British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

DARWIN & THE GEOLOGICAL SURVEY –

An unlikely collaboration?

Mike Howe

Chief Curator, British Geological Survey

Darwin in the field: Collecting, Observation and Experiment

Presentation Outline

Aims:

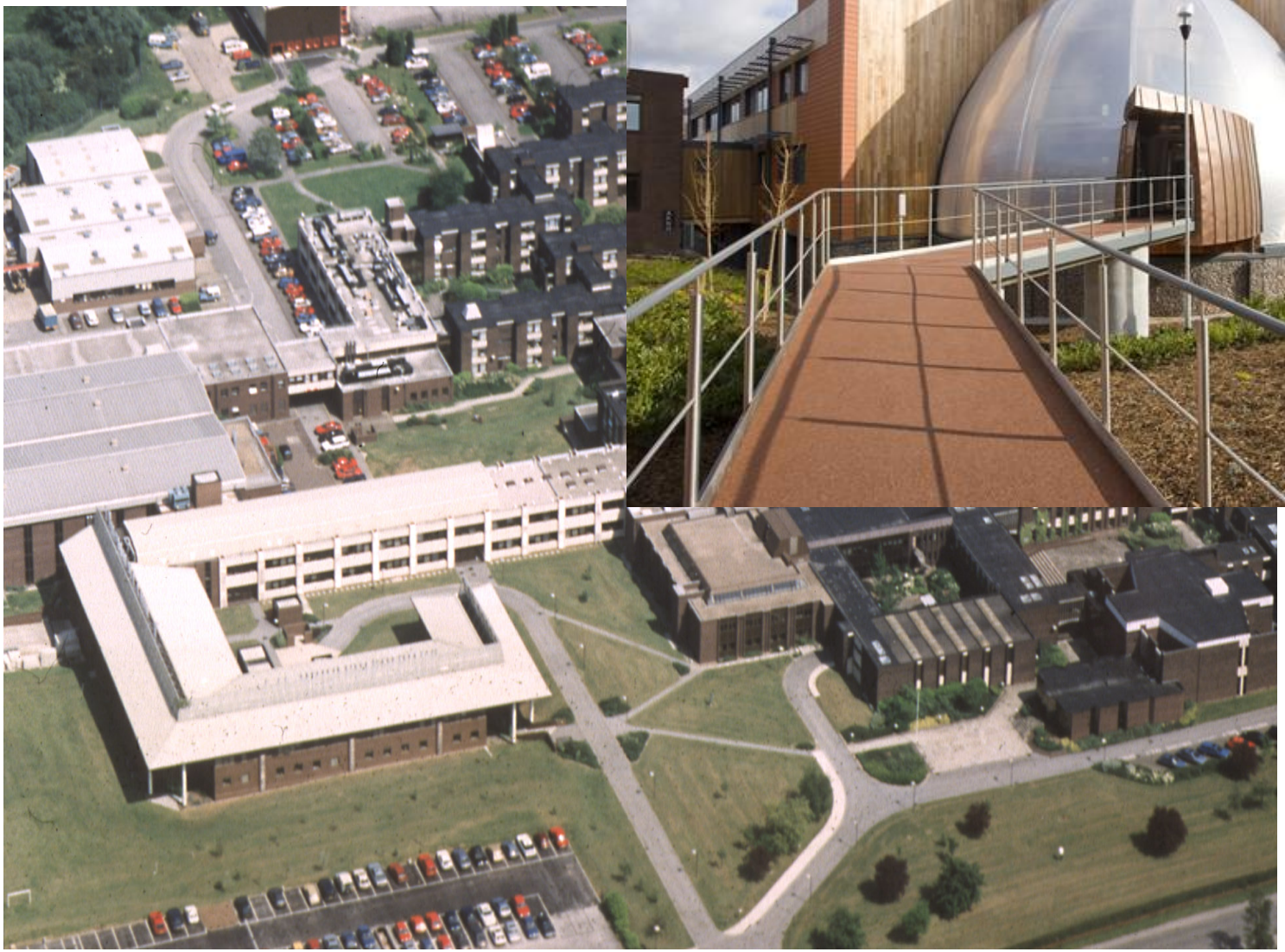
- To consider examples of collaboration or probable collaboration between Darwin and the Survey.
- To review Darwin's Collection & Data Management practice.

Darwin in the field: Collecting, Observation and Experiment

Presentation Outline

- The Geological Survey (BGS) today
- Early years of the Geological Survey
- Case Study 1: Donation of volcanic rocks to the Museum of Practical Geology
- Case Study 2: Sample registration systems
- Case Study 3: *Origin of Species* and Salter's Longmynd specimens
- Conclusions

What is the Geological Survey ?



Cardiff

Belfast

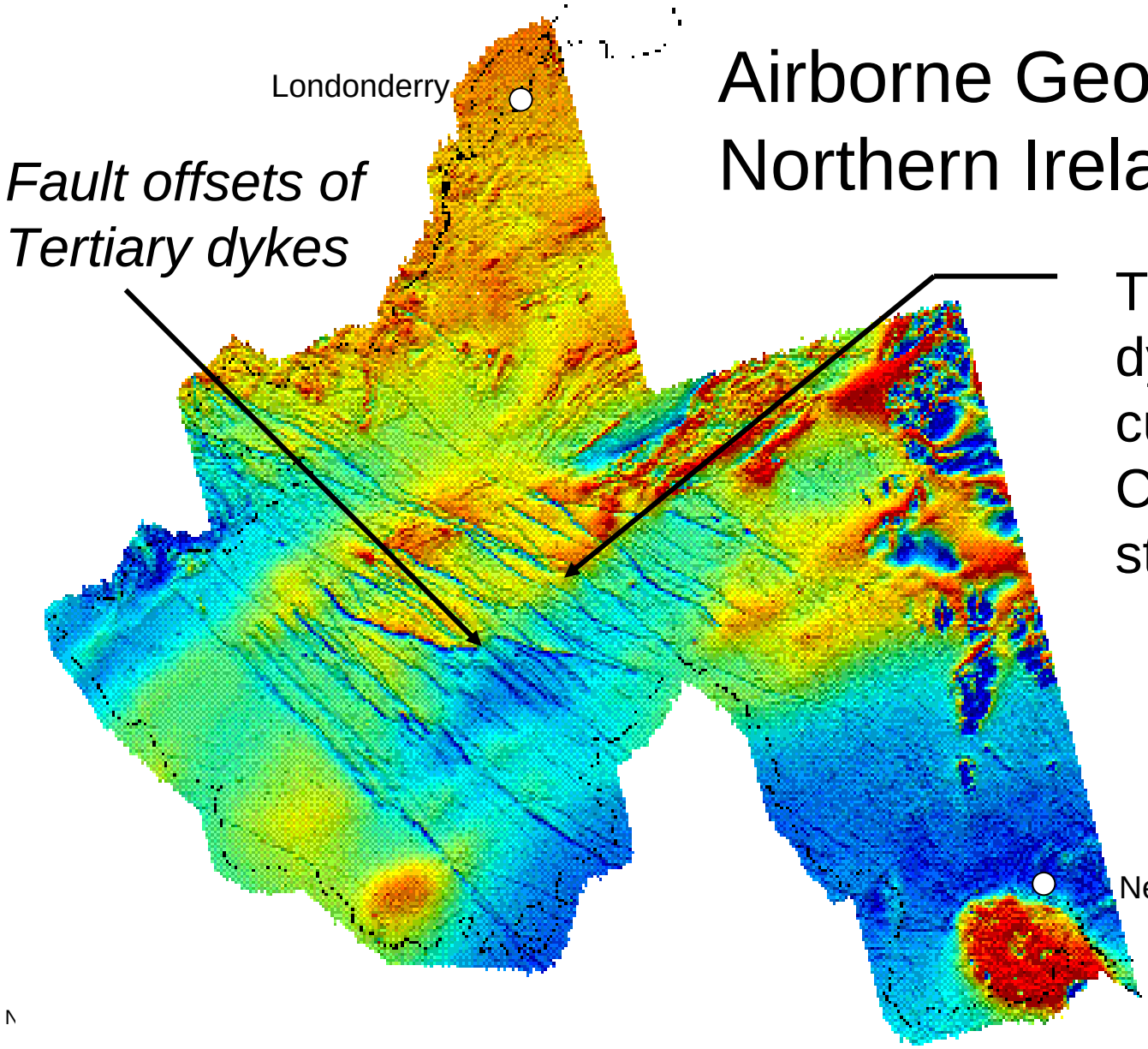
Part of the Natural Environment Research Council

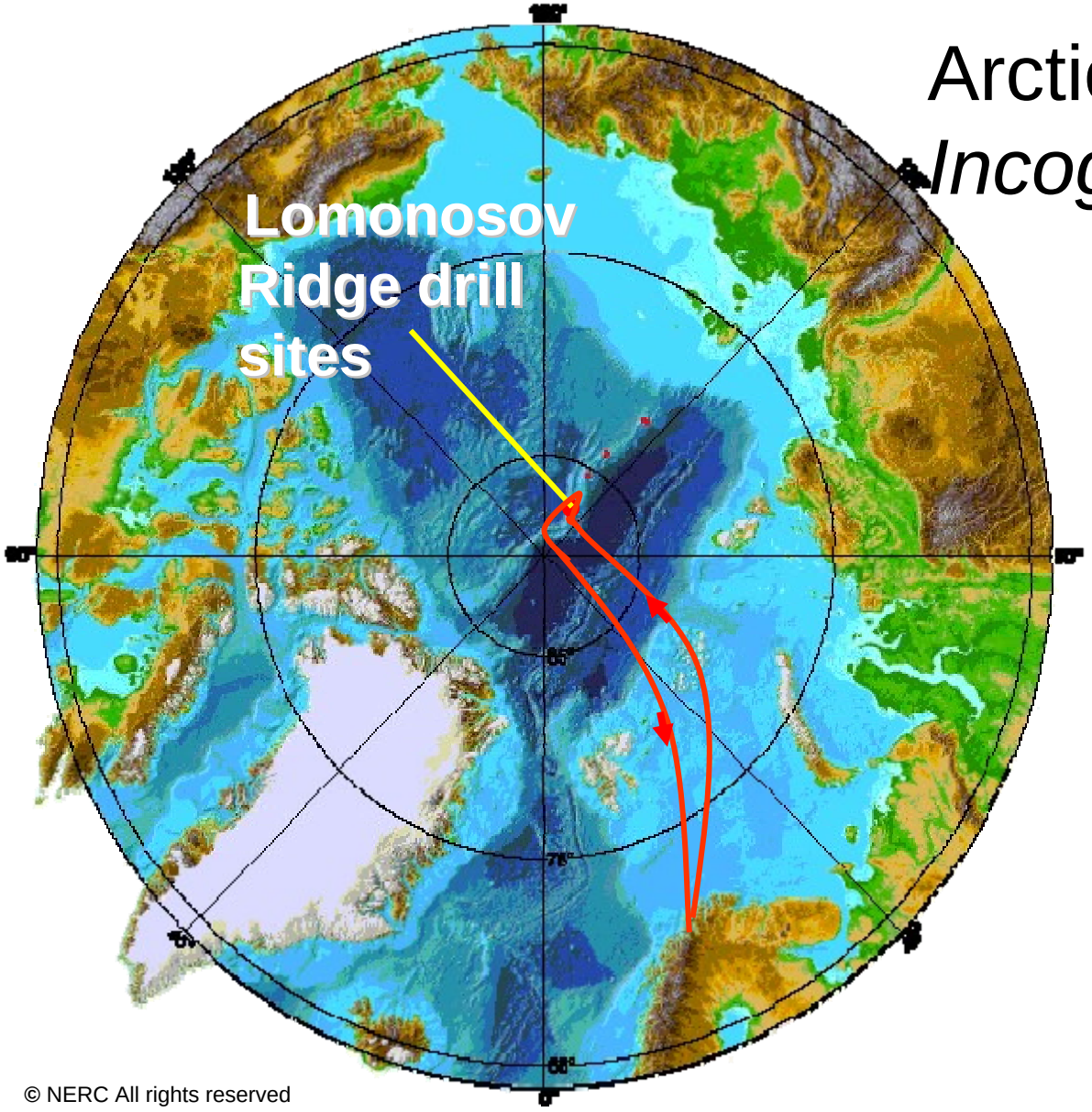
800 staff (550 ‘scientists’)

200+ scientific projects

Worked in 100 countries in past 50 years

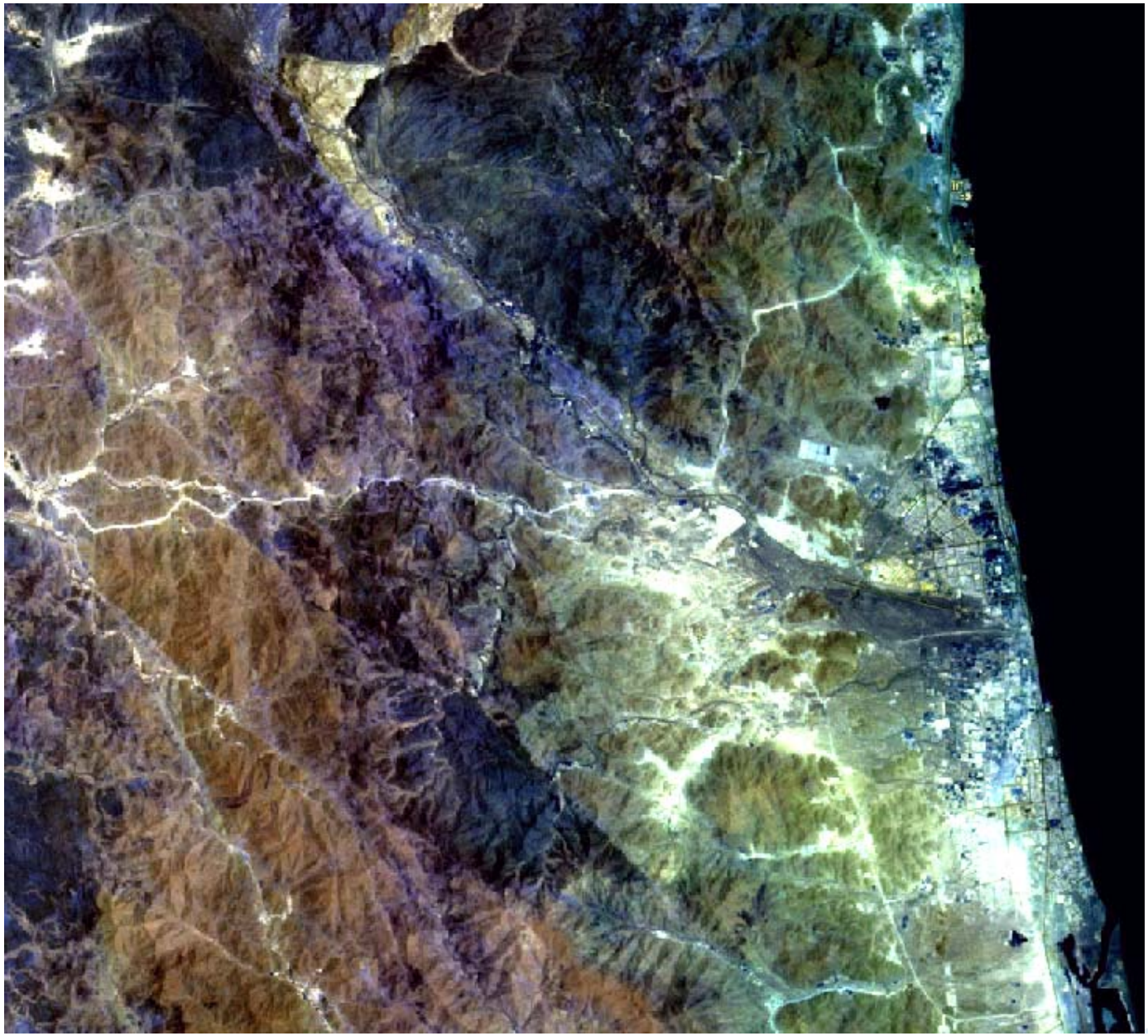
Airborne Geophysics Northern Ireland





Arctic Ocean: *Mare Incognito* no longer

- Integrated Ocean Drilling Program expedition
- Managed by BGS
- To investigate Arctic climate and origins of the Lomonosov Ridge
- Analysis of cores was conducted by a team of scientists from Europe, USA and Japan

