



NMM
PAI0470

PRECISION EXPLORATION

MATHEMATICAL PRACTICE & 18TH-CENTURY
BRITISH VOYAGES OF SCIENTIFIC EXPLORATION

Dr Rebekah Higgitt, University of Kent
@beckyfh

CAPTAIN EDMOND HALLEY



An East Indiaman off Saint Helena, by Thomas Luny, 18thC (NMM: BHC3519)

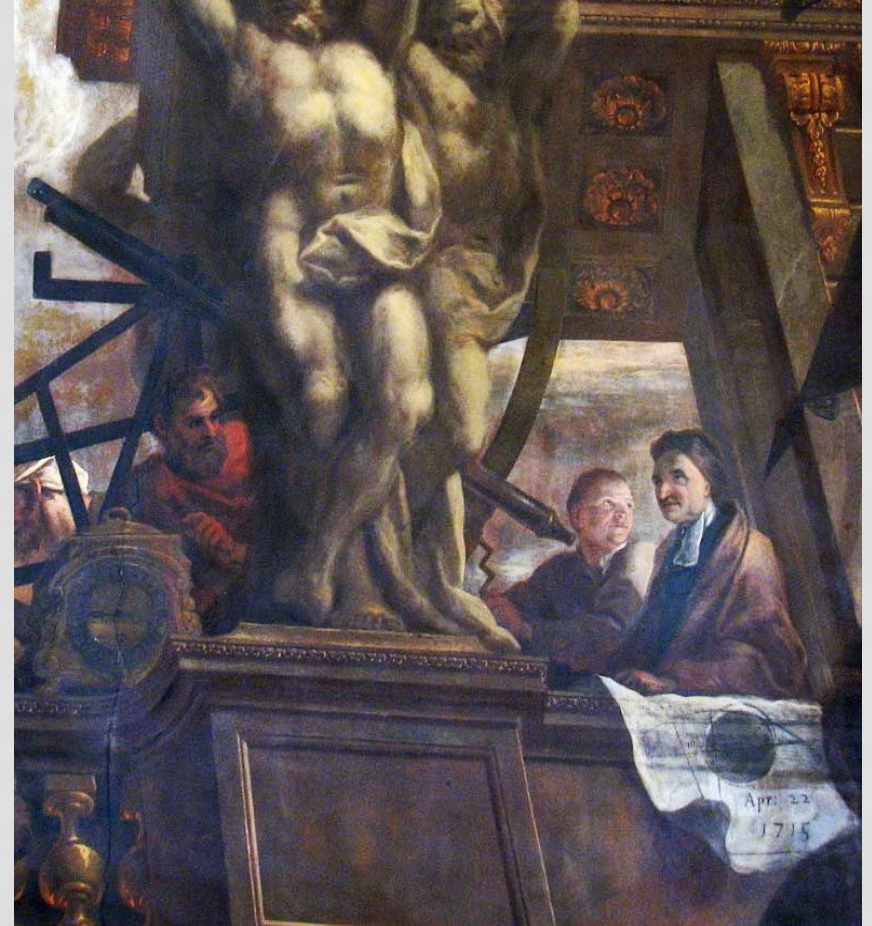


Edmond Halley, by Godfrey Kneller, before 1720 (NMM: BHC2734)

ROYAL OBSERVATORY, GREENWICH



Royal Observatory, Greenwich, c.1700
Jan Griffier (NMM: BHC1817)



John Flamsteed, with Thomas Weston,
Painted Hall, Greenwich Hospital

JAMES HODGSON



Royal Mathematical School, by J. Taylor after Samuel Wale (LMA)



James Hodgson, by G. White after Thomas Gibson (Wellcome Collection)

A SYSTEM OF THE MATHEMATICS

“...let every one of His Majesty’s Ships of War be provided with a good *Telescope*, a small *Quadrant*, and a good *Time-keeper*, and let the Teacher of *Mathematicks* appointed for that Ship, be obliged in every Port he comes into, to make all the Observations that happen during the time of his stay there; and let him be obliged at his return home, to bring them to the *Royal Society*, or to any Person or Set of Men whom the Government shall think fit to appoint for this Purpose, who should be obliged from time to time, to make such Corrections in the Charts, as those Helps should afford them....”

