the Talas Ala-tau, the Bishelik, the Badam Mountains, the Kazyk-urt, and the Alym-tau—fringe the above on the north-west, and occupy the south-east corner of Syr-Dari- insk. The snowclad summits of the Talas Ala-tau range from 14,000 to 15,000 feet, and immense glaciers occur about Manas Mountain. So far as our maps show, the range seems to run from west-south-west to east-north-east. The other chains just mentioned have a decidedly south-westerly direction, and are much lower, the outlying ranges having rather the character of broad plateaus, above 2000 feet in height, where the Kirghiz find excellent pasture grounds. Some of them, such as the Kazyk-urt, rise as isolated mountains from the steppe, and have therefore been called Ararats. The Kara-tau is quite separate from the preceding and runs at right angles to them—that is, from north-west to south-east. It belongs therefore to another series of upheavals which prevails in western Asia and to which Richthofen has given the name of the “ Kara-tau series.” Its length is about 270 miles, and its average height about 5000 feet, rising at some points to 6000 and 7000 feet. It separates the Syr-Daria from the Tchu, and its gentle south-western slope contains the sources of a multitude of streams, which water the oasis around the town of Turke­stan. Another range, having the same direction, from north-west to south-east, touches the southern border of Syr-Daria, namely, the Nura-tau (or Nuratyn-tau), also called Turkestan Mountains, which lifts its icy peaks (15,000 to 16,000 feet in height) abruptly from the steppe. It separates Syr-Daria from Zerafshan, and the passes by which it is crossed reach an altitude of from 10,000 to 13,000 feet. Finally, a few islands of metamorphic or granitic rock, called Ararats by the natives, stand isolated in the steppes.

The mountainous tracts occupy, however, only a small part of Syr-Daria ; the rest of its wide surface is steppe. Three different areas must be distinguished,—the Kizil-kum, the Muyun-kum or Ak-kum, and the Kara-kum (“ black sands,” so called more from their desert character than from their colour). The Kizil-kum (red sands) is the most interesting.@@1 These sands occupy the wide stretch between the Amu and the Syr, and have a gradual ascent from 160 feet at the Sea of Aral to 1500 and 2000 feet in the south­east. They are covered with numerous folds or elongated dunes (*barkhans),* partly shifting partly stationary, 30 to 60 feet high, and mostly parallel to each other, amidst which are immense spaces covered with clay, and saline clays appear here and there on the surface. The Kizil-kum varies much in its characteristics. Close by the Sea of Aral it is covered with shifting sands, the result of the disintegration of cretaceous sandstones ; and every storm raises clouds of hot sand which render communication exceedingly difficult. But even there a rich verdure covers the undulations in spring. Farther east the sands lose their shifting character, and the barkhans are covered with a kind of *Carex,* which serves as excellent food for sheep. The *Holoxylon Anemodendron* grows extensively on the elevated ridges and yields fuel and charcoal, which last is exported to Bokhara. In the west the surface is covered with remains of Aral-Caspian deposits. As the Tian-Shan is approached the steppe takes another character : a thick covering of loess girdles the foothills and forms the fertile soil to which Turkestan is indebted for its rich fields and gardens.

The Kara-kum sands, situated to the north-east of the Sea of Aral, are manifestly *a* former bottom of the lake. They are covered with débris of *Cardium edule, Mytilus, Dreissena polymorpha, Neritina litturata, Adacna vitrea, Hydrobia stagnatis,* with remains of marine *Algæ {Zostera),* and with fragments of *Scirpus* and *Phragmites.* The Kizil-kum is characterized by the presence of *Lithoglyphïes caspius, H. stagnalis, Anodonta podervsa,* and the sponge *Metehnikowia tuberculata.* The evil reputation of the Kara-kum has been exaggerated to some extent ; the harsh things said of it apply only to the neighbourhood of the Sea of Aral. In the east the steppe has some vegetation and is readily visited by the Kirghiz. The barkhans do not shift, being covered with *Calligonum, Tamarix, Holoxylon Anemodendron,* and some rushes ; shifting dunes 40 to 50 feet high occur, especially towards the Sea of Aral. The Muyun-kum or Ak-kum Steppe, between the Kara-tau Mountains and the Tchu, is quite uninhabited, except in the loess region at the northern base of the mountains.

