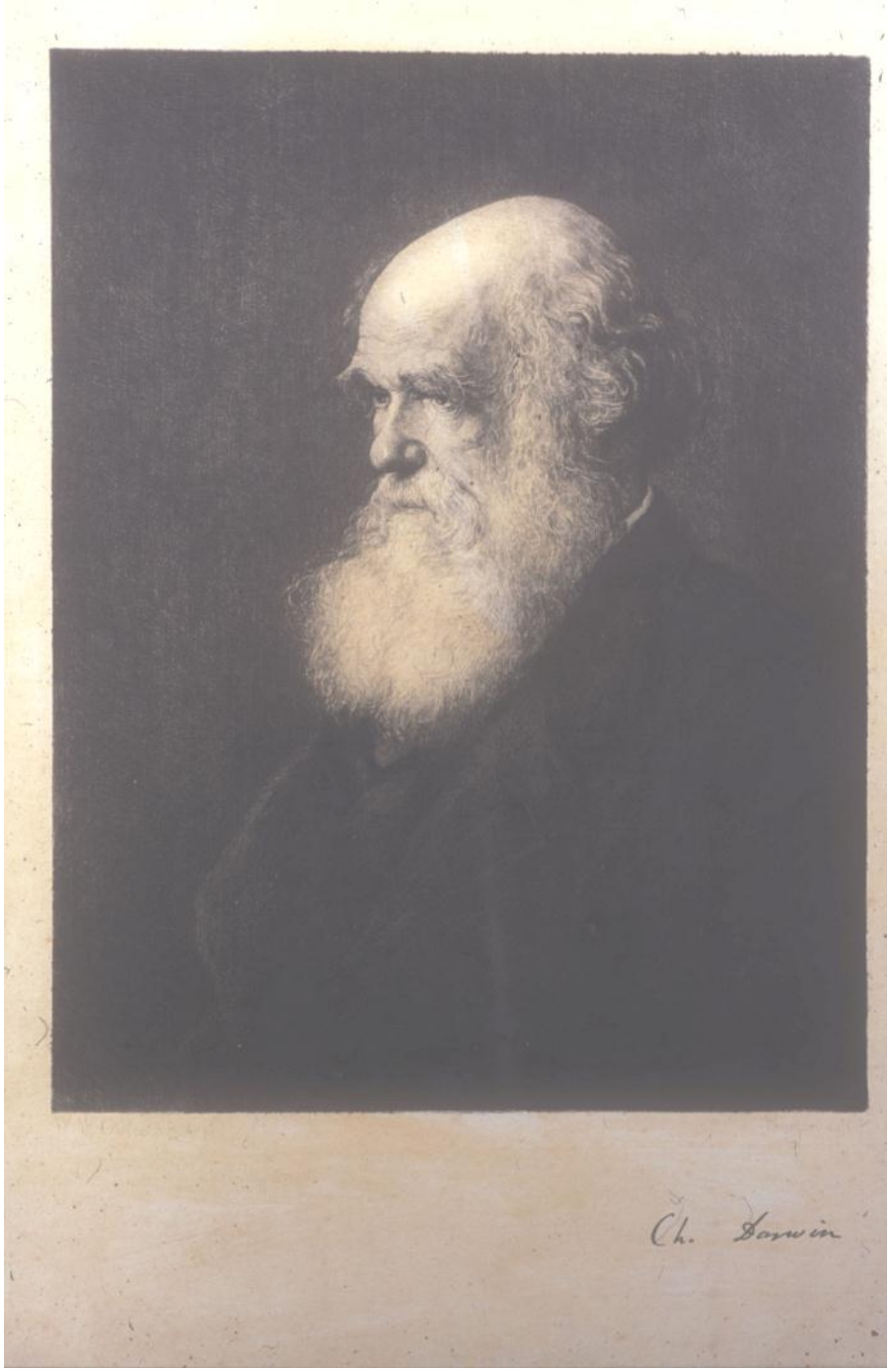
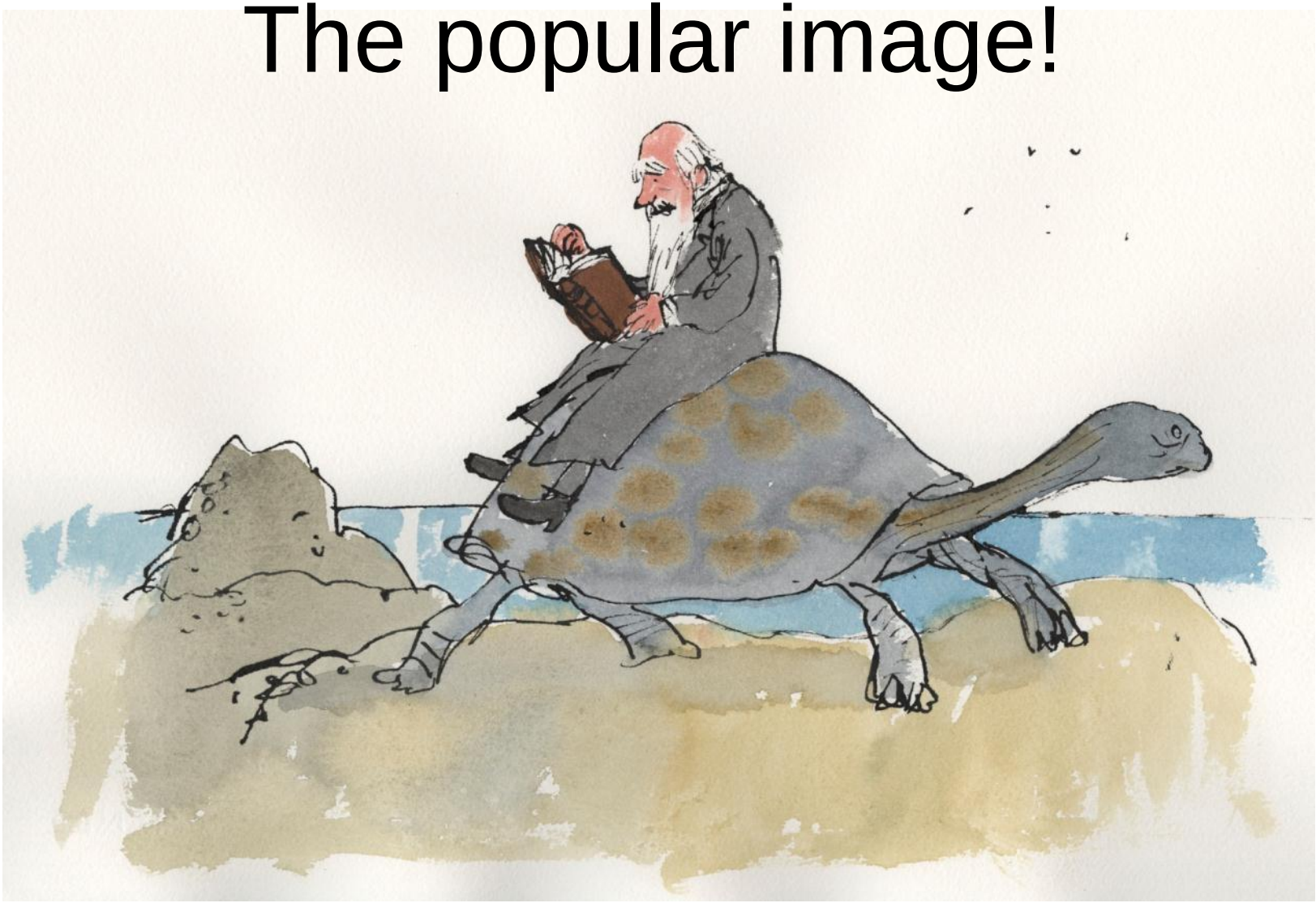
A long way to *The Origin*

John Parker
University of Cambridge



“Souvenir” given by Darwin to his visitors to Down House

The popular image!