TRANSIT OF VENUS, 1761



Shipping off Saint Helena, by Adam Callander, c. 1785 (NMM BHC1826)



Nevil Maskelyne by John Russell, c. 1776 (NMM ZBA4305)

PUBLISHING LONGITUDE, 1763

A PRACTICAL METHOD

FOR FINDING THE
Longitude and Latitude of a Ship at Sea,

By Observations of the Moon;

With GENERAL RULES for computing the same,

Illustrated by EXAMPLES.

Together with all the necessary TABLES, and their Explanations.

To which are added,

TABLES of the Time the MOON passes the Meridian of
LONDON, and her Declination, for the Years 1763 and 1764.

With EXAMPLES of their Uses in finding the Latitude and Variation.

By ROBERT WADDINGTON,

Teacher of the Mathematics, in Three Tun Court, Miles's Lane, near the
Monument, LONDON.

L O N D O N :

Printed by W. RICHARDSON and S. CLARK, for the AUTHOR:
And Sold by Messrs. MOUNT and PAGE, on Tower Hill; and J. NOURSE,
Bookfeller, in the Strand.

M DCC LXIII.

[Price Three Shillings stitched in Blue.]

THE British MARINER'S GUIDE.

CONTAINING,

Complete and Easy Instructions

FOR THE

Discovery of the LONGITUDE at Sea and
Land, within a Degree, by Observations of
the Distance of the Moon from the Sun and
Stars, taken with HADLEY'S Quadrant.

To which are added,

An APPENDIX, containing a Variety of interesting
Rules and Directions, tending to the Improvement of
Practical Navigation in general.

And a Set of correct

ASTRONOMICAL TABLES.

By NEVIL MASKELYNE, A.M.

Fellow of TRINITY COLLEGE, CAMBRIDGE, and of the
ROYAL SOCIETY.