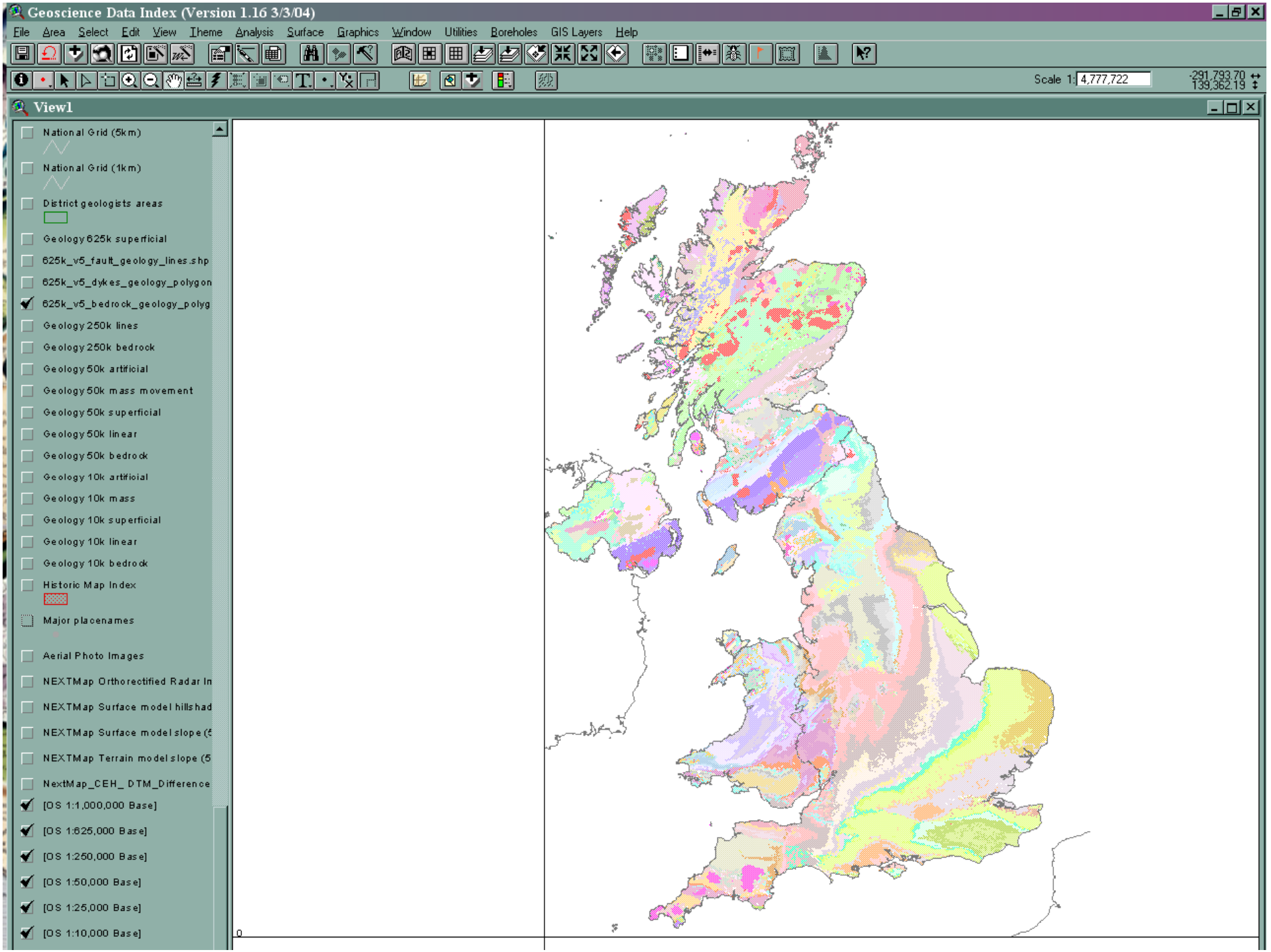


Special processing of ASTER short-wave infrared bands shows geology invisible on the ground

Collapse of gypsum solution cavity, 23/24 April 1997 Ure Bank, Ripon

Collapsed C19th shaft, ironstone workings, Glasgow

NERC's National Geoscience Data Centre


Geoscience Data Index (Version 1.16 3/3/04)
File Area Select Edit View Theme Analysis Surface Graphics Window Utilities Boreholes GIS Layers Help
Scale 1: 4,777,722
-291,793.70
139,362.19
View1
National Grid (5km)
National Grid (1km)
District geologists areas
Geology 625k superficial
625k_v5_fault_geology_lines.shp
625k_v5_dykes_geology_polygon
625k_v5_bedrock_geology_polyg
Geology 250k lines
Geology 250k bedrock
Geology 50k artificial
Geology 50k mass movement
Geology 50k superficial
Geology 50k linear
Geology 50k bedrock
Geology 10k artificial
Geology 10k mass
Geology 10k superficial
Geology 10k linear
Geology 10k bedrock
Historic Map Index
Major placenames
Aerial Photo Images
NEXTMap Orthorectified Radar In
NEXTMap Surface model hillshad
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NEXTMap Terrain model slope (5
NextMap_CEH_DTM_Difference
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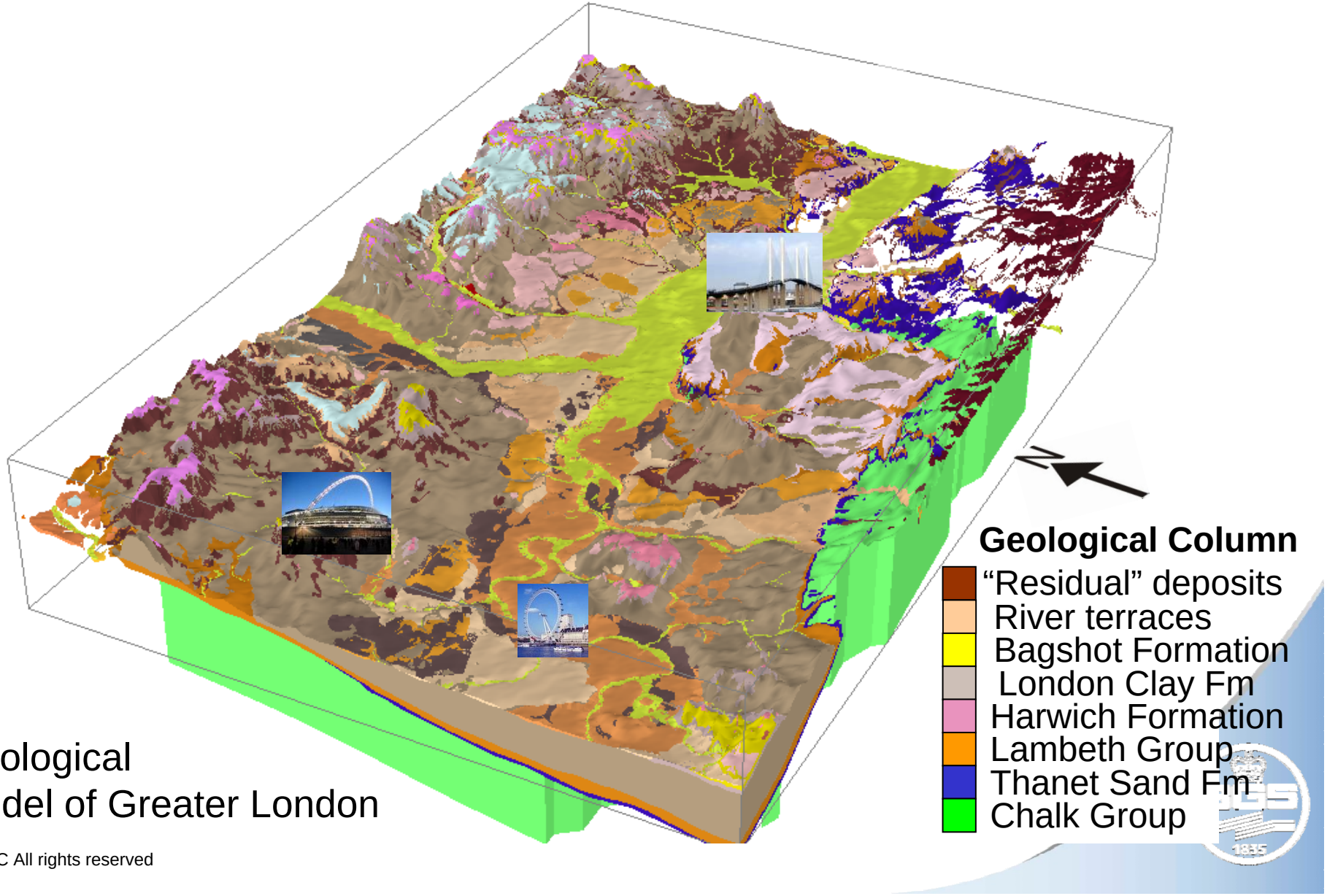
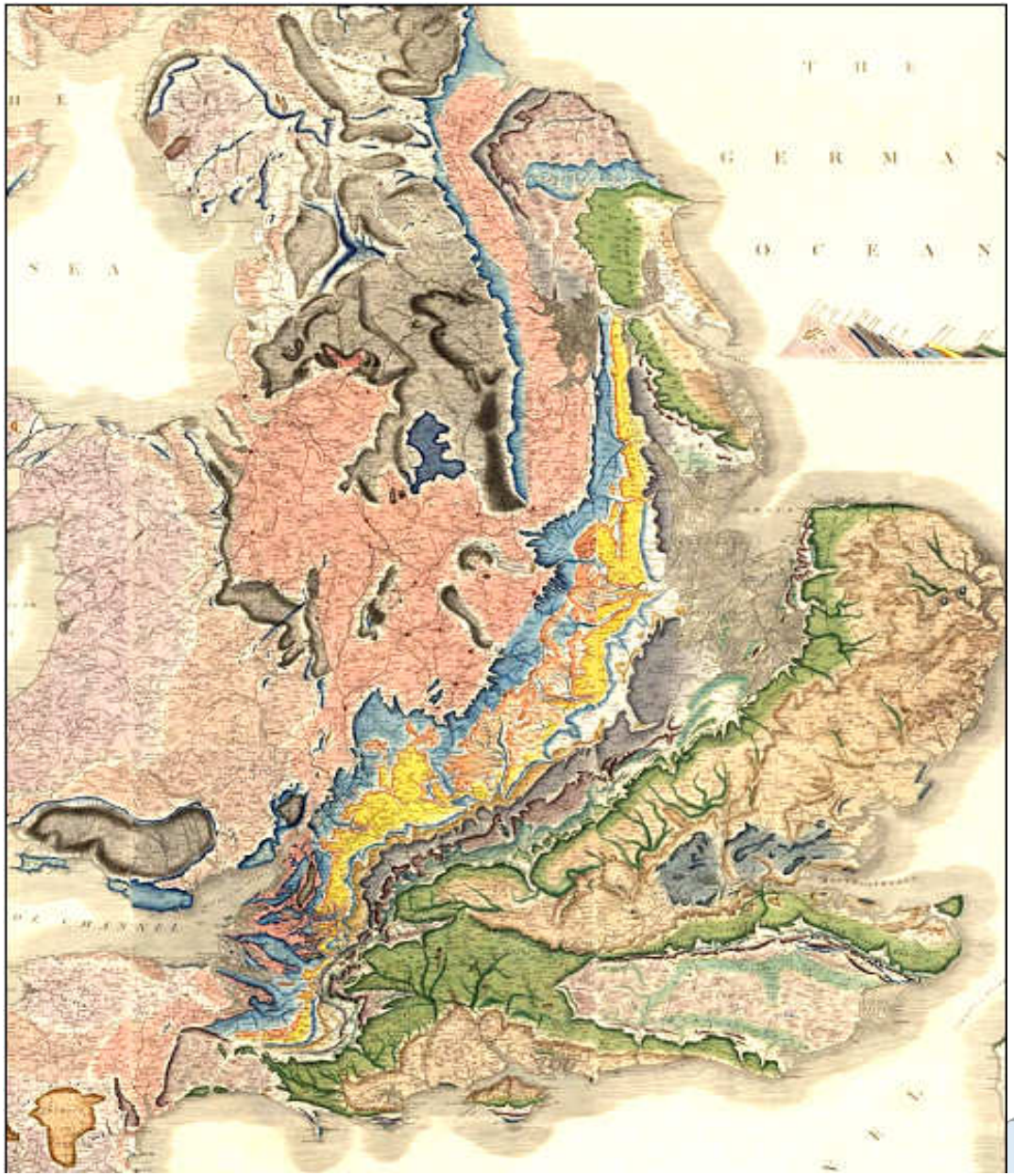
and 3D models