HMS Beagle

December 1831-
May 1836

Approaching Isabella, Galapagos

Darwin's finches

"the evolution of a legend"

Thick-billed ground finch

Cactus-spine user finch

Charles Darwin
1809-1882

Christ's College
Cambridge
1828-1831

John Stevens Henslow
1796-1861

John Stevens Henslow

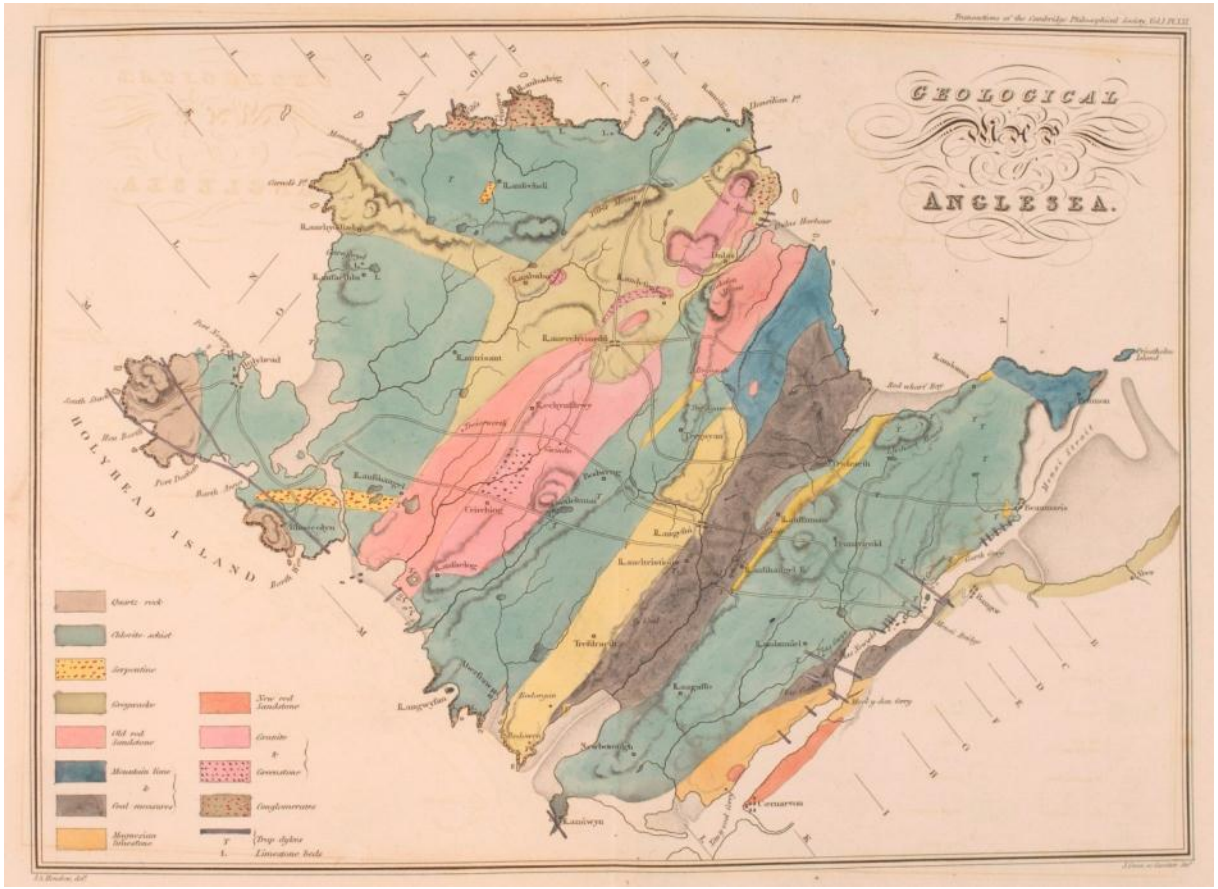
- 1796 Born at Rochester, Kent
- 1814 St John's College, Cambridge
- **1818 Graduated in Mathematics**
- 1818-21 Demonstrator for Professor of Chemistry
- **1823 Elected Professor of Mineralogy**
- **1825 Elected Professor of Botany**

St John’s College
Cambridge

Henslow's early research interests before the age of 25

- Geology of complex regions; field mapping of the Isle of Man
- Mathematics of crystal structures
- Anatomy, morphology and "ecology" of land and marine molluscs
- Marine biology

Geology of Anglesey



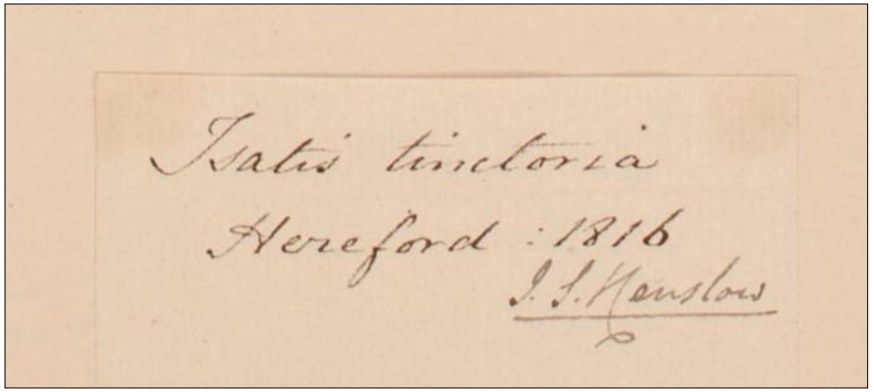
Henslow's paper published 1822

used by Darwin as the template for his study of the geology of the Falkland Islands

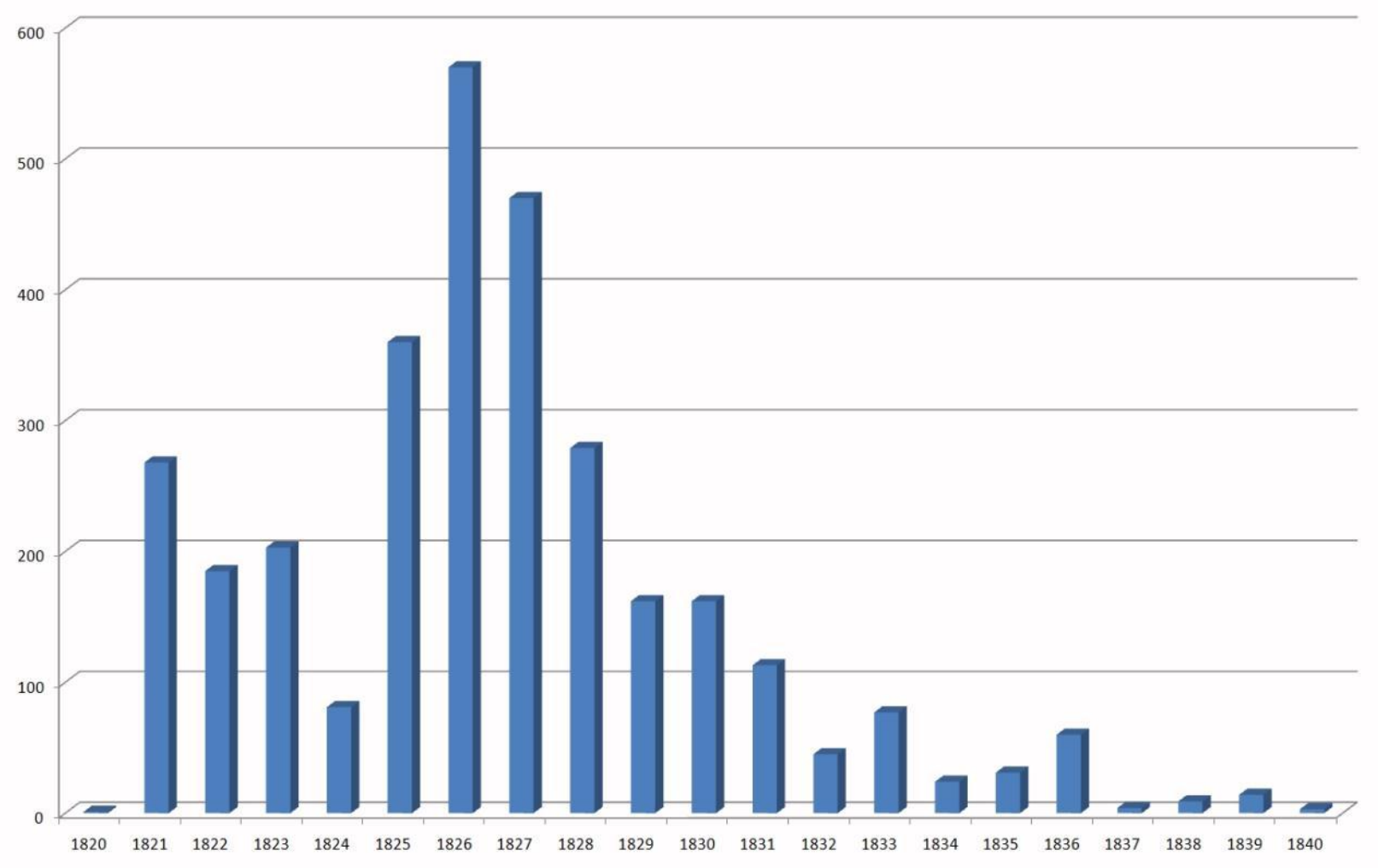
Drawing for a paper on molluscan anatomy 1818

