Tables

(Table 2.1) Summary of the Palaeocene igneous geology of the Isle of Skye (based on Bell, J.D., 1976, table 1; Bell, B.R. and Harris, 1986)

Late dykes (dolerite, felsite and peridotite)
Eastern Red Hills Centre
Composite acid/basic sheets
Five granite intrusions
Kilchrist hybrids (possibly post-date some of the granites)
Broadford and Beinn nan Cro gabbros
Acid lavas, ignimbrites, tuffs and agglomerates of Kilchrist vent (may pre-date this Centre by a considerable amount)
Dykes (dolerite, pitchstone)
Western Red Hills Centre
Marsco and Meall Buidhe granites
Marscoite suite of hybrids, etc.
Nine granite and major felsite intrusions
Marsco Summit Gabbro
Belig vent
Dykes (dolerite)
Strath na Crèitheach Centre Three granite intrusions Loch na Crèitheach vent
Dykes (dolerite)
Cuillin Centre
Cone-sheets (dolerite)
Coire Uaigneich Granophyre (but see text)
Intrusive tholeiites
Druim na Ramh Eucrite
Explosive vents (of several ages)
Inner Layered Series: allivalite, eucrite, gabbro
Outer Layered Series: allivalite, eucrite, gabbro
Layered Peridotite Series
Border Group: gabbro, allivalite
Cone-sheets and dykes (overlap with many of the above)
Palaeocene lavas
Preshal More tholeiitic flows
Skye Main Lava Series (SMLS) flows (with sparse clastic
sedimentary horizons, and basal sediments and tuffs)
N.B. Additional details through text.

(Table 2.2) Correlation of the divisions of the Palaeocene lavas of the Isle of Skye (mainly after Williamson, 1979, table 1).

NORTHERN SKYE	WEST-CENTRAL SKYE	Based mainly on NORTHERN SKYE
(1) Anderson and Dunham (1966)	(2) Williamson (1979)	(3) Thompson *et al.* (1972)
	7. Talisker Group	Preshal Mhor tholeiitic basalts

	6. Loch Dubh Group	Skye Main Lava Series
5. Osdale Group	5. Arnaval Group	Transitional and alkali-olivine basalts, hawaiites, mugearites, benmoreites and trachytes.
4. Bracadale Group	4. Tusdale Group	
3. Beinn Totaig Group	3. Cruachan Group*	
2. Ramascaig Group	2. Bualintur Group	More fractionated types are more common in the higher groups.
1. Beinn Edra Group	1. Meacnaish Group	

Individual groups are probably geographically restricted (see, for example Anderson and Dunham, 1966, figure 13)

* The thick fluviatile conglomerates of the Allt Geodh a' Ghamhna site are at the base of this group.

(Table 2.3) The succession at Allt Geodh a' Ghamhna (after Williamson, 1979, table 2)

14	Thin, alkali olivine basalts with scoriaceous tops	7 m
13	Massive basaltic lava with pillow structures towards the base	5 m
12	Thin white ash	0.03 m
11	Coal	0.05 m
10	Sandstone with obscure plant remains occurring as diffuse carbonaceous streaks and rootlets, possibly seat earth	0.2 m
9	Coal	0.01–0.05 m
8	Conglomerate with well-packed, rounded pebbles and cobbles of granophyre, quartzite, porphyritic rhyolite and red arkose. Clasts have a maximum diameter of 0.10–0.15 m, and are set in a pale sandy matrix	3.2 m
7	Sandstone with micaceous partings	0.2 m
6	Coal	0.02 m
5	Sandstone with plant remains	1.8 m
4	Conglomerate with a more sandy matrix than Bed 2, and a smaller proportion of acid igneous to arenaceous sediments than Bed 8. Rare pebbles of amygdaloidal and feldspar macroporphyritic basalt. Clast size <0.30 m, averaging 0.10–0.15 m. Thin lenses of white sandstone in lower horizons	2.3 m
3	Fine-grained sandstone, laminated base	1.1 m
2	Massive conglomerate with densely packed, crudely imbricated clasts of red arkose up to 0.30 m in diameter. Contains green siltstones with a sandstone wedge thickening to the north	2.75 m
1	Highly amygdaloidal basaltic lavas forming the top of the cliff at about 125 m elevation 10 m	

(Table 2.4) Minerals present in skarn zones (after Tilley, 1951, Table 1)

