PROCEEDINGS OF

THE GEOLOGICAL SOCIETY

OF GLASGOW

Session 157 **2014-2015**

SESSION 157 (2014-2015)

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SESSION157 (2014-2015)
Members of Council

President	Dr. Brian Bell
Vice Presidents	Miss Margaret Donnelly
	Dr. Ben Browne
	Mr. Michael Pell
Honorary Secretary	Dr. Simon Cuthbert
Treasurer	Dr. Ben Browne
Membership Secretary	Dr. Robin A. Painter
Minutes Secretary	Mrs. Margaret L. Greene
Meetings Secretary	Dr. J.M. Morrison
Publications	Mrs. Mina Cummings
Librarian	Dr. Chris J. Burton
Asst. Librarian & Hon Archivist	Mrs. Margaret Anderson
Proceedings Editor	Mrs. .Mina Cummings
Excursion Secretaries	Mr. Roy Bryce (day / evening)
	Ms. Katerina Braun (Residential)
Junior Members' rep	Vacancy
Editors of S.J.G.	Dr. Colin J.R. Braithwaite
	Dr. Brian Bell
Webmaster	Dr. Bill Gray
Website Coordinator	Miss Emma Fairley
Website Consultant	Dr. Neil Clark
Ordinary Members	Dr. Walter Semple
	Dr. David Brown
	Mr. David Webster
	Mr. Robert Diamond
Geoconservation Group Chairs	
Strathclyde	Mrs. Margaret Greene
Argyll & Islands	Mr. Alistair Fleming
Independent Examiner	Mr. Ian Anderson

President's report session 157

This session, the Society has a membership of 356, which includes 20 new members. Eight evening meetings took place on the second Thursday of each month from October 2014 through to May 2015. Speakers were: Dr. Peter Treloar (Kingston University); Dr. Graham Leslie (BGS, Edinburgh); Dr. Jim MacDonald (University of Glasgow); Professor Zoe Shipton (University of Strathclyde); Dr. John Winchester (Keele University); Dr. Ian Williamson (formerly of BGS, Nottingham); and, Dr. Laura Evenstar (University of Bristol). Our day excursions ran from July through to September 2015 and included the following day trips: July – Rosneath & Loch Long (Dr. Iain Allison); July – The Arrochar Igneous Complex (Dr. Chris Burton); August – Fife Coastal Path (Emma Fairley); August – Field skills at Loch Ardinning (Dr. Simon Cuthbert); and, Fossil hunting at Trearne Quarry (Joint with the Geological Society of Edinburgh, Dr. Al McGowan). The Strathclyde Geoconservation Group (SGG), a sub-committee of the Society's Council, has continued to promote geology in the wider community, investigating a number of new sites as well as continuing work on others. Two other sub-committees, Geodiversity: Argyll and the Islands and Geodiversity Dumfries and Galloway, are also making progress and have investigated a selection of new sites. Members of the Council continue to attend Steering Group meetings for the refurbishing of the Fossil Grove building in Victoria Park. Progress continues to be slow due to a lack of funds, although the Trustees hope to submit a Heritage Lottery Fund bid, possibly in 2016. Funding continues to be provided by Glasgow City Council for any urgently required repairs to the roof and other parts of the building. Visitor numbers were good for the summer 2015 season. Our Society is a member of the Scottish Geodiversity Forum, which includes Geoparks, Museums, SNH, BGS, Geoconservation Groups, other Geological Societies and interested groups/individuals. The aim of the Forum is to promote Scotland's Geodiversity and its value in education, community involvement and health, tourism and the wider economy. On our website we have a Local Rocks feature, which illustrates the geology of the western part of the Central Belt of Scotland: a very useful portal to some marvelous (geological) localities. A Guide to the Geology of Islay (by Webster, Anderton & Skelton) was published in 2015; details of this book and other publications available from the Society bookshop are available on our website. Our website is under continuous development and upgrading thanks to Bill Gray and I invite you to explore its many useful features and data resources.

Brian Bell

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Membership Secretary's Report

	At end Session 157	At end Session 156
	30 Sep 20156	30 Sep 2014
Honorary Members	6	4
Ordinary Members	269	275
Associate Members	68	64
Junior Members	13	10
TOTAL Members	**356**	**353**
New Members	20 (joining in Session157)	14 (joining in Session156)
Memberships Closed	17	19

Overall membership numbers in Session 157 were little changed from the previous Session 156. The new members joining rate in Session 157 was a little lower than the long term average but higher than in Session 156. There was a slightly lower number of memberships closed (memberships are closed either by resignation, non-payment of fees or death) than in Session 156 Robin Painter

R A Painter

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Library Report 2014-2015

The Society's library has, over the session, both grown and has had to accommodate our journal collection within the same space. The journal collection has, hitherto, been stored separately - but a requirement by the School of Geographical and Earth Sciences for more laboratory space has prompted the move. However, this does mean that key journals are now immediately available in our library and can be borrowed at any time. Acquisitions Over fifty new books have arrived this session, including a large number from the collection of the late Professor Brian Bluck. The range of titles and subjects is large including a number of excursion guides (Shetland; South Wales; Falkland Islands; Nova Scotia/New Brunswick); BGS district memoirs (Scotland), sedimentological texts, and palaeontological works. The British Geological Survey continues to provide us with up to-date geological maps of the whole of the UK; including new versions of the 1:50 000 sheets for Crianlarich and Killin, the former filling a long-standing gap in coverage. At other scales are the William Smith 1815 Geological Map (Facsimile) and the NERC Geological Map of Britain Bicentennial edition. All the Society's maps are available for loan and can be used in the field. Those planning excursions next summer (or for the hardy even sooner) should consult the Librarian on meeting nights (in the Society's Library) where the relevant maps can be provided.

Chris Burton

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Scottish Journal of Geology: Editors' Report 2014

Unlike some previous years 2015 has seen sufficient submissions for us to produce two full issues for volume 51 with a wide range of topics covered. The most popular papers have been "Ichthyosaurs from the Jurassic of Skye", that exceeded all expectations in the number of hits it received on the web-site, "Mating trackways of a fossil millipede" and a controversial review paper on the "Neoproterozoic to Mid-Devonian evolution of Scotland". Our impact factor is creeping up, and over 5 years is now a respectable 0.870, due to a large extent to our greater exposure online in the Lyell Collection and GeoScience World. Our more observant readers will already have noticed changes in format that we hope make papers more attractive to readers and authors. In the coming weeks we will be moving to a new online submission and review system that should keep authors and editors better informed of the status and progress of submissions. We would still like to see greater numbers of submissions and remind members and others that we have a system of mentoring for those unused to submitting scientific manuscripts, including students and amateurs. This year has seen the departure of two long-serving members of the Board. After several years serving as secretary to the Board Al McGowan has resigned, to be replaced as Palaeontological specialist by Breandán MacGabhann, and Rob Duck, after many years of service, is retiring as Quaternary specialist to be replaced by Martin

Kirkbride. We are grateful to both of these for their service to the Board and the membership of our two Societies.

Colin Braithwaite

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Publication Report session 157

The bookshop has had another busy year, slightly complicated by some reorganisation of the store room where our books are housed. We have been able to provide several new books for members and they have all sold very well. The availability of the Guides to the Geology of Madeira and Gigha via the web has also continued to attract orders from throughout the UK and from abroad. These sales account for about half of our overall sales and a large part of our profits of over £600 for the year. My thanks to Bill Gray for patiently teaching me how to manage the Paypal system for managing sales made via the website

Mina Cummings

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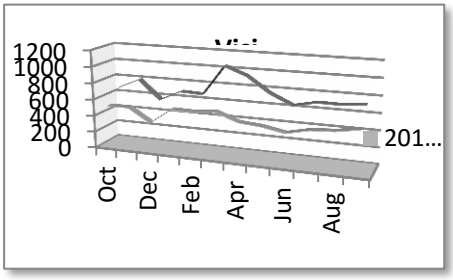
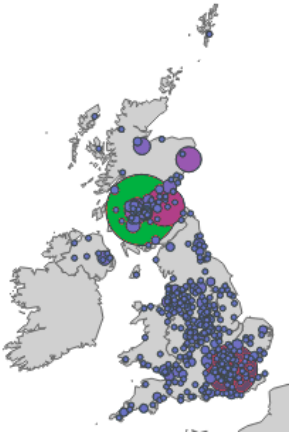
Website Report for Session 157

In November 2014, a substantial upgrade to the website was carried out. This involved many small improvements, and two major changes. There is a new Local Rocks section, containing a beautiful geological map of the extended Glasgow area prepared by the society's website coordinator Emma Fairley. This map contains pins providing links to descriptions of 12 of the best geological sites in the area, and excursion itineraries for the sites are provided. Three of these itineraries, for sites in Arran, have been freshly prepared by Jim MacDonald, and other new itineraries are in preparation. The Local Rocks section also contains new articles about minerals, rocks and fossils. The website is also now more compatible with mobile devices. In particular, the image rotators on the Home page and the Geoconservation pages now display properly on tablets and smartphones.

