

Big Dipper a Guide to Constellations

Astronomy

By JAMES STOKLEY

At this time of year, during the spring, it is a good time to commence the study of the constellations. After a winter of more or less bad weather, which kept us indoors at nights, we are now beginning to get out at the same time as the stars. And, also, one of the most conspicuous and best known of all the constellation—the Big Dipper—is now high overhead in its best evening position of the year.

Perhaps better than any other star group is the Big Dipper, also known as the Great Bear, and in England, as Charles' Wain, as a guide to the constellations. Few indeed are the people who do not know it by sight, even though they may be completely ignorant of all the others. And most people know also that the two stars at the bowl of the Dipper, now inverted in the sky, tell the location of the pole star, and are so called the Pointers. As the pole star is always in almost the exact north, it can thus be used as a guide at night.

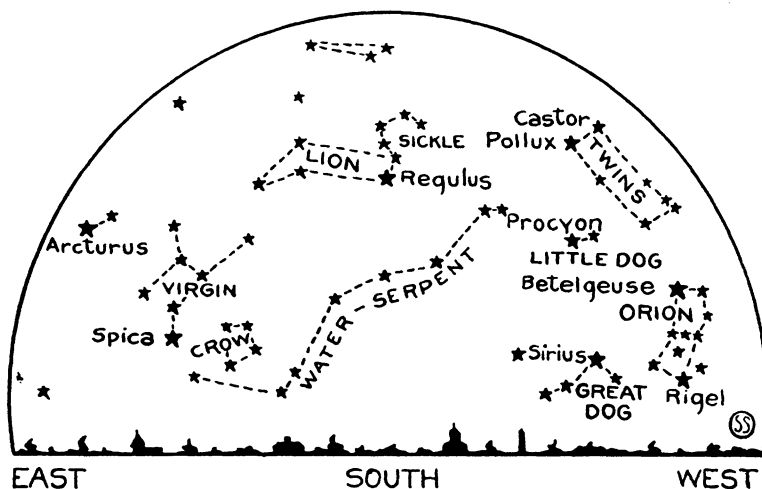
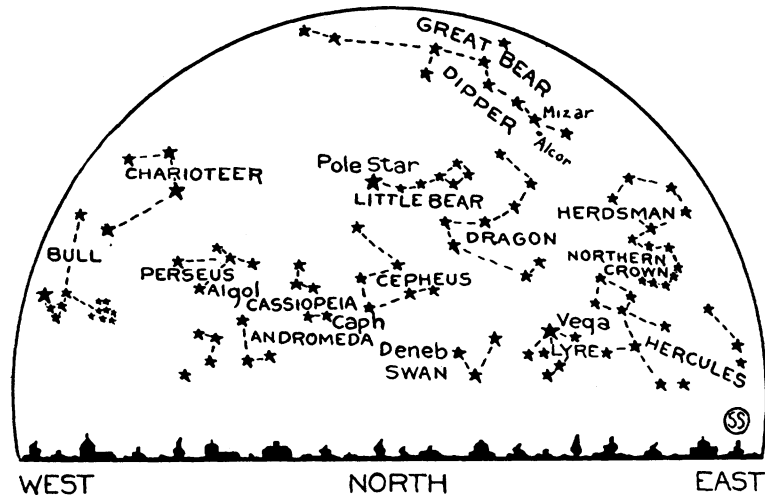
The Big Dipper is interesting in itself. For one thing, there is a test in it for keenness of vision. Look at the handle, which points to the east these evenings. Now look at the star where the handle turns. How many stars do you see there? Almost anybody can see one—the star Mizar. But can you see another and much fainter star just below it? If you can, you see Alcor, or the "rider" as it is sometimes called. Mizar, with its immediate neighbors, Alioth, nearest the bowl of the dipper, and Benetnasch, the one at the end of the handle, and the three horses. Alcor is of the fourth magnitude, ap-

parently well within the limits of naked eye visibility, as it is usually stated that stars as faint as the sixth magnitude can be seen with the naked eye. But, unfortunately for many of us, that refers only to a really dark sky and a clear atmosphere, a condition unattainable in our great cities. From the cities in the eastern part of the country Alcor is often rather difficult to observe. But if Mizar can be seen at all, a pair of opera glasses will reveal Alcor. From such a point of vantage as a high mountain or plateau, as in northern Arizona, for example, a dark night brings out quite a different kind of sky, with such a profusion of stars that even city-dwelling astronomers have had difficulty in recognizing familiar star groups.

The Big Dipper is not the only such implement. There is also the Little Dipper, or the little bear, Ursa Minor, which has the pole star

at the end of the handle. As a bear, the pole star is at the tip of the tail. The map shows the little bear, or dipper, with its seven stars, but here again the lights of the city blot out many of these. Usually all that can be seen under such conditions are the pole star itself, which can be located with the aid of the pointers; and the two stars at the bottom of the dipper, farthest from the pole star. These latter orbs are called the guardians of the pole. Though sometimes above or below, and at other times, as now, to the side of the pole star, these guardians always remain close by it.

