THE GEOLOGICAL SOCIETY OF GLASGOW

PROCEEDINGS

Session 164
October 2021 to September 2022

In the Devil's Kitchen on the Snowdonia Field Trip in September 2022.
(Photo A Brown)

Registered Scottish Charity No. SC007013

President: Dr Simon Cuthbert

www.geologyglasgow.org.uk

Hon. Secretary: Walter Semple email: sec@gsocg.org
Newsletter/Proceedings Editor: David Webster email: contact@gsocg.org

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Council Members Session 164

Elected Officers

At the AGM on December 9th 2021 the following were elected to Council:

Position	Nominee	Proposed by	Seconded by
President	**Simon Cuthbert**	N Clark	D Webster
Vice President	**Neil Clark**	W Semple	M Donnelly
Vice President	**Brian Bell**	M Donnelly	R Bryce
Treasurer	**Ian Veitch**	N Clark	R Bryce
Meetings Secretary	**Ian Millar**	W Semple	I Veitch
Publications Officer	**Gary Hoare**	W Semple	I Veitch
Junior Representative	**Matthew Statis**	N Clark	D Webster
Editor of SJG	**David Brown**	B Bell	N Clark
Editor of SJG	**Colin Braithwaite**	B Bell	M Cummings
Independent Examiner	**Brian O'Neill**	I Millar	I Veitch

Continuing Officers

The following continued in office:

Roy Bryce - Day Excursions Secretary

Maggie Donnelly - Residential Excursions Secretary

Neil Clark - Website Consultant

Walter Semple - Hon. Secretary

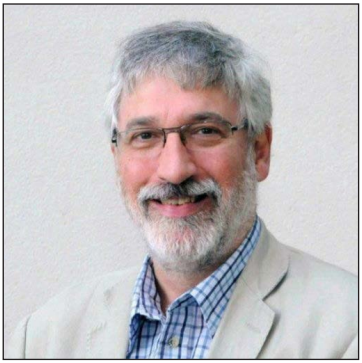
David Webster - Newsletter & Proceedings Editor

Bill Gray - Webmaster

Margaret Anderson - Honorary Archivist & Asst. Librarian

Mina Cummings - Ordinary Member

President's Report



This Session has seen our Society emerging from the challenges and restrictions of the pandemic and re-establishing a full programme of activities. I want to begin by thanking our previous President, Neil Clark, for his leadership through those difficult times.

We returned to face-to-face lecture meetings in the spring of 2022 with a hybrid format that included an online audience in the new venue of the Boyd-Orr Building at Glasgow University. Recordings of on-line talks have greatly increased the Society's reach, with one having over 2000 viewers! We're grateful to David Webster and Ian Millar for handling the technicalities of setting this up and for organising such a great programme.

The return to a full programme of day excursions was especially welcome, along with two residential trips to Ardnamurchan and Snowdonia. Many thanks go to Roy Bryce and Maggie Donnelly, our Day and Residential Excursion Secretaries, for all their hard work in the often complicated business of setting up the trips, and of course to the trip leaders for their time and wisdom.

Our affiliated organisation, the Strathclyde Geoconservation Group (SGG) led by Margaret Greene, has been running very successful outreach events in collaboration with the Fossil Grove Trust. These have promoted geology among folk of all ages in the wider Glasgow community and raised awareness of our joint work in restoring the Fossil Grove to its former glory. SGG have continued their excellent work in Geoconservation through their engagement with the local planning system. Exploratory trips to local geo-sites is leading to a new series of short descriptions that will be available from the Society website.

An important aspect of our Society's work is providing information about geology to members and the wider community. We hold an extensive Library of books and journals, but these are no longer easily accessible. Hence during this session the Society's Council has been reviewing the Library and how it can best be made available and used. We hope to make some announcements about this during the next session. The Society's archives from our long history are held in Glasgow University library

and this has been the source of some fascinating articles about famous characters in Glasgow geology that have been made available on our website. The website itself continues to grow, supporting our members' interests and the running of the Society. Thanks go to Gary Hoare and the Publications Group, our Archivist and Assistant Librarian Margaret Anderson, Web-Master Bill Gray and web-consultant Neil Clark for maintaining and developing all these information resources. Our on-line presence also includes communications through social media. Use of our Facebook and Twitter accounts continues to grow and members are encouraged to use them to find topical information and promote our activities. Thanks to David Webster and Neil Clark for their work managing and moderating these media.

Another key part of our dissemination of geology and support for geological research is the Scottish Journal of Geology, published jointly with the Edinburgh Geological Society. This a difficult time for journals of relatively small learned societies and attracting contributions to the SJG remains challenging. However, we hope that the recent move to on-line publications and the on-going renegotiation of the contract with our publisher will help to maintain a sustainable level of content. We thank the Editor, Colin Braithwaite and members of the Editorial Board for their hard work and commitment to the SJG and I encourage all members who are undertaking geological research to consider publishing in it.

The Geological Society of Glasgow's members have seen changes to the way we run our meetings and reductions in our activities as a result of the COVID restrictions. The tolerance and loyalty of members has been much appreciated during this time. As restrictions are eased and folk feel more confident about meeting face-to-face we hope members will enjoy a return to the social benefits of our events, but also enjoy the opportunities offered by the new hybrid meeting format. Our membership has grown again in this session and it is hoped that the exposure arising from the large on-line audiences will encourage more to join.

Our Society is run by its Council, all volunteers, who give their time and energy generously in preparing activities and managing our resources. Three essential roles are the Treasurer, (Ian Veitch), Membership Secretary, (Campbell Forrest) and Honorary Secretary, (Walter Semple). Their roles bear a great deal of responsibility in a registered charity and we have much to thank them for in keeping the Society running effectively. Ordinary Members of Council help to spread the load and bring new ideas and insights so we thank Mina Cummings for her long-standing commitment. Matthew Statis was our Student Representitive, during this session; we thank him for keeping us connected to local geoscience students. All this requires a lot of effort, but we face severe problems in recruiting members to serve on Council and meet our legal requirements as a charity, to the extent that we may, soon, no longer be able to function sustainably.

So, I'll end this report by making a plea for new Council members to help us keep alive the fantastic programme I've outlined here. Please don't hesitate to contact us if you'd like to help – on Council or with any of our other activities.

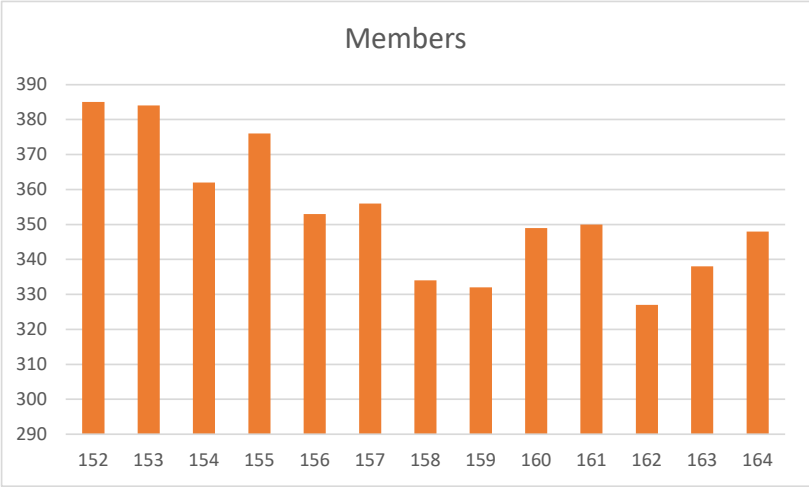
Dr Simon J Cuthbert

Membership Secretary's Report

38 new members were welcomed to the Society in Session 164. A number of new members have joined so far in Session 165, but leavers will be unclear until the full picture of subscription renewals emerges. So the "Total Members" figure below would be expected to fall somewhat.

A very encouraging trend appears to be the number of Junior Members, but this remains to be adjusted for non-renewals.

	Session 164	Session 163
	Ended 30 Sep 2021	Ended 30 Sep 2022
Honorary Members	2	4
Ordinary Members	236	235
Associate Members	86	89
Junior Members	21	7
Institute Members	3	3
TOTAL MEMBERS	348	338
Incl New Members	38	25



The above graph shows total membership numbers for the Society for the last 12 sessions. The overall decline shown up to session 162 is now showing an upturn, possibly related to increased interest in the society's online lecture programme.

Campbell Forrest

Treasurer's Report

1 Basis of Accounting

These accounts have been prepared on the Receipts and Payments basis in accordance with the Charities & Trustees Investment (Scotland) Act 2005 and the Charities Accounts (Scotland) Regulations 2006 (as amended)

2 Nature and purpose of funds

Unrestricted funds are those that may be used at the discretion of the trustees in furtherance of the objects of the charity.

Restricted funds may only be used for specific purposes. Restrictions arise when specified by the donor or when fund are raised for a specific purpose. The restricted funds are:

The T N George Fund: to be used to engrave a medal for the annual T N George lecture

The Brian Bluck Fund: to be used to award a prize to the top student in the final year of Geology at Glasgow University

Fossil Grove Trust Fund: to be used for expenditure on the Fossil Grove on request from the Fossil Grove Trustees

3 Related party transactions

The Society's insurance policy includes Trustee Indemnity Insurance for all council members. No remuneration was paid to the trustees during the year (2021: nil)

4 Grants and Donations

Unrestricted Funds	
Printing of new Gigha Guide	393
Kiara Brooksby - Grant	200
Strathclyde Geoconservation	200
Friends of Hugh Miller annual donation	50
Total Unrestricted Funds	843
Restricted Funds	
Fossil Grove Trust	22,329
Total Grant and Donations	23,172

5 Expenditure

Expenditure was similar to the previous session.

•Day excursions made a deficit of £706 as, although the cost of bus hire had increased substantially, the Council took a decision to maintain charges in order to encourage members to return to excursions after lockdown. This proved successful with good numbers attending.

•As most lectures were online and Glasgow University now generously allows us to use a lecture room free of charge our income continues to comfortably exceed expenditure.

•The stock of books for sale was checked and a number of items that were unsaleable or missing have been written off in the year.

6 Restricted Funds

	T N George Fund	Brian Bluck Fund	Fossil Grove Trust fund	Total
Movement on the Funds:	£	£	£	£
Balance at 1 October 2021	340	7,500	7,065	14,905
Income	0	0	42,565	42,565
Grants & Donations	0	0	-22,329	-22,329
Balance at 30 September 2022	340	7,500	27,301	35,141

Notes

The T N George Medal was not awarded this year.

The Brian Bluck Prize has not yet been awarded for 2022

Fossil Grove Fund expenditure is authorised by the Fossil Grove Trustees

7 Payments Due at the year end

	£
Independent Examiner's Fee	150
Expenses - S164 Lectures	372
Meetings Expenses	99
Newsletter Printing & Postage	211
Total	832

8 Investments

The investments in the Endowment Fund reduced in value by £4,414 and are now valued at £51,628.

