

The Bee's Home Magazine Page

Marvels of Astronomy

By GARRETT P. SERVISS.

"How far away would the sun have to be to look like a star, and why—if it is true, as I have read—cannot a telescope magnify a star?—C. A., New York."

Since the intensity of light radiated from a given source varies inversely with the square of the distance, the sun would be reduced to the apparent magnitude of the brightest of the stars, Sirius, if its distance from the earth were about 3,666 times as great as it now is.

Its present distance is 93,000,000 miles, and this multiplied by 3,666 becomes 7,700,000,000 miles. At that distance the sun would simply be a star in the night equal in brilliance to Sirius, the Dog Star.

The calculation is based upon the observed fact that the amount of light received upon the earth from Sirius is one-7,000,000,000th of that received from the sun, and the square of 7,000,000,000 is 3,666.

If the sun were 3,666 times its present distance away, its disk would be reduced to an angular diameter of about one-fortieth of a second of arc, and the most powerful telescope in existence could not make it visible as a disk. It would appear, as all the fixed stars do, like a piercing point of light, immeasurably small, though intensely brilliant.

The larger the telescope used the brighter it would look, because the larger glass would collect more light, but still the disk would remain too minute to be perceived or measured.

It is true that there would be a spurious or false disk, made up of concentric rings of light, due to diffraction, and owing to these appearances, which vary with the brightness, the stars do seem to have visible disks, but the fact that these are not real becomes evident when we find that they are actually smaller in the telescope than when viewed with the naked eye. The higher the magnifying power employed the more minute the apparent disks.

The practical disappearance of the disk of a star, while its light continues to affect only the eye, is due to the inability of the eye to perceive magnitude below a certain range of dimension. Perhaps this can best be illustrated in the following way:

On a sheet of paper lying on your desk make a minute circle one-eighth of an inch in diameter. This circle, viewed from the ordinary distance of 93,000,000 miles, appears no larger than a circle one-eighth of an inch in diameter viewed from the ordinary distance for reading a book.

Now, let the sun be removed to eight times its present distance. Its angular diameter will become one-sixteenth of a degree, and in order to represent its size upon your sheet of paper you will have to decrease your little circle to a diameter of only one-sixty-fourth of an inch, which is the size of a very small printer's point or period.

Next, remove the sun eight times farther, or, in all, eighty times its present distance. Its diameter will then have become 1/10th of a degree, and your dot on the paper representing its size to the eye will have shrunk to a diameter of only one-six hundred and fortieth of an inch; in other words, it will have become smaller than a pin's point and cease to be visible to the naked eye, or if faintly visible in a strong light its disk will be far too minute for measurement without a magnifying glass.

At a distance, then, of eighty times 93,000,000, or 7,440,000,000 miles, the sun would present a disk too small to be distinctly seen without a telescope, although it would still shed upon the earth about a million times as much light as comes from the brightest of the stars, Sirius.

It would continue to be a sun to us, rather than a star, making a daylight about 100 times more intense than the light of a full moon. Yet all that light would come from a disk imperceptibly small to the unaided eye, although the spurious disk formed would be very conspicuous.

Putting the sun at greater and greater distances, we should find its disk getting smaller and smaller, until even a telescope could not reveal it, and its light dimming until, at length, that, too, would become too faint to be perceived.

The enormous difference between the sensitiveness of the eye to light and its sensitiveness to minute spatial magnitude may be shown by simply supporting our vanishing dot, representing the sun's size on paper, to possess a power of light equal, area for area, to that of the sun. In that case we could see the shining dot when it had shrunk to an angular diameter of only a few thousandths of a second of arc, just as we could see the sun as a faint star if it were removed to several millions times its present distance. The star on the paper and the star in the sky would be precisely alike.

The Goddess

The Most Imposing Motion Picture Serial and Story Ever Created.

By Gouverneur Morris and Charles W. Goddard

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Synopsis of Previous Chapters.

John Amesbury is killed in a railroad accident, and his wife, one of the most beautiful women, dies from the shock, leaving a 3-year-old daughter, who is taken by others to a remote place, where she is reared in the seclusion of a cavern. Fifteen years later Tommy Barclay, who has just quarreled with his adopted father, wanders into the woods and discovers the girl, now known as Celestia, in company with Prof. Stilliter. Tommy rescues the girl from the clutches of a noted procurer, but is able to win over his woman by her peculiar hypnotic power. Here she attracts the ferret, who becomes attached to her. At a big clothing factory, where she goes to work, she exercises her power over the girls, and is saved from being turned to death by Tommy. About this time Stilliter, Barclay and others who are working together, decide it is time to make use of Celestia, who has been trained to think of herself as coming from outer space. The first place they send her is to Bitumen, a mining town, where the coal miners are on a strike. Tommy has gone there, too, and Mrs. Gundorf, wife of the miners' leader, falls in love with him and denounces him to the men when he returns her. Celestia saves Tommy from being lynched, and also settles the strike by winning over Kehr, the agent of the houses, and Barclay, Mr. Mary Blackstone, who is also in love with Tommy, tells him the story of Celestia, which she has discovered through her husband. Kehr is named as candidate for president on a ticket that has Stilliter's support, and Tommy Barclay is named as the miners' ticket. Stilliter professes himself in love with Celestia and wants to get her for himself. Tommy urges her to marry him. Mary Blackstone bribes Mrs. Gundorf to try to murder Celestia, while the latter is on her way to town, traveling on a snow white train. Mrs. Gundorf is again hypnotized by Celestia and the murder averted.



