OBSERVATIONS DURING A VOYAGE FROM ENGLAND TO FORT VANCOUVER, ON THE NORTH-WEST COAST OF AMERICA.

By Dr MEREDITH GAIRDNER. *In a Letter to Professor* JAMESON *.

I SEIZE the first opportunity which has presented itself since my arrival on the shores of America, of communicating to you a few short notices of the scenes which have passed under my view since quitting my native country.

Our voyage hither was long, and, by many, would have been considered as tedious; but the atmosphere which surrounded us, and the ocean which we were traversing, presented so many interesting and continually changing objects to our view, that I am tempted to think what is called the *ennui* of a long sea-voyage, is owing rather to the temper of mind of the voyager than to the circumstances in which he is placed. Daily I had a constant source of occupation in noting the oscillations of the barometer (we had a very good marine one on board, constructed by Gilbert), the diurnal changes in the temperatures of the air, and the superficial strata of the ocean; in carrying on a series of astronomical observations for the determination of the ship's place, in concert with our navigators; and in observing the habits and structure of the different aërial and aquatic animals which fell in our way in the course of our long traverse. And yet I had daily to regret the omission of many highly interesting observations, from the want of opportunity, and the means of their

* "Fort Vancouver is situated in a plain, about ninety miles from the mouth of the Colombia River, on its north bank. In my journey of about fourteen days into the country of the Walamet River, a tributary of great size which falls into the Columbia opposite to Fort Vancouver, I remarked this country as consisting of a series of extensive plains or prairies, covered with grass, interspersed with belts of fir and oak, and bounded on the east by the maritime chain of snowy peaks, and on the west by the ranges immediately skirting the Pacific. The thick cover of soil prevented my obtaining much information in my favourite geognostic science; but being my first essay at voyaging in NW. America, was highly interesting. One of the most interesting objects which I saw in these plains, were large blocks of granite scattered on the surface, which must have come from a great distance, as this rock is not found fixed in the maritime chain or country between it and the sea-coast to the south of the Colombia,—a tract, as far as I have seen specimens, or have been able to procure information, consisting almost if not entirely of igneous rock from modern cellular lava (as at the falls of the Walamet) or compact block basalt.

"One of the most striking phenomena in the atmospheric constitution of Fort Vancouver, is the extent of the diurnal change of temperature, 36° from sunrise to 2 P. M. is not uncommon. Once I saw the thermometer (Fahr.) at 43° at sunrise, while at noon of the same day it stood at 87°. The highest I ever saw it was one day in July, when at 2 P. M. it stood at 89° in the shade."
—*Extract from Dr Gairdner's Letter to his father, dated* 31*st August* 1833.

performance. A merchant vessel was not the most favourable place for such observations. I regularly noted the height of the barometric column at 9–10 A. M., noon, and 4–5 P. M., besides different observations at shorter intervals on particular occasions. You will form a better idea of these from the following Tabular View, which I drew up at the conclusion of the voyage. I confine it to the two torrid zones, as there the atmospheric phenomena proceed with a regularity unknown in temperate latitudes.

Date, and Place of Observation.	Mean.	Obs. of Noon.	Range, 9 A. M. to 4 P. M.
I. North Atlantic Torrid Zone.			
1832,			
Oct. 13.	30.09	30.08	0.08
... 14.	30.09	30.07	0.05
... 15.	30.09	30.09	0.06
... 16.	30.09	30.16	0.18
... 17.	30.02	30.02	0.13
... 18.	29.99	29.98	0.13
... 19.	30.05	30.05	0.04
... 20.	30.03	30.03	0.03
... 21.	30.04	30.06	0.08
... 22.	30.01	30.04	0 04
... 23.	30.05	30.05	0.08
... 25.	30.04	30.02	0.09
... 26.	30.03	30.05	0.07
... 27.	29.96	29.96	0.10
... 28.	29.95	29.97	0.03
... 29.	30.03	30.04	0.16
... 30.	30.06	30.05	0.04
... 31.	30.07	30.08	0.08
Nov. 1.	30.02	30.03	0.06
... 3.	29.97	29.96	0.10
... 4.	29.99	30.01	0.08
... 5.	29.97	30.01	0.09
... 6.	29.91	29.91	0.13
... 7.	29.91	29.92	0.16
... 8.	29.94	29.94	0.02
Mean,	30.003	30.000	0.087
II. South Atlantic Torrid Zone.			
Nov. 9.	29.95	29.95	0.09
... 10.	29.88	29.96	0.17
... 11.	29.97	29.96	0.10
... 12.	30.02	30.04	0.06
... 13.	30.06	30.07	0.07
... 14.	30.08	30.06	0.07
... 15.	30.06	30.06	0.11
... 16.	30.02	30.04	0.06
... 18.	29.99	29.99	0.05
... 19.	30.00	29.98	0.05
... 20.	29.96	29.99	0.02
... 21.	29.98	29.98	0.09
... 22.	29.71	29.70	0.14
... 23.	29.60	29.63	0.15
... 24.	29.68	29.67	0.02
Mean,	29.895	29.905	0.063