The Endowment Fund is invested in 4 managed funds which generate income to be used for the purposes of the society. In the year the investment income was £3,142 of which £843 was used for grants and donations.

Ian Veitch

THE GEOLOGICAL SOCIETY OF GLASGOW

Income and Expenditure Account for year ending 30th September 2022

	Note	Unrestricted Funds	Restricted Funds	Total	*Year Ended 30/9/21*
Income					
Subscription Income		7,238	0	7,238	*7,112*
Investment Income		3,192	0	3,192	*3,089*
Gift aid		1,127	0	1,127	*1,262*
Publication Sales		256	0	256	*8*
Day excursions net deficit	5	-706	0	-706	*0*
Residential excursions net surplus		20	0	20	*0*
Donations & Grants Received	6	0	42,565	42,565	*10,221*
Miscellaneous Income		0	0	0	*0*
Total income		**11,127**	**42,565**	**53,692**	***21,692***
Expenditure					
Cost of Charitable Activities:					
Meetings - room hire, zoom and speakers	5	1,016	0	1,016	*1,044*
Publication and postage of Proceedings		0	0	0	*131*
Library and Down to Earth		57	0	57	*43*
Affiliation fees		40	0	40	*40*
Insurance		254	0	254	*254*
Website		161	0	161	*209*
Newsletter		742	0	742	*233*
Book write off	5	422	0	422	*0*
Treasurer		46	0	46	*94*
Purchase of Camera Equipment		0	0	0	*224*
Miscellaneous		0	0	0	*132*
Total Charitable Activities		2,738	0	2,738	*2,404*
Governance Costs					
Independent Examiner Fees		150	0	150	*150*
Grants and Donations	4	843	22,329	23,172	*6,906*
Total expenditure		**3,731**	**22,329**	**26,060**	***9,460***
Surplus (Deficit) for the year		**7,396**	**20,236**	**27,632**	***12,232***

THE GEOLOGICAL SOCIETY OF GLASGOW

Statement of Balances at 30 September 2022

	Note	Unrestricted Funds	Restricted Funds	Year Ended 30/9/22	*Year Ended 30/9/21* ***Session 163***
Funds Balance as at 1st October 2021		30,880	14,905	45,785	*33,553*
Surplus (deficit) for the year		7,396	20,236	27,632	*12,232*
Funds at 30 September 2022	6	38,276	35,141	73,417	*45,785*
Represented by:-					
Bank and Cash Deposits					
Royal Bank of Scotland				46,960	*20,695*
National Savings Income Bond				12,000	*12,000*
National Savings Investment Account				4,592	*4,542*
On deposit with Redmayne Bentley				7,799	*5,500*
Cash in Hand (float)				100	*105*
Total Cash and Savings				71,451	*42,842*
Stock of Publications				3,041	*3,517*
Less Liabilities:					
Subscriptions paid in advance				-243	*-324*
Payments Due	7			-832	*-250*
Net Assets				73,417	*45,785*
Investments					
Analysis of Movement in Investments					
Balance at 1/10/21		56,042			*44,576*
Increase (Decrease) in value		-4,414			*11,466*
Valuation at 30/9/22	8	51,628			*56,042*

The Notes on pages 9 to 10 form part of these accounts.

The financial statements were approved by the Trustees on 5th December 2022 and signed on their behalf by

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Dr Simon Cuthbert Mr Ian Veitch

Chair Treasurer

Meetings Secretary Report

Due to the ongoing Covid-19 pandemic the lectures up to February 2022 were delivered remotely by Zoom. The March and April lectures and Member's night in May 2022 were held in person the Boyd Orr Building and the James McCune Smith Learning Hub. All were live-streamed on zoom and recorded, with YouTube links distributed to members.

Thursday 14th October 2021

Professor Mike Searle, *Oxford University.*

"Tectonics and Mountain Building in the Himalaya."

The crash of the Indian plate into Asia is the biggest known collision in geological history, and it continues today. The result is the Himalaya and Karakoram - one of the largest mountain ranges on Earth. The Karakoram has half of the world's highest mountains and a reputation as being one of the most remote and savage ranges of all. Mike's talk presented a rich account of the geological forces that were involved in creating these mountain ranges. Using his personal accounts of extreme mountaineering and research in the region, he pieced together the geological processes that formed such impressive peaks.

Link to YouTube recording: https://youtu.be/csgaui2xXZM

Thursday 11th November 2021

Due to illness the planned talk by Neil Clark was postponed until December and members were instead encouraged to watch the online talk given by the NW Highlands Geopark on Cambrian Life by Dr. Frankie Dunn of Oxford University.

Thursday 9th December 2021

Dr Neil Clark *Hunterian Museum*

"Dinosaurs from Muck"

Neil described a recent field trip to the Island of Muck in the Inner Hebrides of western Scotland looking for evidence of mid-Jurassic dinosaurs.

Link to YouTube recording: https://youtu.be/bbu1KsctvLo

Thursday 13th January 2022

Dr Emrys Phillips *British Geological Survey, Edinburgh.*

"Deformed Dirt: the deformation caused by glaciers and ice sheets"

High resolution seismic data from the Dogger Bank in the central southern North Sea has revealed that the Dogger Bank Formation records a complex history of sedimentation and penecontemporaneous, large-scale, ice-marginal to proglacial glacitectonic deformation. The internal structure of the Dogger Bank thrust-moraine complexes can be directly related to ice sheet dynamics, recording the former positions of a highly dynamic, oscillating Weichselian ice sheet margin as it retreated northwards at the end of the Last Glacial Maximum.

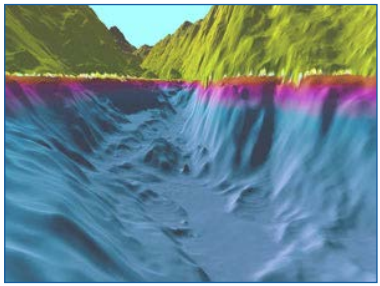
Link to YouTube recording: https://youtu.be/XXxPSTM2tzQ

Thursday 10th February 2022

Dr. Andrew Findlayson, *British Geological Survey, Edinburgh.*

"Below the bonnie banks – investigating Loch Lomond's subaqueous Quaternary landscape"

Loch Lomond is an iconic part of Scotland's landscape. From a Quaternary geological perspective, the wider Loch Lomond basin has a long history of research and forms a type area for a period of environmental change at the end of the last glacial cycle in Britain – the 'Loch Lomond Stadial'. However, there is still relatively little known about the submerged landscape below the loch surface. Andrew's talk gaves a brief overview of the Quaternary landscape evolution around Loch Lomond and then presented new findings from multibeam bathymetry and shallow seismic profiles. It also looked at how these data add the loch's glacial and postglacial story, and also what they tell us about more recent processes such as subaqueous slope activity associated with shoreline infrastructure.



Link to YouTube recording:
https://youtu.be/6oyTUO_IRCM

Thursday 10th March 2022

Noel Williams, *Lochaber Geopark.*

"Big Boulders of Scotland"

In April 1871 The Royal Society of Edinburgh appointed a Committee to "make inquiry about boulders in Scotland". The Committee on Boulders had two main aims, namely to identify where boulders of interest were situated, and to indicate which boulders were deemed especially worthy of preservation. The idea of setting up this Committee was inspired by large surveys which had been set up in 1867 to record erratic boulders and "enormous heaps of gravel" in Switzerland and the Jura region of France.

David Milne Home was encouraged by Professor Favre of Geneva to organise a similar survey in Scotland. In order to set up such a widespread survey Milne Home made contact with church ministers, head teachers and landowners across Scotland. The Committee on Boulders collected data over 13 years (1871–84) and published 10 reports.

The talk retraced the steps of Professor Heddle and local headmaster Colin Livingstone who recorded the position of large erratic boulders, as well as glacial striations, during lengthy outings on the hills in the Lochaber district around Fort William.

Link to YouTube recording: https://youtu.be/C8fWpPeHdxk

Thursday 14th April 2022

Professor Colin Ballantyne, *University of St. Andrews*

"Landslides, Glaciation and the evolution of mountain landscapes during the Quaternary"

A persistent view amongst geologists is that landscape evolution in mid-latitude mountains during the Quaternary (2.6 Ma to the present) was dominated by glacial erosion. Using examples from Scotland, this presentation shows that areas of high ground have experienced very limited glacial erosion, and that classic glacial landforms such as glacial troughs, corries and arêtes continued to evolve during successive interglacial periods through rockfall and rock-slope failure. The present mountain landscapes of Scotland and other tectonically stable mid-latitude mountains therefore represent a synergistic relationship between glacial and interglacial (paraglacial) processes operating over very long timescales.

Link to YouTube recording: https://youtu.be/8ALgMJVXUB0

Thursday, 12th May 2022 - Members' Night

Matthew Statis

"Accessing the sedimentary record of ocean acidification prior to the K/Pg mass extinction"

A short talk covering Matthew's Masters project

Link to YouTube recording: https://youtu.be/vGxsFKOZ15g

David Webster

"Glasgow area geological exposures"

A short talk describing recent reconnaissance visits by the Strathclyde Geoconservation Group to Campsie Glen, River Kelvin and Overtoun

Link to YouTube recording: https://youtu.be/HbopawhoNaA

Dr. Simon Cuthbert

"The Beast of Linn Park"

A short talk on an Arthropleura trail by the Whitecart Water"

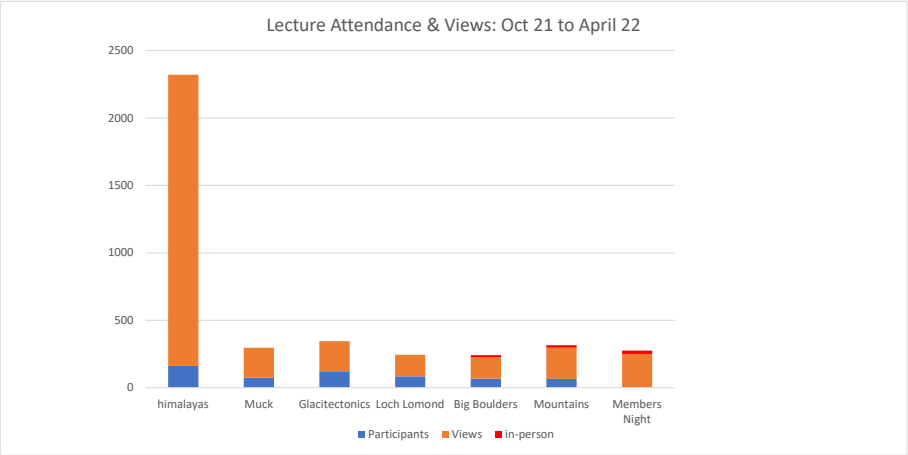
Link to YouTube recording: https://youtu.be/BRcqVy61W3s

David Webster

"Fossil Grove Renovation Project"

A short talk describing the new renovation project at the Fossil Grove being led by the Fossil Grove Trust

Link to YouTube recording: https://youtu.be/b8Ni-AReR7g



Day Excursions 2022

Six day excursions were run in 2022 as follows:

19th March	Trearne Quarry. Gary Hoare (with Glasgow University students)
11th June.	Charleston Lime Quarry. Katie Strang.
2nd July.	East Kirkton and Petershill Quarries. Gary Hoare.
16th July.	South Queensferry. Richard Smith.
13th August.	Onich Shore. Jim Blair and Iain Allison.
20th August	Elie, St Monans and Pittenweem. Brian Bell

Trearne Quarry

After two long years we were finally able to get our programme of day excursions up and running again. I was approached by a student from Glasgow University who was asking if we could run an excursion as Covid meant the university were unable to organise field trips. After a discussion with Trearne Quarry expert, Gary Hoare, we decided to offer a field trip specifically for GU students to enable them to gain valuable experience, and for GSG to gain new younger members.