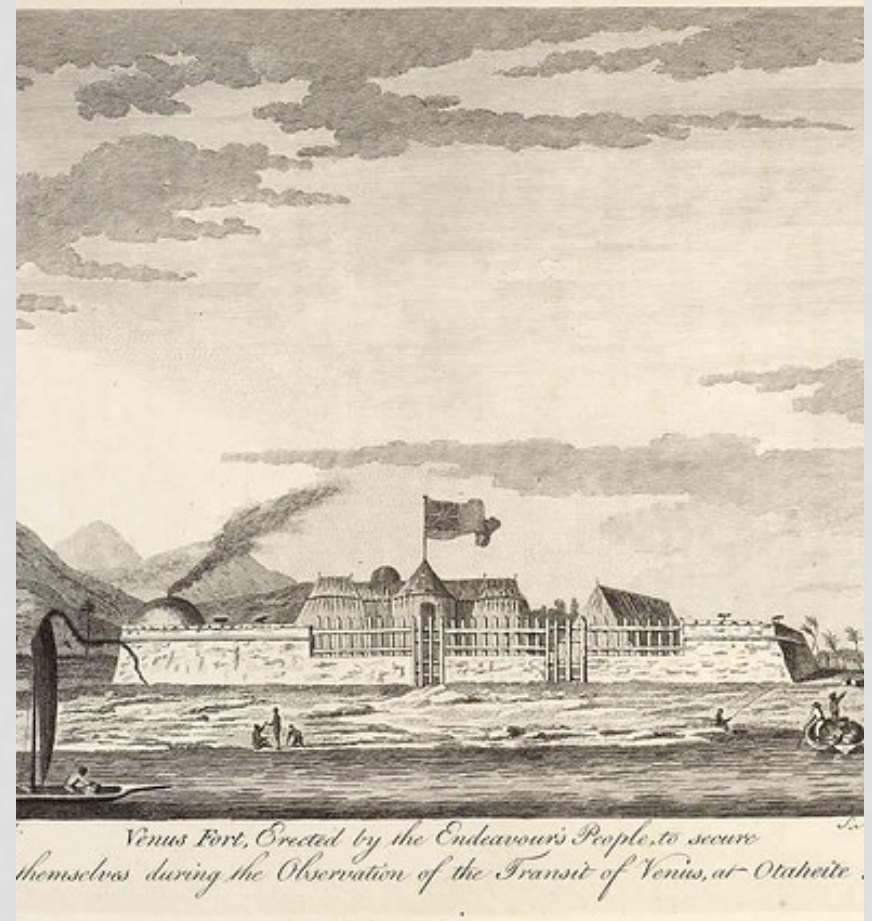
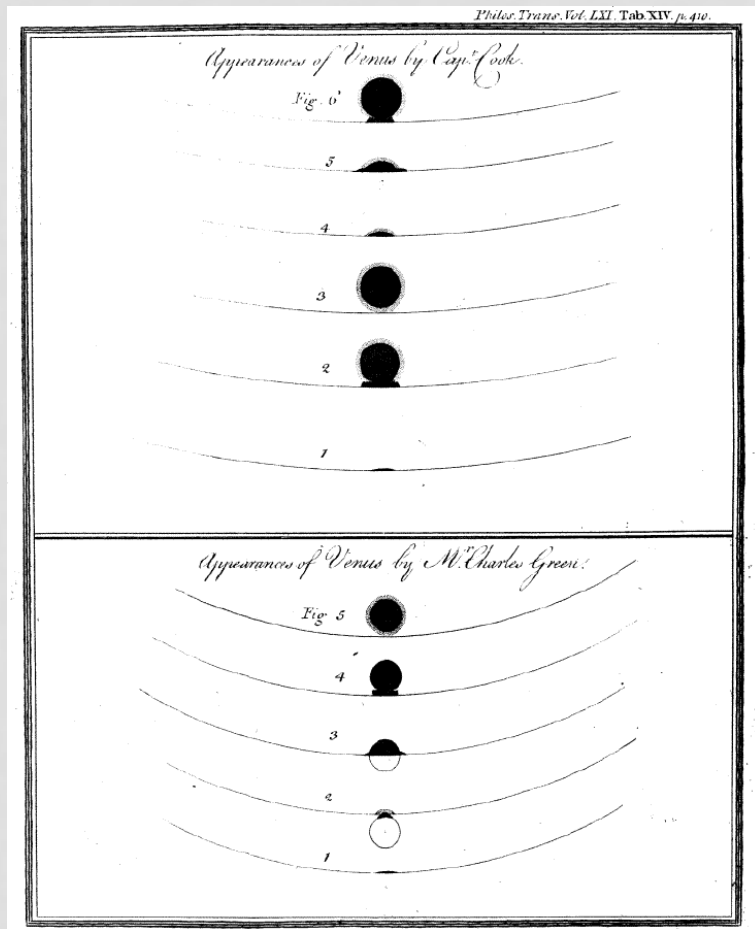
L O N D O N :

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PAGE, on Tower-Hill; and Messrs. HAWES, CLARKE, and
COLLINS, in Paternoster-Row.

M DCC LXIII.

TRANSIT OF VENUS, 1769



MASKELYNE AND COOK'S 2ND VOYAGE

“may be rendered more serviceable to the improvement of Geography & Navigation than it can otherwise be if the ship is furnished with Astronomical Instruments as this Board hath the disposal of or can obtain the use of from the Royal Society and also some of the Longitude Watches; and, above all, if a proper person could be sent out to make use of those Instruments & teach the Officers on board the ship the method of finding the Longitude.”

