

EARLY SCIENCE IN PHILADELPHIA.

BY EDGAR FAHS SMITH.

In this age of rapid scientific progress and brilliant research, one is apt to overlook and lose sight of the patient labors of the early pioneers of science, many of whom laid the foundations of discoveries, which have since proved of inestimable value to mankind. Hence the history of the past, whether in science or in art, is always worthy of study and attention.

Just where the story should begin is a bit puzzling, but on second thought it seems it will do no harm to commence with the arrival of that very distinguished, august Proprietary—William Penn. It was some time in 1682 when his good ship “Welcome” dropped anchor somewhere in the broad Delaware, and he proceeded to found his city—Philadelphia, subsequently very appropriately hailed as

IMPERIAL DAUGHTER OF THE WEST.

With Penn were members of the medical profession, men of the highest order of intelligence and acquirement. These Colonial physicians were not neglectful of resources that lay within their reach. Stimulated by a desire to render themselves independent in the supply of their remedial agents, they made important discoveries in regard to the value of indigenous plants, which have stood the test of experience. Further, the rich and resplendent flora about them was a subject for wonderment and contemplation, well calculated to awaken enthusiasm, irrespective of the practical application that might be made of its study and investi-

gation to the interests of humanity. In short, Botany, the amiable science, thus came into the City of Brotherly Love to be studied for itself. It was first of the natural sciences to so engage the attention of the community, and, it may be declared without fear of contradiction, that in this city botany had its scientific beginning, so far as the Colonies were concerned. That it was enthusiastically pursued is evident from the current literature of that period. What is more, the descendants of William Penn's fellow-voyagers to "these parts" adopted the science and became its earnest cultivators. What other one of the Colonies could boast of a John Bartram, whom Linnæus called

the greatest natural botanist in the world,

whose home consecrated

to friendship and philosophy

still stands on the banks of the Schuylkill—below Gray's Ferry?

This rare and choice spirit, John Bartram, travelled through all the provinces then subject to England, with an ardor for botanical pursuits, so vigorous and lively, that few obstacles opposed or confined his progress. Indeed, he was the first American to put into operation a botanical garden for the reception of American plants as well as those from foreign lands. Men of science in Europe knew John Bartram and welcomed his annual contributions to their Societies of which he was in Fellowship. In his modest Quaker fashion he said—that his first passion for Botany was excited by contemplating a simple daisy, as he rested from ploughing, under a tree! Its beauty—its delicacy of parts—inspired all his subsequent efforts and studies in the vast and complex plant world. And that sublime spirit was transmitted to his son, William Bartram; who after six years of mercantile pursuits

turned to botany, and with his father spent years in the Carolinas, Georgia and the Floridas.

Father and son were pioneers in their chosen field. Their lives, their devotion to a science—which encompassed so much for humanity—could not pass unnoticed, and so the old City and the country roundabout came to be later the home of many eminent botanists. For example, Father Time had scarcely turned page one thousand eight hundred A.D. in his universal diary than there appeared “Elements of Botany” by Benjamin Smith Barton of this City. It was the first textbook on the subject to see light in this Western world. It was republished abroad and translated into many foreign languages. It was admirable in all its parts. One, not a botanist, will read it with ever increasing interest. As one of America’s earliest naturalists and the “Father of American Materia Medica,” Barton greatly extended the borders of human knowledge. Minerals, trees and flowers—all spoke to him.

It was he who lent a helping hand to Thomas Nuttall, an unknown, new name, perhaps, to many of our people, but nevertheless it was the name of a lad destined to do great things in the field of American botany. Wandering out the Lancaster Pike, in his youthful days, he saw in a marshy ground by the road a common Greenbrier, creeping up a tree.

“Egad!” said he to himself, “there is a Passion-flower!” He plucked it and brought it to his home. None of his fellow-boarders could tell him what he had, but advised him to consult Dr. Barton. This he did and the interview, replete with infinite pleasure and vast learning, decided Nuttall, then and there, that his vocation was to worship Flora. To her shrine he remained devoted to the last day of his life.

One consequence was “The Genera of North American Plants” in two volumes, said by the distinguished Torrey to have

contributed more than any other work, to the advance of the accurate knowledge of the plants of the country.

Over vast savannas, where the wandering eye,  
Unfixt, is in a verdant ocean lost,

went this eager searcher for the treasures in the great plant life.

