Chapter 4 Metamorphic rocks, Appin Recumbent Syncline

Introduction

The schists of the Lochaber district, north of Loch Leven, can easily be correlated with those of the Appin district, south of the same; but the Great Glen Fault along Loch Linnhe defeats any attempt at correlation between the Lochaber–Appin assemblage and that of Ardgour to the north-west. It has been found convenient to start with the Lochaber-Appin country, and to divide its description between chapters 4 to 7, based on structural considerations, with a short *resumé* in chapter 8; and then to pass on to Ardgour in chapter 9. Even so, the material of chapters 4 to 7 has had to be subdivided under eleven local headings A–K as set out in the Table of Contents.

A. Onich to Fort William

Introduction

Before proceeding to detail let us give a brief introduction, easy to follow on Sheet 53 (Geol.). The map shows that between Onich and Ben Nevis the following five stratigraphical groups are disposed in a north-east-striking fold which we have already spoken of in chapter 3 as the Appin Fold:

Appin Phyllites (2,<ref>The numbers attached to the various rock groups were introduced before it was known that the Appin Phyllites are the youngest of the list.</ref> youngest)

Appin Limestones (3)

Appin Quartzite (4)

Ballachulish Slates (5)

Ballachulish Limestone (6, oldest)

In the terminology explained in chapter 3, the listed formations are said to constitute the core of the Appin Fold, while older rocks either side constitute the envelope of this core. As regards age relations, we have already pointed out in chapter 2 that the Appin Quartzite is shown by its current-bedding to be younger than the Ballachulish Slates. In other words the Appin Phyllites are, in this district, the youngest formation in the Appin Core. Also the formations of the core are younger than the formations of the envelope, so that the fold is in this sense synclinal.

In addition we have seen in chapter 3 that the cross-section of the Appin Fold in Glen Nevis is synformal ((Figure 3), p. 39) and that this, combined with the mapping, indicates a south-west pitch from Glen Nevis to Onich. Further, the map brings out clearly that the regularity of the Appin Fold disappears in the envelope formations that lie beyond the outcrop of the Ballachulish Limestone. To the south-east the Ballachulish Limestone is followed by Leven Schists (7), whereas to the north-west it is succeeded, often immediately, by rocks referred to the Eilde Flag division (13, p. 40). This has led to the recognition of an important slide, the Fort William Slide, along the north-west boundary of the limestone ((Figure 2), (Figure 14)**,** pp. 37, 94 and west end of Section AA, one-inch map).

We shall now follow up this outline sketch with a little detail in two parts. The first concerns stratigraphy, and the second the Fort William Slide. We reserve for chapters 6–8 our reasons for interpreting the Appin Fold as a large-scale recumbent fold. Since the fold is a syncline the Fort William Slide, cutting out much of its lower limb, is a lag as defined in chapter 3.

Stratigraphical detail

The Appin Phyllites and Appin Limestones (2 and 3) may be taken together, since, on the Onich shore where both groups are well exposed, the limestone is in two parts — one at the margin of the Appin Quartzite (4), the other separated from this margin by a minor part of the phyllite development.

Appin Phyllite Group (2)

The Appin Phyllite Group (2) consists of grey pelitic sediments, with which, in many outcrops, flaggy fine-grained quartzite is abundantly intercalated. On the Onich [NN 025 614] shore quartzite beds seem to be restricted to the part lying between the two bands of Appin Limestone already mentioned. The younger portion of the phyllitic outcrop consists of homogeneous massive grey mica-slates and is well exposed on the foreshore in a small promontory east of Onich Pier.

East of this, the foreshore for half a mile shows alternating outcrops of limestone and phyllite, presumably with much repetition by isoclinal folding, the details of which have not been worked out (Figure 2). The most easterly part of the combined outcrop of Appin Phyllites and Limestones, traversed from west to east and ending with the Appin Quartzite, presents the following outcrop widths:

	Outcrop width	
	ft	in
Cream-coloured Appin Limestone, often with dark stripes, and interrupted by three thin lamprophyres (West)	153	0
Very pale blue-white limestone	4	6
Lamprophyre	19	0
Shear zone	—	—
Grey phyllite, with subordinate quartzose layers and one thin lamprophyre	70	0
Pinkish quartzite, essentially fine-grained	17	0
Mainly fine-grained quartzite with grey phyllitic beds and occasional thin gritty beds. Two very small porphyry pebbles have been found, the first by Clough (S12909) [NN 040 612]<ref>S followed by a number refers to a Scottish slice in the Geological Survey collection, London.</ref>	10	0
White, grey and pink quartzite, mainly fine-grained	9	6
Pink quartzite, with a few thin grey phyllitic partings; some beds gritty	11	6
Pink quartzite, often with distinct grains of blue quartz	15	0
Grey phyllite	0	6
Pink quartzite, with two phyllitic partings	11	6
Porphyritic dyke	9	0
Massive pinkish quartzite	10	6
Well-bedded cream-coloured Appin Limestone, some dark seams	19	0
Crush-zone, mainly flaggy grey phyllite	8	0
Edge of massive Appin Quartzite (East and oldest)	—	—

Appin Limestone (3)

The two Appin Limestone (3) outcrops listed above are interpreted as separated stratigraphically by the phyllite-quartzite assemblage that intervenes in the shore exposure. What is called limestone in accounts of the Appin Limestone is generally magnesian, and is sometimes pure dolomite. Its beds often weather a pale cream or pink colour, and may be striped with impure dark seams (Tiger Rock). Most of it is somewhat sandy.