Since the upgrade, further new content has been added to the website, including a page listing all the presidents of the society since its inception in 1858, with links to biographical details. Since the website's launch in January 2011, the number of visits per session has steadily increased.



In Session 157 there were 8911 visits to the site, an increase of 20.7% over the total for the previous session (7385). The number of visitors, as opposed to visits, was 6494, an increase of 23.8% over the previous session's total (5344). The chart shows the number of visitors each month for Sessions 157 (2014-2015) and 156 (2013-2014)



. The increase in visits reflects increased traffic both from the UK and from abroad. The number of visits from the UK increased from 5548 in Session 156 to 6317. Outside the UK, the three most productive countries were the USA with 723 visits (389 in the previous session), Australia with 176 (131) and Germany with 157 (88). Within the UK, Scotland accounted for 3768 visits (3142 in Session 156), England for 2394 (2298), Wales for 83 (45) and Northern Ireland for 66 (59) The map shows the amount of traffic from cities within the UK. Glasgow was the most productive city, with 1773 visits (1461 in the previous session), followed by London with 899 (814) and Edinburgh with 581 (489).
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Apart from the homepage, the most popular pages were the new Local Rocks page (4.0% of pageviews), the Excursions page (3.7%) and the Lectures page (3.3%). The Membership, Bookshop and Events pages all had 2% or more of pageviews. By far the most productive source of traffic to the website was Google, which was responsible for 4779 visits (3948 in the previous session), but the next most productive was direct logons to the website, which produced 1922 (1789) visits. Bing produced 253 (192) visits and Yahoo 167 (91). The majority of the remaining visits resulted from referrals from other websites. As in Session 156, the most productive source of referrals was visitscotland.com, which produced 352 visits (231 in Session 156). The referrals from scottishgeology.com (165 this session compared to 136 last session), the Edinburgh Geological Society website (100 compared to 96) and the Geological Society of London website (51 compared to 48) were all up from the previous session. Facebook produced 83 referrals, considerably fewer than the 194 in the previous session. The society's Facebook group now has 880 followers, which represents a dramatic increase compared to this time last year, when it had around 160 followers. The reasons for the decrease in direct traffic from the Facebook page to the society's website are unclear. As Webmaster, I am responsible for the day-to-day running of the website. Two other Council members, Neil Clark (Web Consultant) and Emma Fairley (Website Coordinator) assist with the development of the site, and Emma looks after the society's Facebook page. In addition, Maggie McCallum has recently taken on the task of looking after the Geoconservation section of the site. I am grateful to all three for their enthusiastic support. I also wish to record my thanks to Maggie Donnelly for the valuable guidance she provided while chairing the website working group over the past three years. 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 encourage all members to continue to send relevant articles and information to: web@gsocg.org.

Bill Gray

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STRATHCLYDE GEOCONSERVATION GROUP ANNUAL REPORT 2014-2015

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 the website and Margaret Anderson in charge of archiving. Two new members have joined this year

The SGG action plan was updated for November 2014-November 2015

Leaflets and Booklets:- "Building stones of Glasgow" - the Geological Society of Glasgow gave £350 toward producing this booklet. It has mainly been distributed to the City Chambers, GOMA, and several libraries around the Glasgow area and has proved popular. "Dumbarton Rock", "Balmaha", "Fossil Grove" and Geoparks are now linked to the Visit Scotland website.

SGG Website:- Maggie McCallums's training on management of the SGG website by Bill Gray, Webmaster, is now complete and will enable MMcC to keep the website up to date.

East Renfrewshire Council and Glasgow:- ERC are reprinting the Rouken Glen leaflet including a map and corporate logos, with Heritage Lottery Fund support. MG has been asked to supply photographs for the leaflet. The Local Development Plan for East Renfrewshire is now finished and printed with geodiversity mentioned.. The Glasgow LDP has gone to committee and there are no changes to geodiversity boundaries.

North Lanarkshire:- Members of the North Lanarkshire Group (Mike Browne and Paul Carter,PC) of the SGG had success with North Lanarkshire Council as the Geodiversity Action Plan is being included into the Biodiversity Action Plan. The group is continuing to assess sites, having submitted the majority with some still to assess. PC continues to promote geoconservation with a 'rock' show, geowalks and talks and his leaflets, "Cumbernauld Rocks " and " Kelvin Valley Rocks" continue to be popular.

Activities/Meeting etc:- SGG now have an 'area' beside the bookshop at alternate Geological Society meetings of the session, also including the AGM and Members' Night. The area comprises a trifold board with SGG propaganda and information on it, and free SGG leaflets and booklets. A member of SGG is usually nearby to answer any questions. Margaret Greene (MG) led four walks taken from "Building Stones of Glasgow" booklet. In March she led the University of the Third Age Edinburgh branch geology group round Glasgow City Centre buildings. In conjunction with the September "Doors Open Day"

(having led a practice run with 5 participants in August) she led two groups, on 15th and 19th September. Both walks were fully booked and proved very popular.
Dr. Iain Allison reported on his attendance Diversity on 22nd November 2014 in Edinburgh.
MG attended a number of Scottish Geodiversity meetings including theAGM and Fossil Five Poll on 24th March 2015.
In August 10 participants from SGG had an extremely interesting visit to the geology collection at the Glasgow Museums Resource Centre. Ann Ainsworth, Curator of Geology, Glasgow Museums, gave excellent (and enthusiastic) information on a number of the 62,000 specimens in the collection. The group was very impressed with the collection under Ann's guardianship.

Fossil Grove:- SGG continue to be **very concerned** about the fate of Fossil Grove. Over the last year no attempt has been made to maintain the building and damp is apparent with the computer and lights malfunctioning despite the stalwart efforts of the rangers employed during the season. What is even more worrying is the fact that nobody appears to be taking responsibility for the Fossil Grove and no moves have taken place regarding the rehousing/modenisation of the building which was discussed in public earlier in the year. More leaflets are also required.

SGG Future Projects:- A new booklet about the Glasgow Necropolis is being discussed. It is thought that there is enough material and knowledge of the stones to make one worthwhile. The Necropolis is already on the Glasgow tourist route.
East Dunbartonshire would like to set up a geowalk. Bob Diamond from the Geological Society will be attending a meeting to discuss this and then he is to report any information to SGG.
SGG are considering a downloadable booklet on the Pillars in the GOMA.
SGG will be investigating the possibility of a display board in the popular Mugdock Country Park pointing out geological features such as DumGoyne, quarries etc.

Margaret Greene

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Geoconservation: Argyll and the Islands; Annual report 2014- 2015

The 2014 AGM for GAI was held on Monday 8 December 2014, at Wetherspoons, South Pier, Oban. The standard business was completed. The roadside geology trail remains on the group's agenda, but current efforts are being focused on the Building Stones Town Trail in Oban in conjunction with the Oban U3A Geology group. A little further research on individual buildings has been done, and the GAI group will be asked soon to cross-check the first drafts for the material produced so far, including drafts entries for 6 buildings out of a potential 25. The U3A geology group undertook field excursions to the North West Highlands and to Gigha in the summer. In addition a joint meeting of the Oban

U3A and Edinburgh U3A Geology groups was held in September to hear a talk by Roger Anderton on the recent research done on the underwater geology in the Firth of Lorn.
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We were unable to attend the SGF conferences in 2015 due to diary clashes. Hopefully we will be luckier in 2016. We still await the promised best practice guidance from the 2014 Write Right conference.

