Excursion guide to the Moine geology of the Northern Highlands of Scotland


Contents

- 1 Contents
- 2 Summary of the Moine geology of the Northern Highlands of Scotland
- 3 Excursion 1 Ross of Mull
  - 3.1 Itinerary A. Eastern limb of the Assapol Synform (1)
  - 3.2 Itinerary B. Eastern limb of the Assapol Synform (2)
  - 3.3 Itinerary C. Structure and lithologies within the Ardalanish Striped and Banded Formation, western limb of the Assapol Synform
  - 3.4 Itinerary D. Western limb and core of the Assapol Synform
- 4 Excursion 2 Fort William to Glenfinnan
- 5 Excursion 3 Glenfinnan to Morar
5.1 High grade rocks of the 'vertical' belt
5.2 Western margin of the vertical belt and low grade rocks of the western ‘flat’ belt

6 Excursion 4 Invergarry to Kinloch Hourn
   6.1 Loch Garry to Loch Quoich dam
   6.2 Loch Quoich shore section
   6.3 Quoich Bridge, westwards

7 Excursion 5 Glen Moriston and Glen Shiel
   7.1 Glen Moriston
   7.2 Glen Shiel

8 Excursion 6 West Glenelg and Loch Hourn
   8.1 West Glenelg
   8.2 Loch Hourn region

9 Excursion 7 East Glenelg and Loch Duich
   9.1 East Glenelg
   9.2 Loch Duich

10 Excursion 8 Glen Strathfarrar and Loch Monar

11 Excursion 9 Loch a‘ Bhraoin, Braemore and Loch Broom
   11.1 The Squrr Beag Thrust section
   11.2 Option A, Meall an t Sithe
   11.3 Option B. Corrieshalloch Gorge and Loch Broom

12 Excursion 10 South and Central Sutherland
   12.1 South Sutherland
   12.2 Central Sutherland

13 Excursion 11 The Moine Thrust Belt at Loch Eriboll
   13.1 Transect 1: South Eriboll
   13.2 Transect 2: Arnaboll
   13.3 Transect 3: Kempie
   13.4 Transect 4: Creagan Road

14 Excursion 12 Durness and Faraid Head
   14.1 Durness
   14.2 Faraid Head

15 Excursion 13 North Sutherland
   15.1 The Melness area
   15.2 South and east side of Tongue Bay
   15.3 Loch Cormaic and Borgie peat cuts
   15.4 Torrisdale Bay
   15.5 Craig Ruadh to Glaisgeo
   15.6 Swordly Bay, Kirtomy Bay and Cnoc Mor
   15.7 Port Mor to Portskerra

16 Excursion 14 Great Glen

17 Foreword
18 Editorial introduction
19 References

Contents

Summary of the Moine geology of the Northern Highlands of
Scotland

Excursion 1 Ross of Mull

Itinerary A. Eastern limb of the Assapol Synform (1)

Locality 1.1 Viewpoint of the regional and local geology.

Locality 1.2 Upper Shiaba Psammite with cross bedding and heavy mineral bands [NM 4425 1893]

Locality 1.3 Shiaba Group lithologies; Tertiary intrusions and faulting. [NM 4452 1898]

Locality 1.4 Folds within the Lower Shiaba Psammite. [NM 442 185]

Locality 1.5 F₂ sheath folds within the Lower Shiaba Psammite. [NM 4410 1841]

Locality 1.6 Sedimentary and tectonic structures within the Upper Shiaba Psammite. [NM 436 183]

Locality 1.7 Upper Shiaba Psammite cut by Tertiary dolerite. [NM 4365 1805]

Itinerary B. Eastern limb of the Assapol Synform (2)

Locality 1.8 Geological viewpoint. [NM 4208 1884]
Locality 1.9 $S_0/S_2$ relationships within the Ardalanish Striped and Banded Formation. [NM 4215 1882]

Locality 1.10 Scoor Pelitic Gneiss. [NM 4214 1876]

Locality 1.11 $S_0/S_2$ relationships within the Scoor Pelitic Gneiss; Tertiary intrusion. [NM 4231 1873]

Locality 1.12 Top of the Lagan Mor Formation. [NM 4229 1854]

Locality 1.13 Transition from the Lagan Mor Formation into the Upper Shiaba Psammite. [NM 4251 1834]

Locality 1.14 $F_2/F_3$ relationships within the Ardalanish Striped and Banded Formation on the eastern limb of the F3 Assapol Synform. [NM 4165 1847]