Date, and Place of Observation.	Mean.	Obs. of Noon.	Range, 9 A. M. to 4 P. M.
III. South Pacific Torrid Zone.			
1833,			
Feb. 16.	30.15	30.16	0 14
... 17.	30.07	30.04	0.10
... 18.	29.95	29.98	0.03
... 19.	29.96	30.03	0.15
... 20.	30.03	30.05	0.10
... 21.	30.05	30.10	0.10
... 22.	30.01	30.04	0.07
... 23.	29.92	29.98	0.11
... 24.	29.97	29.97	0.08
... 25.	29.89	29.90	0.01
... 26.	29.97	29.94	0.04
... 27.	29.96	29.97	0.07
... 28.	29.94	29.96	0.23
Mar. 1.	29.88	29.99	0.11
... 2.	29.91	29.88	0.26
... 3.	29.91	29.95	0.14
... 4.	29.93	29.98	0.08
Mean,	29.965	29.980	0.13
IV. North Pacific Torrid Zone.			
Mar. 5.	29.93	29.99	0.06
... 6.	29.96	29.98	0.10
... 7.	29.95	29.96	0.10
... 8.	29.92	29.94	0.11
... 9.	29.95	30.00	0.12
... 10.	30.01	29.99	0.06
... 11.	29.94	29.97	0.07
... 12.	30.00	29.98	0.03
... 13.	29.91	29.93	0.18
... 15.	29.95	30.01	0.14
... 16.	29.98	29.97	0.06
... 17.	30.00	29.99	0.12
... 18.	30.04	30.01	0.15
... 19.	30.02	30.02	0.09
... 20.	30.09	30.07	0.09
... 21.	30.11	30.10	0.09
... 22.	30.18	30.20	0.14
... 23.	30.15	30.18	0.06
... 24.	30.20	30.21	0.06
... 25.	30.14	30.13	0.12
... 26.	30.19	30.19	0.07
... 27.	30.25	30.26	0.02
Apr. 10.	30.28	30.33	0.09
Mean,	30.093	30.103	0.083

From which:

North Pacific Torrid Zone,	Mean,	30.093
South Pacific Torrid Zone,	.....	29.965
Mean of North and South Pacific,		30.029
North Atlantic Torrid Zone,	Mean,	30.003
South Atlantic Torrid Zone,	.....	29.895
Mean of North and South Atlantic,		29.949

I was chiefly led to the calculation of these barometric means, by the idea, that *perhaps* a difference of level between the two oceans might be the result. May not the irregularities resulting from the motion of the ship, winds and weather, be lost in the number of partial observations, giving errors both in excess and defect? If they are of any value in this point of view, they would indicate the level of the Pacific to be lower than that of the Atlantic Ocean. To find the amount, using Dabuisson's Portative Table, given in his Geognosie, i. 467.:,

30.029 In.	= 768.7 mills.	= elevation,	76
29.949	= 760.7	=	97
		Difference,	21 metres = 69 feet,

neglecting all corrections for temperature, &c. as these will operate in the same direction, and nearly about the same amount, on both barometric columns. *N. B.* The cistern of the barometer used was about 10 feet above the level of the water.

My observations on the temperature of the surface strata of the ocean were daily made throughout the voyage at 7–8 A. M., noon to 2 P. M., and sunset. It would occupy too much space to give here the detail of these observations. I shall therefore merely give you their abstract, following two methods, by comparing which, more correct conclusions will be formed than by either method singly.

