- 10 -

affected by these systematic corrections, that the astronomers try to answer the question, "Whither are we drifting?" This question has for the astronomer a wider import than when it is asked by the political orator. The astronomer means: Whither are the sun and all its attendant planets drifting? The observations of the International Latitude Service help to answer the question.

Thus, though the actual variation of latitude is a small matter, it ties in with many important geophysical questions, most of them not yet answered and contains mysteries enough to excite the curiosity even of those less inquisitive than the Elephant's Child.

- 4 -

I LIVE AN UPSIDE-DOWN LIFE

Earl L. Williams

I am the variation-of-latitude observer at Gaithersburg, Md. As such it can hardly be said that I lead a normal existence. My outlook on life is largely "uplook" at stars. I work while the rest of the world sleeps, with only the mournful hoot of a distant owl or the incessant call of the whip-poor-will to keep me company. When the world begins to teem with activity I am just starting my slumber. One nice thing though, I can sleep into the day as far as I please. No raucous alarm clock disturbs my slumbers, calling me unwillingly to a workaday world. But I must begin my labors at the end of the day when others have given themselves to lighter things. Others work and then play; I violate this well-advocated precept by playing first and then working. Then, too, my meals are topsyturvy, for I eat my breakfast at noon and often wind up the day by eating at three or four o'clock in the morning.

Although thousands of miles from it, I help keep track of the wanderings of the pole. But on a cold windy night in winter, I can tell you, I feel as if I were watching Mr. Pole's activities in person on the spot. In summer, though, it is quite pleasant, as I work during the coolest part of the day. Yet even at this season too, my equilibrium is often disturbed by some bounding insect bent on reaching his destination by the shortest possible path wholly regardless of the position of my nose.



Telescope at Gaithersburg, Md.

One might think that observing the same stars in the same manner night after night, would be a wholly monotonous affair. Many times, however, unusual things break in upon it. I often see brilliant meteors. My work has been interfered with twice by earthquake tremors which were still strong enough after traveling some 3000 miles, to rock the telescope foundation and cause the level bubbles to move to and fro. One night I discovered a fire burning on a distant farm and reported it.

My work is part of a program carried on by five stations, distributed more or less evenly in longitude around the earth and all quite closely on the same parallel of latitude. This work has for its purpose the continuous plotting of the position of the geographical pole on the surface of the earth. Or, for my station, to determine the angular distance from Gaithersburg to the pole. To do this, reference points not on the earth are necessary, so stars are employed. What I do is to observe how the earth's rotation on its axis causes certain stars to pass my zenith, all observations being taken when they cross the me-Variations in the star's passage, that is, in the disridian. tance from a star to the zenith, may be due to three causes; a motion of the star on the celestial sphere (called proper motion) due to the motion of the individual star through space, to a motion of the observer's station (the variation of latitude) or to a motion of the station and the axis together (precession of the equinoxes, nutation, etc.).

Our problem is to separate these various effects. Three observing stations are essential, and more are desirable for greater accuracy and for detecting any errors arising in a single station, such as errors which would result if that station were to

ATAR ALLAN REPARTS

be moved by earthquake or drifting land masses, or if for any reason its instrumental set-up should be unstable.

Let us assume that all stations are exactly on the same parallel of latitude and that a certain star tonight passes directly overhead of each one, in the zenith. If the star's own proper motion causes it to move to the southward on the celestial sphere it will be observed, say, one month hence, to pass to the south of the zenith by all of the stations. If, however, the earth shifts position with respect to an unmoved axis (unmoved with respect to space) and Gaithersburg shifts northward the star would again appear shifted to the south of the zenith of Gaithersburg, but such an earth shift would carry an observing station on the opposite side of the earth in the opposite direction (one side of the earth moves toward the pole, the other away from it) so that the star for the Japanese station would pass to the north, and not to the south of the Japanese station. A similar direction of shift takes place for all stars (after correction for individual star motions) at any given station, with an opposite direction of shift for all stars at a station located on the other side of Now in the case the earth's axis moves with respect to the earth. space carrying the earth along with it, the oppositely located stations will not only get oppositely directed shifts but there will also be an opposite direction of drift as between all stars in one section of the sky and stars on the opposite side of the sky as well, all stars not acting the same at any one station as in the case of station motion only (without axis motion).

Because of these differences, with the use of enough stations all observing the same stars under as nearly similar conditions as possible, it is possible to untangle the variation-of-latitude from other earth motions.

Of what value such knowledge is to us is discussed in another article in this issue entitled "Who Shot Those Peas?"



The meridian mark

The observer's home

Gaithersburg, Md.