

The Students' Association of Natural Science. Upsala.

Geological and Physico-Geographical Division.

Meeting, Januari 28th 1898.

Directors were appointed:

K. VINGE, Secretary.

C. WIMAN, Editor and Treasurer.

C. SÖDERSTRÖM and A. HOLLENDER, Reporters.

Herr C. WIMAN read a paper on Silurian coral-reefs in Gotland. (See Bull. of the Geol. Inst. of Ups. N:o 6).

Hrr MUNTHE and J. G. ANDERSSON were of opinion that the lecturer had perhaps carried his comparison between the Silurian reef-like lime-masses and the recent littoral reefs too far. The fact, they said, that considerable masses of very minutely distributed mechanical silt were to be found in the former, must be regarded as an evidence against their purely littoral character, and, besides, their topographic distribution and limitation seem to differ somewhat from those of the strand-reefs of the present day. As instances of reefs situated in the limits of the present sea may be mentioned: the Lithothamnion-reefs in the Gulf of Naples and in arctic seas, and the Dentalina-reef near the Väder-islands in Bohuslän.

Herr MUNTHE gave a résumé of KEILHACK's work: Die Drumlin-landschaft Norddeutschlands.

Herr HÖGBOM took the occasion to observe that Drumlin-landscapes: have been described long ago by SEDERHOLM as existing in Finland, and that similar formations are met with in many parts of our own country.

J. G. ANDERSSON gave a short account of the radial moraines, found on the Silurian plains of Nerike and Östergötland, and then he proceeded to compare them with typical drumlins. It is a remarkable fact that these radial moraines are found on plains which are bounded either on the north or on the south by distinctly marked stretches of hills running from east to west.

Meeting, Februari 18th 1898.

Herr R. SERNANDER spoke on some subfossil mammiferous animals found in Swedish peat-bogs (See Bull. of the Geol. Inst. of Upsala 1897), illustrating his discourse by numerous remains of mammiferous animals and photographs.

The lecture gave rise to a very lively discussion chiefly concerning the different ways, in which Gotland may be supposed to have got its fauna of quaternary mammalia.

Herr MUNTHE gave it as his opinion that the Ancylus-sea had been covered with ice every winter, and that lots of animals had in this way immigrated to Gotland from the continent. The hedgehog, however, of which animal remains had been found in Gotland, and perhaps even the boar could not have got there in that way. In all probability, Hr Munthe said, the occurrence of these animals in Gotland was to be accounted for by assuming that in postglacial time there had been a land-connexion between the island and the continent. The occurrence of strand-gravel on the sea-bottom between Gotland and the continent, too, seemed to speak in favour of this supposition. In order to establish such a connexion an elevation of 40 metres would be sufficient.

The lecturer said that it was not necessary to embrace the opinion of Herr MUNTHE about the land-connexion just mentioned.

Prof. HÖGBOM thought it very probable that the Ancylus-sea, as Herr MUNTHE had already observed, had been ice-bound in winter. As late as the fourteenth century the Baltic had, in some winters, been covered with ice and during the Ancylus-time a rather severe clima prevailed, far severer than that of the present day. As an instance of animals having been carried far away on drifting ice, he mentioned that a whole herd of rein-deer had once been driven on an ice-float from the coast of Norrland as far as Åland.

As a proof of the long swimming rambles that are sometimes made by certain animals, Herr H. HESSELMAN said that an elk had once been found swimming far away in the Gulf of Bothnia, and Prof. HÖGBOM called attention to the fact that horses, reared in Finland and later sold in West Bothnia, have been known to try to return to their native place by swimming.

Herr HÖGBOM showed a piece of a meteor from Australia, recently acquired by the Geological Institute, and gave an account of its ingredients. The whole meteor had originally weighed 25 kg.

Meeting, March 4th 1898.

Prof. HÖGBOM read a paper on some pegmatite-minerals. (See Bull. 1897, N:o 6.)

Meeting, March 18th 1898.

Herr H. MUNTHE read a paper on a profile from Cleongart on the peninsula of Kintyre, S. W. Scotland. (See Bull. of the Geol. Inst. of Upsala 1897.)

The lecture gave rise to a discussion in which Prof. DE GEER, Prof. CLEVE, Prof. HÖGBOM and the lecturer took part.

Prof. DE GEER read a paper on the glaciers of Spitzbergen, illustrated by scioptic images.

Meeting, April 1st 1898.

Prof. HÖGBOM spoke on the Lake-region east of Ural.

