with a suggestion here, a kindly but scrutinizing glance there, he made his sympathetic presence felt by the whole establishment. No man ever exercised a more genial personal influence over his students and assistants. His initiatory steps in teaching special students of natural history were not a little discouraging. Observation and comparison being in his opinion the intellectual tools most indispensable to the naturalist, his first lesson was one in *looking*. He gave no assistance; he simply left his student with the specimen, telling him to use his eyes diligently, and report upon what he saw. He returned from time to time to inquire after the beginner's progress, but he never asked him a leading question, never pointed out a single feature of the structure, never prompted an inference or a conclusion. This process lasted sometimes for days, the professor requiring the pupil not only to distinguish the various parts of the animal, but to detect also the relation of these details to more general typical features. His students still retain amusing reminiscences of their despair when thus confronted with their single specimen; no aid to be had from outside until they had wrung from it the secret of its structure. But all of them have recognized the fact that this one lesson in looking, which forced them to such careful scrutiny of the object before them, influenced all their subsequent habits of observation, whatever field they might choose for their special subject of study. One of them, who was intending to be an entomologist, concludes a very clever and entertaining account of such a first lesson, entirely devoted to a single *fish*, with these words: "This was the best entomological lesson I ever had—a lesson whose influence has extended to the details of every subsequent study; a legacy the professor has left

to me, as he left it to many others, of inestimable value, which we could not buy, with which we could not part."

But if Agassiz, in order to develop independence and accuracy of observation, threw his students on their own resources at first, there was never a more generous teacher in the end than he. All his intellectual capital was thrown open to his pupils. His original material, his unpublished investigations, his most precious specimens, his drawings and illustrations were at their command. This liberality led in itself to a serviceable training, for he taught them to use with respect the valuable, often unique, objects entrusted to their care. Out of the intellectual good-fellowship which he established and encouraged in the laboratory, grew the warmest relations between his students and himself. Many of them were deeply attached to him, and he was extremely dependent upon their sympathy and affection. By some among them he will never be forgotten. He is still their teacher and their friend, scarcely more absent from their work now than when the glow of enthusiasm made itself felt in his personal presence.—ELIZABETH CARY AGASSIZ.

AGASSIZ AND CUVIER

Agassiz was not a good practical geologist like Cuvier. His active spirit did not allow him to follow patiently the always long, tedious, and often too-fatiguing researches of practical geology. He wanted the results which he could promptly obtain in the drawers, on the shelves, and in the glass cases, of large collections. There Agassiz had not his equal, being even quicker than Cuvier.

Cuvier was very grave, while Agassiz, on the contrary, was always laughing, or, at least, smiling. Cuvier had a

special aptitude for all kinds of knowledge, and possessed talents to fill any official position, such as professor, general inspector of public instruction, state councillor, great chancellor of the University, or secretary of public instruction, peer of France, perpetual secretary of the Academy of Science, etc., etc., while Agassiz limited himself all his life entirely and exclusively to natural history. Both possessed an extraordinary memory, and both were remarkably gifted with the faculty of order; both were capable of long labor, and at the same time both worked with great facility. With them work was always easy. They did it without effort; it was natural to them. But neither was inventive; both saw facts and observed them sharply, but neither thought to link them by theories calculated to conduct to the discovery of other facts. They were "*terre à terre*" naturalists, while Lamarck, Geoffroy Saint-Hilaire, Darwin, Huxley, looked forward to the future, prophesying, and always ready to call to their help suppositions and probabilities.

Physically, Cuvier and Agassiz resembled each other in possessing enormous heads and largely developed brains, while neither Lamarck nor Darwin were abnormal as regards size and development of the head. In a crowd Cuvier and Agassiz always attracted attention, and were distinguished at once as uncommonly fine-looking men, while Lamarck, Darwin, and Huxley passed unnoticed.

