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ATHENAEUM SOCIETY

"The Erroneous South Boundary of Kentucky"

By

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Not realizing the Society's strict policy of brevity, I made my first and only previous paper much too long. Tonight I will try to make ammends for that gievious error of conduct, so please do not expect a full-semester course on surveying in 30 minutes.

My aim will be to give you ⁱⁿ layman's language an understanding of the technical problems incident to such a survey and to show you that the survey actually was not as carelessly run as we in this age of advanced technology are inclined to believe.

The subject of my paper is "The Erroneous South Boundary of Kentucky". Most of you are aware of the situation but I think that it will help you to understand the paper to see the boundary on a map.

(SHOW MAP)

I chose this subject because as a pious Kentucky youth it had bothered me considerably to have History give credit for this error to JOHN BARLEY CORN -- I didn't like to give John Barley Corn credit for anything. This fall I had an opportunity to take a course in Kentucky History from our very own great Historian, Mr. William Turner, and again I heard John Barley Corn given credit for this error.

I was willing to concede that Histories must depart somewhat from the dull facts of life in order to sell (and the printer does have to be paid you know), but to attribute this error to John Barley Corn is as far fetched as one historian saying that France fell to Hitler in a couple of weeks because Deladier had not one, but two mistresses.

During my work years I was responsible for surveys of oil lands where an error could easily result in the loss of one to fifty million dollars, so I soon learned that my only defense would be to make an in-depth study of every error that had ever happened in surveying of record and to perfect absolute safeguards against any of our men making such an error.

With this background experience I took another look at the Kentucky boundary and was fully convinced that the mislocation was not so much an error as it was an inaccuracy brought on by the conditions under which the survey was made.

Lets take a look at the effects of the mislocation and then we will look at how it seems to have occured.

At the southeast corner of the State, the boundary was marked on the gound about $5\frac{1}{2}$ miles too far north, and this error gradually increased until at the Tennessee River the boundary was about 12 miles too far north.

This placed approximately $2500\frac{59436}{\text{miles}}$ of territory in Tennessee that would have been in Kentucky had the boundary been surveyed exactly on Latitude $36^{\circ}30'$ as called for. Such Tennessee cities as Clarksville, Springfield, Cedar Hill, Lafayette and the birth places of Sgt. Alvin York and Grace Moore would have been in Kentucky, as well as all of Dale Hollow Lake.

As you may recall, Kentucky was originally a part of the Colony of Virginia and Tennessee was a part of the Colony of North Carolina. Therefore the boundary between Kentucky and Tennessee was suposed to have been the same as the western end of the boundary between the colonies of Virginia and North Carolina, which had been defined in early charters as the Parallel of Latitude $36^{\circ}30'$, extending from the Atlantic Ocean to the Tennessee River, a distance of approximately 772 miles.

The survey of this Virginia-North Carolina boundary was begun in 1727, proceeding westward along what the surveyors thought was Latitude $36^{\circ}30'$ to the Cumberland Mountains where it stopped because there were no settlers and no immediate need to go further west. By the time the surveyors got to the Mountains their marked boundary was already about $5\frac{1}{2}$ miles north of the $36^{\circ}30'$ parallel of Latitude. The remaining 320 miles of this boundary to the Tennessee River was not surveyed for another 50 years.

Surveys are costly and those who controlled the purse strings had little sympathy for the bears or Indians (possibly figuring that they knew where they were), and they didn't have much more sympathy for the handful of settlers who went into the wilderness to live with them. Therefore they spent what money was available on projects which were of more interest to the taxpayers and more productive of votes.

However, Daniel Boone finally came into the picture and stirred up great interest with his fabulous tales about the natural wealth of Kentucky. About eight years after Boone spent his first winter in Kentucky there was enough interest to support a new demand for a boundary survey and as a result Commissioners were appointed from Virginia and North Carolina for conducting this survey.

The survey was to begin at the top of White Mountain where the survey of 50 years earlier had stopped, and was to proceed westward on Latitude $36^{\circ} 30'$ to the Tennessee River.

Since the earlier survey had ended with the marked line being about $5\frac{1}{2}$ miles north of where it should have been (Latitude $36-30$), it meant that the new surveyors were starting off with a similar error in their work.

I am sure you must be wondering how any surveyors could have made an error of $5\frac{1}{2}$ miles. Well, if you consider the state of the art in that day it is more a wonder that they were not off by 20 miles.

Comparing their instruments with modern survey instruments is about like comparing a covered wagon with a Cadillac, and comparing the available technology on the subject with modern technology is about like comparing a farmer's Almanac with a College Library. They just did not have the tools nor the technology for doing such a difficult scientific task as establishing a Parallel of Latitude accurately in the wilderness.

The accepted method today for determining the latitude and longitude of a point is to observe from 12 to 20 pairs of stars, using the finest calibrated astronomical instruments, plus short-wave radios tuned to bothth Naval Observatory in Washington and the Greenwich Observatory for determining the exact time of your star readings, plus all needed astronomical tables for the exact position of the stars at the instant of your observations, and most of all, a team of highly trained scientists for doing the work.

I had all of these things plus others when locating the Equator in the heart of the Amazon Jungle and I know how complex the problem is.

In the days of the survey of the Kentucky boundary they had nothing but a crude solar attachment marked off in degrees and half degrees. The latitude of a point is a direct function of the vertical angle and any error in this vertical angle, no matter what causes it, translates into an error in the latitude of the point.

I told you that their instrument was marked off to read the nearest $1/2$ degree of vertical angle. Any reading closer than $1/2$ degree had to be an estimate. $1/2$ degree of vertical angle translates into a north-south distance on the ground of 40 miles, so when the surveyors got within $5\frac{1}{2}$ miles of the correct latitude I think they were doing pretty good estimating.

