

In a diurnal circle about the true celestial pole as any other star does, only this circle is very small. If we were to take the mean of its least and greatest altitude we would have the altitude of the true pole, and that would give us our latitude.

Any other star will help us almost as much as the pole star, if we measure its altitude at certain times. The sun itself is often used for this purpose, and almost exclusively so at sea.

Appearance of the Heavens at the North Pole

As the north pole of the heavens is exactly overhead at the north pole of the earth, the stars would appear to move in horizontal circles. They will never change their altitudes, and therefore never rise and never set, but move forever parallel to the horizon. They will therefore be visible perpetually; that is to say, all the stars of the northern hemisphere will be visible perpetually, while all those of the southern hemisphere will be forever invisible. This condition of affairs is, of course, exactly reversed at the south pole of the earth.

Hence as the sun is north of the equator for six months, from March 21 to September 24, daylight will endure at the north pole for six months. Then from September 24 to March 21 there will be night for six months. This night will begin and end with a long twilight, lasting about a month and a half each time, because the sun will slowly descend below the horizon.

The sun, therefore, will appear to run parallel to the horizon, except that it will slowly creep up higher from March 21 to June 21, and then as slowly descend until September 24.

The moon will, in like manner, be visible and invisible for two weeks at a time. But the high possible altitude of the sun will be about two degrees less than the sun's lowest meridian altitude at the winter solstice at Omaha.

As Dr. Cook was at the pole on April 21, the sun's altitude was about eleven degrees and a half. It is not likely that his small instruments would enable him to see any stars. The sun must therefore have been his only guide.

The magnetic needle was useless to him, because it probably pointed to the magnetic pole and not to the true pole, which he wanted to find, and made an unknown angle with his true meridian. The magnetic pole has been found long ago. It is in latitude 70 degrees, and almost on the meridian of Omaha, about 2,000 miles north of us.

The sun and the chronometer replaced the magnetic needle and kept Dr. Cook informed in regard to the position of the meridian on which he was traveling.

When he started on his dash for the pole, he surely knew his longitude, and the chronometer time of the sun's crossing his actual meridian.

As he traveled directly northward on the same meridian, he knew that whenever his chronometer showed the time noted at starting, the sun was on his meridian toward the south, and twelve hours later, toward the north. As the north pole of the heavens was very near the zenith, a simple glance at his chronometer would tell him the time of day, together with the sun's azimuth or bearing, so that he could remain very accurately on the same meridian and travel straight north. The height of the sun measured at any time by the sextant would, with a little figuring, give him his latitude. In cloudy weather, he would have to proceed by dead reckoning, as it is called, that is, by keeping the same bearing or alignment with distant and conspicuous landmarks and by carefully noting his speed.

I should think he got within a few miles of the true pole, say within two or three at least. His data will be computed at greater leisure afterwards and his positions verified by expert computers.

Flattening at the Pole

Some people have a very erroneous conception of the appearance of the landscape at the pole. They have heard that the earth is flattened at the poles, that the poles are thirteen miles nearer the earth's center than is the equator. They imagine the earth to be like a perfect sphere or ball, from which portions at the poles have been removed by a file, so that the ball may be set upon a small incline without rolling down.

The earth is indeed flattened at the poles, but the word "flattened" is too strong to express the fact correctly. If we were to take a perfect sphere and then start at the equator and gradually remove more and more of its surface, carry the grade lower, until we lowered it thirteen miles at the poles, we would have a true conception of the shape of the earth's surface. That

is to say, the flattening begins at the equator. Practically, this flattening is a very small quantity. It is thirteen miles out of 4,000, so that if we were to take a globe twenty inches in diameter it would amount to about 3-100ths of an inch, a quantity so small that the eye would never notice it.

Scientific Benefits

The ground or the sea at the north pole will appear the same, therefore, as they would anywhere else under the same conditions of temperature and the like. In other words, one would not know himself to be at the pole except by scientific observation of the heavens, or by keeping a record of his journey thither.

The fact that the poles are thirteen miles nearer the earth's center does not make them on that account any warmer. If that reason ever had any value the surface has cooled off ages ago to its present condition, which it owes, as we all know, to the absence of the sun's heat for six months and the very low altitude of the sun during the other six.

The astronomical benefits accruing from the discovery of the north pole, are practically none at all. The intentions practically none at all. The motions of the heavenly bodies as seen at the pole, are known to every elementary student. The six, or at least three months night would favor long continued observation, but the nights are long enough for human endurance at other places. Besides, the polar regions are practically inaccessible and will probably remain so.

The geological, geographical and magnetic results will, of course, be very great. If Dr. Cook's track is better than any other, we may be sure the pole will be reached by the route by other daring explorers, who will add much to our knowledge.