***Method* 1.**—Where the temperatures given are the means of the observations on the days when the parallels indicated were crossed.

Atlantic Ocean.					
Latitude.	Longitude.	Temperature,—Fahrenheit.		Sun's Meridian Altitude.	Date.
		Sea.	Air.		
					1832,
50° N.	4° W.	58.6°	58.7°	41°	Sept. 20.
45	11	63.5	66.0	44	... 24.
40	15	66.6	66.3	47	... 29.
35	16	71.7	68.0	51	Oct. 2.
30	19	73.6	72.0	54	... 7.
25	22	74.4	73.5	58	... 11.
20	24	76.3	75.6	62	... 14.
15	26	79.6	78.1	65	... 16.
10	23	81.6	79.1	69	... 21.
5	17	80.1	78.7	70	Nov. 3.
0	23	76.2	76.7	73	... 8.
5 S.	27	76.7	77.8	77	... 11.
10	31	79.2	79.1	82	... 14.
15	34	80.1	76.6	86	... 19.
20	37	76.6	75.3	90	... 22.
25	37	72.1	73.4	85	... 25.
30	38	68.9	67.8	81	... 29.
35	49	70.9	71.6	77	Dec. 7.
40	54	63.8	56.2	74	... 13.
45	54	56.4	55.9	68	... 17.
50	56	45.9	48.6	63	... 21.
55	64	43.2	45.6	55	... 29.
					1833,
58	67	41.3	42.0	55	Jan. 2.

Method 2.—Where the temperatures given are the mean of all the observations on the days the ship was within the limits of the zone indicated.

Atlantic Ocean.					
Zone.	Date.	Limits of the Zone.		Mean Temperature of the Zone.	No. of Obs. from which the Mean is calculated.
		Latitude.	Longitude.		
	1832,				
N. Lat. 45°	Sept. 21. to 28.	49° to 39°	5° to 15° W.	63.7°	24
... 40	... 25. to Oct. 1.	44 ... 34	12 ... 14	66.9	21
... 35	... 30. to ... 6.	39 ... 29	14 ... 18	72.2	21
... 30	Oct. 3. to 10.	34 ... 26	17 ... 21	73.6	24
... 25	... 8. to 13.	29 ... 21	19 ... 23	74.4	18
... 20	... 12. to 15.	24 ... 16	22 ... 25	76.2	12
... 15	... 15. to 20.	19 ... 11	25 ... 23	80.2	18
... 10	... 17. to Nov. 2.	14 ... 6	25 ... 17	80.8	51
... 5	... 22. to ... 7.	9 ... 1	23 ... 22	80.0	51
Atlc. Eq. Zone,	Nov. 4. to 10.	4 N.—4 S.	18 ... 26	77.5	21
S. Lat. 5°	... 9. to 13.	1 ... 9	24 ... 29	77.3	15
... 10	... 12. to 18.	6 ... 14	28 ... 31	79.3	21
... 15	... 15. to 21.	11 ... 19	32 ... 34	79.9	18
... 20	... 20. to 24.	16 ... 24	35 ... 37	76.4	15
... 25	... 23. to 28.	21 ... 29	36 ... 35	71.3	18
... 30	... 26. to Dec. 6.	26 ... 34	36 ... 47	68.5	33
... 35	... 30. to 12.	31 ... 39	40 ... 53	69.1	39
... 40	... 8. to 16.	36 ... 44	50 ... 55	65.4	27
... 45	... 14. to 20.	41 ... 49	53 ... 57	54.2	21
... 50	... 18. to 28.	46 ... 54	57 ... 64	46.2	33
... 55	... 22. to Jan. 2.	51 ... 58	57 ... 67	43.8	36

South Pacific Ocean.				
Zone.	Date.	Limits of the Zone.		Mean Temperature of the Zone.	No. of Obs. from which the Mean is calculated.
		Latitude.	Longitude.		
	1833,				
S. Lat. 55°	Jan. 3. to 19.	58° to 51°	68° to 79° W.	43°.3	51
... 50	... 15. to 26.	54 ... 46	76.. 82	50.4	36
... 45	... 21. to 31.	49 ... 41	78...86	55.4	33
... 40	... 30. to Feb. 2.	44 ... 36	86...87	61.7	12
... 35	Feb. 1. to 7.	39 ... 31	86...88	69.6	21
... 30	... 5. to 13.	34 ... 26	88...87	74.2	27
... 25	... 10. to 17.	29 ... 21	87...92	75.8	24
... 20	... 15. to 20.	24 ... 16	89...97	75.6	18
... 15	... 19. to 23.	19 ... 11	95..101	76.5	15
... 10	... 22. to 26.	14 ... 6	99..106	77.7	15
... 5	... 25. to Mar. 3.	9 ... 1	104..113	79.1	21
Pac. Eq. Zone,	.. 28. to 9.	4S.—4N.	109..121	79.8	30

