



yours
very truly

G. Lindström

Further north, in Glenfalloch, there is a more extensive area of similar brecciated schist, where, however, as far as I remember, no igneous rocks are to be seen.

The researches of Lapworth, Peach, and Horne in the Highlands, of Lamplugh in the Isle of Man, and of others elsewhere, have taught us that solid rocks have been broken up or ground into powder by mechanical violence on a far larger and more extended scale than had been previously dreamed of.

If I am right in my conjecture as to the origin of the breccias mentioned above, they are instances of the same sort of thing.

June 4, 1901.

J. R. DAKYNS.

P.S.—I am reminded by my friend, Mr. C. T. Clough, that the breccias may be due to explosions. They are mentioned by Sir Archibald Geikie in his work on "Ancient British Volcanoes," but I have not the book at hand to refer to.—J. R. D.

OBITUARY.

GUSTAF LINDSTRÖM.

(WITH A PORTRAIT, PLATE XIII.)

BORN AT WISBY, AUG. 27, 1829.

DIED AT STOCKHOLM, MAY 16, 1901.

How vividly comes to one's mind that little room looking into the courtyard of the Riksmuseum at Stockholm, with its plain deal floor, deal tables and writing-desk, and the rough deal shelves for books covering three of its walls, the only decoration a few portraits (as of Angelin and Darwin), the only sign of comfort an old horse-hair sofa. Here for twenty-five years, day after day, Gustaf Lindström pursued his quiet labours on that wonderful collection stored in the adjoining room, a collection rich chiefly in the fossils of Silurian Gotland amassed by the successive exertions of Hisinger, Angelin, and Lindström himself. At one of the windows in that room, overmuch darkened though it was by the tall houses opposite, one would see G. Liljevall developing some rare fossil or making those exquisite drawings that illustrated Lindström's papers; at another window the attendant boy, usually a Gustaf too, made cardboard trays or sorted out new accessions; while a third window was generally occupied by some foreign palæontologist who had journeyed far to study the famous collection. Many are there of these who to-day mourn Lindström, not merely as a leader gone from among them, but as an ever attentive host, and as a dear friend.

Born among the mediæval ruins of Wisby, in whose cliffs and on whose strand fossils are to be had for the mere taking, the meditative and retiring youth could not fail to have his interest aroused by the relics of the past. He might have been a great archæologist, in fact his academic thesis was on the history of his native island in Queen Christina's reign, and in after years he published two thick volumes on the Middle Ages in Gotland; but the direct incentive to palæontological studies was early furnished. "In 1845," he once wrote, "when I was quite a boy, much wondering at the marvellous things I saw enclosed in the limestone rocks of my native island of Gotland,

Sir Roderick, accompanied by M. de Verneuil, visited the island and ranged its strata, along with the other old 'transition rocks' of Sweden, in his newly-founded realm 'Siluria.' This fact acted upon me as a fresh revelation, and indicated the path upon which to proceed." It was no doubt also Murchison's visit which suggested his enquiry into the elevation of Gotland, the subject of his first paper (1852).

But Lindström, though he continued to the last to study the geological relations of the Gotland rocks, did not become a mere stratigraphical palæontologist. In 1848 he commenced student at Uppsala University and took the opportunity of attending a course of lectures delivered by Lovén in Stockholm. Thus was impressed on him the need to the palæontologist of a thorough understanding of living animals, and so, after taking his doctor's degree in 1854, he served for a time as extraordinary amanuensis at the zoological museum of the University, and published purely zoological papers—on the invertebrate fauna of the Baltic, on the larva of *Peltogaster*, and on the development of *Sertularia*. In 1856 he accepted a post as school-teacher in Wisby, and in 1858 a mastership at the Grammar School in that town. During these years he translated a textbook of zoology by H. Masius, and produced his "Geologiens Grunder," which was an adaptation of the works of Lyell to Swedish students, and contained numerous original illustrations from the geology of Sweden; it speedily ran through two editions, and did much to increase the study of geology in that country.

Now settled in Wisby, Lindström, without dropping his zoological researches, as proved by a paper on the fish of Gotland (1867), devoted more attention to the fossils of the island. He began with the Brachiopoda (1860), but soon turned to the Cœlentera, and in 1865 published the first of that valuable series of papers on the rugose corals which led up to his memoir on the operculate corals of the Palæozoic formations (1883). These papers, while disclosing hitherto unsuspected facts of coral structure, finally solved the problem of the systematic position of the peculiar *Calceola*, previously regarded as an aberrant brachiopod. A remarkable type of madreporarian was fully described by him in 1868 under the name *Calostylis*, and again discussed in his memoir on the Anthozoa perforata of Gotland (1870). He wrote also on the tabulate corals, and was at the same time investigating the deep-sea corals of the Atlantic. To complete the account of his work on the corals, we may mention his papers on Silurian corals from Russia (1882), on *Rhizophyllum* (1884), on *Prisciturben* (1889), on the 'Corallia baltica' of Linnæus (1895), a description of some Silurian corals from Gotland, including the new genera *Nodulipora*, *Holophragma*, and *Dinophyllum*, with re-descriptions of his *Helminthidium*, *Pachypora*, *Polyorophe*, *Actinocystis*, and others (1896), on a *Tetradium* from Beeren Eiland (1899), on the Neocomian *Thecocyathus Nathorsti* from King Charles Land (1900), and his great memoir on the Heliolitidæ (1899).