Aureole beyond the skarn zones	Skarn zones Group 1 Primary skarns	Skarn zones Group 2	
		Boron-fluorine ore skarns	
Talc	Grossular-andradite*	Magnetite*	Grossular-andradite
Tremolite	Wollastonite solid solutions*	Tremolite	Hydro grossular
Forsterite	Diopside-hedenbergite	Forsterite*	Idocrase
Diopside	Spinel	Diopside*	Bornite
Periclase	Plagioclase	Monticellite*	Chalcosite
Wollastonite	Idocrase	Cuspidine*	Covellite
Spinel	Xanthophyllite	Fluorite	Chalcopyrite
Idocrase	Phlogopite	Chondrodite*	Pyrite
Grossular	Orthite	Humite	Blende
Phlogopite	Clinozoisite-epidote	Clinohumite	Galena
Brucite	Prehnite	Ludwigite	Chessylite
Serpentine	Apophyllite	Fluoborite	Malachite
Chlorite	Pectolite	Szailbelyite	
Hydromagnesite	Xonotlite	Datolite	
		Harkerite	

* most abundant minerals

(Table 2.5) Succession in the Cuillin Hills site (after Bell and Harris, 1986, pp. 45–6)

Granites of the Strath na Crèitheach Centre
Volcaniclastic deposits of Strath na Crèitheach dolerite cone-sheets
Coire Uaigneich Granite
Intrusive tholeiites of the Outer and Main Ridge Complexes
Inner Layered Series
Inner Layered Gabbros
(?vent agglomerates in Harta Corrie)
Inner Layered Eucrites
Inner Layered Allivalites
Druim nan Ramh Eucrite
Agglomerates and explosion breccias of diatremes
Dykes
(Gars Bheinn ultrabasic sill?)
Outer Layered Series
Outer Layered Gabbros
Outer Layered Eucrites
Outer Layered Allivalites
Layered Peridotites
Border Group (including White Allivalite)
Cone-sheets
Dykes
Outer Marginal Gabbros and Eucrites
?**Early Granites (may pre-date Palaeocene basalts of south-west Skye)**
Basalt lavas
Torridonian sediments

(Table 3.1) Summary of the Palaeocene igneous geology of Rum and the Small Isles (based on Emeleus and Forster, 1979, table 1, with later amendments)

Valley-filling pitchstone of the Sgurr of Eigg, and associated conglomerates Dolerite dykes
Lavas and fluviatile sediments of north-west Rum and Canna-Sanday, olivine basalts, hawaiites, mugearite (on Canna), including also tholeiitic basaltic andesite, icelandite (on Rum)
—Period of profound erosion during which the Rum central igneous complex was unroofed and eroded—
The Rum Layered Igneous Complex:
Central Series: feldspathic peridotites, including breccias and some layered allivalites and peridotites
Western Layered Series (WLS): feldspathic peridotites and gabbroic rocks at Harris
Eastern Layered Series (ELS): layered feldspathic peridotite and allivalite, also gabbroic and ultrabasic intrusive bodies
(The WLS and ELS above may be coeval)
Dolerite and basalt dykes (some also post-date the Layered Igneous Complex)
Dolerite and basalt cone-sheets on Rum
Early phase of acid igneous activity:
Western Granite, also granite at Papadil and Long Loch
Porphyritic felsite (ignimbrites, in caldera, and intrusions)
Tuffisites (some may post-date porphyritic felsite)
Volcaniclastic breccias - probably a mixture of explosion breccias and breccias formed by caldera wall collapse
Dolerite and basalt dykes (some intruded after breccias and prior to felsites)
Initiation of the Main Ring Fault System: movement on this system of arcuate faults probably continued at least until emplacement of the ELS/WIS and was a major tectonic feature during the early acid phase of igneous activity.
Lavas of Eigg and Muck, and those involved in the Main Ring Fault on Rum. Principally olivine basalts, feldspar-phyric olivine basalts and mugearites on Eigg. The dykes cutting these lavas belong to the main post-felsite and granite phase of dyke intrusion on Rum. Thin sedimentary layers occur in the Eigg and Muck successions.

(Table 3.2) Harris Bay: subdivisions of the ultrabasic and basic layered rocks (modified from Wadsworth, 1961, table 1, with amended Western Layered Series).

	Thickness	Distinctive features
Upper Ruinsival Series	~ 330 m	Both Ruinsival series show an upwards gradation from olivine cumulates often with feldspar to feldspar-olivine cumulates often with pyroxene.
Lower Ruinsival Series*	~ 500 m	Exposure is generally poor and the sequence is complicated by transgressive later intrusions, zones of igneous breccia and structural disturbances. In places, gravity stratification, rhythmic layering and slump structures occur.
Transition Layer	~ 0.5 m	Olivine-feldspar cumulate. Variable dips (5°-50°) in all directions but predominantly in general easterly direction.