Let me briefly demonstrate latitude with a clock. I chose this clock as my model because its face is about the same size as the instrument used by the surveyors for measuring latitude vertical angles.

If we slice the earth into halves, right through the North and South Poles, it will look like this:

3 o'clock will be the North Pole.
9 o'clock will be the South Pole and
12 o'clock will be the Equator.

From the Equator to the North Pole is 90° of Latitude. The south boundary of Kentucky which is defined as $36^{\circ} 30'$ of latitude, would be just slightly over $1/3$ of the distance from the Equator to the North Pole, located at 6 minutes on the clock, and Hop. at 2 seconds past 6 minutes. Now lets translate this latitude into miles on the ground so as to better understand how little inaccuracy in the work it would take to produce the $5\frac{1}{2}$ miles error.

From the Equator to the North Pole is 6200 miles.

(For you winter vacationers I might tell you that from Hopkinsville to the North Pole is 4200 miles and from Hopkinsville to the Equator is 2000 miles -- take your choice).

On the face of this clock 15 minutes would represent the 6200 miles, and the space of each single minute would represent 420 miles.

Therefore, to get an accuracy of 1 mile in the Latitude, the surveyors would have had to divide each of these 1-minute spaces into 420 parts.

Obviously this was not done and could not have been done on the crude instruments of that day.

So, when the Tennessee surveyors started to arguing about the Kentucky surveyors being off 2 miles in latitude, they were just plain "nit picking".

A somewhat more available analogy would be to say that a space the width of one minute on your wrist watch would have to have been subdivided into 100 parts, and read accurately, to determine the latitude within 1 mile of correct on the ground. Certainly you can see that this would not have been possible 200 years ago.

There is one other factor that we need to look at and that is why the surveyors gradually increased their error from $5\frac{1}{2}$ miles at the starting point to about 12 miles at the Tennessee River.

The detail field records of the surveyors cannot be found (perhaps they ended up in the same file as the famous Oswell letter in Dallas). However, it is fairly obvious to me how the gradual drift to the north occurred.

Surveying in those days was done with a Surveyor's Compass. It had a magnetic needle on it about 6" long. This needle always pointed to the "MAGNETIC North Pole" and not to the GEOGRAPHICAL North Pole which is normally referred to as the "TRUE" North Pole.

The angular difference between the MAGNETIC North Pole and the TRUE North Pole is called the "Declination" of the point you are standing on and it is different for every point in the world, and it is a constantly varying thing.

While it has been recognized for hundreds of years that a Surveyors Compass had to be adjusted for the declination in order to run his survey on true cardinal directions, the surveyor usually felt that if he observed the declination at the beginning of the survey, that was sufficient for the entire survey. We know differently now.

To help us understand the ~~the~~ tremendous effect of this Magnetic Declination on a large Compass survey, let's look at a modern day map published by the Government.

(Discuss Agonic Chart)

At the time of the Kentucky boundary survey no such data was available. The surveyor simply started his survey by determining the difference between true north and magnetic north at his starting point and adjusted his Compass to take care of that difference. They should have adjusted their Compass many times across the State but it does not seem to me that they did. (Actually, most surveyors used the same declination adjustment as long as their instrument lasted. For example, virgually all of the old Government surveys in Louisiana were run with a $6\frac{1}{2}^{\circ}$ adjustment for the declination, whereas they should have changed often.)

If, as I firmly believe, the Kentucky boundary surveyors did not readjust their Compass as they moved westward across the State, this would fully account for the additional six miles of error.

There is a great deal more to the technical difficulties involved but suffice it to say that it is an absolute wonder when you consider the equipment, technical know-how and working conditions, that they came as close to the correct latitude in that wilderness as they did.

Actually there was little importance placed on the survey by either the public or the public officials. In the winter they stopped for cold weather and in the spring they stopped when the rattle snakes started to crawl and stayed stopped until the rattle snakes went dormant again. And when some of the younger Commissioners felt the need for a clean shirt they would start a big argument and use that as an excuse to quit and go home for "consultation".

However, the survey finally reached the Tennessee River in 1780 and everybody went home for a clean shirt. It was many years later that it was learned that the boundary as marked on the ground by this survey was actually 5 to 12 miles north of the $36^{\circ} 30'$ parallel of Latitude, where it should have been. This was the first survey of the boundary and was known as the WALKER SURVEY.

During the next 40 years parts of the boundary were resurveyed at least 3 more times, with trees being blazed each time for identification of the boundary. All the while settlers were gradually moving into the area, justifiably accepting whatever blazed trees they found as marking the correct boundary, and there they lived, paid taxes and voted for many years. But, with so many trees blazed for different boundary lines, it is quite understandable that disputes arose among the settlers, especially since the Civil War was fast approaching and each settler had his own loyalty and idea as to which State he preferred to be in.

To allay the rising tension, both Kentucky and Tennessee concluded that right or wrong, the Walker Survey which had been completed 80 years earlier and recognized by most settlers as the correct boundary, should be officially accepted as the boundary, with minor jigs and jogs being made to accomodate those settlers who had accepted the wrong set of blazed trees. The two states reached full agreement on the boundary in 1860 and a Treaty was signed to that effect.

I think that this compromise solution was a statesman-like act and I compliment those responsible for the decision.

Likewise, I have no criticism to offer on the survey. I think that under the circumstances the surveyors did an admirable job.

In other words, it is my opinion that any present day criticism of the boundary should be no more than polite Monday-morning quarterbacking, which we all like to indulge.