**Itinerary C. Structure and lithologies within the Ardalanish Striped and Banded Formation, western limb of the Assapol Synform**

Locality 1.15 Regional and contact metamorphism of the Assapol Group Moine. [NM 3753 1884]

Locality 1.16 Migmatitic fabrics and polyphase folds. [NM 3772 1876]

Locality 1.17 Garnetiferous amphibolites. [NM 3778 1870]
Locality 1.18 Relationships between amphibolites and host metasediments. [NM 3805 1855]

Locality 1.19 East verging $F_3$ folds. [NM 3816 1837]

Locality 1.20 $F_3$ folds. [NM 3824 1832]

**Itinerary D. Western limb and core of the Assapol Synform**

Locality 1.21 Hinge and eastern limb of $F_3$ antiform. [NM 384 183] to [NM 398 188] ==

Locality 1.22 Discordant amphibolite and $F_2/F_3$ structures. [NM 3965 1864]

Locality 1.23 Hinge zone of the $F_3$ Assapol Synform. [NM 3980 1885] to [NM 4100 1880]

Locality 1.24 Contact metamorphic phenomena within the aureole of the Ross of Mull Granite. Distance is less than 1km, taking c.1 hour. [NM 365 217]

Locality 1.25 Margin of the Ross of Mull Granite. Distance from Ardalanish and return is c.4km, taking 3 hours. [NM 3680 1765]

**Excursion 2 Fort William to Glenfinnan**

Locality 2.1 Loch Eil shore section. Loch Eil Psammite intruded by amphibolites. [NN 057 784]
Locality 2.2 Fassfern. Sedimentary structures within the Druim Fada Quartzite; microdiorite intrusions within the Loch Eil Psammite. [NN 0215 7895]

Locality 2.3 Loch Eil road section. Calc silicates in Loch Eil Psammite; late granite veins. [NM 988 788]

Locality 2.4 Kinlocheil. Psammites and hornblende schists of the Loch Eil Group; pelitic gneisses of the Glenfinnan Group. [NM 962 793]

Locality 2.5 Callop road section. Flat lying Ardgour Granite Gneiss with S₂ fabric and quartzofeldspathic lits; microdiorite sheet; D₂ folds in flat belt. [NM 925 794]

Locality 2.6 Craigag road section. Amphibolites and ptygmatic folds in granitic gneiss. [NM 922 796]

Locality 2.7 Allt na Criche road section. Low strain zone in centre of granitic gneiss sheet. [NM 919 799]

Locality 2.8 Glenfinnan road section. Loch Quoich Line; minor intrusions; western margin of the granitic gneiss; steep belt. [NM 916 802]

Locality 2.9 Glenfinnan road section. Loch Eil Group psammites within the steep belt. [NM 909 804]

**Excursion 3 Glenfinnan to Morar**

**High grade rocks of the 'vertical' belt**
Locality 3.1 The Muidhe. Glenfinnan Group psammites, pelites and migmatites; pegmatites; microdiorite sheets. [NM 857 815]
Locality 3.2 The Loch Eilt Antiform eastern limb. Glenfinnan Group pelites; Morar Group psammites and pelites; Sgurr Beag Thrust Zone. [NM 828 821] to [817 824]

Locality 3.3 Morarian (= Knoydartian) pegmatites at Loch Eilt [NM 806 827]

Locality 3.4 The Glenshian Synform and the Sgurr Beag Thrust [NM 789 828] to [NM 777 830]

Western margin of the vertical belt and low grade rocks of the western 'flat' belt

Locality 3.5 The western limb of the Glenshian Synform [NM 7675 8236] to [NM 7570 8260]

Locality 3.6 The Ardnish Synform [NM 7478 8305] to [NM 7401 8330]

Locality 3.7 The Arnipol Slide Zone [NM7421 8370] to [NM 7438 8430]

Locality 3.8 The Upper Morar Psammite: Rhue peninsula [NM 1613 7842]

Locality 3.9 The Upper Morar Psammite: Morar Bay [NM 1668 7933]

Excursion 4 Invergarry to Kinloch Hourn

Loch Garry to Loch Quoich dam
Locality 4.1 Garry Quarry [NH 196 023]

Locality 4.2 Coir’ an t Seasgaich [NH 076 035]

Locality 4.3 Quoich dam spillway [NH 071 023]

Locality 4.4 Quoich Quarry [NH 062 018]