Granites, granilites, syenites, porphyries, and various meta­

morphic slates constitute the bulk of the western Tian-Shan Moun­tains. They appear also in the Kara-tau and Nura-tau, and some­times in the form of isolated islands in the steppe. Silver and lead ores, as well as malachite and copper ore, are found in them, especially in the Mogol-tau, and turquoises about Khojend. The crystalline rocks, much metamorphosed, especially in the west, are overlain by thick Devonian and Carboniferous deposits. Jurassic rocks (Rhætic) cover small areas on the slopes of the mountains. These last are all of fresh-water origin ; hence it would seem that throughout the Jurassic and Triassic periods Turkestan was a continent intersected only by lagoons of the Jurassic sea. The Jurassic deposits are most important on account of their coal-beds, which occur in the basins of the Badam and Sairam and in Ferghana. Chalk and Tertiary marine deposits are superimposed upon the above to the thickness of 2000 to 5000 feet, and are widely spread, although they have suffered greatly from denudation. The former belong to the Upper (Ferghana deposits, much resembling Senonian) and Middle Chalk, and contain phosphorite, gypsum, and naphtha (in the Amu-Daria basin). The Tertiary deposits, which contain gypsum and lignite, are represented by nummulitic sands around the Sea of Aral, and by Oligocene and Miocene (Sarmatic) deposits. In the Tian-Shan the red Tertiary conglomerates (Pliocene ?) attain a great develop­ment. Throughout the Chalk and earlier Tertiary periods the lowlands of Syr-Daria were under the sea. The character of the region during the Post-Pliocene period remains unsettled. To what extent the mountains of the western Tian-Shan were under ice during the Glacial period remains a subject of controversy among geologists ; many deposits, however, have been described, even in the outer parts of mountain tracts, which have a decidedly Glacial character. A girdle of loess, varying in width from 30 to 50 miles, encircles all the mountain tracts, increasing in extent in Bokhara and at the lower end of the valley of Ferghana. It seems certain that during the Lacustrine period the Caspian was connected by a narrow gulf with the Aral basin, which was then much larger, while another inland sea of great dimensions covered the present Balkash basin, and at an earlier period may have been connected with the Aral basin. Recent traces of these basins are found in the steppes.

The chief river of the province is the Syr-Daria (see above), with its tributaries. The frontier touches the eastern shore of the Sea of Aral, and numerous small lakes, mostly salt, are scattered over the sandy plains. A few lakes of alpine character occur in the valleys of the hilly tracts.

The climate of Syr-Daria varies greatly in its different parts. It is most severe in the high treeless *syrts* of the mountain region ; and in the lowlands it is very hot and dry. As a whole, the western parts of the Tian-Shan receive but little precipitation, and are therefore very poor in forests. In the lowlands the heat of the dry summer is almost insupportable, the thermometer rising to 111° Fahr. in the shade; the winter is severe in the lower parts of the province, where the Syr remains frozen for three months. The average yearly temperature at Tashkend and Kazalinsk respectively is 54° and 44° (January, 28° and 8° ; July, 80° and 76°).

The flora and fauna belong to two distinct regions,—to Turke­stan and to the Aral-Caspian depression (see Turkestan). The ter­races of loess mentioned above are alone available for culture, and accordingly less than 1 per cent. (0·8) of the total area of the pro­vince is under crops, the remainder being either quite barren (57 per cent. of the surface) or pasture land (42 per cent.). Although cultivation is possible only in a few oases, it is there carried to great perfection owing to a highly developed system of irrigation,— two crops being gathered every year. Wheat and barley come first, then pease, millet, and lentils, which are grown in the autumn. Rye and oats are grown only about Kazalinsk. Cotton is cultivated in the districts of Khojend, Kurama, and Turkestan. Gardening is greatly developed. Sericulture is also an important source of income, nearly 85 tons of silk being produced every year. Cattle- breeding is largely pursued, not only by the nomads but also by the settled population, and in 1881 it was estimated that Syr-Daria had 242,000 camels, 396,000 horses, 294,000 horned cattle, and 3,200,000 sheep. Fishing is pursued to some extent on the lower Syr. Timber and firewood are exceedingly dear ; timber is floated down from the mountains, but in small quantities ; trees raised in gardens, dung, and some coal (the last in very limited quantity) are used for fuel.

The population of the province amounted to 1,109,500 in 1881, of whom 146,300 lived in towns, 326,600 were settled, and 621,600 were nomadic. It is comparatively dense in certain parts, reaching 15 to 31 inhabitants per square mile in Kurama and Khojend, and still more in the valley of the Tchirtchik. Its ethnographical com­position is very mixed. The Russians barely number 8500, if the military be left out of account ; they live principally in towns and about Kazalinsk. Kirghiz (709,400 with the Kara-Kirghiz) and Sarts (211,000) are the main elements of the population; 50,000 Tadjiks, 26,000 Uzbegs, 4500 Tatars, about 77,000 Kuramints (settled Kirghiz mixed with other elements), and a few Jews, Persians, and Hindus must be added. The chief occupations of the Sarts, Uzbegs, Tadjiks, and Kuramints are agriculture and

@@@1 Comp. J. Mushketoff’s *Turkestan,* vol. i.