## APPFNDIX --- REPORT ON THE SUMMER CAMP AT QUACO.

## TIDAL PHENOMENA AT QUACO. By Prof. A. Wilmer Duff.

The point that the writer was chiefly interested in was the occurrence of those somewhat puzzling phenomena called "secondary undulations." Anyone who examines the record of the Kelvin Tidal Gauge at St. John will find that it gives a wave-shaped curve, the heights of which correspond with the time of high water and the hollows with the time of low water; but, in addition, he will discover that on this main curve there are smaller indentations, indicating minor risings and fallings of water level, the whole time from greatest of these minor undulations to the next greatest rise being, on an average, about forty minutes. These small and comparatively rapid oscillations of level are the so-called "secondary undulations," and the time of forty minutes required for them to complete their cycle of changes of level is called their period.

The author had already shown\* that these secondary undulations could be explained as due to a long, slow oscillation of the whole body of water between the New Brunswick and the Nova Scotia coast, the vibrations being similar to these that are set up in a wash-basin full of water when it is disturbed. It became, then, an interesting point to determine whether the rest of the body of water in the bay partook of this same general motion, and whether the period was the same as at St. John. The author fully expected that it would be.

With this in view, the tide gauge described in a former communication<sup>†</sup> to the Society was used at Quaco. On three different days the gauge gave clear records of "secondary undulations;" but, contrary to his expectations, the period in all cases was  $12\frac{1}{2}$  minutes. This was a somewhat puzzling result, until it occurred to the writer to examine the chart of the bay off the New Brunswick coast in the neighborhood of Quaco, when he found that the presence of a reef called the Quaco Ledges, and the two headlands that project into the bay above and below Quaco, respectively, marked out a smaller bay (open, it is true, to the east), in which the water would naturally oscillate in a period of its own, determined by its own dimensions. From the smallness of its dimensions these oscillations might be expected to be much quicker than those across the bay at St. John, although the irregularity in shape of this small bay precludes any attempt to calculate mathematically what the period of the oscillations of the water in it would be.

\*See American Journal of Science, Vol. III, No. 17, 1897.

+See Bulletin XV of the Natural History Society of N. B., 1897.

bers lous A and curthe ded Its the one ale, Carone out well ear ary ore e at

at nes, one ine ndith ills

and

eat one eek of nd, ers ern 69