

materials, essentially in the same arrangement, have simply been appropriated from his predecessor without his being so much as named even once, the other sources to which Sozomen was indebted being, however, expressly cited. All that can be said to the credit of Sozomen is that he has been himself at the trouble to refer to the principal sources used by Socrates (Rufinus, Eusebius, Athanasius, Sabinus, the collections of epistles, Palladius), and has not unfrequently supplemented Socrates from them, and also that he has adduced some new authorities, in particular sources relating to Christianity in Persia, Arian history, monkish histories, the *Vita Martini* of Sulpicius, books of Hilarius; the whole of the ninth book is entirely drawn from Olympiodorus.

It is difficult to discern the motive for a work which was merely an enlarged edition of Socrates. But it is probable that Sozomen did not approve of Socrates's freer attitude towards Greek science, and that he wished to present a picture in which the clergy should be still further glorified, and, above all, monasticism brought into still stronger prominence. In Sozomen everything is a shade more ecclesiastical—but only a shade—that in Socrates. Perhaps also he wrote for a different circle,—say, the monks in Palestine,—and could be sure that in it the work of his predecessor would not be known.

Sozomen is everywhere an inferior Socrates. What in Socrates still betrays some vestiges of historical sense, his moderation, his reserve in questions of dogma, his impartiality,—all this is wanting in Sozomen. In many cases he has repeated the exact words of Socrates, but with him they have passed almost into mere phrases. The inferiority of Sozomen to Socrates as an historian appears as much in the manner in which he transcribed him as in those passages where he introduces something new. The chronological scrupulosity of the earlier writer has made no impression on his follower; he has either wholly omitted or inaccurately repeated the chronological data. He writes more wordily and diffusely. In his characterizations of persons, borrowed from Socrates, he is more dull and colourless. After Socrates he has indeed repeated the caution not to be too rash in discerning the finger of God; but his way of looking at things is throughout mean and rustic. Two souls inhabit his book: one, the better, is borrowed from Socrates; another, the worse, is his own. Wherever he abandons his leader he frequently falls into mere retailing of stories, and prostrates himself in reverence before the poorest products of the religious fantasy of a degenerating age. Evidence of a boundless credulity with regard to all sorts of monkish fables is to be met with everywhere. Raisings of the dead are quite common occurrences with him, and he repeatedly gives accounts of enormous dragons. In the finding of the bones of saints he takes the highest interest, and even believes in the rediscovery of the tombs of the Old Testament prophets.

Where we still possess Socrates's account that of Sozomen very seldom has any consequence, but some of the additions he has made are instructive and important. The number of new acts of councils introduced by him is small. His monkish histories are as sources almost utterly valueless; his account of the Christians in Persia absolutely swarms with mistakes. It must, however, be noted that for the period from Theodosius I. onward he has emancipated himself more fully from Socrates and has followed Olympiodorus in part, partly also oral tradition; here accordingly his statements possess greater value.

Editions and Literature.—Socrates and Sozomen have been edited by Stephanns (Paris, 1544; Geneva, 1612), Valesius (Paris, 1659-73), Reading (Cambridge, 1720), Hussey (Oxford, 1858, 1860). They are also to be found in vol. lxvii. of Migne's *Patrologia*, and there is an Oxford school edition (1844) after Reading. Bright edited Socrates according to the text of Hussey in 1875. There are "Testimonia Veterum" in Valesius; and Nolte's papers in *Tubing. Quartalschr.* (1859) p. 518 sq., (1861) p. 411 sq., contain emendations in Hussey's text, and notes towards the history of the text and editions; see also Overbeck, in *Theol. Lit. Zeitung*, (1879), No. 20.

Special studies have been made by Baronius, Miræus, Labbé, Valesius, Halloix, Scalliger, Cellier, Cave, Dupin, Pagl. Ittig, Tillemont, Walch, Gibbon, Schroech, Lardner. See also Voss, *De Histor. Græcis*; Fabricius-Harless, *Biblioth. Gr.*, vol. vii.; Rössler, *Biblioth. d. Kirchenväter*; Holzhausen, *De Fontibus quibus Socr., Soz., ac Theod. in scribenda Historia Sacra uti sunt* (Göttingen, 1825; Ständlin, *Gesch. u. Lit. d. K.-G.*, Hanover, 1827; Baur, *Epochen* (1826); Harnack, "Socr. u. Soz.," in *Herzog-Plitt's Theol. Encycl.* Detached details are given also in works upon Constantine (Manso), *Julian Studies of Artianism*, 1882, gives a severe but trustworthy criticism of Rufinus and discusses the manner in which Socrates was related to him), the emperors after Julian (De Broglie, Richter, Clinton, the *Weltgeschichte*, of Ranke, the *Gesch. d. Kaiser Arcadius u. Theod. II.*, 1885, of *Güldenpenning*, and the *Kaiser Theodosius d. Gr.*, Halle, 1878, of *Iffland*, the last-named work discussing the relation of Socrates to Sozomen), the barbarian migrations (Wittefsheim, *Dahn*), the Goths (Waltz, Bessel, Kauffmann, and Scott's *Uffias*, 1885). Lastly, reference may be made to Rosensteln, *Forsch. z. deutsch. Gesch.*, vol. I.,—*Krit.*

