XXII. *Obſervations of the Immerſions and Emerſions of the Satellites of* Jupiter, *taken in the Year* 1768, *by Enſign* George Sproule, *of his Majeſty's* 59*th Regiment, on the South Point of the Entrance of* Gaſpee Baſon, *which bears from* Cape Ferrilong, *or the Cape forming the Bay to the Northward, N.* 68¼ *W. by the true Meridian, diſtant* 12¼ *Marine Miles. Communicated by the Aſtronomer Royal.*

Redde, Jan. 20, 1774. THE obſervations were made with Mr. SHORT's reflecting teleſcope, and the times ſhewn by a pendulum time-piece, made by Meſſieurs MUDGE and DUTTON, firſt adjuſted to equal or mean time, by obſerving the paſſage of Sirius through a gun barrel fixed in the plane of the meridian, with a contraction made in the bore of the barrel; and then proved, in its going, by correſponding and ſingle altitudes, taken with HADLEY's quadrant, as often as the weather would permit, by reflection from clear oil, placed in a room with two windows; one to the S.E. and

the other nearly S.W. adjacent to where the clock ſtood. The windows being high, and the Sun having no great altitude, during the time the obſervations were made, the oil was therefore placed at ſuch a diſtance, from the windows, that no wind could get at it to diſturb it. There was alſo every precaution uſed to render it as ſtill as poſſible, by fixing a ſhed to windward without the windows.

The method I uſed, in taking all my correſponding altitudes, was firſt to ſcrew the index to a certain altitude; then, for the morning obſervations, I firſt noted, when the upper limb, by reflection, touched the lower limb in the oil; ſecondly, when the centers coincided, by obſerving an equal coincidence in both images; and laſtly, when the Sun's lower limb, by reflection, touched the upper in the oil. In the afternoon, I obſerved the Sun's falling, noting each contact correſponding to that in the forenoon. I always made it a rule to take a large number, that I might reject thoſe, where the oil ſuffered the leaſt agitation,

The clock was fixed to an upright ſteady poſt, in a warm room, kept as temperate as poſſible, by encreaſing or diminiſhing a large wood fire oppoſite the clock.

Notwithſtanding every precaution, the intenſeneſs of the cold was ſo great, that it frequently ſtopped the clock, by which I loſt many obſervations during the months of January and February.

The following obſervations were made, when it was proved to go, at an equal rate, ſome days before and after.

The teleſcope and quadrant were the ſame Mr. Wright uſed on the iſland of Anticoſti.

The ephemeris uſed was that of Mr. DE LA CAILLE, calculated for ten years to the meridian of Paris.

The teleſcope I had fixed on a ſteady ſtand without doors, near the room where the clock ſtood, and the time counted by a very careful perſon, with another to overlook him: great care was alſo taken of the quadrant, that it ſhould not alter its adjuſtment between the morning and evening altitudes.

The latitude of the place of obſervation, at GASPEE, I determined, as accurately as poſſible, by ſeveral meridian altitudes of the Sun, taken in an artificial horizon, with the aforementioned quadrant; the error of adjuſtment being moſt accurately obtained by different methods. The mean reſult of the whole (15 of which agreed one with the other to 6 or 7 ſeconds) I found to be 48° 47′ 32″. The variation of the needle, by repeated trials different ways, I found 16° 30′ Weſt; one of the meridian altitudes I inſert, to ſhew the method I uſed.

	°	′	″
15th May, 1768, double angle of meridian altitude of the Sun's upper limb.	121	10	0
Error of adjuſtment of quadrant to the left,	0	0	35
	121	9	25
Apparent altitude of Sun's upper limb,	60	34	42½
Semi-diameter ſubt.		15	51
App. alt. of center,	60	18	51½
Refraction,			31
	60	18	20
— 90 = Sun's zenith diſtance =	29	41	40
Sun's decl. reduced to the meridian of obſervation *.	19	5	50
Lat. of the S. Point of Gaſpee Baſon,	48	47	30

GEORGE SPROULE.

* i. e. The ☉'s declination, at the time of his paſſing the obſerver's meridian, computed from tables adapted to another meridian, according to the known or ſuppoſed longitude of one meridian from the other. S. HORSLEY.

Mr.

Mr. Sproule, *in reducing the time of his clock, having neglected the equation of equal altitudes, it was neceſſary to re-compute the corrections; and here follow the immerſions and emerſions of Jupiter's ſatellites, reduced to apparent time, from the original obſervations, due allowance being made for the equation of equal altitudes, by the Aſtronomer Royal.*

1768		Apparent Time. h ′ ″	
Jan. 29.	Im. 1.	13 57 47	
Mar. 15.	Im. 1.	14 21 14	
16.	Im. 2.	11 59 7	
	Im. 3.	13 30 10	
April 9.	Em. 1.	11 18 26	N. B. In theſe two emerſions, the ſatellites ſeemed to emerge ſlowly out of the ſhadow.
10.	Em. 2.	11 38 8	
25.	Em. 1.	9 39 40	This is the beſt obſervation, the ſatellite ſtarting out inſtantaneouſly.
May 9.	Em. 1.	13 30 54	
12.	Em. 2.	11 15 43	