MEMOIR

OF

LEO LESQUEREUX.

1806-1889.

BY

J. P. LESLEY.

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BIOGRAPHICAL MEMOIR OF LEO LESQUEREUX.

LEO LESQUEREUX was born November 18, 1806, at Fleurier, Canton de Neuchâtel, Switzerland, and died at Columbus, Ohio, October 20, 1889, at the age of 83.

The following short sketch of his life and works is made partly from a series of autobiographical letters which I happily induced him to write to me between December, 1885, and the following May, embracing the first 36 years of his life, and partly from my intercourse with him during the last forty years. As I intend to give his own charmingly naïve narrative to the public, I will confine my extracts from it now to the parts of it which have a special interest for men of science—the youthful growth of his character as a student of nature and the earliest investigations into which he was led.

The Pontarlier railway route from France into Switzerland descends southward by a long ravine into the Val de Travers at Fleurier. There, turning east, it proceeds along the narrow level floor of the valley, between mountain walls a thousand feet high, and issues by one of the wildest gorges of the Jura upon the north shore of the lake, and so reaches Neuchâtel, thirty miles from Fleurier.

This was the grand and beautiful region in which the Huguenot Squirrels (L'écureuil) settled when driven from France by the Revocation of the Edict of Nantes. "A large number of the French families of the Cantons of Geneva, Vaud, and Neuchâtel came from France, like Agassiz and Guyot, for example—people deeply religious, of severe morality, and of simple habits; comparable, indeed, to the Pilgrims who took refuge in America." And as the English Pilgrims have made despotism impossible in the New World, so the French Pilgrims not only checked the establishment of a permanent universal despotism in Europe, but established the republic which is sooner or later to take its place everywhere.

The male inhabitants of Fleurier, like those of other villages of the Jura, were and still are industrious watchmakers; the women were lacemakers, until the Dutch women took their markets from

them. In Lesquereux's young days, in fact as late as 1872, there was not, however, in all Switzerland a single manufactory of watches—that is, any establishment where entire watches were made. Each part of a watch, even the smallest piece, was made by a different person, exclusively occupied in that particular. One made only screws, another the dial, another the spring, another the hour or minute hand. Each lived in his own house and worked at home, aided by his family, and sometimes by one or more apprentices or journeymen. From these scattered workmen the Etablisseurs ordered the several pieces and put them together. "Each operator," writes Lesquereux, "was his own master, paid for his work according to his skill and proficiency, so much per day, or oftener so much per piece. That was, as you see, a quiet and patriarchal time. The Americans have changed all that; and now in a single factory in Connecticut they make more watches than could be made in a whole Swiss village." Lesquereux's father made watch springs, with usually four journeymen, each performing always the same part, one cutting the thin plates into strips, another giving them their proper thickness, a third polishing, the master reserving to himself the more difficult task of tempering, coloring, and finishing the springs; and for the superiority of his springs (adds his son with pride) he was celebrated in all the Jura mountains. We will see what a rôle this paternal skillfulness came to play in the life of his more celebrated son.

The father was an uneducated man, "knowing just enough to keep his accounts, write a few short letters, and read his Bible on Sundays." The mother knew more, "read much, and had the greatest regard and concern for scientific people, especially for the preachers," and she induced the father to give his son a liberal education to become a minister. "I owe to my mother," he writes, "all the influences which were developed later in my youth. Until I left home she directed my studies at school, and after I left it I never ceased to correspond with her until her death."

But, as in many another case, the boy whom his mother dedicated to the ministry of religion was prepared and trained by her for a very different ministry, the ministry of science. "As far back as I can remember," he writes, "my greatest enjoyment as a child was in freeing myself of all my surroundings of the village and becoming associated in some way with nature, in the woods and fields, where I could be alone and ramble without constraint." All his spare

time out of school was spent in household work or running errands; but on Saturday afternoon and sometimes for a few hours after Sunday school he could take long rambles with one or two friends, generally climbing the gravelly slopes to the foot of the bare rocks, and then following goat tracks up the cliffs to reach some high crag from which he could look down on the valley below. "For what?" he asks. "I do not know. I was in my element like a fish in water. I sang the whole time. I gathered wild fruits, hazelnuts, or flowers for my mother. When two or three of us were together we would detach great rocks to see them vaulting down, springing across chasms, and bursting into thousands of pieces."

Recounting his famous fall he writes: "By a misstep at the very top of the mountain, opposite the village, on the edge of a vertical cliff, I fell from rock to rock and rolled to the base like a bunch of moss down the steep slope to the borders of the cultivated meadows of the valley. I was immediately taken up and carried home by some workmen who had seen the fall. My whole body was covered with wounds, some of my limbs lacerated to the bone, my scalp cut in nine places, one of my eyelids split and torn aside; but none of my bones were broken. I had lost consciousness from the first shock, and falling from rock to rock, sometimes upon trees, without resistance of my own, I escaped death as by a miracle. I remained unconscious for two weeks, but after two months I was out and had to attend school. The council of the village had the event recorded, and a flag was erected not far from the top of the mountain, as high as two hardy workmen could ascend. I was then ten years old." A few years ago when Desor took me to see Berthoud, the artist scholar of Fleurier, he pointed to "Lesquereux's cliff."

Soon after this event the boy began his Latin studies with the village parson, "a poor preacher and a very poor intructor, from whom he did not learn much." At 11 years of age he was sent to the cleverer parson of a neighboring village, Motiers, who kept a sort of boarding school. The first year, rising at 5 o'clock, he walked the two miles, sometimes in deep snow and often in darkness. The second year he became a boarder in the school. His weekly vacations were still spent in mountain climbing. When the preacher was away or too busy to give them lessons the boy haunted a large limestone cavern, opposite the village, of which he explored all the nooks and crevices and galleries, "penetrating far deeper beneath the plateau than any grown man had ever done or could have done."

The times between school hours he spent in a nest which he had devised near the top of a high tree overhanging the little river which runs down the Val de Travers past Motiers. Here he could con his lessons undisturbed, for none of his fellow-scholars would climb the tree.