Maskelyne to Lord Sandwich, Nov 1771, in Board of
Longitude Minutes, 28 Nov 1771

<http://cudl.lib.cam.ac.uk/view/MS-RGO-00014-00005/211>

INSTRUMENTS FOR COOK'S 2ND VOYAGE

- 2 Astronomical Quadrants of 1-foot radius
- 2 Astronomical Clocks
- 1 Transit Instrument
- 2 Common Brass Hadley's Quadrants
- 2 Alarum Clock
- 2 Reflecting Telescopes
- Mr Kendal's Watch
- Mr Arnold's Watch
- 2 Journeymen Clocks
- 2 of Dollond's last improved 3 ½ feet Telescopes wth Object Glass, Micrometers & moveable wires
- 2 Brass Hadley's Sextants with Mr Maskelyne's Improvements
- 6 Variation Charts
- 2 Marine Barometers
- 4 Common d^o
- 6 Thermometers
- 2 Theodolites
- 2 Wood frames with Glass roofs for observing y reflection
- 2 large magnetic needles to use at Land
- 2 d^o of old construction – to use at sea
- 2 Magnetic variation compasses
- 2 Gunter's Chains with spare Links & Rings

List of Instruments ^{belonging to the} ~~Board of Longitude~~ ^{delivered to Capt.}
Cook May 22 1776

- x An Astronomical Clock
- x An alarm Clock
- x An astronomical quadrant
- A Hadley's Sextant by Ramsden
- A Hadley's Sextant by Dollond
- Astronomical instrument of 1 foot with 14 inch scale, & 1/2 inch Bayly only
- x An achromatic telescope with a treble object glass
- x of 6 inches focus, with an divided object glass
- micrometer, and an eye tube with 1/2 inch of 1/2 inch
- x A reflecting telescope
- x of 1 foot 6 inch perspective with a large aperture.
- x A marine dipping needle, with 6 magnetic
- x Two small variation compasses
- x An azimuth Compass with a spare card.
- x A theodolite & Gunter's chain, to Capt. Cook only
- A basin for holding quicksilver for observing
- double altitudes with ^{new} quicksilver.
- Two portable barometers
- x Six thermometers
- Hendall's first watch made in exact imitation
- of Harrison's to Capt. Cook, May 22 1776
- x A pocket watch with a second hand and
- ruby cylinder, to Capt. Cook only.
- x A Marine barometer
- A wooden bracket contrived for fetching
- up ^{sea} water from great depths for trying it,
- x taking its weight and its degree of
- condense; with 2 thermometers, belonging to it
- x 3 bottles for weighing salt water in
- x A hydrostatic balance.
- x Two night telescopes
- x Tent Observatory
- List of Books.

Instruments proper to be sent on the Voyage to the ⁹⁰
North West coast of America, for the use of the Astronomers

- x An astronomical Clock; to be purchased.
- An afixtant Clock
- An Alarm Clock
- x A watch with a second hand; to be purchased.
- An achromatic telescope of 14 inches focus, with a
- divided object-glass micrometer.
- A reflecting telescope
- x A vertical circle, with an azimuthal circle, for taking
- altitudes and azimuths. To be purchased
- A.S. A transit instrument of 1/2 foot by Bird, with level.
- To be borrowed of the Royal Society
- A dipping needle for use at land.
- A set of magnetic steel bars, to change the poles of
- the dipping needle.
- A small pocket compass
- A Knight's azimuth compass, by Adams.
- A Burton's theodolite with a stand.
- x A steel Gunter's chain, for surveying. To be purchased.
- A Hadley's Sextant, by Dollond.
- x A new Hadley's Sextant, by Troughton. To be purchased.
- 2 large Thermometers
- 2 thermometers with wooden scales by Ramsden.
- A portable Barometer, by Burton; to be repaired.
- A basin to hold quicksilver. A new glass roof to be provided.
- x A quantity of quicksilver in a bottle; to be provided
- A night telescope
- The nautical almanacs from 1791 to 1796
- Tables requisite to be used with the same
- x A Variation
- x Bode's celestial
- General Table
- N.B. These par

List of Instruments &
books delivered to Capt.
Cook May 22 1776
(NMM: AGC/8/29)

of Refraction & parallel
ity Assistant
J. H. M. & 10/1773
6. 1777 & 1778
by H. M. & 10/1773

Instruments proper to be
sent on the Voyage to the
North West coast of America
(NMM: REG09/000037)