Dornabac Series	~ 130 m	Olivine-feldspar and feldspar olivine cumulates often with streaky or rhythmic layering and frequently with slump structures and evidence of gravity stratification. Layering dips at 35° to 40° to the east and southeast. The rocks show similarities to the allivalites of the Hallival–Askival area. Feldspathic peridotite breccia at the base of the Central Series cuts transgressively across all Western Layered Series units.
Ard Mheall Series	~ 400 m	Olivine and olivine-feldspar cumulates with rhythmic layering throughout. Harrisitic cumulates are intimately associated with normal cumulates and are very prominent within the lower half to two-thirds of the sequence and they are also locally important higher in the series. The layering has a general dip of 5° to 10° (exceptionally 15°) to the south-east or east.
Transition Series	~ 50–60 m	Olivine-feldspar cumulates, often with pyroxene, of both harrisitic and normal types. Olivine is more abundant than in the Harris Bay Series, while the content of feldspar is higher than in the Ard Mheall Series.
Harris Bay Series	~130–140 m	Essentially eucritic mesocumulates in texture with olivine, feldspar and ubiquitous pyroxene as cumulus phases. Olivine is the most abundant phase and forms distinctive tabular crystals exhibiting igneous lamination in the normal cumulates. Intercalations of generally thin harrisitic cumulates (crescumulates) richer in feldspar and pyroxene than those of the Ard Mheall Series occur. Layering dips at low angles (5–10°) to the north-east.
		* Now termed the Long Loch Group (of Volker and Upton, 1990).
		Part of Central Series: Upper Ruinsval Series to Ard Mheall Series **Amended (1982) Western Layered Series**: Ard Mheall Series to Transition Series

(Table 4.1) The geological succession in the Ardnamurchan Central Complex (based on Richey and Thomas, 1930, Chapter 7)

(youngest)
Late NNW-trending dolerite dykes

Centre 3
Quartz monzonite
Tonalite
Fluxion biotite gabbro of Glendrain
Fluxion biotite gabbro of Sithean Mòr
Quartz-biotite gabbro
Quartz dolerite, granophyre-veined
Inner Eucrite
Biotite eucrite
Quartz gabbro, southern side of Meall an Tarmachain
Quartz gabbro of Meall an Tarmachain summit
Outer Eucrite
Great Eucrite
Cone-sheets of Centre 3 (sparse)
Porphyritic gabbro of Meall nan Con screen
Gabbro, south-east of Rudha Groulin
Gabbro of Plochaig
Fluxion gabbro of Faskadale
Quartz gabbro of Faskadale
(Migration of focus of activity to Achnaha area)
Centre 2
Felsite, south of Aodann
Fluxion gabbro of Portuairk
Younger quartz gabbro of Beinn Bhuidhe
Quartz gabbro of Beinn na Seilg
Quartz gabbro of Loch Caorach
Eucrite of Beinn nan Ord
Inner cone-sheets of Centre 2
Quartz dolerite of Sgurr nam Meann
Quartz gabbro of Aodann
Older quartz gabbro of Beinn Bhuidhe
Granophyre of Grigadale
Quartz gabbro of Garbh-dhail
Old Gabbro of Lochan an Aodainn
Hypersthene gabbro of Ardnamurchan Point
Glas Eilean vent
Outer cone-sheets of Centre 2
(Migration of focus of activity to Aodann area [NM 453 664])
Centre 1 and the Ben Hiant vent*
Cone-sheets of Centre 1 (penecontemporaneous with the quartz dolerite intrusion of Ben Hiant)
Ben Hiant quartz dolerite
Composite intrusion of Beinn an Leathaid
Augite diorite of Camphouse
Quartz dolerite of Camphouse
Porphyritic dolerite of Ben Hiant
Granophyre west of Faskadale
Quartz gabbro west of Faskadale
Old Gabbro of Meall nan Con
Porphyritic dolerite of Glas Bheinn
Agglomerates of Northern Vents
Tuffs, agglomerates and lavas of Ben Hiant vents
Trachyte plug

(Igneous activity localized at Ben Hiant and also centred on a focus *c.* 1.3 km west of Meall nan Con)
Palaeocene basalt lavas and thin sediments
Jurassic and Triassic sandstones, shales, limestones, conglomerates
Moine metasediments
(oldest)
*The relative ages of many of the units assigned to Centre 1 and Ben Hiant are uncertain. (From Emeleus, in Sutherland, 1982, table 29.5).