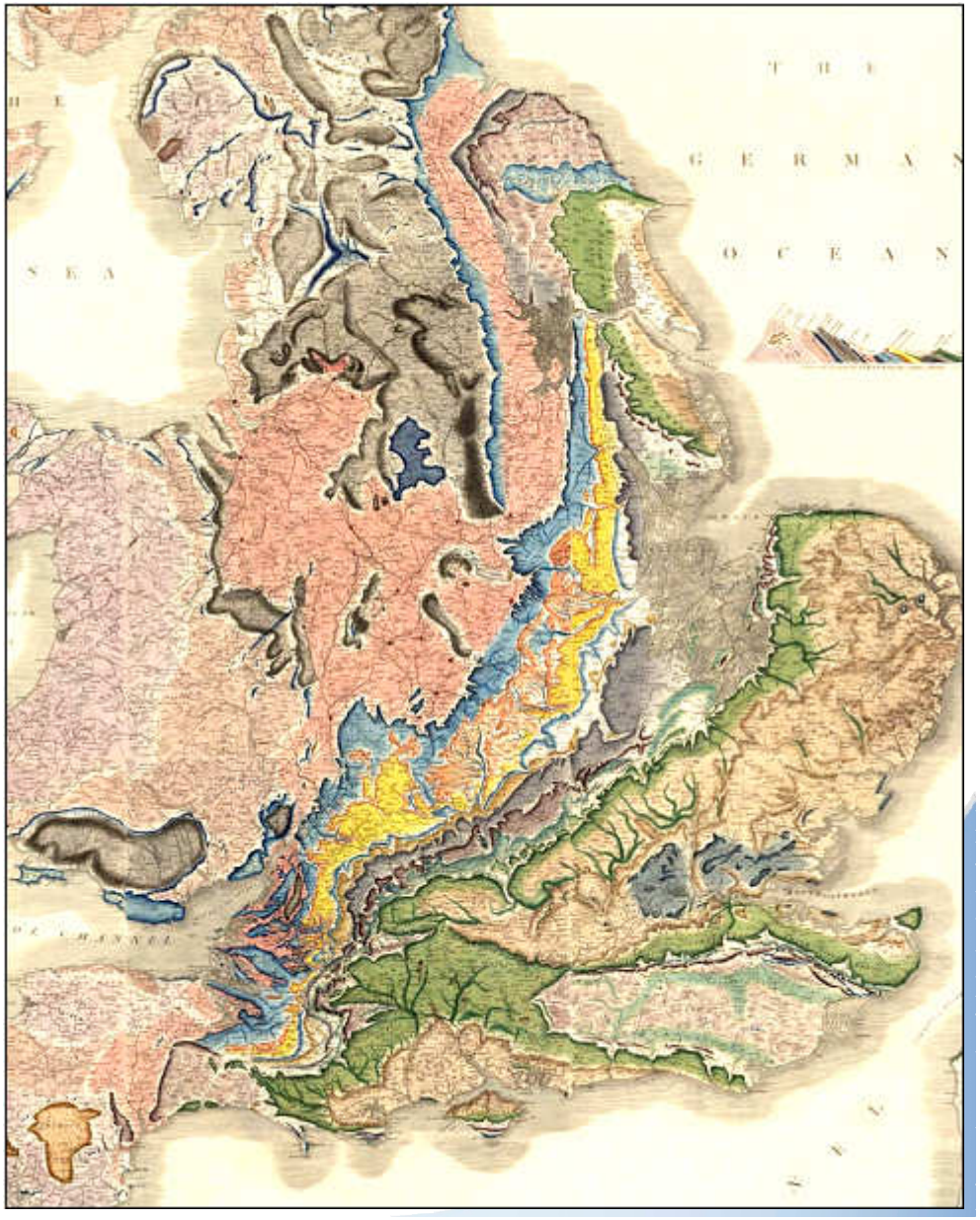
Geological
model of Greater London

But go back 200 years……

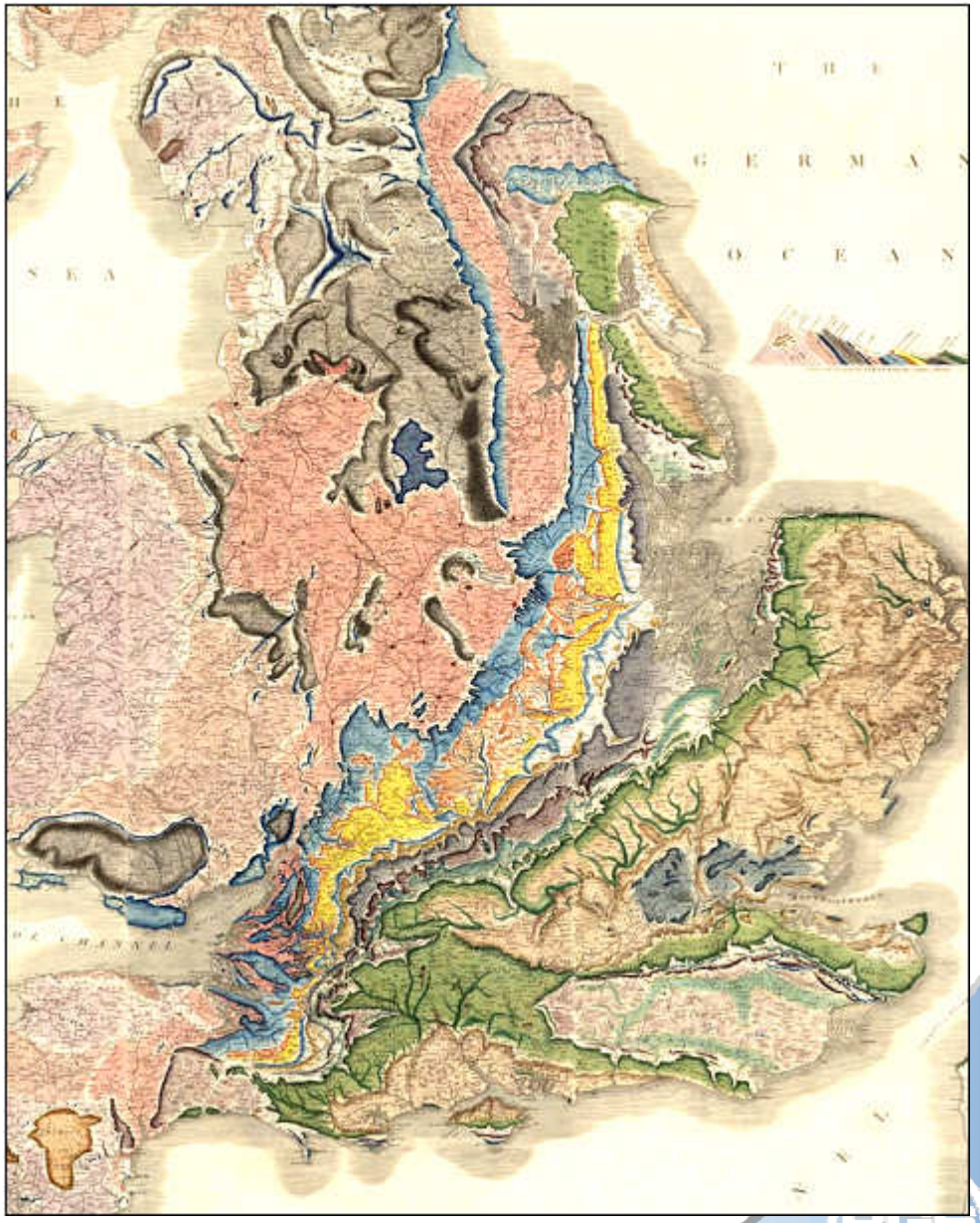


William Smith's 1815 geological map 'changed the world'

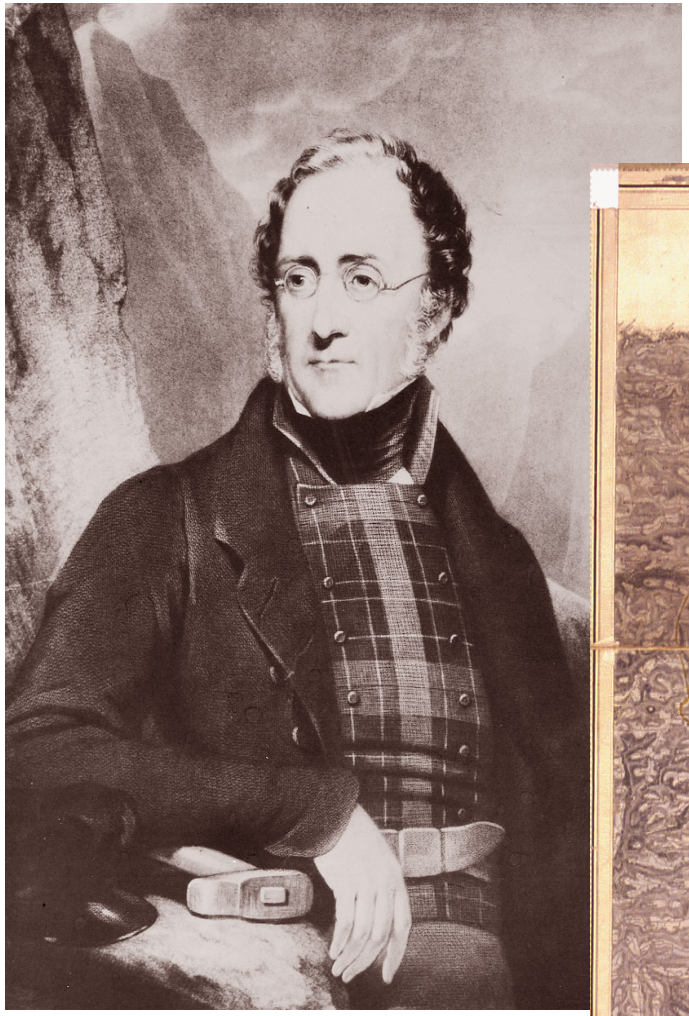
- Geology became an applied science
- Which documented our knowledge of the Earth, and:
  - where & what to mine
  - where to bury & protect
  - where to build & tunnel



- 1791 – Ordnance Survey established
- 1831 – Murchison lobbied for William Smith to be officially appointed as ‘ Geological Colourer of Ordnance Maps’ – but considered to old
- 1835 – Geological Survey established as part of Ordnance Survey, with Henry de la Beche as Director
- By 1837 – Museum of Economic Geology at No 1, Craig’s Court, Whitehall.

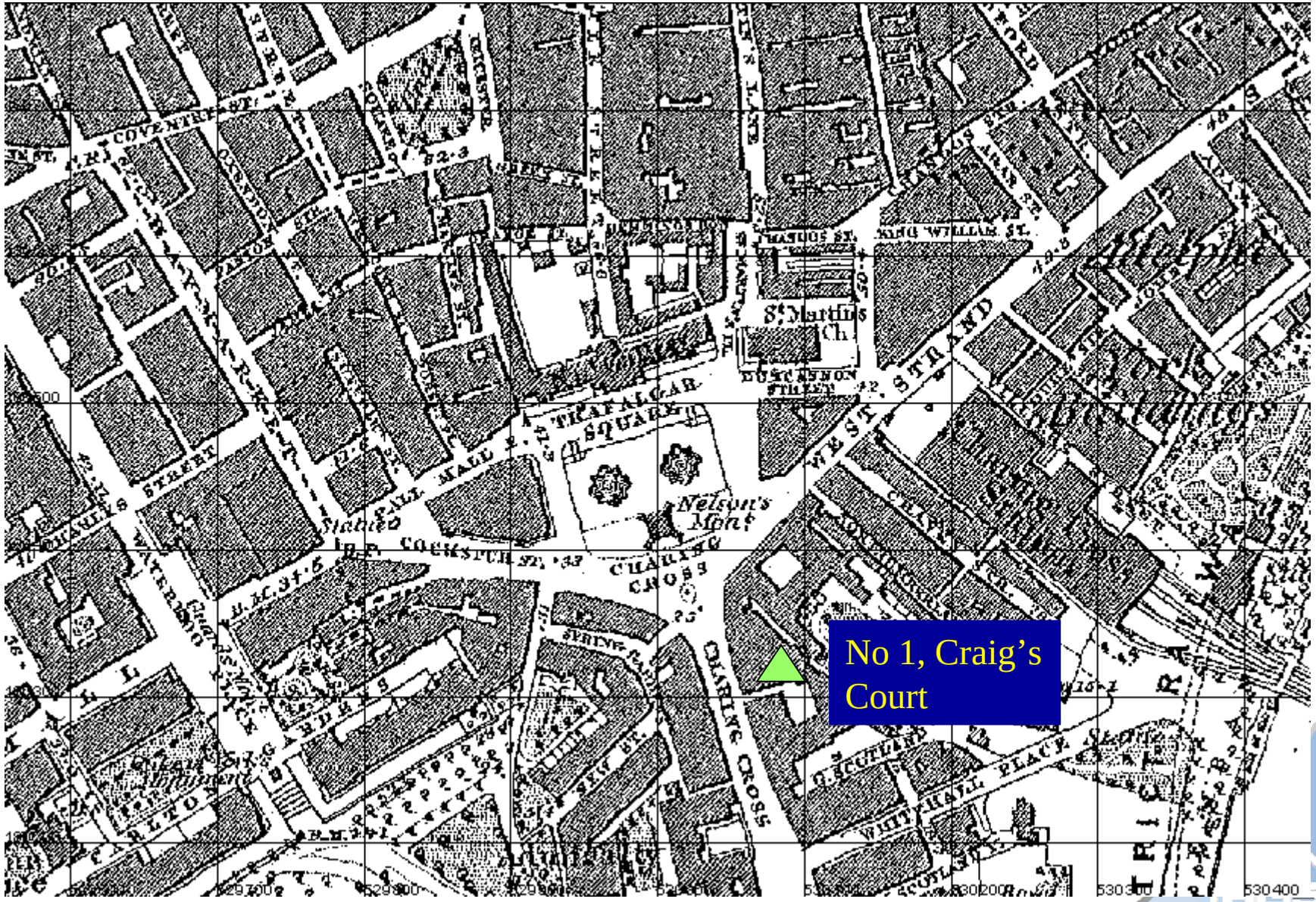


Sir Henry De la Beche



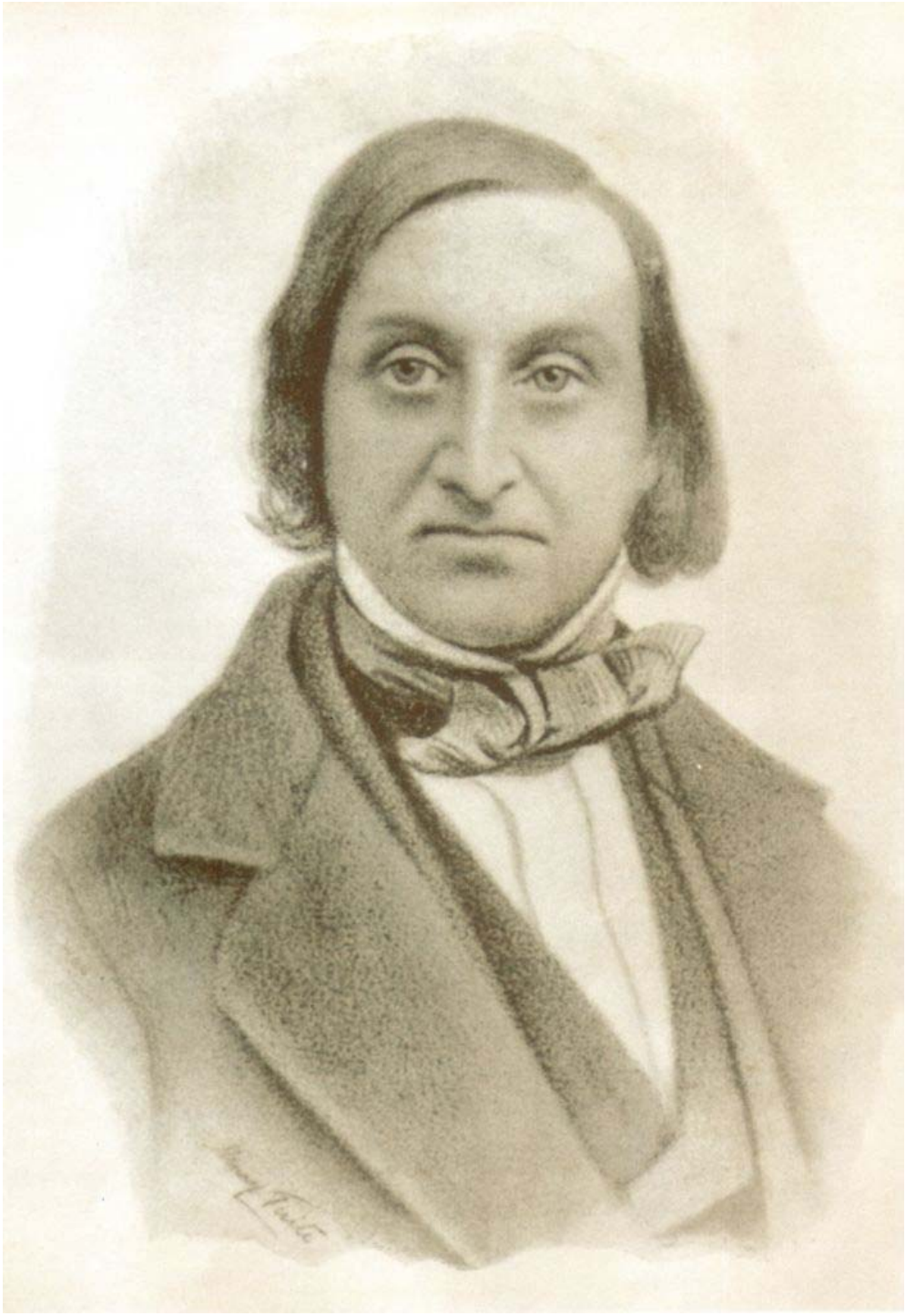
Geological Surveys Act, 1845:

'…to enter upon the land of any owner for the purpose of making a geological survey…'



Richard Phillips
1778 – 1851

1839 Appointed first Chemist and Curator to Museum of Economic Geology.



Edward Forbes
1815 – 1854

1844 Joined Geological Survey as its first “Palaeontologist”

John Salter
1820 – 1869

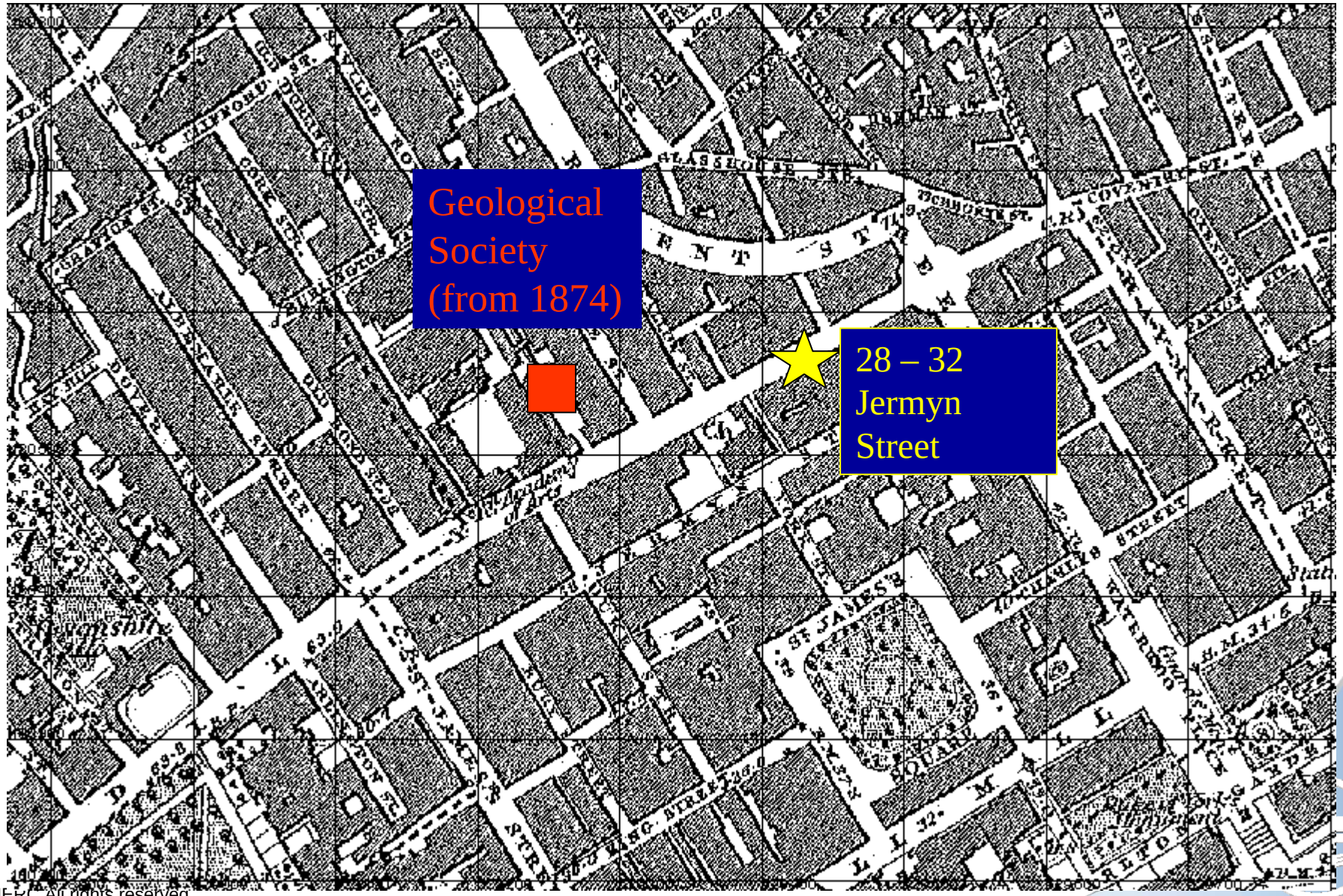
1846 Appointed as assistant to Forbes

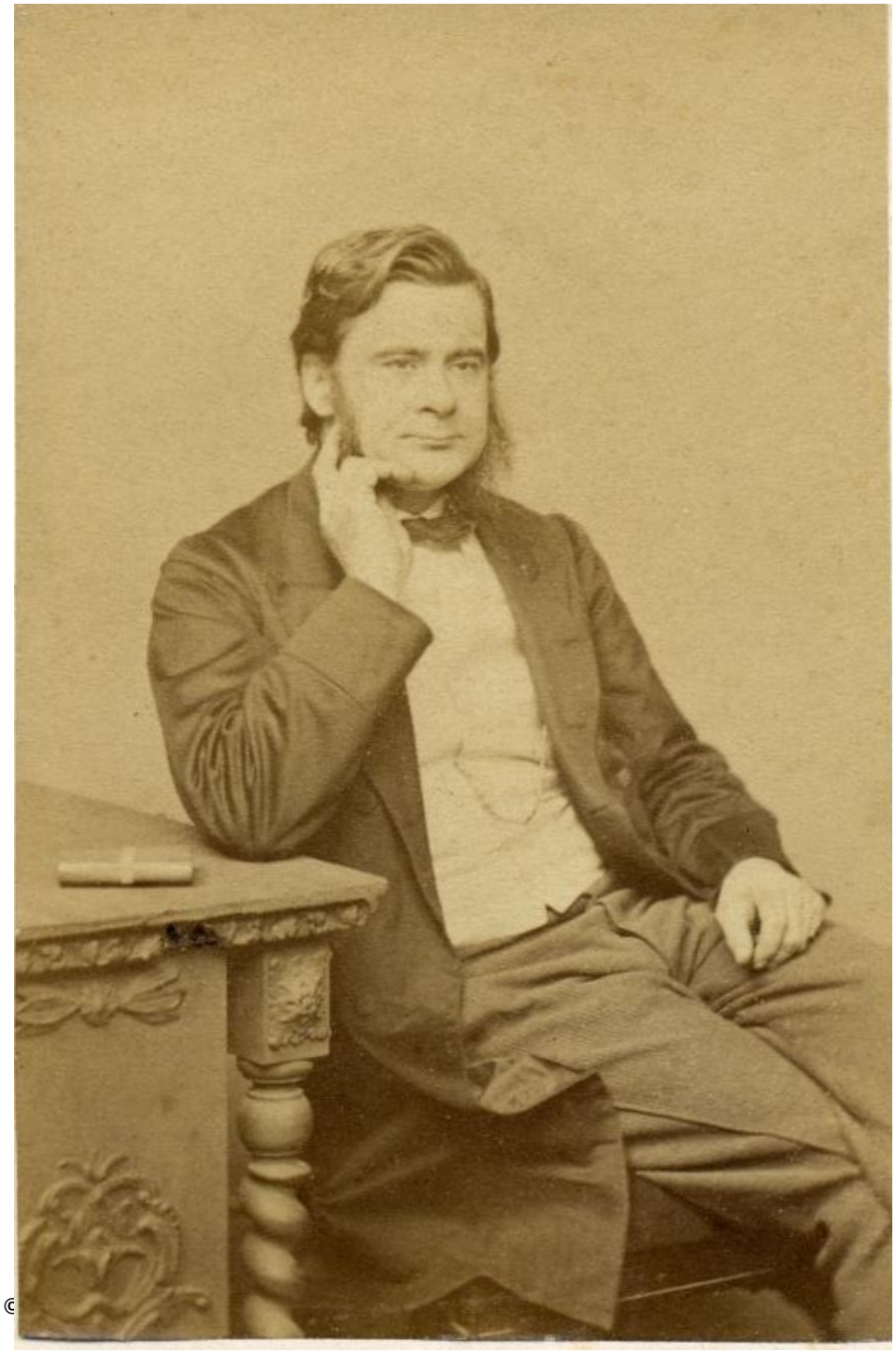
1863 Resigned from Survey

Richard Gibbs
died 1878

1843 – 1872 First Fossil Collector with the Survey.

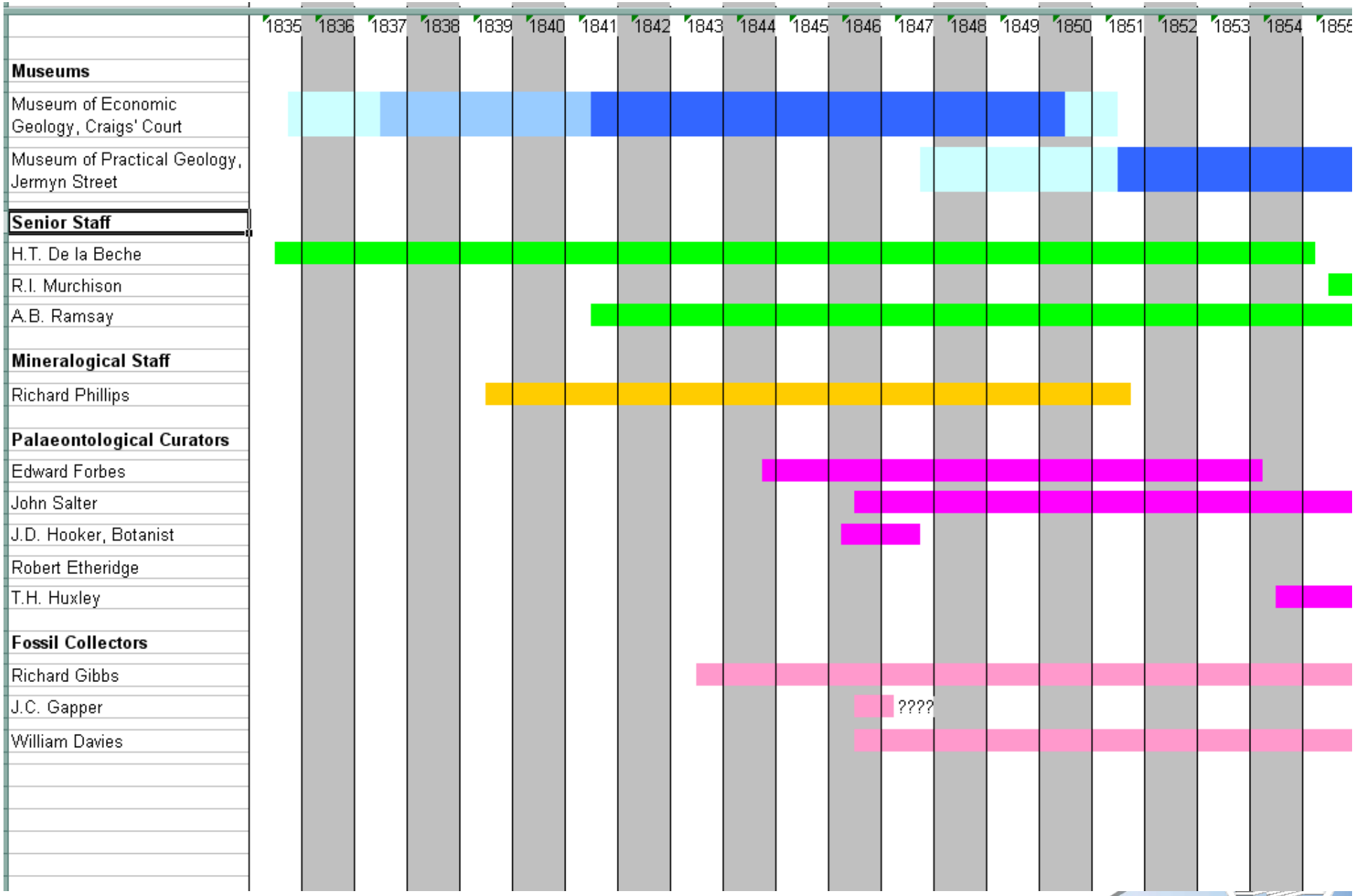
- The limited accommodation at Craig's Court soon proved inadequate
- 1851 - Museum of Practical Geology opened at 28, Jermyn Street.
    - Geological Survey
    - Mining Record Office
    - Government School of Mines and of Science applied to the Arts.





Thomas Huxley
1825 – 1895

1854 Appointed Professor of Natural History, including palaeontology, in Royal School of Mines, and Curator of Fossils in Jermyn Street Museum.