“To me,” said Nuttall, “hardships and privations are cheaply purchased, if I may but roam over the wild domain of primeval Nature, and behold

Another Flora there, of bolder hues,  
And richer sweets beyond our garden’s pride.

As long as our Flora remains an object of study, Nuttall’s name will live!

Those who have read that delightful novel “The Red City”—by the never-to-be-forgotten Weir Mitchell,—will probably recall a rather striking illustration representing Aunt Gainor Wynne—the masterful dame in “Hugh Wynne”—arresting the carriage of Doctor Chovet, and reading to him one of her famous diatribes, setting forth her deep displeasure.

It is a lovely picture on which to rest the eye, but it is Doctor Chovet who is presented to the reader. He may have exasperated Aunt Gainor, and have done many things—provoking, foolish and absurd, such as this :

On one occasion the Spanish Minister, Don Juan, ordered his carriage to convey the Doctor to his home, as the weather was rather inclement. The Doctor, full of fun and joke, directed the coachman to drive by the Coffee-house, filled with the great merchants of the City at that particular hour, and these as the Doctor approached immediately drew up in order, hats off, to pay their respects to the Don, as Minister from a friendly power. Dr. Chovet kept himself close back in the carriage until directly opposite the Coffee-house,—the gentlemen all bowing and scraping,—when he popped out his head,—Good morning, gentlemen, good morning! I hope you are all well; thank you, in the name of his Majesty, King George! and off he drove, laughing heartily at having again joked with the Philadelphia Whigs.

People said the Doctor had “much sarcastic wit” and that his expletives in common conversation were neither useful nor ornamental.

He was very human, this Doctor Chovet, but in this hour his interest to readers is that he made a splendid anatomical collection—with the avowed purpose of developing comparative anatomy. To this most eccentric man, full of anecdote and propensity for humbugging, is the science of comparative anatomy indebted for its beginning, although later graced and marvelously advanced by Hornor, Harrison Allen, Leidy and others. By his skill and perseverance were finally perfected those wonderful anatomical preparations in wax—probably yet in possession of the Pennsylvania Hospital—anatomical preparations, the very sight of which inspired a feeling of solemn awe. This serious work was a beginning—that is all—but it led to very remarkable results, so that while we smile on observing the picture of Aunt Gainor Wynne heaping invective after invective upon the head of the aged, distinguished medical man, all that is forgotten in the light of what he accomplished for science in this city in the days

when the voice of the devout and ardent Whitefield rang out clear as a bell on renowned High Street (Market), calling sinners to their knees, and was plainly heard upon "Society Hill," and away over on the Eastern shores of the swiftly flowing and majestic Delaware.

Doctor Chovet was our first comparative anatomist!

Never do my steps carry me through Independence Square but there arises in my mind the recollection that, not far from the Hall and the sacred bell, there once stood an observation platform from which the immortal Declaration was read to an eager and cheering multitude of citizenry. Prior to that profound occasion, however, the platform had served another epoch-making event. Upon it had been arranged a telescope and numerous astronomical instruments made by the hand of a most ingenious student, practically self-trained in many subjects, whose name in time graced the membership rolls of learned Societies in

far away lands. It was that of David Rittenhouse, who with ten other eminently able associates, determined to observe the transit of Venus over the sun's disk. It was a rare phenomenon. There had been but one of these transits of Venus during the 130 years preceding that of 1769; and

for upwards of seven centuries, antecedently to the commencement of that period, the same planet had passed over the sun's disk no more than 13 times.

Its importance had justly drawn the attention of every civilized nation in the world. Three places, in this country, were chosen for observation—Cape Henlopen, the State House yard in Philadelphia, and Norristown. In pensive silence Rittenhouse waited for the predicted moment of observation; it came—in the instant of one of the contacts of the planet with the sun it excited in Rittenhouse an emotion of delight so exquisite and powerful that he fainted. But this was only for a moment.

Learned societies of first reputation were not slow to place the results of these labors on a footing with their own, freely acknowledging that the Colonials had been chiefly instrumental in ascertaining that great desideratum in astronomy, the sun's parallax, and consequently, the dimensions of the solar system.

