Mercuric chloride, in aqueous solution, in the proportion of 1: 10,000, is a reliable agent for the destruction of micrococci and bacilli in active growth, not containing spores; in the proportion of 1:1,000 it destroys the spores of bacilli, when they are fairly exposed to its action for a sufficient length of time (two hours).

Carbolic acid cannot be relied upon for the destruction of spores. This agent is recommended by Koch for the disinfection of the excreta of patients with cholera (5% sol.). A two per cent solution may be used for disinfecting clothing, etc.

Sulphate of copper is largely used as a disinfectant in France. It is efficient in the proportion of one per cent for the destruction of micro-organisms without spores; for excreta, use a five per cent solution.

Sulphurous acid gas is the most useful gaseous disinfectant, and is mainly relied upon for the disinfection of ships, hospital wards, etc. It is important for the destruction of spores, and exact experiments show that its disinfecting power, as determined by biological tests, has been very much over-estimated. For details, with reference to the germicide power of this and other disinfectants mentioned, the reader is referred to the preliminary reports of the committee on disinfectants of the American public health association, published in the *Medical news*, Philadelphia (Jan.–July, 1885).

GEORGE M. STERNBERG.

LIFE OF AGASSIZ.

IT is nearly twelve years since Agassiz died. Many tributes to his life have appeared in the meantime, the best of them being a memoir by his life-long friend, Guyot, which was communicated to the National academy of sciences. Now come his memoirs, edited (as the title page modestly expresses it) by his widow. Mrs. Agassiz was the person of all others best qualified for this work. Her entire familiarity with the scientific pursuits of her husband, her participation in his long journeys, her excellent style as a writer, and her calm and well controlled enthusiasm have enabled her to produce a volume which must give satisfaction to every one. She has avoided two obvious dangers, that of describing too minutely the incidents of domestic life, and that of leading the uninformed into the depths of zoölogical learning. She has drawn a portrait of the great naturalist,—let us rather say she has drawn a series of portraits, taken at different periods of life and in different attitudes, so that the man himself is before us, as the devoted student of nature, the brilliant lecturer, the correspondent of eminent men in every land, the good citizen, the bright companion, the hearty friend, the wonderful teacher.

The first of the two volumes is devoted to the European life of Agassiz, with which Americans generally are less familiar, and the second to his American career, which is not so well known in Europe. The proportions of the narrative are well preserved, and upon those who knew Agassiz well, and upon those who knew him only by name the same effect will doubtless be produced. As they read these pages they will see the man. He will appear as a personal and, perhaps, as a familiar acquaintance, returned once more to the scenes from which he has departed, and ready to open the stores of his memory, of his correspondence, and of his museums, to our eager attention. We have rarely, if ever, read a biography which brought the subject so vividly before the reader in the lineaments of life. One of the most charming chapters in the book is the first on the boyhood of the naturalist: it gives the key to all that is subsequent. We are here introduced to the parsonage at Motier, with its view of the Oberland, its garden and orchard with unblemished apricots, and its great stone basin into which a delicious spring was always pouring the water for Agassiz's first aquarium, and to the wise and discerning mother who understood that her boy's unusual love of nature was 'an intellectual tendency' to be developed by her aid, and who remained until her death—only six years previous to that of her gifted son—'his most intimate friend.'

From his earliest days onward, Agassiz's love of natural history was manifested: birds, field mice, hares, rabbits, guinea pigs and fishes were collected and studied. All sorts of handicrafts were also practised, and the future naturalist was not a bad tailor, cobbler, carpenter, and cooper. He acknowledged through life that his dexterity was largely due to these half sportive and half earnest pursuits of his childhood. At ten years of age he began his school life at Bienne, twenty miles from home, and there, during a period of four years, he received good training in Greek, Latin, French and German, and in various branches of natural science. A letter which he wrote at fourteen, showing what books he feels in need of, is a remarkable sign of his intellectual aspirations. During the next two years at Lausanne, he found a sympathetic teacher in Chavannes, who possessed the only collection of natural history in the Canton de Vaud, and a good counsellor in his uncle, Dr. Mayor, a physician of note, who

[1] *Louis Agassiz, his life and correspondence.* Edited by ELIZABETH C. AGASSIZ. Boston, *Houghton, Mifflin & Co.*, 885. 2 vols. Illustr., portr. 12°.