(Table 5.1) The Mull Central Complex: sequence of events (after Skelhorn, 1969, pp. 2–6)

(youngest)
Dykes were intruded throughout the sequence (Loch Bà-Ben More)
Loch Bà Centre (Centre 3; North-West or Late Caldera)
Loch Bà felsite ring-dyke (Allt Molach-Beinn Chaisgidle, Loch Bà–Ben More)
Hybrid masses of Sron nam Boc and Coille na Sroine (Loch Bà–Ben More)
Beinn a' Ghraig Granophyre (Loch Bà–Ben More)
Knock Granophyre (Loch Bà–Ben More)
Late basic cone-sheets (Loch Bà–Ben More)
Early Beinn a' Ghraig Granophyre and felsite (Loch Bà–Ben More)
Glen Cannel complex and some late basic cone-sheets
(Allt Molach-Beinn Chaisgidle, Loch Bà–Ben More)
Beinn Chaisgidle Centre (Centre 2)
Glen More ring-dyke (Loch Sguabain, Cruach Choireadail)
Late basic cone-sheets (Allt Molach–Beinn Chaisgidle), Loch Scridain sheets (intruded towards middle and end of Centre 2 and start of Centre 3)
Ring-dyke intrusions around Beinn Chaisgidle
?Augite diorite masses of An Cruachan and Gaodhail (Loch Bà–Ben More)
Corra-bheinn layered gabbro (Loch Bà–Ben More)
Second suite of early basic cone-sheets
Second suite of early acid cone-sheets
Explosion vents (numerous at margin of the South-East Caldera) (Loch Bà–Ben More)
Glen More Centre (Centre 1; including the Early or South-East Caldera)
Ben Buie layered gabbro
Loch Uisg granophyre-gabbro
First suite of early basic cone-sheets (Loch Bà–Ben More)
Early acid and intermediate cone-sheets (Loch Bà–Ben More)
Acid explosion vents containing porphyritic rhyolite material (Loch Bà–Ben More)
Glas Bheinn and Derrynaculen granophyres (Loch Spelve–Auchnacraig)
Updoming and folding in south-east Mull as a result of rising diapir (Loch Spelve–Auchnacraig).
Lava eruption on to eroded surface of Mesozoic and older rocks. Latest flows overlap in time with formation of the South-East Caldera where pillow lavas are found. (Lavas: Bearraich, Ardtun, Carsaig Bay, Loch Bà–Ben More. Pillow lavas: Loch Sguabain, Cruach Choireadail)
(oldest)

(Table 5.2) Classification and correlation of the Mull lavas

Mull Memoir (Bailey *et al.,* 1924)	Beckinsale *et al.* (1978)	Morrison (1978) Thompson *et al.* (1982) Morrison *et al.* (1985) Thompson *et al.* (1986)
Central Group (= NPCMT) (Includes pillow lavas in central complex)	Not dealt with in detail	Some samples analysed, all zeolitized or hydrothermally altered.

Plateau Group (majority = PMT)	Group 1 olivine basalts (mainly sampled in north-west Mull) and Group 3 olivine basalts (mainly sampled around Lochaline, Morven)	Mull Plateau Group (MPG)
Pale Group of Ben More (= PMT) (with interlayered mugearite and Big-Feldspar Basalt)		Note that many are transitional between alkali basalt and tholeiite, and compare closely with Skye Main Lava Series. Some lower crust contamination.
(Staffa Type at base = NPCMT)	Group 2 of south-west Mull	Staffa Magma Type (SMT) Variably enriched in lower and upper crustal contaminants.

(NPCMT = Non-Porphyritic Central Magma Type) later = tholeiitic basalt

(PMT = Plateau Magma Type) later = alkali olivine basalt but many flows are in fact transitional between alkali basalt and tholeiite

Total thickness of Mull lavas estimated about 2000 m (Bailey *et al.,* 1924)

(Table 6.2) Petrological variation within the Dippin Sill (based on Gibb and Henderson, 1978b, figure 4)

Rock type	Position within sill	Petrological features
(a) Crinanite	Central = forms the bulk of the intrusion	Plagioclase, analcite, olivine, ophitic Al-, Ti-rich augite. Zeolites. Analcite, secondary after nepheline and of hydrothermal origin. Olivine up to 12 vol.% about 10–15 m above base.
(b) Teschenite	Marginal facies = fine-grained margins showing quench textures	Lacks fresh olivine, substantial amounts of analcite, zeolites and calcite. Margins have skeletal Ti-augites.
(c) Augite teschenite	Patches within crinanites, especially towards base.	Augite, plagioclase, analcite. Alignment of augite suggests cumulate texture. Fe-Ti oxides more abundant than in crinanite.
(d) Pegmatite(i)	At several horizons throughout sill, centimetres to metres in thickness	Brown augite with emerald-green rims (Na-rich), plagioclase, analcite, Fe-oxides, apatite, rare blue riebeckitic amphibole and rare olivine pseudomorphs. Variant of augite teschenite.
(e)Pegmatite (ii)	As pegmatite (i)	Mineralogically as (i) but has less pyroxene and is much coarser grained. Skeletal magnetite and ophitic augite, rather than euhedral as in (i).