Agassiz did not possess the original ideas, or the great sagacity, or the depth of view of Cuvier. He did not open new roads to natural history, but he enlarged greatly all those which were pointed out by others. If Cuvier had an enormous influence on the future of science and on the savants themselves, Agassiz had more influence on the

masses; he made science more popular, gave a strong impulse to the development of questions very little known before him, and created a more elementary method of teaching. Agassiz delighted in making pupils, and was always on the lookout for applause from all his hearers, whoever they might be, savants or populace. Cuvier, on the contrary, never took the trouble to make pupils, although he left several after him, among them Agassiz and Richard Owen; he never courted applause nor popularity. Cuvier took care to screen himself, and preferred the solitude of his laboratory and library, while for Agassiz solitude was insupportable; he wanted to be surrounded at all times by pupils or admirers. He courted bustle. This is a very unusual characteristic among savants, who are generally more or less retiring, and conduct their researches in the solitude of a laboratory, far from all distractions. As soon as Agassiz had found something new, he proclaimed it even before he had obtained all the proofs. He was always anxious to make an impression on his surroundings and his contemporaries. He was a leader of men, and above all a charmer. Cuvier, on the contrary, was difficult to reach, always on his guard, and very reserved. He did not care about publicity, but he was extremely desirous to make discoveries and keep them secret, until he had deduced all the consequences, and proved them beyond question.

If Cuvier showed great superiority and inventive genius in his classification of the animal kingdom, in his comparative anatomy, his restoration of fossil vertebrates, his description of the geology of the Paris basin, and his celebrated lectures at the Jardin des Plantes and at the Collège de France, Agassiz rose very high in his study of "Fossil

Fishes," the living fishes, the echinoderms, the embryology of the turtle, in the description of the glacial epoch, and in his popularization of natural history in North and South America, and finally in his creation of a great museum at Cambridge and of a great marine biological laboratory at Penikese. Both were creators, each in his own way. From 1795 to 1873 these two savants "of mighty wings" gave to natural history the most important impulse which it has ever received, divulging facts more numerous and more clearly founded on exact principles than any other naturalists who preceded them. If Cuvier was superior to Agassiz as a classifier and a creator of several parts of natural history, Agassiz was above Cuvier as a lover of nature, and a popularizer of science. No naturalist has admired every object of natural history with the enthusiasm of Agassiz. He stood in ecstacy before a zoölogical specimen; whether it was living or fossil was of no importance to him. I doubt if any one has ever handled a specimen with such reverence and veneration as Agassiz did. Cuvier will always occupy a very exalted position in natural history. He is above the rank and file; while Agassiz is only in the first rank of Cuvier's pupils. Agassiz is a brilliant satellite who has moved in the orbit traced by Cuvier; but what an orbit! and what a brilliant light!—JULES MARCOU, *in "Life, Letters, and Works of Louis Agassiz."*

READERS' AND STUDENTS' NOTES

1. The life of Agassiz by his widow, Elizabeth Cary Agassiz, entitled "*Louis Agassiz, His Life and Correspondence,*" with

portraits and illustrations, is the "life" most people will care to read first. It is partly autobiographical, and is especially full in regard to Agassiz's early years. (Boston: Houghton, Mifflin & Co. 2 vols., $2.50.)

2. "*Louis Agassiz, His Life and Work,*" by Charles Frederick Holder, is a popular life of Agassiz, written, like the author's "*Life of Darwin,*" as much for young people, as for their elders—"in the hope that they may be tempted to emulate the lesson the life of the great naturalist presents." Like the corresponding Darwin book this work is freely and beautifully illustrated. (New York: G. P. Putnam's Sons, $1.50.)

3. "*The Life, Letters, and Works of Louis Agassiz*" in two volumes, by his friend, Jules Marcou (New York: The Macmillan Co., $4.00) may be described as the "standard" biography of Agassiz. It is an attempt to portray the life, character, and work of the great naturalist, "in a true light, in correct perspective," to put him "in his true place in the field of the history of natural science." Though in many respects an interesting work it is perhaps better suited to the needs of the professed student than to the general reader. It is furnished with a very full and carefully prepared Agassiz bibliography.