Heavenly Swan Now in Evening Sky—*Continued*

Incidentally, many of these discoveries have been made with one of the most ingenious instruments that has even been invented to aid scientific workers. Imagine a photographic plate with several thousand tiny dots upon it, and another with a similar number in the same place and of the same size except for one. How is the astronomer to find out which one has changed? It would be far too tedious to compare each particular dot separately on each plate, yet how else is the change to be measured and discovered?

To the aid of the astronomer comes an instrument with the somewhat awkward name of "blink-mikroskop". Familiar to everybody is the old-fashioned stereoscope, in which a pair of photographs is used, one for each eye. In the blink-mikroskop, the two photographic plates are placed side by side. Light passes through them to a system of lenses and the astronomer looks at them through an eye-piece similar to that of any ordinary microscope. But prisms bend the path of light so that in the same eye piece the astronomer can see either one of the plates. A small lever operates a shutter that changes from one to the other.

Thus, if you have two plates of stars, and want to find out which one has changed, all you have to do is to put them in a blink-mikroskop. Then you adjust them until the stars in each are in the same relative place. This assumes, of course, that both photographs were made with the same camera, so that the stars on the plate are the same distance apart. Then you operate the lever, or "blink" the plates, as the astronomer would say. The stars that have not changed look the same in one as in the other, so if both are entirely identical, the motion of the lever will not produce any noticeable effect. But if one of the stars has changed, that is, if in one plate it is small and in the other it is large, then the shift of the blink lever will cause this one to apparently swell and contract in a most peculiar fashion. This causes it to stand out at once from the background, and so a change may be very quickly detected.

What causes a star, ordinarily well behaved, to suddenly have delusions of grandeur and become thousands of times as bright as it used to be?

This is one of the outstanding astronomical questions, and has never been entirely satisfactorily answered. One idea that was popular in the past is that a nova is due to a collision between two stars. All the stars are moving at tremendous speed, and if two should happen to hit, something would happen. Such a collision might well produce a nova, but the fact is that the stars are so scattered in space that on the average a collision could not occur more often than once in a million years. This is the fatal objection to this theory, when we think of the five bright novae since 1900.

Probably it is caused by a sudden release of energy already within the star. According to modern ideas, the energy of the stars comes from an actual breaking up of their matter into light and heat. This process is continually taking place and if something should happen to increase it temporarily, it might produce a nova. But what that "something" is that might happen is not known. One suggestion, and a plausible one, is that a small body, a small meteor, for instance, might serve as a trigger to set off the explosion.

Perhaps a meteor might come in from outer space so accurately aimed, and travelling so fast, that it would hit the sun. It might be carried far into the star's interior before it met layers of strength enough to impede its progress. Then the energy that it had by virtue of its motion would be changed into heat and a lump of highly heated material would result. Perhaps it would be millions of degrees in temperature. At this high temperature, all sorts of things are likely to happen that do not occur at the temperature to which we are used. Some of the atoms themselves might be broken down very rapidly and a literal explosion would result. It would throw off some of the lighter layers of the star, but after it was over, the star might go on pretty much as before.

Of course, if this should happen to the sun, all of the planets would be quickly burned up. We earth dwellers would hardly have time to realize what had happened before we were burnt to cinders. Fortunately, there is no need to suppose that there is any immediate danger of this thing happening. However, there are perhaps a billion stars within reach of a large telescope. If there are ten times as many capable of becoming new stars, and as there are, on the average, ten nova a year, including the fainter ones, any star would be a nova on the average of once in a billion years. Long though this period may seem, it is short in the life of a star, and so most of the stars may have been novae several times in their history. We cannot tell whether or not the sun has ever been a nova, but the probabilities are that it will be many, many millions of years before it becomes one again, if ever.

This month brings six first magnitude stars to the evening skies. One of these is Deneb, which has already been mentioned. Directly west of Deneb, in the constellation of Lyra, the Lyre, is Vega. To the southwest of Cygnus is Aquila, the Eagle, with first magnitude Altair. Low in the northwest is Bootes, with the bright Arcturus, which will soon disappear from the evening sky completely until next year. In the south near the horizon is Fomalhaut, in Piscis Austrinus, the southern fish. Low in the northeast is Auriga, the charioteer, with the bright Capella. In a few months this star will be high over head in the evening skies.

Only one planet has been left in the evening sky, and that is Saturn. It is on the meridian, directly south at sunset, and sets about four and a half hours after the sun. Mars and Mercury are also in the evening skies this month, but so near the sun that they can hardly be seen. Venus and Jupiter are both brilliant morning stars, and can be seen before sunrise in the eastern sky.

Science News-Letter, September 7, 1929

Pennies in the Pool

Geology

A bushel and a half of hairpins, nails, badges and other miscellaneous articles too numerous to mention have been retrieved from Handkerchief Pool in Yellowstone National Park during a recent housecleaning.

According to Dr. E. T. Bodenburg, ranger naturalist, visitors at the Park must have the idea that the famous pool operates on the principle of a slot machine, for coins to the value of $1.98 were included in the haul.

The investigation of the spring's "plumbing" was undertaken to facilitate the current movements for which the spring is noted. The currents are due to the cool water sinking on the sides of the pool while the warm water rises in the center.

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