While details have not been established, the general pattern of outcrops is admirably shown in J. S. Grant Wilson's mapping in Sheet 53. For a rapid appreciation of the main structural features, a geologist is recommended to traverse the Appin Phyllite — Appin Limestone exposures of the coastal belt from east to west through Onich, and then, a mile to the north, go up the Amhainn Righ [NN 060 630] from west to east. Here he will see Appin Quartzite emerging with observable south-westerly pitch.

Appin Quartzite (4)

The Appin Quartzite (4) consists of two portions, each about 500 ft thick. The half near the Appin Limestone is a massive, white, false-bedded, gritty quartzite, with big detrital grains of quartz and felspar. It is admirably exposed along the road and coast a mile east of Onich. The other half is a striped transition group, consisting of alternating beds of quartzite and seams of black slate, linking up naturally with the Ballachulish Slates. It makes a stretch of overgrown raised-beach cliff east of the good road exposures just mentioned; but it can be better studied inland round the northern extremity of the group outcrop.

The road-cutting across the massive part of the Appin Quartzite shows several instances of current-bedding, and in every case the quartzite youngs westwards towards the Appin Limestone and away from the striped transition group. Better still, on the shore, extreme low tide lays bare a continuous polished cross-section which reveals with surprising clarity that, throughout its whole thickness, the massive half of the Appin Quartzite youngs westwards. There is, it is true, a smash at the junction of Appin Quartzite and Appin Limestone; but this is probably due to a trivial fault, and all evidence elsewhere agrees in showing the Appin Limestone to be the younger of the two formations.

Ballachulish Slates (5)

The Ballachulish Slates (5) are well exhibited in a large quarry by the roadside a mile east of Onich. The group consists of black roofing slates with big undeformed cubes of pyrites. In this particular quarry, owing to proximity of the Ballachulish Quartz-Diorite across the water, the pyrites has been altered to aggregates of pyrrhotite (Neumann 1950), which weather to give holes. The slates are well exposed again on the shore west of Onich; and inland they build large grassy hills stretching north to Glen Nevis. Their outcrop is easily followed and surrounds on three sides that of the Appin Quartzite, except where for a short space cut out by a fault east of Corran Narrows [NN 0183 6342]. Near the Ben Nevis Pluton the slates become hard and brittle and are spotted with cordierite; but they remain black. They are in this condition where seen perched on top of the Ballachulish Limestone in the south wall of Glen Nevis (Figure 3).

Ballachulish Limestone (6)

The Ballachulish Limestone (6) succeeds the Ballachulish Slates in a very clear shore section in the promontory west of Onich. The portion associated with these slates is a dark grey, sandy, fairly pure, banded limestone. The western part of the outcrop is very much more impure, and some is of a cream colour. The limestone is also well exposed east of Onich [NN 025 614], where it forms conspicuous little crags at the hill-top above North Ballachulish [NN 052 603]. These are easily recognised from the road, but unfortunately the outcrop near the road itself is covered by glacial drift and raised beach. At the hilltop the part of the limestone group adjacent to the Ballachulish Slates is again dark, banded and fairly pure. East of this comes much more impure pale grey limestone with a prominent cream-coloured band near the junction with the next succeeding group, the Leven Schists (7).

It is easy to follow the eastern and western outcrops of Ballachulish Limestone until they unite around the Ballachulish Slates on the southern slopes of Glen Nevis (Figure 3). Before this happens, however, at about a mile from the margin of the Ben Nevis Pluton, the more impure portion of the Ballachulish Limestone assumes the character of a flaggy, greenish

white calc-silicate-hornfels totally unlike the original limestone or calcareous schist in appearance. All that reaches the bottom of the glen is in this condition, and appears immensely thick owing, presumably, to steep isoclinal packing (S15439) [NN 1235 7122]; (S15440) [NN 1235 7122]; (S15441) [NN 1235 7122]; (S15442) [NN 1235 7122]; (S15443) [NN 1235 7122]. On the hill slope to the south, in a broad rocky belt picked out in (Figure 3) below the cap of Ballachulish Slates, the purer portion of the limestone group has altered to dark marble with long prisms of tremolite. We have already commented in chapter 3 upon the clear evidence which this natural cross-section affords of the synformal character of the Appin Fold in its outcrop between Glen Nevis and Onich.

We now pass from the core to the envelope of the Appin Fold. The original stratigraphical succession from Ballachulish Limestone (6) to Leven Schists (7) is only found on the south-east side of the Onich — Glen Nevis outcrop of this fold.