**Loch Quoich shore section**

Locality 4.5 Loch Quoich shore section [NH 042 019]

Locality 4.5 Loch Quoich shore section [1] [NH 046 016] to [NH 044 017]

Locality 4.5 Loch Quoich shore section [2] [NH 044 017] to [NH 043 018]

Locality 4.5 Loch Quoich shore section [3] [NH 043 018] to [NH 042 019]

**Quoich Bridge, westwards**

Locality 4.6 Quoich Bridge [NH 015 041]

Locality 4.7 Coire Shubh road section [NG 9668 0407]
Excursion 5 Glen Moriston and Glen Shiel

Glen Moriston

Locality 5.1 – A887 road cutting. [NH 2864 1219]

Locality 5.2 A887 road cutting [NH 2348 1115]

Locality 5.3 Large quarry to the north of the Cluanie dam [NH 185 103]

Locality 5.4 Loch Cluanie shoreline [NH 1230 1034]

Glen Sheil

Locality 5.5 Glen Shiel [NH 0266 1234]

Locality 5.6 Glen Shiel [NH 006 135], [NH 008 137]

Excursion 6 West Glenelg and Loch Hourn

West Glenelg

Locality 6.1 North Glenelg Bay [NG 809 205]
Locality 6.2 Glenelg village [NG 8092 1921]

Locality 6.3 Sandaig [NG 7680 1463] to NG 7706 1520

**Loch Hourn region**

Locality 6.4 Road section west of Arnisdale [NG 8320 1118]

Locality 6.5 Crudh ‘Ard [NG 8464 0963]

Locality 6.6 Corran to Rudha Camas na Caillin [NG 85 08]

Locality 6.7 Loch Hourn [NG 8193 1181]

**Excursion 7 East Glenelg and Loch Duich**

**East Glenelg**

Locality 7.1 North of Glen More [NG 8397 2039] to [NG 860 234]

Locality 7.2 Between Glen More and Glean Beag

**Loch Duich**

Locality 7.3 Eilean Donan Castle [NG 885 254] to [NG 8430 2445]
Locality 7.4 Carr Brae to Loch a’ Mhuilinn [NG 8995 2445] to [NG 9065 2480]
Locality 7.5 Loch Duich roadside [NG 905 233] to [NG 900 239]
Excursion 8 Glen Strathfarrar and Loch Monar

Locality 8.1 Roadside just NE of North dam. [NH 2038 3938]

Locality 8.2 Hillside just NE of North dam. [NH 2002 3895]

Locality 8.3 Glacial pavement immediately west of South dam. [NG 1990 3884]

Locality 8.4 Roadside outcrops west of the road. [NH 1996 3848]

Locality 8.5 South of the Upper Power Station. [NH 1840 3772]

Locality 8.6 Lakeside outcrops west of Monar Lodge. [NH 1988 4050]

Locality 8.7 River section of the Garbh Uisge. [NH 2180 3927]

Locality 8.8 Moine Lewisian contact north of Inchvuilt [NH 2294 3874]

Excursion 9 Loch a’ Bhraoin, Braemore and Loch Broom

The Sgurr Beag Thrust section
Locality 9.1 Allt Leacach [NH 177 768]

Locality 9.2 Allt Breabaig [NH 156 752] to [NH 166 723]

**Option A. Meall an t Sithe**

Locality 9.3 Meall an t Sithe [NH 141 765]

Locality 9.4 Meall Dubh [NH 103 748]

Locality 9.5 Allt Teanga nan Caiseachan [NH 090 746] to [NH 093 736]

Locality 9.6 Loch an Nid [NH 085 733]

**Option B. Corrieshalloch Gorge and Loch Broom**

Locality 9.7 The Corrieshalloch Gorge [NH 204 782]

Locality 9.8 Loch Broom [NH 171 858]

Locality 9.9 Loch Broom shoreline [NH 156 892] to [NH 149 911]

Locality 9.10 The Moine mylonites [NH 149 922]
Excursion 10 South and Central Sutherland

South Sutherland

Locality 10.1 Oykell Bridge [NC 3859 0086]

Locality 10.2 Glen Oykell [NC 3399 0512] to NC 3457 0613

Locality 10.3 Airde of Shin [NC 5219 1542] to [NC 5297 1291]

Locality 10.4 Creich Peninsula [NH 6400 8839] to [NH 6504 8802]

Central Sutherland

Locality 10.5 Vagastie Bridge [NC 5324 2712]