Alastair Fleming

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Proceedings editor's report

The proceedings for session 156 were distributed a little later than usual but gave, as always, due to the reports of the Council officers, a comprehensive picture of the work of the Society for the year 2013-2014. This included an excellent programme of evening lectures and a varied selection of field trips including a trip based on a teaching schedule around the University grounds and a week end trip to Banffshire. For all of these trips I am indebted to the members who provided reports and photos sharing the experience with those who could not be present. It has been decided by Council that the proceedings should be uploaded to the website and this has been done for sessions 153 to 156. They can be viewed at http://geologyglasgow.org.uk where a notice has been posted indicating how the proceedings can be accessed. My thanks to our webmaster Bill Gray for uploading and managing these PDFs

Mina Cummings

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Treasurer's report

The Income & Expenditure Account and the Balance Sheet at 30 September 2015 are shown on the following pages. A significant proportion of members have failed to pay the 25% increase of our membership subscription which has so far yielded a 19% increase in subscription income. During the course of last year money was collected to fund the Conoco-Phillips prize. ConocoPhillips contributed £1250 to fund prizes for the five years 2014-2018. Our sister societies of Edinburgh and Aberdeen each contributed £83.33 to fund the prize for 2014 to this we added £83.34 and the sum of £1500 has been allocated to a

restricted fund making £500 available for the 2014 prizes. A prize of £400 was awarded and this year the three societies again jointly contributed £250. The fund was drawn down £150 to make up the £400. The publishing costs for the Moine Guide were shared on a 50%/25%/25% basis between the National Museums of Scotland and the Geological Societies of Edinburgh and Glasgow who own the distributed stock in these proportions and pooled profits are shared accordingly. Stock reporting is unreliable but last year end was reported as 107 volumes at per item cost of £8.52. Sales have been poor so I propose to devalue the reported closing stock of 105 volumes to £5.00 per item.

Moine Guide (25% of total)
Closing stock 131.35
Revenue 171.10
Closing Assets 302.35
Opening stock Value156 228.00

Profit 74.35

In House Publications
Opening stock 157 3915.63
Add Publications purchased 1471.29
Stock available for sale 5386.92
Deduct Closing stock 156 3889.53
Stock assumed sold 1497.39
Receipts 2120.86
Gross profit 575.08
Less Expenses 50.40

Profit 573.07

Room Hire for lectures has been renegotiated at an inflated rate for next year but fixed for three years during which it will be necessary to consider the possibility of alternative accommodation. Society funds were used to sponsor by £750 another educational expedition similar to last year's "Voyage of the Betsy". This time it was to commemorate the publication of "A Testimony of the Rocks" by Hugh Miller. An expedition by Glasgow University Undergraduates to the carbonatite volcano Ol Doinyo Lengai was supported by £1000. Half the cost of upgrading the website was born last year the remainder was paid this year. This exercise may need supplementing every three years or so. It has been our policy to cautiously underestimate the balance sheet value of investments. In a recently very volatile market the face value of these fell by about 2% during this year but retaining the same balance sheet figure still cautiously undervalues this by approximately 8%.

Ben Browne

The Geological Society of Glasgow

Income and expenditure for year ending September 2015

	Session 157 2014-2015		Session156 2013-2014	
Income *note1*				
1. Subscriptions				
Received during the year less refund	7023.14		5936.00	
Deduct paid in advance this year	-92.50		-120.00	
Add receied in advance last year	120.00	7050.64	80.00	5926.00
2. Investment Income	580.43		558.00	
Dividends	267.40	847.83	398.00	956.00
3. Gift Aid		1059.93		1064.00
4. Conoco-Phillips prizes *note 2*				
ConocoPhillips 5yr. contribution	0.00		1250.00	
Transfer from Conoco-Phillips funds	150.00		0.00	
Edinburgh GS	83.33		83.00	
Aberdeen GS	83.33	316.66	83.00	1416.00
5. Publications *note3* In House *net profit*	573.07		502.00	
Moine Guide *net profit*	74.35	647.42	257.00	759.00
6. Saturday Excursions *net profit*		81.57		-26.00
7. Weekend Excursions(none this year) *net profit*		0.00		44.00
8. Donations *(coffee collections)*		227.31		280.00
9. Miscellaneous income		25.42		25.00
10.Received in error from Eth Zurich		570.62		
Total Income		**10827.40**		**10892.00**

Expenditure

1. Meetings and speakers expenses etc.	625.77		500.00	
Meeting Secretary's expenses	717.30		676.00	
Room Hire *note 4*	3268.80	4611.87	3132.00	4308.00
2. Publications and postage of proceedings		542.21		578.00
3. Strathclyde Geoconservation		100.00		350.00
4. Sponsorship *note 5*				
Scottish Geodiversity Forum	125.00			
Testimony of the Rocks Expidition	750.00			
Ol Doinyo Lengai Expedition	1000.00	1875.00		1510.00
5. Library and Down to Earth		455.00		480.00
6. Affiliation Fees		90.00		40.00
7. Insurance		201.52		198.00
8. Conoco-Phillips prizes		400.00		0.00
9. Website Maintainance	383.98			318.00
Note 6 I Upgrade	1186.80	1570.78		1187.00

10. Admin Costs- postage stationery etc			
Hon Secretary expenses(newsletter)	250.37		216.00
Membership Secretary	711.04		514.00
President and VP	0.00		54.00
Treasurer	55.03	1016.44	24.00
11. Refund to Eth Zurich		570.62	
Total Expenditure		**11433.44**	**11281.00**
Deficit		**-606.04**	**-388.00**

Note to the Financial Statement
For year ending 30th September 2015

Accounting convention

The financial statements have been prepared under the historical cost convention and in accordance with applicable accounting standards. The accounts are also set out to comply with guidance from OSCR.
The principal accounting policies adopted in the preparation of the financial statements are as follows:-
All income from membership subscriptions, excursions, publications, bank interest and donations is accounted for on an accruals basis.
Resources expended are accounted for on an accruals basis and are recognised when there is a legal or constructive obligation to pay for expenditure.
All costs have been directly attributable to one of the functional categories of resources defined in the Statement of Financial Activities.
Expenditure on equipment is charged to Revenue in the year of purchase.

Notes on entries:-

1. A significant proportion of members have failed to pay the 25% increase of our membership subscription which has so far yielded a 19% increase in subscription income.
2. During the course of last year money was collected to fund the Conoco-Phillips prize. ConocoPhillips contributed £1250 to fund prizes for the five years 2014-2018. Our sister societies of Edinburgh and Aberdeen each contributed £83.33 to fund the prize for 2014 to this we added £83.34 and the sum of £1500 has been allocated to a restricted fund making £500 available for the 2014 prizes. A prize of £400 was awarded and this year the three societies again jointly contributed £250. The fund was drawn down £150 to make up the £400.
3. The publishing costs for the Moine Guide were shared on a 50%/25%/25% basis between the National Museums of Scotland and the Geological Societies of Edinburgh and Glasgow who own the distributed stock in these proportions and pooled profits are shared accordingly. Stock reporting is unreliable but last year end was reported as 107 volumes at per item cost of £8.52. Sales have been poor so I propose to devalue the reported closing stock of 105 volumes to £5.00 per item.

Moine Guide	(25% of total)
Closing stock	131.35
Revenue	171.10
Closing Assets	302.35
Opening stock Value156	228.00
Profit	**74.35**

In House Publications	
Opening stock 157	3915.63
Add Publications purchased	1471.29
Stock available for sale	5386.92
Deduct Closing stock 156	3889.53
Stock assumed sold	1497.39
Receipts	2120.86

4. Room Hire for lectures has been renegotiated at an inflated rate for next year but fixed for three years during which it will be necessary to consider the possibility of alternative accommodation.

5. Society funds were used to sponsor by £750 another educational expedition similar to last year's "Voyage of the Betsy". This time it was to commemorate the publication of "A Testimony of the Rocks" by Hugh Miller. An expedition by Glasgow University Undergraduate to the carbonatite volcano Ol Doinyo Lengai was supported by £1000

6. Half the cost of upgrading the website was born last year the remainder was paid this year. This exercise may need supplementing every three years or so.

