

Citation:

Klein, W.C., On a Trilobite Fauna of presumably Devonian age in the Dutch East Indies near Kalooë (Tamiang district S.E. Atjeh), in:

KNAW, Proceedings, 18 II, 1916, Amsterdam, 1916, pp. 1632-1636

Palaeontology. — “*On a Trilobite Fauna of presumably Devonian age in the Dutch East Indies near Kalooë (Tamiang district, S. E. Atjeh).*” By Dr. W. C. KLEIN. (Communicated by Prof. MOLENGRAAFF).

(Communicated in the meeting of January 29, 1916).

In the south eastern part of Atjeh (Tamiang district, chief settlement Kwala Simpang, south of Langsar) the present author discovered at a few hours' distance west of the military encampment Kalooë on the Simpang Kiri river, when investigating limestone mountains in that locality, a probably devonian fauna, containing among other things trilobites, brachiopods, corals and crinoids.

A local investigation, not extending over the more distant environs, led to the following statements.

When following the Aloer (small river) Kalooë, which a little above Kalooë joins the Simpang Kiri river on its western bank, one meets after a walk of about an hour and a half a left (western) tributary, the Aloer Boenji, the mouth of which is characterised by terraces of limestone (travertine). About a hundred metres beyond this tributary there is on the same western bank a little used footpath, which at first has a south western, further on mainly a western direction and which after half an hour's walk, after a fairly steep rise, passes through limestone rocks that seemed to me to belong to the younger, probably early tertiary, limestones, which in this region are very frequent. They are very well seen e.g. in the Simpang Kiri valley when travelling in a sampan (small boat) from Kalooë to the mouth of the Serba river. These limestones from which I chipped here and there fragments did not seem to me to belong to any particular type.

After this the road descends in a northern direction and on the cleavage-planes of one of the rocks lying on this slope I first found the pygidium of a *trilobite*. On searching further a whole fauna then came forth from the dispersed blocks, which apparently consisted of clayey, reddish brown fine-grained sandstone.

Eastward of this path, which descends to the north lies a small valley, sloping down towards the north east. When examining the western bank I could state the following *series of strata* between this rivulet and the highest point of the path, where the rocks of limestone occur.

Reddish grey marly limestones, alternating with grey soft shales, occasionally containing fossils; sometimes harder shales; total thickness about 50 m., position fairly well horizontal. In a cliff of 6 m. height the upper portion of these marls is well exposed, in banks of $\frac{1}{4}$ to

$\frac{1}{2}$ m. thickness, dipping 20 to 30° N.N.W. and striking N. 80° E. with vertical joint-planes. The thick banks have weathered into round-edged blocks, a finer stratification in places being observable. This first examination did not yield any fossils from these rocks. The upper edge of the hard marls forms a small platform and above this begins the limestone mentioned above.

This *limestone* presents the following section from below upwards to the west of the platform:

About 40 m. grey or white dolomitic limestone, sometimes sugar-grained, mostly very fine-grained, sometimes slightly stratified, with a very rough, sharp-edged surface of brecciated appearance, sometimes with undulations on the joints like ripplemarks, i. e. the ordinary aspect of limestone rocks. The lower 20 m. are fine-grained, grey, with indistinct veins of white calcite, the uppermost 20 m. are dolomitic, brighter and sometimes a little sugary in texture. On the slope next to this limestone lie the blocks with the trilobites. Still higher when ascending along the path fine-grained limestone of 2 m. thickness occurs, greyish white with fine white streaks, further two metres of grey limestone and then again about ten metres of greyish white fine-banded limestone and finally about 15 m. of unstratified limestone with a rugged surface.

Above the highest point of the path where the dip of the strata is 20° S.S.E. still further occur when climbing in a W.S.W. direction about 15 m. of fine-grained dark grey limestone, which a little higher appears to alternate with a rock containing the *trilobites*, although this could not be clearly stated without digging. The uppermost bank consists of a greyish white dolomite, at least 4 m. thick and is underlain by rather thin banks of reddish limestone containing crinoids. The trochites have become entirely crystalline.

Above the uppermost limestone shale was found of a grey colour and this seems to prevail until the top of this mountain, 25 m. higher. The strata with trilobites and brachiopods appear to be entirely absent above the limestone.