Henslow's developing passion for plants

Henslow's oldest plant specimen, collected while an undergraduate aged 20



Growth of Henslow's own British Herbarium of 7000 specimens 1821-1840



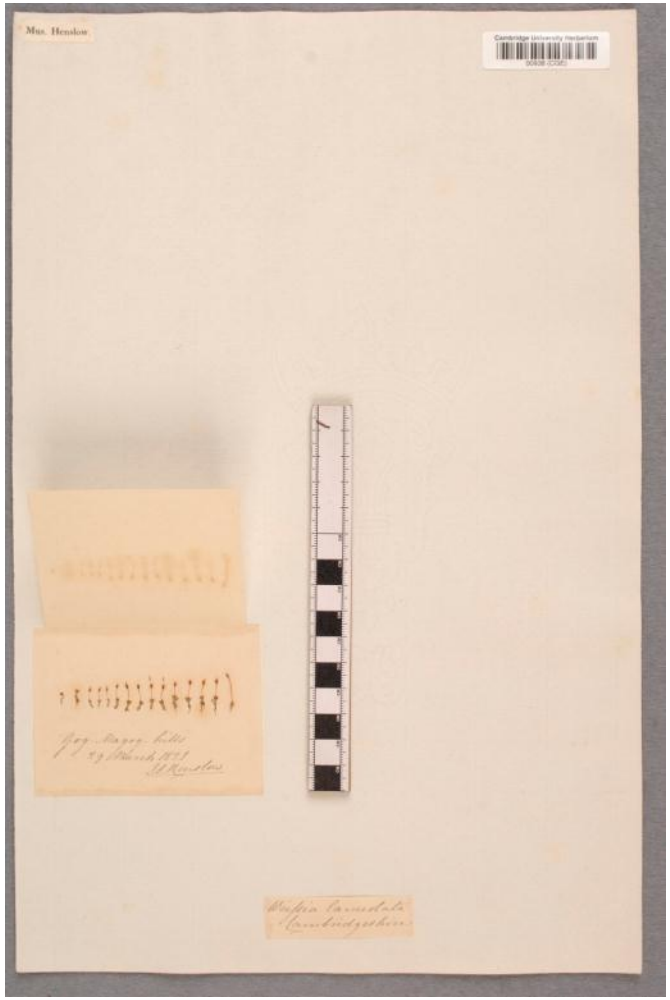
The growth of a scientific network: the distribution of all collections in Henslow's British herbarium of **15,000** specimens

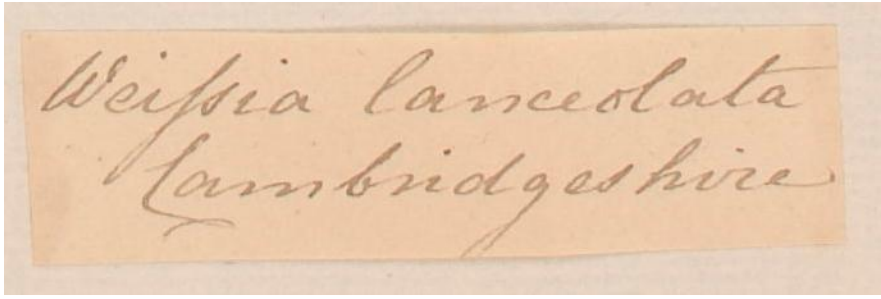
Why collect all these specimens?

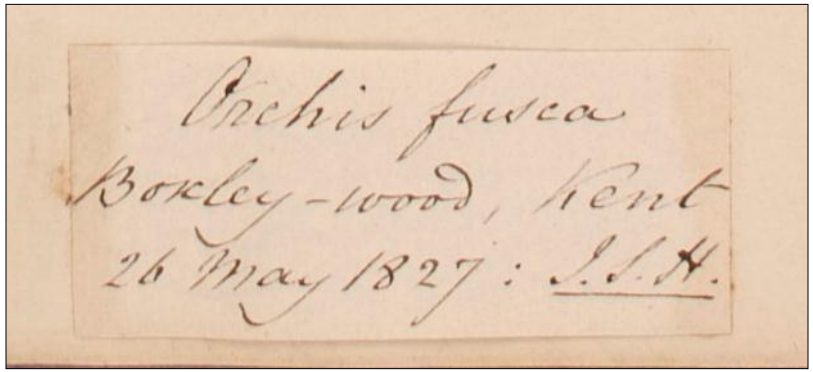
NOT for taxonomy**!**

“for **Physiological Botany**.. of interest..owing to (the) numerous and striking phenomena to explain”

