SCIENCE

VOL. 96 — FRIDAY, SEPTEMBER 11, 1942 — No. 2489

SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. MCKEEN CATTELL and published every Friday by

THE SCIENCE PRESS

Lancaster, Pennsylvania

Annual Subscription, $6.00 — Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary in the Smithsonian Institution Building, Washington, D. C.

EDMUND BEECHER WILSON[1]

By Professor THOMAS HUNT MORGAN

CALIFORNIA INSTITUTE OF TECHNOLOGY

EDMUND BEECHER WILSON was born on October 19, 1856, at Geneva, Illinois. The first sixteen years of his life were passed there.

When Wilson was not quite sixteen his uncle Davis suggested that he take over the "little country district school," that his brother Charles had taught the year before. The offer was thirty dollars a month and board (with his aunt and uncle). "When the thermometer stood at thirty degrees below zero, as it did at times, this was, I assure you, no joking matter. I wonder how the modern city-bred youth would like such an experience. I had only twenty-five pupils or so, of all ages from six to eighteen, and I had to teach all grades, from the three R's up to history and algebra."

In the following summer he was in Geneva, where his cousin, Sam Clarke, had just returned from Antioch College. "As the summer passed I had gradually made up my mind to try for a college education and a life devoted to biology or at least to science." "I had nothing but my two hundred dollars and with this in hand I packed up my meager outfit in September and started for Antioch College in Southern Ohio." The college was a very simple one but with sound ideals. "We had good teachers. Here, for the first time I received regular instruction in zoology and botany, in Latin, in geometry and trigonometry

[1] Condensed from a memoir presented to the National Academy of Sciences.

may be accurately placed by orienting it with a magnetic compass with due allowance for compass declination, and by using a plumb bob to get the right slant, as suggested in the picture for a station in the latitude of New York. The plumb bob consists of a small weight supported by a thin thread which is held in a slit on the degree mark on the declination disk corresponding to the latitude of the place.

The next adjustment is to turn the right ascension disk to its proper position. This is the same as rectifying a celestial globe. The easiest way to do this accurately is to turn the pointer and also the rod on its axis so as to sight upon some known star whose right ascension may be learned from the Nautical Almanac or from a star map. Then turn the right ascension disk until the proper hour mark is opposite the indicator, in which position it should be temporarily clamped. The instrument may now be used in two ways: (1) To identify unknown stars sight upon the unknown star with the pointer, read its declination and right ascension, and then identify it from its position on a star map; (2) To make an original map of the sky, plot on a blank sky map the observed positions of stars and constellations whose actual names, however, may be unknown. The original map may later, with much pleasure, be compared with an authentic map.

One of the most interesting uses we have made of the astrolabe is to set it up in the daytime, rectifying the right ascension disk by using the tables for sidereal time on the first pages of the Nautical Almanac and then adjusting the pointer so that it will be directed at a certain star to appear some time that evening several hours later. The instrument is then left untouched until that time has arrived. As we have a battery of these astrolabes available, different students are able to set up the instruments in order to view different stars at different later times.

Daytime use of the astrolabe is especially instructive because the North Star is not visible. From the Nautical Almanac tables we set up the instrument to point at the moon, which often as not is below the horizon. Then we determine what phase the moon is in and the hour of rising or setting. These conclusions are later checked either by direct observation or by reference to the almanac, thus giving practice in the use of that valuable and interesting book.

On two occasions we have set up the instrument at midday and directed it at the location of Venus, whose position was obtained from the almanac. Then by careful scrutiny we were able to observe Venus by the naked eye at high noon in a brilliant summer sky. This perhaps indicates the accuracy with which celestial bodies can be located. We found that it is quite possible to measure the right ascensions and declinations of the three stars in the belt of Orion which are perhaps only a degree or two apart.

Other kinds of observations readily suggest themselves, such as locating the position of a planet in the sky (be it either above or below the horizon) by using the right ascension and declination figures given in the almanac, and from this determine the planet's configuration which can then be checked against the almanac tables.

Night-time studies of the invisible sun as well as daytime and night-time studies of the invisible moon suggest problems by which the times of sunset and sunrise as well as moonset and moonrise may be determined, this being accomplished by turning the right ascension rod so that the pointer is directed toward the western or eastern horizon and making the other necessary observations and adjustments.

It is possible also to set up the instrument for any point on the earth's surface and from the almanac tables giving right ascension and declination of the sun and moon determine the time of sunrise and sunset, and moonrise and moonset at any latitude on any date. These results can be compared with other almanac tables.

We venture to believe that simple, home-made apparatus of the type described may be used to wean the students away from the idea that scientific thinking can be done only in the midst of test-tubes and elaborate equipment. Courses in general science are presumably designed to inculcate a habit of scientific thinking in matters of all kinds and for that reason the use of readily made instruments is to be encouraged as such devices are available at all times. It should be remembered that the vast majority of students taking courses in general science, after they leave school, never have access to factory-made laboratory apparatus.

If we learn that this short account proves to be of interest to other science teachers we may have the temerity to describe one or two other simple things that we have done along these lines.

A. K. LOBECK

COLUMBIA UNIVERSITY

BOOKS RECEIVED

ABRAMSON, HAROLD A., LAURENCE S. MOYER and MANUEL H. GORIN. *Electrophoresis of Proteins and the Chemistry of Cell Surfaces.* Illustrated. Pp. 341. Reinhold Publishing Corporation. $6.00.

BIRKELAND, JORGEN. *Microbiology and Man.* Illustrated. Pp. x + 478. F. S. Crofts and Co., New York. $4.00.

HRDLIČKA, ALEŠ. *Catalog of Human Crania in the United States National Museum Collections: Eskimo in General.* Pp. 169 + 429. Smithsonian Institution.

MILLS, CLARENCE A. *Climate Makes the Man.* Illustrated. Pp. vi + 320. Harper and Brothers. $3.00.

RIEGEL, EMIL RAYMOND. *Industrial Chemistry.* Illustrated. Pp. 861. Reinhold Publishing Corporation. $5.50.