

riety of unpracticed subjects. Other papers of a somewhat philosophical nature were presented by Dr. Chamberlain on the "Relation of Psychology to Anthropology," and Dr. Aikens on an "Analysis of Cause."

The meeting adjourned, to meet next December, at Columbia, N. Y. The officers of the association are: G. Stanley Hall, president; Professor Ladd, of Yale University, vice-president; and Professor Jastrow, of the University of Wisconsin, secretary.—*Science*.

REMINISCENCES OF PENIKESE.

Mrs. HELEN B. C. BEEDY, Bangor, Me.

THE twenty years since the first seaside school in America was established at Penikese Island have been years of such marked progress and evolution of new methods of teaching in natural history that there has hardly seemed time even to stop to be grateful to the originator of these methods, our beloved and honored Agassiz.

He it was who gave the impetus to the study of natural history in America—not from books but from nature herself.

Among the memories of Penikese that come thronging back are not so much "The Formation of Glaciers," the "Ice Sheets that Covered this Continent" or "Classification in Natural History," as the man, Agassiz, whose genial countenance always bore the index of his great heart.

Standing before his class, crayon in hand, he seemed not to see the eager students before him, but rather the children all over the land for whose faithful instruction he pleaded.

Every lecture became a lesson in method. No matter how intricate the scientific subject he was presenting, he often broke the thread of his discourse, to impress some lesson in method or to call attention to some truth bearing upon the ethics of everyday life.

Turning to my note book, I read between the lines:

"Consult no one in regard to your modes of life. The time will come when that which is in nature will be expressed—not what any naturalist may divine. The conceit of originators must be overcome. Aim to be translators, not originators. Always mark specimens carefully. Attach label so as not to be removed. There should be a little museum in every school room. I would prefer that you go home with a dozen specimens well studied and identified than to learn much. Self-conceit retards progress. The study of nature is humiliating. Nature is always right. If there are errors, it is we who are in the wrong. We must be willing to know little, but know that little well. Every student must have his own opinions. All studies that go deep benefit one. Never attempt to teach what you do not know yourself well. Teach pupils to be observers. The study of nature, if done in the right spirit, is an intercourse with the highest mind. A laboratory is to me a sanctuary, and I would have nothing done within it unworthy of its great Author."

Those who enjoyed that golden summer with Agassiz at Penikese can never forget his earnest appeals to them as teachers to help him make the true way of teaching universal throughout the country by leading their pupils to study natural objects. How faithfully they have heeded his instruction the great demand for summer schools, seaside laboratories, field classes in botany and geology abundantly testifies. The teacher who to-day would attempt to instruct a class in botany or zoology without specimen in hand would not be tolerated even in our rural schools.

Work and recreation were combined in the Anderson school. The social hours were very delightful. After the busy day in the laboratory it was our custom to assemble on the little hill, the only eminence upon the island, and there near the flagstaff which had been planted amid some small bowlders, seat ourselves upon the dry grass to hear the conversation of Agassiz and his associates, or join in singing while we watched the bright tints of Gay Head as it gave back the last rays of the setting sun, or marked the position of the lightships as they sent their glimmer across the waves.

It was very touching to note the unaffected friendship of Agassiz and Guyot, who had been lifelong friends. It was not unusual to see them walking together over the island of Penikese, with their arms fondly folded over each other rehearsing their boyhood days, or living over again their perilous excursions among their native Alps. The natural history club founded by the teachers and students for the discussion of methods of teaching was an attractive feature of the school.

When Mr. James Johonnot asked, "When shall we commence to teach natural history?" Professor Agassiz struck the keynote of all his teachings when he replied, "At once, using the material nearest at hand." Sometimes small parties of us gathered in the shadow of the great rock for more quiet reading or sketching. As there was not a tree upon the island, this huge bowlder, beneath the scorching July sun, was a striking illustration of what Isaiah must have had in mind when he compared the prophetic kingdom to the shadow of a great rock in a weary land.

Professor Agassiz always quoted his friends in such a way that their names seemed to linger in love upon his lips. This was specially true of Cuvier, with whom he had enjoyed the closest friendship. To Agassiz, Cuvier himself had intrusted his drawings and notes on fossil fishes, and placed at his disposition all the material he had collected for the great work to which he had devoted his life.

The last words of Cuvier to Agassiz were: "You are young, you have time enough for the work. I have none to spare. Be careful and remember that work kills."

At the death of Cuvier, Agassiz was the only man in Europe deemed competent to take up his unfinished work. Humboldt, too, was Agassiz's personal friend, and in the home-like lectures and talks at Penikese the students got glimpses of these great men that could not be obtained in any other way. He often spoke of Humboldt as his benefactor. It was through his kindness and liberality that Agassiz was able to publish his great work on fossil fishes. For Darwin, Agassiz had only words of kindness; he spoke of him as "my friend—I like him much."