An obsession with variation begins: March 1821



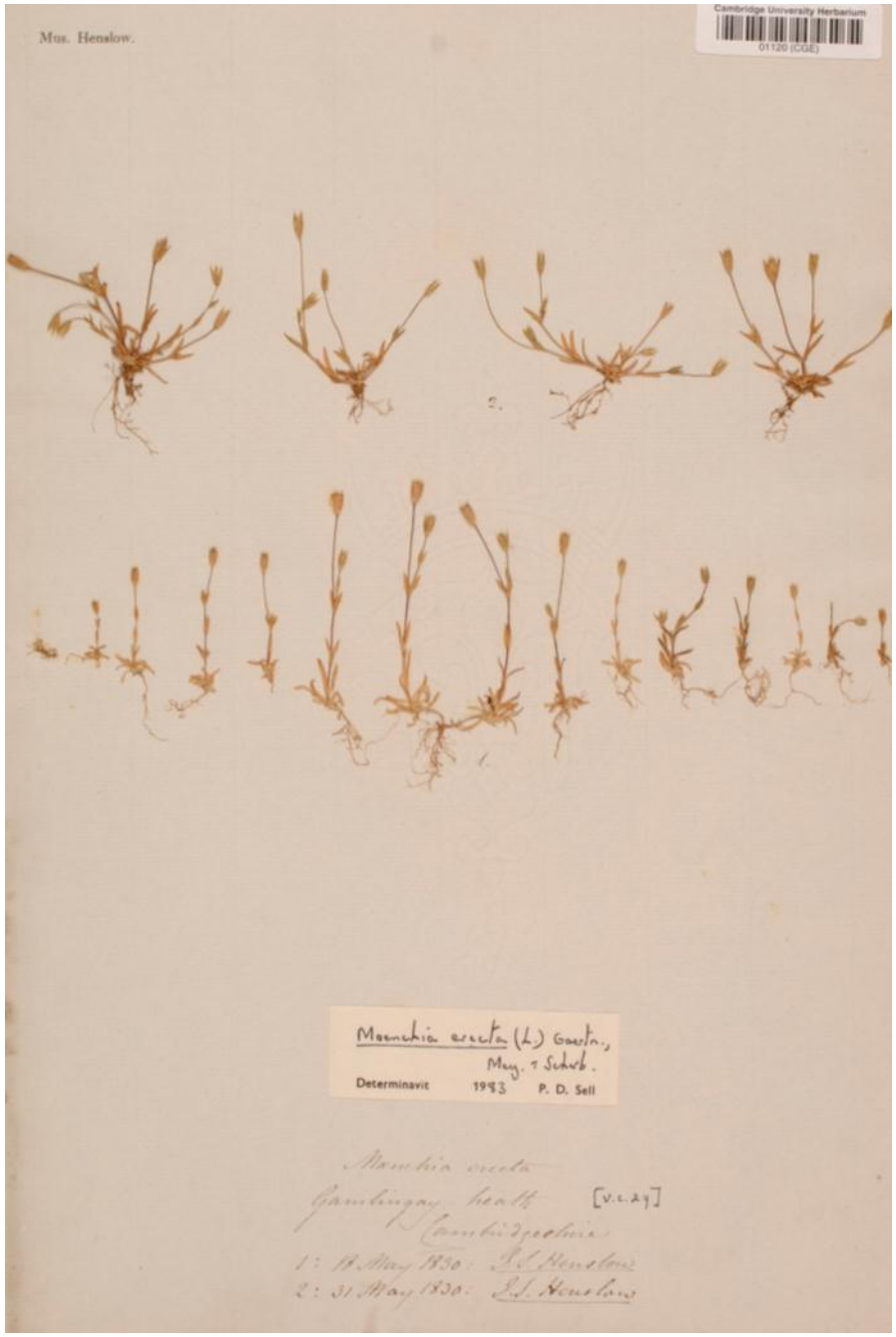




Population sampling for variation

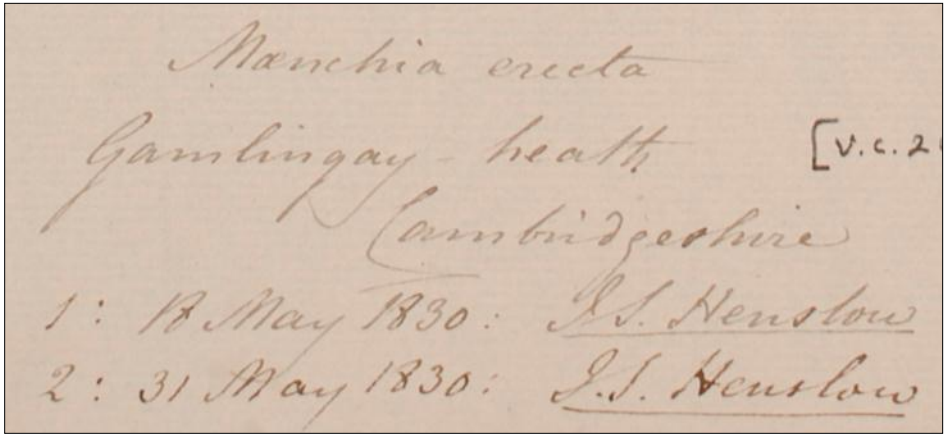
“**Collation**”:
a unique method of displaying patterns of variation

here combining plants from William Wilson in Lancashire with his own from Suffolk



Collecting for variation:

Henslow and his students on field trips to Gamlingay, May 1830



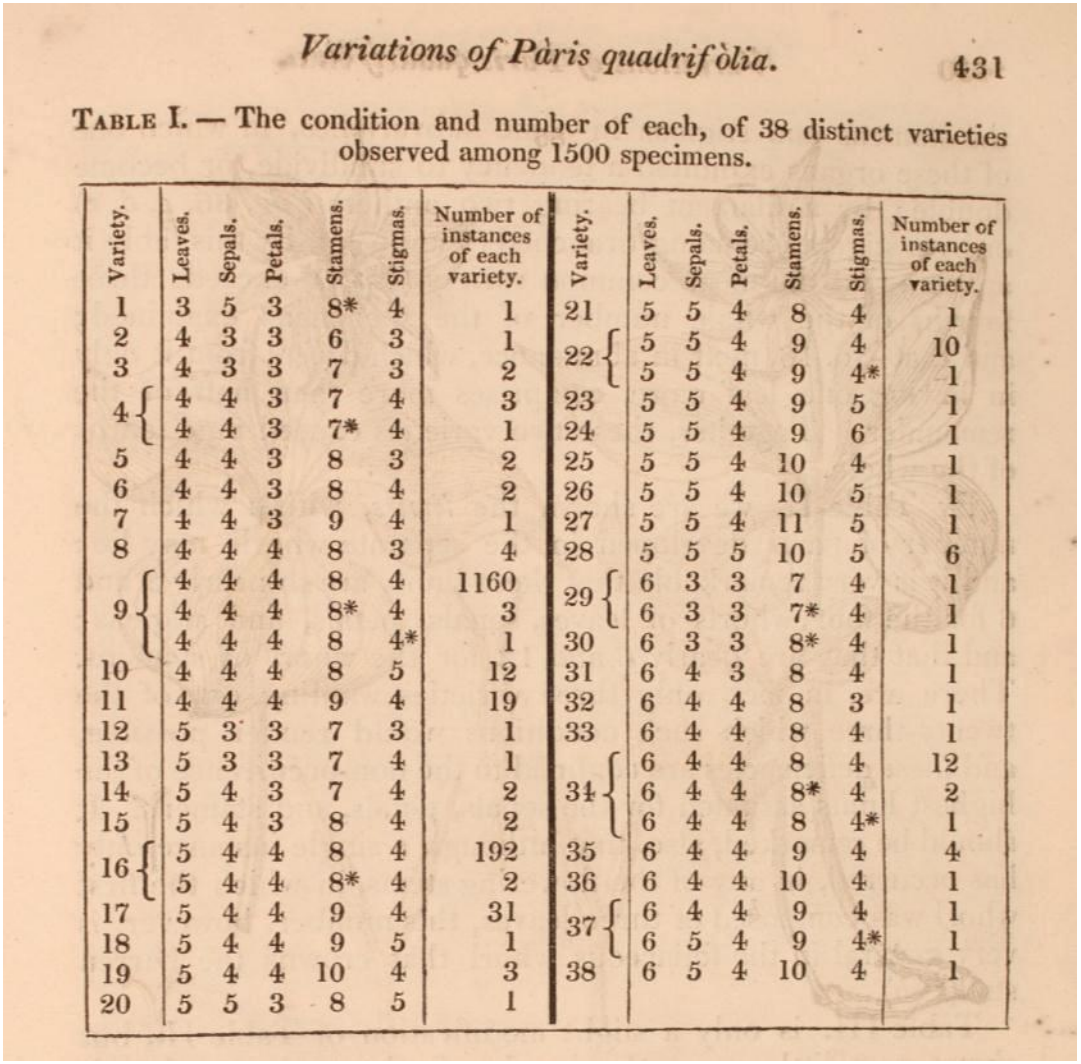
Pinus nigra subspecies
showing extremes of variation,
Cambridge University Botanic Garden

***Paris quadrifolia**:* numbers of parts too

Meristic variation

variation of leaf and flower part numbers in *Paris quadrifolia*

The first population study: 1500 plants sampled over three years



Variations of Pàris quadrifòlia. 431

TABLE I. — The condition and number of each, of 38 distinct varieties observed among 1500 specimens.

Variety.	Leaves.	Sepals.	Petals.	Stamens.	Stigmas.	Number of instances of each variety.
1	3	5	3	8*	4	1
2	4	3	3	6	3	1
3	4	3	3	7	3	2
4	4	4	3	7	4	3
	4	4	3	7*	4	1
5	4	4	3	8	3	2
6	4	4	3	8	4	2
7	4	4	3	9	4	1
8	4	4	4	8	3	4
9	4	4	4	8	4	1160
	4	4	4	8*	4	3
	4	4	4	8	4*	1
10	4	4	4	8	5	12
11	4	4	4	9	4	19
12	5	3	3	7	3	1
13	5	3	3	7	4	1
14	5	4	3	7	4	2
15	5	4	3	8	4	2
16	5	4	4	8	4	192
	5	4	4	8*	4	2
17	5	4	4	9	4	31
18	5	4	4	9	5	1
19	5	4	4	10	4	3
20	5	5	3	8	5	1
21	5	5	4	8	4	1
22	5	5	4	9	4	10
	5	5	4	9	4*	1
23	5	5	4	9	5	1
24	5	5	4	9	6	1
25	5	5	4	10	4	1
26	5	5	4	10	5	1
27	5	5	4	11	5	1
28	5	5	5	10	5	6
29	6	3	3	7	4	1
	6	3	3	7*	4	1
30	6	3	3	8*	4	1
31	6	4	3	8	4	1
32	6	4	4	8	3	1
33	6	4	4	8	4	1
34	6	4	4	8	4	12
	6	4	4	8*	4	2
	6	4	4	8	4*	1
35	6	4	4	9	4	4
36	6	4	4	10	4	1
37	6	4	4	9	4	1
	6	5	4	9	4*	1
38	6	5	4	10	4	1