Untersuch. üb. d. Verhältniss zu Olympiodor, Sozimus, u. Soz.; Sarrazin, *De Theodoro Lectore, Theopanis Fonte Præcipuo*, 1881 (treats of the relation between Socrates and Sozomen, and of the completeness of the former's work); Jeep, *Quellenuntersuch. z. d. griech. Kirchengeschichte*, Leipzig, 1884. (A. H.A.)

SPA, a watering-place of Belgium, in the province of Liège, 20 miles by rail from Liège via Pepinster, is beautifully situated, at a height of 814 feet above the sea, in the valley of the Wayai (a small sub-tributary of the Meuse). On the north and north-east it is protected by the wooded range of hills known as the Spaloumont, or in its several parts as Bois de la Reid, Bois du Chiencul, &c.; and on the south are a number of beautiful ravines cut in the Primary rocks of the district by small affluents of the Wayai. Much of the charm of the place is due to the promenades and drives along the sides and crests of the hills. The principal mineral spring called the Pouhon (a local word for "well") is enclosed in a pump-room in the centre of the Place Pierre le Grand. Public baths, fed by chalybeate streams collected in a remarkable reservoir at the hamlet of Nivesé, occupy a large building in Place Royale, erected in 1868; and in the same neighbourhood is the casino, with ball and concert rooms. An English church was built in 1872-76. A local industry is the production of fancy articles in lacquered wood (bois de Spa). A liqueur resembling Chartreuse is also manufactured under the name of "elixir de Spa." The population of the commune was 6930 in 1884. Several springs in the neighbouring district are nearly as celebrated as those of Spa proper; the Sauvenière waters, supposed to be effective against sterility, are half a mile distant.

Spa, said to derive its name from a Walloon word, *Espa*, for "fountain," was practically founded by a certain Wolf, or Collin le Loup, iron-master of Breda, who had obtained benefit from the waters, and purchased the piece of ground containing the Pouhon spring from Erard de la Marck, bishop of Liège, in 1326. At the beginning of the 15th century the little town numbered 250 houses. The European celebrity of the waters dates from the 16th century, when they were drunk by the duke of Nevers, Margaret of Valois, Henry III. of France, and Alexander Farnese, and the fashion of visiting Spa became thoroughly established in the 18th century. The French Revolution, and, as far as English visitors were concerned, the attractions of the German watering-places made known by Sir Francis Head, for a time turned the tide elsewhere; but since the middle of the century Spa has taken a new lease of prosperity.

SPAGNA, Lo (? -c. 1529), the usual designation (due to his Spanish origin) of Giovanni di Pietro, one of the chief followers of Perugino. Nothing whatever is known of his early life, or of the circumstances under which he became a member of the Perugian school. A large number of panel pictures by him exist, of which some are painted with much grace and refinement of touch. There is, however, a very marked absence of individuality about his style, which seems like an imitation of the earliest manner of Raphael and that of Pinturicchio in a weaker and less virile form. The chief of his numerous panel paintings are the Nativity, in the Vatican, and the Adoration of the Magi, at Berlin. In 1510 Lo Spagna executed many frescos at Todi, and in 1512 several other mural paintings in and near Trevi. His most important works were frescos at Assisi and Spoleto, of which some exist in good preservation. He received the freedom of the city of Spoleto in 1516, as a reward for his work there. As is so often the case, Lo Spagna's frescos reach a much higher standard of merit than his panel pictures. The museum of the Capitol in Rome now possesses a very beautiful series of life-sized fresco figures by him, representing Apollo and the Nine Muses. These are drawn with a strong feeling for grace of pose and beauty of expression, and are very remarkable for the delicate refinement of their colouring; in style they strongly recall Raphael's earliest manner. Lo Spagna was alive in 1528, but he appears to have died before 1530, as in that year a pupil of his named Doni completed a fresco in S. Jacopo, near Spoleto, which Lo Spagna had begun.