We were greatly amused after a lecture at Penikese in which Professor Agassiz had spoken of Darwin,

when one of the teachers narrated the conversation in which Darwin's son, when told that Agassiz did not accept his father's views of evolution, replied, "Very well; my father does not believe in the glacial theory."

This man Agassiz, so great—a member of all the scientific academies of Europe and of the learned societies of America—equally at home with the savants of the old and new worlds; with the living and the dead; as familiar with the works of Aristotle as Cuvier; an honored guest at the homes of the monarchs of Europe and the less pretentious firesides of America; this man mingled freely with his students at Penikese and entered into their personal interests with an enthusiasm born only of greatness. His artless simplicity of character was constantly revealing itself in his kindly attention to the students. How vividly I remember a Sunday morning call from him and Mrs. Agassiz, in the dormitory. Our rooms, so neat and comfortable, boasted of but two chairs. He refused the one offered him and seated himself upon a trunk too wide and high to admit of his feet touching the floor. I had taken great pains to send home for my autograph album, but hardly as brave as Wagner in Faust, had hesitated to ask him for his name—but this seemed my opportunity; producing the book, I said: "Do you object to writing your autograph, Professor Agassiz?" All those who have ever heard the musical tones of his voice, will recall them in the familiar answer, "Certainly not." And now as I read, "Lz' Agassiz," and below on the same page, "With pleasant memories of the first summer at Penikese, yours truly, Elizabeth C. Agassiz," there comes to me not only the memory of the man but also that of the noble woman who so faithfully co-operated with him in all his labors for the enlightenment and uplifting of humanity.

One of the pupils had been invited by her State superintendent of schools to prepare a paper upon the work at Penikese, to be read before the State teachers' association. She took the matter to Professor Agassiz and asked him if he thought she could fittingly present the subject before such a body. He replied, "Certainly. You can do it better than I; you are nearer them."

The storm of Aug. 13, that detained Prof. Benjamin Pierce and his yachting party upon the island, blew no ill wind to the students. Professors Pierce and Agassiz were genial friends. He was easily induced to address the school and was listened to with marked attention. His first words were: "The great need of the world to-day is men of truth." As Professor Agassiz was afterward taking him through the laboratories, pointing out the work of the students, they came upon a party of us gathered around the table of Miss Lydia W. Shattuck (always the center of a loving group), busy over the algae we were preparing for preservation (for which we were not unwilling to leave the dissection of fish and lobsters), he remarked to Professor Pierce, "You see ladies will do ladies' work."

Professor Agassiz constantly urged: "You can do if you think you can do." But every student of his knows that the thinking to do can come only after careful study and research. His own zeal knew no bounds. From boyhood he had grappled with every obstacle the lover of truth is called upon to surmount. Without this life-long experience the Penikese school would have been greatly delayed in its opening. The school was not decided upon until March, but dormitories and laboratories were begun in May and the school was to open July 8. In the meantime apparatus for working was to be provided and provision for the comfort of fifty pupils and a large corps of teachers was to be made.

When Professor Agassiz arrived upon the island, July 5, things were in a very unfinished condition, but with his characteristic zeal everything was made ready, and when the steamer brought the school at the appointed time, they found the bare, unfinished walls of a few days before transformed into airy and comfortable sleeping halls; the barn metamorphosed into dining room and lecture hall, while in and out of the great barn doors the swallows were still permitted to pass to their nests in the rafters.—*Education*.

CARL WILHELM SCHEELE, PHARMACIST AND CHEMIST.

A BRIEF ACCOUNT OF HIS LIFE AND WORK.

THE subject of this note was born on December 9,* 1742, at Stralsund, which was at that time the chief town in that part of Pomerania which was united with Sweden after the peace of Westphalia, though from its position it naturally formed part of Prussia, to which it now belongs. Scheele was thus a Swedish subject, but he may be regarded as strictly of German nationality. German was his mother tongue, and, though practically the whole of his life was passed in Sweden, he never attained any degree of intimacy with the language of the country. The accounts of his researches were invariably written in German, and had to be specially translated into Swedish in order that they might be inserted in the transactions of the learned societies to which they were communicated. His father, Joachim Christian Scheele, a respectable tradesman and burgess of Stralsund, belonged to an offshoot of a widespread and wealthy family of some note, members of which had filled prominent positions. Margaretha Eleonora Warnekross, the wife of Joachim, was the daughter of the head of a firm of brewers in the same town. They had, in all, eleven children, of whom Carl was the seventh.

