

# HALLEY'S COMET after 75 YEARS RUSHES EARTHWARD AGAIN

### PROFESSOR BARNARD, OF THE YERKES OBSERVATORY, TELLS WHY THE CAMERA WILL "PICK UP" THE CELESTIAL TRAMP BEFORE IT CAN BE SEEN BY THE GREATEST TELESCOPE



MISS MARY PROCTOR (PHOTO BY SARONY)

By Mary Proctor

Whence art thou, say, thou pale winged messenger? And whither guest? What thy history? And what thy future? Tell a waiting world Ere visiting again you silent deeps.

**A**FTER an absence of 75 years Halley's comet (so named after the astronomer who determined its orbit) is on a return trip. The magnified eyes provided by scientists in the giant lenses of the telescopes of the Lick and Yerkes observatories will be enabled to get a glimpse of the returning wanderer from space in the fall of the present year. As the comet approaches nearer and nearer to our planet the smaller telescopes will have their chance.

The surprising fact, however, is noted by Prof. E. E. Barnard of the Yerkes observatory, that the comet will be found by the camera before it can be picked up by the greatest telescopes.

In reply to questions regarding the expected return of Halley's comet I have received the following interesting reply from Professor Barnard. He is an eminent authority on the subject and is well known for his remarkable work in celestial photography, especially in the photographs he has taken of comets. In this way we have learned much of the marvelous changes these celestial visitants from the sky undergo while journeying through space.

By means of photography a new chapter will be added to our knowledge of the peculiar characteristics of Halley's comet, and doubtless many fine photographs of the wanderer will be obtained before it recedes on its return trip through space.

"I think you can say with absolute certainty," says Professor Barnard, "that Halley's comet will be visible in the 40 inch telescope in the winter of 1909. It ought to be a bright object then in a good telescope, and should be visible in any telescope of five or six inches aperture, because, according to Holteck (Astr. Nach. for 1908, June 13) it will on October 2, 1909, be of the fourteenth magnitude. It will, of course, get brighter after that date.

"On October 2, 1909, it will be unusually faint, because its computed magnitude will be 14.2m. According to Dr. Holteck the brightness of the comet at its best will be 3.7m. This would make it not very different from the brightness of Daniel's comet of that year. But you must bear in mind that a comet is an uncertain quantity, so far as a prediction of its brightness is concerned, and it may come up to some of its glory of the middle ages, though this is not probable, for the comet at each return must lose a great deal of its tail producing material, and hence, at each successive return it must present a less brilliant aspect.

**B**RIEFLY, the position of Halley's comet at the return is not yet known with any decided accuracy. Cowell and Cromellin (Monthly Notice, Royal Astronomical Society, Vol. 68) give the perihelion passage April 3, 1910. They are doubtless nearer it than others, but there is an uncertainty of perhaps several weeks. The largest field of view of the 40 inch telescope is less than six minutes of arc. This will be covered many times by the little finger nail held at arm's length. The astronomer, therefore, can see but a small speck of space. If the position of an object be closely known, it can be readily picked up if bright enough to be seen in the 40 inch. But if the place is uncertain by some degrees it would be a great loss of time to hunt for it with the 40 inch.

"At the same time, the photographic plate is far more sensitive than the naked eye to the light of a comet. The field of view of a photographic telescope is far greater than that of the visual telescope so that it can readily take in, in one picture, all the region that is likely to contain the comet.

There are much greater chances of the comets being picked up with some of the reflecting telescopes, or with some of the portrait lenses, or with some of the photographic plates. Though the comet will be very faint the coming fall and winter I have no doubt that it will be found photographically.

The comet is now out between the orbits of Jupiter and Saturn. It will

be within the distance of Jupiter's orbit after March 1, 1909. It is possible that some one with the aid of a great telescope or photographic camera may catch sight of the expected visitor during the winter of 1908-1909. We may begin to search for it as early as September, 1908, provided good ephemerides are at hand. Almost certainly it may be found by September or October.

It will then be only a round nebula, whatever tail it has being almost directly behind it as seen from the earth. The date of its nearest approach to the sun, according to H. C. Wilson, should be March 10, 1910.

After October, 1909, the comet will probably be visible to the unaided eye. Even now it is nearer to us than Saturn and is rushing forward at the rate of 520 miles a minute. After it passes Jupiter, the next planet on its way, the speed will increase to 783 miles a minute. It will then plunge through the zone of asteroids, or tiny planets which wander between Jupiter and Mars. Woe to any small asteroid it may encounter on the way, but worse still for the comet should it crash head on in its mad career into the giant planet Jupiter, the great disturber of comets.