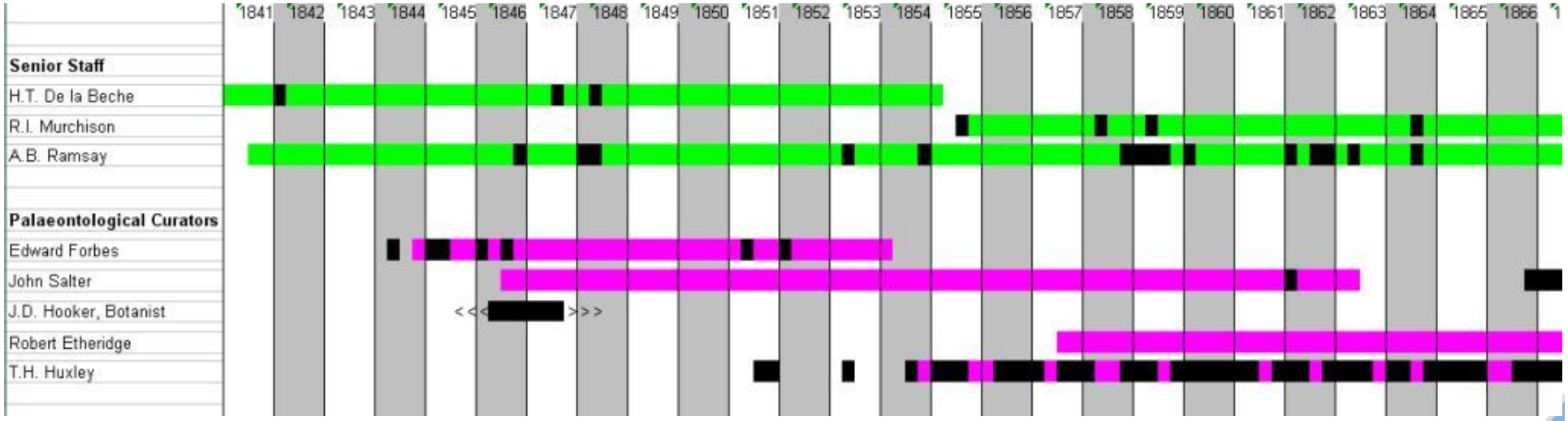


Darwin

A long collaboration

Correspondence with Geological Survey Officers –

Black boxes indicate quarters with correspondence with Charles Darwin



Source: Darwin Correspondence Project

Information retrieved 9th July 2009

XVIII. DARWIN AND GEOLOGY.

By By J.W. JUDD, C.B., LL.D., F.R.S.

(Mr Francis Darwin has related how his father occasionally came up from Down to spend a few days with his brother Erasmus in London, and, after his brother's death, with his daughter, Mrs Litchfield. On these occasions, it was his habit to arrange meetings with Huxley, to talk over zoological questions, with Hooker, to discuss botanical problems, and with Lyell to hold conversations on geology. After the death of Lyell, Darwin, knowing my close intimacy with his friend during his later years, used to ask me to meet him when he came to town, and "talk geology." The "talks" took place sometimes at Jermyn Street Museum, at other times in the Royal College of Science, South Kensington; but more frequently, after having lunch with him, at his brother's or his daughter's house. On several occasions, however, I had the pleasure of visiting him at Down. In the postscript of a letter (of April 15, 1880) arranging one of these visits, he writes: "Since poor, dear Lyell's death, I rarely have the pleasure of geological talk with anyone.")

Case Study 1

Donation of a set of volcanic rocks from oceanic islands to the Museum of Practical Geology

A

DESCRIPTIVE CATALOGUE

OF THE

ROCK SPECIMENS

IN THE

MUSEUM OF PRACTICAL GEOLOGY,

WITH EXPLANATORY NOTICES OF THEIR NATURE AND MODE OF OCCURRENCE, AND OF THE PLACES WHERE THEY ARE FOUND.

BY

ANDREW C. RAMSAY, F.R.S.,
Local Director,
HENRY W. BRISTOW, F.G.S., Geologist, AND HILARY BAUERMAN, Assistant Geologist,
of the Survey of Great Britain.

LONDON:
PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

1858.

1st Ed.

Wall-case 2.

PAGE

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Island of Ascension - 148
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Wall-case 3.

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Description *of Vesuvius*, Lyell - 162
Description of volcanic rocks and minerals of Vesuvius, by H. Bauerman - 164

Wall-case 4.

Igneous Rocks of Lower Silurian date of Wales and Shropshire. *Introductory remarks and descriptions of sections in the case*, by A. C. Ramsay - 172
Catalogue and description of specimens, by A. C. Ramsay and H. Bauerman, *with notes* by A. C. Ramsay - 178

Ashy Rocks, volcanic conglomerates, &c.—
Merionethshire - 178
Snowdon series - 184
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Radnorshire (near Builth) - 192
Caermarthenshire - 193
Pembrokeshire - 194

Volcanic rocks from the Island of Ascension.

Presented by Mr. Charles Darwin, F.R.S., and Captain Ord, R.E.

The Island of Ascension, situated between the coasts of Africa and Brazil, is nine miles long by six in breadth. Its entire surface, which is broken into mountains, hills, and ravines, is covered with ashes, cinders, pumice, and lava. Its general appearance is that of a mass of s
red conical hills, with truncated summits, r
plain of black, sterile lava. The highest point
Green Hill, is 2,870 feet above the sea level.—

1 & 2.—VOLCANIC SLAG, or CINDER.

3.—RED SCORIACEOUS LAVA, partly vesicu
outer portion of the stream.

4 & 5.—CELLULAR or VESICULAR BASALTIC LAVA.

UPPER GALLERY.
Wall-case 2.

6.—SLAG, *from an iron furnace* at Wolverhampton, for comparison with the two preceding specimens.

7.—Cellular BASALTIC LAVA. Some of the cells are elongated, and partly filled with *carbonate of lime.*

8.—Vesicular BASALTIC LAVA, showing the elongation of the vesicles in the direction of the current.

9.—BASALT, in one part slightly scoriaceous.

10.—Vesicular BASALTIC LAVA, some of the vesicles filled with crystals of *glassy felspar.*

11.—Compact brown BASALTIC LAVA (slightly vesicular in places) with crystals of *glassy felspar.*

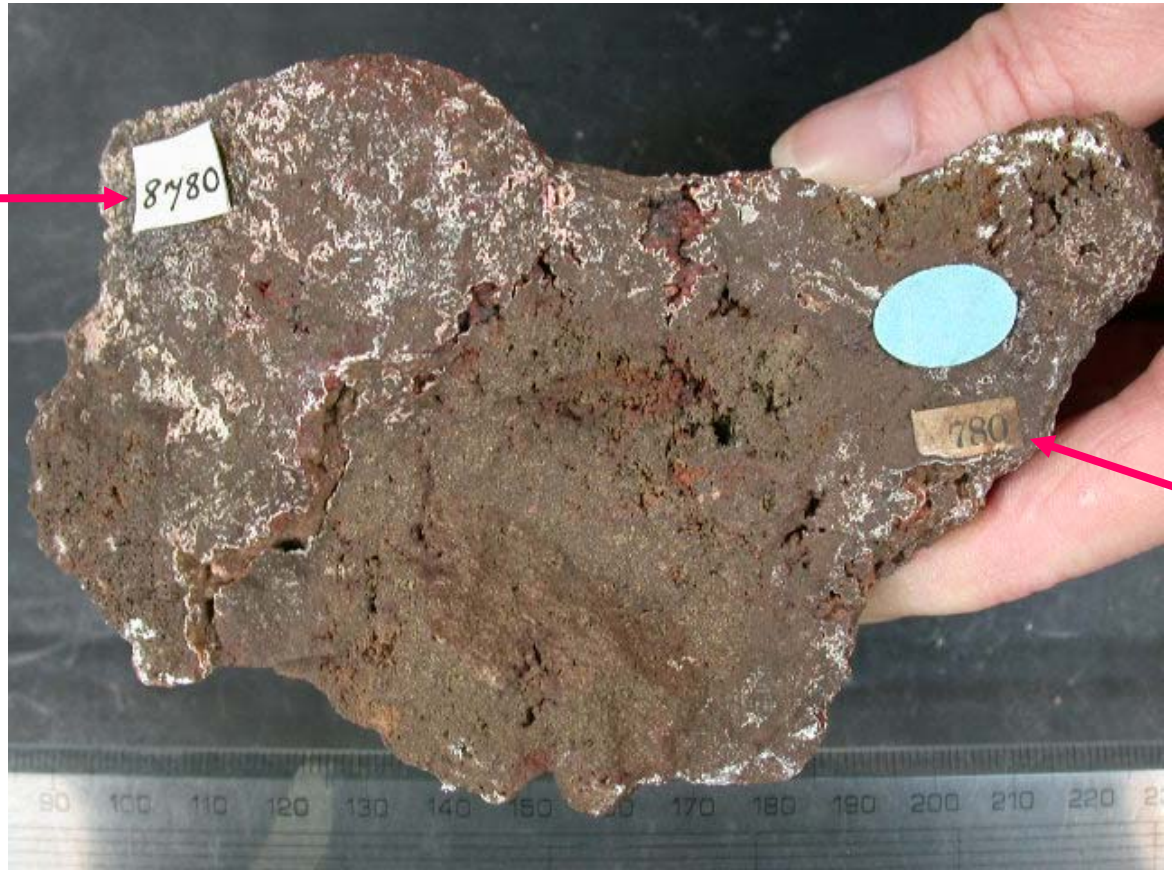
12.—Vesicular BASALTIC LAVA, with crystals of *augite.*

13.—Compact brown BASALTIC LAVA, with crystals of *olivine.*

14, 14a, 14b, 14c, 14d, and 14e.—Six specimens of fragments from the superficial part of a BASALTIC LAVA CURRENT, presenting singularly twisted and convoluted forms, and exhibiting lines formed by the flowing of the stream while in a viscous or slightly fluid state.

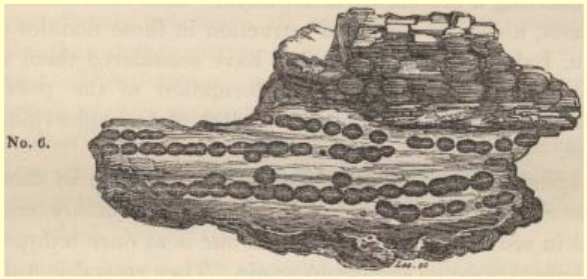
(See Darwin "On Volcanic Islands," p. 35.)

BGS
MR8780



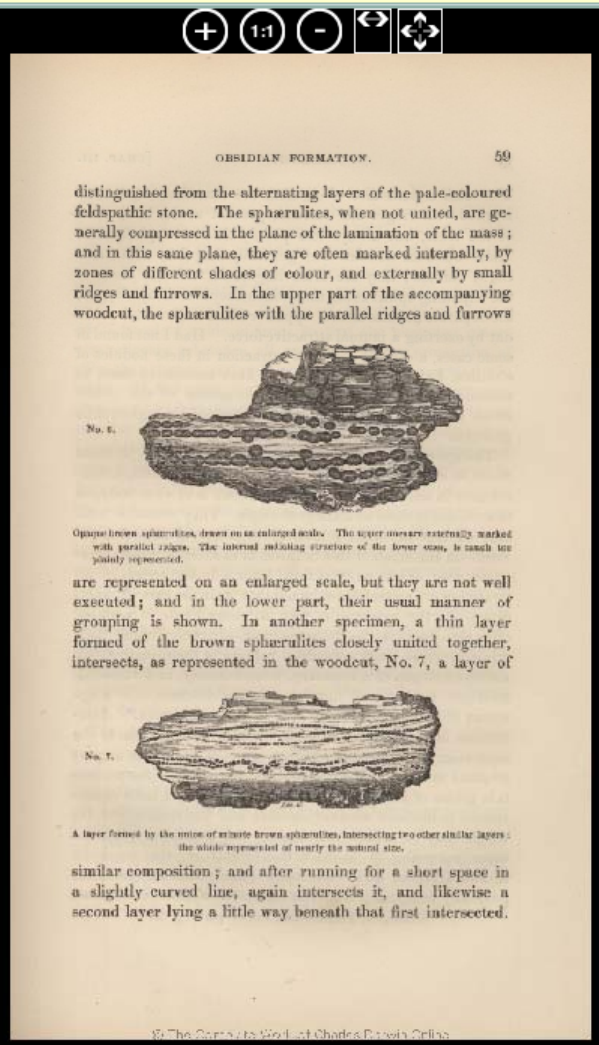
Darwin's
label 780

distinguished from the alternating layers of the pale-coloured feldspathic stone. The sphærulites, when not united, are generally compressed in the plane of the lamination of the mass; and in this same plane, they are often marked internally, by zones of different shades of colour, and externally by small ridges and furrows. In the upper part of the accompanying woodcut, the sphærulites with the parallel ridges and furrows



Opaque brown sphærulites, drawn on an enlarged scale. The upper ones are externally marked with parallel ridges. The internal radiating structure of the lower ones, is much too plainly represented.

are represented on an enlarged scale, but they are not well executed; and in the lower part, their usual manner of grouping is shown. In another specimen, a thin layer formed of the brown sphærulites closely united together, intersects, as represented in the woodcut, No. 7, a layer of



OBSIDIAN FORMATION. 59

distinguished from the alternating layers of the pale-coloured feldspathic stone. The sphærulites, when not united, are generally compressed in the plane of the lamination of the mass; and in this same plane, they are often marked internally, by zones of different shades of colour, and externally by small ridges and furrows. In the upper part of the accompanying woodcut, the sphærulites with the parallel ridges and furrows

No. 6.

Opaque brown sphærulites, drawn on an enlarged scale. The upper ones are externally marked with parallel ridges. The internal radiating structure of the lower ones, is much too plainly represented.

are represented on an enlarged scale, but they are not well executed; and in the lower part, their usual manner of grouping is shown. In another specimen, a thin layer formed of the brown sphærulites closely united together, intersects, as represented in the woodcut, No. 7, a layer of

No. 7.

A layer formed by the union of minute brown sphærulites, intersecting two other similar layers: the whole represented of nearly the natural size.

similar composition; and after running for a short space in a slightly curved line, again intersects it, and likewise a second layer lying a little way beneath that first intersected.