EXPEDITIONARY ASTRONOMERS

- 1761 transit of Venus (Nevil Maskelyne, Robert Waddington, Jeremiah Dixon, Charles Mason)
- 1769 transit of Venus (James Cook, Charles Green, William Bayly, Jeremiah Dixon, Charles Mason, William Wales, Joseph Dymond, John Bradley)
- Cook II (William Bayly, William Wales)
- 1773 Phipps (Israel Lyons)
- Cook III (James King, William Bayly)
- 1787 First Fleet (William Dawes)
- 1791 Vancouver (William Gooch; John Crosley)
- 1801 Flinders (John Crosley; James Inman)

WILLIAM WALES (1734?-1798)

1		43. 39. 41	47. 31. 33	51. 23. 25	55. 15. 17
2		53. 32. 7	55. 4. 24	56. 36. 16	58. 7. 45
3		65. 39. 18	67. 8. 27	68. 37. 14	70. 5. 39
4	The Sun.	77. 22. 36	78. 48. 58	80. 15. 1	81. 40. 46
5		88. 45. 20	90. 9. 27	91. 33. 21	92. 57. 0
6		99. 52. 6	101. 14. 34	102. 36. 52	103. 59. 1
7		110. 47. 42	112. 9. 6	113. 30. 25	114. 51. 49
6	Aldebaran	50. 36. 10	52. 4. 5	53. 31. 57	54. 52. 44
7		62. 17. 43	63. 45. 10	65. 12. 34	66. 39. 57
8	Pollux.	31. 25. 48	32. 53. 11	34. 20. 40	35. 48. 12
9		43. 7. 5	44. 35. 4	46. 3. 8	47. 31. 15
10		17. 51. 57	19. 20. 36	20. 49. 25	22. 18. 27
11		29. 45. 36	31. 15. 26	32. 45. 26	34. 15. 35
12	Regulus.	41. 48. 49	43. 19. 55	44. 52. 10	46. 22. 35
13		54. 2. 11	55. 34. 36	57. 7. 12	58. 39. 59
14		66. 26. 28	68. 0. 18	69. 34. 20	71. 8. 33
15		25. 4. 34	26. 39. 23	28. 14. 26	29. 49. 44
16	Spica ♀	37. 49. 37	39. 26. 14	41. 3. 5	42. 40. 8
17		50. 48. 40	52. 26. 59	54. 5. 31	55. 44. 15
18		64. 1. 2	65. 41. 3	67. 21. 18	69. 1. 48
19		31. 37. 14	33. 19. 7	35. 1. 13	36. 43. 32
20	Antares.	45. 18. 29	47. 2. 10	48. 46. 5	50. 30. 12
21		59. 14. 6	60. 59. 31	62. 45. 11	64. 31. 2
22		73. 23. 37	75. 10. 43	76. 58. 2	78. 45. 31

Page from the first edition of the *Nautical Almanac* (1767)