For once the Scottish weather was extremely kind to us The students had of course all seen fossils in trays in the lab back at the university, but the look on their faces as they were able to fill up their sample bags with fossils they had pulled from the rock with their own hands was a rare delight to see.

Gary was able to instantly recognise and identify all their discoveries, and especial excitement was generated when one of the students found a quite rare *Paraconularia*. Conulariids had elongated, pyramidal exoskeletons. Two very well preserved crinoid cups of *Ureocrinus bockschii* were also identified and collected.

The owners have carried out “remedial work” which has covered a lot of the rock faces that we were previously able to examine with ease, and other parts of the quarry are no longer accessible. After much fossil finding, we took the long way round the perimeter of the quarry to the coral reef. The direct route across the quarry is now

usually a swamp, so the long way is not the wrong way. Sadly run off from rain over the previous weeks had led to the part of the face we wanted to inspect being submerged again. Gary had visited two weeks before and the face was accessible, so we just have to hope this is a temporary occurrence. Nevertheless, we sat down in the sun and enjoyed a pleasant lunch together.

Part of the afternoon was also spent looking at the transgression between terrestrial and marine conditions. *Lepidodendron* remains at the top and bottom of the rock sections confirmed that we were in terrestrial conditions, and fully marine beds were observed containing large amounts of brachiopods, crinoids and corals.

Roy Bryce

Charleston Lime Quarry

Our first standard GSG day trip after lockdown was to visit the Fife conservation village of Charlestown. The intention was to visit the limestone quarries and see some of the industrial archaeology in the area. We were especially lucky in that our leader, Dr. Katie Strang is not only hugely knowledgeable about the local geology, but also lives in the town and so is also hugely knowledgeable about the history of the area. This combination led to both an instructive and entertaining tour of the locality. We entered the forest and were guided down the in places quite slippery slopes until we got to the floor of an old area of mine workings.

The impression of being in a Brazilian Rain Forest was tempered somewhat by the chill east coast wind. However, staring into the old mine entrances gave us pause to think of the working conditions of the old workers. Moving further through the trees brought us to a clearing where all around the central pillar had been mined and removed, but the pillar was left as a memorial to those workers who had lost their lives in the mines. Pretty impressive on its own, but when we got up close it became even more interesting. The final part of the day was to walk down to the old harbour where the limestone was burnt and transformed into lime to be exported around the UK. The unusual feature of Charlestown for one of our day trips is that the area was designed as a model village for the mine and general estate workers. We usually visit an interesting

outcrop, then walk half a mile to the next interesting outcrop. On this visit, everything we saw could be integrated into the context of a thriving community endeavour, and indeed, some of the discussion was around how the current inhabitants of the area are trying extremely hard to maintain the entire area. Only about an hour's drive from Glasgow, Charlestown is well worth a visit.

Roy Bryce

East Kirkton / Petershill Quarries

This outing held a double treat for fossil fanciers: two limestone quarry sites with Carboniferous fossils, both SSSIs. We were a smaller party than expected, with only 9 participants out of the 15 that had booked, Covid being a big factor. We set off from University Avenue at 9.30 am in a large luxurious bus, which had a toilet!

We had arranged to meet Gary, our leader, at Petershill Quarry, which lies to the north east of Bathgate. Gary gave us an excellent summary of the history of the quarry and what we were likely to see. Petershill is a beautiful site, consisting of a wide valley full of wild flowers, and wonderful views over the surrounding countryside. It had been a limestone quarry, worked until the end of the 19th century, when it was filled as a reservoir. It was only when it was drained in 1986 that the richness of its marine fossil heritage was revealed. We spent the morning exploring the rock exposures on the south flank of the valley; as Gary had promised, they were teaming with fossils from the Carboniferous period, around 330 Ma, when it had been a limestone reef in a warm shallow sea. The largest rock face was covered in the shells of the huge brachiopod

Quarry face at Petershill

Gigantoproductus brachiopods

Siphonodendron 'spaghetti' coral

Slump features at Kirkton quarry

Gigantoproductus, another face consisted of masses of solitary coral, *Dibunophyllum*. We were not allowed to hammer or remove anything from the rock faces, but there were plenty of small pieces of loose rock with a variety of fossils – "spaghetti" corals (*Siphonodendron*), fragments of crinoids and brachiopods. Gary was on hand to identify everybody's finds, explaining the environment in which they would have flourished.

After a heavy shower, the sun shone for our picnic lunch on the slope of the quarry, after which we called the bus back and drove the short distance to East Kirkton, our afternoon site, again on the outskirts of Bathgate. It is a small and disused lime and shale quarry approached by a long leafy path off the road. It was worked in the early part of the 19th century, closing in 1884. It was made famous by the discoveries of Stan Wood, a professional fossil collector, who uncovered many fossils of very early land-living animals and plants, including the famous Lizzie, one of the earliest reptiles and key to understanding how reptiles evolved from amphibians.

The site is unusual for a limestone quarry, in that it contains thinly-bedded fresh-water limestone. Volcanic hot springs rich in chemicals had fed a small lake, around 338 Ma. The chemicals deposited the limestone on the bottom of the lake. Animals and plants falling into the lake became victims of the scalding poisonous water, and were preserved as fossils. Now a SSSI, under the care of Scottish Natural Heritage, again no fossil collecting, except from spoil found on the quarry floor, is permitted.

We found the site very overgrown, with nettles and cleavers almost waist high, and all ground spoil covered in thick moss. It was not possible to examine the rock face where Stan Wood had worked, except from a distance, because of the rough overgrown terrain, but we had an interesting session splitting several of the very fine grained shale pieces found lying around. We appreciated from this exercise how painstaking his work must have been. On our way back out of the quarry, we had a closer look at the rock face at the entrance to the site. This had nice successions of limestone and shale, and some interesting slumping and folding, indicative of the volcanic disturbance of the site during Carboniferous times.

Back at the bus, we thanked Gary for his enthusiastic guidance to the sites and for his patience at answering all our questions about the fascinating fossils we had seen. The weather had been relatively kind to us, but remarkably cool for early July.

Anne Gray

South Queensferry

Each year we hold a joint meeting with the Edinburgh Geological Society and this year it was their turn to host the excursion.

As these trips have to be planned early and Covid restrictions were still in place at the planning stage, it was agreed that a maximum of 10 from each society could be involved to enable social distancing. However, since the whole point of a joint meeting is to socialise together, we still organised a meal for after the walk.

Edinburgh has the advantage of several local and easily accessed sites of geological interest and so we started our excursion underneath the Forth bridge. Usually the parking in South Queensferry is easy, but there was a cruise liner moored offshore and their excursion buses were using all the space in the main car park. Luckily our walk started early enough for us all to get parked anyway. Only 6 people from GSG drove through to Edinburgh. As the excursion was free I had expected more.

Right at the beginning of the walk on the small pier that the cruise ship was disembarking onto were several fine examples of fossilised roots and plant stems.

Starting under the bridge

Stigmaria roots

A short walk along the beach in the still, chill East Coast breeze took us to many other interesting sites including a fine-grained basaltic sill which is now mainly carbonate, kaolin and muscovite mica.

Intrusive sill

End of the walk

As the day wore on the sun came out and the breeze died down so by the time we stopped for lunch we were enjoying a fine day out. Continuing our walk after lunch led us past a variety of good exposures of sandstones and dolerite sills.

Our route back to the car-park was much quicker as we were able to take a coastal path. A quick change out of our boots and on to the Hawes Inn for an excellent meal and a convivial chat.

Roy Bryce

Ballachulish and the Onich Shore

A good turnout and a long bus trip to Ballachuilish to meet Jim Blair and Ian Allison who led us to three localities: (1) the Ballachuilish slate quarry, (2) the south shore of Loch Leven near Ballachuilish and (3) the shoreline of Loch Linnhe from North Ballachuilish to the Onich Hotel.

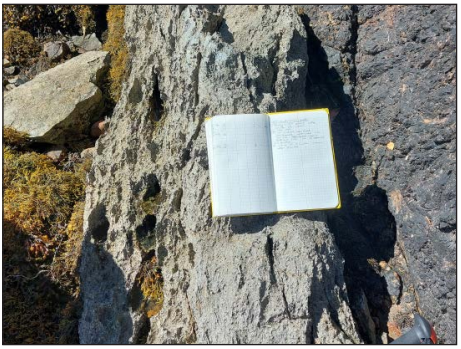
Locality 1. Ballachuilish Quarry [NN 08402 58420]

Lamphrophyre dyke in poor quality slates. Cleavage sub-vertical

Sandstone bed defining bedding which is at a lower angle than the cleavage.

Locality 2. South Loch Leven shore, west of Ballachuillish [NN 06647 58676]

Deformed cleaved metamudstones and metasandstones close to the Ballachulish Slide.



Ballachuilish limestone. Bedding vertical

Locality 3. Onich Shore [NN 04943 61058] to [NN 03014 61408]

The Onich shore section contains four stratigraphical units of the Ballachulish Subgroup – the Ballachulish Slates, the Appin Quartzite, the Appin Limestone and the Appin Phyllite. These metamorphosed rocks still retain sedimentary structures showing the original order of deposition. Secondly, they contain a wealth of minor structures (folds and cleavages) resulting from their deformation which can be used to demonstrate the relative age (D1), position and shape of a major fold (the Appin Syncline) which is a key component of the Grampian mountain belt.

3a. Start of section. Ballachuilish Slate, phyrrotite replacing pyrite (thermal metamorphism from Ballachulish pluton)

3a Crenulation cleavage and kink band fold (highlighted by quartz crystals)

3b [NN04440 61055] Appin Quartzite. Cross-bedding, gravel bases to fining up cycles, younging to west, dipping steeply east, on overturned W limb of the Appin syncline.

