What is plinthite?

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Summary. Many specimens of plinthite, a species described from Co. Antrim by T. Thomson in 1836 and later from Skye by M. F. Heddle, prove to be mixtures of zeolites and hematite. Both original analyses are those of a ferruginous clay (a mixture of hematite, kaolinite, and montmorillonite). The type specimen (Thomson Collection) is a red clay in the montmorillonite group intimately mixed with hematite and a little analcime.

In 1836 Thomas Thomson described a new mineral from Co. Antrim that he called plinthite (from πλίνθος) on account of its brick-red colour.[1] Its texture was earthy; fracture flat, conchoidal; hardness 2·75; and sp. gr. 2·342.

In 1880 M. F. Heddle described a similar substance, deep red in colour with a greasy lustre or earthy and dull, from The Quirang in Skye.[2] A more detailed description of this occurrence is given in a paper published in 1883.[3] At this locality he found plinthite occurring in three forms: in beds of a few inches to nearly a foot in thickness, which he thought might have been formed by the alteration of loam by a lava stream; in rough radiating spheres about the size of a pea; and in thin layers or bands occurring with zeolites (chabazite, 'red mesolite',[4] thomsonite, analcime), calcite, saponite, and apophyllite. This last occurrence he thought so unusual that he analysed the material and found it compared favourably with T. Thomson's plinthite.

In Skye, particularly near Uig, there are lumps of a massive red mineral that look like hematite. This proved to be a mixture of hematite and chlorite (B.M. 1959, 571) but it turned my attention to plinthite and I determined to try to solve its identity. As Thomson was Professor of Chemistry in Glasgow University and his nephew was his chief analyst, it seemed possible that some of his material might be

[1] T. Thomson, Outlines of Mineralogy, Geology, and Mineral Analysis, 1836, p. 323.

[2] M. F. Heddle, Min. Mag., 1882, vol. 5, p. 26.

[3] M. F. Heddle, Min. Mag., 1883, vol. 5, p. 117.

[4] See p. 457, below.

in the Hunterian Museum, but his collections do not appear to have been preserved there.

After much searching, a specimen of plinthite (1960.10.1) from the Thomson Collection was found in the Royal Scottish Museum. It bears the label 'Plinthite Co. Antrim' on which is superimposed a red ticket with the initial T. On comparison with other specimens in the collection this was found to mean 'Thomson', although it had not been previously recognized as such. The Royal Scottish Museum has only a few specimens belonging to the Thomson Collection and how these came there is not yet known. The type specimen consists of masses of a shiny deep-red mineral (A) in close association with an earthy pale-red mineral (B), veined with fibrous, nodular, and massive natrolite together with some of the parent basalt; the mineral A is a clay belonging to the montmorillonite group ($1{\cdot}524 > n > 1{\cdot}517$) intimately mixed with hematite and a little analcime (X-ray no. 8806); the mineral B (X-ray no. 8807; $1{\cdot}517 > n > 1{\cdot}497$) is granular analcime. Another specimen from the Royal Scottish Museum Collection (1847.17.1; Patrick Doran no. 19) from Co. Antrim consists of red and white nodules in basalt associated with well-developed acicular natrolite; the red material of the nodules (X-ray no. 8805) is analcime with a little clay and the white is natrolite. In the British Museum Mineral Collection a pale-red rough massive specimen of plinthite from Co. Antrim (B.M. 89894)[1] proved to be a fine-grained mixture of thomsonite and chabazite. A specimen from Co. Antrim[2] in the Natural History Department of the Glasgow Art Gallery and Museum also proved to be a mixture of thomsonite and chabazite (X-ray no. 8738).

Heddle's material from Skye is preserved in the Royal Scottish Museum and has been made available for examination. There are two specimens (S.M.C. 493 A1 and 493 A2) from the Echoing Rock near Fir Breugach, about a mile north of The Quirang, which tally very closely with his description of the second variety: they are brick-red but the radiating appearance is only superficial; X-ray determination (X-ray nos. 8625, 8622) showed them to be a mixture of thomsonite and hematite. S.M.C. 493 A3 from The Storr, a dull-red massive specimen, not entirely homogeneous, is a mixture of analcime and hematite (X-ray no. 8624) with inclusions of thomsonite. The fourth specimen (S.M.C. 493 A4) is labelled in Heddle's handwriting 'Bole between Uig and

[1] Allan-Greg Colln.: obtained by R. P. Greg between 1848 and 1851.

[2] No. 02–161 abw. Presented by Major A. J. Fleming, 1901 (probably collection of Professor John Fleming (1785–1857) of Aberdeen).

Stainshal [= Stenscholl], Skye'; this is dark-red, smoother in texture than the last and with a slightly conchoidal fracture; it is a mixture of thomsonite and hematite (X-ray no. 8626).

