important being the Puerto de Despeñaperros, where the Rio Magaña, a sub-tributary of the Guadalimar, has cut for itself a deep gorge through which the railway ascends from Andalusia to Madrid. Between Andalusia and Estremadura farther west the communication is freer, the Sierra Morena being broken up into series of small chains.

Of the mountains belonging to the table-land the most continuous are those of the Cantabrian chain, which stretches for the most part from east to west, parallel to the Bay of Biscay, but ultimately bends round towards the south between Leon and Galicia (see Cantabrian Mountains). A peculiar feature of this chain, and of the neighbouring parts of the table-land, is the number of the *parameras* or isolated plateaus, surrounded by steep rocky mountains, or even by walls of sheer cliff. The bleak districts of Sigüenza and Soria, round the headwaters of the Douro, separate the mountains of the so-called Iberian system on the north-east of the table-land from the eastern portion of the central mountain chains of the peninsula. Of these chains, to which Spanish geographers give the name Carpetano-Vetonica, the most easterly is the Sierra de Guadarrama, the general trend of which is from south-west to north- east. It is the Montes Carpetani of the ancients, and a portion of it (due north of Madrid) still bears the name of Carpetanos. Composed almost entirely of granite, it has an aspect when seen from a distance highly characteristicof the mountains of the Iberian Peninsula in general, presenting the appearance of a saw-like ridge *(sierra)* broken up into numerous sections. Its mean height is about 5250 ft., and near its centre it has three summits, the highest (named the Pico de Peñalara) rising to a height of 6910 ft. The chief passes across the Sierra are those of Somosierra (4692 ft.) in the north-east, Navacerrada (5837 ft.), near Peñalara, and Guadarrama (5010 ft.), a few miles farther south and west; these are crossed by carriage roads. The railway from Madrid to Segovia passes through a tunnel close to the Guadarrama Pass; and the railway from Madrid to Avila traverses the south-western portion of the range through a remark­able series of tunnels and cuttings.

A region with a highly irregular surface, filled with hills and parameras, separates the Sierra de Guadarrama from the Sierra de Gredos farther west. This is the loftiest and grandest sierra in the whole series. Its culminating point, the Plaza de Almanzor, attains the height of 8730 ft., not far short of that of the highest Cantabrian summits. Its general trend is east and west; towards the south it sinks precipitously, and on the north it descends with a somewhat more gentle slope towards the longitudinal valleys of the Tormes and Alberche which separate it from another rugged mountain range, forming the southern boundary of the paramera of Avila. On the west another rough and hilly tract, similar to that which divides it from the Sierra de Guadarrama in the east, separates it from the Sierra de Gata, the westernmost and the lowest of the Spanish sierras belonging to the series. These hilly intervals between the more continuous sierras greatly facilitate the communication between the northern and southern halves of the Spanish table-land. The Sierra de Gredos has a road across it connecting Avila with Talavera de la Reina by the Puerto del Pico; but for the most part there are only bridle-paths across the Gredos and Gata ranges, and no railway crosses either of them, although the line from Plasencia to Salamanca skirts the Sierra de Gredos on the west. The Serra da Estrella, in Portugal, is usually regarded as a fourth section in the Carpetano- Vetonica chain.

On the southern half of the table-land a shorter series of sierras, consisting of the Montes de Toledo in the east (highest elevation Tejadillas, 4567 ft.) and the sierras of San Pedro, Montanchez and Guadalupe in the west (highest elevation Cabeza del Moro, 5100 ft.), separates the basins of the Tagus and Guadiana. The southern system of mountains bounding the Iberian table-land—the Sierra Morena *(q.v.)—*is even less of a continuous chain than the two systems last described. As already intimated, its least continuous portion is in the west. In the east and middle portion it is composed of a countless number of irregularly-disposed undulating mountains all nearly equal in height.

Even more important than the mountains bounding or crossing the table-land are those which are connected with it only at their extremities; viz. the Pyrenees *(q.v.)* in the north-east, the Sierra Nevada *(q.υ.)* and the coast ranges in the south. The transverse valleys of the Sierra Nevada open southwards into the mountainous longitudinal valleys of the Alpujarras *(q.υ.),* into which open also on the other side the transverse valleys from the most easterly of the coast sierras, the Sierra Contraviesa and the Sierra de Almijara. These ranges are continued farther west by the Sierra de Alhama and Sierra de Abdalajiz. Immediately to the west of the last-named sierra is the gorge of the Guadalhorce, which affords a passage for the railway from Malaga to Cordova; and beyond that gorge, to the west and south-west, the Serrania de Ronda, a mountain group difficult of access, stretches out its sierras in all directions. To Spanish geographers the coast ranges just mentioned are known collectively as the Sierra Penibetica. Although not comparable in altitude with the Pyrenees (highest summit Aneto, 11,168 ft.) or the Sierra Nevada (highest summit Mulhacen, 11,421 ft.), the coast ranges frequently attain an elevation of over 5000 ft., and in some cases of over 6000 ft. North-east of the Sierra Nevada two small ranges, Alcaraz and La Sagra, rise with remarkable abruptness from the plateau of Murcia, where it merges in that of the interior.