A strong argument that this is the original succession is afforded by its reappearance in typical form, in the Ballachulish Fold. Moreover, junction sections provide evidence of intercalation. For instance the crags above Glen Nevis show an interlaminated passage zone between Ballachulish Limestone (here calc-silicate-hornfels) and Leven Schists.

Leven Schists (7)

The Leven Schists (7) are excellently exposed in ice-moulded crags at the mouth of Loch Leven, north-east of Ballachulish Ferry [NN 053 598]. In the main they here consist of a great mass, probably two thousand feet or more thick, of greenish-grey phyllite or mica-schist, which apart from incessant colour lamination is wonderfully homogeneous. Quartzitic beds are confined to a comparatively thin, banded, transition zone, bordering outcrops of the Glen Coe Quartzite (8). This banded zone, treated as part of the Leven Schist formation, is composed of grey phyllite or mica-schist with occasional dark carbonaceous seams, together with quartzose ribs of various degrees of purity, some slightly calcareous.

The regional metamorphism of the Leven Schists increases in a general way from west to east. Near Loch Leven the western part of the outcrop is of phyllitic aspect with numerous small porphyroblasts of magnetite. The western part, on the other hand, is of definitely mica-schist type, spangled with biotite porphyroblasts, which are more abundant than the magnetites of the lower grade.

North-eastwards the whole outcrop (except for small patches seen beneath the downthrown lavas of Ben Nevis) develops the biotite porphyroblast facies, and with increasing metamorphism garnet becomes fairly common. Near the Mullach nan Coirean and Ben Nevis Plutons intense contact-alteration has been superinduced rendering the rocks harder and darker, often with conspicuous spotting due to development of cordierite.

Glen Coe Quartzite (8)

The Glen Coe Quartzite (8) which follows this banded zone is a thick, fine-grained, well-bedded quartzite. As developed in Tom Meadhoin [NN 085 624] it is non-felspathic and free of mica.

The Glen Coe Quartzite of Tom Meadhoin [NN 085 624] and of a more continuous outcrop reaching north-east from Mam na Gualainn [NN 116 625] will be treated in Section H dealing with Kinlochleven ((Figure 14), p. 94; (Figure 15), p. 99). Suffice it here that it is separated stratigraphically from the Eilde Flags (13) of Loch-Eilde Mòr by Binnein Schists (9), Binnein Quartzite (10), Eilde Schists (11) and Eilde Quartzite (12); and that current-bedding shows that these formations are successively older in the order stated. This, of course, confirms the conclusion that the Appin Quartzite is older than the Appin Limestone.

The rocks claimed as Eilde Flags (13) from Corran Narrows [NN 0183 6342] to Glen Nevis upstream from Fort William are quartzo-felspathic flagstones rich in biotite and muscovite. Characteristic flags are seen in interrupted river exposures upstream from a quarry at the old Bridge of Nevis, Fort William, or more fully in Cow Hill [NN 115 735] close at hand. Near Corran [NN 016 636] Ferry thoroughly typical flags have disappeared, and the Ballachulish Limestone is bordered for a quarter of a mile, measured across strike, by flags more pelitic than is usual in the type Loch-Eilde Mòr [NN 230 640] area. These seem to belong to a division of the Eilde Flags, which, at Fort William [NN 101 738], outcrops miles away from the Ballachulish Limestone. At Corran [NN 016 636] they are followed by fine-grained Linnhe Quartzite and

Dark Schist (p. 32), a horizon which has been exposed at numerous localities along the coastal road, departing from the outcrop of the Ballachulish Limestone at an angle of 15° measured in the horizontal plane. The stratigraphical significance of the Linnhe Quartzite and Dark Schist must be left to future workers. Before reaching Fort William the Linnhe Quartzite seems to fail; but hard dark schist is exposed intimately associated with flags. For about a mile south-west of the outskirts of Fort William the coastal exposures are hopelessly broken by the Great Glen Fault.

Fort William Slide

To turn now to the question of the correlation of the Fort William flags with the Eilde Flags. Since mapping leaves no doubt that all the rocks of the district, from Appin Phyllites to Ballachulish Limestone, are disposed in a fold (*cf.* Section AA at foot of Sheet 53; and (Figure 2), (Figure 3) in memoir), it is natural to look for the equivalents of the Fort William flags somewhere in the succession exposed south-east of the south-east outcrop of Ballachulish Limestone (Figure 14); and the first formation with the requisite lithology is the Eilde Flags.

The break in the stratigraphical succession at the north-west margin of the Ballachulish Limestone outcrop can only be explained by postulating the great fold-fault, or slide, which is called the Fort William Slide. The north-west outcrop of Ballachulish Limestone keeps wonderfully parallel with this slide, for it is always represented except at about 1+ miles north of Corran Narrows [NN 0183 6342]. On the other hand, as has been pointed out, the Eilde Flags seem less parallel, allowing of a very appreciable south-westward approach of the Linnhe Quartzite and Dark Schist.