Published 1832

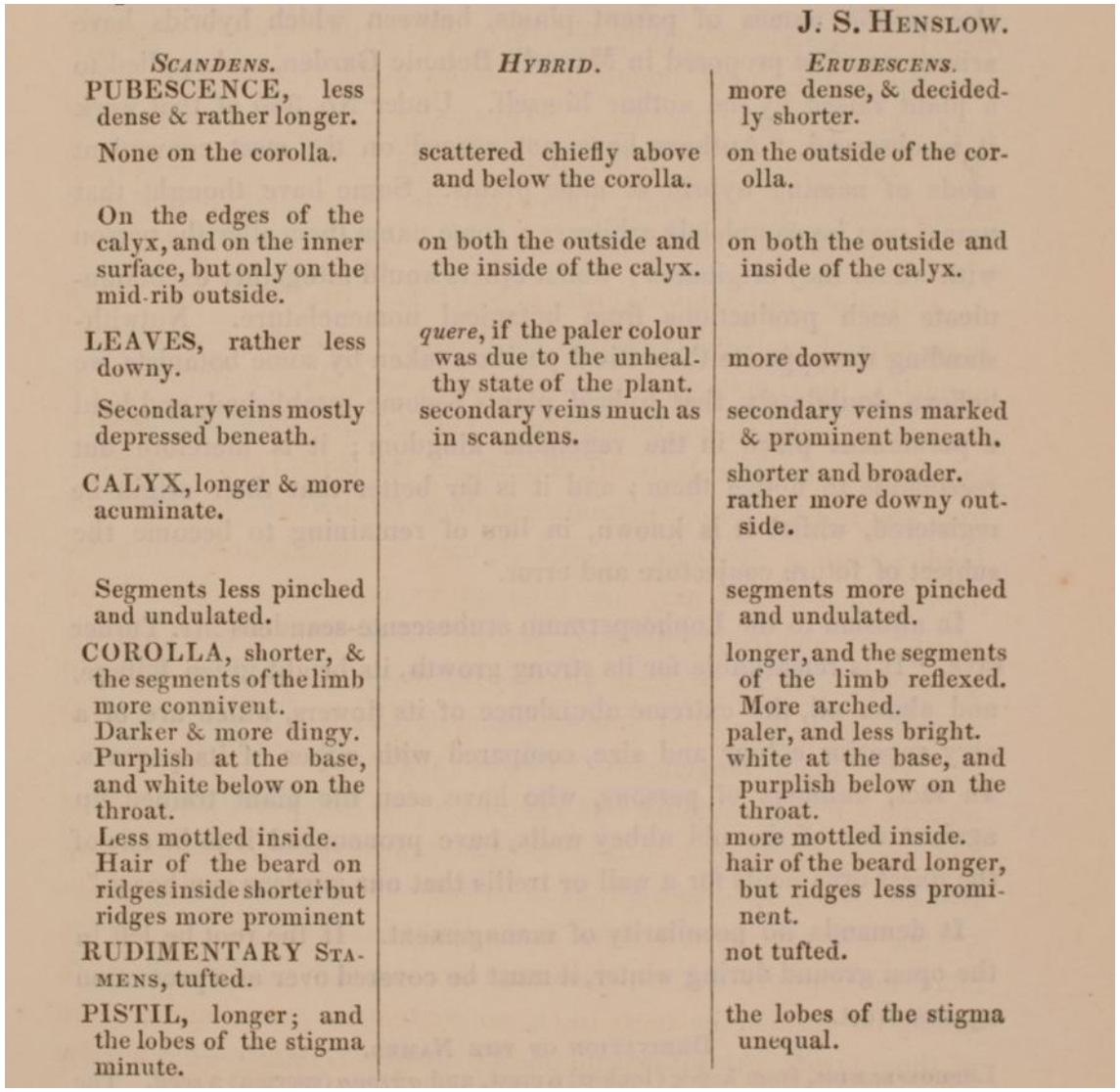
Magazine of Natural History

Monstrosity: the key to plant development

note also size variation between fronds and "collation"

Hybridisation Species Limits and Heredity

Lophospermum erubescens x scandens



J. S. HENSLOW.

Scandens.	*Hybrid.*	*Erubescens.*
PUBESCENCE, less dense & rather longer.		more dense, & decidedly shorter.
None on the corolla.	scattered chiefly above and below the corolla.	on the outside of the corolla.
On the edges of the calyx, and on the inner surface, but only on the mid-rib outside.	on both the outside and the inside of the calyx.	on both the outside and inside of the calyx.
LEAVES, rather less downy.	*quere*, if the paler colour was due to the unhealthy state of the plant.	more downy
Secondary veins mostly depressed beneath.	secondary veins much as in scandens.	secondary veins marked & prominent beneath.
CALYX, longer & more acuminate.		shorter and broader. rather more downy outside.
Segments less pinched and undulated.		segments more pinched and undulated.
COROLLA, shorter, & the segments of the limb more connivent. Darker & more dingy. Purplish at the base, and white below on the throat. Less mottled inside. Hair of the beard on ridges inside shorter but ridges more prominent		longer, and the segments of the limb reflexed. More arched. paler, and less bright. white at the base, and purplish below on the throat. more mottled inside. hair of the beard longer, but ridges less prominent.
RUDIMENTARY STAMENS, tufted.		not tufted.
PISTIL, longer; and the lobes of the stigma minute.		the lobes of the stigma unequal.

How to establish the laws of heredity

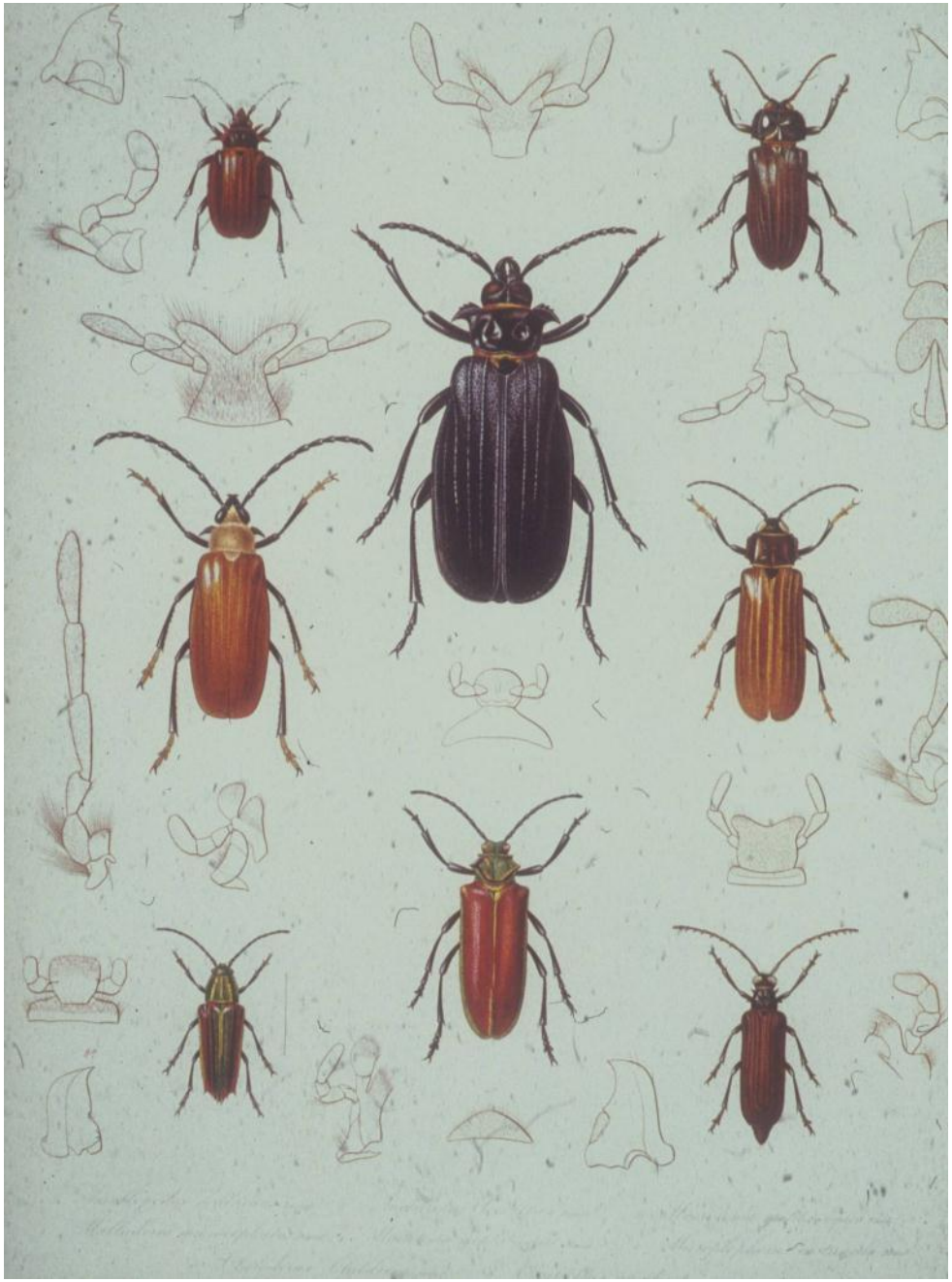
"accumulate data on 100 such comparisons…"

Henslow's botanical research programme1821-1835

- Patterns of variation in nature and the definition of **species *limits*** by population sampling
- **Monstrosities** and the "laws of development"
- **Hybridisation** and the "biological species concept"