The only two important lowland valleys of Spain are those of the Ebro and the Guadalquivir. The Ebro valley occupies the angle in the north-east between the Pyrenees and the central table-land, and is divided by ranges of heights proceeding on the one side from the Pyrenees, on the other from the base of the Moncayo, into two portions. The uppermost of these, a plateau of between 1000 and 1300 ft. above sea-level, is only about one-fourth of the size of the remaining portion, which is chiefly low- land, but is cut off from the coast by a highland tract connecting the interior table-land with spurs from the Pyrenees. The Guadalquivir basin is likewise divided by the configuration of the ground into a small upper portion of considerable elevation and a much larger lower portion mainly lowland, the latter composed from Seville downwards of a perfectly level and to a large extent unhealthy alluvium *(Las Marismas).* The division between these two sections is indicated by the change in the course of the main stream from a due westerly to a more south-westerly direction.

The main water-parting of the Peninsula is everywhere near the edge of the table-land on the north, east and south, and hence de- scribes a semicircle with the convexity to the east. There are five great rivers in the Peninsula, the Tagus (Spanish *Tajo,* Portuguese *Τejο),* Douro (Spanish *Duero),* Ebro, Guadiana and Guadalquivir, all of which rise in Spain. The Ebro alone flows into the Mediterranean, and the Ebro and Guadalquivir alone belong wholly to Spain ; the lower courses of the Tagus and Douro are bounded by Portuguese territory; and the lower Guadiana flows partly through Portugal, partly along the frontier. The Tagus rises in the Montes Universales on the borders of Teruel, and flows in a westerly direction until it enters the Atlantic below Lisbon, after a total course of 565 m. The Douro (485 m.) and the Ebro (466 m.) flow respectively south-west to the Atlantic at Oporto, and south-east to the Mediterranean at Cape Tortosa, from their sources in the great northern watershed. The Guadiana (510 m.) passes west and south through La Mancha and Andalusia to fall into Cadiz Bay at Ayamonte; and the Guadalquivir (360 m.) takes a similar direction from its headwaters in Jaen to Sanlucar de Barrameda, where it also enters Cadiz Bay farther south. These five rivers, as also the smaller Júcar and Segura, which enter the Mediterranean, are fully described in separate articles. With the exception of the Guadalquivir, none of them is of great service for inland navigation, so far as they lie within the Spanish frontier. On the other hand, those of the east and south are of great value for irrigation, and the Júcar and Segura are employed in floating timber from the Serrania de Cuenca. The only considerable lakes in Spain are three coast lagoons—the Albufera *(q.υ.)* de Valencia, the Mar Menor in Murcia and the Laguna de la Janda in Cadiz behind Cape Trafalgar (see Murcia and Cadiz). Small alpine and other lakes are numerous, and small salt lakes are to be found in every steppe region.

*Geology.—*Geologically the Spanish Peninsula consists of a great massif of ancient rock, bordered upon the north, east and south by zones of folding in which the Mesozoic and early Tertiary beds are involved. The massif is composed of Archean, Palaeozoic and eruptive rocks, partly concealed by a covering of Tertiary strata, but characterized by the absence, excepting on its margins, of any marine deposits of Mesozoic age. It stretches from Galicia and Asturias on the north to the valley of the Guadalquivir on the south, and includes the mountains of Castile, the Sierra de Toledo and the Sierra Morena. The rocks which form it are often strongly folded, but the folding is of ancient date and strikes obliquely across the massif and has had no influence in determining its outline. The massif is in fact merely a fragment of the great Hercynian mountain system which was formed across Europe at the close of the Carboniferous period. During the Mesozoic era this mountain chain was shattered and large portions of it sank beneath the sea and were covered by Mesozoic and Tertiary strata. But other fragments still rose above the waves, and of these the great massif of Portugal and western Spain was one. Around it the deposits of the Jurassic and Cretaceous seas were laid down; and during the Tertiary era they were crushed, together with the earlier Tertiary beds, against the ancient rocks, and thus formed the folded zones of the Cordillera Betica on the south, the hills of southern Aragon on the east and the Pyrenees on the north. The intervening plains and plateaus are now for the most part covered by Tertiary deposits, which also spread over much of the ancient massif.

Archean rocks are exposed in the north of the Peninsula, particu­larly along the great Pyrenean axis, in Galicia, Estremadura, the Sierra Morena, the Sierra Nevada and Serrania de Ronda. They consist of granites, gneisses and mica-schists, with talc-schists, amphibolites and crystalline limestones. The oldest Palaeozoic strata are referred, from their included fossils, to the Cambrian, Ordovician and Silurian systems. They range through a vast region of Andalusia, Estremadura, Castile, Salamanca, Leon and Asturias, and along the flanks of the Pyrenean and Cantabrian chain. They consist of slates, greywackes, quartzites and diabases. Grits, quartzites, shales and limestones referable to the Devonian system are found in a few scattered areas, the largest and most