(Table 7.1) Geological succession in the St Kilda archipelago (adapted from the British Geological Survey 1:25 000 Special Sheet, St Kilda)

Pleistocene glaciation
Palaeocene igneous activity
Basaltic and composite (acid and basic) inclined sheets and dykes
Conachair Granite
Mullach Sgar Complex (mixed magma (basic-acid) intrusions)
Glen Bay Granite
Glen Bay Gabbro
Breccias of gabbro and dolerite
Western Gabbro (layered in places)

No pre-Palaeocene rocks are exposed, but the complex is thought to be intruded into Lewisian gneisses.

References

Late dykes (dolerite, felsite and peridotite)

Eastern Red Hills Centre
- Composite acid/basic sheets
- Five granite intrusions
- Kilchrist hybrids (possibly post-date some of the granites)
- Broadford and Beinn nan Cro gabbros
- Acid lavas, ignimbrites, tuffs and agglomerates of Kilchrist vent (may pre-date this Centre by a considerable amount)

Dykes (dolerite, pitchstone)

Western Red Hills Centre
- Marsco and Meall Buidhe granites
- Marscoite suite of hybrids, etc.
- Nine granite and major felsite intrusions
- Marsco Summit Gabbro
- Belig vent

Dykes (dolerite)

Strath na Crèitheach Centre
- Three granite intrusions
- Loch na Crèitheach vent

Dykes (dolerite)

Cuillin Centre
- Cone-sheets (dolerite)
- Coire Uaigneich Granophyre (but see text)
- Intrusive tholeiites
- Druim na Ramh Eucrite
- Explosive vents (of several ages)
- Inner Layered Series: allivalite, eucrite, gabbro
- Outer Layered Series: allivalite, eucrite, gabbro
- Layered Peridotite Series
- Border Group: gabbro, allivalite
- Cone-sheets and dykes (overlap with many of the above)

Palaeocene lavas
- Preshal More tholeiitic flows
- Skye Main Lava Series (SMLS) flows (with sparse clastic sedimentary horizons, and basal sediments and tuffs)

N.B. Additional details through text.

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NORTHERN SKYE (1) Anderson and Dunham (1966)	WEST-CENTRAL SKYE (2) Williamson (1979)	Based mainly on NORTHERN SKYE (3) Thompson *et al.* (1972)
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5. Osdale Group	6. Loch Dubh Group 5. Arnaval Group	Skye Main Lava Series
4. Bracadale Group	4. Tusdale Group	
3. Beinn Totaig Group	3. Cruachan Group*	Transitional and alkali-olivine basalts, hawaiites, mugearites, benmoreites and trachytes. More fractionated types are more common in the higher groups.
2. Ramascaig Group 1. Beinn Edra Group	2. Bualintur Group 1. Meacnaish Group	

Individual groups are probably geographically restricted (see, for example, Anderson and Dunham, 1966, figure 13).

* The thick fluviatile conglomerates of the Allt Geodh a' Ghamhna site are at the base of this group.

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11	Coal	0.05 m
10	Sandstone with obscure plant remains occurring as diffuse carbonaceous streaks and rootlets, possibly seat earth	0.2 m
9	Coal	0.01–0.05 m
8	Conglomerate with well-packed, rounded pebbles and cobbles of granophyre, quartzite, porphyritic rhyolite and red arkose. Clasts have a maximum diameter of 0.10–0.15 m, and are set in a pale sandy matrix	3.2 m
7	Sandstone with micaceous partings	0.2 m
6	Coal	0.02 m
5	Sandstone with plant remains	1.8 m
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2	Massive conglomerate with densely packed, crudely imbricated clasts of red arkose up to 0.30 m in diameter. Contains green siltstones with a sandstone wedge thickening to the north	2.75 m
1	Highly amygdaloidal basaltic lavas forming the top of the cliff at about 125 m elevation	10 m

(Table 2.3) The succession at Allt Geodh a' Ghamhna (after Williamson, 1979, table 2)

Aureole beyond the skarn zones	Skarn zones: Group 1 Primary skarns	Skarn zones: Group 2 Boron–fluorine ore skarns	
Talc	Grossular–andradite*	Magnetite*	Grossular-andradite
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Spinel	Xanthophyllite	Fluorite	Chalcopyrite
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Brucite	Prehnite	Ludwigite	Chessylite
Serpentine	Apophyllite	Fluoborite	Malachite
Chlorite	Pectolite	Szailbelyite	
Hydromagnesite	Xonotlite	Datolite	
		Harkerite	

* most abundant minerals

(Table 2.4) Minerals present in skarn zones (after Tilley, 1951, Table 1)

Granites of the Strath na Crèitheach Centre

Volcaniclastic deposits of Strath na Crèitheach dolerite cone-sheets

Coire Uaigneich Granite

Intrusive tholeiites of the Outer and Main Ridge Complexes

Inner Layered Series
- Inner Layered Gabbros
- (?vent agglomerates in Harta Corrie)
- Inner Layered Eucrites
- Inner Layered Allivalites

Druim nan Ramh Eucrite
- Agglomerates and explosion breccias of diatremes
- Dykes
  - (Gars Bheinn ultrabasic sill?)