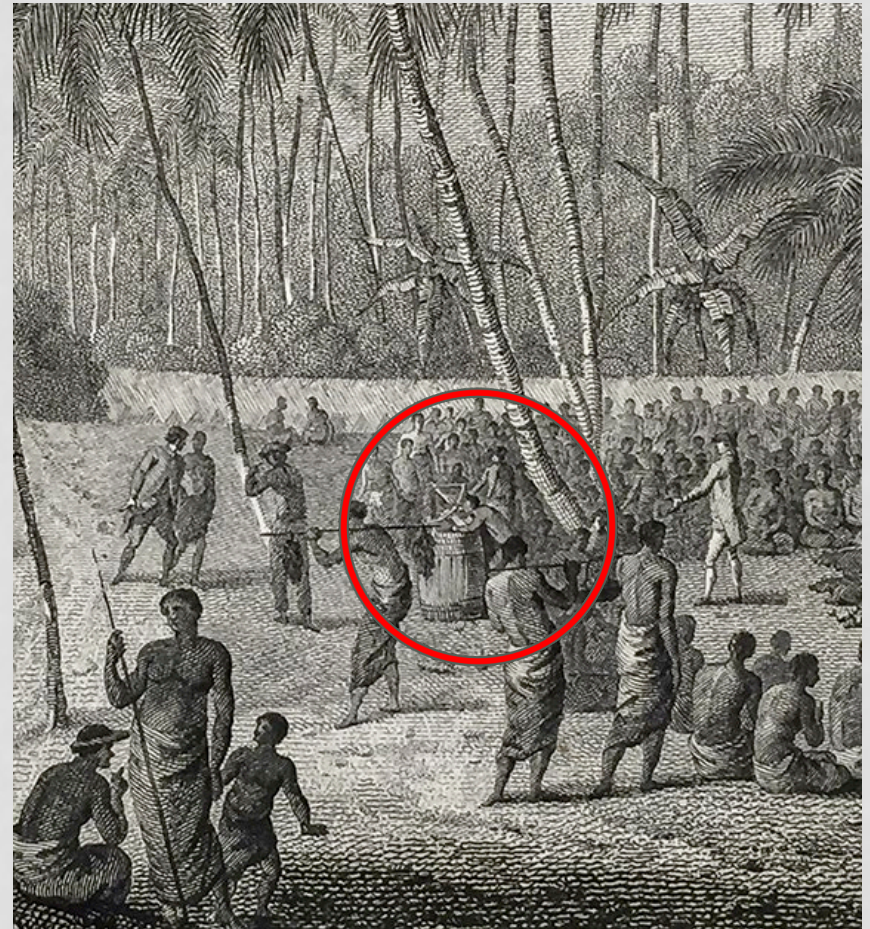


William Wales, by John Russell, 1794? (Christ's Hospital)

WILLIAM BAYLY (1737-1810)

THE ORIGINAL
ASTRONOMICAL OBSERVATIONS
MADE IN THE COURSE OF
A VOYAGE
TO THE
NORTHERN PACIFIC OCEAN,
FOR THE DISCOVERY OF
A NORTH EAST OR NORTH WEST PASSAGE:
WHEREIN
THE NORTH WEST COAST OF AMERICA AND NORTH EAST COAST
OF ASIA WERE EXPLORED.
In His Majesty's Ships the RESOLUTION and DISCOVERY,
IN THE YEARS MDCCLXXVI, MDCCLXXVII, MDCCLXXVIII, MDCCLXXIX, AND MDCCLXXX.
By CAPTAIN JAMES COOKE, F.R.S. COMMANDER OF THE RESOLUTION,
AND LIEUTENANT JAMES KING; *K*
AND
Mr. WILLIAM BAYLY,
LATE ASSISTANT AT THE ROYAL OBSERVATORY.
PUBLISHED BY ORDER OF THE COMMISSIONERS OF LONGITUDE,
AT THE EXPENCE OF WHOM THE OBSERVATIONS WERE MADE.

L O N D O N:
PRINTED BY WILLIAM RICHARDSON, PRINTER;
AND SOLD BY P. ELSLEY, IN THE STRAND; AND MESS. MOUNT AND PAGE, ON TOWER-HILL;
BOOKSELLERS TO THE SAID COMMISSIONERS.
MDCCLXXXII.