Locality 10.6 Loch Naver [NC 6288 4048] to [NC 6537 3925]

Excursion 11 The Moine Thrust Belt at Loch Eriboll

Transect 1: South Eriboll

Transect 2: Arnaboll

Transect 3: Kempie

Transect 4: Creagan Road

Excursion 12 Durness and Faraid Head
Durness

Locality 12.1 Sango Sands, Durness [NC 4100 6740] to [NC 404 685]

Faraid Head

Locality 12.2 Faraid Head [NC 3925 6965] to [NC 3785 7135]

Excursion 13 North Sutherland

The Melness area

Locality 13.1 The Melness area [NC 580 643] to [NC 5850 6501]

South and east side of Tongue Bay

Locality 13.2 Kinloch Broch [NC 5500 5282] to [NC 553 531]

Locality 13.3 Ribigill [NC 5618 5258] to [NC 5860 5455]

Locality 13.4 Coldbackie Bay [NC 6124 6053]

Locality 13.5 Sleteil & Skullomie Harbour [NC 6281 6283] to [NC 6180 6150]

Loch Cormaic and Borgie peat cuts

Locality 13.6 Loch Cormaic [NC 6234 5858] to [NC 6291 5766]
Locality 13.7 Borgie peat cuts [NC 6380 5770]

Torrisdale Bay

Locality 13.8 Torrisdale Bay [NC 6875 6089] to [NC 6896 6169]

Craig Ruadh to Glaisgeo

Locality 13.9 Creag Ruadh [NC 6970 6316]

Locality 13.10 Farr Bay [NC 7147 6265]

Locality 13.11 Glaisgeo [NC 7146 6360]

Swordly Bay, Kirtomy Bay and Cnoc Mor

Locality 13.12 Swordly Bay [NC 7354 6355]

Locality 13.13 Kirtomy Bay [NC 7413 6408]

Locality 13.14 Cnoc Mor [NC 7567 6344]

Port Mor to Portskerra

Locality 13.15 Port Mor [NC 7735 6547]
Locality 13.16 Strathy road sections [NC 7992 6395] to [NC 8127 6487]

Locality 13.17 Strathy Point [NC 8282 6964] to [NC 8340 6680]

Locality 13.18 Portskerra [NC 8740 6644]

**Excursion 14 Great Glen**

Locality 14.1 Torcastle, River Lochy: northern outcrop [NN 135 791]

Locality 14.2 Torcastle, River Lochy: southern outcrop [NN 132 786]

Locality 14.3 View over Loch Lochy towards the Clunes Tonalite [NN 235 892]

Locality 14.4 Loch Lochy shoreline [NN 255 918]

Locality 14.5 Loch Oich shoreline [NN 304 985]

Locality 14.6 Kilfinnan Burn [NN 277 957]

Locality 14.7 Rosemarkie [NH 773 627] to [NH 765 615]
Foreword

The Neoproterozoic rocks of the Moine Supergroup underlie an extensive tract of the Lower Palaeozoic Caledonian mountain belt in NW Scotland. The region contains numerous classic geological localities that have been illustrated in geology textbooks for many years. The superb geology of the region continues to attract field parties of amateur groups, undergraduate students and international scientists. This guide is a new edition of the first 'Moine fieldguide' that was published by Scottish Academic Press in 1988 on behalf of the Edinburgh and Glasgow geological societies, and is now more or less unavailable. As was the case with the first guide, the aim is to provide an up-to-date summary of the geological evolution of the Moine Supergroup, illustrated by the field evidence on which it is based. Owners of the first fieldguide will see that a number of excursions have survived more or less intact, although at a minimum all have been updated to take account of new geological information, as well as any new outcrops and/or additional constraints on access. Other excursions have been more or less completely rewritten. A key feature of this second edition is the inclusion of new excursions to the Ross of Mull, West Glenelg and Loch Hourn, East Glenelg and Loch Duich, Glen Strathfarrar and Loch Monar, South and Central Sutherland, Durness, and the Great Glen (Fig. F.1).

The editors acknowledge the substantial contributions made by Iain Allison and the late Frank May who co-edited the first ‘Moine fieldguide’. The authors of the various excursions acknowledge discussions with colleagues too numerous to mention, and also the role of the Natural Environment Research Council who funded studentships which allowed much of the research reported here to be carried out.