Arithmetic and writing long French letters were easy and pleasant tasks. Latin and Greek were failures. He says that his memory was extremely weak and "always unreliable." At 13 he was sent to college at Neuchâtel, greatly against his will. He had no inclination to study. "I was rather a dreamer," he writes, "very timid, afraid of people," and he desired to help his father to support the family at his trade. But the mother insisted, and the result was a failure, which he describes in a piteous and amusing manner. His first examination was made with Arnold Guyot and August Agassiz, the brother of Louis, who was then a student in a German university. Of the three, Lesquereux was "the oldest and the most ignorant," and although he worked harder than any of his classmates he "never reached any kind of those honorable distinctions so highly appreciated at school." On commencement day, in the crowded church of Neuchâtel, so well-known to American tourists, he got none of the prizes, and "no other reward but some honorable memento for good behavior, and *le prix de bonnes notes*, a big psalm book, nick-named by the boys *le prix des ânes*. His shame and confusion of soul were unbounded, increased by the presence of the Prussian Governor and other high officials. Mother and son, without stopping to eat, took their melancholy way on foot back to Fleurier. Two years of toil had been wasted; time and money lost; the family disgraced. The boy could answer nothing to the reproaches. He could do nothing but weep and say: "You heard from Mr. B. that for months past I have worked at least sixteen hours a day, often leaving my studies at midnight to take them up again at 3 or 4 o'clock. I cannot learn anything. I cannot remember anything. The work is killing me, and I get nothing but unkind words from you. Why do you force me to study Latin and Greek and such stuff, worth nothing to me, while I could be so happy at work with my father? I cannot go back to Neuchâtel."

Yet, four weeks later, he did go back. His collegiate instruction was at an end; his academic life began. "This was the end of my youth and the beginning of manhood; a great change, which opened

the true spring, the most beautiful and too short season of my life." The *auditoires* did not demand long preparation. The professor read and explained the classic authors, "analyzing their meaning, the character of their thought, the merits of their elocution." The French poets were read, and the students were required to discuss their ideas, style, and composition. "To learn poetry by heart was for me the same as learning or repeating fine pieces of music. That was not work." He loved to write his French compositions, and often those of his idler fellow-students.

Madame Guyot and her daughters had an institute for young ladies at Hauterive, a small village on the hillside overlooking the lake, with a magnificent view of the Alps. Here Lesquereux was made at home from the first year of his life in Neuchâtel. Here he and Guyot spent their Saturday nights and Sundays together. The shy boy came in time to take his part in the games and excursions of the girls; read and sang with them; found a mother, and fine company, and "some of that sweetheart disease which when enjoyed too young generally turns to disappointment or even distress."

His private lessons now began to pay him well, and he went to live in the same house with the brilliant and sociable Professor of Mathematics of the academy—a good painter, excellent musician and composer, and a most attractive talker, who had taken a fancy to the stupid boy who could not learn mathematics. They took their meals together, and he found his friend an invaluable aid in his study of philosophy. "Yes," writes Lesquereux, "I did not know how to think; but under his patient direction I tried and learned a little of the difficult process of thought." He learned stenography, and found it of great assistance to his memory; for his shorthand notes of the lectures were afterwards copied carefully, and discussed with his fellow-students. He spent much time in the public library, and came to be praised by his professor of philosophy as his best student, who had free access to him for advice.

Guyot had gone to a German university. Lesquereux's father could no longer support him at the academy. Neuchâtel and Geneva were "hot-beds" for the training and education of private teachers and nursery maids. Every year squads of these were sent in great slow-going omnibuses to Berlin, Vienna, and cities in Russia, and even as far as Persia, where they were installed in houses of people of consideration to teach children French and other accomplishments. One of Guyot's sisters, for instance, was governess to

the German Prince Imperial (*Unser Fritz*). Lesquereux was offered the place of private teacher in the family of the Governor of Tiflis. His friend the professor of mathematics advised him to decline so distant and unknown a post. He did however accept an offer from Eisenach, in Germany, to give lessons, three hours per day, to the children of Herr Eichel, "a tall, very polite, and very fine man, austere in aspect, but speaking French still more fluently than his wife, and still more interested to hear me speak about all that he thought could be of interest to me." He describes his pupils as "three fine young boys, apparently very intelligent, and already speaking some French, which they had learned from their nursery maid; the youngest ten years old." He was installed in a neighboring house, and boarded at the stage tavern.

His story of the life at Eisenach is delightful reading. He was treated with the utmost kindness and consideration, and had permission to use all the rest of his time in giving private lessons for his own advantage. He was immediately introduced as "the new French teacher" to the best people of the place: "State councillors, generals, majors, directors of mines, inspectors of forests, government employés with long German names, and all their wives, young ladies, &c. The Baron von Gersdorf spoke French very finely indeed, and was an enthusiastic lover of that language, and later became an intimate friend." To most of these people he gave instruction. Eisenach was the second town of the Grand Duchy of Weimar, and its aristocracy was on the same footing as that of the capital. "Those whose French language was elegant and of good pronunciation had chances to be in favor at court. For all these people of high society, therefore, a teacher of the French language was a valuable acquisition. There was one there already, but he had made a bad beginning—coming without introduction and becoming intimate with common people, himself of common type." But all was not *couleur de rose* with him. He gives an amusing account of the trouble he had with the high ladies of the place, who did not quite accept him as authority on mooted points of style and grammar. He wrote to his friend, the professor of philosophy, to send him books, and worked hard over the two great volumes of Cyran Duriner's "grammar of grammars," as he calls it, and made out of it a grammar of his own. At one time he had six classes of young ladies and two or three of gentlemen. A few months later he was called to give a course of lectures on the French language at the

town college. His days were full of work. His evenings were free. He was made an honorary member of a club, took part in dancing parties, and frequently spent his evenings at the Von Gersdorfs. On Saturdays and Sundays the Baron was his companion in visits to the Wartzburg or on tours of exploration through the Türingenwald.

