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## Chapter 3 Moine Schists of Ardnamurchan

### Introduction

The pre-Triassic rocks of the district included in the Memoir-map are all schistose and belong to the great series or complex known as the Moine Schists. Their most westerly exposure is near the Stone Circle (Greadal Fhinn), a quarter of a mile north-west of the head of Kilchoan Bay. This lies in Sheet 51 (the outcrop is shown on the Memoir-map but not on the one-inch Map). Otherwise all the schist exposures of the area fall within Sheet 52.

The Moine Schists throughout the district are metamorphosed felspathic sandstones, with quite subordinate micaceous partings representing shales. In spite of recrystallization their original sedimentary texture is very generally shown by the presence of comparatively large scattered grains of quartz and feldspar. Their metamorphism increases markedly from west to east. So far as known the most lowly metamorphosed rocks are included in the biotite zone of Barrow's well-known classification; while most if not all of the country lying east of Ben Hiant belongs to the garnet zone.

It is generally supposed that the Moine Thrust passes near to the western end of Ardnamurchan, either obliterated by Tertiary intrusions or hidden under the sea. It appears, therefore, that the Ardnamurchan Moines decrease in metamorphism as they approach the Moine Thrust. A similar decrease has often been observed in the North-West Highlands. The possibility of mistaking the effects of crushing and retrogressive metamorphism for a true regional decrease of metamorphism has been carefully considered in the case of the grits and micaceous phyllites of the Kilchoan district. The conclusion has been reached that these rocks had never been highly metamorphosed.

The fall of metamorphism from east to west seems to be in large measure gradual; but the evidence suggests that it is also in part abrupt. If appearances on this score can be trusted, a thrust passes near the south end of Loch Mudle (exposures are not sufficient to allow of its precise location) and separates the Moine outcrop into two differently metamorphosed portions. West of this supposed thrust we have what may be called the Kilchoan Moines, less crystallized than the main mass of the Moines lying farther towards the east. <ref>C. T. Clough on the Tarskavaig Moines in *The Geological Structure of the North-West Highlands of Scotland*, *Mem. Geol. Surv.*, 1907, p. 590.</ref>

Another aspect of the subject is illustrated in (Figure 2). On the two sides of a line which has been traced across Ardnamurchan in a general north and south direction past the south end of Loch Mudle, the attitude or structural disposition of the schists is markedly different, as is indicated in the letterpress of (Figure 2). This line does not correspond exactly with the boundary separating the Kilchoan Moines from the more crystalline rocks to the east — for instance, the exposures south-east of Ben Hiant seem all to belong to the eastern suite. It does, however, furnish an independent suggestion of thrusting in this vicinity. E.B.B., J.E.R., J.B.S.

### Kilchoan Moines

The type exposures, much complicated by Tertiary intrusions, occur between Kilchoan and the Ben Hiant vent. The rocks are sheared white recrystallized sandstones often somewhat gritty, and occasionally separated by thin grey phyllitic layers. Four specimens were sliced from the shore east of Glas Eilean. One [\(S26742\)](#) [NM 4914 6289] represents the common type and roughly consists of two thirds quartz and one third alkali-feldspar. It also contains scattered orientated flakes of muscovite, seldom 0.2 mm. long, and grains of iron-ore. Shearing and recrystallization mask the original grain structure of the quartz, but the feldspar (predominantly microcline) has been very little deformed, and the larger grains up to 1.5 mm. are evidently essentially of sedimentary origin. The other three slices from this shore section [\(S26294\)](#) [NM 4898 6296], [\(S26741\)](#) [NM 4893 6300], [\(S26745\)](#) [NM 4898 6293] have been cut from phyllitic partings. The first of the set is mostly made of wavy muscovite with embedded lenticular grains of quartz.

Fresh brown deeply pleochroic biotite is fairly abundant and is undoubtedly a product of regional metamorphism. Some late-formed epidotic strings run along and across the foliation, and may possibly be of Tertiary date. The other two slices do not show any fresh biotite.

In three slices from inland exposures in this neighbourhood ([S26293](#)) [NM 5108 6425], ([S26743](#)) [NM 488 645], ([S26744](#)) [NM 488 645] only the last contains fresh biotite, and this is in all probability contact biotite due to a neighbouring Tertiary intrusion. The other two, however, almost certainly contain pseudomorphs after regional biotite.

Another exposure assigned to the Kilchoan Moines is traversed by the road west of Loch Mudle. The supposed thrust-boundary of the Kilchoan Moines crosses the road due east of the summit of Beinn nan Losgann, and to the south more highly crystalline Moines are encountered. Four specimens have been sliced from the psammitic flags allotted to the Kilchoan Moines ([S26292](#)) [NM 5411 6547], ([S23465](#)) [NM 5393 6629], ([S23467](#)) [NM 1502 5516]. Of these, the first is noteworthy for the exceptional size, up to 6 mm. long, of some of its detrital grains of microcline. In ([S23465](#)) [NM 5393 6629], ([S23466](#)) [NM 5393 6629] fresh biotite occurs in minute flakes and there are also some very small partially chloritized garnets.

