

of it are situated the forts Murzaterék and Chakmák, some ten miles distant from each other. The southern portion of this range consists at its base of undulating layers of greenish or purplish shales, overlain by dark coloured, mostly black, limestone in thick and thin strata, the latter being generally earthy. The limestone occupies all the higher elevations, and, as is generally the case, greatly adds to the ruggedness of the mountains. About five miles north of Chungterék, I found in a thick bed of limestone an abundance of *Megalodus triqueter*, a large *Pinna*, a *Spiriferina* of the type of *S. Stracheyi*, blocks full of *Lithodendron* corals, and numerous sections of various small *Gastropods*. Thinner layers of the same limestone were full of fragments of *crinoid stems*, and of a branching *Cerriopora*, the rock itself bearing a strong resemblance to the typical St. Cassian beds. In this place the shales, underlying the limestone, were partly interstratified with it, in layers of from 5 to 10 feet; and from this fact it seems to me probable that they also are of triassic age, representing a lower series of the same formation.

Proceeding in a north-westerly direction, the *Megalodus*-limestones are last seen near Murzaterék. From this place the greenish shales continue for a few miles further on, much disturbed and contorted; and at last disappear under a variety of dark coloured shales, slates, and sandstones, with occasional interstratified layers of black, earthy limestone. The strike of the beds is from east by north to west by south, and the dip either very high to north or vertical. At Chakmák the river has cut a very narrow passage through these almost vertical strata, which rise precipitously to about 3,000 feet, and to the south of the fort appear to be overlain by a lighter coloured rock. It is very difficult to say what the age of these slaty beds may be, as they seem entirely unfossiliferous, and we can at present only regard them as representing, in all probability, one of the palæozoic formations.

About five miles north-west of Chakmák a sensible decrease in the height of the range takes place, and with it a change in the geological formation. The palæozoic beds, although still crossing the valley in almost vertical strata, become very much contorted; while, unconformably on them, rest reddish and white sandstones and conglomerates, regularly bedded, and dipping to north-west with a steady slope of about 40 degrees. The rocks, though evidently belonging to a comparatively recent (kainozoic) epoch, appear to be much altered by heat, some layers having been changed into a coarse grit, in which the cement has almost entirely disappeared. I have not, however, observed any kind of organic remains in them. A little distance further on they several times alternate with successive, conformably bedded, doleritic trap. The rock is either hard and compact, being an intimate, rather fine grained mixture of felspar and augite in small thin crystals, or it decomposes into masses of various greenish and purplish hues, like some of the basic greenstones.

After leaving the junction of the Suyok and Toyán (or Chakmák) rivers, and turning northwards into the valley of the latter, the panorama is really magnificent. Shades of white, red, purple, and black compete with each other in distinctness and brilliancy, until the whole series of formations appear in the distance capped by a dark bedded rock.

Although, judging from the greater frequency of basaltic boulders, we already knew that this rock must be found further north, we hardly realized the pleasant sight which awaited us on the march of the 4th January, after having left our camp at Kulja or Bokum-bashi. The doleritic beds increased step by step in thickness, and after a few miles we passed through what appears to be the centre of an extensive volcanic eruption. Along the banks of the river columnar and massive basalt was noticed several times, with occasional small heaps of slags and scoriæ, among a few outcrops of very much altered and disturbed strata of red or white sandstone, thus adding to the remarkable contrast of the scene. In front of us, and to the right, stretched in a simicircle a regular old Somma; the almost perpendicular walls rising to about 1,500 feet above the river, and clearly exposing the stratification of the basaltic flows, which were successively dipping to north-east, east, and south-east. On our left, as well as in an almost due western direction, portions of a similar Somma were visible above the sedimentary rocks, all dipping in the opposite way from those ahead of us. The cone itself has in reality entirely disappeared by subsidence, and the cavity was filled with the rubbish of the neighbouring rocks.