His future father-in-law General von Wolffskeel von Reichenberg now steps upon the scene, as a short bent man, looking like an old farmer clothed in military garments, sad of figure, speaking little and rarely, but of most benevolent address, the commandant of Eisenach, with one company of soldiers in his barracks; an old soldier who had followed Napoleon's Saxon contingent to Russia, been wounded many times, now honored and beloved by all; with three boys in college destined for the army, and two girls, 16 and 10 years old, to whom Lesquereux gave two hours of French instruction in each week. He describes the lively and friendly mother, from whose frequent and garrulous visits to the school room he learned that a third and older daughter was with her uncle, Baron von Fritsch, one of the Grand Duke's ministers at Weimar and a colleague of Goethe.

This young lady had been remarkably well educated, was beloved by everybody, and was one of Goethe's favorites, to whom he never failed to make a birth-day present. Eighteen months after Lesquereux's appearance at Eisenach she returned to her home. They fell in love with each other, and were in due time married. This is no occasion for the recital of a romance, amusing as my learned audience would find it, told with the smouldering youthful enthusiasm of an octogenarian, and with the delicate wit and humor of a refined and cultivated heart; nor will I extract anything from his reflections on the woman life of Germany, nor any of the merry episodes of the wedding. Some day I will find occasion to print it all, and you can enjoy it then in the *ipsissimis verbis* of the dear old botanist himself.

Late in the spring of 1829 he returned to Fleurier—"a long, tedious, and tiring journey of ten days"—on foot, through the Black Forest and over the Jura mountains. He describes his approach, his shouts from afar, his mother's welcome, the grandmother's, the children's, the father's, the workmens' at the forge. "If there had been a fatted calf it would have been killed that day." A week later he learned of a vacant teachership at Le Lôcle, a village of

6,000 inhabitants, 18 miles from Fleurier, on the high plateau. After less than one month the Board of Education acknowledged that the school had become quite orderly; that pupils and parents were satisfied, and that the post was his if he chose to accept it on a salary of 60 louis d'or ($300) per annum. He hesitated. He could not marry on that. La Chaud de Fonds, eight miles further, had a college, and there would soon be a vacancy with a salary of 72 louis d'or. He had scarcely three months to prepare for a severe examination which would last a week. He was one of twenty-one candidates. At the close three only remained. Lesquereux won the prize, "but with a close shave." His early history, his life in Eisenach, his projected marriage with one of the Well-born, interested the people. He taught his pupils as if they were his own children. Once a week he took the school into the open and gave it object-lessons in natural history. "I knew a little botany and a little geology, too," he writes. "I had read much and liked to tell stories." "We always came back in the evening loaded with plenty of things—plants, flowers, stones, &c., good, of course, to throw away, but leaving after them a fine remembrance of nature and scientific enjoyment for the future. These summer days in the valleys of the high Jura have a charm which cannot be understood by people who live in a more favorable climate, and they are therefore enjoyed with keen delight by the inhabitants." In contrast, he adds a terrible story of his sufferings in one of the winter storms between Chaux de Fonds and Lôcle.

He describes his life at Chaux de Fonds. The first of July he took the diligence for Eisenach. "Such meetings and such joys repay the anguish of years of absence. Why cannot we let the water of happiness ooze drop by drop to refresh our heavy hearts, restore courage, and cheer us by new hope when we have to traverse the barren, desolate places of our life? Why? We *may*. The means are with us: Remembrance." This is the widowed old man's cry at the end of one of his letters.

He was married on the 30th of July, and the couple returned to Chaux de Fonds in one of the omnibuses already described (being shamefully plundered en route at the Darmstadt custom-house), and set up housekeeping in one ill-furnished room. "We had a place for fire, but no regular kitchen. I cooked our breakfast and supper; we got dinner from a restaurant; and so we began." The young wife found her lonely life very hard, and was often in tears before

her husband returned from his college duties. They soon moved into a separate house, and the two following years passed without trouble. The upright piano arrived, and the first baby in the following May. The husband taught six hours a day in the college, taught private pupils besides, and spent many of his nights without sleep, nursing both the child and the mother. His income never surpassed $500 a year. In Switzerland rent is high and hospitality costly. No call of a friend is received without offering food and drink to the visitor. The second year one of his wife's sisters came to live with them and complete her French education, which made their circumstances still more straitened. The young mother began to give music lessons; but by and by they had to part with all the objects of value which she had brought with her from Germany to meet the balance against them as each semi-yearly settlement day came round. The second child came with the third year, and was, according to the custom of the country, subjected to the *maillot*—that is, tightly swathed from head to foot. "Nobody could admit that a child could thrive, or even live a few days, without that implement of torture." A hard fight with the grandmother, supported by all the women, resulted however in setting the baby free, according to the new maxims of Dr. Ufland's book on the first physical education of children. "The excellent health and robust growth of my children," writes the old man, "have reformed in a great measure the old methods, which, like the patois and other things of the good old times, were still predominant in the Jura mountains; for we were at Fleurier, at La Chaux de Fonds, and even at Lôcle, a kind of authority. I was consulted as much as if I were the pastor of the village; and, if not consulted, at least our mode of living was considered and adopted by many."

Now came bad times. His mother had become deaf from a sickness commencing as a common cold. He himself took a similar cold and for a time lost his hearing, followed by ulcers in the inner canal of the ears, from which he suffered terribly, without abandoning his college duties; these were cured the following summer at the hot baths of Larey, in the Valais; but his hearing became more defective and began to interfere with his class teaching. He ceased to hear recitations. He prepared courses of study, according to which he lectured, demanding of his pupils written notes, which he corrected afterwards at leisure; but this proved unsatisfactory to both pupils and parents. After correspondence with Dr. Itard, the