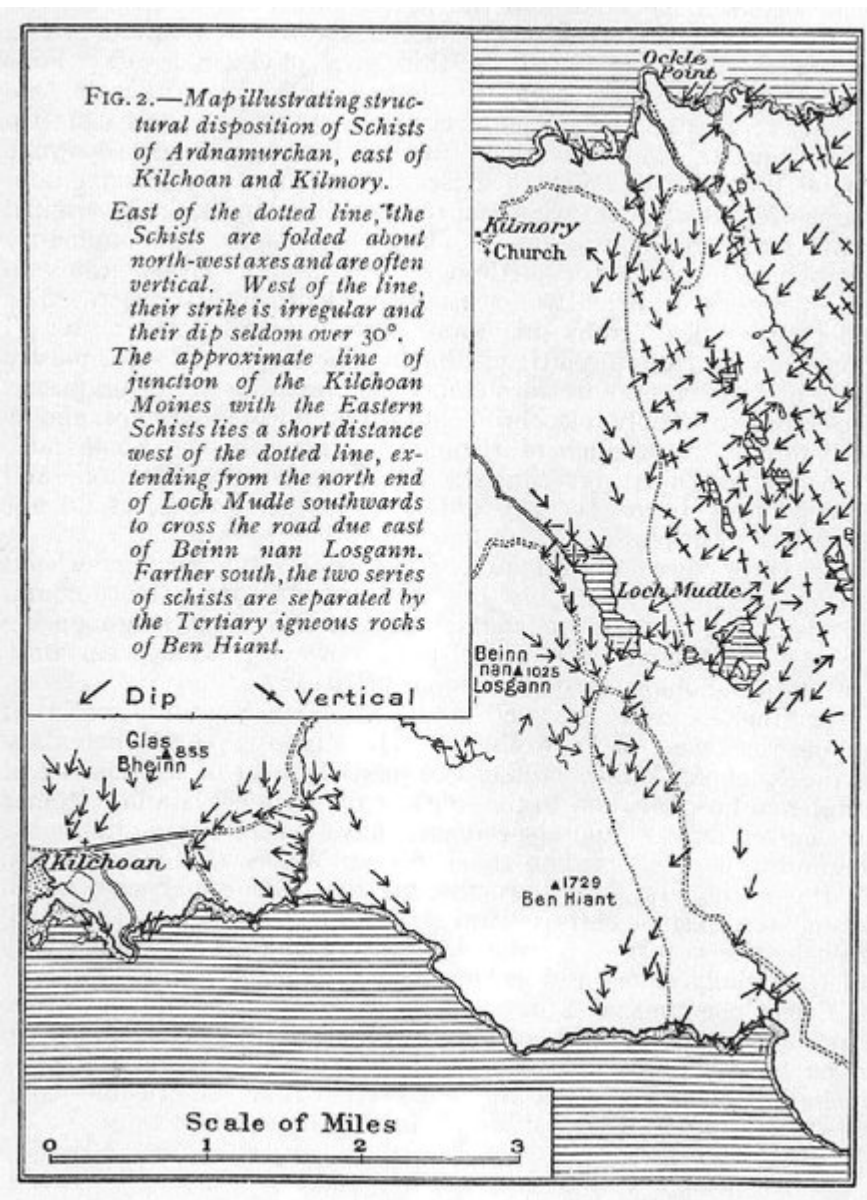
Crush phenomena ([S23613](#)) [NM 5380 6545], ([S26291](#)) [NM 5385 6515], ([S26746](#)) [NM 5380 6545] were found in hillside exposures on the east side of Beinn nan Losgann, near what seemed to be the boundary between the Kilchoan Moines and the more crystalline schists; but it was not certain that the crushing coincided exactly with the position of the supposed thrust.

### **More crystalline eastern Moines**

The easterly Moines are more massive in their outcrop than the Kilchoan Moines, and are pink rather than white, and they glitter with mica, while garnets are commonly seen in thin partings of mica-schist. Detrital grains of quartz and feldspar are often recognizable. The only sliced representative of the main part of this area is a fine-grained muscovite-biotite-schist with very subordinate spongy porphyroblasts of garnet ([S24484](#)) [NM 5565 6741].

As already stated, the Moines east of Loch Mudle have a very strong tendency to strike north-west. The dips are generally steep, either towards the south-west or north-east, and often pass through the vertical. It can be seen in various exposures, but more particularly on the north coast east of Ockle Point, that the rocks are thrown into a series of compressed folds of moderate dimensions and with steep axial planes directed north-west and south-east.

In the extreme north-east corner of the Memoir-map a different type is reached which has a broad outcrop farther to the east. The rock is still a metamorphosed feldspathic sandstone, but is much more massive than the distinctly flaggy rocks hitherto described. On this account it gives rise to some of the barest rock scenery of the Highlands, whereas the other Moine rocks of the district disintegrate freely and are for the most part covered by grass. These massive Moines are highly crystalline, but retain particularly abundant and striking relict grains of feldspar and quartz. Another feature is the perfection with which they have kept their original false-bedding. Three slices ([S21330](#)) [NM 5696 7144], ([S21331](#)) [NM 5696 7144], ([S21332](#)) [NM 5696 7144] show scattered detrital grains of microcline and quartz up to about 3 mm. in length. The microcline has recrystallized marginally, while the quartz has granulitized into a mosaic of moderate dimensions. The matrix is a well-crystallized aggregate of quartz, alkali-feldspar, muscovite, biotite, and epidote, in which the quartz tends to remain as separate irregular grains. E.B.B.



(Figure 2) Map illustrating structural disposition of Schists of Ardnamurchan, east of Kilchoan and Kilmory. East of the dotted line the Schists are folded about north-west axes and are often vertical. West of the line, their strike is irregular and their dip seldom over  $30^{\circ}$ . The approximate line of junction of the Kilchoan Moines with the Eastern Schists lies a short distance west of the dotted line, extending from the north end of Loch Mudle southwards to cross the road due east of Beinn nan Losgann. Farther south, the two series of schists are separated by the Tertiary igneous rocks of Ben Hiant.