Outer Layered Series
- Outer Layered Gabbros
- Outer Layered Eucrites
- Outer Layered Allivalites
- Layered Peridotites

Border Group (including White Allivalite)
- Cone-sheets
- Dykes

Outer Marginal Gabbros and Eucrites

?Early Granites (may pre-date Palaeocene basalts of south-west Skye)

Basalt lavas

Torridonian sediments

(Table 2.5) Succession in the Cuillin Hills site (after Bell and Harris, 1986, pp. 45–6)

Valley-filling pitchstone of the Sgurr of Eigg, and associated conglomerates
Dolerite dykes
Lavas and fluviatile sediments of north-west Rum and Canna–Sanday, olivine basalts, hawaiites, mugearite (on Canna), including also tholeiitic basaltic andesite, icelandite (on Rum)
—— Period of profound erosion during which the Rum —— central igneous complex was unroofed and eroded
The Rum Layered Igneous Complex:
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Eastern Layered Series (ELS): layered feldspathic peridotite and allivalite, also gabbroic and ultrabasic intrusive bodies (The WLS and ELS above may be coeval)
Dolerite and basalt dykes (some also post-date the Layered Igneous Complex)
Dolerite and basalt cone-sheets on Rum
Early phase of acid igneous activity:
Western Granite, also granite at Papadil and Long Loch
Porphyritic felsite (ignimbrites, in caldera, and intrusions)
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Volcaniclastic breccias – probably a mixture of explosion breccias and breccias formed by caldera wall collapse
Dolerite and basalt dykes (some intruded after breccias and prior to felsites)

Initiation of the Main Ring Fault System: movement on this system of arcuate faults probably continued at least until emplacement of the ELS/WLS and was a major tectonic feature during the early acid phase of igneous activity.

Lavas of Eigg and Muck, and those involved in the Main Ring Fault on Rum. Principally olivine basalts, feldspar-phyric olivine basalts and mugearites on Eigg. The dykes cutting these lavas belong to the main post-felsite and granite phase of dyke intrusion on Rum. Thin sedimentary layers occur in the Eigg and Muck successions.

(Table 3.1) Summary of the Palaeocene igneous geology of Rum and the Small Isles (based on Emeleus and Forster, 1979, table 1, with later amendments)

		Thickness	Distinctive features
PART OF CENTRAL SERIES	Upper Ruinsival Series	~ 330 m	Both Ruinsival series show an upwards gradation from olivine cumulates often with feldspar to feldspar–olivine cumulates often with pyroxene.
	Lower Ruinsival Series*	~ 800 m	Exposure is generally poor and the sequence is complicated by transgressive later intrusions, zones of igneous breccia and structural disturbances. In places, gravity stratification, rhythmic layering and slump structures occur.
	Transition Layer	~ 0.8 m	Olivine–feldspar cumulate. Variable dips (5°–50°) in all directions but predominantly in general easterly direction.
	Dornabac Series	~ 130 m	Olivine–feldspar and feldspar olivine cumulates often with streaky or rhythmic layering and frequently with slump structures and evidence of gravity stratification. Layering dips at 35° to 40° to the east and south-east. The rocks show similarities to the allivalites of the Hallival–Askival area. Feldspathic peridotite breccia at the base of the Central Series cuts transgressively across all Western Layered Series units.
AMENDED (1982) WESTERN LAYERED SERIES	Ard Mheall Series	~ 400 m	Olivine and olivine-feldspar cumulates with rhythmic layering throughout. Harrisitic cumulates are intimately associated with normal cumulates and are very prominent within the lower half to two-thirds of the sequence and they are also locally important higher in the series. The layering has a general dip of 5° to 10° (exceptionally 15°) to the south-east or east.
	Transition Series	~ 50–60 m	Olivine-feldspar cumulates, often with pyroxene, of both harrisitic and normal types. Olivine is more abundant than in the Harris Bay Series, while the content of feldspar is higher than in the Ard Mheall Series.
		Thickness	Distinctive features
	Harris Bay Series	~130–140 m	Essentially eucritic mesocumulates in texture with olivine, feldspar and ubiquitous pyroxene as cumulus phases. Olivine is the most abundant phase and forms distinctive tabular crystals exhibiting igneous lamination in the normal cumulates. Intercalations of generally thin harrisitic cumulates (crescumulates) richer in feldspar and pyroxene than those of the Ard Mheall Series occur. Layering dips at low angles (5–10°) to the north-east.