Tommy stumbled on, shifting the heavy basket frequently from hand to hand. As it got to be broad day, he was careful to make no noise. At any moment now he might hear sounds of Stilliter and Celestia approaching.

FOURTEENTH EPISODE.

He still had Tommy's knife and with this he cut a great pile of tender balsam for Celestia to lie on. By good fortune the night was not cold. Celestia lay (ill) morning without moving or closing her half-open eyes. And Freddie stood guard over her, then sat guard, and then slept.

Stilliter also slept after a time. He had found his way to the hut, and had controlled his phobic mind sufficiently to reason that if he was to find help, if help was to find him it would be at night, but in the day time.

He had many nightmares.

Toward dawn he walked in a cold sweat. In his sleep he had asked himself this question:

"How will I know when it is day?"

Tommy found his candle at last, lighted it, and retraced his steps by means of the chalk marked at the turns and forks to the mouth of the cave. He had not expected to find Celestia. And yet, it shocked and unnerved him not to find her. He called to her at the top of his lungs, twice, then thrice, and to Freddie. He had no answer. To continue shouting was a waste of breath. He would need a little more light, perhaps to catch up with Stilliter and Celestia. At ready he was on his way down the trail which led eventually to where he had left the purloined automobile, and along which somewhere or other he hoped to come up with the psychologist and his victim.

Stilliter, Tommy reassured, on coming up with the abandoned automobile, must have left his own, taken to the woods and reached the vicinity of the cave by this very trail.

Why hadn't Freddie the ferret given warning? Tommy thought that the poor boy had probably been shot down in cold blood. There was no time to look for the body. Tommy proceeded at a dog trot—not a run exactly, but that gait, a little faster than a walk that makes the least demand upon the wind and muscles. He kept this up, with occasional lapses into fast walking, until the moon set.

"They must have had a tremendous start of me," he thought, "or else," and his heart sank. "They're gone some other way." He paused abruptly and hesitated.

"Why," he thought, "he would make the poor child take this long tramp again without a good rest. Even I don't like it any too well, and I'm strong as a horse. He's probably taken her somewhere just out of the ear-shot of the cave, he may know of some shelter, and I've been getting further and further from her instead of nearer to her."

Still Tommy could not make up his mind to go back to the cave. Nothing was sure. If Stilliter was somewhere ahead, with Celestia, and Tommy gave up following, the same was up. If they were merely resting near the cave they would be coming along in the morning and he could ambush them somewhere along the trail. And he hurried on as best he could in the darkness.

His own car was as he had left it. Stilliter was standing just behind it. The driver had wrapped himself in a top robe and was sound asleep in the tonneau. Also in the tonneau was a good-sized wicker picnic basket, which on examination proved to be well stocked with sandwiches, cold chicken and thermos bottles containing hot coffee and soup.

Tommy carried the basket into the woods without asking permission of the sleeping chauffeur, and ate a square meal. He had not until now realized how hungry and thirsty and tired he was. The choicest provisions in the basket he put aside for Celestia. "If I'm hungry and tired," he thought, "think what she must be! But I suppose Stilliter tells her she's just had a square meal and she believes the dog, but that can't last forever."

Having eaten Tommy rested for half an hour, took up the heavy basket, and once more hit the trail. But now he went slowly and stopped often to rest. He had seldom been so tired in his life, and only for an overmastering love and anxiety for Celestia kept him going.

It was no longer night, it wasn't yet dawn; but that lovely interval between when it what appears to be pitch darkness, things become suddenly visible.

Mother-in-Law Question Still Supreme

No Other World Problem So Fraught with Misery and So Insoluble—Woman Who Has Been Saint in Own Home Becomes Firebrand in House of Her Children.

By DOROTHY DIX.

Perhaps there is no other problem in the world so fraught with misery and so insoluble as the mother-in-law question. In it are condensed jealousy, and a cold selfishness, and stintiness, and temper, and greed, and tyranny—every mean and unworthy impulse that can away the human heart. Just to put two persons together in the relationship of mother-in-law and daughter-in-law, or son-in-law, or son-in-law, seems to bring out the worst that is in them, as a hot potato brings out the measles.

The mother who has been a saint in her own home becomes a firebrand in her children's home. The angel wife turns into a spitefire when she has to live with her husband's mother. Chivalrous men treat their mothers-in-law with a lack of courtesy that they would not show to a scrub woman.

Any divorce judge will tell you that nine-tenths of the domestic infidelity that results in the breaking up of homes is caused directly by the mother-in-law, and just how much of the unnecessary sorrow of life is occasioned by the inability of in-laws to get along peacefully together no one knows.