The Pole of Revolution and the Pole of Symmetry

I said that the north pole was the northern end of the earth's axis of revolution. This axis is not fixed in the earth, as we would imagine, as even professional mathematicians imagined, until observation proved the contrary. This axis shifts in a space of about sixty feet square, and follows a very complicated course. The variation of the latitude of fixed observations has enabled us to trace this path and then to predict it. That is, the axis itself that shifts, is proved by the fact that when the latitude of any place is increased, the latitude of a place on the other side of the pole 180 degrees in longitude away is decreased by the identical amount. A certain fixed point in the ground is called the pole of symmetry, and the actual end of the axis of revolution at the time is the pole of revolution.

All this we know without having our observatories. The difference, of course, was too minute for Dr. Cook to bother about or even to measure. The axis of the earth does not point continuously to the same point in the heavens. It is affected by nutation, precession and annual observation. The explanation of these terms would take us too far adrift. Enough has been said to show that the discovery of the north pole is an extremely difficult problem, physically, as well as scientifically.

NORTH POLE LITERATURE

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formation established the fact that there was land at the north pole, as he understood that this was not true. Sir Gilbert explained that he meant adjacent to the north pole, and Mr. Asquith suggested that he frame another question. Continuing, the premier, with a twinkle in his eye, went on to say that the question of possession of the pole involved too much hypothetical matter to permit him to give a definite reply. If, however, it proved to be British territory, it certainly would be taxed as undeveloped land under the new finance bill."

SENATOR BOURNE'S VOCABULARY

Senator Bourne of Oregon on July 1 made his first formal speech of the session. In the opening paragraph occurred a strange word:

"The struggle was a titanic one, his task herculean, the treatment necessarily heroic, but Mr. Roosevelt was equal to the emergency. He first awakened the public conscience, pointed out in an echinated manner the existing evils. * * *

Such as wish to add this word to their vocabularies will find this meaning given by the Standard Dictionary, twentieth century edition:

"Echinated—A family of echinoideans, especially diadematoideans having tests with equal diameters, the ambulacral plates compound with pores in triplets, tentacles all alike, and jaws

with epiphyses. Set or armed thickly with prickles."

It seems expedient to add that the remainder of the senator's speech carries the conviction that his intention was to compliment Ex-President Roosevelt.—Collier's Weekly.

A NATIONAL FARM JOURNAL

I have recently purchased the American Homestead, a national farm journal, established in 1883, at Omaha, Neb., and published continuously in that city for the past twenty-six years. It will hereafter be published monthly at Lincoln, Neb., yearly subscription price 50 cents, and will be devoted to the diversified interests of the American farmer.

The widespread interest being taken in the subject of agriculture at the present time indicates that farm life and the ownership of land are becoming very popular with all classes. This interest amounts to a revival of immense proportions. It is becoming an almost universal ambition among the American people to own a piece of ground and to cultivate it. The American farmer has come into his own; he is being recognized as the nation's greatest business man.

During the past decade the American farmer has astonished the world with the magnitude of his achievements. The products of a single state in a single branch of agriculture in one year more than equal the entire annual gold and silver production of the United States. The amount of money invested in farming is now more than double the capital of the entire manufacturing industry, and almost equal to the railroad and manufacturing business combined. Yet, in the face of this amazing showing, it has been declared that the agricultural possibilities of this country have not been developed to a one-hundredth part; that the day that sees the population of this country doubled, or tripled, or quadrupled, will see mankind living just as comfortably as today, with no greater struggle to secure a livelihood from nature. These results can, and will, be accomplished by more intensive farming and by the conservation of our agricultural resources.

The status of the American farmer is continually broadening. His influence is rapidly increasing in the world's affairs. Yet American farming is now in the infancy of its opportunities. The life of the old-time farmer was hard, but newer methods and modern machinery have lightened his load. Farming has been raised to a different plane, and made an interesting and fascinating study. In no occupation can trained intelligence be put to better use than in that of farming. The farmers who have been successful in accumulating wealth have been the ones who have been ready to avail themselves of the experiences of other practical farmers, as well as to profit by the work of the United States department of agriculture and the state agricultural colleges. They have also been quick to utilize the information and suggestions of the agricultural papers.

In the continued advance of the American farmer, the work of the agricultural press and the state agricultural colleges have been important factors. But the farmer is a very busy man, and he has little time for extended research among the mass of information on agricultural subjects. Nor has he time to waste on unimportant matters. The American Homestead will every month aim to pick out from every possible source the information he wants and needs to help him in his work. To this end it will make a special feature of the work of the state agricultural colleges, presenting their researches in bright, readable, practical style—without technical phrase. A list of the bulletins issued by the various state experimental stations will be published and where to obtain them free. Another helpful feature will be the practical experiences of farmers and farmers' wives. Its Home Department will be especially attractive, containing information on home gardening, fruit growing, poultry, etc., of special interest to everyone whether engaged in farming or not.

It is my intention to make the American Homestead one of the most practical and helpful farm journals in the United States. It will present to its readers every month practical ideas and suggestions from farmers in various states for comparison and study, as well as the latest advances in scientific farming. The announcement on page ten of this issue outlines the scope and character of the publication, and also presents several offers that will be found of interest. Every farmer, no matter where he lives, will find its contents invaluable and full of inspiration for better farming.

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