7. It has been our policy to cautiously underestimate the balance sheet value of investments. In a recently very volatile market the face value of these fell by about 2% during this year but retaining the same balance sheet figure still cautiously undervalues this by approximately 8%.

B. Browne

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Meetings Secretary's Report

February 2014 flood victim Peter Treloar made it to Glasgow from Kingston University this time on 9 October to open Session 157 with his postponed talk on minerals – 'from mines to mountains'. Mountains are something we associate with BGS Edinburgh stalwart, Graham Leslie from his extensive works in the Scottish highlands. This time, on 13 November, hills were replaced by coasts and Caledonia by Mona when he gave us a whole new perspective on Anglesey – "its accretion and tectonic amalgamation".
On 11 December, our AGM was accompanied by a beautifully illustrated talk by clarinet playing (though not on this occasion!) past-President Jim MacDonald. Namibia is not a place that many can claim intimate knowledge, but Jim showed that it is more than the scarily-named Skeleton Coast. Mid-decade, otherwise known as 15 January 2015, opened with Zoe Shipton from Strathclyde University giving a very clear exposition of the ins and outs (as it were) of fracking in "UK Shale gas: frack on, frack off or frack well". Well, frack me! John Winchester, formerly of Keele University, is perhaps best known to us for his work on metamorphism in the Scottish highlands, but has long had an interest in the Palaeozoic 'assembly' of mainland Europe. On 12 February, he talked about "Recognition and origins of accreted terranes." Some of these terrane boundaries have little in the way of topographic expression. Ian Williamson, long-term collaborator of President Brian Bell essayed to persuade us that the early Palaeogene lava fields of NW Scotland are NOT "monotonous piles of old, cold and very boring basalt". His examination of the variety of rock types and structures present convinced me at any rate. Ian is veritable mountain goat and gets to places, for example on the south coast of Mull, so vertiginous that I for one felt in need of a lie down! At the risk of being accused of sexism, it was charming – at least for this old 'gentleman' - to be addressed by a second geologist of the female persuasion when Laura Evenstar talked to us. She was accompanied from Bristol by her baby daughter, Autumn – a first for the Society, I believe. Laura's spectacular photos showed us the Atacama Desert and its gigantic mineral extractions – we have indeed been taken to some exotic locations this session! The session's meetings closed on 14 May with Members' Night and its interesting and varied programme of talks and demonstrations by various members of the Society. We thank them most warmly.

Jim Morrison

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Meetings

9th October 2014

Dr Peter Treloar, Kingston University

Minerals - from mines to mountains

Minerals are more than just the building blocks of rocks. Analysis of their chemistry, their textures and of the solid and fluid inclusions contained within them will document the evolution of the rocks that host them. Modern analytical techniques now make possible the rapid collection of precise data which enable us to drill down into petrological and structural histories. In this talk I will use two case studies. In the first, mineralogy of metamorphic rocks from the High Himalaya of North Pakistan have allowed us to deduce precise geochronologically constrained Pressure-Temperature-Strain-Time paths for orogeny which leads to a discussion of rapid rates of regional metamorphism. In the second, mineral chemistries and textures together with fluid inclusion and stable isotope analysis of gold deposits from West Africa enable us to challenge the metamorphic fluid paradigm for orogenic gold deposits,

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13th November 2014

Dr. Graham Leslie, BGS Edinburgh

Accretion and tectonic amalgamation in Anglesey

Edward Greenly viewed the older schists and quartzites of Anglesey with 'great trepidation' – perhaps with great foresight. Some 100 years on, it is now apparent that Late Neoprot-erozoic accretion at the outboard margin of East Avalonia is recorded on Anglesey in ca. 650 Ma metamorphism in the Coedana Complex, the ca. 615 Ma supra-subduction zone Coedana Granite, and ca. 560 Ma exhumation of the Penmynydd Zone blueschists. Thrusting complexity upon complexity however, Anglesey's present architecture is largely a product of repeated cycles of accretionary tectonics against peri-Gondwana that commenced in the Early Ordovician when coaxial to intensely non-coaxial SE-vergent deformation assembled the Late Neoproterozoic rocks with the Middle Cambrian (to earliest? Ordovician) Monian Supergroup. This cycle is consistent with Penobscottian accretion in the northern Appalachians. Those Monian rocks were at surface (and deeply weathered?) before sub-aerial eruption of the (early Arenig?) ca. 300 m thick, acid Church Bay Tuff Formation. The tuffs are overlain unconformably by a Middle Ordovician to early Silurian marine foreland basin succession now arranged, with its basement, in a SE-vergent (Salinic?) thrust stack. All of that orogenesis pre-dates Acadian deformation recorded in Devonian strata on Anglesey.

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11th December 2014
AGM and lecture
Dr. Jim MacDonald, University of Glasgow
A journey through geological time in Namibia.

Namibia, the second largest country in Southern Africa, has a population of only about 2¼ million. Half the land is desert, the Namib Desert on the coast and inland the Kalahari which stretches to the east into Botswana. Much of the rest of the country is scrub punctuated by rocky outcrops – a great place for the study of Geology. This 2,500 km long trek documents episodes in the geological history of Namibia from Mesoproterozoic times to the present day. We will visit the Fish River Canyon, second deepest on Earth, where the metamorphosed rocks of the Namaqualand Complex are succeeded unconformably by the Namibian succession ranging in age from 1000 Ma to Cambrian by which time the supercontinent of Gondwanaland had been assembled. Travelling northwards a landscape dominated by the Great Escarpment bears witness to the dominance of terrestrial erosion throughout much of the Phanerozoic Eon. At the Giant's Playground huge residual boulders represent what remains of a once more widespread cover of Karoo dolerite. We will climb the largest sand dunes in the world in the Namibian Desert on our way to Walvis Bay on the west coast. Farther north in Damaraland, Brandberg Mountain forms the remains of a huge central volcano active at about 130 Ma at the end of the activity of the Etendeka flood basalts that marked the opening of the South Atlantic and the beginning of the separation of Africa and South America. Much of Damaraland is dominated by the deposition of sedimentary rocks during the Tertiary. These have been subjected to episodes of desert conditions alternating with intense fluvial erosion to produce a landscape resembling that of the American Southwest. Here the culture of the local Damara tribe is preserved in rock art and in a living museum hidden among spectacular outcrops of syenite. Finally we reach the Etosha National Park on the northern margin of the Etosha Pan, a vast expanse of evaporites margined on its southern edge by a series of water holes that sustain an impressive fauna including great herds of zebra, antelopes, ostriches and elephants, prides of lions and many other species.

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15th January 2015
Professor Zoe Shipton, University of Strathclyde
UK shale gas: frack on, frack off or frack well?

In the UK, public concern about hydraulic fracturing for shale gas (fracking) was triggered by low magnitude earth tremors induced by exploratory activities in Lancashire in April 2011. The resulting embargo on fracking for shale gas was lifted by DECC in Dec 2012. Campaign groups argue that shale gas extraction could produce significant environmental

damage, whereas proponents of the shale gas industry argue that an indigenous source of UK gas will enhance energy security and may result in falling household energy bills. Indeed it is now possible to buy "Keep calm and frack on" T-shirts on the web! In this talk I will argue that it should be possible to "frack well" - i.e. extract potentially considerable shale gas resources in the least environmentally damaging way. A Royal Society and Royal Academy of Engineering working group report on "Shale gas extraction in the UK: a review of the scientific and engineering evidence" investigated the major risks associated with fracking and asked how these risks can be effectively managed. The report found that the health and safety and environmental risks associated with fracking for shale gas can be managed effectively in the UK as long as operational best practices are implemented and enforced through legislation. The risk of groundwater contamination (both from natural gas and water and from fracking fluids) via hydraulic fractures is very low. Seismicity is also a very low risk, and where it does occur is likely to be at magnitudes less than those regularly felt near abandoned coalfields. Ensuring borehole integrity must be the highest priority to prevent groundwater and surface contamination. The joint academies report recommended implementing robust monitoring systems to address uncertainties in the subsurface process and to strengthen public confidence. If we can convince the public that it is possible to 'frack well', shale gas has a place as a bridge between traditional, declining fossil fuels and renewables.