The Fort William Slide runs out to sea in the promontory west of Onich. A thin porphyrite or lamprophyre has here intruded along it, separating Ballachulish Limestone from intensely sheared, non-typical Eilde Flags.

In the river Kiachnish [NN 090 700], six miles further north-east, the slide is repeated by a normal fault. The succession, seen twice, is Ballachulish Limestone, mica-schist (very thin), quartzite (very thin), Eilde Flags. It would be unsafe to correlate the mica-schist and quartzite, beyond recognising them as remnants of the formations completely cut out by the slide further south-west. The quartzite is more flaggy than is common in these formations where exposed south-east of the Appin Core, and minute examination reveals occasional instances of very gradual transgression of one divisional plane across another; but, though the whole of the attenuated quartzite, from banded edge against mica-schist to contact with the Eilde Flags, is laid bare in the river, there is no more evidence of disruption than one is accustomed to find in ordinary exposures of schistose rocks. Mere inspection of the Fort William and other slides of the district as a whole often fails to suggest the importance attaching to these structures.

B. Kentallen to Appin

Introduction

Kentallen Bay lies south of the entrance to Loch Leven. Appin House [NM 932 493] faces Shuna Island [NM 920 490] across the Sound of Shuna [NM 920 490]. Appin railway station is at Portnacroish [NM 926 474], a mile to the south. The district may be considered as the south-westerly continuation of that described above.

As the one-inch map shows, there is considerable resemblance between the stratigraphy and structure exhibited in the Appin Fold, here and on the Onich Shore. At the same time the south-westerly pitch revealed between Glen Nevis and Onich brings in at least one additional formation, the black Cuil Bay Slates of (Figure 4). These slates are lithologically like the Ballachulish Slates, but are linked with the Appin Phyllites by an intercalatory passage zone. Further south-west, in Shuna Island [NM 920 490], there is probably still another and younger formation, the Lismore [NM 870 440] Limestone, which repeats the characters of the dark purer portion of the Ballachulish Limestone. In the first edition of this memoir the black slates and dark grey limestone of Shuna [NM 920 490] were correlated with the Ballachulish Slates and Limestone, and their contact with the Cuil Bay Slates was interpreted as a slide. Since then the Creag Islands [NM 835 370] further south-west have been examined by the writer (Bailey 1925, p. 19), who now correlates the Shuna [NM 920 490] slates with the Cuil Bay Slates, and regards the Shuna [NM 920 490], or Lismore, Limestone as younger still. On this understanding, the formations of the district, beginning with the youngest, are: Lismore Limestone (0), Cuil Bay Slates (1), Appin Phyllites (2), Appin Limestone (3), Appin Quartzite (4), Ballachulish Slate (5), Ballachulish Limestone

(6), all included in the core of the Appin Fold; and Leven Schists (7), to the south-east, belonging to the envelope ((Figure 4), (Figure 5)). The core-formations (2–6) do not vary much in character from their representatives at Onich. The Leven Schists (7), however, develop a special facies.

The tectonics of the district are more complicated than further north-east, and it is convenient to name two minor synforms and one minor antiform within the major Appin Synform. The more north-westerly of the former is the Cuil Bay Synform reaching from Kentallen south-west through Cuil Bay and Shuna [NM 920 490]. The more south-easterly is the broken Glen Stockdale Synform, the regularity of which is destroyed by the Glen Stockdale Slide of (Figure 4), (Figure 5). The two synforms are separated by the Beinn Sgluich Antiform, responsible for the main Appin Quartzite outcrop of the district. In this we often see an exposed core of the striped transition zone or even of the Ballachulish Slates. The Glen Stockdale Slide, as seen on the map, commonly brings Appin Phyllites and Limestone against Ballachulish Slates and Limestone.

Detail

Lismore Limestone (0)

TheLismore Limestone (0) is restricted in Sheet 53 to Shuna [NM 920 490] and some rocks to the south-west. It is dark grey and fairly pure.

Cuil Bay Slates (1)

The Cuil Bay Slates (1) are black or dark grey, and are connected with the Appin Phyllites by interbanding. They occur only in the Cuil Bay Synform, and are seen at Cuil Bay [NM 970 550] and at Lurignich [NM 941 509], 3 miles to the south-west, and again in Shuna [NM 920 490].

Appin Phyllites (2)

The Appin Phyllites (2) outcrop in both the Cuil Bay [NM 970 550] and Glen Sockdale Synforms. They are somewhat more sandy than at Onich, so that much of the formation consists of grey quartzose mica-schist. Near Cuil Bay towards the Appin Limestone, flaggy quartzite intercalations are common; but only one band of Appin Limestone has here been identified, and it lies at the margin of the Appin Quartzite.

Near Kentallen the Appin Phyllites have been converted by the Ballachulish Quartz-Diorite into massive spotted cordierite-hornfels for a quarter of a mile from the contact.

The Appin Phyllites of the south-eastern limb of the Cuil Bay Synform extend south-west to opposite Shuna [NM 920 490] as a coastal, or near-coastal strip.

