

About the time that the patent on the Blake transmitter was expiring, the public were astonished to learn that a patent had just been issued to the Bell company, covering in the broadest possible terms the identical microphone transmitter for which the telephone subscribers had been paying rentals in the past, and under which new patent the Bell company would be entitled to exact a continuance of the same rentals for the same instrument for seventeen years longer.

An examination of the files in the Patent Office, then for the first time accessible to the public, showed that the application for this new patent had been filed by Emile Berliner, June 4, 1877, and had become the property of the Bell company in 1878, and had been controlled by that company to the time of its issue.

The extraordinary delay in the issue of the patent (the application being all the time under the control of the Bell company), coupled with the manifest interest of that company to prolong its monopoly by means of that delay, prompted the United States, in 1893, to bring suit against the Bell company and Berliner to set aside and cancel the said Berliner patent. On January 3, 1895, the United States Circuit Court entered a decree setting aside and canceling said patent. On appeal to the United States Circuit Court of Appeals for the First Circuit, that court, on May 18, 1895, reversed the decree below, and directed a dismissal of the bill of complaint. Thereupon, the United States took an appeal to the United States Supreme Court, and on May 10, 1897, that court rendered a decision affirming the decision of the United States Circuit Court of Appeals.

The suits just decided by the Circuit Court were brought to enjoin the defendants from making, using, or selling telephones embracing or containing a microphone attachment substantially as claimed in the said Berliner patent. The court, on the 27th inst., dismissed the bill of complaint, holding the Berliner patent to be void, and anticipated by the Edison and Bell inventions.

The Bell company will undoubtedly take an appeal, and the public will await with interest the ultimate decision which will confirm or destroy the Bell company's monopoly.

THE SLABY SYSTEM OF WIRELESS DUPLEX TELEGRAPHY.

From an ill-understood curiosity wireless telegraphy seems at last to have become an important and valuable branch of electrical science. Much of the credit for this evolution is due to Prof. Slaby, of Charlottenburg, and to his indefatigable collaborator, Count Arco, both of whom have systematically investigated the phenomena of the Hertzian waves and formulated laws by which these phenomena can be explained. As a result of their labors, the uncertainty and whimsicality of wireless telegraphy have disappeared. Much that was formerly considered indispensable in the ethereal transmission of electrical waves has been proven unnecessary, and even disadvantageous.

The balloon at the upper end of the transmitting wire, supposed to serve the purpose of increasing the capacity; the peculiar plates at the receiving station, formed like butterfly-wings, and likewise designed to increase the capacity; the careful insulation of the receiving wire from the earth; and other details of the old system have been rudely thrown aside. Nothing more is heard of the law that the distance to which messages can be transmitted is proportional to the square of the length of the transmitting and receiving wires. That there is a definite relation between distance and length of wire or height of mast may well be assumed; but that relation, whatever it may be, plays no very important part in Slaby's system, since the tension to which the coherer is subjected is augmented by means different from those hitherto known.

The waves sent forth by a transmitter loop are augmented by a condenser. An induction coil is connected with the upper end of the loop, and is so wound that it permits the passage of low-frequency currents, but checks the high frequency currents generated by the discharge of the condenser. At the moment of discharge the loop acts as a single vertical wire. By varying the nature of the induction-coil and the condenser, waves of any length can be sent forth. At a lecture delivered before the German Emperor, waves varying in length from 140 to 600 meters were utilized.

In direct opposition to Marconi, Slaby grounds his receiving-wire. An ordinary lightning rod is used instead of a mast. If the length of the receiving wire be exactly one-fourth the wave length, a node is formed at the connecting-point with the earth, and the maximum amplitude of the alternating tension appears at the upper end. Evidently the coherer should be attached to the point of greatest amplitude; but such an arrangement is impossible in practice. The difficulty is very simply and ingeniously overcome by connecting with the receiving-wire at the earth-node