It is a well known fact that the giant planet has a way of annexing comets and even tiny asteroids which may happen to drift his way in a most unprincipled fashion. Suspicions have been aroused concerning two new moons acquired of late years which doubtless were once members of the asteroid family. Jupiter has been gravely accused by some learned astronomers of exerting his mighty influence on the helpless worldlets and adding them to his own family circle. Not only that, but he has reached out for passing comets and captured no less than 30, which are now recognized and spoken of as Jupiter's "family" of comets.

As another 75 year cycle must pass away before the comet will again come within our ken, it behooves us to follow the example of the astronomers and be on the lookout for the arrival of our celestial guest. The advance guard to welcome it on its return will be stationed at the Lick and the Yerkes telescopes; then the owners of smaller telescopes will get their opportunity, until finally by October, 1909, it will be possible for all to see the comet with the unaided eye.

It is impossible to say anything regarding the position of the comet in the sky, as observable from the earth, until certain computations have been made. A prize has been offered by the German astronomical society of 1,000 marks for the most exact calculation, and when it is made we shall know exactly where to look for the comet. As seen from the sun its position when nearest to that luminary will be about four or five degrees from Theta in the constellation of the Eagle, a distance equivalent to that separating the Pointers.

As to the appearance of the comet on its return it depends entirely upon its position with regard to the earth and sun. If the earth happens to be near the comet about the time of its passage round the sun, when the comet's light is necessarily greatest and the train most extended, then we shall have a splendid view of the glorious spectacle. At its return in 1759 the comet had a train 50 feet in length and was best seen in the southern hemisphere. That is, the train of the comet extended to a distance equivalent to a little more than half the way from the zenith to the horizon.

At its next return, in 1835, it was somewhat shorn of its splendor, for its train was but 15 degrees in length. Even so, that means a length three times as great as that separating the Pointers, which forms a very convenient scale for denoting distances of objects observed in the sky. How the comet will look on its next return it is impossible to conjecture, but it is to be hoped that it will treat us to a display worthy of its former reputation.

**U**NFORTUNATELY, comets are made of such flimsy material and use it in such an extravagant fashion in the formation of trains, in order that they may be presentable, as it were, when they visit the sun, that many such visits ultimately lead to bankruptcy. Halley's comet has the reputation for being specially reckless in this way, adorning itself with trains long enough to reach from the earth to the sun and millions of miles beyond. No court beauty about to be presented to her monarch could vie in vanity with this celestial coquette.

minute, and by the time it has reached its greatest distance from the sun it will have attained the rate of 39 miles a minute, an "aphelion crawl," as it has been jocosely termed by scientists.

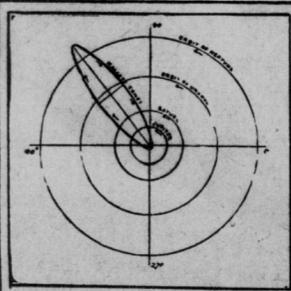
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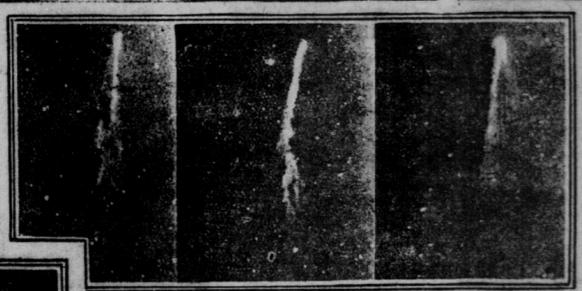
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ORBIT OF HALLEY'S COMET



CHANGES OF A COMET WHEN FIRST SEEN



THREE PHOTOGRAPHS MADE ON SUCCESSIVE DAYS OF BROOKS COMET 1893. BY E. E. BARNARD.

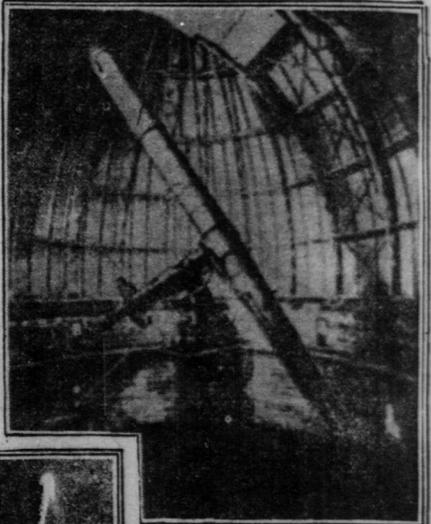


HALLEY'S COMET, 1835, APPROACHING THE SUN, OCTOBER 26.