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12th February 2015
Dr. John Winchester, Keele University
European accretion in the Palaeozoic: recognition and origins of accreted terranes

The Palaeozoic growth of Europe was dominantly by accretion of terranes, derived from the Americas and Africa, which became attached to its southwest margin. These came in four stages. 1. Cambrian relocation of displaced blocks from southeast Baltica. 2. End-Ordovician accretion of Avalonia, formerly adjacent to Amazonia. 3. Silurian collision with Laurentia, of which a fragment (including Scotland) remained attached to Europe after the Palaeogene Atlantic opening. 4. Carboniferous accretion of Variscide blocks (Armorican Terrane Assemblage), originally adjacent to North Africa, extending from Iberia to Turkey. Their basement rocks provide evidence of their origins and the geological reasons for their migration.

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12th March 2015

Dr. Ian Williamson, formerly of British Geological Survey

Are the Early Palaeogene lava fields of NW Scotland monotonous piles of old, cold and very boring basalt?

For many of us the Palaeogene lava fields of the Inner Hebrides probably conjure up bleak landscapes comprising endless tracts of rank grassland and blanket-peat bogs beset by mist, ticks and midges. The rocks too, are often considered unexciting, dull and little more than monotonous piles of old, cold and very boring basalt, and as such, pretty-well intractable and unworthy of detailed field-based research.

Hopefully, as a result of this lecture you'll see them in a very different, more dynamic light.

Taking specific case studies from Skye, Mull and Canna, this lecture aims firstly to summarise our current knowledge of the early Palaeocene lava fields and then to detail how recent field-based research has significantly increased our understanding of the physical volcanology, stratigraphy and facies architecture of these rocks. Age relationships, geochemistry, secondary mineralisation and sedimentary rocks (including some palaeontology and palaeoecology) associated with these sequences are also covered. Finally, in lighter 'non-scientific' vein, my talk will demonstrate the legacy of this volcanism in determining present-day Landscape Character in the Inner Hebrides and how, peoples' perceptions of these "lava field landscapes", including for example the iconic features of Fingal's Cave (Staffa, Mull) and the Old Man of Storr (Trotternish, Skye), have inspired generations and played influential roles in both art & cultural circles and in the (Geo) tourism industry.

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9th April 2015

Dr. Laura Evenstar, University of Bristol

Atacama Desert: the chicken or the egg scenario?

It has long been believed that the uplift of the Andes created a rainshadow effect forming the Atacama Desert, the driest desert in the world. New evidence suggests that the Atacama Desert is actually substantially older than this and may have played a huge role in creating such a large Andean mountain chain. This talk will explore why and when the desert formed. As well as looking at some of the stranger things you find in the desert like giant boulders and ancient Inca walkways.

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14th May 2015
Members Night

Oral presentations (15 minutes each):

Rosie Bradshaw & Derry Wilkinson - *Following the Cruise of the Betsey* (recipients of GSG funding and Society member sponsorship as Young Earth Scientists).

Walter Semple - *The Curious Tourist visits Dalarna in Sweden*

Anne Grey - *Making a geological garden*

David Jarman - *The proto-Highlands - Alps, Andes, or Himalayas?*

There will also be bench displays and posters. If you'd like to bring some sample or pictures to display and haven't let us know yet, just bring it along and we'll be pleased to see it.

Thanks go to all who contributed to a very enjoyable end to the indoor lecture season.

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Excursions Secretaries Reports

Residential excursion report

The planned residential trip to Northern Ireland in September 2015 was postponed until 2016.

Katerina Braun

Day Excursions report

04/07/15 Rosneath Peninsula, Dr. Iain Allison; 16 participants.
25/07/15 Arrochar Igneous Complex, Dr. Chris Burton; 19 participants.
08/08/15 St Monans Coastal Walk, Emma Fairley; 15 participants.
15/08/15 Loch Ardinning Nature Reserve, Dr. Simon Cuthbert; 8 participants.
05/09/15 Trearne Quarry, Dr. Al McGowan; 14 participants.

Our first outing of the new season was to inspect various outcrops on the coastline of the Rosneath peninsula. The weather was generally fine and much enjoyed by the midges who also gathered when we grouped together for excellent descriptions of the local geology from Dr. Iain Allison. We moved between several locations by bus as well as short walks along the seashore. A change of bus company to Abbey Coaches this year was I believe well received as I chose to increase comfort levels at a small increase in cost. Our second excursion involved considerably more walking as we left the bus at the Inveruglas

Visitor Centre and meandered up Glen Loin gaining an understanding of the Arrochar Igneous Complex. The weather was dry and sunny right up to the final outcrop we examined at which point a gentle rain kept us cool for most of the return journey back down the glen. I have walked in this area several times so it was especially interesting for me to gain an understanding of how the landscape was shaped over the millennia. Many thanks to Dr. Chris Burton for providing this information in his usual genial manner.
Our third trip involved the most travel as we all bussed through to the Fife coastal resort of St Monans. Fellow council member Emma Fairley very kindly agreed to lead this expedition and I can only say that her clear explanations and bountiful knowledge belied the fact that this was her first outing as a geological tour leader. We gained some background knowledge about St Monans itself then set off for a generally level walk around three miles down the coast. The weather was glorious and frankly we would all have had a wonderful day out even without the geology! The day was rounded off nicely by a visit to a farm shop for some ice cream as we awaited the bus coming to pick us up and take us back to Glasgow. Our fourth trip took a different format as it was a field skills course delayed from last year's programme. This required close tuition so the smaller numbers meant that we did not hire a bus but instead travelled to Loch Ardinning near Mugdock by private car. Dr. Simon Cuthbert explained how the early geological mappers painstakingly created the maps we still use today and then also showed us how to use some of the stunning software available free on smartphones that can hugely simplify the task of accurately recording field observations. Another dry sunny day continued our run of good luck with the weather in a Scottish summer. Our final trip this year was a joint excursion with our friends from the Edinburgh Geological Society. Although many of our members have been to Trearne Quarry in the past, the sheer quantity of fossils available to view meant that it was well worth a revisit for those that knew it and was an absolute delight for those visiting it for the first time. Dr. Al McGowan informed us of the geological history of the rocks in the quarry, and GSG member Gary Hoare who lives nearby and visits the quarry regularly was incredibly knowledgeable in identifying the many varied fossils that were drawn to his attention. Yet again we were lucky enough to enjoy a dry and sunny day for our excursion and finished the day off by a visit to "The Canny Man" near Lugton for an excellent High Tea. My policy this year was to charge a deposit on booking an excursion and then add an additional charge on the bus to ensure that the society broke even on the cost of each trip. This of course means that the attendees took a risk on the overall cost of the trip, but as this did not cause any problems I am aware of, I intend to carry on with this method of payment next year. Many thanks to those who came along to learn a little more about our surroundings and enjoy a sociable day out with their fellow GSG members.

Roy Bryce

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EXCURSION TO ROSNEATH PENINSULA
Saturday 4th July 2015

Leader Dr. Iain Allison **Participants** 15
Report by Robin Painter

For the duration of the excursion there was heavy cloud throughout and periods of heavy rain.

Except for the southern tip of the peninsula, the rocks of the Rosneath Peninsula, which lies between the Gare Loch and Loch Long, are Dalradian of the Southern Highland Group. The Rosneath Peninsula is cut by the northern branch of the Highland Boundary Fault, running NE/SW across the southern tip of the peninsula. The rocks to the south of the Highland Boundary Fault are Upper Old Red Sandstone.

The main focus of the excursion was on the lithologies and structures of the Dalradian rocks in the vicinity of the Highland Boundary Fault but also to observe features of the Upper Old Red Sandstone.

The Southern Highland Group is a range of metamorphic rock types which are thought to have been deposited largely as marine turbidites in the late Precambrian and then subject to low grade metamorphism during tectonic movements in the early Ordovician.
Observation at the minor centimeter scale of metamorphic structures in the Rosneath Peninsula rocks, the main theme of the excursion, was made with reference to the overall regional structure. Interpretation of these minor scale structures are part of the evidence used to support the explanation of the regional structure.

The regional structure is thought to have developed from a sequence of folding and deformations in response to the rising pressure, temperature and shearing stresses caused by tectonic movement. It is thought that there were a series of phases of deformation over geological time that were progressively superimposed, with succeeding phases overprinting the structures that formed in the previous phases.