author of a book on diseases of the ear, he went to Paris and submitted to treatment. "The celebrated doctor," he goes on to say, "treated me shamefully. Demanding payment before making an examination of my case, fearing, he said, that I might leave Paris without paying his price, which was very high, he performed a first operation by liquid injections so strong as to produce an inflammation of the brain, and then refused to come to see me, saying that that was not his specialty, and that I must have another doctor." He was nursed by a sister of his father living in Paris; and when sufficiently recovered, having become almost totally deaf, he returned home "to begin a new career and try some kind of work for the support of his family." He had long contemplated this necessity, but he "could see no way out of the deep slough of despond which seemed about to engulf him." He could really do nothing with the scientific materials procured by his education. His wife had her music pupils, and he some private pupils, but that was little to the purpose. By the advice of a friend, a *guillocheur* (or watch-turning engineer) he learned the art. There were many *guillocheurs* at La Chaux who could earn far more than was paid to the principal of a school. The engine, however, cost $500. The wife's piano was sacrificed and its place in the room taken by a "turning engine." Instead of going out of the house eight hours a day to teach, he now worked with his wife at home, without responsibilities to pupils or parents, and was well satisfied with the change. But he had to work hard for very little profit, and for the first year was "a poor, slow, unskilled workman." Although he had plenty of friends, the watch-case makers could not accept poor work for the same price as good work. And when spring came he "felt, like the birds at that season, the need of wandering out after flowers for his herbarium, and rambling in the woods, after being a prisoner in a room for months." Poverty drove them from their commodious home into a cheaper quarter of the village. In two small rooms and a little kitchen they lived comfortably enough when work was plenty; but the country custom of paying for work only twice a year was sometimes distressing; and although he worked from 6 a. m. to 10 p. m., and sometimes even later into the night, he could only earn one dollar a day; and many times he had no work at all to do. I refrain from giving some touching and charmingly told stories in this canto of the idyl of his life, and omit also many interesting details about his employment which spread a color of reality over the

romance. His wife after a while found a seat by her husband's work-bench, and during the last years of the sojourn at La Chaux her work was quite as valuable and remunerative as his own. But bending over the machine was gradually undermining his health, and his nerves were affected by the tremor of the machine. "Good workmen do not care about that," he writes. They earned enough to spend much of their time drinking wine and playing cards at the cabarets; but he could only spend his little spare time in fatiguing rambles in the woods. At last his marasmus got the better of him; he could no longer work; he could not walk the length of his room. He left his wife desperately, went to Fleurier, was nursed by his mother like a new-born child, and after ten days could walk for an hour in the meadow behind his father's house. Then his father offered to receive his family, and install himself as one of his own apprentices.

He begins his next letter to me with the sentence: "Still a new career to begin, and that one degree lower than any of the former ones; for I was now not even a day laborer." He then describes the hours of work, the way watch-springs were made, examined, packed, and marketed, and the part he took in the manufacture.

In spite of all this he was a man of science. "When I had not to help my father," he says, "I worked most of the time in my kitchen, being there alone or receiving visitors. How many friends, even men of celebrity, have remained sitting near me while I was coloring my springs, conversing quite as pleasantly as if we had been in a parlor. Dark and dirty as was this kitchen, I passed in it most of my time for years; never alone, for I had always something to think of. The work was merely mechanical, and the brain was in full activity without hindrance. Books of mine were written in that kitchen."

The first year at Fleurier was difficult and sad. They felt like poor strangers and beggars; and his nobly born German wife resented his position as a manservant more than he himself, a free-born Swiss, the son of an artisan, could do. In the fall of 1837 he gladly agreed that she and her two boys should visit her parents in Eisenach. Lesquereux was alone for a whole year. Their third child was born in Eisenach. When she returned with her three children, her youngest brother, and the sister who had formerly been with them at Chaux de Fonds, all was much changed. His apprenticeship was ended; he was a journeyman; and by and by

his father put into his hands the care and the management of the business. Accounts, correspondence, purchase of materials, sale of products were now his affairs. He placed his family in a small house and gave them as many comforts as his own parents enjoyed. For himself his deafness, if nothing more, cut him off from association with the workmen of the village. He spent no money at the club—at the tavern. He was a man of science, a botanist.

Now he began to take up again his botanical studies, and especially that of the mosses. He bought a microscope for $5, "a very poor instrument, of course," and spent his evenings and portions of the night with it and a student's lamp. In this occupation he was joined by an enthusiastic naturalist, the old physician who had patched up his little body after the fall from the mountain top. With patients distributed in villages and on farms over an area with a radius of a dozen miles, this old doctor, who never owned a horse, had but little time to ride his hobby, and no one to help him or direct his studies; nor had he any special branch of natural history to prefer. Now, he made Lesquereux his companion; invited him to dine with him and his daughter frequently, or to coffee after dinner. The daughter was lame, nearly paralyzed by rheumatism, and loved botany. Lesquereux on Sundays gathered mountain flowers for her admiration and study, some of them rare. Conversation with father and daughter was easy enough, for at La Chaux de Fonds he had learned to read the movement-meaning of the lips and "rarely missed a word of conversation when the language was slowly pronounced."

He had another friend, a rich botanical amateur, with fine and peculiar flowers in a large garden, for the care of which he kept a gardener; but he never allowed a flower to be cut. Once he gave his wife a birthday rose and confessed that he never ceased to regret the act. Lesquereux, who had no spare time to study in the garden, got little good from it; but no matter. Did he not live in Fleurier, the flowery village? All around it was a splendid vegetation, and the most beautiful and rarest flowers abounded. The highest peak of the Jura, the Chasseron, 6,600 feet above tide, was quite near, and overlooked the Val de Travers. On its summit the Alpine flora begins to appear. Gentians, Ranunculas, Anemones cover the top in such abundance that in the beginning of July it looks like a real carpet of flowers. The climb from the village was only two hours, and it was his favorite excursion—at first alone, then with his boys

when they were large enough, and then with European botanists on a visit to him. The view of Switzerland with its four large lakes, its towns and villages, meadows and vineyards, is superb. The whole chain of snowy Alps stretches across the background of the picture. In after years, when the *heimweh* attacked him at Columbus, it was ever that prospect from the top of Chasseron that "floated for days and nights before his eyes, preventing sleep, thought, hunger, and calling him with an irresistible longing. Then I should have died," he adds, "but I went to the mountains of North Carolina and was cured. When I came in view of the Black Mountains, which are so like the Jura, I wept like a child, and the distressing anxiety passed away."