SPAGNOLETTO. See RIBERA

SPAIN

PART I.—GEOGRAPHY AND STATISTICS.

SPAIN, a country rather more than twice the size of Great Britain including the adjacent small islands, constitutes in its mainland portion about eleven-thirteenthths of the Iberian Peninsula, and has in addition an insular area (in the Balearic and Canary Islands) of nearly 5000 square miles. On all sides except that of Portugal the boundaries are natural, the Peninsula being separated from France by the Pyrenees and on every other side being surrounded by the sea. On the side of Portugal a tract of inhospitable country led originally to the separation between the two kingdoms, inasmuch as it caused the reconquest of the comparatively populous maritime tracts from the Moors to be carried out independently of that of the eastern kingdoms, which were also well peopled. The absence of any such means of intercommunication as navigable rivers afford has favoured the continuance of this isolation. The precise line of this western frontier is formed for a considerable length by portions of the chief rivers or by small tributaries, and on the north (between Portugal and Galicia) it is determined to a large extent by small mountain ranges. The British rock of Gibraltar, in the extreme south of the peninsula, is separated from Spain by a low isthmus known as the Neutral Ground. The coast-line on the north and north-west is everywhere steep and cliffy. On the north there are numerous small indentations, many of which form more or less convenient harbours, but the current flowing along the coast from the west often leaves in the stiller water at their mouths obstructive bars. The best harbours are to be found on the *rias* or fiord-like indentations in the west of Galicia, where high tides keep the inlets well scoured; here occur the fine natural harbours of Pontevedra and Vigo, Coruña and Ferrol, the last one of the chief stations of the Spanish fleet. Less varied in outline but more varied in character are the Spanish coasts on the south and east. Flat coasts prevail from the frontier of Portugal to the Straits of Gibraltar. Between the mouth of the Rio Tinto and that of the Guadalquivir they are sandy and lined by a series of sand-dunes (the tract known as the Arenas Gordas). Next follows a marshy tract at the mouth of the Guadalquivir, after which the coast-line becomes more varied, and includes the fine Bay of Cadiz. From the Straits of Gibraltar a bold and rocky coast is continued almost right round to Cape Palos, a little beyond the fine natural harbour of Cartagena. North of Cape Palos a line of flat coast, beginning with the narrow strip which cuts off the lagoon called the Mar Menor from the Mediterranean, bounds half of the province of Alicante, but in its northern half this province, becoming mountainous, runs out to the lofty headland of Cape Nao. The whole coast of the Bay of Valencia is low and ill-provided with harbours; and along the east of Catalonia stretches of steep and rocky coast alternate with others of an opposite character.

The surface of Spain is remarkable at once for its striking contrasts and its vast expanses of dreary uniformity. There are mountains rising with Alpine grandeur above the snow-line, but often sheltering rich and magnificent valleys at their base. Naked walls of white limestone tower above dark woods of cork, oak, and olive. In other parts, as in the Basque country, in Galicia, in the Serrania de Cuenca (between the head waters of the Tagus and those of the Jucar), in the Albarracin (between the head waters of the Tagus and those of the Guadalaviar), there are extensive tracts of undulating forest-clad hill country,

and almost contiguous to these there are apparently boundless plains, or tracts of level tableland, some almost uninhabitable, and some streaked with canals and richly cultivated—like the Requena of Valencia. While, again, continuous mountain ranges and broad plains and tablelands give the prevailing character to the scenery, there are here and there, on the one hand, lofty isolated peaks, landmarks for a wide distance round, such as Monseu, Monserrat, and Mont Sant in Catalonia, the Peña Golosa in Valencia, Moncayo on the borders of Aragon and Old Castile, and, on the other hand, small secluded valleys, such as those of Vich and Olot among the Catalonian Pyrenees.