Darwin:
the failed medic at Edinburgh 1825-1827

Christ's College
Cambridge



An obsession with beetles: as his contemporaries saw him

Darwin and Cambridge 1828-1837

- 1828 Entered Christ's College, Cambridge, to read for an ordinary degree to qualify for entry into the **Church of England**

- **1829 Attended Henslow's botany course**
- **1830 Attended Henslow's course a second time**
- **1831 Attended Henslow's course a third time**

- **1829 – 1831 "The man who walks with Henslow"**

- Early 1831 Darwin begins arrangements for a visit to the **Canary Islands** with Henslow
- August 1831 Henslow recommends Darwin for ***HMS Beagle*** voyage

- 1832-6 All ***Beagle*** collections sent to Henslow

- 1835 **Henslow** reads Darwin's letters to the **Philosophical Society**

- 1836-7 Working with Henslow at Cambridge on ***Beagle*** specimens

Darwin and Cambridge 1828-1831

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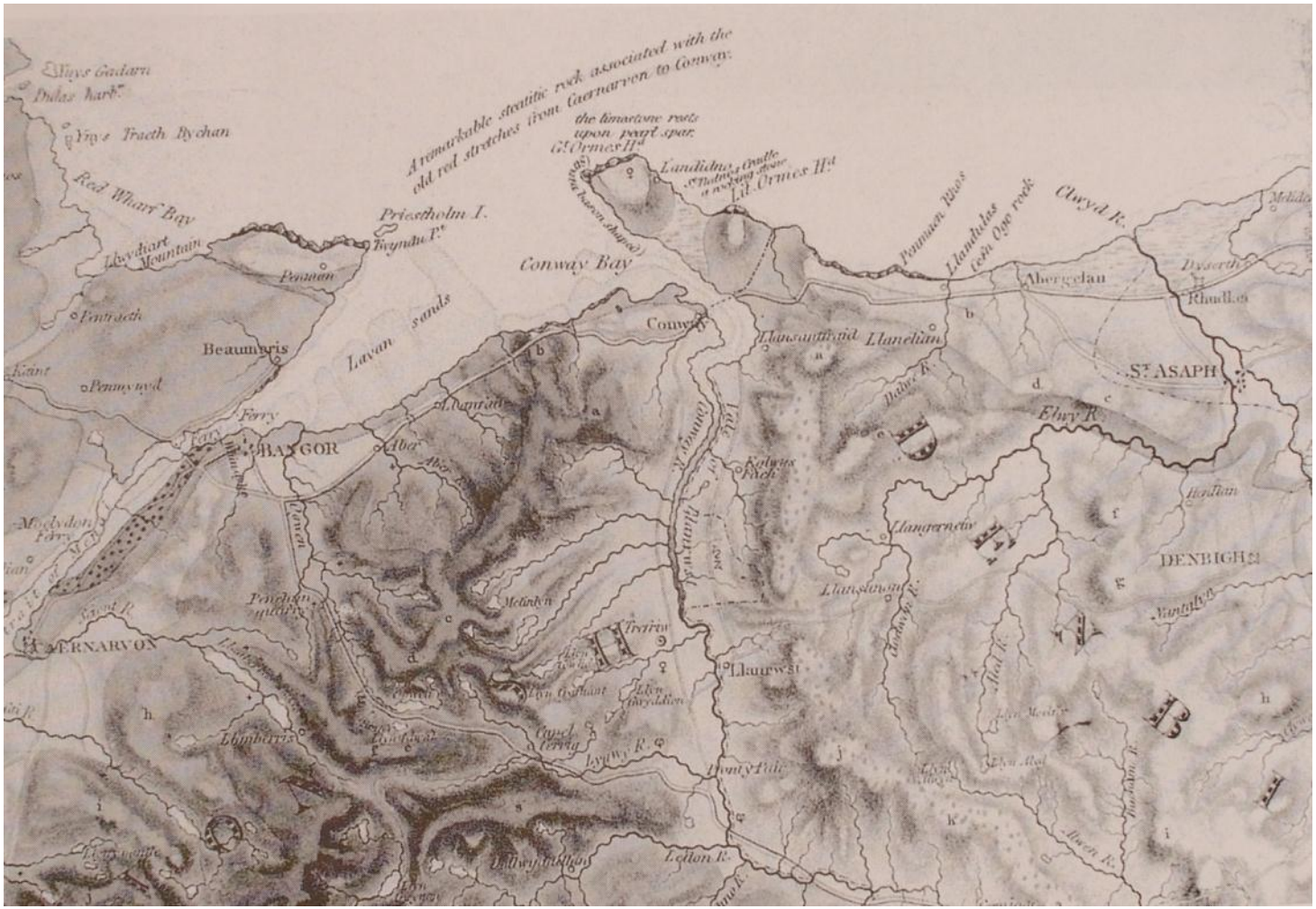
- **1829 – 1831 "The man who walks with Henslow"**

Adam Sedgwick
1785-1873

Professor of Geology
1818-1873

at the age of 47
in 1833

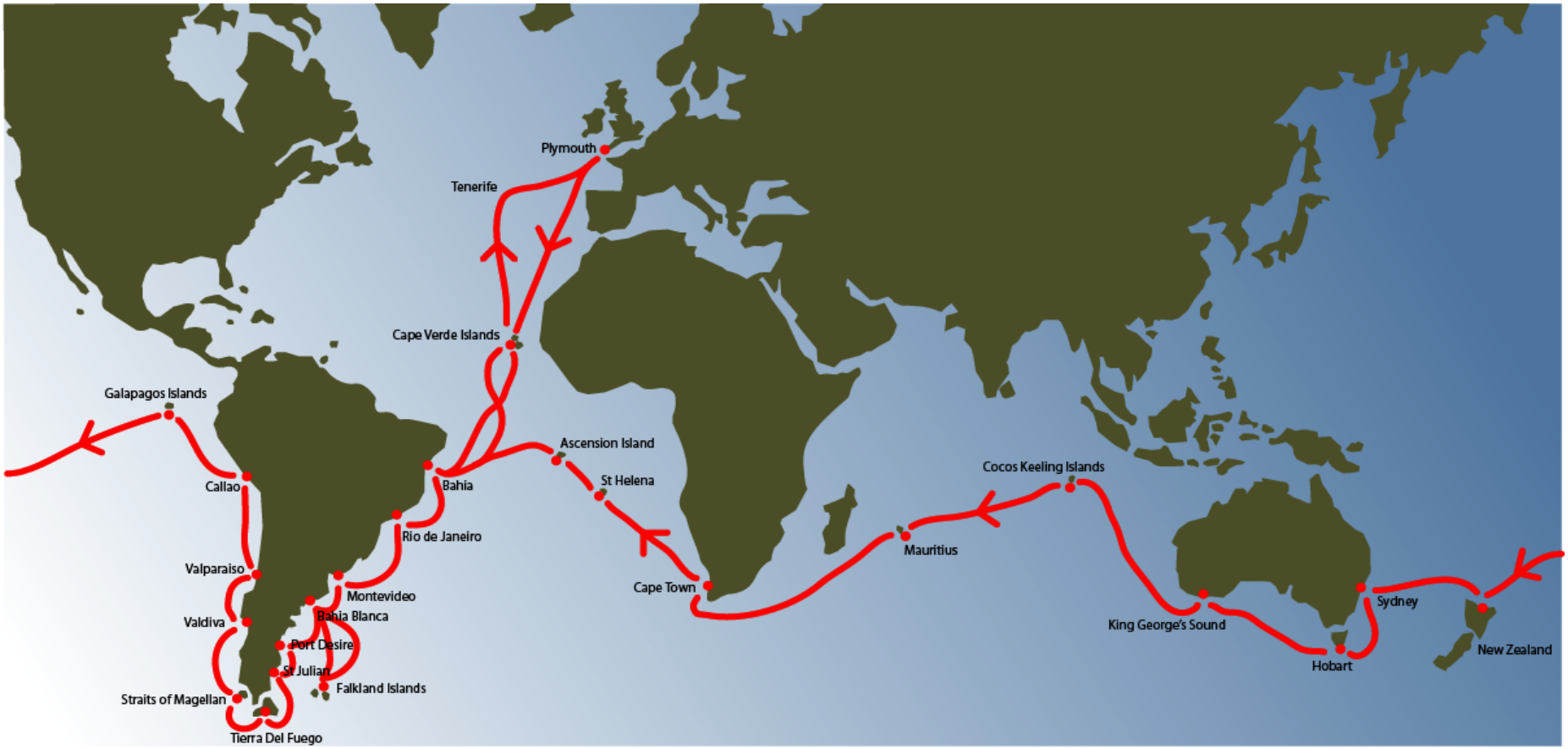
August 1831 Henslow arranges Darwin's trip with Sedgwick to North Wales to study hard-rock geology



Darwin's oldest specimen:

Matthiola sinuata collected for Henslow in Barmouth, Wales, August 1831, after his geological trip

Henslow recommends Darwin for the "*Beagle*" voyage August, 1831



February 2, 1832

"There is perhaps no question in botany which, at this moment, is more desirable on a sure basis of experiment than the law which limits the **variation of species**."