At this time his "very modest study of mosses" procured him the acquaintance of Schimper and other celebrated botanists of France. There was a poor boy of Fleurier who settled in Mühlhausen and became the wealthy merchant, M. Vaucheron, whose grounds were turned into a superb flower garden. Every year he visited Fleurier to collect, under Lesquereux's guidance, Alpine flowers for this garden. He and Schimper were great friends. Schimper, like Agassiz, or rather like all true naturalists, was poor, and never thought of procuring money to pay for his publications. When hard pressed, Vaucheron many times saw him through his troubles. Lesquereux received from him a present of the first numbers of Schimper's Bryologia. The next summer he brought Schimper to Lesquereux's workshop kitchen; looked over and corrected the specific names of Lesquereux's small collection of mosses, and gave him plenty of specimens of species which he had not. Thus continuing his microscopic researches in the night, sometimes during entire nights, Lesquereux soon became an authority for mosses; not a celebrity in science, but well-known for the fine specimens of rare species which he had collected and which he was prepared to exchange with correspondents. All these became good friends: Mougiet, Desmazieu, Lenormand, Scherer, Godet, Muhlenbeck, and others, who in successive years visited Fleurier, each spending one or two weeks in exploring the Jura mountains, as often as possible under his guidance. He could entertain but one himself; the rest found lodging at Mühlhausen, in Vaucheron's great mansion, as guests of the rich man with a very large heart."

Now, he says, began for Lesquereux a renovated existence, or rather, now he was to go up a new step of the ladder. Now began

his more earnest and fruitful study of those peat-bogs which extend so widely over the floors of the higher valleys of the Jura. The basin-like surface of the plateau on which is the village of Les Ponts, and on the southern edge of which is Desor's farm-house of Combe Varin, has a continuous peat bog twelve miles long. The parallel high plateau basins of Lôcle and Chaux de Fonds, La Brevine, and La Chaux have still more extensive stretches of peat, from 4 to 50 feet deep. There is also a peat-bog in the Val de Travers, opposite the great spring of Noiraigue, and smaller ones between Motiers and Couret. Others lie at Les Verriers and Wraconne, towards the French border. These peat-bogs had an irresistible fascination for the bryologist of Fleurier, because on them he found the most beautiful species of mosses, and in great profusion, and because they administered to his natural passion for solitude. Even in their most dangerous places, which no other man or animal dared to visit, he felt at home among the now partly forgotten things of his youth. From Fleurier a pleasant climb and stroll of two hours would take him through the bogs of Les Sagnettes and La Brevine, bordering the lac d'Etailliers. A climb from Noiraigue took him to the bogs of Les Ponts, Lôcle, and La Chaux de Fonds. If he had a whole day at his disposal he would walk to Neuchâtel and search the great level stretches of peat between the lakes of Neuchâtel, Bienne, and Morat. "What a splendid laboratory!" he exclaims at the beginning of the letter that opens this new chapter of his life. "What an immense amount of materials to use for study!"

I am at a loss to know how to follow his narrative. He describes the character and habits of the peat, in order to show why its study became so engrossing. The beautiful mosses which he had gathered from its surface had nothing in common with the bog on which they grew. The Sphagnum which made the bog was not a true moss at all. He longed to discover what it really was, and what was its function in the economy of nature. While pursuing his investigations the work-people of the Jura had become alarmed at the scarcity of fuel. The charcoal-burners were destroying the forests for the benefit of the French iron-works. Peat served the purposes of the villagers who lived along the borders of the bogs, but it was not acceptable to the Swiss who lived around the great lakes. Some clamored for the destruction of the bogs as useless obstacles to agriculture. Some pronounced them nests of malarious fevers, especially

the typhoid, so prevalent at La Chaux de Fonds. Some asserted that the evening fogs which covered the stretches of peat caused the spring frosts which killed potatoes and the few other vegetables cultivated in the high valleys. So great did the excitement rise that the Prussian Government offered a prize of twelve gold ducats, or a medal of that value, for the best memoir on the peat. Questions were formulated to which satisfactory answers must be given. The first question was: "What is peat?" The second: "How is it formed?" Others were: "Could peat-bogs grow, as some persons asserted?" "Is it true that once dug out from the bogs the matter would grow again in the open ditches?" "What influence have the bogs upon the atmosphere?" "Was peat a necessary fuel, or could wood be economically substituted for it?"

Agassiz had just then come to Neuchâtel and formed the Society of Natural History, of which Lesquereux had been made a member. Agassiz had married the sister of the celebrated German naturalist, Alexander Braun, and consequently took a lively interest in these botanical inquiries. He sent for Lesquereux, who found Agassiz hard at work dictating to Desor, and surrounded by his assistants, Vogt, Nicolet, Sornel, and his lithographers. The visit led to nothing but the acquaintance. Subsequent visits were few and short. Time was precious for both. He did not even speak to Agassiz of his intention to write a memoir. Indeed, he could never remember how the intention arose and took shape. He knew all the difficulties of the subject, all the time it would cost. He had no time to spare. His father's business could ill spare him for a single day. Many books must be read. He had never written anything as yet but "a poor catalogue of the mosses of Switzerland, which Schimper had helped him to prepare." "But the bogs called me and I went to them. I bought some old German books on peat and borrowed others. I procured some instruments, especially thermometers, and invented a sort of auger with which I could study the peat compound from the surface down to a depth of 12 or 14 feet, and the temperature at various depths." His father indulged him with extra leisure for the summer, so as to compete for the medal. His researches became more careful and precise. He established the mean temperature of the valleys by the depth at which his thermometers remained unchanged in the bog. He established thermometers at various stations and went from one to the other to record the data. He passed nights at a peat-digger's hut

in the middle of the Marais de la Brevine, observing the temperature of the air and bog outside, entering the hut now and then to warm himself. Going off at noon on Saturday morning, he brought back home, at noon on Monday, heaps of Sphagna to experiment upon as to their force and rate of absorption; either from below by their long filiform stems; or from above by their surface; weighing them; exposing them to different conditions of the air, in the cellar, in the garret, in sunshine, in bowls and plates on the ground, on the roof, and noting the effects of fogs; comparing their aspiration, their capacity for retaining moisture, &c.