(L) Ballachulish quarry (Locality 1)

(R) General view along the Onich shore section (Locality 3)

3c [NN 04302 61082] Top of Appin Quartzite (L), faulted contact with subvertical Appin Limestone (R)

3d [NN 04259 61110] Cross-bedded sandstone bed within Appin Limestone. Younging to east, dipping 63/133 thus right-way-up

3e [NN03597 61290] Interbedded metamudstones, metasiltstones and metasandstones of the Appin Phyllite Fm.

3f (end of section) Folded mudstones and siltstones with small parasitic asymmetric folds with NE-directed vergence.

David Webster

Elie, St Monans and Pittenweem.

Our final day excursion of 2022 was to be along the beautiful Fife coastline starting at Elie and continuing through St Monans and finally to Pittenweem. This was one of the longer coach journeys not helped by long diversions at the end caused by a hotel burning down at the side of the main road through Lundin Links. We have had a few unusual difficulties with the day trips this year, but again fortune favoured us slightly since by the time the bus arrived at the Ruby Bay car park, the rain stopped and stayed off for the rest of the day – perfect. The ten of us who had travelled through from Glasgow met with a further six including our leader Brian Bell, who were already on holiday or living in the Fife area. A further advantage of coming by bus was that we were able to arrange to meet the driver at journey's end rather than having to retrace

our steps to collect our vehicles. A toilet stop and then about a 200 metre walk down to the shore over some rather rocky and seaweed covered ground to begin the day's examination of the Carboniferous geology along the coast.

Group at Elie shore with leader Brian Bell.

At our first stop, considered to be the best example of one of the volcanic necks exposed along this part of the Fife coast, we could see a mixture of basaltic breccia, bedded tuffs and sediments that in places, are cut by basaltic dykes. The rest of the walk was on much easier ground, in fact using parts of the Fife Coastal Route paths as well as the lovely sandy beaches.

A twenty-minute walk along the beach got us to the second locality to be examined, this time to see sandstones displaying cross-stratification, ripple-lamination including climbing ripples, slumping, and soft-sediment deformation. Plant and woody debris could be seen as well. Above and within the sandstone ones are thin layers of coal and carbonaceous mudstone with associated rootlet horizons.

As you walk along the path, there is always something of interest that catches your eye, for example, igneous dykes are common.

Wherever you look but here are also some unusual geological sights, and the next locality looked quite

Cross-bedded rippled sandstones with some soft-sediment deformation.

Dyke crossing the beach.

different to anything else we came across during the day. It shows fracturing in the Upper Ardross Limestone.

Fracturing in Ardross Limestone.

Carrying on through the fishing village of St Monans with the added temptation of its ice cream shop, we walked further along the path until we came to an interesting piece of industrial archaeology. In the early 1800s most of the coastal communities that had access to coal were involved in the industry: coal was needed to heat the evaporation pans where water from the sea was boiled into sea salt. The windmill at St Monans – the last remaining windmill in Fife – was used to pump sea water into the salt pans, which were then heated by local coal.

Some industrial archaeology: the windmill used to pump sea-water into the salt pans.

Another mile or so took us to journey's end in Pittenweem. Another place well worth the visit even without the geology. After a brief walk round the harbour trying to find the toilets that were actually shut, we all jumped on the bus for the three-mile journey back to Elie's welcoming open facilities!

Roy Bryce

Residential Field Trip to Ardnamurchan 6-9 May 2022

Leader: Dr Con Gillen. Attendees 17

Fri 6th May, pm: Report & photos by David Rae

Con Gillen introduced the group to the geology of Ardnamurchan. Volcanic activity occurred approximately 58 million years ago for about 1 million years. The activity occurred sequentially from three different centres. There then followed 50+ million years of erosion and finally glaciation. This has resulted in the removal of 1-2 km of rock.

Multiple cone sheets to the west of Mingary Pier. Here they are intruded into Moine and Jurassic country rock. The cone sheets are typically composed of dolerite. Ardnamurchan was the first area where the relationship between cone sheets (and ring dykes) and volcanic centres was identified.

Cone sheet related to centre 2 intruded into Jurassic interbedded shales and sandstones. The cone sheet can be seen "jumping" from one bed to another. Individual cone sheets are rarely more than 6m. thick but there are so many that their cumulative thickness is over 1000m.

Cone sheet intruded into Moine psammite and incorporating Moine "xenoliths" into its base.

Mingary Castle, now a very expensive hotel, sits on top of a composite (= two phases of intrusion) sill. The upper part is a granophyric rock known as craignurite and the lower part dolerite. The sill is intruded into Jurassic shales containing *Gryphaea* fossils.

Triassic conglomerate on Rubh a Mhile to the east of Mingary Castle. There are also pebble beds and cornstones with iron carbonate nodules indicating deposition in a semi-arid environment.

Sat 7th May, am Report by John Guerrier

The focus of this morning was Centre 3, which is the youngest and most complete of the intrusions of the Ardnamurchan Central Complex. On a nice clear morning we headed through a treeless wilderness towards Achnaha. The first stop, about a kilometre before Achnaha, was an exposure of layered, rotted gabbro with lighter more acidic layers that had settled out within the magma chamber.

Soft gabbro showing layering (John Guerrier)

From here we started walking towards the centre of this magnificent natural amphitheatre, a place of pilgrimage for geologists. A low grassy mound marks the centre spot of the complex, and at this point you are surrounded by the crags of the Great Eucrite. The Eucrite is a coarse gabbro, with large crystals of plagioclase feldspar, augite and olivine. We were able to examine this rock in closer detail in the afternoon. The structure of the ring is called a lopolith, which is a steep saucer-shaped intrusion of layered gabbro. The lopoliths are piled on top of one-another, possibly ten or more, following each fresh pulse of magma.

Panorama of a section of the Great Eucrite (John Guerrier)

The rocks exposed on the grassy mound are of quartz-monzonite, close in composition to a granite but not sufficiently acidic and named after the region in the Italian alps.

Quartz-monzonite (John Guerrier)

Great Eucrite with Eigg in the background (John Guerrier)

We were fortunate to have wonderfully clear views out to the islands of Muck, Eigg, Rum and Canna, and Con explained how the topography of each of the islands is a result of different volcanic processes. The impressive sugarloaf crag of the Sgurr of Eigg, for example, is composed of pitchstone formed from clouds of acidic, volcanic ash.

Abandoned village of Glendrian (John Guerrier)

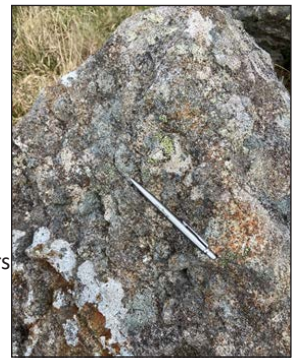
In the distance we could make out the distant abandoned crofting village of Glendrian. The village was inhabited for hundreds of years, in 1737 it had 6 men, 8 women and 15 children. However, by the 1930s only two families remained and in 1941 it was finally deserted.

We returned to the cars and drove off to Sanna Bay. It was clear we had fortune on our side as the weather became increasingly glorious. The beach was white with shells, the spring flowers sparkled on the machair and the sea was azure blue. It was the perfect time to take our lunch and do some paddling or even swimming!

Sat 7th May, pm Report & photos by Ian Veitch

After lunch we walked northwards towards Sanna Point to look for mineralogical layering in the hypersthene-gabbro. This is the Ardnamurchan Point Gabbro within Centre 2. The layering will have taken place inside the magma chamber as the 'crystal mush' cooled and the minerals came out of suspension in order of their melting point in this order: Olivine, Iron (Magnetite), Pyroxene (Augite) and Plagioclase Feldspar. There

(L) Layering of minerals within the gabbro.



(R) Knobbly looking olivine clusters in gabbro. The pyroxene has been preferentially eroded.

were regular injections of magma with each cooling in turn. We also saw slumping where one layer runs into and distorts another. This used to be called Fluxion Gabbro.

The olivine is reactive and weathers out leaving distinctive grooves on weathered surfaces, but in some places it also forms 'olivine clusters' where the pyroxene has weathered out. We observed these knobbly looking clusters in the surrounding rocks.

Moving on we observed more slumping showing as a wavy connection between the feldspar above and hypersthene gabbro below demonstrating that both had not yet fully solidified at the time of contact:

The wavy junction between feldspar slumping on to hypersthene gabbro.

From Sanna we drove back to Kilchoan and parking at the shop at Ormsaigbeg walked westwards along the shoreline to observe the Lower Jurassic Shales. These contained fossils including belemnites, a type of squid in which the central bony structure is preserved while the soft parts have eroded away. After an enjoyable time here looking fossils, we finished for the day.

Bullet shaped Belemnites in the Lower Jurassic Broadford Beds

<u>Sunday 8th May am Report & photos by Allison Grant</u>

This morning the group travelled out to Portuairk on the Ardnamurchan headland and walked down to the beach in lovely sunshine. This location lies within the second volcanic centre of the three Ardnamurchan eruptions, and the gabbro on the shore is homogeneous and coarse grained with little evidence of the layering seen at Sanna

Our group on the Portuairk shore

Block of Mull granite

yesterday. From here we travelled out to the lighthouse at Ardnamurchan Point where the coffee shop proved more immediately attractive than the geology and the whole party enjoyed elevenses. The lighthouse itself was built of Mull granite by Alan Stevenson in 1848, and the teams of lighthouse keepers that kept the light over the following 140 years until its automation in 1988 were grateful for this choice: its pale pink colour made it visible enough that painting was never required. This location also lies within the second volcanic centre and the gabbro is coarse grained and not layered, with some finer grained dolerite intrusions; a freshly exposed surface is shown in the photo (R). Con explained that the sheeted appearance of the gabbro did not represent cooling joints but unloading and rebound: this area had been compressed by up to 2 km of ice during the most recent glaciation period, and when the ice melted the crustal rocks experienced uplift. Above the coffee shop we also saw a good example of a whaleback, left after glaciation scraped away softer rock round about.

Fresh surface of Ardnamurchan Point gabbro

Sun 8th May pm Report & photos by Bill Gray

After our visit to the lighthouse, we drove a short distance along the road to the east and parked near a cattle grid. We then walked to the shore next to Eilean Carrach (NM 425681), which is a tidal islet. As we started the walk, we were treated to the sight of a herd of red deer on a ridge of the Great Eucrite to our east. We had lunch on the shore and an intrepid member of the party went for a swim. The weather was sunny but cool, with a strong south wind.

After lunch we returned to the serious business of geology. We were still in the area

Gabbro with granodiorite veining on shore near Eilean Carrach

Gabbro with pitchstone vein containing feldspar crystals on Eilean Carrach

associated with Centre 2 and the rocks we saw during the afternoon represented different stages of the evolution of the centre's magma chamber. The dominant rock type is hypersthene-gabbro, but there are more acidic components, such as granophyre and granodiorite, as well as dolerite, a finer-grained version of gabbro. At the edge of the shore there was an outcrop of gabbro with patchwork veining of lighter granodiorite. As the tide was out, courtesy of Con's planning, we were able to walk on to Eilean Carrach. The dominant rock type here was the gabbro, with some intrusions. We found a gabbro pegmatite dyke and also a pitchstone vein. This contained feldspar crystals that had been carried with the magma.