This grand success was frankly conceded to be largely due to Rittenhouse, who later constructed the orrery—a piece of mechanism admitted to be one of the greatest of his works. Its purpose was to reproduce the movements of the planetary system in miniature, which it virtually was, or as Thomas Jefferson said:

Rittenhouse has not indeed made a world, but by imitation approached nearer to its Maker than any man who lived from creation to this day.

This remarkable production may at any time be seen at the University of Pennsylvania. Gazing upon it one understands the spirit which prompted the lines:

See the sage Rittenhouse, with ardent eye,  
Lift the long tube and pierce the starry sky;  
Clear in his view the circling systems roll,  
And broader splendors gild the central pole.  
He marks what laws the eccentric wand'ers bind,  
Copies creation in his forming mind,

And bids, beneath his hand, in semblance rise,  
With mimic arts, the labours of the skies.  
There wondering crowds with raptured eye behold  
The spangled Heav'ns their mystic maze unfold.  
While each glad Sage his splendid Hall shall grace,  
With all the spheres that cleave the ethereal space.

And more than can be here recited did Rittenhouse achieve. Upon his death his remains were deposited beneath his Observatory—the only observatory in America known to the eminent French astronomer—Le Lande.

Tho' no costly tomb contains the ashes of this great man, tho' no cenotaph in any part of the country proclaims his genius, or records his fame, tho' the chisel of the statuary has never been employed in obedience to the public voice to produce a resemblance of his countenance and figure, yet he lives in the hearts of the learned and good, and the name of David Rittenhouse will be venerated forever by men of science and the benefactors of mankind.

Franklin Institute, throughout its long career, has given attention to electricity in many diverse forms. Indeed, the Institute promoted electrical exhibits, and above all it had adopted as its name that of the first natural philosopher in this country who applied himself to an earnest, fruitful study of its numerous properties. Franklin's discoveries in this particular field, made entirely independent of any in Europe, won for him the distinction of being called *philosopher*. His results were communicated to his friend, Peter Collinson, in London, in 1747 in the form of letters, and according to the immortal Joseph Priestley.

nothing was ever written upon the subject of electricity which was more generally read, and admired in all parts of Europe than these letters.

The pages of foreign publications were covered with the terms *Franklinism*, *Franklinist*, and the *Franklinian system*.

Franklin had discovered that the "electric matter" was not created but collected by friction, from the neighboring non-electric bodies. He had observed that

it was impossible for a man to electrify himself, etc. His keen interpretation of the Leyden jar was thought to be almost epoch-making. And probably his grandest discovery concerning electricity, one of the greatest practical use to mankind—was that of the perfect similarity between electricity and lightning! Franklin's letters or the *Philadelphia Letters*, as they were called, continue to charm today. From none of the Colonies had come such striking and illuminating experimental work. Remember, it all occurred here in the city just about sixty years after its founding by the Quaker Penn. It was the scientific spirit of his early medical fellow-voyagers transformed into another, but kindred type of research.

The eminent savant was, however, not alone in the years of fruitful electrical endeavor. A remarkable co-laborer was Ebenezer Kinnersley, described by Franklin as

an ingenious neighbor out of business.

Who was he?

Kinnersley was born in Gloucester, England, in 1711; therefore, Franklin's junior by five years. He came to America in 1714—when three years old. His father was a Baptist minister who settled in lower Dublin township just beyond Philadelphia, where young Kinnersley grew up. In 1743 he was ordained to the ministry and removed to the City, where tradition tells he taught school. In some unknown way he had become interested in experimental work of great variety, and incidentally with electricity; and, on the basis of this common interest in electrical and physical phenomena became acquainted with Franklin. These men were neighbors in lower High or Market Street, and met in the most friendly relations. It is unknown which of the two was first to enter the domain of electrical experimentation. But they had been and were for some time

concurrent, independent workers—i.e. independent of one another, each in his own home, busy with the subtle agent! After delving through their publications the writer is convinced that the place of Kinnersley must be put high in the list of those who busied themselves with experimental science. Franklin encouraged Kinnersley to give public experimental demonstrations—to show them for money and “drew up” two lectures for Kinnersley, methodically arranging the subject matter of the experiments. These lectures were well attended and gave great satisfaction. The exhibitions (the experiments) were made in every capital town of the Colonies, and even in the West Indies.