But before these last-mentioned papers were written occurred the death of the Keeper of the fossil Invertebrata in the State Museum at Stockholm, N. P. Angelin, and the Academy of Sciences appointed

Lindström to the post (1876). One of his first tasks in this new and more favourable position was the completion and publication of the "Fragmenta Silurica" (1880), for which some plates had been prepared by Angelin. There also fell on him the difficult and ungrateful labour, shared with Lovén, of editing Angelin's "Iconographia Crinoideorum." These tasks accomplished, Lindström found time to attack other groups of Gotland fossils. Thus, in 1884 we have from him a beautifully illustrated memoir "On the Silurian Gastropoda and Pteropoda," of importance as indicating the varying nature of the fauna in correspondence with the varying conditions in different parts of the Gotland sea. In 1885 he issued a revision of the trilobites and Merostomata, containing descriptions of many new species, while in the same year he was associated with T. Thorell in a publication that awoke profound interest, namely, the description of a scorpion, *Palæophonus nuncius*, from a bed of Lower Ludlow age at Wisby.¹ This was the oldest air-breathing animal then known, but there have since been described *Proscorpius*, Whitfield, from the Waterlime group of New York, *Palæoblattina*, Brongniart, from the Middle Silurian of Calvados, and *Protocimex*, Moberg, from the Upper Ordovician of Sweden. He then turned his attention to the remains of Cephalopoda preserved in a hard, splintery limestone of Southern Gotland, and requiring the utmost patience for their extraction and elucidation. The result of this was the important memoir on "The Ascoceratidæ and the Lituroidæ," in which he lucidly explained the complicated structure of that extraordinary nautiloid, *Ascoceras*. The year 1895 produced another discovery of the greatest interest, namely, a *Cyathaspis* from beds of Lower Wenlock age at Lau in Gotland; the minute structure of the plates was very fully described by Lindström.

These important memoirs by no means exhausted the activities of Professor Lindström. He visited Gotland every summer and pursued his enquiries into its geology, as many minor papers bear witness. On these wanderings through the island he also collected the materials for his archæological studies. He published a list of the fossils of Gotland, followed by lists of the Cambrian, Ordovician, and Silurian faunas of Sweden. He took an active part in the affairs of the Academy, and occasionally gave popular lectures on subjects of general geological interest. Of recent years, as the burden of age began to press more heavily, he rejuvenated himself (as he expressed it) by visits to Italy, in which both as naturalist and archæologist he took the greatest possible delight. But this did not cure the gradual failure of eyesight that was his greatest trouble, and rather more than two years ago he finally lost the use of one eye. When I saw him last, in 1899, he was dreading the loss of the other, but was still hard at work, and greatly excited over an important discovery just made in the trilobites. Oddly enough, this concerned certain maculæ, believed by him to be vestigial eye-spots, occurring on the hypostome of many genera. This gave rise to the last paper he ever wrote, a wonderfully detailed study of these maculæ and of the

¹ Another Silurian scorpion, referred to Lindström's genus *Palæophonus*, has been discovered by B. N. Peach at Lesmahagow, Lanarkshire.

visual organs of the trilobites in general, with important bearings on the zoological position of those animals (February, 1901).

The scientific work of Gustaf Lindström, though not greatly affecting the more theoretical and philosophical questions of zoology and geology, was marked, as we have seen, by many discoveries of great interest and importance. But the discovery of to-day is the stale news of to-morrow, and it is not by any sensational features of his work that his fame will continue. It will continue and it will increase by reason of the immense care he bestowed on all details, the accurate descriptions, and the exquisite illustrations. He recognized the futility not merely of the ordinary semi-diagrammatic figures but also of the more pretentious photographs, when there was question of such perplexing detail and variation as is presented by the corals. It is only just to say, and Lindström himself always insisted, that in his attempts he received the greatest help from the remarkable artistic talents of Mr. G. Liljevall. His work will live because of the absence of unwarranted speculation, because of its thoroughness, because of its honesty. He had always, in the rich collection at his elbow, and in the appeals of his contemporaries, the temptation to publish much more than he did, but future generations will rejoice that he understood how it was better to do one thing conscientiously than many things superficially.

Lindström indeed was thorough and true-hearted in all relations of life. Though retiring and careless of popular applause, he was more sensitive of the opinion of others than he might have been had he mixed more with the world. It were far from the truth, however, to regard him as a narrow-minded recluse. He interested himself in many subjects outside those of pure science, and one soon perceived the sly and kindly humour that twinkled behind his spectacles. He was ever ready to discuss English literature or politics. Those of other countries too, perhaps; but he had a great affection for England, which he visited last in 1874, and he was always full of reminiscences of Murchison and our ancient heroes of geology. Huxley also he met and was much impressed by, and hoped that a day would yet come when a "Life" would be written that would do justice to "that great and good man." Most of his important works were written in English, while of some he published translations in the *GEOLOGICAL MAGAZINE*. To the workers from all countries who made pilgrimage to Gotland or to Stockholm he was attentive and hospitable, but I have thought that the particular kindness he showed to me at all times, and specially when I first came to Sweden an unknown student, must have been due to my nationality. He was member of the Russian and Prussian Academies of Science, of the Belgian Geological Society and many others, but few honours pleased him more than those received from the Geological Society of London, of which he was elected Foreign Correspondent in 1885, Foreign Member in 1892, and whose Murchison Medal he received in 1895. There are many in this country who now sorrow for his loss, and while all will ever honour him as a great palæontologist, there are not a few who will long remember him with affection as a personal friend.

F. A. BATHER.