* Now termed the Long Loch Group (of Volker and Upton, 1990).

(Table 3.2) Harris Bay: subdivisions of the ultrabasic and basic layered rocks (modified from Wadsworth, 1961, table 1, with amended Western Layered Series).

(youngest)

- Late NNW-trending dolerite dykes

Centre 3

- Quartz monzonite
- Tonalite
- Fluxion biotite gabbro of Glendrain
- Fluxion biotite gabbro of Sithean Mor
- Quartz–biotite gabbro
- Quartz dolerite, granophyre-veined
- Inner Eucrite
- Biotite eucrite
- Quartz gabbro, southern side of Meall an Tarmachain
- Quartz gabbro of Meall an Tarmachain summit
- Outer Eucrite
- Great Eucrite
- Cone-sheets of Centre 3 (sparse)
- Porphyritic gabbro of Meall nan Con screen
- Gabbro, south-east of Rudha Groulin
- Gabbro of Plochaig
- Fluxion gabbro of Faskadale
- Quartz gabbro of Faskadale

(Migration of focus of activity to Achnaha area)

Centre 2

- Felsite, south of Aodann
- Fluxion gabbro of Portuairk
- Younger quartz gabbro of Beinn Bhuidhe
- Quartz gabbro of Beinn na Seilg
- Quartz gabbro of Loch Caorach
- Eucrite of Beinn nan Ord
- Inner cone-sheets of Centre 2
- Quartz dolerite of Sgurr nam Meann
- Quartz gabbro of Aodann
- Older quartz gabbro of Beinn Bhuidhe
- Granophyre of Grigadale
- Quartz gabbro of Garbh-dhail
- Old Gabbro of Lochan an Aodainn
- Hypersthene gabbro of Ardnamurchan Point
- Glas Eilean vent
- Outer cone-sheets of Centre 2

(Migration of focus of activity to Aodann area [NM 453 664])

Centre 1 and the Ben Hiant vent*

- Cone-sheets of Centre 1 (penecontemporaneous with the quartz dolerite intrusion of Ben Hiant)
- Ben Hiant quartz dolerite
- Composite intrusion of Beinn an Leathaid
- Augite diorite of Camphouse
- Quartz dolerite of Camphouse

- Porphyritic dolerite of Ben Hiant
- Granophyre west of Faskadale
- Quartz gabbro west of Faskadale
- Old Gabbro of Meall nan Con
- Porphyritic dolerite of Glas Bheinn
- Agglomerates of Northern Vents
- Tuffs, agglomerates and lavas of Ben Hiant vents
- Trachyte plug

(Igneous activity localized at Ben Hiant and also centred on a focus c. 1.3 km west of Meall nan Con)

- Palaeocene basalt lavas and thin sediments
- Jurassic and Triassic sandstones, shales, limestones, conglomerates
- Moine metasediments

(oldest)

*The relative ages of many of the units assigned to Centre 1 and Ben Hiant are uncertain. (From Emeleus, in Sutherland, 1982, table 29.5).

(Table 4.1) The geological succession in the Ardnamurchan Central Complex (based on Richey and Thomas, 1930, Chapter 7)

(youngest)

- Dykes were intruded throughout the sequence (Loch Bà–Ben More)

Loch Bà Centre (Centre 3; North-West or Late Caldera)

- Loch Bà felsite ring-dyke (Allt Molach–Beinn Chaisgidle, Loch Bà–Ben More)
- Hybrid masses of Sron nam Boc and Coille na Sroine (Loch Bà–Ben More)
- Beinn a' Ghraig Granophyre (Loch Bà–Ben More)
- Knock Granophyre (Loch Bà–Ben More)
- Late basic cone-sheets (Loch Bà–Ben More)
- Early Beinn a' Ghraig Granophyre and felsite (Loch Bà–Ben More)
- Glen Cannel complex and some late basic cone-sheets (Allt Molach–Beinn Chàisgidle, Loch Bà–Ben More)

Beinn Chàisgidle Centre (Centre 2)

- Glen More ring-dyke (Loch Sguabain, Cruach Choireadail)
- Late basic cone-sheets (Allt Molach–Beinn Chàisgidle), Loch Scridain sheets (intruded towards middle and end of Centre 2 and start of Centre 3)
- Ring-dyke intrusions around Beinn Chàisgidle
- ?Augite diorite masses of An Cruachan and Gaodhail (Loch Bà–Ben More)
- Corra-bheinn layered gabbro (Loch Bà–Ben More)
- Second suite of early basic cone-sheets
- Second suite of early acid cone-sheets
- Explosion vents (numerous at margin of the South-East Caldera) (Loch Bà–Ben More)