Magazine of Natural History: **J. S. Henslow**

Galium chilense

32 plants sampled from a **single population** on the Chonos Peninsula, Patagonia,1834

Population sampling for variation in plant size

Vulpia tenella from Bahia Blanca, October 1832

Viola magellanica

one of several genera from Europe also found by Darwin in South America

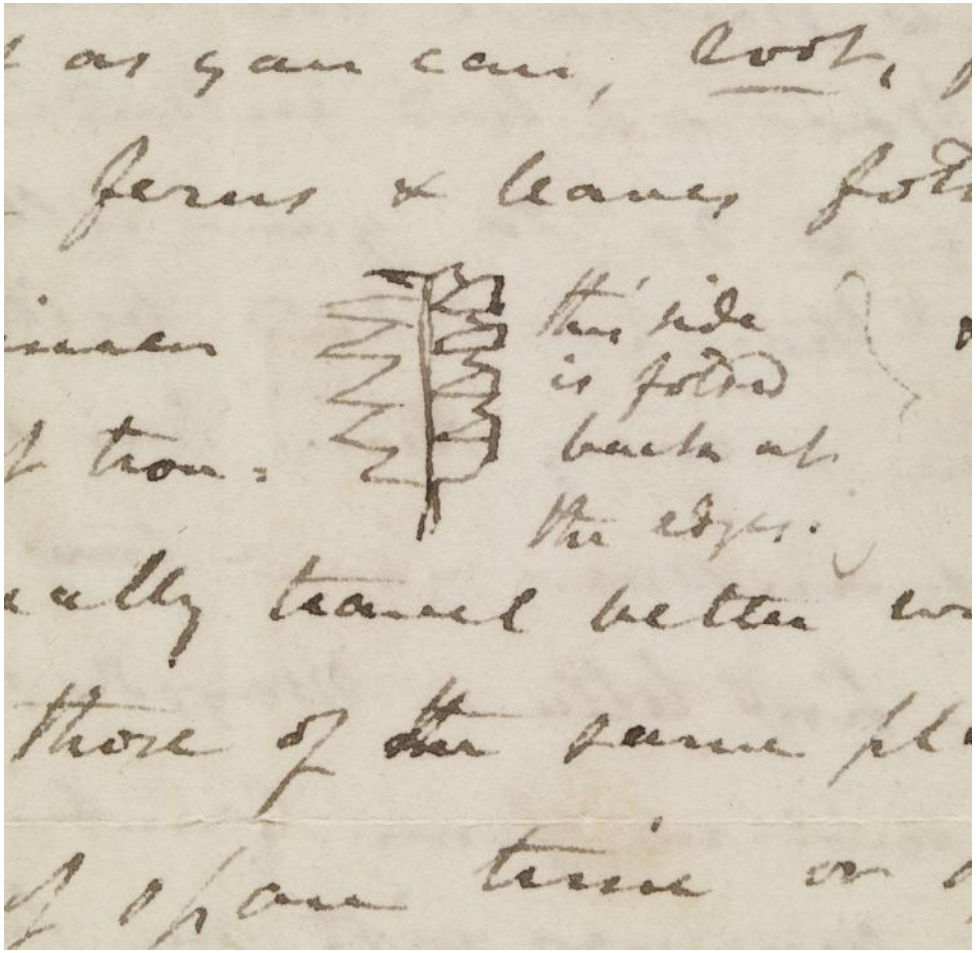
Size variation in a population from the "south of **Tierra del Fuego** 1834"

Variation of European ***Erodium moschatum*** from the streets of Valparaiso.

"Do plants moved to other climes develop differences in response to change of location?"
J. S. Henslow

A **Henslow** fern collection with folded pinnae: displaying both sides of the leaf

Continuing teaching by letter! January 1833



JSH to C. Darwin “ *HMS Beagle*. Somewhere in the South Atlantic”

"fold over the pinnae"

Henslow letter to Darwin

January 1833

Pleopeltis

James Island, Galapagos

October 1835

“monstrous” form of *Pleopeltis* frond

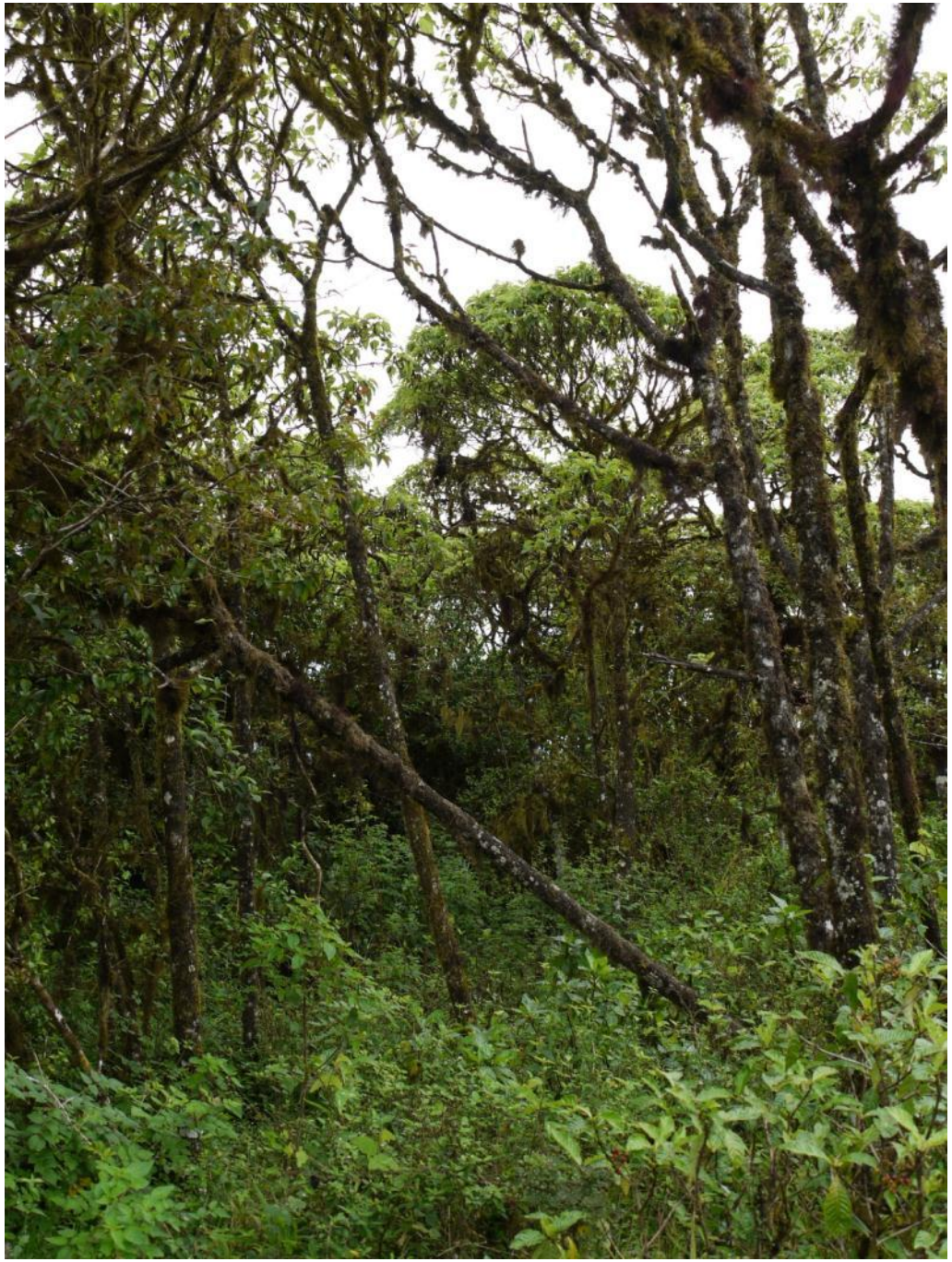
James Island
Galapagos
October 1835

The “imps of darkness”

Even the marine iguanas vary between islands

Lava cactus, endemic to Isabella and Fernandina

Darwin collected 5 distinct species of the genus *Scalesia, Asteraceae*



“Tree daisies” on Santa Maria island

The “Thecla”, the Galapagos mocking birds *Nesomimus*

Secretary,
Cambridge Philosophical Society
1821-1839

6 November 1835

"Extracts were read of letters from **C. Darwin**, **Esq**., of Christ's College containing accounts of the Geology of certain parts of the Andes and South America. Observations by **Prof. Sedgwick** and **Henslow**"

FOR PRIVATE DISTRIBUTION.

