whom he thought worthy his own more or less elaborated manuscripts, to use in their investigations, thus waiving his own priority in the field. His insistence on giving full credit to collaborators of every degree, both in publications and in records, labels and reports, was proverbial. To the tyro treading with uncertain step the entrance ways of science he was ever cordial; always a friend, guide and helper. While Professor Henry lived, the affectionate loyalty of Baird to his venerable chief was an inspiration to those about him.

That this faithful cooperation would not have been a matter of course with most men, however honest in purpose and devoted to science, will be more evident when it is understood that, notwithstanding the well-known views of Professor Henry, enforced by him on every possible occasion, a great museum actually did grow up on their hands, the inevitable result of the scientific activity promoted by Professor Baird. This museum, only after years of effort, and but shortly before Professor Henry's death, came to take its present semi-independent position, such as he would originally have assigned to it. Until this was consummated, Professor Henry's anxieties were very great. When, by Professor Baird's persistent effort, quiet tact and unremitting labor, a distinct organization was finally effected for the museum, it was felt by Professor Henry as the greatest comfort of his declining years. The possibilities of antagonism in such a situation are readily perceptible, and nothing could testify more clearly to nobility of character in both than the fact that such differences never germinated between these faithful servants of science.

When Professor Baird succeeded to the office, it was with a modesty almost amounting to timidity that he spoke of the opportunities and duties of the post. His kindly recognition of his juniors was only changed by the shade of seriousness due to increased responsibility. Only those who were engaged with him can realize what an amount and variety of labor he willingly undertook. During the period of Pacific railroad explorations and the activity of the Hudson Bay Company's people, fired by the enthusiasm of Kennicott during his sojourn in the north, collections and correspondence poured in upon Professor Baird in extraordinary quantity. Not alone was the shedding of its horns by the antelope on the western plains, or the nesting of the canvas-back among Alaskan marshes, the theme of eager letter-writing. The professor and the ladies of his household might often have been seen among the shops seeking novels for the army officer at some isolated post, a necktie for a northern voyager, or the dress goods for a wedding to come off on the banks of the Mackenzie during the crisp Arctic September. It may be imagined that in his home life Professor Baird was altogether lovable, and we can not help saying that not the least of the benefits conferred upon American science was embodied in the influence which extended from that home upon a host of boyish students gathered from year to year under the brown towers of the Smithsonian Institution, slender as to their resources, half Bohemian as to their living, let loose with little restraint in that great disjointed village, the Washington of fifty years ago.

We have dwelt on this occasion not on Professor Baird's scientific researches, his administrative successes, his creation of organized scientific agencies, like the Fish Commission and the present National Museum, nor on the fame and honors which came to him from far and near. We have left these things, which are evident and accessible, to others, and speak here of our impressions of the genius and traits of character which moulded his life and made it truly great. The latter are embalmed in the consciousness of his contemporaries, now so few; and are chiefly unrecorded, while the former may be found in reports and statistics. Two things his experience may be said to have lacked: he never had a personal controversy, nor, so far as we have ever heard or had reason to suspect, an avowed enemy.

WILLIAM H. DALL
SMITHSONIAN INSTITUTION

THE FOUR HUNDRED AND FIFTIETH ANNIVERSARY OF THE BIRTH OF COPERNICUS

NICOLAUS COPERNICUS, philosopher, philanthropist, financial expert and churchman, was born at Thorn, Poland, February 19, 1473. Under the patronage of his uncle, a bishop, he

received the most thorough education of the period, studying mathematics three years at the University of Cracow, canon law and astronomy under Novara at Bologna, lecturing himself in Rome in the year 1500, taking up medical studies at Padua for four years, 1501-1505, and also receiving the degree of doctor in canon law at Ferrara May 31, 1503. He was his uncle's private physician until the death of the latter in 1512, received the post of Canon of Frauenberg, and exerted himself for many years as physician to the poor.

Copernicus laid the main lines of his famous theory of celestial orbits about the year 1513, but published nothing for many years, though endeavoring to test his views with the scanty instruments at his command. His great treatise, "De revolutionibus orbium cœlestium," was finished in 1530 but not published until 1543. It, however, had attracted so much attention while yet in manuscript that lectures were given upon it in Rome much earlier, and the theory received the general approval of the Pope and hierarchy. The first copy of the great work reached Copernicus on his deathbed in 1543, but he was already so low that he probably never appreciated that the book was marred by a preface by Osiander in which he attempted to disarm prejudice by insisting on the purely speculative character of the work.

Copernicus also published a large work on monetary reform.

The Ptolemaic theory which was then in vogue regarded the earth as stationary and accounted for the apparent motions of the planets by a complex system of epicycles. Copernicus, following the suggestion of Professor Novara at Bologna, adopted the view that the sun is the stationary center of the solar system and that the stars are also stationary. He failed to introduce the hypothesis of elliptical orbits for the great planets, including the earth, so that he had still to retain a number of epicycles of Ptolemy.

If, as Copernicus urged, the earth revolves about the sun, the stars ought to show parallactic evidences of this motion just as a forest of trees indicates by the apparent march of the nearer stems with the respect to the farther ones the motion of the observer. The absence of any sensible stellar parallax was for three hundred years the difficulty in the way of Copernicus' theory. Furthermore, to many of the schoolmen the idea of a mobile earth seemed blasphemous.

The defects of Copernicus' theory began to be removed by the careful observations of Tycho Brahe at the observatory at Cassel, erected for him by the Landgrave of Hesse-Cassel. Kepler, the follower of Tycho Brahe, making use of these excellent observations, was able to discover his three famous laws: (1) That planets travel in ellipses with the sun in one focus. (2) That equal areas are described by the radii vectores in equal times. (3) That the squares of the periods of revolution are proportional to the cubes of the mean distances.

Sir Isaac Newton put the capstone on this edifice by his mathematical proof that these three laws of Kepler are all consequences of the hypothesis of an attracting force of gravitation varying proportionately to the product of the masses, and inversely to the squares of the distances separating them.

The final difficulty of the Copernican theory was removed in 1838 by the nearly simultaneous measurement of Bessel and Henderson of the parallaxes of the stars 61 Cygni and of α Centauri.

At this time of the four hundred and fiftieth anniversary of the birth of Copernicus, it is well to reflect upon the momentous consequences of the release of the human mind from the bonds of blind obedience to preconceived notions, partly religious and partly superstitious, which had made the speculations of the schoolmen so fruitless and had made life and property so insecure from the inquisition of those who felt themselves responsible for the destruction of heresy. Copernicus has left us a model of the earnest, kindly, modest student of science, content to test and verify before publication, but withal concerning himself with the profoundest problems of his time.

The Smithsonian Institution will hold an informal meeting at 4 o'clock, February 19, for its employees and others who may care to attend, at which a brief address will be made by the assistant secretary, Dr. Abbot, on Copernicus and his astronomical theory. The institution regards it as very appropriate that similar meetings should be held at that time at other seats of learning.

C. G. ABBOT

SMITHSONIAN INSTITUTION