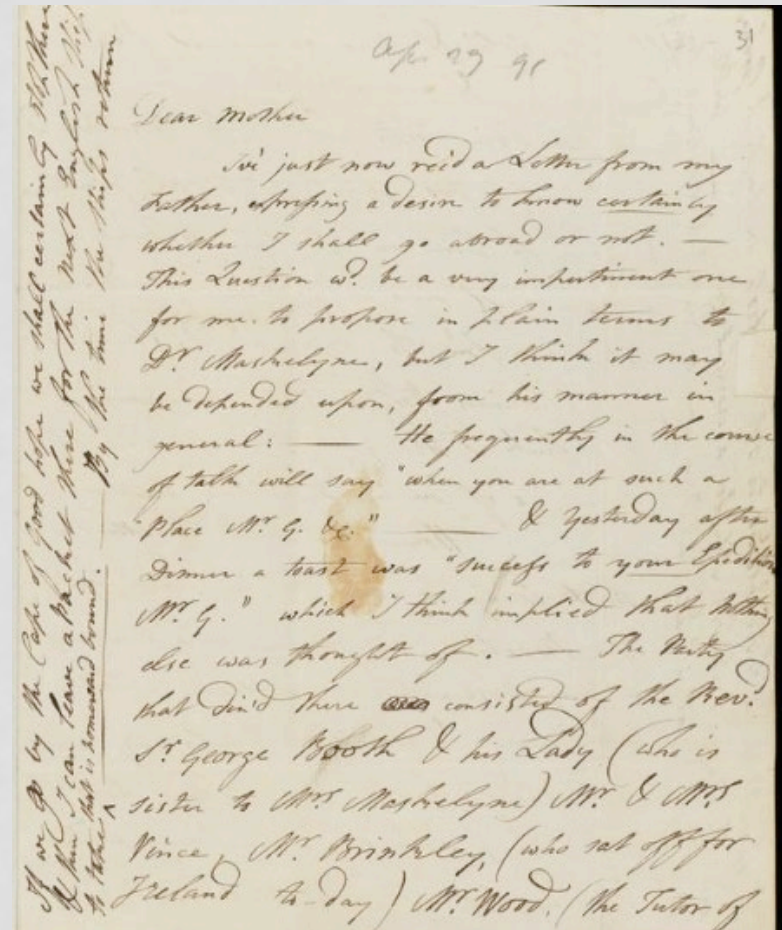


Detail from John Webber, A View at Anamooka (Tonga), 1777

WILLIAM GOOCH (1770-1792)



Karakakoa Bay, Owhyee (Hawaii) by T. Heddington, 1814 (NMM PA469)

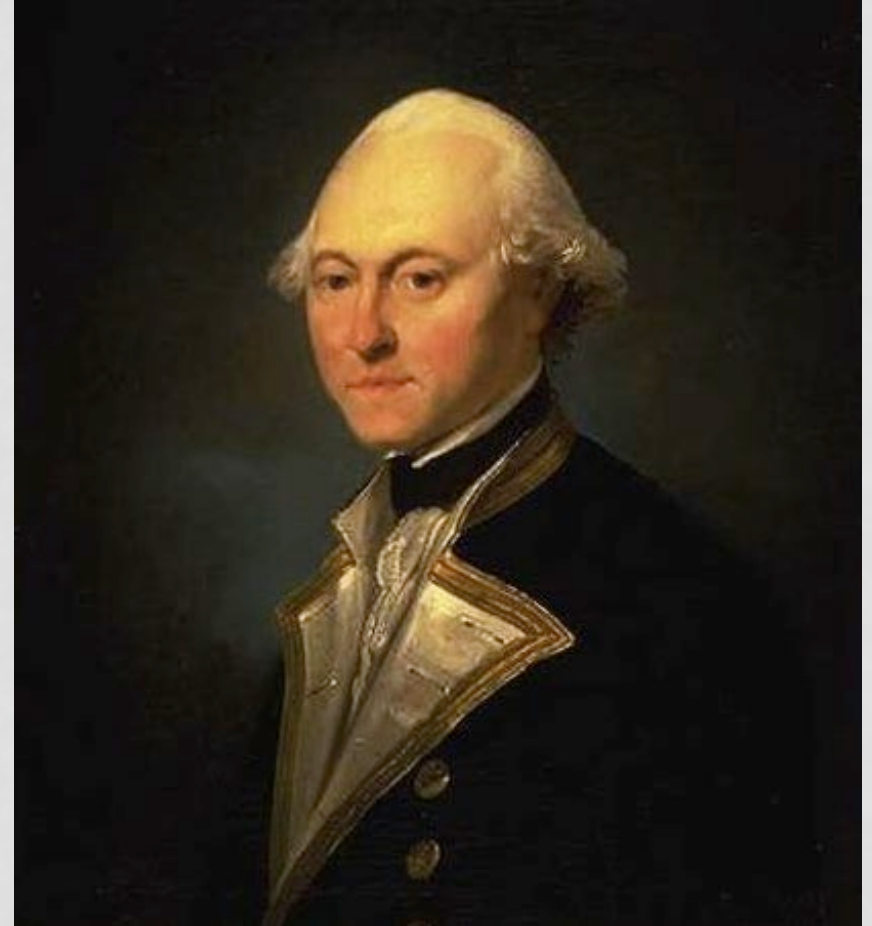


William Gooch to Sarah Gooch, 29 April 1791, Mm.6.48 (Cambridge UL)

