of the ebb and flow, and the height of the rise and fall ; it being high water invariably at noon and midnight, and low water at six in the morning and evening. The total range from low to high water seldom exceeds eighteen inches or two feet. Generally once, and frequently twice in the year, a very heavy sea rolls over the reef, and bursts with great violence upon the shore. But the most remarkable feature in this periodically high sea is, that it invariably comes from west and south-west, which is just the opposite of the trade-wind. The eastern sides of the islands are never injured by these periodical inundations. Mr Wil­liams is anxious to call the attention of scientific men to this remarkable phenomenon, which he believes to be re­stricted to the Tahitian and Society Island groups in the South Pacific, and the Sandwich Islands in the North. But he cannot speak positively respecting the islands eastward of Tahiti ; but at all the islands he has visited in the same parallel of longitude to the southward, and in those in the same parallel of latitude westward, the same regularity is not observed, but the tides vary with the moon, both as to the time and magnitude of the tide, which is the case at Rarotonga. He is also anxious to correct the erroneous statements of some scientific visitors, particularly of Kot­zebue, who asserts that “ every noon the whole year round, at the moment the sun touches the meridian, the water is highest, and falls with the sinking sun till midnight!” Ac­cording to Captain Beechy, “ the tides in all harbours formed by coral reefs are very irregular and uncertain, and are almost wholly dependent upon the sea-breezes. At Oututaunoa, it is usually low water about six every morn­ing, and high water half an hour after noon. To make this deviation from the ordinary course of nature intelli­gible, it will be better to consider the harbour as a basin, over the margin of which, after the breeze springs up, the sea beats with considerable violence, and. throws a larger supply into it than the narrow channels can carry off in the same time, and consequently during that period the tide rises. As the wind abates, the water subsides ; and the nights being generally calm, the water finds its lowest level by the morning.”

“ This statement,” says Mr Williams, “ is certainly most incorrect; for not only have I observed for years the un­deviating regularity of the tides, but this is so well under­stood by the natives, that the hours of the day and night are distinguished by terms descriptive of its state : as, for example, instead of asking 'What is the time ?’ they say ‘ Where is the tide ?’ Nor can the tides, as Captain B. observes, be ‘ wholly dependent upon the sea breeze ;’ for there are many days during the year when it is perfectly calm, and yet the tide rises and falls with the same regu­larity as when the trade-winds blow ; and we very fre­quently have higher tides in calms than during the preva­lence of the trade-wind ; besides which, the tides are equally regular on the westward or leeward side of the islands, which the trade-wind does not reach, as on the eastward, from which point it blows. But the perfect fal­lacy of Captain Becchy’s theory will be still more apparent, if it be recollected that the trade-wind is most powerful from mid-day till about four or five o’clock, during which time the tide is actually ebbing so fast, that the water finds its lowest level by six o’clock in the evening ; and that in opposition to the strength of the sea-breeze, Captain Beechy adds, \* that the night being calm, the water finds its lowest level by morning;’ whereas the fact is, that the water finds its highest point at midnight when it is perfectly calm. How then can the tides be dependent on the sea-breeze ?”

Mr Lubbock thinks some of these extraordinary anoma­lies may perhaps be accounted for by considering the con­tinent of South America as a dam, preventing the derived tide-wave from flowing freely into the Pacific from the great Southern Ocean.

Owing to the tide-wave which enters the German Ocean by the north coast of Scotland, not reaching the mouth of the Firth of Forth at the same time with the other tide-wave which conies through the Straits of Dover, there are frequently four, and sometimes six tides a day, observed in the upper part of the Firth of Forth. These peculiarities are most conspicuous about the time of spring tides, and gradually decrease till the neaps, when they vanish alto­gether. For the particulars, we beg to refer to the Re­ports of the British Association on Waves, by Sir John Robison and Mr Russell. But so long ago as the year 1750, peculiarities had been observed in the tides of the Forth, as described by Wright in the Phil. Trans. for that year.

When a tide-wave arrives at the mouth of a river, it en­ters in a manner similar to that of a derivative tide into a narrow sea ; and though there are generally some features peculiar to each river in the entrance of the tide-wave, it afterwards assumes a direction at right angles to the cur­rent, and advances regularly up the stream. If the chan­nel gradually narrows upward like a funnel, the height of the tides will be increased by this convergence. Where the width is nearly uniform, the tide will gradually die away, and still more rapidly if the channel spreads out. In the Amazons the tide continues to ascend for several days against the stream, and is still sensible at 200 leagues from its mouth. Seven or eight tides, with intermediate low waters, follow in continual succession up this mighty river. Something similar takes place in the St Lawrence, the tides reaching 432 miles up the main channel to a point between Montreal and Quebec. Among other plausible reasons to account for the tide not ascending the Missis­sippi, its crookedness has been assigned as a very sufficient one. But the best of all reasons seems to be, that there is next to no tide in the sea at its mouth ; the total rise there being only about eighteen inches. When the tide, on entering a river, is made to rise greatly by the contrac­tion of the channel, the part of the water so affected may­be abruptly terminated on the inland side, owing to the depth and quantity of the water on that side not admitting of the surface there being immediately raised by means of transmitted pressure. A tide-wave thus rendered abrupt has a close analogy with the waves which curl over, and break on a shelving shore, and is called a *bore.* In many places it occurs in such magnitude as to produce great noise by the violent intestine motion of the water. Though it appears to travel with great rapidity, it in fact moves more slowly than the tide-wave under any other circum­stances. The bore which enters the Severn is nine feet high ; that in the creek of Fundy is said to be still higher. In the Garonne this phenomenon takes place near Bor­deaux, and is called there the *Mascaret :* at Cayenne it is called the *Barre.* It occurs on a grand scale in the river Amazons, at the junction with the Arawary, having there a face twelve or fifteen feet in height, and producing a noise which may be heard at two leagues distance. The Indians of the neighbourhood call it *Porοroca.* Ships are often ex­posed to considerable danger from the bore, especially in the more shallow parts of a river, and near the shore.

The range of the tide, that is, the height of high water above low water, is very different at different places, and is affected by circumstances which it is often very difficult to analyse. It is however clear that the configuration of the coast exercises a very considerable influence upon the amount of this range, according as it makes the tides con­verge or diverge. Thus the range is very much increased in deep in-bends of the shore, which are open in the direction of the tide-wave, and gradually contract like a funnel, such as the Bristol Channel, the Gulf of Avranches, the Bay of St Malo, and the Bay of Fundy, where sometimes it very con­siderably exceeds seventy feet, some say 100. On the con-