On a regional scale, during the rise of the Caledonian Mountain Belt, the earliest fold phase (D1) consisted of a series of upright folds. During second phase of deformation (D2), a major D1 fold was tilted SE and squeezed out as a flattened sheet, referred to as the Tay Nappe, imposing a second set of folds on the earlier ones. As a result of relative tectonic movement from the NW, the Tay Nappe buckled downwards at the Highland Boundary Fault against resistant crustal rock beneath the Midland Valley to form the overturned Aberfoyle Anticline (D3 and D4). Starting, therefore, from the northern side of the Highland Boundary Fault and moving roughly NNW up from the southern end of the Rosneath Peninsula, makes a traverse from D1 type folding through to D4. This general traverse northwards up the peninsula was the main itinerary of this field excursion.
All the localities visited are situated on or close to the shore lines.

Location 1 Camsail Bay

The incoming tide at the headland of the bay limited the extent to which it was possible to stand back on the shingle and look back up onto the rock face. It was also raining heavily and many of the rock exposures are seaweed covered.
Suffice it to say here the rocks are the Bullrock Greywacke. They are thick (>1metre) beds of meta-greywacke and thin layers of slate and coarser foliated rock. The foliated rock exhibits closely spaced strain slip cleavage, showing its derivation from a fine-grained original sediment. This contrasts with the adjacent folded beds of greywacke derived from much coarser grained rock and showing much less evidence of cleavage. Viewed in profile this section is seen as a series of plunging folds. These folds have axial planes with steep to vertical dips and are representative of D1 folds.

A calcareous nodule within the mudrocks, which is flattened parallel to the cleavage trace, can be seen at the SE end of the section. Given its probable near spherical initial shape, this distortion is a measure of the vertical strain to which it was subjected during D1 folding.

Location 1(a) Portkil Cliff

Included with the kind permission of North Clyde Archaeological Society
http://www.spanglefish.com/northclydearchaeologicalsociety/

This is the only location visited not in the Dalradian rocks of the peninsula. It is to the south of the line of the Highland Boundary Fault and is an exposed ca. 20 metres tall conglomerate rock sequence in the Upper Old Red Sandstone. The sequence is somewhat inshore from the coastline on a raised beach. The cliff was cut by wave action when sea level stood higher than the present day in early post glacial times. The beds dip at about 25 degrees to the NW.

There are alternating beds of conglomerate and thinner sandstone beds The conglomerate includes clasts of vein quartz and quartzite, some of which are quite large (2-10 cm.), types consistent with derivation from the Dalradian. Depositional environment is suggested to be a fast flowing river.

Location 2 was on the beach about 140 m north of the Cove Burgh Hall car park. The rocks here are interbedded metagreywackes and phyllite close to the junction between the Bullrock Greywacke and the Dunoon Phyllite. Examination of the rocks shows the strain slip cleavages. Some of the coarser layers show the presence of thin layers between the strain slip cleavages where an earlier foliation has been preserved, indication that the rocks have been deformed during both the D1 and D2 deformations.

Location 3, Barons Point, is close to and slightly to the north of Location 2.Here the rocks are black phyllites (originally mudstones and siltstones) with quartz veins, all belonging to the Dunoon Phyllite. There is visible crenulation cleavage in the Dunoon Phyllite. Asymmetrical folds in the phyllite deform a penetrative, slatey looking cleavage, which has been characterised as D2, though this conclusion cannot be verified by onsite observation alone.

image from www.secretscotland.org.uk

An effort was made here to determine the vergence of the observed folding (the direction in which the next primary fold is located) when looking down the plunge of minor folds. Such a determination is an aid to structural mapping.
At location 4, Knockderry Castle, the rocks are greywackes and phyllites belonging to the Beinn Bheula Schists. They show numerous examples of minor folds with a Z-profile (indicating northerly vergence). Examination of the hinge zones of these minor folds shows that they fold both the lithological layering and an early (D1) spaced cleavage. These features are characterised to be D2 deformations.

At the final location, Location 5, Letter Layo, Coulport, the rocks show alteration of the original bedding and the D1 cleavage, during the D2 deformation. There are numerous deformed quartz-carbonate-chlorite veins in these rocks. The green phyllite bands have penetrative D2 micro-scale crenulation cleavage.

Time available and weather terminated the excursion at Location 5.

Further north from Letter Layo at Portincaple the steep south limb of the Tay Nappe Downbend Antiform can be visited. This location is adjacent to the hinge zone where development of D3 and D4 minor folds and fabrics are observable.

Excursion to The Arrochar Igneous Complex
Saturday 25th July 2015

Leader Dr. Chris Burton **Participants** 19
Report by Bob Diamond

On a bright day with the usual threat of rain, a group of us led by Dr. Chris Burton set out to explore the Arrochar Igneous complex above the Loch Sloy power station.

Our first stop, not far along the hydro road, was to look at the steep gorge where the river is rapidly cutting down. The question was 'What was causing this'? The answer seems to be that the recent glacial rebound was causing this rapid uplift

Further up the road it was possible to see how the Tertiary drainage system of the Arklet flowing into the Teith had been severed by the Anglian/Devensian North-South glacial downcutting had ensured that the catchment area now flows via Loch Lomond into the Clyde.

At the small quarry (NN2973 0933) we saw an outcrop of semi pelitic and psammitic schists, indicating that we were in the 'flat belt' of the Dalradian. There was little sign of contact metamorphism, indicating we were not yet in the aureole.

Further along the road (NN29250888) the exposures became harder, close-grained and finally hornsfelised. This indicated that we were finally in the aureole. The extent of the aureole is difficult to precisely determine, as there are few outcrops, but it follows roughly to the forestry boundary and the river. Because the intruding diorite is softer, and iron rich there is a marked change in the vegetation.

Continuing on up the road we came to the quarry (NN2856 0897) where the stone used in the construction of the dam had been quarried. There is a considerable amount of detail, but the main feature is the series of carbonate veins. On the eastern face of the quarry there is a brecciated zone (c50 cm wide) which may be associated with gas streaming during the emplacement of the surrounding appinite. The suite of minerals found at this locality seems to argue for an origin from a carbonate platform which was being subducted.

The final location was at a short spur from the road, down to a ford. Here within the river we discovered the chilled margin (a hard fine-grained diorite) of the intrusion.

All in all a very interesting day in amongst an unusual complex of mid-Silurian (c425Mya) age.

Fife Coastal Walk: St Monans to Ardross
Saturday 8th August 2015

Leader: Emma Fairley **Participant**s: 14
Reporter: Ben Browne

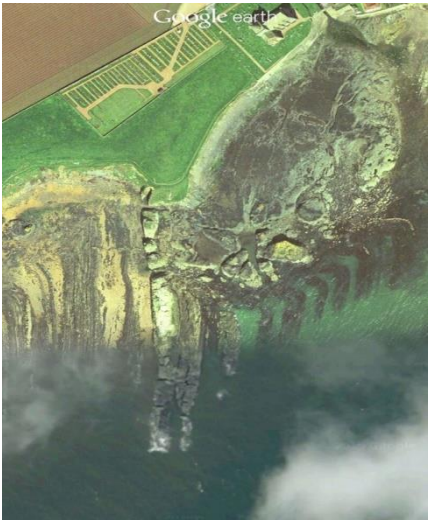
We assembled at St Monans on a falling tide to examine the foreshore south west to Ardross. Fluctuating conditions in the carboniferous of about 326Ma ago had resulted in a stratigraphy of sandstones, limestones and shales of contrasting hardness. These were subsequently folded, intruded by volcanic necks and dykes and faulted. The evidence for all of this is displayed most beautifully on a wave cut platform at low tide. All these structures can be previewed on Google Earth. In passing we were also to see a 9th century church, 13th century castles, a dovecot,18th century salt works and a 20th century tidal swimming pool all relating to the local geology.