We now returned to the mainland and spent some time examining the rocks near the shore to the south of Eilean Carrach, walking to the south (NM427679-424674). Gribble states that the relationships between dolerite, quartz-dolerite, granophyre and hypersthene-gabbro are well displayed here. With Con's help, we saw some of these features in the course of our walk. We saw striking exposures of gabbro containing broad granodiorite veins and an exposure with alternating layers of gabbro and dolerite. We then came to a dyke channel with cooling joints at the bottom and some rocks with channels created by glacial ice meltwater. We were now in the granophyre

Dyke channel

Granophyre with inclusions of angular dolerite

zone (granophyre is a medium to fine-grained granitic rock) and encountered several exposures of granophyre containing rounded inclusions of porphyritic dolerite and also some of granophyre containing more angular inclusions of dolerite.

After a glorious day in the field, we returned to the cars, taking time to admire some orchids beside the road on our way.

Monday 9th May am Report by Jim Martin

Monday morning 9th May with weather conditions deteriorating, Con and 9 members drove to our final location, the overlook at Camas nan Geall (the bay of the pledges) & Ben Hiant (the blessed mountain). The view point is itself on lava from the Mull Volcano. In the distance, Ben Hiant is a centre 1 dolerite intrusion pushed through the Moine basement around 60 Ma.

We proceeded across the boulder strewn Moine beach, past the ancient graveyard and cone sheets for the elevated ground with a clear view of Ben Hiant and Macleans Nose. Maclean's Nose, consisting of a 200 metre sequence of volcanic breccias was formed during the eruption of the first of the three Ardnamurchan volcanic centres.

Due to a further deterioration of conditions and time restraint it was not possible on this occasion to proceed further. At this point we retraced our steps to the viewpoint where a vote of thanks was given for Con's excellent leadership.

Con - thank you.

Our group in the middle of Centre 3.

Added Attractions on Ardnamurchan: Report by Anne Gray

A weekend geological excursion in early May is a great opportunity to enjoy many other features of natural history as well as the rocks. On Ardnamurchan we were charmed by the distant call of the Cuckoo as we trekked over the moor in the centre of the Great Eucrite. On moor and machair by the sea we were accompanied by the soaring song of the Skylark, whose nesting sites we were no doubt disturbing. Wheatear and Stonechat could also be seen low across the moor. We regularly scanned the long crests of volcanic cone sheets, heard the croak of the Raven, and hoped to spot an eagle; once or twice we were sure that the soaring bird was not a buzzard. And, on the shore at Kilchoan, our presence disturbed a Whimbrel, easily distinguished from a Curlew by its loud trill as it flew past. In Sanna Bay we saw Great Northern Divers and dolphins (with the help of binoculars) and, as we walked from our cars to the sandy beach at Eilean Carrach on the west coast, a herd of red deer was watching us from the heights of the gabbro cone sheet.

A herd of red deer watch us from the heights of a gabbro cone sheet. Photo: Bill Gray

The wild spring flowers were also a delight. Primrose banks clustered in ditches and on wooded slopes, little blue Dog Violets arose out of the boggy moor, sometimes accompanied by the bright pink Lousewort. The boggy land was also home to two kinds of orchid, possibly both marsh orchids, and to the fleshy leaves of the Sundew, not yet in flower. There were swathes of Celandine, Tormentil, Birdsfoot Trefoil and Daisy among the grass. Some late Cuckoo Flower and Coltsfoot gave hint of the generally cool conditions in this most westerly windy promontory. Bugle and Thrift were in flower down on the shore, with masses of Silverweed yet to come. We walked over the machair at beautiful Sanna Bay, but were too early in the year to see it in its full summer glory. The tall blades of the yellow Flag Iris could be seen in many fresh water boggy areas, although their yellow flags were yet to come. One is never too early of course to enjoy the bright yellow blooms of the gorse, great banks of it welcoming us to this beautiful peninsula.

A damp ditch near Eilean Carrach houses a marsh orchid. Photo: Bill Gray

Residential Field Trip to Snowdonia 9-12 September 2022

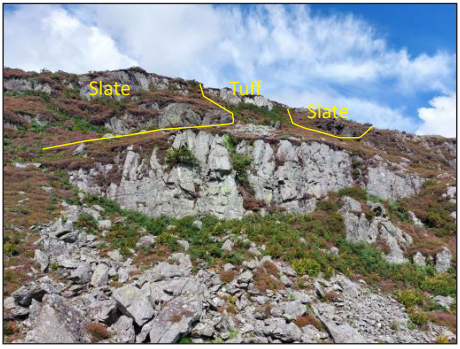
Leader: Simon Cuthbert. Attendees: 12. Report by D Webster

The purpose of this excursion was to examine the volcanic and intrusive rocks of the Caradoc (Late Ordovician) back-arc magmatic system in Snowdonia and some of their associated sedimentary rocks. The volcanic rocks of Snowdonia are an internationally important field laboratory in developing an understanding of explosive volcanism, especially the dynamics of pyroclastic flows in marine environments.

Day 1 - Dyffryn Mymbyr - Capel Curig Volcanic Group. Garth and Racks Tuff members comprising of ash-flow tuffs and interactions with underlying sediment. Volcanic centre to the north, with tuffs deposited during nue ardentée type eruptions onto land in the north and in a marine basin to south. Later deformed into transpressional periclines with vertical axial planar cleavage in the Acadian (mid-Devonian) orogeny.

Locality A [SH 71059 57916] Pyroclastic flow tuffs with siliceous nodules, soft sediment deformation (possible seismite), rhyolite bombs, shale rip-up clasts

Locality A [SH 71059 57916] Disarticulated brachiopods in tuff



Locality B [SH 71056 57929] Irregular contacts between mudstones (now slate) and tuffs. Loading of dense tuffs in marine soft muds.

Locality C [SH 71313 58062] Isolated 'pod' of tuff surrounded by mudstone (now slate)

Day 2 - Cwm Idwal - Snowdon Volcanic Group. Outcrops of the Pitts Head Tuff Formation, with tuffites, and sandstone. Cliffs of the Lower Rhyolite Tuff Formation and the Bedded Pyroclastic Formation. The Snowdon Syncline. Classic examples of roches moutonnees, a glacial cwm, hanging valleys, moraines. Post-glacial rock-fall boulder field (the Devil's Kitchen).

Locality A [SH 64883 60551]. Roadside exposure of Pits Head Tuff. Fiamme (flattened pumice) in welded ash-flow tuff.

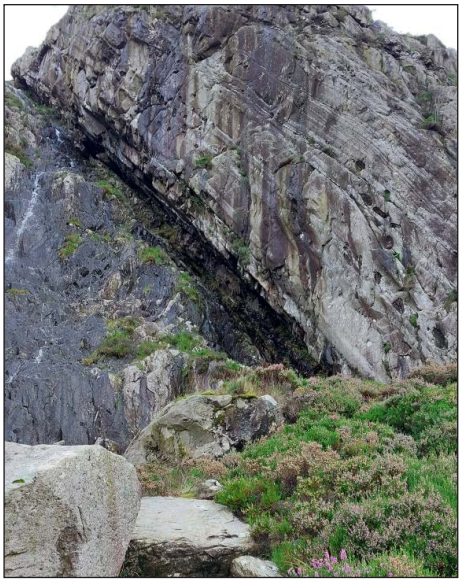
Locality B [SH 64950 60341] 'Hone Stone' quarry. Tuffite (ash-mud mixture). Faint bedding laminations with cleavage

Locality C [SH 64936 60265] View into Cwm Idwal. The axis of the Snowdon syncline runs through the cleft of the Devil's Kitchen (centre). The main cliffs and the Idwal Slabs (left) are formed from the Lower Rhyolite Tuff Formation (a large ash-flow deposit) whereas the upper parts are in the Bedded Pyroclastic Formation – a sequence of basaltic tuffs, pillow lavas and hyaloclastites.

Locality D [SH 64765 560237] Welded tuffs and tuffaceous sandstones near the top of the Pitts Head Tuff Formation.

Locality E [SH 64531 58968]. In a gully to the left of the Idwal Slabs. Large blocks of basalt in a 'traction carpet' near base of Lr Rhyolitic Tuff

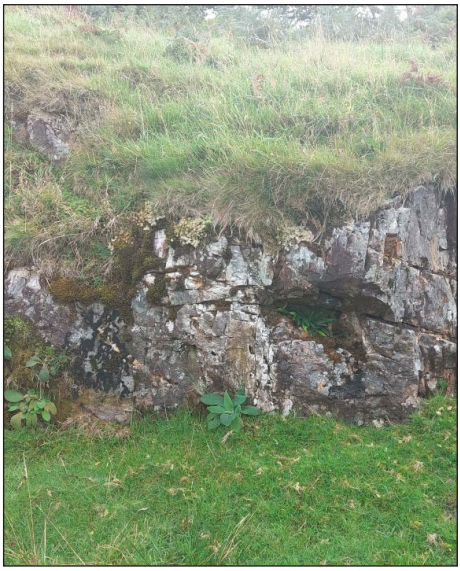
Locality F [SH 64514 59060]. Looking up the classic rock climbs on the Idwal Slabs. Lower part of the Lower Rhyolitic Tuff. Probably one 50+ m thick ash-flow tuff unit.



Locality G [SH 64442 58934]. To the right of the Idwal Slabs. A thin slate unit followed by bedded air-fall tuffs.

Locality H [SH 63934 58803]. Looking north down Cwm Idwal. Rippled tuffaceous sandstone (basaltic air-fall tuff reworked in shallow marine setting).

Day 3 - Curig Hill and Clogwyn Mawr - Crafnant Volcanic Group. Low hills to the northeast of Capel Curig exposing the Cwm Eigiau Formation with volcanics and the overlying Lower Crafnant Volcanic Formation.



Locality A [SH 72294 58112]. Tuffite in Cwm Eigiau Fm. Flinty appearance. Vertical quartz veining indicating local tectonic dislocations.

Locality B [SH 72343 58089]. Exposures of agglomerate on Curig Hill. Brown angular clasts of basalt in pumice matrix, some smaller lapilli in weathered pockets, often defining a bedding surface. Some folding which is probably slumping on a depositional slope. Outcrop is cone shaped and is interpreted as a submarine crater-fill in a short-lived volcanic episode near the top of the Cwn Eigiau Fm. Fault gully nearby with splays and en-echelon tension gashes.

Locality D [SH 72575 58234]. Tuffaceous sandstone with spaced cleavage overlain by layer of tuff with rhyolite bombs in a basaltic pumice matrix (base of Lr Crafnant Tuff Formation). Overlain by muddy matrix debris flow deposits - 'Lahar'.