South Pacific Ocean by Method 1.					
S. Latitude.	Longitude.	Temperature,—Fahrenheit.		Sun's Meridian Altitude.	Date.
		Sea.	Air.		
					1833,
55°	77°	43°.1	42°.8	55°	Jan. 14.
50	78	50.7	49.9	60	... 20.
45	85	56.2	56.8	62	... 27.
40	86	60.1	60.7	66	... 31.
35	88	69.6	65.0	71	Feb. 3.
30	87	73.6	71.7	74	... 8.
25	88	76.2	75.7	77	... 14.
20	94	75.2	73.7	81	... 18.
15	98	76.7	76.6	85	... 21.
10	103	77.5	78.2	89 N.	... 24.
5	107	79.3	80.4	87 S.	... 27.
0	114	78.7	79.9	84 N.	Mar. 4.—5.

Since arriving here, there has been no leisure for reducing into a similar tabular form my observations in the North Pacific. The causes formerly referred to deprived me of many favourable opportunities which might have been embraced, for ascertaining the temperature of the ocean at different depths. I had several opportunities of remarking the slight effect of great atmospheric changes upon the height of the barometrical column in tropical latitudes; this was especially striking in the heavy rains that we experienced in the North Atlantic, in about 6°—8° north latitude. On one occasion, I collected 1140 grains of water in a basin of a circular form, 9.3 in diameter, in 12 hours, the barometer remaining stationary at 30.00—29.99. This was on the night of the 26-27th October 1832, Lat. 7° 20′ N., Long. 20° 3′ W.

We crossed the part of the Atlantic where Maltbrun, in his Geog. Univ. (Transl. i. 322), places the Mer de Sargasso, but not a vestige of it was seen. The 1st February 1833, was remarkable for the sudden and great oscillations of our barometer, which cannot be accounted for in the state of the winds and weather; our position at the time was in Lat. 39° S. Long. 86° W.; it would be highly interesting to connect this with any striking phenomenon in other parts of the globe, particularly in the adjoining continent of South America. On the 19th October 1832, I collected in the basin above referred to 3630 gr. of rain water, between noon and 6 P. M. This, of course, is not the true quantity of rain which fell, as some would necessarily be returned into the air by evaporation, from the exposure of so large a surface in the basin to the air.

It would be but an inadequate outline that I could give you of the impression that the magnificent constellations of the southern hemisphere produced upon me, after the eloquent delineation given by Humboldt in his Personal Narrative, which, I dare say, is fresh in your recollection, and which, I assure you, is not exaggerated. Neither will I occupy your time by dwelling upon the splendours of a tropical sunset, which has so often been the theme of voyagers, except to mention a circumstance which I do not remember to have been particularly attended to, but which, I think, may be considered as one of the strongest proofs of the remarkable transparency of the atmosphere in these latitudes; it is the violet hue assumed so regularly by the ether in the western horizon, a short interval after sunset. I have never observed a tint of the sky exactly similar in our European skies, and perhaps it may be explained in the following way: the rays of white light are decomposed into the prismatic colours, in consequence of the greater density of the air at sunset, both from accumulated vapours, and a greater length of atmospheric column that they have to traverse; and those least refrangible, such as red and orange, are what usually in northern climates alone reach the eye, while, in tropical climates, where the air is more serene, we may suppose that those more refrangible will reach the eye also; as the yellow, green, blue, indigo, violet, which agrees with the phenomena observed. We had a fine opportunity of observ-

ing the solar eclipse of Jan. 20, in Lat. 49° 38′ S., Long. 77° 53′ W. With us the app. time of immersion was 4° 30′, and of emersion 6° 44′; and the portion of sun eclipsed was 27° 30′, or about 7-8ths of his diameter, by my measurement with a sextant.