Here is a case in point: A man writes me that he has a mother, 81 years old, and that his wife has left him because she refused to turn his mother out of his house. He says he loves his wife dearly and his mother dearly, and has done everything he possibly could to make them both happy, but that when it came to a show-down between his wife and his mother he simply refused to send the mother away, because she is old and helpless while his wife is young and strong.

The man writes that he is bound to his mother not only by every tie of natural affection, but of gratitude, for his father was a drunkard who misused and his mother, and finally deserted them, and his every childish memory is of her toiling all day long and far into the night to support him. Now he wants to repay that devotion by making her old age happy and comfortable, and his wife demands that he turn the old woman out as if she was an old work horse who had served her day.

The man cannot do it. He knows that he is his mother's all. Every instant she has in life is bound up in him. He houses which they had built.

It was far better than Prof. Stilliter should be found than that he should go through the dangers and agonies of seeking. Under ordinary circumstances he knew the region like the palm of his hand. The cave itself he could find his way about in as easily as in his own house. But knowing things, when you see them in very different from knowing them when you can't see them and can only touch them. What is merely a depression by day is an abyss by night.

In wooded countries there is nothing better than a fire to attract attention. If any lonely or hungry person is in sight of that fire, that person will go to it, across lakes and mountains if necessary. Prof. Stilliter had matches. He might or might not be able to find the materials for a fire in the neighborhood of the cave. He wished to make a big smoke, and one which would endure a long time.

(To Be Continued Tomorrow.)



Do You Know That

Guineas were first made in Guinea.

Spiders have six to eight eyes.

Saccharine is 220 times sweeter than cane sugar.

In the seventeenth century a single tulip bulb was sold for 12,000 florins.

There is a law in Venice which compels all gondolas to be painted black.

There are over 300 female blacksmiths in England.

The Russian "veret" is about three-quarters of an English mile.

France was the first country to introduce a really successful submarine.

Over one-third of Italy's population is engaged in agriculture.

Freddie Deals Out the Cards in a Superstitious Effort to Learn What to Do

To develop a bump of locality, and at last Freddie, with cold fear in his heart, admitted to himself that he was hopelessly lost. I shouldn't have said hopelessly; the mariner has his sextant and compass to guide him across the waters; the woodsman has the sun and the stars, and the mossy side of trees to help out in intuitive sense of direction, and Freddie the ferret, feeling in his inside pocket, found to his unmitigated relief that he had his pack of cards.

Forthwith he made Celestia sit down, and he knelt, and having shuffled his greasy and shabby deck, he dealt thirteen cards face down in a very accurate circle. Then one by one, a look of faithful expectancy on his face, he turned them over.

Twelve of the cards he then gathered up and put up with the pack. The thirteenth was the ace of hearts.

This Freddie lifted with reverence and great care, so as not to change the direction to which it pointed, until it reached the level of his eye and he could sight along it.

A blasted pine standing alone was the first landmark to which the goddess of chance directed Freddie the ferret.

"We're not lost now," he said, and he helped Celestia to her feet.

You may call it what you please. The fact remains that Freddie the ferret had a return of his usual luck and had hit upon the general direction of the cave.

Advice to Lovelorn : By Beatrice Fairfax

You Must Answer.

Dear Miss Fairfax: About one and a half years ago girl friends dared me to write to one of their friends in another state, and on January 1, 1914, I wrote her a New Year's card with a little verse.

I didn't receive any reply until last Christmas. I answered her postal, and since they have been corresponding once in a while.

Now, this young lady seems to think that she may not be doing just the right thing in writing to me because, as she puts it, she has never met me personally, but on account of the friendship between this young lady and the one I know, she thought it was all right at the time she first wrote.

"She didn't say that I had written anything that she didn't like, but, on the other hand, she said that she enjoyed reading my letters and enjoyed writing to me. I enjoy reading her letters and writing to her, and she wants me to let her just how I feel about it. I would like to do the right thing, and as I always try to be a gentleman, I would like to know just what you think about it, so I will not be wrong in answering her letter."

What you have done is rather a silly thing that boys and girls often do. But if you know in your heart that you respect this friend of the other girl's, and get wholesome enjoyment out of the correspondence, keep it up. In any case, answer her letter and reassure her—for she is probably much worried as to whether she has forfeited any of your respect by replying to your letters. Tell her that you appreciate and esteem the privilege of hearing from her and hope to meet her through your friends some day, and that you hope she will feel that she may keep up the friendship so informally begun. I don't advise starting such a correspondence; but if you drop it now the girl will surely feel snubbed and unhappy. She wants the same many reassurances as to your feelings you gave me.

That longing for the rugged health of Youth

Alas, the dreams of happy boyhood days profit naught—we are "made to tread the mills of toil." And the nearest we can come to bringing back the sunny days of youth is to make timely *anende* for the heavy overdrafts made by work and worry.

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Grand Prize, International Congress of Medicine, London, 1913

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