Case Study 2

Sample registration systems

Sample Collecting & Registration Form — UK samples

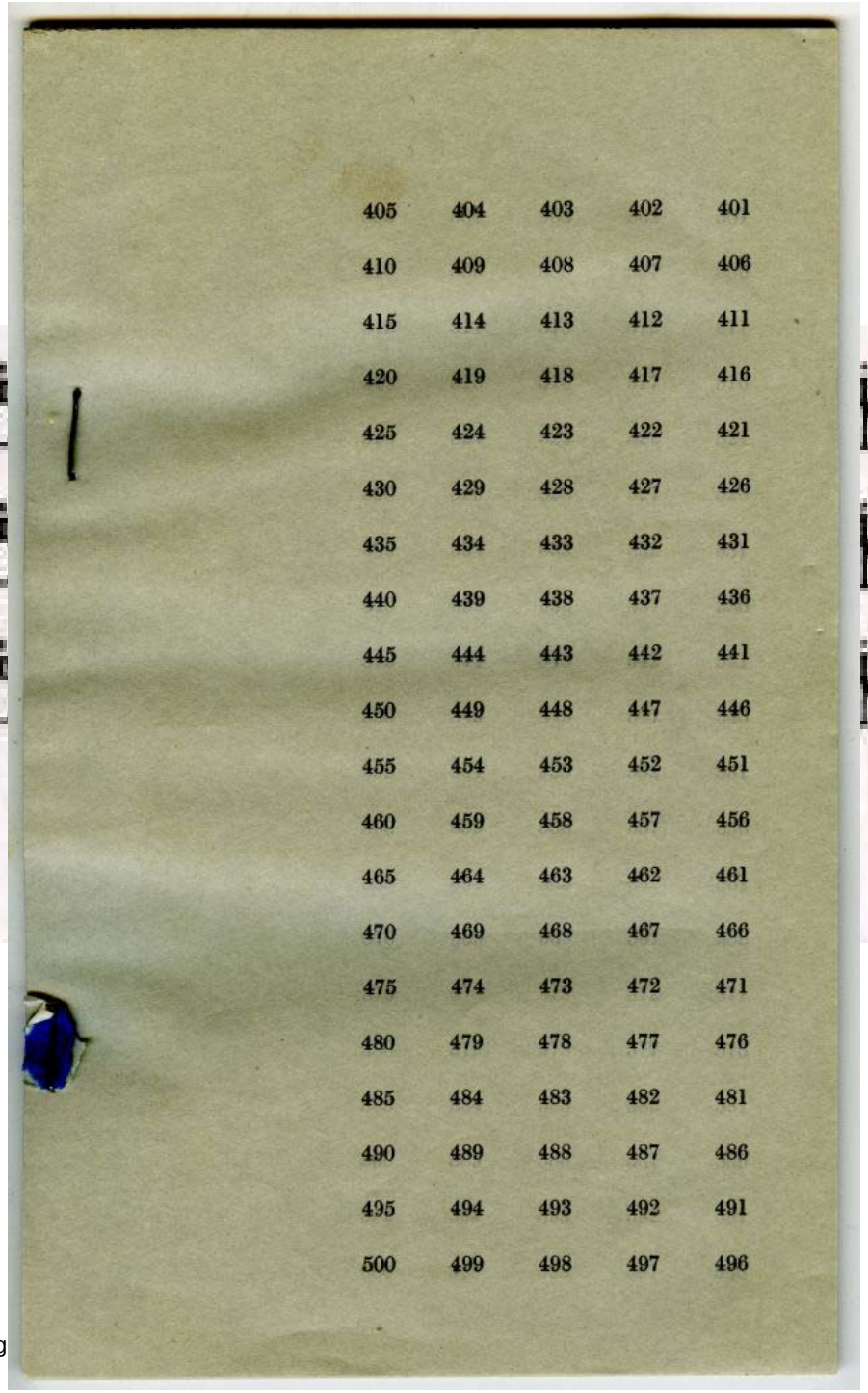
Please use this form for submitting rock samples for thin sectioning or entering onto the Britrocks database as part of the BGS thin section collection (E, N, S, C) or

Please Note: Highlighted columns **MUST** be fill
collections.

Collectors Number		Collectors Number 2		Registered Number		comment	RCS name or code (field identification)
Prefix	Number	Prefix	Number	Prefix	Nu		

GoBook

1754 codes to date



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410	409	408	407	406
415	414	413	412	411
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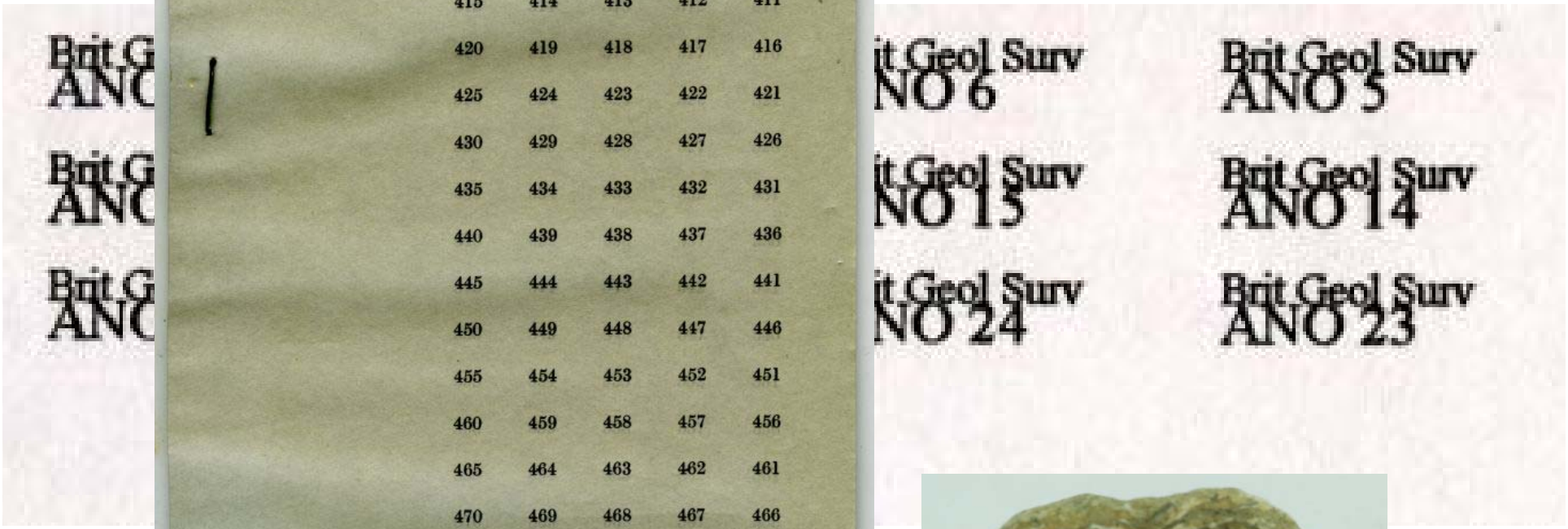

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A	Mac Conachie A./Allen J.K./Anderson J.G.C.	P	0001	P		1791		
A	Anderson F.W.	B	0001	P		2197		
A	Gibbs	B	0001	P		5000		
A	Mac Conachie A.	P	0001a	P		3533a		
AA	Allen A.W.	B	0003	P		72	SMART	06/06/20
AA	Archer A.A.	P	0001	P		0286		
AAA	Archer A.A.	B	0001	P		2295		
AAM	Irving A.A.M.	B	0001	A	AAM	5000	SMART	17/07/20
AB	Bell A.	B	0001	P		0112		
AB	Benfield A.C.	P	0001	P		0002		
AB	Brandon A.	B	0120	P	ABR	1525		
ABL	Leslie A.B.	R	0001	A	ABL	500	SMART	08/10/20
ABR	Brandon A.	B	0001	A	ABR			
ABU	Buchan Alan Craig	P	0001	A	ABU	5000	SMART	23/10/20
ABX	Bloodworth A.J.	P	0001	P				
AC	Craven C.A.U.	P	0	P		0		
AC	Lucas S.A.	B	0001	P		1496		
ACB	Buchan Alan Craig	B	0001	A	ACB	5000	SMART	23/10/20
ACJ	Jones A C	B	0001	A	ACJ	2000	SMART	30/07/20
ACW	Wilson A.C.	B	0	P		0		
AD	Exeter University Contract PETROLOGY	P	0086	P		0116		
AD	Exeter University Contract (BIOSTRATIGRAPH	B	0001	p		5715		
AD	Cheshire J.	B	0001	P		0402		
AE	Edmond E.A./ Griffith A.E.	P	0063	P		0112		
AE	Edmonds E.A.	B	0001	P		0109		
AEM	Milodowski A.E.	P	0001	A	AEM			
AF	Fowler A.	P	0001	P		0299		
AG	Edmonds E A	P	0	P		0	JLWR	25/05/19
AG	Crosby A.	B	0001	P		1786		
AG	Griffiths A E	P	0	P		0	JLWR	25/05/19
AGI	Gibson Andrew D	P	1	A	AGI	5000	SMART	08/04/20
AH	Horton A.	P	0001	P	AHH	638		
AH	Horton A.	B	0001	A	AH	5212		

Symbol.	User.	Register / spec. nos.	Tray index equivalent NOT on spec
△ △ △	Allen H.A	4, 5, C. 4274-5000 28-4171	ZAF
12|34 (red vert. line)	Allen H.A	C, E 1-1375	ZAG.
(B)	Bolton Coll.	4	Tray Zl
B	Barrow G	4 1-322	ZLL (prev. in ZAL)
J.H.B.L (in red)	Blake J.H.	H 101-11	Tray 146
E Th	E Heridge R.	E	" 131
C	Clough C T.	J 329-391	? Trey Edenburgh
● red spot	Etheridge R	A	?
G script	Gibbs R	1	Tray index
G "	" .	A	" "
X	" "	B, 2, 3	" " ?
O	" " + Walter	B, 3, 4	" " ?
P.	" " "	B 4	" " ?
(14) green spot	" " + Rhind	A 1-7	ZAB
(14) blue. spot	" etc	A 1-476?	ZAA
Gam	Gamble W	J 1-847	Trays 350-355
GGG	Goodchild G.	3, 4 26-2200	Trays. 9375, 9377-8, 9733-6.
1/64, 1/65, 1/66	Green A H	2	Largely reveg. in Leeds Sheets 87, 89 + 112.
Geol. Soc. Coll.	Geological Society of London	1 + 2 vols.	
Haw	Hawkins C C.	D 2346-8 only	?

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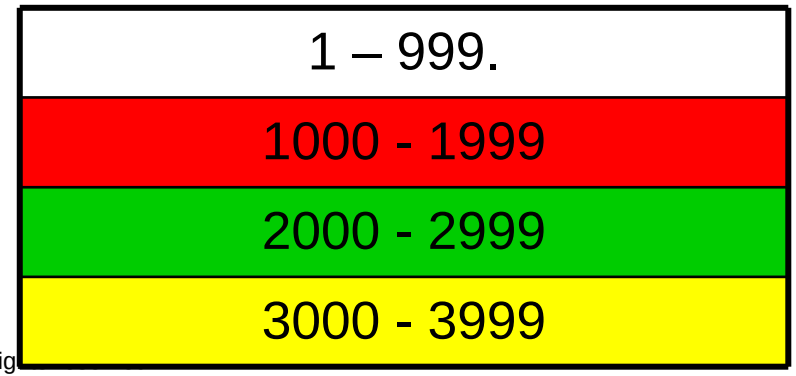
HBW in red.	" "	G, H J.	ZAQ
WKr	Walker J, F	J	Tray 401
20 } numbers on red label	Gibbs R	A } 1-500	ZAN
20 } numbers on red label	Cotton J.	A } 1-500	
10 numbers on green label	Cameron A.G.	E, D. 1-40	ZAM
TMcKH written sideways.	Hughes TMcK.	3 1-126	ZAY
Tr script	Turnbull.	7, 10.	ZAJ
numbered but No prefix			
1234	GSM series	Reg 1-19 later ones have GSM.	—
numbers only.	Woodward HB.		?
numbers on purple or green background	Ged. Soc. Coll.		Ged Soc Reg.

Darwin’s rock sample numbering scheme

Put a number on every specimen, and every fragment of a specimen; and during the very same minute let it be entered in the catalogue, so that if hereafter its locality be doubted, the collector may say in good truth, "Every specimen of mine was ticketed on the spot." Any thing which is folded up in paper, or put into a separate box, ought to have a number on the outside (with the exception perhaps of geological specimens), but more *especially* a duplicate number on the inside attached to the specimen itself. A series of small numbers should be printed from 0 to 5000; a stop must be added to those numbers which can be read upside down (as 699. or 86.). It is likewise convenient to have the different thousands printed on differently coloured paper, so that when unpacking, a single glance tells the approximate number.

Darwin (1839)




806.
8728

1 – 999.
1000 - 1999
2000 - 2999
3000 - 3999

Early Survey collections frequently had just labels. Museum specimens were mounted on tablets & catalogued by position.

1659

Geological Survey.

Fossils.

No.	LOCALITY.	FORMATION.	NAME.	Destination. Temporary.	Destination. Final.
		Tray 17	No specs in Tank	May 1962	
	Gibbs. June 1859.				
G.1387	Cockenzie Prestonpans, Haddington	Uppermost Bed Carboniferous Limes	Cyathophyllum –		R.
1388	1" Scotland 33	Bed No 1 – R. Gibbs.	Superficial marine marks.		R.
1389		(P. giganteus a abundant)	Productus giganteus –	W. D	
1390	Copied in Book K. p 33	mne like Bed 3. Dumbar	Nil –		R.
1391			Productus giganteus & P. longispinus		R.
1392			Superficial marine marks.		R.
G. 1393	Cockenzie Prestonpans, Haddington	Carboniferous Limestone – Bed belo	Nil –		R.
1394	1" Scotland 33.	No 1 – or Bed No 2. R. Gibbs.	Large Encrinite		R.
1395			Nil –		R.
1396			Productus giganteus?		R.
1397			Productus longispina.		R.
1398			Chonetes & Spirifer		S
1399	in Book K. page 33		Bivalve		R.
1400	Copied	(must be Bed 3	Poteriocrinus stem	W.D	
1401		Dumbar (Skuter	Productus giganteus		R.
1402		limestone. Mr	Nil		R
1403			"		R
1404			"		R.
1405			Encrinite stem		
1406			Productus		R
1407			Productus longispina?		R.

Instructions to the Officers engaged in the Collection and Determination of Fossils.

The immediate and primary object of collecting fossils in any district in which the operations of the survey are carried on, is to enable those officers who are especially charged with Palæontological duties, to furnish the persons concerned in drawing up the maps and sections, with the means of accurately determining the age of the rocks whose physical relations have been ascertained and delineated.

The books of printed numbers formerly employed by the Survey of Great Britain, and now adopted in Ireland, are to be invariably used for the future, a distinctive letter being assigned to each book when issued, with instructions to the collector (or other officer) who receives it, to write that letter neatly and legibly before each number in the book. Every specimen collected is to have one of these lettered numbers gummed on it as soon after collection as possible, and the collector is to keep a catalogue, in which he will enter these numbers, with the exact locality, and any other information respecting the specimens which he is capable of affording. In each box or parcel of fossils sent up to

enclosed, or must be forwarded to the proper officer at the time the box or parcel is sent up. A similar book of numbers is to be kept in the work-room of each national museum, with a letter of its own assigned to it, so that lettered numbers may be immediately affixed to any specimens that may be sent up by any officer of the survey, or bought of or presented by any other person, who not being regularly employed in collecting is not provided with one of the books of numbers.

logical officer.

15th November 1858.

Roderick Impey Murchison,
Director General.

* The British Palæozoic fossils are to be directed to Mr. Salter; the Secondary and Tertiary fossils to Professor Huxley.

Geological Survey.

No.	LOCALITY.	FORMATION.
G	Gribbs Survey Oct 1848	
		Tray 17

Carboniferous Limestone.

North Wales.

Re. registered pages 63-88 or space reserved.

A series of Carboniferous Limestone fossils from North Wales numbered. G.1—740. but with many numbers wanting, have only the first 30 entered.