In the broken Glen Stockdale Synform there are three isolated outcrops of Appin Phyllites. The most northerly is crossed by Glen Duror [NN 010 543], and shows interbanded quartzite and pelitic sediment baked by the Ballachulish Pluton. The middle outcrop lies south of Salachan Glen [NN 000 514], where a quartzitic development separates two stratigraphically distinct bands of Appin Limestone. The most southerly is seen midway between Appin House [NM 932 493] and Glenstockdale farm.

Appin Limestone (3)

The Appin Limestone (3) shows the same characters as at Onich, and is always magnesian. In fact it is being worked for dolomite near Dalnatrat [NM 968 533] south of Cuil Bay, where a thickness of 40 ft is seen, white, saccharoidal and with very little impurity. The dolomite is employed as an ingredient in the manufacture of rock-wool (chapter 23).

In the north-west limb of the Cuil Bay Synform the Appin Limestone is well exposed near Ardsheal [NM 995 574] Cottage, partly on the shore and partly in the cliff of the raised beach. On the shore it is of the striped, Tiger Rock type. In the south-east limb, exposures are excellent between the mouth of Glen Duror [NN 010 543] and Appin railway station at

Portnacroish [NM 926 474]. At the latter place Appin Limestone may be seen passing through a transitional gritty calcareous bed into Appin Quartzite alongside.

Appin Limestone is well developed again in the Glen Stockdale Synform, and for a while south of Salachan Glen [NN 000 514] is in two distinct bands: the one separated from the Appin Quartzite is of the striped variety; the other adjacent to the Appin Quartzite is massive and white.

Appin Quartztite (4)

The Appin Quartztite (4) is exactly as at Onich [NN 025 614], massive and gritty in the half next the Appin Limestone, and striped with black slate in the half next the Ballachulish Slates. In the north-west limb of the Cuil Bay Synform, some of the massive half seems to be missing near Ardsheal Cottage [NM 995 574]. In the main outcrop, however, brought up by the Beinn Sgluich Antiform, the succession is complete.

Ballachulish Slates (5)

Black Ballachulish Slates (5), exposed at intervals along the centre of the Beinn Sgluich Antiform, may be conveniently studied together with the striped transition zone of the Appin Quartzite near the road leading east from Appin railway station. In the Glen Stockdale Synform the slates occur as a long strip associated with Ballachulish Limestone. This strip is a virtual continuation of the Ballachulish Slate outcrop quarried by the roadside, a mile east of Onich. Here, however, it is always bounded to the north-west by the Glen Stockdale Slide which brings it as a rule into contact with Appin Limestone or Phyllite. It is interesting to note that the Glen Stockdale Slide is complementary in character to the Fort William Slide. It is a thrust, whereas it will be remembered the Fort William Slide is a lag.

Ballachulish Limestone (6)

The Ballachulish Limestone (6) is well exposed for seven miles along the south-east limb of the Glen Stockdale Synform. In this position it continues the more south-easterly outcrop of Ballachulish Limestone mapped north-east of Onich. It has the same stratigraphical features, dark grey and relatively pure towards the Ballachulish Slates, and pale grey and impure with white or cream-coloured fairly pure bands towards the Leven Schists. This is well shown in tributary burns of the valley south of Glenstockdale House.

Leven Schists (7)

The Leven Schists (7) of the envelope of the Appin Fold occupy a broad strip of country between Glen Stockdale [NM 950 490] and Glen Creran. For half a mile from the Glen Stockdale [NM 950 490] outcrop of Ballachulish Limestone the group is represented by pale greenish-grey phyllites of the type predominant in northern exposures, though less highly metamorphosed. Beyond this, thin dark seams begin to put in an appearance, just as they do further north in the relatively narrow banded passage zone bordering the Glen Coe Quartzite. In fact, the next three miles measured across strike, right up to the Ballachulish Slide reintroducing Ballachulish Limestone, consist in the main of an exaggeration of this banded zone with an enormous development of quartzose intercalations and black pelitic seams, finely interlaminated.

The pre-eminence of this banded assemblage gives the Leven Schists of the Appin district a distinctly peculiar facies. The change naturally does not come in abruptly: the road and railway cuttings along the shores of Loch Leven, northeast of the Ballachulish Pluton, already show an unusual number of black seams as compared with the north; while, south of the pluton, black seams and quartzitic bands are fairly prominent and gather strength progressively.

A third of a mile within the north-western limit of the banded development, narrow outcrops of quartzite are met with intermittently along a line of strike passing east of Salachan [NN 000 514]. In the north-east the quartzite is massive, white and fine-grained. In the south-west, on the borders of the one-inch map, it is equally massive and white, but markedly gritty; and it is linked by transition types with what appear to be banded Leven Schists. The stratigraphical and structural relations of these small quartzite exposures are as vet uncertain. E.B.B.