The excursion started at the tidal swimming pool at NO531017 which had been constructed by taking advantage of a trench eroded in softer shales representing a period

of deep water deposition between upstanding walls of more resistant sandstone laid down in more energetic beach environments also indicated by the trace fossils teichichnus, planolites and diplocraterion they contain. The richer chemistry of the shales was indicated by nodule formation. The richly organic nature of this carboniferous environment had also been responsible for the development of salt works immediately to the north east where coal excavated from the adjacent Coal Farm had been used to evaporate sea water pumped up by a windmill, now restored, to extract salt so important in the preservation of fish.

On returning along the top of the low cliff we had a view from NO528016 just before the harbour of a clear exposure of the north east plunging St Monans Syncline.

In St Monans we noted crinoids in the dolomitised lime stone of the house walls and the roofs of red pantiles not produced locally but traded for salt from the lowlands.



From the yard, NO522014, of the church of 9th century origin we had a view south west of the volcanic St Monans Neck clearly intruding the folded sediments and so postdating the folding. Then later it self being intruded by basaltic dykes. Closer inspection of the volcanics revealed the inclusion of coalified wood and subsequent calcite veining.

St Monans Church and shoreline .Taken from Google Earth

Just south west of the St Monans Neck is a promontory of resistant sandstone, the Lang Shank, stratigraphically just above the Upper Ardross Limestone. Further to the south west these and adjacent beds are folded into a north east plunging anticline intruded by the Davies Rock Neck. On passing this we found the dove cot and Newark Castle had been built on the Lang Shank sandstone repeated by a complementary syncline.

After lunch at the 13th century Newark Castle we examined from the cliff top at NO517012 the strictly linear Ardross Fault as it cut south west across the foreshore. Here it formed the south east margin of the extensive Coalyard Hill Neck with sediments to the

south east showing apparent drag folding suggesting dextral movement. Here it was apparent that the sequence of events was no longer so clear and three theories of the relationship of the vent and the fault were discussed. The possibilities considered were that the fault post-dated the intrusion and brought sediments into contact with the volcanics either by a large, 1200 meter, dextral displacement or by a lesser dextral combined with a vertical displacement or alternatively the fault pre-dated the intrusion which had then taken advantage of this plane of weakness. The latter process was thought unlikely to have preserved undisturbed the linear nature of the fault as seen.

Passing over much detailed structure of the Coalyard Hill Neck we arrived beyond it at a sandy bay at NO509007. Here the party split into two. One half walked seaward across the fault to one suite of rocks where lay the well-known shrimp beds and where recent discoveries had revealed a rich but fragmentary record of fish whilst the other half examined the sediments in a cliff under yet one more castle, Ardross Castle, as an exercise in stratigraphic logging with record sheets thoughtfully prepared by our leader Emma Fairley. In conclusion the party were reunited over ice-cream and strawberries purchased at the Ardross farm Shop where Emma was warmly thanked for her leadership.

The all-important Ardross farm shop… and shoreline.
Taken from Google Earth

Reference
MacGregor A R, Fife and Angus Geology, Pentland Press 1996. ISBN 1-85821-353-3

Loch Ardinning Field Skills Day
Saturday 15th August 2015

Leader: - Dr. Simon Cuthbert **Participants** 7
Report by Roy Bryce

Last year I enjoyed a drive through the North West Highlands Geopark, and stopped off to take a walk round the Knockan Crag Visitor Centre. The display boards there explained that after the completion of several years of hard work in severe conditions, Ben Peach and John Horne had been able to use the results of their careful mapping of the region to convince doubters that the Moine Thrust was a reality. I looked round at the landscape from the Visitor Centre and wondered just how they could have extracted so much information from such rugged and forbidding terrain. I was therefore delighted to get the chance to find out how this was done when the Society offered the chance to undertake a Field Skills Day at Loch Ardinning near Mugdock Country Park.

The day began with an introduction from our leader, Dr. Simon Cuthbert, to the technique of "Exposure Mapping" with a warning that in the locality being examined there was only a small percentage of the underlying rock that was actually outcropping, so it would be necessary to also use "Green Line Mapping" to record our observations to provide a map and accompanying notes that would enable other people to locate and identify the features we were recording. Having explained the laborious procedures that were required by earlier mappers, Simon then gave a demonstration of some smartphone apps which were downloadable free from the internet that not only provided instantaneous strike and slip measurements but also provided a structured project environment for recording notes and photographs.

Following on from the wise words of Ronald Regan – "Don't just do something – sit there", we did not all sit down and start creating our maps immediately, but instead took a leisurely tour round the entire area of the locality to try to gain an understanding of the lie of the land and the relationship between the different types of terrain both visible and under the soil. Simon also gave us some valuable tips on understanding how the land that we could see was shaped by the type of rock underneath, certain ground conditions being a consequence of the geology beneath. Armed with our new knowledge, we were then given the task of revisiting the features that had caught our interest on the original tour of the locality and to start adding detail to the unmarked map that Simon had supplied and to record our observations in our notebooks. We also came across an extremely interesting outcrop in the woods that we had not noticed earlier and Simon showed us how to interpret the evidence in front of our eyes to understand how the formation came into existence.

As four o'clock drew near, we headed back to our cars with the sound of a prize giving ceremony coming from the nearby riding school.

"Thank you all for coming – it's been a great day"

said the announcer. I couldn't have agreed more.

N.B. As this was a field skills day involving academic teaching, I have chosen not to mention any specifics of the skills taught. It is also a day of discovery, and since Simon intends to repeat the course with other participants, I have also not ruined their day by identifying any features.

Photo bill Gray

A gravel bar with cross-bedding in the Douglas Muir Quartz-Conglomerate, the basal unit of the Craigmaddie Muir Sandstone. This bar was deposited in a deep (20 -50m) channel of a braided stream flowing rapidly down a gradient of around 3 degrees

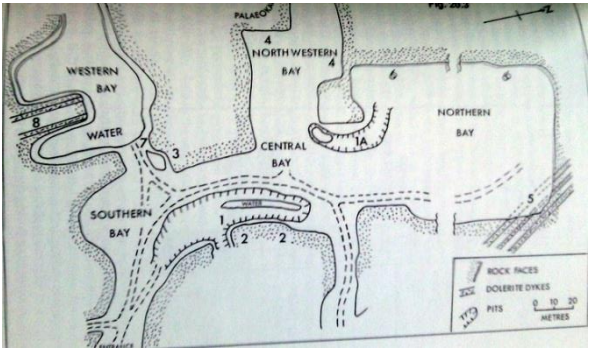
Joint Excursion to Trearne Quarry
Saturday 5th September 2015

Leader: - Dr. Al McGowan **Participants.**.
Report by M. Cummings from Glasgow……14
from Edinburgh……..18

The members of the two societies met at 11 am at Trearne Quarry in fine sunny weather for a fascinating day of fossil finding and identification, as well as interpreting the landforms of the site. At the gate we met our guide Dr. Al McGowan together with Gary Hoare, a very knowledgeable amateur enthusiast with considerable expertise on the fossil fauna of Trearne Quarry. The visit began with Al distributing handouts covering a brief history of the quarry together with diagrams of the kind of fossils which may be found. Gary, meanwhile, had brought a selection from his fossil collection for examination which proved a great help in identification of items found in the rubble and the rock faces of the site. These samples included a fossil jellyfish, a rare find. He told us that Trearne has proved to be a very valuable source of these fossils which have been collected and are being studied at Glasgow University and at University College in Dublin. The site is also a designated SSSI for the three dimensional exposure of a Paleozoic reef. This ancient reef

was composed of sponges, algae, solitary and colonial corals together with bryozoans, brachiopods and other invertebrates. Some evidence of Paleozoic fish has also been foun

We entered the site, with high hope of interesting finds, from the Southern Bay and first looked at the remains of the Lower Carboniferous coal seam at locality 1 before going to the other side of the water (locality 2) to examine some very large blocks of rock. These proved to be packed with the fossil remains of crinoids, brachiopods and other fauna indicating a rich fertile environment in this area while it was still at the southern edge of Laurussia.



Examining the large rock .locality 1

From this locality we had a clear view of the Limestone sequence shown in the diagram provided by Al which indicated the type of fossils to be found at each level of the column.

Unfortunately the exposure of coral in the Western Bay could no longer be easily seen as the area has become very overgrown. Al suggested that we leave that until we were leaving so that small groups could be taken round safely.