The only land of which we had a near and distinct view in the long run from England to the Sandwich Islands, was Staten Island, off the east entrance of the Straits of Magellan, and nothing can exceed its rugged and desolate aspect. Snow was lying in small patches in the sheltered hollows, near the summits of the highest hills. The summit profile of the island presented a series of denticulated eminences, rising to the northwest, to which point were generally directed all the precipices, the slope of the island being to the south-east. When the extremity of the island about Cape John was viewed with a glass, I thought I could recognise in the steep precipices, at whose base the sea broke, the outgoing of strata, with a direction S.SW. to NNE. From the regularity and smoothness of the slope of the bare rocks to the SE., and the numerous greyish white masses projecting from the general black surface of rock, I should think the prevailing rock to be mica slate, with large imbedded masses of quartz rock. Numerous vertical fissures, hollowed out by the waves into caverns, were visible along the point from Cape St. John southwards; these rose obliquely upwards to the NW., confirming the preceding idea of the position of the strata. I observed no columnar or strictly tabular masses, leading to the idea of ancient or modern volcanic productions. These observations, and some others which space prevents me detailing, were made when sailing along the coast, at about 1-2 miles distant. According to a rough calculation of the height of a mountain above Cape St. John, taking as a base the run of the ship (4 knots) for an hour, between the times of taking its angle, which I made 2580 feet, and from patches of snow existing at its summit in the midsummer of the hemisphere (Dec. 29, 1832,), the line of perpetual snow must be below 8000 feet; theoretically for Lat. 55°, it is 4900 feet. So that we have already a proof of the inferior temperature of the southern hemisphere, and yet the snow line of Staten Island must be raised, from its isolation, and its being surrounded by a vast ocean. About 500 feet of the upper part was bare rock; mosses

did not extend so high, so that the superior limit of vegetation might be about 2000 feet. All these measurements are to be viewed merely as approximations; but, in regions so seldom visited by observers, I have thought that even approximations merit being recorded.

In the Atlantic, the gigantic Albatross (Diomedea exulans) of the southern seas first appeared in Lat. 30° 57′ S. on the 30th Nov., and disappeared again in the South Pacific on our reaching Lat. 35° S. During a space of two months, we had these birds more or less constantly round the ship, when their voracity afforded us all on board much amusement, as the observation of their manners was a fertile source of employment. I have seen three distinct kinds characterised by a distinct marking of the plumage; but to what extent these form distinct species, or whether they are merely varieties of sex, age, &c. would require an acquaintance with them on their native breeding places to determine. The *first* is characterised by a beautifully snow-white head, neck, and belly, with dark brown wings; it is the largest of the three, the expanse of wing varying from 10 to 13 feet. It was the most common variety before crossing the meridian of Cape Horn, being comparatively rare in the Pacific:—the *second* was all over of a dark brown colour, its head was nearly black, forming a remarkable contrast with its long white hooked beak; its size much less than that of the preceding; we were never so fortunate as to shoot or hook a specimen of this variety:—the *third* was characterised by a remarkable circular black spot on the vertex. The head, neck, and belly, were of a spotted grey colour, and the back and wings of a light brown. Its expanse of wing was about 6-7 feet; this was by far the most common variety in the Pacific Ocean. These circumstances of geographical distribution would lead us to doubt of their being mere varieties of age and sex. Of the prodigious force of wing of these birds, I have attempted giving some illustration in a letter to my Father, which you have probably seen.

We met with the Cape Pigeon on two different occasions in the Southern Ocean, in the vicinity of the American continent. And, when off the Falkland Isles, two individuals of the singular *Chionis* tribe, with a snow-white plumage, hovered for some time round the ship.

In Lat. 47° S. and Long. 57° W., we met with a shoal of a new species of Delphinus, allied in its piebald markings to the *D. leucoramphus*, Cuv. R. A. i. 291, but in which the distribution of the colours was different. Its high dorsal fin was of a black colour, which was continued from its root into a band or girdle encompassing the body. Tip of snout black, from which two black bands proceeded to a circular band, one over occiput, other along mesial line of lower jaw: ridge of back and belly behind the dorsal band, also black; all the rest of the body pure white.