The memoir was written in his kitchen workshop. It was sent to the council at Neuchâtel. A committee was appointed to examine it. The prize was awarded it. His joy was inexpressible. His parents were more happy than himself; "for, like most of the people of the village, who called me *the fool of the peat-bogs*, they could imagine nothing worth seeing or saying on that subject, nor that a son of theirs could know more about it than other people had done. 'Now,' said my father, 'do what you like henceforth; think good things for yourself and others; you shall always remain my partner, even if you should not work any more at watch-springs.' My dear wife only said, 'I knew you would do it.'"

Of the committee Agassiz was one; M. Coulon, a rich man and excellent naturalist, was another. One of the competitors for the medal was Nicolet, the geologist, who had publicly advocated the destruction of the peat-bogs, and published a pamphlet which adduced no facts. He positively denied Lesquereux's explanation of the peat formation, and the possibility of its spontaneous reproduction. The State council felt it a duty, therefore, to appoint a special committee of seven members to examine all the bogs. Agassiz, Nicolet, and Lesquereux were placed on this committee, which spent ten days in excursions and discussions.

Lesquereux writes: "This tour of exploration attracted me toward Agassiz far more powerfully than I can express; for he was a friend of Nicolet and somewhat inclined to admit his ideas; but all the time we were together he continued, like a true man of science, to examine every bit of evidence, questioning, wanting to know more of one thing or another, never offering contradiction, going on as a simple ignorant student, without any more pretense to superiority than a child. When the tour of exploration was finished the question was settled without any contesting voice. We

had a great dinner at one of the State councilmen's, and then Agassiz said to me: 'You have been found right in every one of your assertions; it is the vote we shall report to the State.'"

The Prussian government then requested Lesquereux to prepare a short manual for the use of all the Cantonal schools, to contain the outlines of the results of his first researches, and also clear, particular directions for the exploitation of the bogs of the high valleys and bogs of the low land; the two being of different nature, and therefore named by Lesquereux *emerged* and *immersed* peat-bogs; the latter, lying around the great lakes and at the mouths of the rivers, being formed by *cattail flags, pond weeds, water plantains, bog rushes, sedges, reeds,* &c., all of them plants rooting at the bottom of permanent stagnant water basins, projecting their stems and leaves above water in summer, and decaying and sinking in successive layers to the bottom in the autumn.

For this school book he was paid $500 and a commission to pursue his researches. This encouraged him to explore the peat-bogs of Europe, his father assenting to his absence for two months. The council also approved of his design and promised that the Prussian Government should pay his expenses and grant him facilities, letters patent to the local authorities of the Kingdom and letters recommending him to men of science in other countries.

In the beginning of July, 1845, he began at Mühlhausen, where his friend Vaucheron lived, and traversed the Vosges mountains to Strassburg, where Schimper was expecting him, to give him letters and show him the fossil plants in the museum of which he was director. He went from district to district in post-stages, but studied each district on foot. He found the bogs of the Vosges, like those of the Jura, composed of *Sphagna*, getting their moisture from the air and filling the highest vales to a level, but descending the valleys to the lowlands. He describes a striking peculiarity, however, viz. the growth of tufts of Sphagnum along the rapid streams which never made bogs. In after years he noticed the same peculiar growth of Sphagna in the Raccoon mountains of America, where there are no bogs, the summer heat drying the streams so that the mosses have no continuous growth, "but begin again each year from seeds or a kind of root (*prothallium*) which survives on the dry surface."

In the Vosges he encountered the celebrated botanist Mougeot, whom he had twice guided to the top of the Chasseron. Now,

Mougeot returned the favor by driving him to the Höhnecke, the highest summit of the Vosges, covered with fog and drenched in rain.

The impression produced on Lesquereux's mind by the greatest European collection of fossil plants at that time, in the Museum of Strassburg, was never effaced: He says: "I felt as if I had been transported into another world, and could scarcely leave the large room where the specimens were exposed. I said to Schimper, how happy a man should be with such an admirable vegetation to study! I did not dare to ask him for even a small piece of one specimen, although I should have prized the smallest as a treasure. Was it a remembrance of some former life, or a pre-vision of what was to come to me in the hereafter?"

From Strassburg to Maintz by steamboat, to Frankfort by rail, to Wurtzburg by steamboat on the Main, he reached Kissingen, from which the black basaltic knobs of the Röhn mountains rise, with the Kreutzburg in their midst, holding aloft the hundred-foot-high iron cross of the Benedictine abbey. At Bischoffsheim he studied the lignite beds beneath the basalt, mined for fuel, fossil wood still with its normal aspect and easily cut with an axe. He describes the black underclay, similar to that of the floor of a peat-bog and holding fresh-water shells; but where the underclay failed the lignite, resting on basalt boulders, was crystalline and hard as coal. "Here then," he says, "I found a sort of transition from peat or wood to coal, and in my letters discussed the proof that coal was merely woody matter preserved against decomposition by certain circumstances, especially by the obstruction of oxygen, or of atmospheric influences. See my Explorations dans le Nord, 1846, page 15."

By the way of the coal mines of Ilmenau, near Weimar, of Permian age, he reached the lignite mines at Lützen, near Leipsig, called by the people *peat* diggings, and having the elements of very old peat-bogs; but the material, black and soft in some places, is in others hard and brittle, and should be called *Lignite.* At the bottom is a deposit of pine-tree trunks, black as coal, soft as clay, and mined with the shovel. The upper part of the mass has evidently been a peat-bog filling a deserted channel of the Saale. Here he saw that the flattening of tree trunks in coal beds has not necessarily been due to the enormous pressure of superincumbent deposits, but that the action of water so completely softens the

woody tissue of all plants that the small constant pressure of a few feet of boggy matter suffices to reduce the cylinder to a plate. In peat-bogs now growing the trees are mostly still hard and natural; in the oldest bogs somewhat blackened; but piles of old Roman bridges and roads across bogs in Switzerland have been found completely black and somewhat soft at the outside. The process of blackening, softening, and flattening is a very long one, and Lesquereux found opportunities to study all its stages. For instance, at Mächlenstadt, near Ilmenau, he saw the wood at the top of the deposit black but still hard; at the bottom, layers of pine-cones with perfectly preserved forms with all their scales in place, but transformed into hard coal and considerably flattened. At Lützen he found pieces of hard brittle coal at the bottom of the trenches. In his Letters of Explorations in the North, published in the Revue Suisse in 1846, he gives a mature theory of the origin of coal, which has been adopted by all geologists who have studied coal measures, except a few who have been overinfluenced by another very different and exceptional set of local phenomena, like that at Commentruy, in France, and elsewhere.