EDUCATION AND APPRENTICESHIP.

The means of his parents do not appear to have sufficed to enable them to give their sons an extended academical education, for we find that after Carl had studied during three years at a private school where he was compelled to make some progress in Latin, though he never showed either inclination or aptitude for the study of languages, he was transferred to the gymnasium or public school at Stralsund. This, however, he soon left, to enter upon the serious business of life. An elder brother, Johann Martin, had been apprenticed with Martin Anders Bauch, an *apothecary* or pharmacist of Gothenburg and a friend of Scheele's family, but had died during his term of pupilage. It was found that Carl's inclination prompted him to

enter the same profession, and in 1757, when he was fourteen years old, he also was put under the charge of Bauch. During the eight years he stayed here he displayed no exceptional ability, though he is described as being thoughtful and studious, as well as very punctual and precise in the discharge of his duties.

STUDIES AND EXPERIMENTAL WORK.

He studied carefully such standard works on chemistry as then existed, the chief being Caspar Neumann's *Prælectiones chemicæ*, Lemery's *Cours de chimie*, Boerhaave's *Elementa chemicæ*, Von Lowenstern's *Laboratorium chymicum*, Roth's *Anleitung zur Chymie*, and Kunckel's *Laboratorium chymicum*, the last named especially interesting him and occupying much of his leisure time. During business hours he planned experiments to be performed in his leisure time, his practical work often extending far into the night, and, by repeating the experiments described in his books and systematically subjecting the substances around him to careful examination, he gradually acquired a considerable stock of knowledge as well as unusual skill and dexterity in manipulation. In 1765, Bauch sold his business and Scheele left for Malmo, in Sweden, to engage himself with Peter Magnus Kjellstrom, also a pharmacist. While here he continued to devote himself to his favorite science, and it is related that he once got into trouble over it. He was conducting some experiments with the pyrophorus when, a fellow apprentice having unknown to him mixed some fulminating powder with the material he was working with, an explosion occurred, and the violent detonation in the middle of the night alarmed the household. The reprimand he received did not diminish his ardor, however, but simply had the effect of causing him henceforth to conduct his experiments more cautiously.

FIRST CHEMICAL DISCOVERY.

Scheele's next engagement was with Scharenberg, of Stockholm, who kept a pharmacy at the sign of the Raven. Arriving here in 1768, he stayed but a brief time, during which, however, he completed his first research of importance, isolating tartaric acid from cream of tartar and ascertaining many of its properties, as well as those of several of its compounds which



CARL WILHELM SCHEELE, PHARMACIST AND CHEMIST.

he prepared. A record of this work was sent to Torbern Olof Bergman, then professor of chemistry and mineralogy at the University of Upsala, who by some mischance neglected it and returned the manuscript unread. Subsequently it fell into the hands of Anders Jahan Retzius, professor at Lund, who recognized the importance of Scheele's results, and secured the insertion of his paper in the Transactions of the Academy of Sciences, Stockholm, for 1770, without, however, naming Scheele as the author.

FRIENDSHIP WITH BERGMAN.

In the autumn of the same year, Scheele obtained a post as chemist in the laboratory attached to the pharmacy belonging to Lökk, of Upsala. This change was made that he might take advantage of Bergman's lectures, but his excessive modesty and timidity, coupled with the soreness he yet felt with regard to the tartaric acid incident, prevented him taking steps that would bring him in contact with the famous chemist. Accident, however, brought about their acquaintance. Jean Gottlieb Gahn, the assessor of mines at Fahlun, was at this time studying chemistry at Upsala, and being one day at the pharmacy whence Bergman's laboratory was furnished, engaged in conversation with Lökk concerning a peculiar reaction the latter had noticed on adding vinegar to niter after it had been heated over a quick fire. Gahn was unable to explain this, but undertook to ask Bergman, who proved to be equally ignorant upon the point. Calling to inform Lökk of his failure to obtain the desired information, Gahn found him absent, and addressed himself therefore to Scheele, who to his surprise explained the matter without any hesitation or difficulty, stating that an acid (nitrous) was given off which differed from the acid of niter (nitric) generally known, and showing how this was brought about. As a result of this episode, the two students soon became intimate, and communicated the details of their respective researches to each other, while later, Gahn persuaded Scheele, not without difficulty, to meet Bergman, who at once acquired a strong liking for the young pharmacist. They soon became great friends, and their friendship never weakened, lasting till Bergman's death in 1784. The professor adopted many of Scheele's views, assisted him to publish all his discov-

* L. Von Crell (*Chemical Journal*, i, 1) incorrectly gives the date as December 19, and the error has been copied in other biographies, including that in the *Encyclopædia Britannica*.