Following up the footpath from these limestones one reaches at a distance of more than one hour further the great Aloer Karangpoetih (?), the whole bed of which is filled with gravel and boulders of rocks of a dirty white to milky white sugar-grained and fine-grained dolomite, the latter resembling vein quartz. After a long march through this river an old footpath on the right bank was found leading upwards to a northern foretop of the Goenoeng (mountain) Karang Poetih in a southern direction. Along this path a limestone wall of at least 100 m. thickness is found, apparently horizontally stratified and containing (at any rate in the highest zone) many grey or grey-black, much fractured and weathered cudgel-

shaped flints, sometimes one to two decimetres in diameter. Flints occur moreover in the whole section. The rock is corrugated everywhere into sharp edges by weathering. In the aloer Karangpoetih near the north east point of a limestone mass of the same name which is from a long distance visible from the military road east of Kalooè in a westerly direction as a bare cliff, beds of limestone occur and next to these beds of a lustrous slate, which is of black grey colour and contains particles of carbonaceous matter. Also a conglomerate composed of fragments of slate or shale is found here. The position of these layers and their mutual relation has not become clear to me during my short visit.

Summarising the sequence of strata from below upwards is:

± 80 m. reddish grey *marls* and grey *shales*;

± 75 m. *limestone*, grey, fine-grained, sometimes dolomitic;

± 10 m. limestone as before, alternating with thin layers of crinoid limestone of reddish colour and with one or more alternating layers of grey marl with probably *devonian trilobites and other fossils*. This rock weathers into a red-brown sandy claystone.

± 25 m. grey *shales*,

The rocks are gently *folded* and the strike is N. 80° E., which is, however, of little importance on account of the small extent of the area, where the rocks are well exposed.

FAUNA.

The entire fauna has been obtained from one horizon in the upper portion of a series of strata, about 190 Metres in thickness, apparently occurring in conformable succession. Moreover the fossils only occur in the beds of *marly limestone*, in the purer limestones I found no fossils as yet, except stems of crinoids. Hence the fossils collected only offer a poor representation of the entire fauna, which e.g. in the crystalline limestone might have had another character, but has entirely disappeared by the processes of recrystallisation and partly also dolomitisation.

The number of specimens of the fauna found in the marl is large, but the number of species is small. A rapid examination, made on the spot without having any literature at hand, gave the following species: *Acanthocladia* sp., *Strophomena* sp.? *Zaphrentis* sp., *Melocrinus* (*Ctenocrinus*) *typus* Bronn., *Actinocrinus* sp.? and a calyx of a crinoid, probably belonging to the order of Carviformia, besides numerous *Trilobites*, probably of the genus *Proetus* and possibly also a *Dalmania* sp. and finally a form belonging to the *Nautilidea*.

Excepting the corals and some of the brachiopods the lime of the shells has entirely disappeared, the casts being difficult to determine. The casts of the trilobites have been preserved best of all, as is,

generally the case in such faunas. The soft weathered rock is very suitable for preparing the organisms, the harder unweathered cores of the large blocks being unsuitable for this purpose.

Through the kind assistance of the military commander at Kalooë, Captain VAN GHEEL GILDEMEESTER, I was able to collect some hundred fossils. An expedition undertaken especially for this purpose will yield much more; I had only a single day at my disposal. The just-named officer will be pleased to procure a guide for geologists who should wish to visit the locality.

Trilobite faunas outside the Dutch East Indies. For comparisons we must look outside the East Indies. The carboniferous fauna of the limestone of the Padang Uplands, discovered by VERBEEK ¹⁾ and described by F. VON ROEMER ²⁾, is of a more recent date and has scarcely any species in common with the fauna found by me, as far as I can judge at present. For the rest only younger faunas of permian ³⁾ or more recent date became known from the East Indies and the fauna found by me is probably the oldest as yet known in these islands.