The greater part of the interior of Spain is composed of a tableland bounded by the Cantabrian Mountains in the north and the Sierra Morena in the south, and divided into two by a series of mountain ranges stretching on the whole from east to west. The northern half of the tableland, made up of the provinces of Leon and Old Castile, has an average elevation estimated at about 2700 feet, while the southern half, made up of Estremadura and New Castile, is slightly lower—about 2600 feet. On all sides the tableland as a whole is remarkably isolated, and hence the passes on its boundary and the river valleys that lead up to it from the surrounding plains are geographical features of peculiar importance. The isolation on the side of Portugal, where the tableland gradually sinks to the sea in a succession of terraces, has already been referred to. On the north-west the valley of the Sil and a series of valleys further south, along both of which military roads have been carried from an early period, open up communication between Leon and the hill country of Galicia; which explains why this province was united to Leon even before the conquest of Portugal from the Moors. The passes across the Cantabrian Mountains in the north are tolerably numerous, and four of them are already crossed by railways. The two most remarkable are the Pass of Pájaros, across which winds the railway from Leon to Oviedo and the seaport of Gijon, and that of Reinosa leading down to the deep valley of the Besaya, and now crossed by the railway from Valladolid to Santander. In its eastern section the chain is crossed by the railways from Burgos to Bilbao and San Sebastian, the latter of which winds through the wild and romantic gorge of Pancorbo (in the north-east of the province of Burgos) before it traverses the Cantabrian chain at Idiazabal.

On the north east and east, where the edge of the tableland sweeps round in a wide curve, the surface sinks on the whole in broad terraces to the valley of the Ebro and the Bay of Valencia, and is crowned here and there by more or less isolated mountains, some of which have been already mentioned. On the north-east by far the most important communication with the Ebro valley is formed by the valley of the Jalon, which has thus always formed a military route of the highest consequence, and which is now traversed by the railway from Madrid to Saragossa. Further south the mountains clustered on the east of the tableland (Albarracin, Serrania de Cuenca) render direct communication between Valencia and Madrid extremely difficult, and the principal communications with the east and south-east are effected where the southern tableland of La Mancha merges in the hill country which connects the interior of Spain with the Sierra Nevada.

In the south the descent from the tableland to the

valley of the Guadalquivir is again comparatively gradual, but even here in the eastern half of the Sierra Morena the passes are few, the most important being the Puerto de Despeñaperros, where the Rio Magaña has cut for itself a deep gorge through which the railway now ascends from Andalusia to Madrid. Between Andalusia and Estremadura farther west the communication is freer, the Sierra Morena being there broken up into series of small chains.

Of the mountains belonging to the tableland 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. Almost everywhere it consists of two parallel ranges, the higher of which, the more southerly, is the immediate continuation of the Pyrenees. The highest summits of the chain belong to the Jura limestones of the Peñas de Europa, on the borders of the provinces of Santander, Oviedo, Leon, and Palencia. The highest of all is the Torre de Ceredo, which attains the height of at least 8750 feet, and next is the Peña Prieta (8300 feet). At the sources of the Sil the main chain divides into two branches, enclosing the fertile and thickly-populated district known as El Vierzo, once the bed of a lake, now watered by the stream just mentioned and its tributaries. The whole chain is remarkable for its intricate ramifications and its wild grandeur, but, as already indicated, is not so much of a barrier to communication as might be expected from its general aspect. Besides the railways above mentioned it is crossed at many points by bridle-paths and roads.

A peculiar feature of the chain and the neighbouring parts of the tableland is formed by the *parameras* or isolated plateaus, surrounded by steep rocky mountains, sometimes even by walls of naked rock. Among the larger of these are the bleak districts of Sigüenza and Soria, round the headwaters of the Duero,—districts which separate the mountains of the so-called Iberian system on the north-east of the tableland 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 characteristic of 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 feet, and near its centre it has three summits (the highest named the Pico de Peñalara) rising to the height of nearly 8000 feet.

A region with a highly irregular surface, filled with hills and *parameras*, separates this sierra 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 8725 feet, 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 communica-

tion between the northern and southern halves of the Spanish tableland. The Guadarrama is indeed crossed by three good pass-roads, and even 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 sierras, and up to the present date not a single railway crosses any one of the sierras directly. The only railway crossing the central system of mountains is that from Madrid to Avila, which traverses the interval between the Sierras de Gredos and Guadarrama, passing through numerous tunnels on the way. A railway from Madrid to Segovia to cross the latter sierra at the Puerto de Navacerrada (5830 feet),¹ the pass at present crossed by the principal high road across these mountains, is now (1886) in course of construction.