While there are no lakes to be found within the topographic Ural Mountain-range, there is east of this range and south of Katharinenburg a district abounding in lakes. The occurrence of lakes in this region, which owing to them affords a striking likeness to Scandinavia, is the more singular as that part was never exposed to any glaciation.

The lakes have fresh water, but farther towards the east there are steppe-lakes with salt-water. On the border of the fresh water lake district and the steppe district, salt-water lakes and fresh water lakes are mixed promiscuously.

The lecturer thought that the fresh water lakes had originally been steppe-lakes which, owing to the climate becoming moister, had got an outlet and transformed to fresh-water-lakes.

As regards the formation of the basins of the original steppe been lakes, there were no detailed researches as to their depths made, nor did we know whether they were rock-basins or not.

Those, however, which are situated close to Ural, the lecturer said, were, in all probability, to be regarded as rock-basins which, with regard to their genesis, might be designated as deflation-basins.

Meeting, April 15th 1898.

Herr SERNANDER read a paper on supposed postglacial land-subsidences of the western part of Scandinavia.

Our knowledge of the postglacial level changes of Scandinavia is chiefly based on the stratifications in those parts of south Sweden which were affected by the complicate transgressions of the Baltic.

To what extent western Scandinavia had shared in the level changes that have evidently taken place in the eastern parts during the Ancylus- and Litorina-periods was, the lecturer said, doubtful. The lecturer went on to criticize some of the arguments adduced in favour of strand-dislocations of that kind.

According to G. ANDERSSON there must have been a level change at the south west coast of Sweden too, corresponding to the transgression of the Ancylus-lake which, as proved by MUNTHE and the lecturer, had taken place in certain parts of central Sweden. This was proved by an older North-Sea clay found at the bottom of the Walda-Moss, North Halland, containing *Betula odorata*. If there had been only one negative level change previous to the Litorina-subsidence, you would have expected to find a purely glacial flora.

There can be little doubt but that the western part of Sweden was once subject to a special Litorina-subsidence. Herr G. ANDERSSON even thinks that he has found some peat-layers in the Björkö-Moss near Gothenburg down to 10 m. above the level of the sea, covered by postglacial marine mud, which in its turn has been covered with a turf-formation (peat-layer).

The lecturer showed, however, that both these turf-formations had exactly the same flora — both of them containing *Taxus* for instance — and that the undermost turf, the so-called mud, and the lower part of the uppermost turf were a continual alluvial formation in a brackish water basin which was being isolated.

It has been supposed that the Litorina-subsidence has extended as far as the fjord of Drontheim. The lecturer showed that the »turf» from Værdalen, which has been called intramarine, was an old vegetation-bed, covered with a clay-layer that had slipped down, and consequently did not represent any special level change.

Meeting, April 29th 1898.

Herr C. WIMAN read a paper on paleontological observations in Gotland, illustrating his discourse by photographs, stuffs, and fossils.

Meeting, May 13th 1898.

Herr R. SERNANDER read a paper on the peat-bog at Rörken.

The lecture gave rise to a lively discussion, in which Hrr. HÖGBOM, AHLENIUS and the lecturer took part.

Meeting, September 26th 1898.

Directors were appointed:

J. GUNNAR ANDERSSON, Secretary.

C. A. FORSBERG, }
C. SÖDERSTRÖM, } Reporters.

Speaking of the election of Reporters, Herr J. G. ANDERSSON seized the opportunity of emphasizing the desirableness of the reports being made casier to be surveyed than hitherto.

Meeting, October 14th 1898.

Herr HOLMQVIST read a paper on the minerals found at Pargas and Skogsböle in Finland.

Herr WIMAN spoke on some geological observations made on a voyage to Karlsöarna near Gotland.

Herr FORSBERG gave an account of some opinions uttered by Branco and Geikie in their newly published works on volcanoes; according to them, Herr Forsberg said, the occurrence of volcanoes is not necessarily restricted to fissures in the rock, as has hitherto generally been admitted.

Meeting, October 29th 1898.

Herr SERNANDER read a paper on the level changes of the Mälar-basin.

The lecture gave rise to a lively discussion between Hrr DE GEER, HÖGBOM, MUNTHE, LÖNNBERG, J. G. ANDERSSON, and the lecturer.

In opposition to the lecturer Herr DE GEER was of opinion that the Litorina-upheaval had proceeded tolerably quickly almost as far as the present level of the sea, and that the vertical changement of level in later times must have been a very diminutive one. At the same time he passed strictures upon the observations made by means of pegels and water-marks, said that evidences, deduced from the occurrence of archæological remains down to certain levels only, as being of a merely negative nature, were of no particular importance, and mentioned that Litorina at Dalarö is met with close to the present surface of the sea.