(Those with locality definitely in 1" Sheets 108, 121 and to Leads 23/3/62)

Tray

NB. Many of these Specimens

Parcel of Specimens

Col. Aveline from Llandewi ystrad Enny

Summer 1847.

calc. courses in sandy mud — Wood house. 1- 1½ m. S W. of Llandewi.

Grap. Sudensis in perfection

Phrag. nautileum ! young ?

Cal. Blumenbachii ?

labrunus do. ++

Spiral

Favosites fibrosa

Rhacops Stokesii !! +

Comularia Sowerbyi ?

Orthoc. close septa - abund+

Orthis elegantula very small

Turbino Spirs Sina.

Avelines parcel. Summer Aug. 1847. 2

sandy — Middle Cefn. 2 1/4 m. SW. Llandevi

Graptolithus Ludensis curved teeth

Orthoc. Sedgwickii?

muddy black flag — In river Ithon. 3 1/4 m. S. Llanbadarn fawr Church

Cardium like?

Funnel shaped pleated membranes

Cardiola fibrosa

Ter. bidentata?

Grap. tenuis?

— peculiar keeled narrow

— Sedgwickii

— 1p

n.r Llandevi — 30 chains N. E of Cross gate 4. — N. of Llanbadarn fawr.

Orthoceras?

coral

Fortunes of Trilobites

O. elegantula

G. Ludensis!! & Marchisonia look at this

Trilobite pieces (like a Leptena)

Leptena transversalis?

flag?

H Symbol

Fossils from A. C. Ramsay & J. B. Sykes. May 1848.

all copied into the rough list 1849.

Llanfyllin. Montgomeryshire.

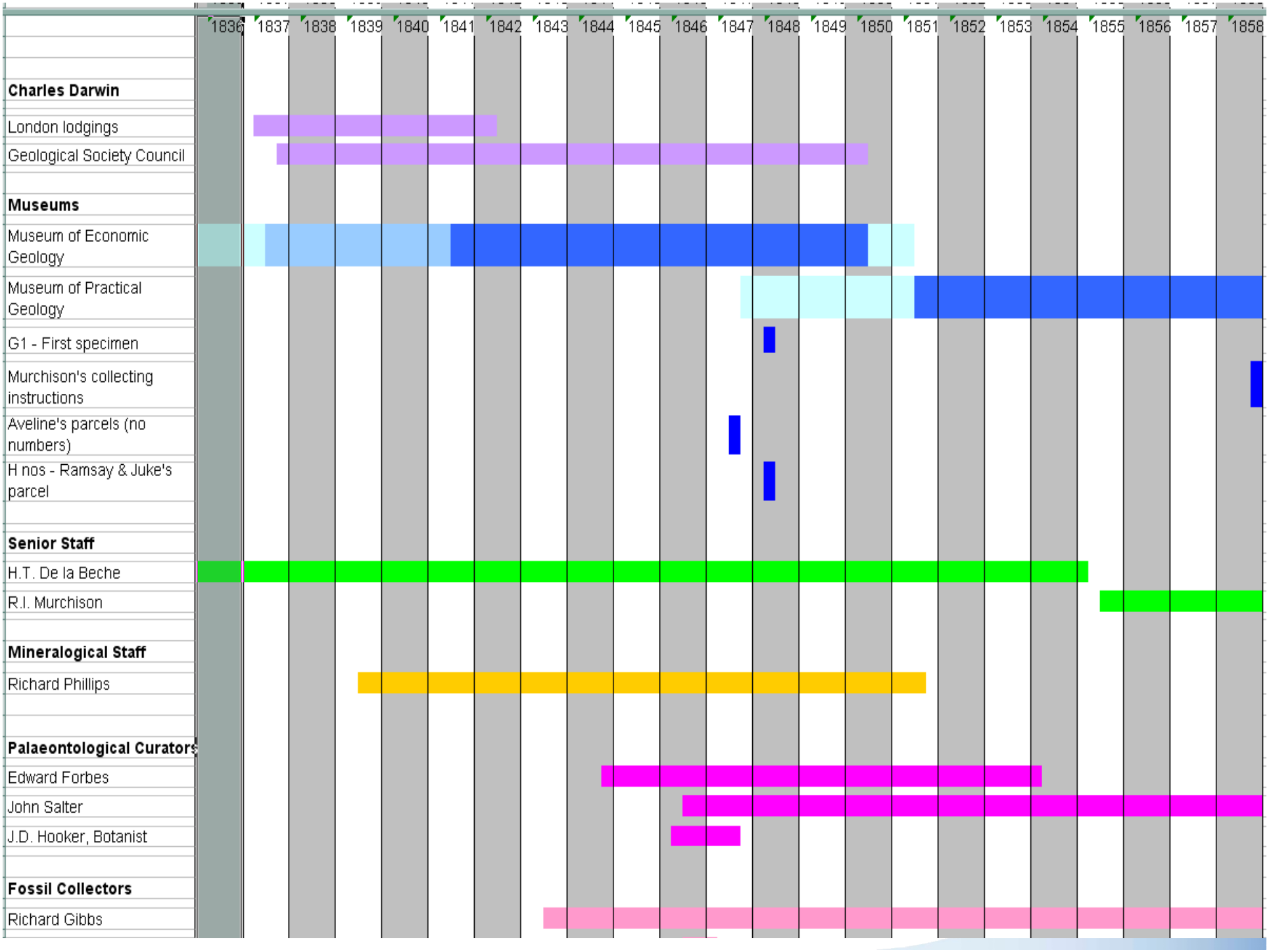
Fridd Gowny. Llanwddyn - 66 N.W

heavy blue slate.

8. . Stromatopora concentrica
7 . Lichas lavata
25 . Favosites fibrosa var. & Orthis elegantula
4 Tail of Phacops Brongniartii. Trinucleus Caractaci. Orthis elegantula - Leptæna transversalis
34 Tail of Phacops fatimus
3 Calymene brevicapitata

Aber Marchnant. 74 SE

53 . same as 339 - Dentalina? possibly
62 } Orthis expansa
72 }
69 Trin. Caractaci
48 - Stromatopora concentrica
46 - Leptæna transversalis & Nucula (322)


1836
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1855
1856
1857
1858
Charles Darwin
London lodgings
Geological Society Council
Museums
Museum of Economic Geology
Museum of Practical Geology
G1 - First specimen
Murchison's collecting instructions
Aveline's parcels (no numbers)
H nos - Ramsay & Juke's parcel
Senior Staff
H.T. De la Beche
R.I. Murchison
Mineralogical Staff
Richard Phillips
Palaeontological Curators
Edward Forbes
John Salter
J.D. Hooker, Botanist
Fossil Collectors
Richard Gibbs

[Short 804 Long][Short 805 Short][Long 806 Short]

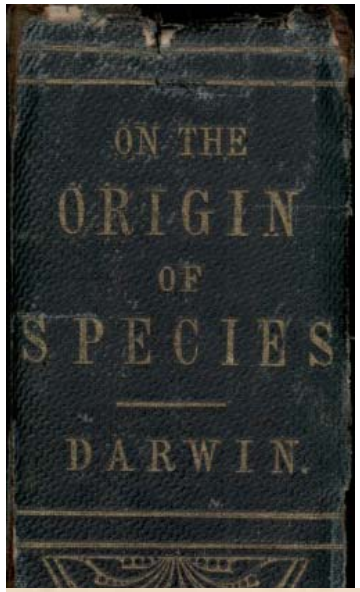
Comparison of Systems

	Geological Survey	Darwin
Tickets per book	5000	5000
Printed	Right to Left	Left to Right
Digits	4	3 (1000s indicated by colour)
Used	1849 +	1832 - 1836

Case Study 3

Origin of Species and Salter's Longmynd specimens

Darwin (1861) *On the origin of species by means of natural selection, or the preservation of favoured races in the struggle for life*. 3rd edition.



Even at this day, if the Malay Archipelago were converted into land, the tropical parts of the Indian Ocean would form a large and perfectly enclosed basin, in which any great group of marine animals might be multiplied; and here they would remain confined, until some of the species became adapted to a cooler climate, and were enabled to double the southern capes of Africa or Australia, and thus reach other and distant seas.

From these and similar considerations, but chiefly from our ignorance of the geology of other countries beyond the confines of Europe and the United States; and from the revolution in our palæontological ideas on many points, which the discoveries of even the last

On the sudden appearance of groups of allied Species in the lowest known fossiliferous strata.—There is another and allied difficulty, which is much graver. I allude to the manner in which numbers of species of the same group, suddenly appear in the lowest known fossiliferous rocks. Most of the arguments which have con-

existing species of the same group have descended from one progenitor, apply with nearly equal force to the earliest known species. For instance, I cannot doubt that all the Silurian trilobites have descended from some one crustacean, which must have lived long before the Silurian age, and which probably differed greatly from any known animal. Some of the most ancient Silurian animals, as the Nautilus, Lingula, &c., do not differ much from living species;

John William Salter

1820 – 1869

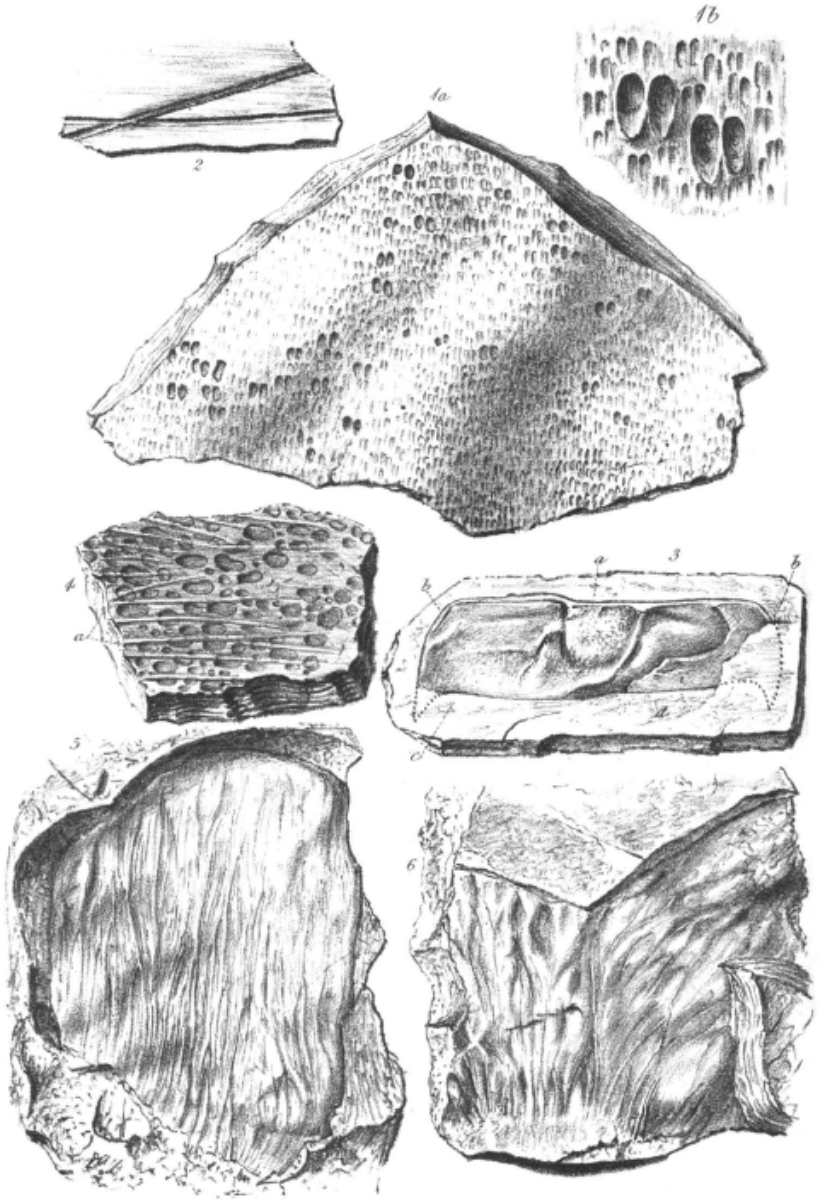
1856

246 PROCEEDINGS OF THE GEOLOGICAL SOCIETY. [Mar. 5,

3. *On* Fossil Remains *in the* Cambrian Rocks *of the* Longmynd *and* North Wales. By J. W. Salter, Esq., F.G.S., of the Geological Survey of Great Britain.

[Plate IV.]

The occurrence of any organism in those ancient sediments which have been so often called Azoic is of sufficient interest for an account of it to be laid before the Society. We have hitherto been acquainted with but one genus—and that doubtfully an animal or a plant—in



J.W.S. del. ad nat. Ford & West lith. J.D.C. Sowerby lith.

FOSSILS FROM THE LONGMYND.

To the question why we do not find records of these vast primordial periods, I can give no satisfactory answer. Several of the most eminent geologists, with Sir R. Murchison at their head, are convinced that we see in the organic remains of the lowest Silurian stratum the dawn of life on this planet. Other highly competent judges, as Lyell and the late E. Forbes, dispute this conclusion. We should not forget that only a small portion of the world is known with accuracy. M. Barrande has lately added another and lower stage to the Silurian system, abounding with new and peculiar species. Traces of life have been detected in the Longmynd beds, beneath Barrande's so-called primordial zone. The presence of phosphatic nodules and bituminous matter in some of the lowest azoic rocks, probably indicates the former existence of life at these periods. But the difficulty of understanding the absence of vast piles of fossiliferous strata, which on my theory no doubt were somewhere accumulated before the Silurian epoch, is very great. If

Darwin (1861) *On the origin of species by means of natural selection, or the preservation of favoured races in the struggle for life*. 3rd edition.

Correspondence

26th June 1859 Darwin letter to Ramsay

Footnote asks about organic remains in the Longmynd Beds.

