

brought on the land, it was very fertile. All the main valleys in the Cordillera are characterized by having, on both sides, a fringe or terrace of shingle and sand, rudely stratified, and generally of considerable thickness. These fringes evidently once extended across the valleys, and were united; and the bottoms of the valleys in northern Chile, where there are no streams, are thus smoothly filled up. On these fringes the roads are generally carried, for their surfaces are even, and they rise with a very gentle slope up the valleys: hence, also, they are easily cultivated by irrigation. They may be traced up to a height of between 7,000 and 9,000 feet, where they become hidden by the irregular piles of debris. At the lower end or mouths of the valleys they are continuously united to those land-locked plains (also formed of shingle) at the foot of the main Cordillera, which I have described in a former chapter as characteristic of the scenery of Chile, and which were undoubtedly deposited when the sea penetrated Chile, as it now does the more southern coasts. No one fact in the geology of South America interested me more than these terraces of rudely-stratified shingle. They precisely resemble in composition the matter which the torrents in each valley would deposit, if they were checked in their course by any cause, such as entering a lake or arm of the sea; but the torrents, instead of depositing matter, are now steadily at work wearing away both the solid rock and these alluvial deposits, along the whole line of every main valley and side valley. It is impossible here to give the reasons, but I am convinced that the shingle terraces were accumulated, during the gradual elevation of the Cordillera, by the torrents delivering, at successive levels, their detritus on the beach-heads of long narrow arms of the sea, first high up the valleys, then lower and lower down as the land slowly rose. If this be so, and I cannot doubt it, the grand and broken chain of the Cordillera, instead of having been suddenly thrown up, as was till lately the universal and still is the common opinion of geologists, has been slowly upheaved in mass, in the same gradual manner as the coasts