The *Hydrostatic acalephæ* form an object of great interest to the voyager in the Pacific Ocean. They often form shoals of great extent; in our passage from the Sandwich Islands to Columbia, the ship sailed through one for about a week. The most beautiful of these which I saw, as well as the most curious, from the complexity of its structure, and the delicate arrangement of all its movements, was the *Physalia* or *Portuguese-man-of-war* of the English sailors, and I had an opportunity of verifying, on numerous living and dead individuals, the accuracy of the immortal Cuvier's brief notice in his R. A. iii. 285. Time would fail me, and I would run the risk of exhausting your patience, if I entered into a full detail of the many interesting phenomena observed on the Chelonia, fish of the species of the great family of Scomberoides, Squali, &c. observed on the voyage. I will merely stop to mention a fact a little curious in the physiology of the common *Bonito*, the *Scomber pelamys*, Cuv. R. A. ii. 198, (N. B. the longitudinal black bands are not by any means limited to four.) During many hundred miles of the voyage, the ship was accompanied by numerous shoals, swimming with great velocity close to the surface of the water, over the ship's quarter, and occasionally presenting to the eye their brilliant silvery bellies. When they turned for an instant on their sides, the vigour and precision of their movements was beautiful. Although packed close together, none interfered with his neighbour, although often enveloped in the foam caused by the ship, and the breaking of the waves. They seem to feel peculiar pleasure in thus coursing along in the agitated water of the ship's way; it is not from hunger, or in the expectation of food, for they will not touch the bait of a hook. What can be the attraction? The following theory suggests itself. Fish are known to respire only

the air contained in the aqueous fluid that surrounds them. Where this air is most abundant, it is probable that they will prefer resorting, as affording an increased aëration to their blood, and, consequently, more elasticity and vigour in the exercise of all their functions. Numerous bubbles of air are carried under water by the motion of the ship, affording to these fish an unusual supply of air, and forming a source of attraction round the vessel.

In sailing along the north side of Owhyhee, we had a fine view of its two snowy peaks, Monna Keah and Monna Roah, and I embraced the opportunity to take a few angles for the trigonometric determination of their elevation. Monna Keah, at a distance of 62 miles, subtended an angle of 2° 2′ 13″; and Monna Roah, at a distance of 84 miles, (Geog.) one of 1° 54′ 20″: I have inferred the distance from the difference of latitude between the ship, (by astr. obs.) and the mountains (by Vancouver's chart) and their bearings by compass, corrected for variations. From these data, I calculate the altitude of the summit of Monna Keah to be 12,081 English feet, and that of Monna Roah 15,306 feet.* Monna Keah rose in the fore ground immediately from the coast, and we had a view of it throughout its whole mass: its summit was chiefly covered by detached masses of snow, furrowed by long black vertical streaks; the snow formed a continuous surface for but a very small portion of its highest peak. The summit only of Monna Roah was seen, barely overtopping the nearer peak of Monna Keah, but easily distinguished from it by its dome-shaped round outline, and the uniform unbroken sheet of snow with which it was clad. I am inclined to place some little confidence in my measurement of Monna Roah, as, by a distant operation from the above, its altitude came out to be 15,087 feet; a difference from the former not worthy of being noticed in this method of measurement. By a direct operation, I calculated the height of the snow line on Monna Keah to be 11,256 feet, and, by another operation, 10,578 feet. The inferior snow-line was not visible on Monna

* These numbers agree more nearly with those of Kotzebue, than of any other observer, and from what is afterwards mentioned of the snow line, I suspect are nearer to truth than the higher estimates of King, &c.

The angle is diminished 1-10th for refraction.

Roah. By a second operation, the altitude of Monna Keah came out 12,651 feet. I regretted exceedingly that the shortness of the ship's stay at Oaho, the seat of government, prevented my visiting the largest and most interesting of this group, the island of Owhyhee. This regret was rendered the more painful, by the interesting description of the island which I obtained from the American Missionaries at Oaho, who have traversed most of the island. From them I learned that the gigantic crater of Kiranea is progressively filling up, the mass of liquid lava now reaching as high as the "wide horizontal ledge of solid black lava," mentioned by Ellis in Polynesian Researches, iv. 238. Monna Roah, from an ancient, has now become an active volcano, which you will easily connect, with the above mentioned diminution in Kiranea. Dr Judd, medical-officer to the American mission in Oaho, who was in Owhyhee in Nov. 1832, informed me of a large volcano having broken out near the summit of the mountain. From the accounts the Rev. Mr Bingham had from the Rev. Mr Goodrich, who has been at or near its edge, it far exceeds in magnitude and depth that of Kiranea. Mr Rooke, surgeon in Oaho, who was in Owhyhee in August 1832, when at sea in July, on his passage thither, saw the flames issuing from this new volcano to an immense height, but, when he reached the island, the eruption had apparently ceased. Rooke, who has been on the mountain as far as the snow line, says, that its ascent is very easy, and you may ride on horseback to the very top.