On the southern half of the tableland a shorter series of sierras, consisting of the Montes de Toledo in the east (highest elevation 4600 feet) and the Sierra de Guadalupe in the west (highest elevation 5100 feet), separates the basins of the Tagus and Guadiana. The southern system of mountains bounding the Iberian tableland—the Sierra Morena—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 tableland are those in the north-east and in the south, which are connected with the tableland only at their extremities. The former are the PYRENEES (*q.v.*), the latter are the Sierra Nevada, and the coast ranges still farther south. The Sierra Nevada, or "snowy sierra," is a well-defined chain, between 50 and 60 miles in length, and about 25 miles in breadth, situated to the south of the valley of the Guadalquivir, and stretching from the upper part of the valley of the Jenil in the west to the deep valley of the Almeria in the east. It is composed chiefly of soft micaceous schists, sinking precipitously down on the north, but sloping more gently to the south and south-east. Its culminating summit, the Cerro de Mulahacen (11,660 feet), is the highest in Spain, and the range contains several other peaks upwards of 10,000 feet in height, and above the limit of perpetual snow. On both sides deep transverse valleys (*barrancas*) follow one another in close succession, in many cases with round basin-shaped heads, like the *cirques* of the Pyrenees. In many of these cirques repose alpine lakes, and in one of them, the Corral de Veleta, there is even a small glacier, the most southerly in Europe. On the south the transverse valleys of the Sierra Nevada open into the mountainous longitudinal valley of the Alpujarras, 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 Almirajara. The latter are continued farther west by the Sierra de Alhama and Sierra de Abdalajiz. Immediately to the west of the latter sierra lies the gorge of the Guadalhorce, which now 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. 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 former occupies the angle in the north-east between the Pyrenees

¹ About 8700 feet above the level of Madrid, 2700 feet above that of Segovia.

Central mountain chains.

Sierra Morena.

Sierra Nevada.

Sierras of south coast.

and the central tableland, 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 feet above sea-level, is only about one-fourth of the size of the remaining portion, which is chiefly lowland, but is cut off from the coast by a highland tract connecting the interior tableland with spurs from the Pyrenees. The Guadalquivir basin is likewise divided by the configuration of the ground into a small upper part 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 tableland on the north, east, and south, and hence describes a semicircle with the convexity to the east. The Ebro alone of the great rivers flows into the Mediterranean. The following table gives the length of the principal Iberian rivers, with the area of their basins,—the length according to different authorities, the area of the basins according to Strelbitsky, whose measurements of area appear to be more trustworthy than those made by him of the length of rivers:—

	Length in English Miles.			Area in Square Miles.
	Wagner.	Ritter.	Strelbitsky.	
Ebro.....	442	416	470	38,580
Duero (Douro).....	452	507	485	36,710
Tagus.....	565	553	566	31,865
Guadiana.....	510	490	316	25,300
Guadalquivir.....	337	350	374	21,580

With the exception of the Guadalquivir, none of the Iberian rivers 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 Jucar and Segura in the south-east are employed in floating timber from the Serrania de Cuenca. The Ebro and Tagus are described in separate articles (*q.v.*).

The Miño (Portug. *Minho*, the *Minius* of the Romans) is formed by the union of two small streams in the north of the province of Lugo, and flows first southwards, then on the whole south-westwards to the Atlantic, forming in the lower part of its course the boundary between Spain and Portugal. It becomes navigable for small vessels at Salvaterra, 25 miles above its mouth. Large vessels cannot cross the bar at its mouth. Its only important tributary is the Sil (left), which at the confluence is the larger river of the two.

The Duero (Portug. *Douro*, the *Durius* of the Romans) emerges from the rock as a small stream among the mountains of Urbin on the borders of the provinces of Logroño and Soria, and, after describing a wide sweep to the east, flows westwards across the northern half of the Spanish tableland and across Portugal. For a distance of nearly 60 miles it forms the boundary between the two countries. It begins to be navigable 80 miles above its mouth, but sea-going vessels ascend only to Oporto, and even so far, on account of a bar at the mouth, only at high tide. The principal tributaries on the right are the Pisuerga and Esla, on the left the Adaja, Tormes, and Coa (the last in Portugal).

The Guadiana (*i.e.*, *Wadi Ana*, the *Anas* of the ancients) was long believed to take its rise in the district known as the Campo de Montiel, where a string of small lakes known as the Lagunas de Ruidera (partly in Ciudad Real, partly in Albacete) are connected by a stream which, on leaving the last of them, flows north-westwards towards the Zancara and then disappears within two or three miles of that river. About 22 miles to the south-west of the point of disappearance the stream was believed to re-emerge in the form of several large springs which form a number of lakes at no great distance from the Zancara, and these lakes are hence known as the "eyes of the Guadiana" (*los ojos de Guadiana*). The small stream issuing from them is known as the Guadiana and soon joins the Zancara. It has now been ascertained, however, that the stream

which disappears higher up can have no such course, but that in fact its waters flow or trickle underground to the Zancara itself, which is therefore entitled to be regarded as the upper Guadiana. It has its source not far from that of the Jucar in the east of the plateau of La Mancha, and flows westwards till, under the name of the Guadiana, it turns south-south-west on the Portuguese frontier. In piercing the Sierra Morena it forms a series of foaming rapids, and it begins to be navigable only at Mertola, about 42 miles above its mouth.