HALLEY'S COMET, OCTOBER 3. FROM DRAWINGS BY STRUVE



THE YERKES OBSERVATORY, AT WILLIAMS BAY, WISCONSIN



YERKES TELESCOPE

mentation of her achievement. Her work for the present will be chiefly tabulating each day the results of each night's observations; also in the microscopic examination of the photographic negatives made in the observatory for the purpose of locating if possible new stars or nebulae not visible to the naked eye of the observer, even when aided by the powerful telescopes, but showing more plainly on the photographic plates.

Miss Allen was very studious while in college, but not a bookworm. She delighted in every department of outdoor and social recreation and always sailed her own sailboat.

That she is an expert in handling her 21 foot craft is asserted by her younger sister, who declares: "I feel perfectly safe to go out with sister, when I wouldn't step into the boat if half a dozen men were at the helm."

"But once—but once! My! We got too far into the outer harbor when a big storm was coming up. She said it was all right, so I just hung on and let her sail. Some saucy waves came right into the boat, and once I thought we were going overboard. Didn't seem to worry sis much, though she was very white."

"We got ashore all right. The life saving captain said he had given us up for lost. Our boat was half full of water and sis and I were drenched."

Miss Allen has a delightful personality. She is a typical New England girl.

## Fattening Properties of the Potato

**W**HEN the lawyers of Harry Thaw made a plea a short time ago to have the prisoner removed from one institution to another on the ground that he was being kept exclusively on a diet of bread and potatoes, they at once sounded a note of cheer to the enormous Army of the Thin. For the argument of counsel was that the potato diet made Thaw take on weight, which he didn't at all want to take on, and it is this argument which has caused the attendance to make a careful inquiry into the antecedents and its possible adoption as a cure for the lean.

One physician who was asked about the effect of potato eating upon the system, said: "Yes, undoubtedly the eating of potatoes will make one fat if anything will. But I do not believe an exclusive diet of potatoes would long agree with any person. Not that the potato in itself is not a very valuable food product, for it is, but because it does not contain all the elements required by the system. A person could not live very long on a potato diet without harm. Many would become a prey to indigestion. But a diet of, say, bread and butter and potato might not prove injurious if the person taking it would also take a great deal of bodily exercise. It is because of the starch and water in the potato that it is bound to fatten those who eat it regularly, and it is because of the starch that the potato should be avoided by persons with a tendency to rheumatism and indigestion. Taken with other foods, the potato is one of the greatest fatteners known in the medical profession."

And this is how Mr. Potato is made up, getting an analysis from many different potatoes examined:

	Per cent.
Water	78.00
Starch	19.65
Sugar	1.20
Albumen	.70
Gum	.40
Fat	.30
Asparagin	.20
Solanin	.05
Other nitrogenous substances	.15
Inedible matter	.40
Ash	.82
Total	100.00

When you get a food containing 95 per cent of water and starch you get something that's bound to put on the pounds. The trouble with the potato diet, in

the opinion of one doctor, is that it is too bulky. For, said he: "Even granting that six pounds of potatoes per day is sufficient to supply fully all the needs of the body, it must be evident that this quantity is still unduly bulky, what is, perhaps, about twice as much as an ordinary mixed diet. The result of its continued use would be the undue burdening of the stomach and bowels, culminating probably in dilatation of these organs. The so called potato belly of the Irish peasant is an example of this result."

"In addition to being bulky the potato contains too little protein in proportion to its starch. It would require about 22 pounds of potatoes to yield even 118 grams of protein daily, while this quantity of potatoes would contain more than four times as much carbohydrate as one really needs. As a matter of fact, however, Rubner has found that six and one-half pounds of potatoes are enough to furnish 3,000 calories of energy and to prevent any loss of bodily protein. This is probably to be explained by the relatively enormous quantity of carbohydrates—that is, protein spacers—which the potato contains."

So, despite the scientific objections of certain of the profession, the practical experiment demonstrates the fattening power of the "spud." Then, of course, everybody wants to know what sort of a potato is going to produce the best results—that is, the best results from the point of view of the skinny—and the answer is the potato cooked with the jacket on. It has been calculated that if a bushel of potatoes were peeled and soaked before being boiled—and this is the way that most of our wives, mothers, house keepers and cooks go about the preparation for the mashed potato—the loss of nutrients would be nearly equivalent to the amount contained in one pound of beefsteak.

That is where you get a line on the sustaining value of the vegetable and also see how important it is that the skin be not taken off before cooking. It follows then that potatoes should either be steamed or cooked in their skins. Two medium sized potatoes, weighing together five and one-third ounces, when boiled and eaten in the usual way, remain from two to two and a half hours in the stomach, and that is a shorter time than a similar weight of bread would require.