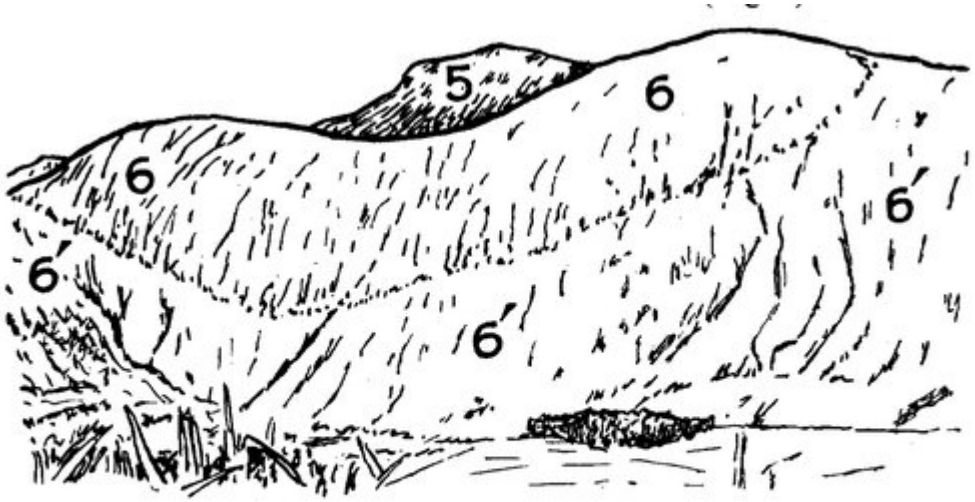

FIG. 3. Sketch of Appin Fold sectioned in S.W. wall of Glen Nevis

5, Baked Ballachulish Slates (youngest) ; 6, Marble of Ballachulish Limestone ; 6′, Calc-silicate-hornfels of Ballachulish Limestone

(Figure 3) Sketch of Appin Fold sectioned in S.W. wall of Glen Nevis 5, Baked Ballachulish Slates (youngest); 6, Marble of Ballachulish Limestone; 6′, Cale-silicate-hornfels of Ballachulish Limestone.

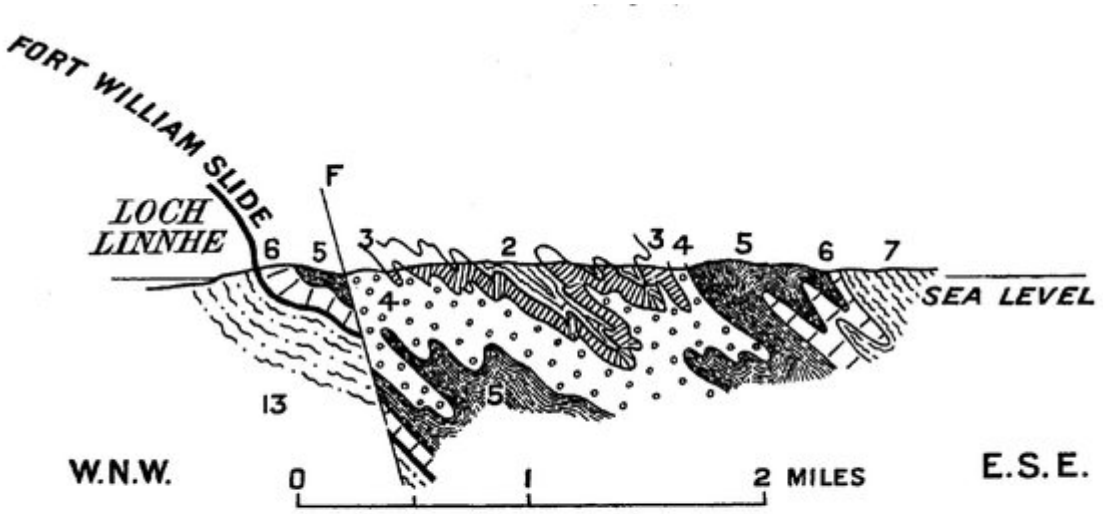

FIG. 2. Section across Appin Fold : Onich shore

2, Appin Phyllites (youngest) ; 3, Appin Limestone ; 4, Appin Quartzite ; 5, Ballachulish Slates ; 6, Ballachulish Limestone ; 7, Leven Schists ; 13, Eilde Flags

(Figure 2) Section across Appin Fold: Onich shore. 2, Appin Phyllites (youngest); 3, Appin Limestone; 4, Appin Quartzite; 5, Ballachulish Slates; 6, Ballachulish Limestone; 7, Leven Schists; 13 Eilde Flags.