Before leaving the Röhn mountains he examined the "Red bog" and the "Devil's bog," of which incredible stories were told, not merely by the superstitious peasantry, but by authors of some reputation; but he found them precisely like those of the high Jura. I cannot take up your time with this amusing and instructive episode, a part of which has, however, a high scientific interest, as it relates to the remarkable dwarf pine trees (*Pinus pumillis*) which enrich the peat bog with their dripping pitch, and to which he assigned conjecturally the production of the Baltic amber and the pseudo-amber of the lignite of the Laramie group in America.

From Lützen he went to Berlin to get his letters patent from the Royal authorities, who received him graciously. He was cordially entertained by his wife's uncle, the Baron Manderode; but saw neither Humboldt, who was in Paris, nor other scientific celebrities, who were off on their summer vacations. The chemist Mitscherlich, however, was very friendly, and gave him much information about the peat-bogs. The great botanist Link, director of the Botanical Garden, was too old and busy to converse much with a deaf man, but gave him a card of entrance and order for specimens.

A few days afterwards his uncle took him in his carriage to

Neustadt, at the base of the Hartz mountains. "That was really a charming pleasure party for me," he writes, "a day of real enjoyment." Thence he went on foot to Clausthall and had the curiosity to descend the copper mines. "I had little profit of that unscientific prank," is his only remark. But his journey through the Hartz to the top of the Brocken filled him with enthusiasm. Peat-bogs cover its base and ascend even on the most rapid slopes to quite near the summit. The sheet of granite boulders is covered with a treacherous sheet of moss. "There is no step where the foot can be placed with security."

Leaving the Hartz he passed through Braunschweig and studied the bogs of the Geest of Luneburg, the great plain which extends to the sea. He describes the wretchedness of the settlers, to whom the government had given small pieces of the bog to cultivate. At the village of Gifhorn they could give him nothing but black bread and milk and bitter beer, as black as ink. Here he first saw the peculiar peat of the shores of the North Sea and Baltic, a complex mixture of emerged and immersed bogs, like those which he afterwards examined at the mouths of the Elbe and Weser. He describes how these revealed the stratification of the coal measures—the superposition of sandstone on coal—by the breaking of wind dunes and the inundations of ice-choked rivers and invasions of the sea during great storms. These phenomena he studied in his course eastward, by way of Stettin, Schwinmund, and Greisewald. He compares these wide stretches of swamps to those of New Jersey, Virginia, and the Carolinas, describing them in detail. He especially desired to know whether some German observers were right or wrong who ascribed a notable part of the phenomena to the direct action of the sea, the heaping up of *fucus*, &c. After much trouble he obtained abundant evidence that there was no ground whatever for this opinion. He instances a subsequent experience in Holland where a village was reported to be using peat made of marine plants; but after a long detour he found that the people were wholly dependent on a scrubby wood and fallen sticks.

From Hamburg he went to Schevering, Wismar, Rostock, Strahlsund; went over to Scania, and through Istadt and Malnive, reached Lund, where Neilson showed him the great Swedish Museum. He then returned to Denmark and examined its peat-bogs at and beneath the surface, holding stone, iron, copper, silver and gold, tools and ornaments, bones of animals, and entire skeletons of man.

Passing through Holland, his time and purse were both exhausted, and he reached his home at Fleurier long after the time appointed. Here he turned his diary into a series of letters for the Swiss Review of Geneva; and then the government of Neuchâtel bought a large tract of the peat land of Les Ponts, facing the Combe Varin, and made him superintendent of its exploitation. He was also appointed member of the commission for lowering the level of Lac Neuchâtel and draining the great swamp country between it and the Lac de Bienne, the Lac de Morat, &c. He worked hard, but had yet no definitive position beyond a promise of one.

While a committee of the Cantons interested in the draining of the lakes was sitting at Berne, a revolution broke out at Neuchâtel; the committee dispersed, Lesquereux went home to Fleurier. The Canton was severed from Prussia. The royal endowments to the Academy, the Council, &c., were lost, and all seemed to be at an end. What the new democratic order of things would produce none could predict. Agassiz had emigrated to America the year before; Guyot, Matile, and Desor soon followed him. The business at Fleurier, as everywhere else in the Canton, became too poor to support two families. His father agreed with Lesquereux that America was a more hopeful home for the children. His mother only objected. He does not even tell what port he sailed from. He ends his story with these touching words: "I came to that promised land a poor emigrant family, having an abominable voyage of sixty days in the entrepont (steerage) of a sailship, together with 300 companions of misery, the most terrible experiences of my life."

I am ignorant of the exact facts of his history for the next three years. He did not obtain the scientific work in Boston which he expected. He settled his family in Columbus, Ohio, where two of his sons established a business in the sale of watches, which still flourishes. The third son, I understand, died at Nashville, Tennessee. His daughter married a farmer near Columbus, and her children were his comfort in old age, after the death of his wife.

In 1851, Prof. H. D. Rogers employed Lesquereux to study the coal plants of Pennsylvania, and embodied his report on them with descriptions and figures of species in the second volume of the Geology of Pennsylvania, published in 1858. This memoir, entitled "Fossil Plants of the Coal Strata of Pennsylvania," occupies fifty quarto pages, and its quarto plates number twenty. Its one hundred and ten new species were established on specimens mostly

collected by himself, a few being based on specimens in the fine private collections of W. Clarkson, at Carbondale, in the anthracite, and of the Rev. Mr. Moore, at Greensburg, in the bitu minous coal-fields. As many more known species were found in Pennsylvania. One hundred were European, and fifty others closely allied to European species.