Herr MUNTHE agreed with the lecturer in thinking that the land-upheaval had been going on even in later times to a considerable extent, and said that in Gotland Litorina and Limnæa occur together up to 5 m. above the level of the sea under circumstances that do not admit of the supposition that Litorina has been secondarily imbedded.

Herr HULTH showed a rich collection of fossil plants found in calcareous tuffs from Vestergötland, and described some arctic *Salix*-forms which he had recently found in the bottom layers of the tuff.

Herr WIMAN demonstrated a collection of fossils, disengaged from limestone and flintstone blocks from Öje myr, Gotland, which blocks all come from a layer between under- and upper-Silurian.

Herr J. G. ANDERSSON gave an account of the researches made by him and Miss A. SAHLBOHM conjointly on the amount of fluor contained in Swedish phosphorites. (Bull. N:o 7.)

Meeting, November 11th 1898.

Herr BENEDICKS gave an account of his exhaustive researches on a new mineral, discovered by him and called Thalénit. (See Bull. of the Geol. Inst. of Upsala N:o 7.)

Herr HÖGBOM spoke on some features of the history of Swedish mining.

Meeting, November 25th 1898.

Herr J. G. ANDERSSON gave a résumé of Fröh's essay on the physical geography of the earlier paleozoic epoch, recently published in Vol. II, N:o 1 of *Lethæa geognostica*.

Meeting, December 9th 1898.

Herr J. G. ANDERSSON gave a preliminary report on Litorina-sea remains in the present fauna of the Baltic. The report will be published in the *Zool. Jahrbücher* and entitled »Über das Thierleben in den Tiefhöhlen der Ostsee».

Herr HÖGBOM opened a discussion on the glacial erosion in central and south Sweden. (See Geol. Fören. Förhandl. XX: Om urkalkstenarna och den glaciala erosionen.)

Herr DE GEER said that from the distribution of the lakes in the southern and central parts of Sweden important conclusions might be drawn, calculated to throw light upon the origin of these formations, which have sometimes been totally ascribed to the influence of glacier erosion. We find, indeed, that, setting aside the large lakes, which might almost be called plain-lakes, all the other lakes are almost exclusively found in certain districts, characterized by an extremely broken ground, while in others lakes in a remarkable degree are wanting. The speaker said that this was probably to be accounted for by assuming that the pre-cambrian abrasion-surface of the

primary rock, which had once extended perhaps over the whole country, nowadays is preserved only in districts, sunk by way of dislocations. This has, no doubt, been the case just in the plains deficient of lakes, and not only in the Silurian districts situated within their limits. The Cambrian-Silurian layers have at an early period been removed by erosion in the districts not sunk which were consequently early exposed to weathering.

In this way the surface of the primary rock had in the north-eastern part of Skåne been deprived of its silurian covering and got its undulating appearance even before the latter part of the cretaceous period. But in the lowered districts the sedimentary layers had been preserved for a long time, perhaps up to the tertiary era, and consequently their basement or the old even abrasion-surface had not had time to get mellowed enough to allow the glaciers of the glacial epoch to dig out any lake-basins. That the fact that such basins are wanting, is not owing to their having been filled up at a later period by means of quarternary sediments, is evident from the circumstance that the undulating basin-landscapes of our archipelagos extend below the surface of the sea, which indicates that the situation of these regions during the quarternary epoch and the sedimentation due to it were not able to mark the character of the superficial appearance of the rocky ground. This seems to make evident that the disposition, situation, and form of the lakes of the primary rock were generally settled by pre-glacial factors and that the glacier-ice upon the whole carried along with it only loose material, by means of which the cavities of the rocky ground appeared as open water-cisterns or lakes.

Herr NORDENSKJÖLD said that the size and distribution of the moraines alone were sufficient to prove that a great ice-erosion had taken place; that this erosion has had a various effect also seemed evident to him. In support of this opinion he referred to the topography in Alaska north of the boundary to which the Land-ice had reached.

On the same latitude and under the same peculiarities of climate as central Sweden, we find here a table-land, covered with huge masses of secular weathering soil. It is interesting to know that at least some part of this disintegration took place during the quarternary epoch. To what extent the Scandinavian ice-erosion attacked the firm rock or weathering soil of this kind cannot now be decided, but a close examination of the microscopic character of the moraines would perhaps throw some light upon this point.