advised the boy to abandon the thought of a commercial life, toward which he had been pointed, and in place thereof, to prepare for the medical profession. Two years were next spent in Zurich; and at the age of nineteen Agassiz was enrolled at Heidelberg. Several letters pertaining to this period are given. Here it was that by the introduction of Tiedemann, he became acquainted with one of the most valued friends of his whole life, Alexander Braun, afterward director of the botanical gardens in Berlin. "Braun learned zoölogy from Agassiz, and he in his turn learned botany from Braun;" and so it came to pass that through life "Braun knew more of zoölogy than most botanists, and Agassiz combined an extensive knowledge of botany with that of the animal kingdom." Karl Schimper was another friend of this period. Leuckart and Bischoff were his favorite teachers, but Tiedemann, Braun, and Nägeli were also valued instructors. We do not recall in biographical literature a more interesting account of the development of a naturalist's youth than is given in this opening chapter. Every teacher of boys ought to read it, for it illustrates the importance of discovering the bent of a young mind, and of affording it the requisite opportunities.

A far more stimulating life than that at Heidelberg awaited Agassiz, Braun, and Schimper in Munich, where Dollinger, Martius, Schelling, and Oken, were among their eminent teachers. For this period Mrs. Agassiz has brought together the letters interchanged between the student and his circle at home. Nothing could be better than the glimpses which they afford of the university influences surrounding a youth of twenty-one, in vacation and in term-time. 'The little academy' which was constituted by Agassiz and his comrades, has become historical. But more interesting than anything else in this part of the memoir is the draft of a letter from Agassiz to Cuvier, which has been preserved, although nobody can now tell whether it was actually sent to the eminent man in Paris, whom Agassiz wished to consult with reference to his future career. He tells what he has done and what he wishes to do, and he brings his confession to a close in these words:—"I seem to myself made to be a travelling naturalist. I only need to regulate the impetuosity which carries me away. I beg you then to be my guide." If Cuvier did not receive this letter, he did receive the work on Brazilian fishes dedicated to him by Martius and Agassiz, and his acknowledgment is preserved and printed. The story of Agassiz's youth is brought to a close by an autobiographical sketch which he once dictated, and "which forms a sort of summary of his intellectual life up to this date."

The next chapter tells of his actual acquaintance with Cuvier and his prosecution of the study of natural history in Paris under great pecuniary limitations and anxieties. Here we read the romance of education. One day Cuvier asked Agassiz to do something, saying, "you are young; you have time enough for it; and I have none to spare." This task proved a legacy. They worked together till eleven o'clock, when they paused for breakfast; and then resumed their occupations until dinner-time, when Agassiz excused himself. Cuvier told him that he was quite right not to neglect his regular hours for meals, and commended his devotion to study, but he added, 'Be careful and remember that *work kills*.' "They were the last words Agassiz heard from his beloved teacher. The next day, as Cuvier was going up to the tribune in the Chamber of deputies, he fell, was taken up paralyzed and carried home. Agassiz never saw him again."

With Humboldt, as well as with Cuvier, Agassiz became acquainted in Paris, and was greatly encouraged by his friendliness. Offers were made to Agassiz to remain in Paris, but Humboldt advised him to accept a professorship in Neufchâtel. This he did in 1832, when he was twenty-five years old, and then his independent life began. Teaching became "a passion with him, and his power over his pupils might be measured by his own enthusiasm." "From the beginning his success as an instructor was undoubted." "The little town suddenly became a centre of scientific activity," and the young professor's name was so favorably known that he was soon called to a chair in Heidelberg, which he could not make up his mind to accept. In 1833, he married Cecile, the sister of Alexander Braun.

During the ten years following (1833–1843) Agassiz was engaged upon the great work of his early life, the 'Researches on fossil fishes.' Offers of coöperation came to him from noted investigators, and he was known in all the museums of Europe as an indefatigable worker and collector. The first American subscriptions to his great work were received through Benjamin Silliman; in Germany, Humboldt continued to be his adviser and friend; the Wollaston medal was awarded him in London. In 1836, 'a new and brilliant chapter of his life was opened,'—the researches upon glacial action,—and he presently startled the Helvetic association "by the presentation of a glacial theory in which the local erratic phenomena of the Swiss valleys assumed a cosmic significance."