From *British India* however and from *Australia* we know also devonian as well as silurian faunas with trilobites. In N. E. Burmah, in the northern *Shan States*, NOETLING and LA TOUCHE ⁴⁾ found silurian and devonian strata east of Mandalay; this fauna has been fully described by COWPER REED ⁵⁾. It originates from a coral reef, the Padankpin reef, situated amid a large massive of "lower plateau limestone", for the greater part dolomitised and for the rest containing no fossils whatever, except a small fauna of uncertain stratigraphical position, in the Wetwin Shales. The Padankpin fauna is mid-devonian. *Calceola Sandalina* is very numerous in it. These limestones, as Dr. NOETLING lately wrote to me, extend from 26° to 14° North. Lat.

¹⁾ R. D. M. VERBEEK, Topografische en Geologische Beschrijving van een gedeelte van Sumatra's Oostkust; Batavia, Landsdrukkerij, 1883. See p. 247.

²⁾ F. VON ROEMER, Ueber eine Kohlenkalkfauna der Westküste von Sumatra, *Palaeontographica*, Bd. XXVII, 1880; reprint in *Jb. van het Mijawezen in N.O. Indië* 1881, deel I, p. 289—305.

³⁾ The trilobites described by MARTIN from the Lorentz-river in New Guinea have only the pygidia preserved. They probably belong to the genera *Proetus* and *Phillipsia* but are unfit for an exact determination of the age of the rocks in which they occur.

K. MARTIN, Palaeozoische, mesozoische und kainozoische Sedimente aus dem südwestlichen Neu Guinea. *Samml. des Geol. Reichsmuseums in Leiden* IX, p. 92.

⁴⁾ T. H. D. LA TOUCHE, *Geology of the Northern Shan States*, *Memoirs of the Geol. Survey of India*, Vol. XXXIX. part 2, 1913, Calcutta, See p. 182.

⁵⁾ T. R. COWPER REED, *The Devonian Faunas of the Northern Shan States*: *Palaeontologia Indica*, New Series, Vol. II, Memoir No. 5, 1908.

The elements summed up above for the Kalooë fauna do not occur in the British Indian devonian, which yielded only a few trilobites with which I cannot identify my species. Melocrinus, which according to my preliminary examination appears to occur at Kalooë, is according to the palaeontological handbooks of ZITTEL, NICHOLSON and LYDEKKER a silurian-devonian genus and the species Melocrinus typus is typical for devonian strata, but the exact determination of species being impossible on the spot no certainty as to the age of the fossils has as yet been obtained. I have sent the fossils to Prof. Dr. JONKER of Delft, who probably later will publish full details.

Also in *South Yunnan* (China) devonian is known, the fauna of which has been described by v. LOCZY in "Reize des Grafen Szechenyi", Bd. I, p. 682. In North Yunnan VON RICHTHOFEN collected devonian fossils, more fully described by KAYSER (v. RICHTHOFEN, China, Bd. IV, p. 75). From the Himalayas only an insignificant devonian fauna has become known. I leave it to palaeontologists to make more elaborate comparisons based on more extensive lists of fossils.

It is desirable to study the stratigraphy of the strata near Kalooë well and thus also to determine the position of the white dolomites. I have found those chiefly as boulders in the Aler Karangpoetih, although they occur in situ in some places of the river, and therefore I am of opinion that the Goenoeng Karangpoetih partly rests on them. A limestone with grey-black flints, as occurs on the northern foretop of this mountain, I did not find mentioned in any of the descriptions of limestones of other parts of Sumatra. Mr. J. B. SCRIVENOR wrote to me that he did not know this type of rock in Malacca either.

The author hopes in a subsequent paper if circumstances permit to be able to deal more fully with this trilobite lime of Kalooë, the discovery of which he only wished to announce in this first communication. *Pangkalan Brandan*, North Sumatra, Aug. 1915.

Prof. MOLENGRAEFF made some remarks in addition to the preceding article.

Mathematics. — "On the nature of the limiting surface for multiple space transformations." By Dr. K. W. RUTGERS. (Communicated by Prof. JAN DE VRIES).

(Communicated in the meeting of February 26, 1916).

1. If $r+1$ surfaces of order p are given by means of the equations $f_1 = 0, \dots, f_{r+1} = 0$, an r -fold infinite linear system S_r of surfaces, determined by these $r+1$ surfaces, is represented by $\lambda_1 f_1 + \lambda_2 f_2 + \dots + \lambda_{r+1} f_{r+1} = 0$.