Looking toward the Western Bay from Locality

Having spent some time scouring the ground and turning over many pieces of rock, some of which contained small fossils and several examples of Productus spines we headed up the path toward the Looking toward the Western Ba Northern Bay. Here we found an extensive area which had been totally cleared. In the main body of the bay there was nothing to see but the quarry walls contain fossils still in their original chronological order. Here we stopped for lunch before making our way to the limestone faces to continue our searches. The remains of a Dolerite dyke were easily spotted but the stars of day were the fossils found at this locality. These included a Goniatite, brachiopods including an excellent Productus fossil with spines still in place, a jellyfish and a solitary coral still embedded in rock. (see photo below)

We were mostly taking photos with our phones and, being well prepared, Al had brought with him a few phone camera magnifiers one of which was used to photograph this coral..

Magnified photo of solitary coral

As we had to be at 'The Canny Man' in time for high tea the fossil hunt had to be brought to a close. On the way back to the entrance Al took groups into the Western Bay to search for exposures of coral to complete the visit. Most of the group took advantage of this opportunity. A vote of thanks for a wonderful excursion was given on behalf of the Edinburgh society before the members of both societies headed back to their respective mini buses to travel the short distance to the restaurant. As always on these joint excursions the groups mixed and socialized over an excellent high tea. The group from the Glasgow Society included two new junior members who were very welcome and knowledgeable. We hope to see more of them at future lectures or excursions.

After the meal our organiser, Roy, gave the customary vote of thanks to Al, Gary unfortunately could not join us for the meal but many thanks are also due to him for his patience and enthusiasm during the day. On returning to the Gregory Building we were all agreed, that it had been a very satisfying day out.

References: - Geological Excursions around Glasgow and Girvan. Edited by J.D.Lawson and D.S.Weedon

T.N George Medal Award

Presentation to Professor John Cope
Honorary Research Fellow, National Museum of Wales, Cardiff

Citation read by Dr. Alan Owen

The Professor T. N. George Medal is awarded "for excellence in palaeontology and/or stratigraphy". Professor John Cope has a long and distinguished track record in both of these disciplines.

John Cope gained his PhD at the University of Bristol. The first 29 years of his professional life was spent in the Geology department at Swansea, including several stints as Head of Department and in that respect following in the footsteps of T N George who was Head of Department there prior to coming to Glasgow in 1947. John moved to the Department of Geology at Cardiff in 1990 on the closure of the Swansea department and he has been a very active Honorary Research Fellow at the National Museum of Wales since his retirement in 2003.

John Cope is one of those rare palaeontologists who has an international expertise in two fossil groups and in two widely separated intervals of geological time. He is an expert on ammonites and Jurassic stratigraphy and a leading authority on the taxonomy, evolution, biodiversity and palaeobiogeography of Ordovician bivalves. Beyond the ammonites and bivalves, John has published on many other fossil groups including other molluscs, echinoderms, corals, bryozoans and the enigmatic late Precambrian Ediacara fauna. His stratigraphical interests have led him to publish papers on problems relating to intervals of geological time from the late Precambrian to the Quaternary. Like T N George he has a strong interest in regional geology and geological history – especially of Wales and SW England but also more widely as shown by his work on lithospheric uplift and its effects on the geological structure of the British Isles and his co-editing of the Geological Society of London Atlas of Palaeogeography and Lithofacies. The latter was in collaboration with our own Keith Ingham, another former TN George medalist.

Outside his research and University roles, John Cope has served our science well in many capacities, including valuable roles on the Councils of the Palaeontolgical Association, the Geological Society of London and the Geologists' Association. Moreover, he has been a strong supporter of the promotion of geology beyond the professional sphere as shown, for instance, by his many lectures and field classes for the Geologists' Association and, as we will hear in this evening's lecture, his teaching of Extra Mural Classes.

For both the depth and breadth of his palaeontolgical and stratigraphical expertise, Professor John Cope is a most worthy recipient of the T N George medal.

With regret we record the passing of:-

Mr. Mathew K Dickie member since session 140 (1997-98) who died on 01-May-2014

Dr. Michael Golden member since session 109 (1967-68) who died on 31-Aug-2015

and

Professor Brian John Bluck, 1935-2015
(member since session 106 (1964-65))

Brian Bluck was born in Pyle, Bridgend, South Wales and attended Bridgend County Grammar School and Cardiff Technical College before taking his BSc Hons at University College, Swansea Department of Geology, graduating in 1958. He went on to study for his PhD, again at Swansea, on the South Wales coal measures, supervised by Dick Owen and Gilbert Kelling. In 1961 he undertook postdoctoral research at the University of Illinois studying Devonian carbonates and phosphates in Indiana and alluvial fans in Nevada. Returning to Swansea in 1962 on a NATO Fellowship, he investigated the Triassic redbeds of South Wales, but soon moved to the University of Glasgow as an assistant lecturer, appointed by Prof T Neville George. In 1965, having been promoted to lecturer, Brian was awarded a scholarship from the British Council for a sabbatical at universities in the Netherlands. He subsequently rose through Senior Lecturer and Reader to be awarded a DSc. in 1985 and was appointed Professor of Geology in 1989. After his retirement, Brian was appointed Emeritus Professor of Sedimentation and Tectonics in the Department of Geography and became an Honorary Senior Research Fellow in the merged School of Geographical and Earth Sciences.

Brian was awarded a number of honours during his career, including the Geological Society of London Lyell Fund in 1981, the Royal Society of Edinburgh Keith Medal in 1981, the Saltire Society Scottish Science Award for 1991, and the Edinburgh Geological Society Clough Medal in 1999-2000, and was elected as a Fellow of the Royal Society of Edinburgh in 1981. He served on the editorial board of the Journal of Sedimentary Petrology, and as Editor of the Scottish Journal of Geology and the Transactions of the Royal Society of Edinburgh.

Brian's research was firmly rooted in sedimentology, especially gravel-bedded fluvial systems, but this led him naturally into wide-ranging studies in unroofing histories, sedimentary provenance and the evolution of basement source terrains, so that he was able to make significant contributions into the nature of ophiolites (as at Ballantrae), and "terrane" models for the assembly of orogens, especially the Caledonides. In doing this, he was as confident and comfortable innovating in isotopic techniques or unravelling submarine volcanic systems as he was in the dynamics of sediment transport. Late in his career these evident talents took him to southern Africa, where he made important advances in the understanding of alluvial diamond resources. This adaptability, combined

with his meticulous approach and clarity of explanation were his true hallmarks, and were admirably displayed in his contributions to the Geological Society of Glasgow's "*Geological Excursions around Glasgow and Girvan*" published in 1992.

Brian was a member of the Geological Society of Glasgow for 51 years. He gave lectures to the Society, led numerous field trips, authored field trip guides and was a regular contributor to the Scottish Journal of Geology. He was an inspirational teacher, especially for field classes. Generations of students will remember him for his charm, infectious enthusiasm and ready smile, and the way he spoke so eloquently with his hands as well as his voice – always with a twinkle in his eye. His enthusiasm sometimes led him astray; I personally recall being sent along on a Scarborough field class by Head of Department Bernard Leake, not so much to help with the geology, but to *"..keep a sharp eye on the time so that he doesn't have to be rescued by the lifeboat again this year!*" (needless to say, all ended well on both occasions). If I ever met him in the corridor when I was in a hurry to get to an appointment, I knew I'd have to abandon my plans because I'd be ensnared into a long, meandering but endlessly fascinating conversation. He made science fun, but never trivial. Bless you, Brian, you'll be sorely missed.

Brian died on 19th June 2015. He is survived by his wife Mary, daughter Emma, son Tim and his four grandchildren.

Simon Cuthbert, 10th February 2016.

The author acknowledges biographical information sourced from obituaries published on-line by the Royal Society of Edinburgh, written by Tim Dempster (https://www.royalsoced.org.uk/cms/files/fellows/obits_alpha/bluck_bj.pdf - accessed 9th February 2016, and the Geological Society of London written by Brian Williams (https://www.geolsoc.org.uk/About/History/Obituaries-2001-onwards/Obituaries-2015/Brian-John-Bluck--1935--2015 - accessed 9th February 2016).

Front cover photograph - Examining the large rock .locality 1 Trearne Quarry

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