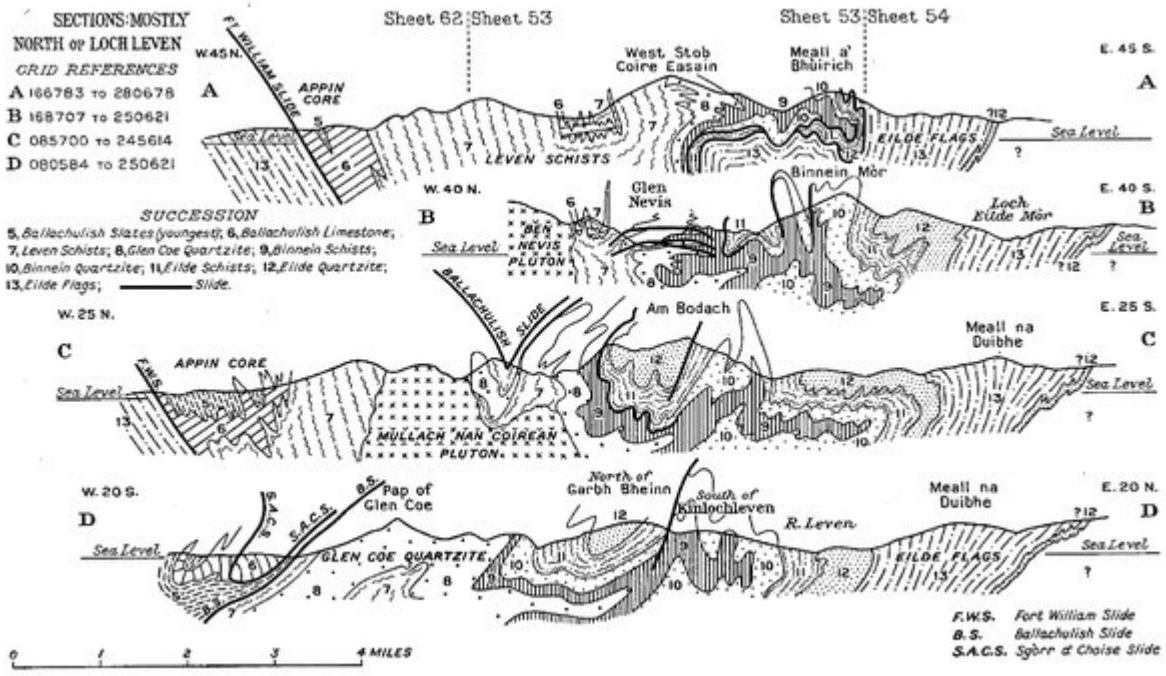

FIG. 14. Sections : mostly north of Loch Leven

(Figure 14) Sections: mostly north of Loch Leven A [NN 166 783] to [NN 280 678]; B [NN 168 707] to [NN 250 621]; C [NN 085 700] to [NN 245 614]; D [NN 080 584] to [NN 250 621].

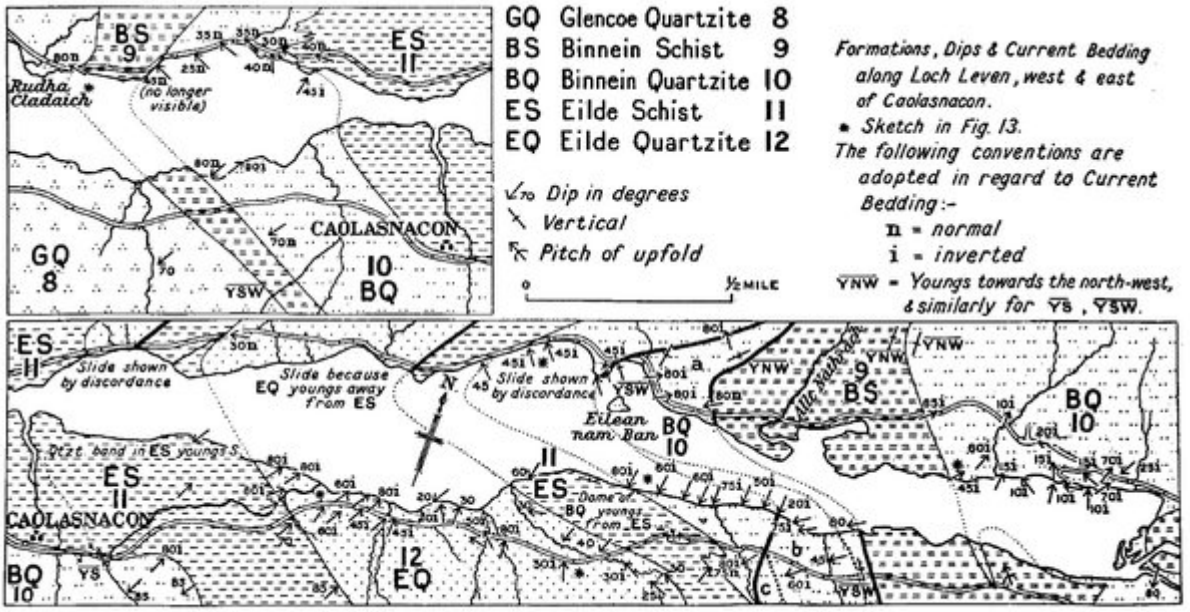

FIG. 15 (West above, east below). Formations, dip and current-bedding west and east of Caolasnacon

(Figure 15) (West above, east below). Formations, dip and current-bedding west and east of Caolasnacon.