Locality F [SH 72769 58417]. Near top of Clogwyn Mawr. Beige weathering tuff in Lower Crafnant Tuff Formation. Pumice fiammi, some cleavage, siliceous nodules

<u>Day 4</u> - Snowdon - **Snowdon Volcanic Group**. Trip up to Clogwyn Station by rail. The railway route starts in the Cambrian and early Ordovician sedimentary rocks. Near Halfway House it crosses an unconformity into the cleaved siltstones of the Nant Francon Subgroup. Near Lechog the line passes over the Pitts Head Tuff and shortly afterwards crosses into the Snowdon Volcanic Group, entering the Lower Rhyolite Tuff. Just before Clogwyn Station the line crosses into the Bedded Pyroclastic Formation with small sheets and bosses of rhyolite and basalt.

Clogwyn Station in the mist and rain

A map of the rocks we didn't see

And finally some group pictures!

All photos D Webster except where indicated)

Strathclyde Geoconservation Group Report

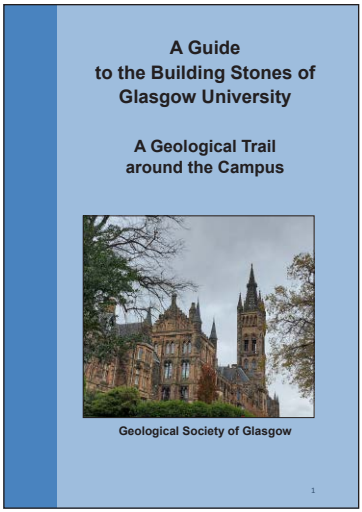
The office bearers have not changed and Margaret Greene remains chairperson, David Hamilton as Treasurer and Barbara Balfour as Secretary. Maggie McCallum is in charge of website matters and Margaret Anderson in charge of archives. Usually about 8 to 10 members attend the meetings which have all been Zoom meetings. Three new members joined in May.

Leaflets/Booklets/Geology walks:

Members of SGG have visited several sites: River Kelvin (twice, to two separate areas), Campsie Glen, Overtoun Glen, Glennifer Braes and the University of Glasgow. As a result of these visits information is being put together to create either A5 fliers, leaflets or booklets.

Future visits for next year are Mugdock Park, Linn Park, and another visit to Campsie Glen to look for essexite.

Alison Drummond and Barbara Balfour updated the booklet " Building Stones of Glasgow University", published in 2013, as some buildings had been altered, demolished or built since then. David Webster contributed to this and created a new document in Indesign and this is now ready for publication.



Margaret Greene led a U3A group round the Glasgow Necropolis using the Necropolis geology booklet. The guided tour was much appreciated and donations were divided between 'Friends of the Necropolis' and SGG funds.

Margaret has distributed 'Necropolis' booklets for staff at Glasgow Cathedral to distribute and also took some to the Museum of Religion and its café, but both were closed. She will return once it reopens.

Margaret prepared a talk on the SGG site visits, for SGG for Members' Night, 12/5/22, which was given as a Powerpoint presentation by David Webster.

Fossil Grove:

Members of SGG have been helping at the Fossil Grove on the monthly Sunday openings this season. Margaret Greene made a display board with SGG leaflets which has been taken along on each open day. On Doors Open Day 18/9/22, the event was very well attended by the public, with SGG helpers both inside the building and outside with 'geology activities'. David Webster continues to keep SGG informed of developments with the maintenance and improvements to the Fossil Grove (see separate report from the Fossil Grove Trust)

Local Authorities:

Margaret Greene has attended three LBAP steering group meetings with Inverclyde, East Renfrewshire and Renfrewshire Councils represented by biodiversity officers or other representatives. She has provided information about geological sites in Renfrew; discussed geology of Glennifer Braes; made a good contact with Andrea Pearson of Paisley Museum who has now joined the mailing list of SGG. East Dunbartonshire issued us a notice of Intention to Adopt the East Dunbartonshire Local Development Plan.

Paul Carter and Mike Browne were invited to revise the 2015-2020 Geodiversity Section of the North Lanarkshire Council (NLC) Biodiversity Action Plan to update for 2015-2025. Barbara typed up this document with Mike adding photos. It was then duly sent to NLC Biodiversity Officer, Laura McCrorie. Paul and Mike have continued their geosite assessments of the Falkirk area, completing their investigative visits, writing up of field notes and taking photos. (Barbara typed up hand written scripts). A 24 page document on the Castlerankine Burn, plus a 20 page document containing 9 reports were submitted to Anna Perks, Biodiversity Officer for Falkirk Council. As a result of this liaison, improvements have been made to one of the sites in Muiravonside Country Park. Paul and Mike continue to have dialogue with both Biodiversity Officers, and Paul continues to lead trips for schoolchildren and adults which feature geology as well as local heritage in North Lanarkshire.

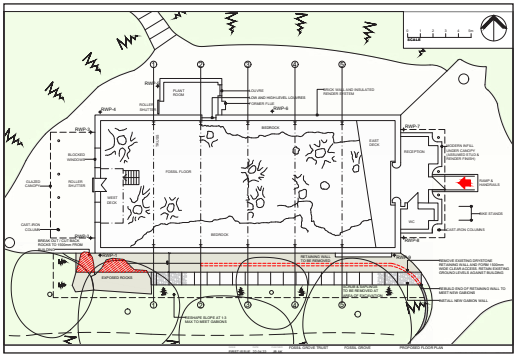
Out and about with the SGG. Top L: Campsie Glen, Top R: Dawsholm, Bottom L: Overtoun, Bottom R: Kelvin River

Fossil Grove Report

Four members of the society (Walter Semple, Campbell Forrest, Ian Veitch and David Webster) are members of the Fossil Grove Trust, which with other members of local organisations and elected members of the City Council is in the process of being reconstituted as a Scottish Incorporated Charitable Organisation (SCIO).

We have embarked on an ambitious and long-term renovation project to restore the building and conserve the fossils which are both suffering from the effects of high humidity in the building.

The city council have undertaken some basic repairs to the doors and security system but the Trust are leading on the renovation project.



The first task is to improve the drainage on the south elevation where there is a lot of water ingress under the wall and through the rock. This will involve excavation and the construction of a new retaining wall, plus guttering and underground drainage works. The contractor will also be working inside the building to open up more vents in the roof.

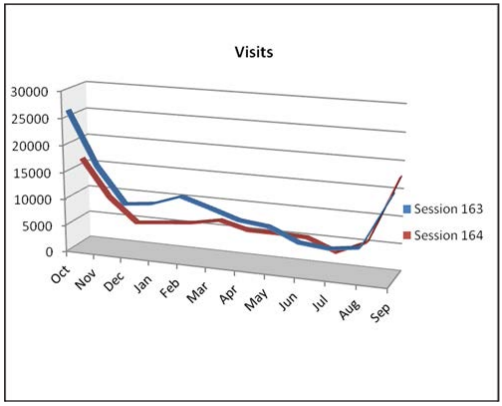
We have spent most of this year discussing all the renovation possibilities and with the help of specialist architects from Smith Scott Mullan and advice from Historic Scotland we are now in a position to invite tenders to carry out this first phase. We will then monitor the humidity for an extended period to assess the effectiveness of the mitigation measures to inform our next steps.

Meanwhile the Trust with help from other society members and others from the local community have been organising some open afternoons during the year to raise awareness and do some geoscience outreach. These have been very successful and between 200 and 400 people came to each of the seven open afternoons we ran on the third Sunday's of the month from April to October including specific events for the Scottish Geology Festival and Doors Open Day.

David Webster

Website Report

In Session 164 the website reflected the recovery of the society's activities from the Covid-19 pandemic, in particular the reintroduction of in-person lectures and the excursions programme. Another feature to make a welcome return was the Bookshop page, which contains details of books from the society's stock that can be ordered from the publications officer Gary Hoare. A new set of extracts from the society's proceedings for significant anniversary years (150 years ago to 25 years ago at 25 year intervals) was added to the Archive section. Our thanks are due to the society's honorary archivist Margaret Anderson for preparing all the anniversaries material for the past 8 years. The Archive section and the Society Presidents page are well worth exploring for the fascinating insight they give into the society's history. The Geoconservation section of the website, which is looked after by Maggie McCallum, has been enhanced by new content and is also well worth exploring.

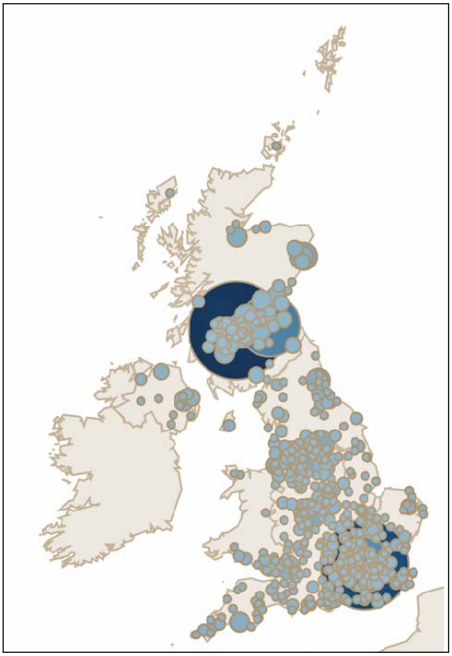


The traffic to the website has increased steadily since the website was launched in January 2011. During the previous session (Session 163) there was a major increase in the number of visitors, probably reflecting the Covid-induced restriction of outdoor activities. Session 164 saw a return to the previous trend. During the session there were 88,668 visits to the site, a decrease of 33.4% from the total for Session 163 (133,391), but an increase of 15.0% over the total for Session 162 (77,073). The number of visitors, as opposed to visits, was 75,520, a decrease of 34.6% from the total for Session 163 (115,485), but an increase of 14.5% over the total for Session 162 (65,964). The chart shows the number of visits each month for Sessions 164 (2021-2022) and 163 (2020-2021).

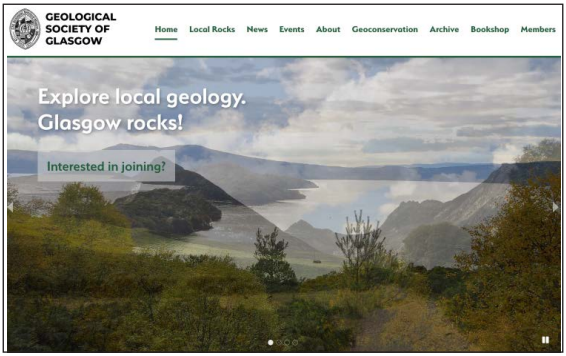
The decrease in visits was mainly the result of decreased traffic from abroad, as the traffic from the UK did not fall by as much. The number of visits from the UK in Session 164 was 11,209, 12.6% of the total visits and a decrease of 11.1% from the UK visits for Session 163 (12,605). Outside the UK, the three most productive countries were the Philippines with 36,502 visits (56,139 in Session 163), India with 11,494 (19,815) and the USA with 10,140 (15,528). Within the UK, England accounted for 5,542 visits (6,166 in Session 163), Scotland for 5,199 (5,889), Wales for 205 (289) and Northern Ireland for 168 (223).