27th – 30th June 1859 Ramsay replies to Darwin

No doubt about worm burrows. Rocks certainly lower than Barrande's primordial Zone. Also mentions new discovery in Canada

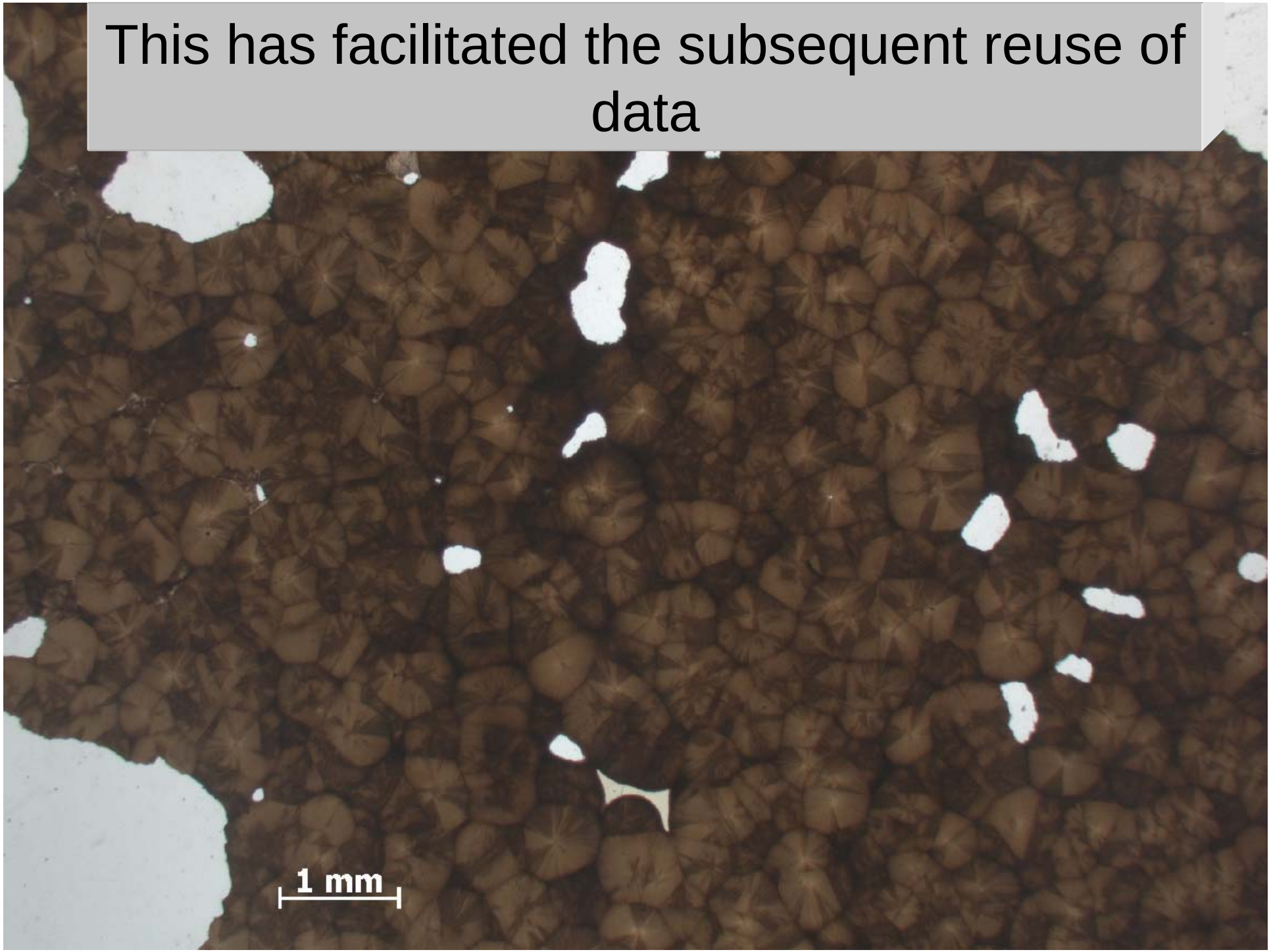
Information from Darwin Correspondence Project

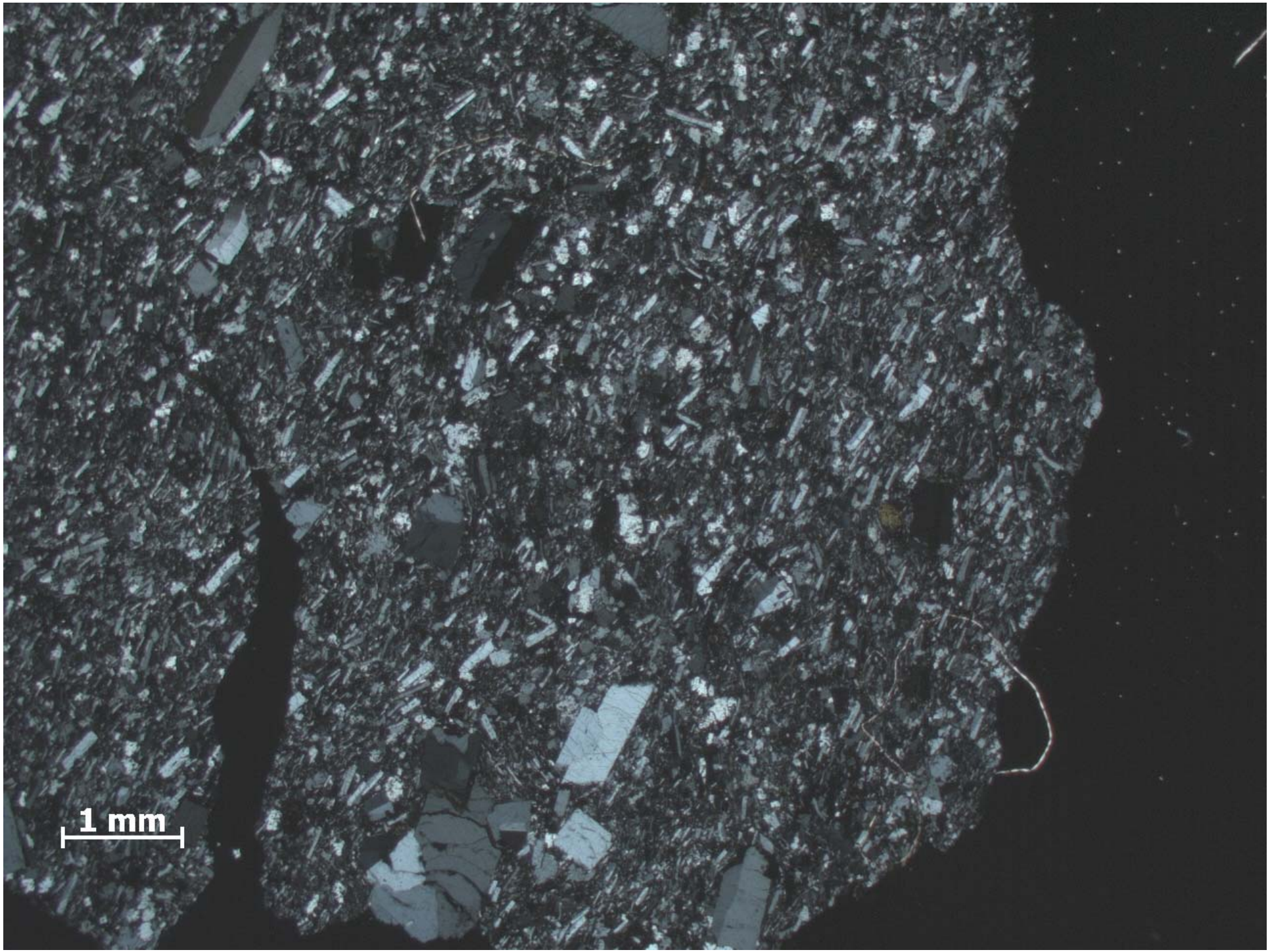
Conclusions

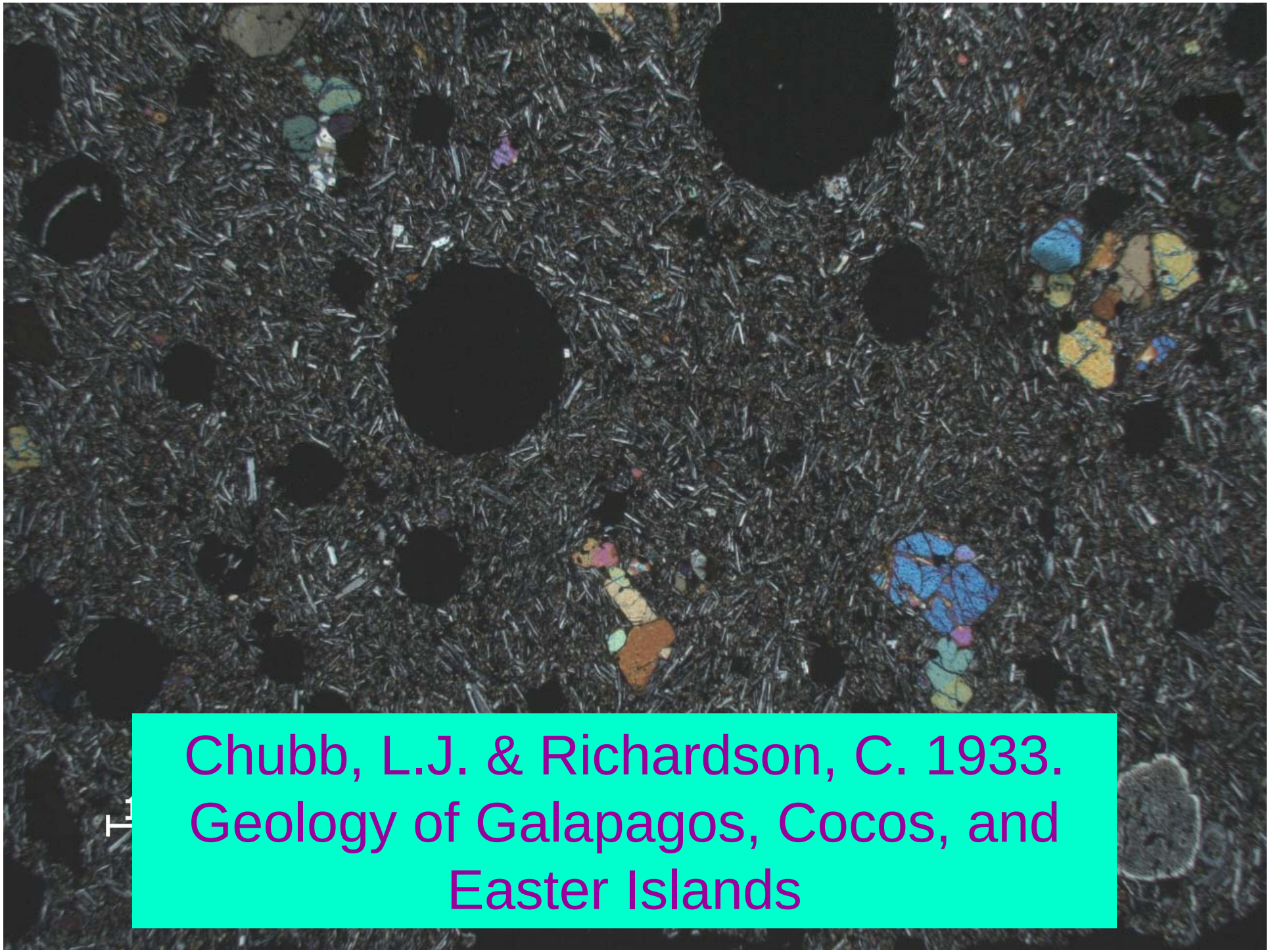
Darwin's Collection Management & Data Management procedures were remarkably advanced and would still have been appropriate 150 years later.

	Geological Survey	Darwin
Field Slips	YES	NO
Sample Numbering	YES	YES
Sample Registers	YES	YES
Field Notebooks	YES	YES
Publications	YES	YES
Archive Data	YES	YES
Reuse of Data	YES	YES

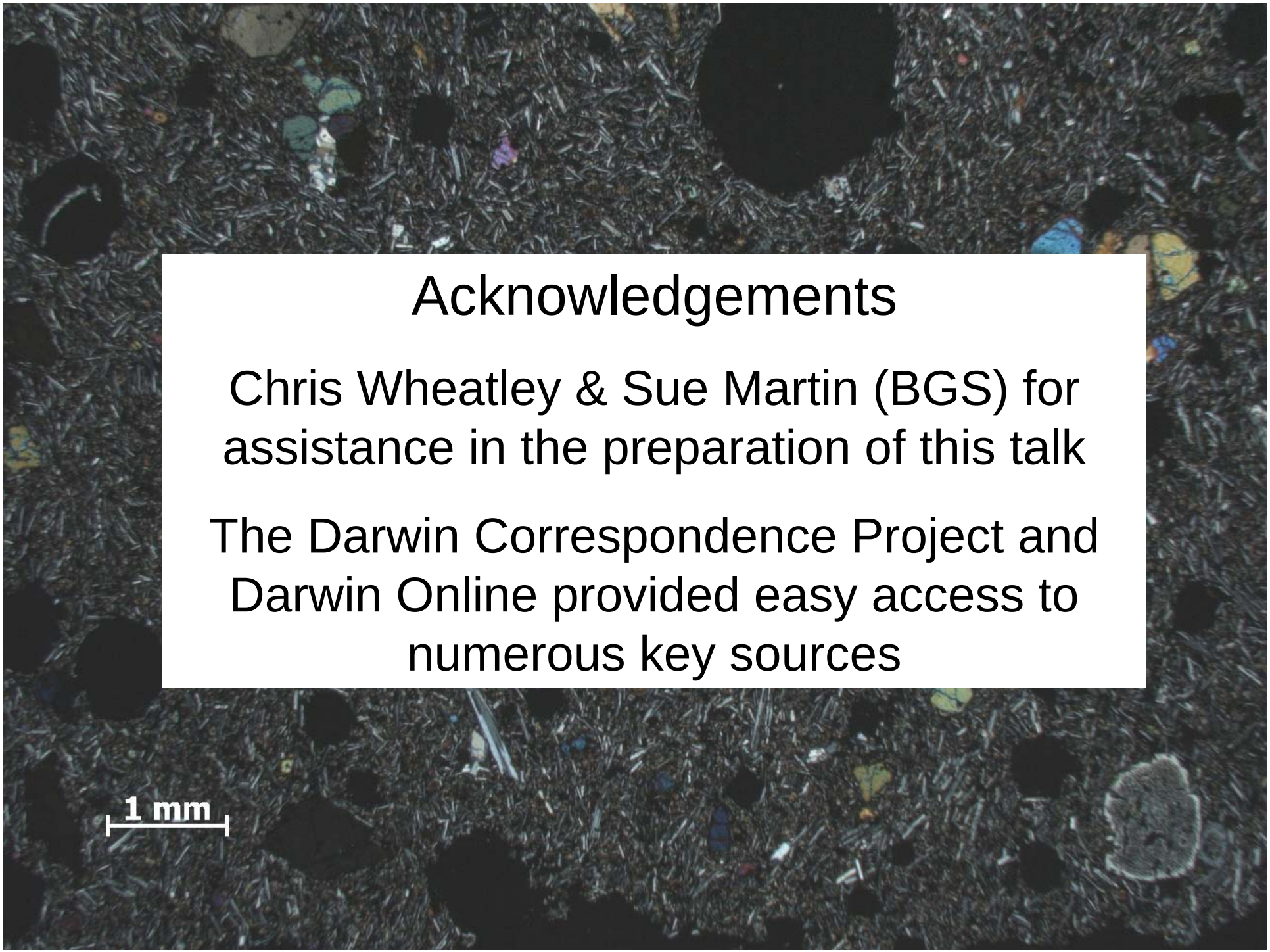
This has facilitated the subsequent reuse of data




1 mm



Chubb, L.J. & Richardson, C. 1933. Geology of Galapagos, Cocos, and Easter Islands



Acknowledgements

Chris Wheatley & Sue Martin (BGS) for assistance in the preparation of this talk

The Darwin Correspondence Project and Darwin Online provided easy access to numerous key sources