Editorial introduction

The aim of this excursion guide is to allow geological field parties to see the wide variety of rocks
and structures that occur within the outcrop of the Moine Supergroup, as well as the Moine Thrust Zone that separates these rocks from those of the Caledonian foreland to the NW. The guide has been written for those who have some previous knowledge of geology: informed amateurs, undergraduate students and professional geologists. Books that provide useful background reading include *The Mapping of Geological Structures* by Ken McClay, and *The Field Description of Metamorphic Rocks* by Norman Fry, which are both published by John Wiley & Sons as part of their ‘Geological Field Guide Series’. Two other publications that provide much useful background information are the 2002 edition of the *Geology of Scotland*, published by the Geological Society of London and edited by N. Trewin, and the British Geological Survey *Northern Highlands Regional Guide* published in 1995.

The excursions are mostly easily accessible from the various roads that cross the Moine outcrop. Statutory rights of public access were established over most land through the Land Reform (Scotland) Act 2003. Nonetheless, stalking of red deer occurs from early August and shooting of grouse from 12 August, and field parties should take account of reasonable requests to minimise disturbance at these times. A guide to access rights is published by the Ramblers’ Association Scotland. Field parties are also reminded that many of the excursions include localities that have Site of Special Scientific Interest (SSSI) status and hammering and collection of material at these sites is prohibited without permission. Details of SSSIs can be obtained from Scottish Natural Heritage.

It is assumed that all geological field parties will adhere to the codes of practice for safety published by the Geological Society of London and/or the Geologists’ Association. Visitors to the Scottish Highlands should be aware that the weather can be highly unpredictable, even in summer. Stout footwear, warm clothing and waterproofs are all necessary, even if the weather looks set fair. Generations of Highland geologists will testify to the need to carry insect repellent during the summer months!

Since the publication of the first ‘Moine field guide’ in 1988, a number of new geological maps of the Moine Supergroup have been produced by the British Geological Survey (BGS). Additionally, the application of modern geochronological techniques has placed important constraints on the timing of major metamorphic and structural events. Despite these significant advances, there still remains a lack of consensus concerning the correlations of certain tectonostratigraphic units and structures, and the nature of the Neoproterozoic evolution. In this guide, no attempt has been made to force a single view; individual authors present the evidence on which they base their views and the reader is invited to follow the excursion guide, to study the rocks and their relationships in the field and to form his or her own conclusions.

Geologists have shown that the Moine Supergroup has been affected by several phases of deformation. These phases, giving rise to recognisable sets of structures, may all be part of one mountain-building event spanning some tens of millions of years, or they may be related to different orogenic events perhaps hundreds of millions of years apart. Some structures, formed during a single phase of deformation, can be correlated over large areas, while others are quite local phenomena. One cannot assume, therefore, that structures with certain labels in one excursion are the same as those with the same label in another excursion. The shorthand terms are D for phase of deformation, S for planar fabric (surface), L for a linear fabric and F for folds. Subscripts (e.g. D₂) are added to denote which phase is being referred to. Thus S₂ is a planar fabric formed during the second (local) phase of deformation (i.e. D₂). The term S₀ may be used to indicate original sedimentary bedding.
References

AFTALION, M. and VAN BREEMEN, O. (1980): U-Pb zircon, monazite and Rb-Sr whole-rock systematics of granitic gneiss and psammitic to semipelite host gneiss from Glenfinnan, northwestern Scotland, Contributions to Mineralogy and Petrology, 72, pp. 87-98.


Caledonides, in RIES, A. C., BUTLER,


PEACH, B. N., HORNE, J., GUNN, W., CLOUGH, C. T. and HINXMAN, L. W. (1907): The Geological


TANNER, P. W. G. (1965): *Structural and metamorphic history of the Kinloch Hourn area*, Inverness-
shire, Scotland, PhD thesis, University of London.


WHEELER, J., MORGAN, L. S. and PRIOR, D. J. (2004): Disequilibrium in the Ross of Mull contact


Retrieved from 'http://earthwise.bgs.ac.uk/index.php?title=Excursion_guide_to_the_Moine_geology_of_the_Northern_Highlands_of_Scotland&oldid=40306'

Categories:
- Edinburgh Geological Society
- Geological Society of Glasgow
- Geological Excursions

Navigation menu

Personal tools
- Not logged in
- Talk
- Contributions
- Log in
- Request account

Namespaces
- Page
- Discussion

variants

Views
- Read
- Edit
- View history
- PDF Export

More

Search

[Search] [Go]

Navigation
- Main page