Our arrival at Oaho was at an interesting juncture, in consequence of the recent death of the queen regent, Kaabawana. The islands were in a state approaching to complete anarchy, for the young king, Kaniekeouli, although acknowledged as sovereign of the whole group, had not promulgated the laws by which he meant to rule, and no efficient executive was in existence. The property and lives of the European residents (now about 200) were, consequently, entirely at the mercy of the rabble, who, however, conducted themselves in general with great propriety towards the whites, who had suffered no loss except one robbery, which was by the servant of the person robbed. All the artificial restraints imposed by the late regent being removed by her death,

an opportunity was afforded for determining whether Christianity had permanently affected the minds of these islanders, or whether it was a forced state, in obedience to example and commands of their chiefs, for political purposes. A state of unbounded licentiousness certainly prevailed at the period of our visit, and some attempts were making to revive the native games, dances, &c. for many years entirely suppressed; but no one could walk through the streets of Honorara, especially on a Sunday, without being convinced that a permanent change had been effected in the religion of the island. Once, in a council of the chiefs, the question of the abolition of Christianity was started, but it was opposed by all those of greatest weight, even by the old *Neva-neva*, or high-priest himself, whose influence has suffered such a blow by the new religion, and who, consequently, might have been supposed most interested in its extinction. Till, however, the sacredness of property is secured by positive laws, these islands can make few or no advances in civilization; the question was in agitation when we were there, and it was said that an enactment to that effect was shortly to be passed.*

I took advantage of the ten days that we staid in Oaho to make a pedestrian tour through the interior of the island. The results of my observations I take the liberty of presenting to you, in the brief physico-geognostical sketch appended to the letter, as far as the island has been opened to my inspection. It is very imperfect, chiefly for three reasons: the hasty progress of my tour; the unfavourable influence of a tropical sun on geognostic pursuits; the density of vegetation, which, in many places, concealed the subjacent rock from view. But, as being the first of the kind on this interesting group of islands, it may be deemed worthy of notice. Any errors in the designation of mineralogical characters you will be able to rectify, by means of the series of specimens I now send you, per the Ganymede barque of the Hudson Bay Company.

We arrived off the bar of the river Columbia on the 1st May, and, on the 4th, reached Fort Vancouver where I have

* I pass over unnoticed the differences between the white residents, with the British and American Consuls at their head and the Missionaries, and refer you to the Rev. Mr Stewart's recent work, whose observations, as far as my knowledge extends, are generally correct.

been stationed ever since. I find my situation here very different from what I was led to expect on leaving Scotland. Besides the duties of medical-officer, those of Indian-trader also devolve upon me; so that my time is so fully occupied that little or none have I been able to devote to natural history pursuits. I have made one short journey into the valley of the Walamet, one of the southern tributaries of the Columbia. But, although my opportunities of seeing North-west America have as yet been but limited, I have gathered sufficient information, and seen objects from the three kingdoms of nature, enough to convince me that it is a country of exceeding interest to the naturalist. Limestone, coal, lead, silver, gold, salt, are among its mineral riches. Among its vegetable wonders, I need only cite to you the gigantic *Taxodium* of the frontiers of California, the size of one of which, as I have from credible authority, is 32 feet in circumference, 3 feet from the ground, and 291 feet of extreme length, by actual measurement. I must reserve, however, for a future letter any information in detail I may be able to obtain regarding this region. The maritime chain contains no less than six snowy peaks, within a range of 200 miles, from the parallel of 43° to that of 46°. How often have I wished, when viewing that of Mount Hood, which towers up within 40 miles of Fort Vancouver, that it were transported to Britain, within reach of so many men illustrious in the annals of physical research *.

Fort Vancouver, Columbia River,
August 31. 1833.