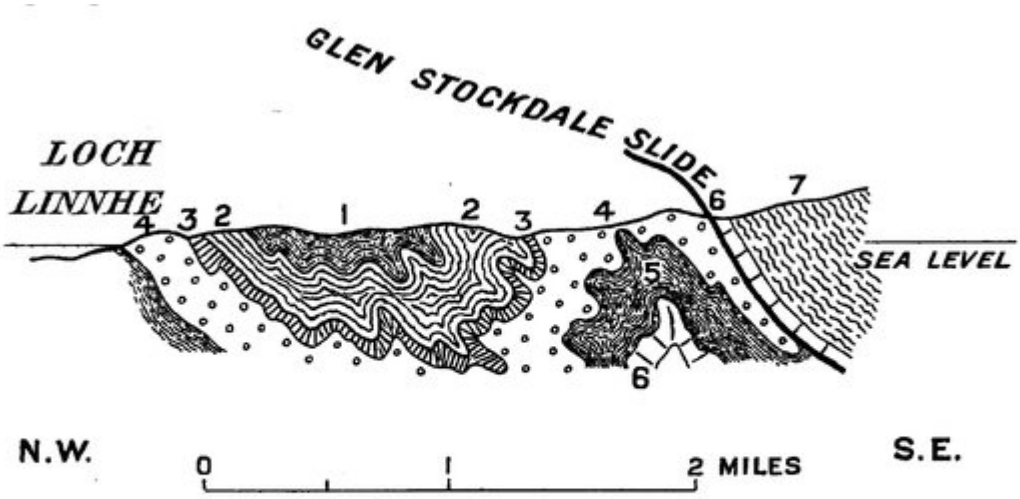

FIG. 4. Section across Appin Fold north of Cuil Bay

1, Cuil Bay Slates (youngest) ; 2, Appin Phyllites ; 3, Appin Limestone ; 4, Appin Quartzite ; 5, Ballachulish Slates ; 6, Ballachulish Limestone ; 7, Leven Schists

(Figure 4) Section across Appin Fold north of Cuil Bay1, Cuil Bay Slates (youngest); 2, Appin Phyllites; 3, Appin Limestone; 4, Appin Quartzite; 5, Ballachulish Slates; 6, Ballachulish Limestone; 7, Leven Schists.

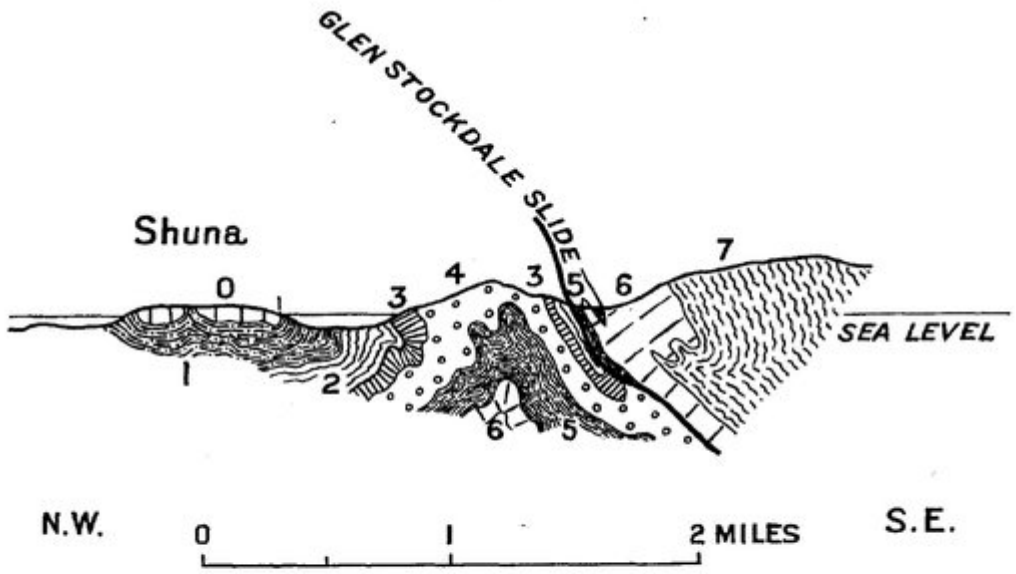

FIG. 5. Section across Appin Fold in Island of Shuna and Glen Stockdale

0, Lismore Limestone (youngest) ; 1, Cuil Bay Slates ; 2, Appin Phyllites ; 3, Appin Limestone ; 4, Appin Quartzite ; 5, Ballachulish Slates ; 6, Ballachulish Limestone ; 7, Leven Schists

(Figure 5) Section across Appin Fold in Island of Shuna [NM 920 490] and Glen Stockdale [NM 950 490] 0, Lismore Limestone (youngest); 1, Cuil Bay Slates; 2, Appin Phyllites; 3, Appin Limestone; 4, Appin Quartzite; 5, Ballachulish Slates; 6, Ballachulish Limestone; 7, Leven Schists.