The map shows the amount of traffic from cities within the UK. Glasgow was the most productive city, with 1,951 visits (2,173 in Session 163), followed by London with 1,768 (1,379) and Edinburgh with 609 (731).

The most popular part of the website was again the Local Rocks section, with the Rock Cycle page accounting for 36.7% of page views, followed by the Rock-forming Minerals page (29.3%) and the Metamorphic Rocks page (5.1%). Other popular pages were the website's Home page (5.3%), the Arthur Holmes page (1.8%), the Membership page (0.8%) and the Lectures page (0.6%). By far the most productive source of traffic to the website was the Google search engine, which was responsible for 73,867 visits (115,452 in Session 163). The next most productive was direct logons to the website, which produced 9,945 (11,864) visits, while the search engine Bing produced 1,194 (1,194) visits. The majority of the remaining visits resulted from referrals from other websites. The most productive source of referrals was Facebook (582 this session compared to 324 in Session 163), followed by Google Classroom (278 compared to 166). There were 100 referrals from www.scottishgeology.com (114 in Session 163).



In addition to the website, the society uses its Facebook page and Twitter account (@GeolSocGlasgow for both) to engage with the public. Both of these have been steadily gaining in popularity. The Facebook page, which Neil Clark looks after, now has 213 followers, 15 more than a year ago, and the Twitter account, looked after by David Webster, now has 377 followers, 228 more than a year ago. If you have a Facebook account, please "like" and share any society posts that you find particularly interesting and, if you have a Twitter account, please follow us and retweet any of our tweets that you like.



The website requires a continuing input of news items and event details to keep it fresh and topical. I am grateful to society members who have provided such material in the past and again encourage all members to continue to send relevant articles and information to web@gsocg.org.

Bill Gray

Library and Publications Report

The Library is currently still housed in the Molema Building, and therefore, since the venue for lectures has now changed to the Boyd Orr Building, the Library is unfortunately no longer accessible on lecture evenings. However, discussions about the future of the Library are ongoing. We are planning to sort and catalogue the books in early 2023. If any members are interested in helping to create an up-to-date audit of the library's books please contact the publications officer at books@gsocg.org

Over the last few weeks a few members of the publications working group have been clearing out the library and store cupboards at the Molema building. Our journals and books etc have been spread throughout many cupboards and were badly overdue a clear out. The geology department are changing the use of the store cupboards, so this seemed an ideal time to attempt this to coincide with departmental clear out.

Around 400 journals, leaflets and publications have been sent for recycling. And many bags of rubbish collected.

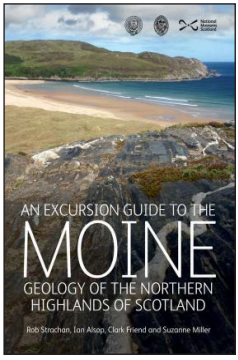
During this work many documents and letters relating to the library have been discovered, and these will be saved as part of the society's history. The most interesting being a library catalogue from 1891.

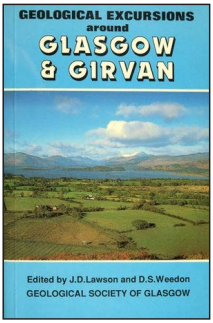
The group are also currently undergoing an outreach project to display fossil specimens and information relating to the fossil grove at Whiteinch library, for public interest purposes.

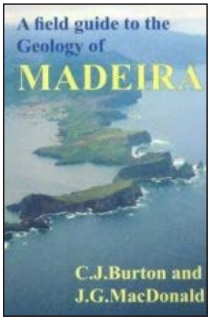
The society online bookshop was reinstated to website in October https://geologyglasgow.org.uk/about/bookshop/

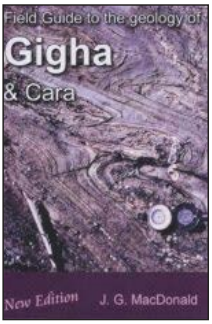
The society also has a surplus stock of the field guide "Geological Excursions around Glasgow and Girvan" – copies are available free to members.

Gary Hoare

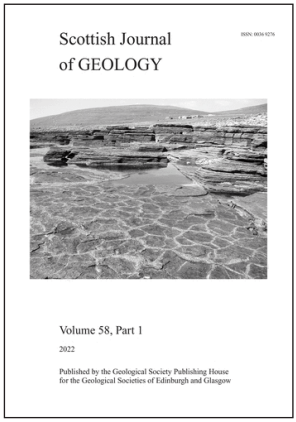








Scottish Journal of Geology Report



There have been several changes to the Editorial Board of the Journal in the past year. Following the unrelated resignations of David Brown, Tom Challands and Martin Kirkbride, all of whom have served the Journal well, we have been seeking replacements to cover their areas of expertise. So far, we have been able to recruit Yves Candela (Palaeontologist at the National Museum of Scotland), and Iain Neill (Igneous Petrologist at Glasgow University). We are still seeking someone with expertise in Quaternary Geomorphology but expect to hold our first formal face-to-face meeting for some time during November to introduce our new colleagues.

Issues regarding submissions continue to be a problem and the reasons for this are well understood. However, the move to digital publication is not without its benefits for authors and the 'Online First' system means that accepted papers are available online almost immediately on acceptance and can be read and cited without the need to wait for the publication of any hard copy.

Negotiations between the Owners (the Edinburgh and Glasgow Societies) and our publishers regarding a new contractural agreement are progressing and should be concluded soon. It is to be expected that any new arrangements will provide the same high standard of service that we have previously enjoyed.

Colin Braithwaite

Volume 58 Part 1 Contents

Space history of the High Possil and Strathmore meteorites from Ne and Ar isotopes. A. Carracedo, F.M. Stuart, L. Di Nicola, and J.W. Faithfull https://doi.org/10.1144/sjg2022-002

Carbonaceous residues in the Southern Uplands accretionary prism of Ireland and Scotland. Andrea Schito, David Muirhead, and John Parnell. https://doi.org/10.1144/sjg2021-021

Temporal and spatial variations in calcium carbonate deposition in a mixed siliciclastic–carbonate deep marine system: the Ediacaran Deeside Limestone Formation, Aboyne, Scotland. Stephen J. Drake, Enrique Gomez-Rivas, Ryan B. Ickert, and David I.M. Macdonald. https://doi.org/10.1144/sjg2021-017

Facies analysis of the Greywacke Conglomerate Formation, Glenbuck, Scotland. A.J. Mitten, A. Gough, A.G. Leslie, S.M. Clarke, and M.A.E. Browne. https://doi.org/10.1144/sjg2021-010

Remember as a member you can sign up to receive email notifications of new papers and also you can opt-out of receiving a hard copy.

Dr Judith Lawson (née Turner)

1937-2022

Judith Lawson was a Kentish Maid born at Gravesend, the only child of her parents Stuart and Enid Turner. She survived the war years at home and with a period of evacuation to Pembrokeshire. She enjoyed physical geology at school, and encouraged by her chemistry teacher, applied to study geology at Bedford College in the University of London, which in those days was only open to female students. Judith graduated with a degree in geology in 1959. It may be difficult for younger people to appreciate, but in those days women in geology were a rarity so Judith was a pioneer in the discipline, and even more so when she undertook a PhD based in Grenoble in the French Alps. She was awarded a NATO studentship, the main source of finance for overseas study at that time, as once again she was a pioneer for British students studying abroad. Her PhD project involved mapping Jurassic and Cretaceous rocks in the region of Bochaine (Beauchêne), a part of the subalpine chains, with complex structures and lots of fossils. Her supervisors were Prof. B.C. King in London and M.J. Debelmas in Grenoble. Judith had to learn to speak French on the hoof, and remained in contact with the many French friends she met at this time. She submitted for the Diplome d'Études Supérieures in Grenoble in 1962 (in French) and for her PhD in London in 1963 (see publication list below).

In 1962 she moved to the University of Glasgow, where she worked as an assistant lecturer for three years under Professor T.N. George. During this time, she published papers on the Oxford Clay of Skye, Scalpay, and Eigg (1966) and the ammonites of the Oxford Clay of Skye (1970). This was when she also met her future husband Jim Lawson, but then fell foul of university regulations which in those days did not permit married spouses to work in the same department. During this period, she and Prof King led a Geological Society of London Student's Instructional tour to France in 1964.

For a few years she taught geology classes in the Adult and Extramural Department at Glasgow University (now known as Short Courses), which then ran courses over a

large area of western Scotland. In 1976 she and Jim published the guidebook *Geology Explained around Glasgow and South-West Scotland, including Arran,* which they dedicated to "our extra-mural students". This book grew out of the many extramural classes given by Judith and Jim.

Her next career move was to work in the Civil Engineering Department at Paisley College of Technology, now part of the University of the West of Scotland at Paisley. Here she undertook regular consultancy work on natural stone masonry and developed a long-standing interest in the building stones of Glasgow, and in particular finding the quarries from which the stone was produced. The day-release students working in Glasgow provided many samples of the facing stones being used. She published a guide *Building Stones of Glasgow* in 1981, with descriptions of the rocks used and where they came from. It described three walks in the centre of Glasgow, and a fourth around the University of Glasgow. A further guide was published as Excursion 1 in the Geological Society of Glasgow's *Geological Excursions around Glasgow and Girvan,* which can be found in the BGS Earthwise online series (Building stones of Glasgow - an excursion - Earthwise (www.bgs.ac.uk). Judith also published an article on the sandstone quarries of Glasgow (1983), which showed the position of numerous ancient quarries, which have now totally disappeared, including several along what is now Byres Road. Judith was also a fabulous teacher, inspiring students of all ages and retaining her love of palaeontology. She carefully built up the fossil teaching collections at Paisley as well as her own personal collection. Judith joined the Geological Society of Glasgow in 1962 and served as president from 1985 to 1988.

For many years Judith and Jim had a cottage at Ellenabeich (island of Seil) where they spent many holidays with their children Anne and David. Judith loved travelling and explored many parts of the world on busman holidays (and real holidays) with Jim, and after his death on her own or with her many friends. Madeira was a favourite destination and Japan was a particular highlight for her.

After Jim's death in 2005, Judith moved to Beetham in the South Lakes District of Cumbria where she lived for 16 years. Jokingly she said that this was equidistant from Anne in Oxford and David in Glasgow. David promptly left for Australia, and Anne is now living back in Scotland. She joined the Westmorland Geological Society, becoming Field Meetings Secretary 2009-2012 and Lecture Secretary 2009-2014, and also became a member of the local Women's Rural Institute. One of us (MK) had many pleasant weekends at Beetham visiting local geological sites and tourist attractions. Even after retirement, Judith maintained her love of field geology. In May 2008, together with Mike Keen, she led a field trip to the French Alps, centred around her old stamping grounds of Grenoble and Briançon, for the University of Glasgow Department of Adult and Continuing Education. This was the first of three university overseas trips she led with Mike; the others were to the Western Pyrenees in June 2012 and Provence in May 2014.