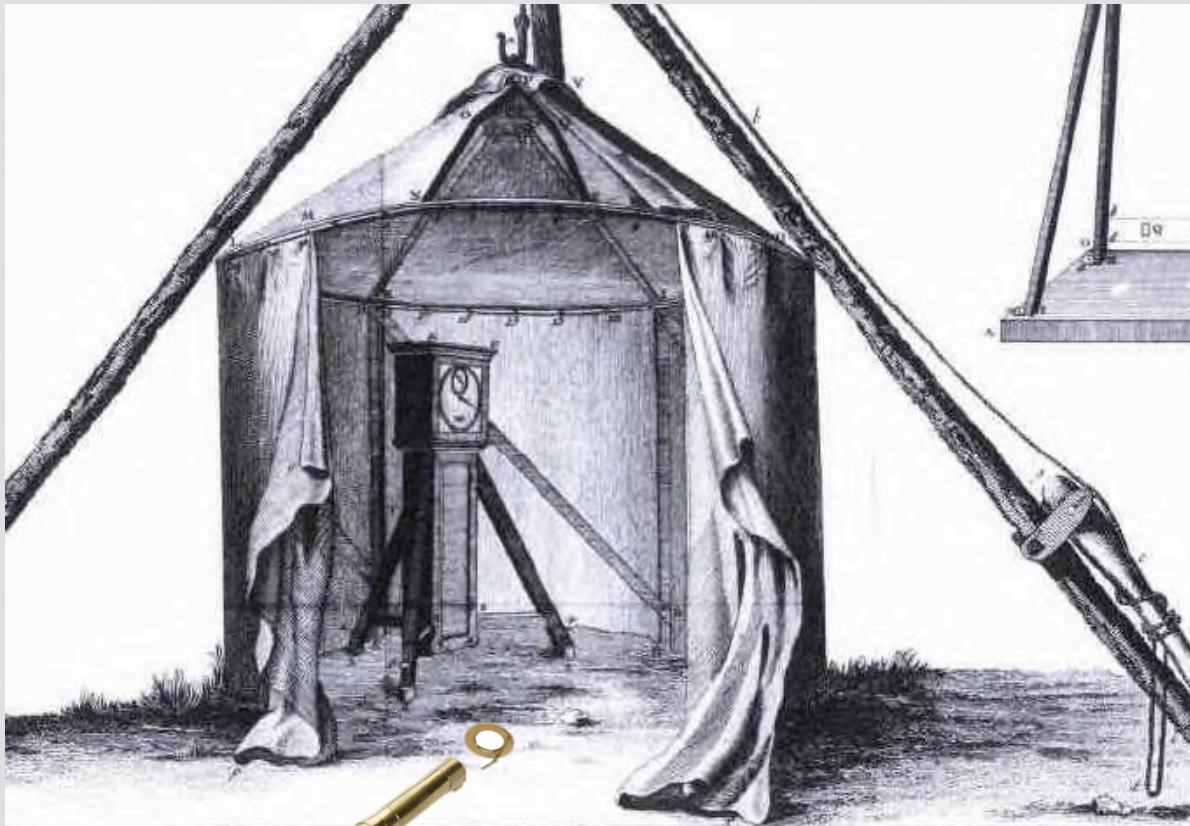
OFFICER-OBSERVERS



Captain James Cook by Nathaniel Dance, 1776 (NMM BHC2628)



Captain James King by John Webber, 1782 (National Library of Australia)



Right top: Portable heliometer by J. Dollond & Son, c.1755 (NMM AST0957)

Right bottom: 12-inch quadrant by John Bird, 1760s (Science Museum Inv: 1876-572)

Left: Transit instrument, by Jesse Ramsden for Dollond, c. 1780 (NMM AST0981)





Drawings by Owen Stanley
1830s-40s (National Library
of Australia)