The two lectures which Franklin claimed to have written for Kinnersley (and why he should have written them when Kinnersley was professor of Oratory and Literature in the University is hard to understand) contained altogether forty-three experiments regularly performed; such as

- a. showing that “our bodies at all times contain enough of it (electricity) to set a house on fire.”
- b. an electrical spider, animated by the “electric fire” so that it would act like a live one;
- c. a leaf of the most weighty of metals suspended in air like Mahomet’s coffin;
- d. musical bells rung by an electrified bottle of water;
- e. a battery of eleven guns discharged “by fire issuing out of a person’s finger;”
- f. a “bright flash of real lightning,” darting from a cloud in a painted thunderstorm;
- g. an exhibition of how “lightning when it strikes a house-top or a ship” may be conducted to the earth or water “without doing the least damage,” and how it might be possible “to preserve ships, homes, etc. from ever being *struck* by lightning.”

The diminutive, concise volume recording these demonstrations consists of 8 pages, 16mo form! The introductory lines read

As the knowledge of Nature tends to enlarge the human mind and give us more noble, more grand and exalted ideas of the *Author of*

*Nature*; it is presumed that this course of experiments will meet with encouragement, as a rational and commendable entertainment.

The works of the Lord are great, and sought out of them that have pleasure therein. Psalms CXI, 2.

The devout Kinnersley concluded his experiments with one described as

the endeavouring to guard against lightning, to be not chargeable with Presumption, nor inconsistent with any of the Principles of either Natural or revealed religion.

Upon page after page of Priestley's *History of Electricity* are described at length many important discoveries made by Ebenezer Kinnersley; and in one section the revered historian wrote:

If Kinnersley continues his electrical inquiries, his name after that of his friend, will be second to few in the history of science.

American scientists should know the researches of this modest, untiring seeker after the Truth, in by-past times, for it is indeed true

the greatest personal, or mental acquirements die with the possessors; but those who labor that others may be wise are a benefit to all posterity. (Mavor.)

Colonial Philadelphia surpassed her sister cities in that she witnessed the rise of many sciences—indeed, she was the birthplace of most of them in the new world.

The preceding paragraphs are mere reminders of a few of many scientific activities. Ponderous volumes would result if adequate presentation were made. To-day one smiles on hearing that Dr. John de Normandie said:

When we want the testimony of experience, a chymical analysis is the best means of investigating the truth.

He acted accordingly, thus laying the foundation for later splendid work in the *human* science—chemistry. Contributing, in a sense, too, to the appearance of Dr. Benjamin Rush's *Syllabus of Chemistry*; the first text-

book written by an American and published in his home country (1770), which brought forward, in due course, such intellects in this science as James Woodhouse, Adam Seybert, John Redman Coxe, Robert Hare and others who caused Philadelphia to be spoken of as the center of scientific chemistry, particularly after the advent of Joseph Priestley—who infused into those partial to chemistry a new spirit of investigation and research, which eventually gave the world the classic labors of Robert Hare. Priestley sojourned at the time in the upper part of High Street in one of a row of small houses between Sixth and Seventh Streets. There, in his simple, friendly way, he diffused knowledge and urged men to self application. The good he did can never be measured.

Bartram, the elder, enkindled love for science in more than one breast. To him and his influence the world is indebted for Alexander Wilson, whose “American Ornithology” is a monument that will never decay, although wrought out under every possible disadvantage, for he

bade all hinderance vanish before him—

hence our glory!

And there was Thomas Say (of the University), whose duty, like Adam of old, was to name the animals as they passed before him,—exhausted himself in the study of an immense range of invertebrates and made himself master in Entomology,—for his discoveries were greater than those ever made by any single individual!

From the sturdy efforts of William Penn’s men of science came, in time, the University of Pennsylvania, the American Philosophical Society (oldest scientific body in this Western world), the Chemical Society of Philadelphia, oldest organization of its class in the world, the Academy of Natural Sciences where that

rare spirit Gerard Troost, and congenial associates like Adam Seybert made mineralogy and geology of paramount importance—all pioneer work, but of such character that Philadelphia was further enriched as a scientific center, in the new world. And finally came the Franklin Institute. Every science was cultivated by it, but especially those which might promptly contribute to man's immediate use and profit.

Viewing the past of Philadelphia in scientific endeavor, and its various centers of scientific effort, one may say in contemplation:

My heart is awed within me when I think  
Of the great miracle which still goes on,  
In silence round me—the perpetual work  
Of the Creation, finished, yet renewed forever.