Judith had a love of theatre and music, and during her stay in Beetham kept in touch with Glasgow life by regularly attending Scottish Chamber Orchestra concerts with her friends Evelyn Lennie and Peter and Helena Barton, and attending Glasgow Geological

Society events. She was a keen gardener, with green fingers, especially with growing vegetables; the nearby garden centre at Beetham came in quite handy. She had many interests, and travelling with her, especially in France, meant visiting lots of Romanesque churches, examining architecture, bird watching, and looking for wild flowers amongst other activities.

Judith will be missed by many. She was a pioneering academic, an inspirational teacher, a loyal and generous friend, a dedicated wife, and a very proud mother.

THESES

The geology of the southern Bochaine and north-western Céüse (Hautes Alpes) in south east France, French Alps. Unpublished PhD thesis, University of London, 1963.

Étude tectonique des plis subalpins entre Lus-la-Croix-Haute et Veynes (Hautes-Alps). Diplome d'Études Supérieures, University of Grenoble, 1962.

PUBLICATIONS

(as J.A. Turner)

Upper Jurassic and Lower Cretaceous microfossils from the Hautes-Alps, 1965, *Palaeontology*, **8**, 391-6.

Landslips near La Faurie and Veynes, Hautes-Alpes, France, 1966, *Proceedings of the Geologists' Association*, **76**, 435-442.

The Oxford Clay of Skye, Scalpay and Eigg, 1966, *Scottish Journal of Geology,* **2**, 243-252,

The ammonites of the Bukowskii Subzone of the Oxfordian of Skye, 1970, *Scottish Journal of Geology*, **6**, 371-378.

(As Judith Lawson)

Geology Explained around Glasgow and South-West Scotland, including Arran, with Jim (James Lawson and Judith Lawson), 1976, David and Charles, 171pp.

The Building Stones of Glasgow, 1981, Geological Society of Glasgow, 29pp.

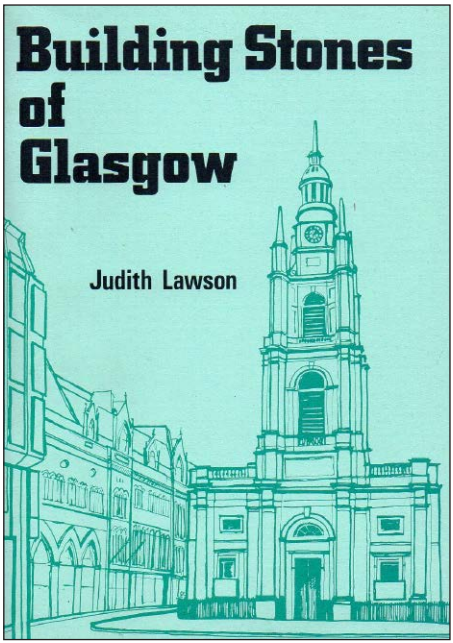
Excursion 1: Building Stones of Glasgow. In: Geological Excursions around Glasgow and Girvan, ed. J.D. Lawson and D.S Weedon, 1982, Geological Society of Glasgow, 56-62.

Sandstone Quarries in Glasgow, 1982, Proceedings of the Geological Society of Glasgow, 18-26.

Mike Keen

Simon Cuthbert

Ruth Watkins



Dr Chris Burton

1941-2022

Chris was born in Birmingham in 1941. His secondary education took place in various schools, including, from 1957 to 1960, Victoria College, Jersey. He was employed by the States of Jersey from 1960 to 1963 as a Junior Chemist. From 1963 to 1966 he studied for his BSc in Geology at the University of Exeter, and worked for his PhD, on "Variation Studies of some Phacopid Trilobites of Eurasia and North West Africa" at the same university from 1966 to 1969.

In 1969 Chris was appointed Assistant Lecturer in Palaeoecology at the University of Glasgow and he remained at the university until he retired from full-time work in 2006. He was appointed to the posts of Lecturer in Palaeontology in 1972 and Senior Lecturer in 1989, and served as Head of the Division of Earth Sciences from 1998 to 2004.

From 1969 to 2014 he also served as Tutor in the Department of Extramural Studies, where he lectured and led field excursion classes in geology. His teaching fields included Earth history, stratigraphy, palaeontology, economic geology, geological mapping, engineering geology, environmental geology and hydrogeology.

His research interests included the stratigraphy and palaeontology of the Devonian of South West England and of the Carboniferous of Scotland, and also studies of the Palaeozoic Chitinozoa of the Highland Border Complex.

Chris joined the Geological Society of Glasgow in 1970 and served on the council as librarian from 1973 until 2017, as publication sales officer in the late 1970s and as president of the society from 2003 to 2005. He was elected as an Honorary Member of the society in 2015.

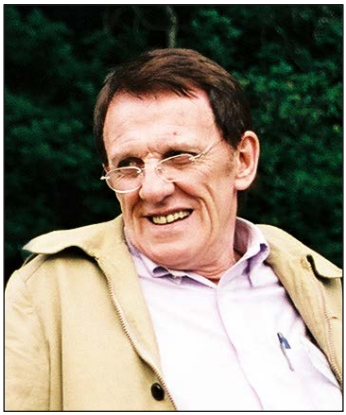
He acted as leader of numerous day and longer excursions, the latter notably to the Channel Islands, Shetland and Madeira. He has contributed to various society publications, including the Glasgow and Girvan Guide, the Southern Kintyre Guide (with J. J. Doody), and the Guide to Madeira (co-author with J. G. MacDonald).

Chris died on 31 March 2022.

Dr Keith Ingham

1937-2022

Keith Ingham was a most worthy recipient of the Society's Professor Thomas Neville George Memorial Medal in 2004 as he excelled in the fields of both palaeontology and stratigraphy for which the medal is awarded. He was a regular contributor of short talks and display specimens at the Society's Members' Nights in the 1970s and 1980s, led several field trips to Girvan and Dob's Linn from the 1980s to the early 2000s and lectured to the Society in the early 2000s. He also wrote and co-wrote several of the chapters in the Society's *Geological Excursions around Glasgow and Girvan*.



Originally from Harle Syke near Burnley, Lancashire, Keith obtained his BSc at the University of Hull in 1959 and his PhD there in 1962. He then joined the University of Glasgow, taking up a joint appointment between the Hunterian Museum and the, then, Department of Geology. He remained at Glasgow for his entire career and retired in 1998. He continued to be active in research and the curation of his extensive collections in the Hunterian Museum until ill health took its toll, some 18 months before his death in May 2022.

Keith Ingham was an internationally renowned expert on Ordovician trilobites and stratigraphy. His PhD study of the Upper Ordovician succession in the Howgill Fells in northern England and subsequent work in the Welsh Borderlands, at Girvan, Dob's Linn and on the Highland Border all reflected his remarkable practical and intellectual skills. His enormous patience enabled him to find and collect fossils even in very unpromising ground and to produce detailed (and accurate) geological maps in poorly exposed and/or structurally complex areas. His remarkable 3D sense at all scales enabled him to piece together the stratigraphical succession and unravel the geological structure of an area and, on a much smaller scale, to reconstruct the anatomy of trilobite (and other arthropod) exoskeletons from disparate and, in some instances deformed, pieces.

As a palaeontologist, Keith Ingham's clear descriptions of Ordovician trilobites reflected his eye for detail and the ability to make succinct comparisons between species. His papers were superbly illustrated by drawings and photographs of the highest quality. He took pride in compiling composite figures of photographs of trilobite specimens, each photo cropped and fitted close to its neighbours in an intricate jigsaw of variously shaped images, evenly matched in tone and with a minimum of 'wasted space'. These works will stand the test of time and are referred to by Ordovician trilobite workers around the world. The same applies to his collaborative 1975 review of the 230 species of the quintessentially Ordovician group of trilobites, the Trinucleidae. His reconstruction of the trinucleid *Marrolithus favus,* made as the symbol for the 1974 Symposium on the Ordovician System, became the logo for the Palaeontological

Association and is testament to his first class artistic abilities that were also applied to many of the displays in the Hunterian Museum.

The review of the trinucleids included an analysis of their distribution and evolution using a series of global palaeogeographical maps; an early use of such maps that were a significant outcome of the development of plate tectonic theory in the previous decade. Palaeogeography and palaeobiogeography were important themes in Keith's work, none more so than in his joint editorship of, and contributions in, the *Atlas of Palaeogeography and Lithofacie*s published by the Geological Society of London in 1992. His artistic skills were also very much to the fore through his editorial responsibility for all the artwork in the highly illustrated volume that includes over a hundred colour maps showing the changing geography of what is now Britain and Ireland from the mid-Proterozoic to the present day.

As a stratigrapher, Keith Ingham, excelled in correlating Ordovician rock successions regionally and internationally and he played an important role in establishing the modern chronostratigraphical and biostratigraphical subdivisions of the Upper Ordovician in the Anglo-Welsh area, the type region for the Ordovician System. He was the only contributor common to both the 1972 and 2000 Geological Society of London volumes on the correlation of Ordovician rocks in the British Isles. As a member of the International Subcommission on the Ordovician System he was heavily involved in helping to establish an internationally recognized Ordovician-Silurian boundary, eventually chosen to be the section at Dob's Linn in the Southern Uplands.

Beyond trilobites, Keith Ingham had an extensive knowledge of other fossil groups including graptolites, Jurassic marine vertebrates and even hominins. His deep interests outside geology included astronomy and photography. His undergraduate lectures on the Solar System exemplified his skills as a captivating and inspiring teacher and his lecture to the Society in 2000 on 'The Geology of the Terrestrial Planets' included some of his own digital compilations of images of the surface of Mars. He had considerable knowledge of historical techniques in photography and photographic processing, an inkling of which was given to the Society at the 1983 soirée to mark its 125th anniversary: members had been invited to wear Victorian costume and the report in the Proceedings noted that photographer for the occasion "…who some believed to be Count Dracula, while others thought him to be Dr Ingham" used what appeared to be a box camera and magnesium flash.

Keith Ingham's attention to detail was evident in all that he did and his perfectionism has meant that some major works on which he expended a great deal of effort were sadly left unfinished. The quality and scientific rigour of his published works, however, are an unquestionable scientific legacy. His generosity with his knowledge, his encouragement of the work of others and his communication skills both as a teacher and in the production of museum displays have touched a great many lives and will be sorely missed.

Alan Owen

The Pap of Glencoe and a happy geologist on the Onich and Ballachulish day excursion.
August 2022

THE GEOLOGICAL SOCIETY OF GLASGOW

Edited by D J Webster.
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