Agassiz was now driving all his steeds abreast; besides his professorial duties he was printing his 'Fossil fishes,' his 'Fresh water fishes,' and his

investigations on fossil echinoderms and mollusks, —all requiring the most careful illustrations. His researches upon glaciers also occupied a great deal of his thought and time between 1836 and 1846. Desor coöperated with him, and so did Arnold Guyot, the acquaintance of his boyhood, the colleague of his middle life, and the friend of his advancing years. In the winter of 1840 the 'Études sur les glaciers' were prepared for publication. The memoir introduces the fascinating story of the 'Hôtel des Neuchâtelois,' and the observations of Agassiz, Guyot, Desor, Vogt, Pourtàles, Nicolet, Coulon and others, and it closes with an account of the ascent of the Jungfrau, by Agassiz, with his five friends and six guides.

About the year 1842, the thoughts of Agassiz turned toward the United States as a region to be studied. Charles Bonaparte, Prince of Canino, was expecting to make the journey and desired to secure his company; but the plan fell through, and in the following spring Agassiz raised this significant question; "Do you think any position would be open to me in the United States where I might earn enough to enable me to continue the publication of my unhappy books, which never pay their way because they do not meet the wants of the world?" Two years later the king of Prussia granted him 15,000 francs for his journey. He sailed for America in September, 1846. Little did he or his friends suppose that he was to make a permanent home in America. "So closed this period of Agassiz's life. The next was to open in new scenes and under wholly different conditions," to which the second volume introduces us.

We have purposely devoted the most of our space to the European portion of this memoir, because the later years of Agassiz's life are so familiar to American readers. We now turn to the second volume, which exhibits the same editorial tact, the same skilful selection and presentation of materials, as the first, and doubtless to many readers it will be more entertaining.

Agassiz first came before the public in this country when he delivered a course of lectures at the Lowell institute. The memoir gives a long letter which he addressed to his mother in December, conveying his impressions of American science and American scientific men, and particularly his observations on a journey from Boston to Washington. Silliman, Dana, Shepard, Gray, Redfield, Torrey, Morton, Lea, Haldeman, Bache, Bailey, Baird, LeConte, are among the familiar names of those whom he met in travel. Another familiar letter to Milne-Edwards gives his impressions of other men and other phases of scientific activity. To Elie de Beaumont he writes of the glacial drift in New England, a problem which always arrested the attention of his practised eye. To oceanic studies he was introduced by the opportunities afforded him on the steamer Bibb, of the U. S. coast survey, through the enlightened invitation of Dr. Bache and Captain Davis. "Here," says the biographer, "was another determining motive for his stay in this country. Under no other government, perhaps, could he have had opportunities so invaluable to a naturalist."

The political revolution of 1848, which released Neufchâtel from the sovereignty of Prussia, released Agassiz from the service of the King of Prussia, and made him free to accept the overtures of a professorship in the Lawrence scientific school of Harvard college, then about to be established, where he was guaranteed a salary of fifteen hundred dollars, until the fees of the students should be worth twice that, a period 'which never came.' The memoir gives a delightful picture of the society of Cambridge in those days, and of the household arrangements, over which an old Swiss friend, 'Papa Christinat,' presided. Then began, 'in an old wooden shanty set on piles,' which might have served as a bathing or boat house, that museum which has grown by the united labors and the devotion of father and son, to be the great Museum of comparative zoölogy in Cambridge. His second marriage took place in 1850, and from that time on Agassiz was identified with the United States. No offers, however tempting, could induce him to give up the delightful circle to which he was bound in Cambridge and Boston.

His scientific journeys to Florida, to Lake Superior, to Brazil, and finally around Cape Horn to California, are so well known to naturalists that we only allude to them. His participation in scientific assemblies; his interest in science-teaching in common schools; his power in developing the school of naturalists now leading in so many branches of science throughout this country; his attractiveness as a public lecturer; his magnetism as a collector; his wonderful beginning of the 'Contributions to natural history;' his hearty friendship; his devotion to his adopted land; his desire to contribute in every way to the good of the public;—all these characteristics are so fresh in the recollection of Americans that they will turn with great delight to the pages in which the details are beautifully brought out.

These volumes deserve to be read by all who are interested in the development of a noble and completed life, which was marked, as the biographer says, by rare coherence and unity of aim.