THE following pages contain Extracts from LETTERS addressed to Professor HENSLOW by C. DARWIN, Esq. They are printed for distribution among the Members of the Cambridge Philosophical Society, in consequence of the interest which has been excited by some of the Geological notices which they contain, and which were read at a Meeting of the Society on the 16th of November 1835.

The opinions here expressed must be viewed in no other light than as the first thoughts which occur to a traveller respecting what he sees, before he has had time to collate his Notes, and examine his Collections, with the attention necessary for scientific accuracy.

CAMBRIDGE,
Dec. 1, 1835.

Darwin's letters edited and printed for the *Society* in 1835 by **John Henslow**

And the impact of the ***Cambridge Philosophical Society*** reading?

Darwin left Cambridge virtually unknown but returned a **celebrated traveller and respected geologist**

Henslow's research interests expressed in "On the

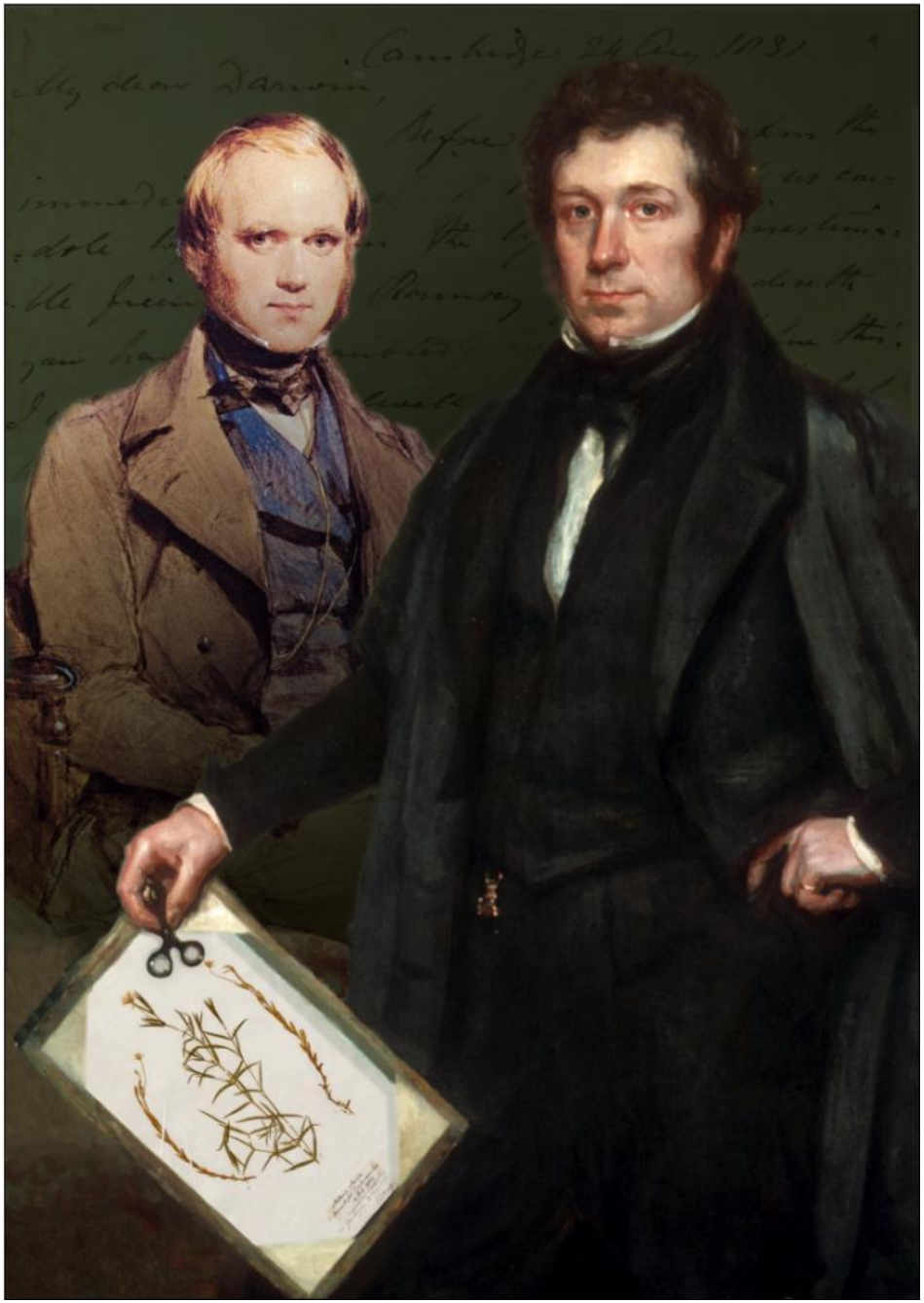
Origin of Species"

1859

Chapter 1: **Variation** under Domestication
Chapter 2: **Variation** under Nature
Chapter 5: **Laws of Variation**
Chapter 8: **Hybridism**
Chapter 11**: Geographical Distribution**
Chapter 12: **Geographical Distribution**
Chapter 13: Mutual affinities; morphology; embryology ***(monstrosities*****)**

John Henslow

"Darwin's mentor"



“Nothing seemed to give him so much enjoyment as drawing conclusions from minute observations. But his admirable memoir on the geology of Anglesea shows his capacity for extended observations and broad views”.

C. Darwin, 1861

"without **Henslow**, there would have been no **Darwin**"

Robert Gunther, 1921

Founder, History of Science Museum, Oxford University

Collaborators in **Henslow** Research Programme Cambridge, Dundee and New York

- Christine Bartram Digitising & Databasing
- David Kohn History of Science
- Gina Murrell Herbarium Taxonomy
- Mark Whitehorn Database Design
- John Parker Evolutionary Genetics

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Darwin's Plants from the Beagle Voyage

Here you can see high resolution images of the very plants collected by Charles Darwin on his round-the-world voyage on HMS Beagle 1831 to 1836

See the plants Darwin gathered. Find out how and where he made his collections.

These plants helped Darwin develop his ideas on evolution which are now pivotal to modern science. The original plants are held in the Herbarium at Cambridge University.

Home
About this Project
Using the Website
About the Herbarium
Darwin's Plants
About the Voyage
About Darwin
About Henslow

What is a Herbarium Sheet?

Web Links

Darwin Manuscripts Project
Darwin Correspondence Online
A Walk in Henslow's Garden
Cambridge University Dept. of Plant Sciences
Biodiversity Library

Plant Search

View All
View top 24

Detailed Plant Search

Family | Genus | Species
Location | Year | Month

My Collection

View collection

Places on the Voyage

Abrolhos
Archipiélago de Colón (Galapagos)
Archipiélago de los Chonos
Bahia Blanca
Cabo Tres Montes
Chiloé
Falkland Islands
Fernando Noronha
Floreana (Galapagos)
Ilhas do Cabo Verde
Isla Isabela (Galapagos)
Isla San Salvador (Galapagos)
Keeling Islands
Puerto Deseado
Puerto San Julián
Rio de Janeiro
S. America
Salvador
San Cristóbal (Galapagos)
Santa Cruz
Straits of Magellan
Tierra del Fuego
Valparaiso

Charles Darwin as a young man

Darwin was recommended for the *Beagle* voyage by his botany professor and friend John Henslow from Cambridge University. Henslow played another crucial role in ensuring the success of the world-trip by receiving and caring for the huge numbers of plants, animals, rocks and fossils which Darwin collected over the next five years. The samples were dispatched home by Darwin in large trunks, which Henslow carefully unpacked.

The plants were prepared by Henslow as herbarium sheets since they were a gift to himself from Darwin. Henslow distributed the rest of this splendid scientific collection amongst his colleagues. The plants now make up a unique scientific and historic element in the University Herbarium at Cambridge. Altogether, there are about 2,700 plants from the voyage, and Henslow arranged them on about 950 herbarium sheets. You can look at images of all of them here.

Small numbers of Darwin's plant specimens are also in other herbaria, most notably Kew. Some Darwin specimens are still incorporated in the main collections of other herbaria around the world.

Map of the Voyage of the Beagle

HMS Beagle in Tierra del Fuego

Department of Plant Sciences

Microsoft Research