The pole star is almost at the north pole of the heavens, but it is not exactly at that point. Anyone with a camera can prove this for himself. Take your camera, set it up after dark on a clear moonless night, so that it points to the pole star. Leave it for several hours, with the shutter open, making a time exposure. Close the shutter before the first break of dawn. When the film is developed, you will find on the negative a series of arcs of circles. There are left by the stars as they apparently cross the sky from east to west. Of course the truth is that the earth itself is turning from west to east, but it turns so smoothly that we are not aware of the motion from our ordinary senses. So as the stars apparently move they leave trails on the camera film. The pole of the heavens is the point directly above the north pole of the earth, and so the stars seem to turn around this point. On your negative of the star trails you will see two rather heavy arcs, due to the pointers. You (Turn the page)



HOLD THIS PAGE in front of you and face north or south on April evenings. The maps then show the position of the stars as they appear to you

Big Dipper—Continued

will see two smaller ones traced by the guardians. And close to the center of all these circles, you will see a very small arc, which is due to the pole star itself. This shows that the pole star is not right at the pole, even though it is near enough to serve as a convenient guide on a dark night. Really, it is about two and a half times as far from the true pole as an apparent diameter of the full moon. The circle in which it moves, therefore, is about five times as big as the moon appears to us.

The north pole of the heavens is the point directly above the north pole of the earth. Another way of saying this would be that to a person at the north pole the celestial pole would be at an angle of 90 degrees from the horizon. If the person were at the equator, the pole would be on the northern horizon, or at an angle of zero degrees from it. Now, as we measure latitude on the earth, the equator is zero degrees latitude, and the north pole is 90 degrees north latitude. So in order to find the latitude of any place north of the equator, we merely have to measure the height of the pole above the horizon.

This is the way that navigators in the days before the invention of the sextant used to find the latitude of a ship at sea. With an instrument called the astrolabe, the height of a star above the horizon could be measured fairly accurately. But since the pole star is an appreciable distance from the pole, how may the pole be found?

Here is where the guardians of the pole proved useful. The true pole of the heavens is almost on a line drawn from the pole star to the nearest of the two guardians. If the guardians, and the pole star, are at the same height above the horizon, the height of the pole star itself is almost exactly the same as that of the celestial pole. So a ship's master, in the days of Columbus, for example, would not use his astrolabe on the pole star to find his latitude unless the pole star and the guardians were on the same horizontal line, as they are in the evenings at this time of the year.

Another familiar constellation now with us is the sickle, in Leo, the lion, now in the southern evening sky. The brilliant Regulus marks the end of its handle. Arcturus, in Bootes, the herdsman, shines high in the east, while down in the north-

east we see again Vega, in the heavenly lyre. The winter constellations are rapidly departing. Early in the evening we can still see Orion, but he sets soon after the sun. The great dog, with Sirius, the "dog-star," also sets a few hours after the sun, and Procyon, in the little dog, follows not long after. Higher in the western sky are Castor and Pollux, the twins, to remind us still of the winter constellations. With the passing of Jupiter close to the sun this month, he has gone from our view completely for the present, to reappear by the middle of May as a morning star before sunrise. With his departure, we are left, for the first time in months, without a naked eye planet in the evening sky, though Saturn can be seen now in the early morning sky. At 3:40 a. m., it is directly south. Venus is also a morning star now, but it is not very well placed for observation even in these hours.

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A Serpent's Meekness

Zoology

E. G. BOULENGER, in *A Naturalist at the Zoo* (Brentano's):

The power of fascination attributed to snakes is non-existent. Many years ago in the late autumn, I remember introducing a mouse into the compartment of a South African house-snake, which I kept in a cage at home. As soon as the mouse entered the cage it went up to the snake, and insisted on nesting in the centre of its coils, pushing at the reptile until they lay in the required position. The snake and the mouse lived in harmony for some weeks, but as the winter approached, the former decided to dig a burrow in which to hibernate, and this it proceeded to do, the mouse being an interested onlooker. The snake, however, on entering the burrow on its completion was not allowed to enjoy its well-earned rest, being turned out by the mouse, who promptly took possession, the unfortunate serpent being forced to construct other winter quarters. On the completion of the second burrow the mouse once more ejected the rightful tenant, and settled down to it, the snake returning to the one which he had been forced to evacuate. With the advent of spring the long-suffering reptile's mind turned to thoughts of food—and possibly revenge, with the result that it made a meal off its companion with which it had lived for nearly six months.

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Poetry in Science

General Science

SIR RICHARD GREGORY, in *Nature*:

It is commonly assumed, that devotion to science inhibits all sense of pleasure in emotional expression and that familiarity with the structure and processes of Nature breeds indifference to her charms, and destroys the aesthetic veil which gives her both mystery and beauty. Science and poetry thus seem to most people to be poles apart, yet Coleridge said that he attended Sir Humphry Davy's lectures at the Royal Institution for the purpose of increasing his stock of metaphors, and modern poets might well be inspired by the scientific imagination of Sir William Bragg shown in his insight into the atomic structure of crystals. Though poetry and science represent different attitudes towards Nature, they are not mutually destructive, and may be complementary to each other.

Science does not want a divorce from literature, but closer union with it and a common understanding of the distinctive qualities by which each can contribute to the fullness of life.

When a student of science confesses that he knows little or nothing of classical literature, he does so in a spirit of humility; but classical scholars often seem to be supercilious in their disregard of science. This vestige of social snobbery will no doubt disappear in the course of time, and it will be understood more clearly than it is today that science is as necessary a part of the mental equipment of a cultured man as is classical or modern literature or any other art of expression.

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The Witch Wand

Physics

W. J. LEWIS ABBOTT, F. G. S., F. R. A. I., in *Behind the Divining-Rod* (Science Progress, January, 1928):

I suppose every water-geologist is continually finding himself upon the heels of the diviner: at least it has been my experience for over thirty-five years. During that period I can safely say that I never knew of a single case in which he located water in a place that would have surprised a hydrologist; on the other hand, in almost every case he has been hopelessly wrong, and has often plunged the dupe into useless and great expense. I have always found that he makes a study (in his own way) of surface features, but is invariably not only ignorant of the elements of geology, but ridicules the idea of that science.

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