Glen More Centre (Centre 1; including the Early or South-East Caldera)

- Ben Buie layered gabbro
- Loch Uisg granophyre-gabbro
- First suite of early basic cone-sheets (Loch Bà–Ben More)
- Early acid and intermediate cone-sheets (Loch Bà–Ben More)
- Acid explosion vents containing porphyritic rhyolite material (Loch Bà–Ben More)
- Glas Bheinn and Derrynaculen granophyres (Loch Spelve–Auchnacraig)

Updoming and folding in south-east Mull as a result of rising diapir (Loch Spelve–Auchnacraig).

Lava eruption on to eroded surface of Mesozoic and older rocks. Latest flows overlap in time with formation of the South-East Caldera where pillow lavas are found. (Lavas: Bearraich, Ardtun, Carsaig Bay, Loch Bà–Ben More. Pillow lavas: Loch Sguabain, Cruach Choireadail)

(oldest)

(Table 5.1) The Mull Central Complex: sequence of events (after Skelhorn, 1969, pp. 2–6)

Mull Memoir (Bailey *et al.*, 1924)	Beckinsale *et al.* (1978)	Morrison (1978) Thompson *et al.* (1982) Morrison *et al.* (1985) Thompson *et al.* (1986)
Central Group (= NPCMT) (Includes pillow lavas in central complex)	Not dealt with in detail	Some samples analysed, all zeolitized or hydrothermally altered.
Plateau Group (majority = PMT) Pale Group of Ben More (= PMT) (with interlayered mugearite and Big-Feldspar Basalt)	Group 1 olivine basalts (mainly sampled in north-west Mull) and Group 3 olivine basalts (mainly sampled around Lochaline, Morven)	Mull Plateau Group (MPG) Note that many are transitional between alkali basalt and tholeiite, and compare closely with Skye Main Lava Series. Some lower crust contamination.
(Staffa Type at base = NPCMT)	Group 2 of south-west Mull	Staffa Magma Type (SMT) Variably enriched in lower and upper crustal contaminants.

(NPCMT = Non-Porphyritic Central Magma Type) later = tholeiitic basalt
(PMT = Plateau Magma Type) later = alkali olivine basalt but many flows are in fact transitional between alkali basalt and tholeiite
Total thickness of Mull lavas estimated about 2000 m (Bailey *et al.*, 1924)

(Table 5.2) Classification and correlation of the Mull lavas

Rock type	Position within sill	Petrological features
(a) Crinanite	Central = forms the bulk of the intrusion	Plagioclase, analcite, olivine, ophitic Al-, Ti-rich augite. Zeolites. Analcite, secondary after nepheline and of hydrothermal origin. Olivine up to 12 vol.% about 10–15 m above base.
(b) Teschenite	Marginal facies = fine-grained margins showing quench textures	Lacks fresh olivine, substantial amounts of analcite, zeolites and calcite. Margins have skeletal Ti-augites.
(c) Augite teschenite	Patches within crinanites, especially towards base.	Augite, plagioclase, analcite. Alignment of augite suggests cumulate texture. Fe–Ti oxides more abundant than in crinanite.
(d) Pegmatite(i)	At several horizons throughout sill, centimetres to metres in thickness	Brown augite with emerald-green rims (Na-rich), plagioclase, analcite, Fe-oxides, apatite, rare blue riebeckitic amphibole and rare olivine pseudomorphs. Variant of augite teschenite.
(e) Pegmatite (ii)	As pegmatite (i)	Mineralogically as (i) but has less pyroxene and is much coarser grained. Skeletal magnetite and ophitic augite, rather than euhedral as in (i).

(Table 6.2) Petrological variation within the Dippin Sill (based on Gibb and Henderson, 1978b, figure 4)

Table 7.1 Geological succession in the St Kilda archipelago (adapted from the British Geological Survey 1:25 000 Special Sheet, St Kilda)

Pleistocene glaciation
Palaeocene igneous activity
Basaltic and composite (acid and basic) inclined sheets and dykes
Conachair Granite
Mullach Sgar Complex (mixed magma (basic–acid) intrusions)
Glen Bay Granite
Glen Bay Gabbro
Breccias of gabbro and dolerite
Western Gabbro (layered in places)

No pre-Palaeocene rocks are exposed, but the complex is thought to be intruded into Lewisian gneisses.

(Table 7.1) Geological succession in the St Kilda archipelago (adapted from the British Geological Survey 1:25 000 Special Sheet, St Kilda)