hand it is a necessary implicate of their very natures, that oceanic currents and sand-currents are never able to come into collision with one another; for their domains are so extremely unlike that they scarcely come into contact with one another even at their boundaries, except perhaps occasionally in the case of littoral dunes. Nevertheless water in another form can and does come into collision with sand-currents, as we have seen in the lower Tarim, and as is the case in the lower Amudarja; and the effects produced by the friction, and the wear and tear thereby occasioned, are extraordinarily great.

One important difference between sand-currents on the one hand and aqueous and atmospheric currents on the other is, that while the latter set up counter-currents for the purpose of restoring equilibrium, there exists no corresponding relation of cause and effect in the case of the former, which simply progress in one direction, and continue to advance time after time in that same direction so far as the boundaries of their basin and the impelling wind will allow them to do. It is only in so far as it attempts to counteract the difference of elevation occasioned by the building up of mountain-ranges that a sand-current can, so far forth, be regarded as an agency for restoring equilibrium; but this is entering upon a different domain, in which drift-sand plays the same part as loess and sedimentary deposits.

In addition to the resemblances which I have pointed out as existing between movements in sand and movements in an absolute fluid, there are of course numerous others, such as the power which the surf possesses of forming very high waves on a rocky coast, a situation which is clearly reflected again when a sandy desert impinges upon the foot of a mountain (see below, The Gobi Desert); but the instances already cited are sufficient to illustrate the resemblance between the effect which the wind produces upon water and upon sand. There is however one other point of comparison remaining, and it brings us to the question with which I began this series of reflections, namely how far ripple-marks may be regarded as dunes in an embryonic stage, as Cornish considers them to be.

Let us therefore, even now, consider an analogous condition in the case of a fluid, e. g. water, and see what Krümmel has to say about it. He begins by reminding us of what is a matter of common experience, how the smooth, bright sheet of water is clouded by the morning breeze, how it then becomes slightly ruffled, and how the little rufflings increase in size from windward to leeward in proportion as the wind gathers strength. When you row out in a boat from the shore off which the wind is blowing, you can distinctly see the waves growing bigger in size. »Sind nun einmal erst jene embryonalen oder kapillaren Wellen vorhanden, so hat es keine Schwierigkeit, das Wachstum derselben unter der weiteren Einwirkung des Windes bis zu den grossen 'Seen' des offenen Ozeans zu erklären. Die weitere Ausbildung erstreckt sich sowohl auf die Umformung der kurzen, schwach gebogenen, in lange geradlinige Kämme, wie auf die Zunahme aller Dimensionen. Hierbei kommen nun die kreisenden Bewegungen der Wasserteilchen in der Welle in Betracht. Im Wellenkamm, im oberen Scheitel, bewegen diese sich ohnehin mit dem Winde vorwärts; der Wind wird also ihre Tendenz nach vorn stetig beschleunigend verstärken . . . Je länger also der Wind auf die ursprünglich so kleinen Furchungen einwirkt, um so grösser wird er die Amplituden der Orbitalbahnen machen, d. h.