At this time (1851) I became acquainted with Lesquereux, as he sat day after day on the anthracite coal-tips turning over each piece of waste slate in search of plant impressions. His patient zeal was a wonder to my impatient and restless nature. The broiling sunshine, the chilly wind, the soaking rain were alike disregarded by him. The evening brought him no repose, for his bag of specimens was exhibited, re-examined, discussed, and sometimes figured then. He was stone deaf, but he read the motions of our lips, and replied in a curious kind of English which he had never heard. Once he praised his wife to mine in these words, "A goot vife is the more better present as God can never geefe to some *body*," strongly accenting the last word, and his face shining with a light of love which never died.* A homelier, a more beautiful face I never saw. The homeliness was of the flesh ; the beauty was the varying expressions of a perfectly lovable spirit. He was a little man with inexhaustible powers of life. His eyes were limpid ; his smile heavenly ; his gratitude for the smallest favors from men and his childlike confidence in the care of God unbounded. Everybody trusted and loved him.

*I have been present when Lesquereux talked with three persons alternately in French, German, and English by watching their lips. The interview would begin by each one saying what language he intended to use. He learned the English language after he became deaf; consequently his pronunciation of it was curiously artificial and original. I leave it to physiologists to explain how it happened that in the course of forty years the pronunciation of this deaf man gradually purified itself, so that in the end it did not differ greatly, except in certain words and only few of them, from that of the people about him. It is a remarkable fact well worth investigation. One of his friends, a member of this Academy, has just informed me that Lesquereux once told him that after Agassiz had resided many years in the United States, speaking English mostly, of course, his pronunciation of French was changed so that Lesquereux found some difficulty in reading his lips. The effect of English upon the muscular action of the mouth gradually modified the method of producing French sounds. The change was too subtle to be perceptible by those who only heard the words, but could be detected by the keen eye of a man stone deaf.

Of course his services as a palæobotanist were from that time until his death in great demand. David Dale Owen employed him in the State surveys of Kentucky and Arkansas; Coxe, in Indiana; Worthen, in Illinois; Hayden, in the surveys of the Territories. Whitney submitted the California plants to his inspection. Innumerable private specimens were sent to him for identification. His cabinet of gifts and duplicates grew large and was in late years bought by the museum in Cambridge, Mass. All others were labeled and returned to their owners.

His "Coal Plants of Pennsylvania," already mentioned, was published in 1858, the same year in which he described species in the Boston Journal of Natural History. Those of Kentucky and Arkansas were published in Owen's Reports of 1860. The Tertiary plants of Mississippi appeared in Hilgard's Report of 1863. The coal plants of Illinois were described and figured in Worthen's Second Report of 1866 and Fourth Report of 1870. His Cretaceous Flora of the Dakota Group was published by Dr. Hayden in 1874. His Pliocene Flora of the Auriferous Gravel Deposits of the Sierra Nevada appeared in 1875. The coal plants of Indiana may be found in the Seventh and Thirteenth Reports of the Geological Survey of that State in 1876 and 1884. The coal plants of Alabama appeared in the State Geologist's Report of 1876. Descriptions of new species appeared in the Transactions and Proceedings of the American Philosophical Society in 1877 and 1878. The same year (1878) Hayden published Lesquereux's monograph "Tertiary Flora," and in 1883 another monograph, "The Cretaceous and Tertiary Flora."

All this represents but a portion of his work in America. Soon after settling in Columbus he became acquainted with a wealthy gentleman of that city, Mr. W. S. Sullivant, a zealous amateur bryologist, who eagerly seized on the fine opportunity to employ the most accomplished bryologist of Europe on the preparation of his memoirs of new species for publication. In the end this brought Lesquereux into friendship with the eminent bryologist of Philadelphia, Mr. Thomas P. James, who afterwards and until his death resided in Cambridge, Mass., and published with Lesquereux a Manual of the Mosses of America. Another of his close friends was Thomas C. Porter, professor of botany at Lafayette College, in Easton, Pa.

In 1861 he was elected a member of the American Philosophical Society, and in 1864, the year after its constitution by the United

States Government, a member of the National Academy of Science, whose meetings, however, he never attended on account of his deafness. He was a member of nearly a hundred other learned societies in Europe and America.

I have said that the works above referred to constituted but a part of his contribution to science. In fact, they may be considered as the American part of the preparation of the great palæobotanist for the crowning accomplishment of his life, a monograph on the Coal Flora of the United States. The year following the organization of the Second Geological Survey of Pennsylvania in 1874, Lesquereux was commissioned to prepare such a monograph. In 1877 he communicated to the proceedings of the American Philosophical Society in Philadelphia (Vol. XVI, *pp.* 397–416) a statement of the plan followed in his researches for its preparation, the available resources of information, the materials for it, when and where collected, the point in its progress then reached, and the more interesting results that would be exposed and illustrated by it.

The Coal Flora of Pennsylvania and the United States was published, as Report of Progress P, in 1880, volumes 1 and 2 bound in one, pp. 694, 8vo, with an atlas volume of 85 double 8vo plates of figures. Volume 3, continuing the paging up to 976, with tables and indexes, and additional double 8vo plates up to 111, appeared in 1884.

From this time until his death, in 1889, the old man scarcely ever left his home; was often ill; grew feebler, and found the examination of specimens more and more difficult; but until the spring of 1889 he kept up his correspondence with a few friends and did some work. His closest intimacy now was with Mr. R. D. Lacoe, of Pittston, in the northern anthracite coal-field of Pennsylvania, whose magnificent private collection of coal plants, fossil insects, &c. is so well known. The beautiful story of the fraternal—I should rather say, the parental and filial—relationship of these two amiable men, so made for one another, may some day be told; but I have no right to introduce it into this public address. They made each other protracted visits; letters and specimens passed to and fro between them incessantly. An appendix volume to the Coal Flora was in preparation. About a hundred new species, some of great rarity and beauty, were named and provisionally described; and Mr. Lacoe stands ready to edit the work if the State Survey of Pennsylvania can at any future time get authority to publish it.