Here mention may also be made of Heddle's 'red mesolite'[1] from The Storr and The Quirang. Three specimens from the Royal Scottish Museum Collection have been examined. A massive red and cream mineral in basalt (S.M.C. 455.2) from the Echoing Rock, The Quirang, is a mixture of thomsonite and analcime, and another specimen from The Quirang (S.M.C. 455.13) occurring as nodules in basalt with thomsonite, analcime, stilbite, and apophyllite, is principally analcime. A third red and white massive mineral from The Storr, with analcime, thomsonite, and chabazite (S.M.C. 455.14), is a mixture of analcime and thomsonite. Heddle's analysis of 'red mesolite' (loc. cit.), which he says is sometimes confused with plinthite, agrees well with such a mixture.

There are three specimens in the Royal Scottish Museum (Patrick Dudgeon Collection) labelled 'plinthite' from The Quirang. These are light-red massive thomsonite with a little chabazite and analcime (1878.49.387); red massive (mixture of analcime and hematite) with thomsonite and analcime (1878.49.386); and red massive (mixture of analcime and thomsonite) with large white crystals of analcime and platy thomsonite (sphaerostilbite) in basalt (1878.49.388). Another 'plinthite' from an unknown donor (S.M.C. 493 A5) from The Storr is a flesh-coloured smooth clay on an altered ferruginous rock and proves to be kaolinite (X-ray no. 8623).

Two specimens of 'plinthite' from the James Currie Collection in Edinburgh University have also been examined. Currie helped with the posthumous production of Heddle's 'Mineralogy' and indeed went over much of the ground covered by Heddle, so his specimens are of considerable interest. They are both from The Quirang. One is a light-red aggregate and consists of thomsonite and hematite (X-ray no. 8737). The other is darker red with inclusions of analcime, chabazite, and earthy thomsonite on a zeolitic lava containing chabazite crystals; the red material is a mixture of thomsonite and hematite (X-ray no. 8736). A pale-pink rough specimen labelled plinthite in the Mineral Collection of the British Museum (B.M. 89893)[2] from The Quirang proved to be a mixture of thomsonite and analcime.

From this it seems obvious that the remains of Heddle's analysed material was lost and the only Heddle specimens that really correspond

[1] M. F. Heddle, Min. Mag., 1883, vol. 5, p. 118.

[2] Allan-Greg Colln.; obtained by R. P. Greg between 1848 and 1851.

to his description are the spherulitic masses from the Echoing Rock—which he did not analyse.[1] In this connexion it is interesting to note that Mr. W. F. Davidson, who has recently been collecting zeolites from The Quirang, had a specimen showing crystals of stilbite and chabazite occurring in basalt and lying on a blanket of a red waxy mineral, which also forms nodules in the rock (B.M. 1959, 280). This red mineral proved to be a member of the montmorillonite group and agrees quite well in description with Heddle's analysed plinthite.

The analyses of the plinthite are:

	SiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	CaO	H_2O	Total
1.	30·88	20·76	26·16	—	—	2·60	19·60	100·00
2.	29·547	19·027	28·013	3·251	0·844	2·234	17·391	100·307

1. Co. Antrim. Analyst, T. Thomson, 1836.
2. The Quirang, Skye. Analyst, M. F. Heddle, 1880.

From both these analyses it can be deduced that the material analysed was, as Heddle suggested, a ferruginous clay, with a composition about hematite 26 %, kaolinite 40 %, and montmorillonite 34 %. In 1882 Heddle noted an occurrence of plinthite overlying lignite from under the 'Organ' at the Giant's Causeway in Co. Antrim[2] but gave no analysis. A specimen called 'levigated clay' from Giant's Causeway, Co. Antrim (B.M. 1944, 85), from the collection of Dr. John Lee (1783–1866) of Hartwell House, Aylesbury, is a mixture of hematite, kaolinite, and montmorillonite and could be taken as typical of material that was collected about the same period as Thomson's plinthite, with approximately the same composition.

From this it seems clear that Thomson applied the name to a ferruginous clay, but that massive red mixtures of zeolites were subsequently also styled 'plinthite'.

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[1] Heddle also noticed at The Quirang and even more abundantly at The Storr (Min. Mag., 1883, vol. 5, p. 119) a variety of thomsonite that has been called 'rock-soap'. It is, however, rough and not soapy in texture, and in appearance rather like kaolinite. The present writer found similar material near Uig, which when fresh was sugary and granular in appearance but on drying became more hard and compact. It was found to consist of a mixture of fine-grained analcime and thomsonite (B.M. 1959, 567) or just analcime (B.M. 1959, 568).

[2] M. F. Heddle, Min. Mag., 1882, vol. 5, p. 24.