The Guadalquivir (*i.e.*, *Wadi-el-Kebir*, "the great river," the *Bætis* of the ancients), though the shortest of the great rivers of the Peninsula, is the only one that at all seasons of the year is a full-bodied stream, being fed in winter by the rains, in summer by the melting of the snows on the Sierra Nevada. What is regarded as the main stream rises in the Sierra de Cazorla in the east of the province of Jaen, but it does not become a considerable river till after it is joined by the Guadiana Menor (from the Sierra Nevada), on the left bank and the Guadalimar on the right. Lower down the principal tributary which it receives is the Jenil (left). In the days of the Moors the Guadalquivir was navigable for large vessels to Cordova, but, having been allowed to become silted up in the lower part of its course, it has only recently again been made navigable for vessels of 1200 tons burden to Seville.

The only considerable lakes in Spain are three coast Lakes lagoons,—that of Albufera in the province of Valencia, the Mar Menor in Murcia, and the Laguna de la Janda in Cadiz behind Cape Trafalgar. Small alpine and other lakes are numerous, and small salt lakes are to be found in every steppe region.

The geological structure of the Spanish Peninsula is Geologically comparatively simple. Upon a fundamental platform of ancient crystalline rocks, which had previously been upraised into detached ridges, a series of sedimentary formations was laid down, among which occur representatives of most of the geological systems from the older Palaeozoic rocks up to those of Quaternary date. Arranged in order of age, with their respective areas, these various groups of rock are shown in the subjoined table:—

Quaternary.....	covering 49,477 sq. kilom., or 10.00 % of whole surface.
Pliocene.....	" 9,064 " 1.80 " "
Miocene and Oligocene.....	" 137,567 " 27.85 " "
Eocene.....	" 23,564 " 4.60 " "
Cretaceous.....	" 47,002 " 9.50 " "
Jurassic.....	" 22,697 " 4.45 " "
Triassic.....	" 22,443 " 4.45 " "
Carboniferous.....	" 11,501 " 2.22 " "
Devonian.....	" 5,780 " 1.10 " "
Silurian (and Cambrian).....	" 114,382 " 23.18 " "
Archean.....	" 1,694 " 0.35 " "
Eruptive rocks of various ages.....	" 49,665 " 10.00 " "

Archean rocks are exposed in the northern half 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 and Silurian divisions. 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, and shales referable to the Devonian system occur in a few scattered areas, the largest and most fossiliferous of these occurring in the Asturias. The Carboniferous rocks of Spain are divisible into three groups, the lowest consisting of limestones with sandstones and shales, the middle of conglomerates and sandstones, and the upper of sandstones, conglomerates, shales, and coals. They lie in detached basins, and have not yet been well explored. One of these areas covers a considerable space in the Asturias, whence it stretches more or less continuously through the provinces of Leon, Palencia, and Santander, covering altogether an area of 6500 square kilometres. Another tract occurs at San Juan de las Abadesas in Catalonia, where it occupies about 200 square kilometres; while a third, about 500 square kilometres in extent, runs from the province of Cordova into that of Badajoz. There are other smaller areas containing little or no coal, but showing by the included plant-remains that the strata undoubtedly belong to the Carboniferous system.

The Triassic system is well developed in the north of the Peninsula along the Cantabrian chain and eastwards to the Mediterranean. It is composed of red and variegated sandstones, dolomites, and marls, traversed in some places by ophitic rocks, and containing deposits of gypsum, aragonite, and rock-salt. These strata are overlain by members of the Jurassic series, which are especially conspicuous in the eastern part of the Peninsula

between Castile and Aragon, along the Mediterranean border, in Andalusia, and likewise along the flanks of the Pyrenees. The Lias is best represented. The Cretaceous system is distributed in four great districts: the largest of these extends through the kingdoms of Murcia and Valencia; a second stretches between the two Castiles; a third is found in the Basque Provinces and the Asturias; and a fourth spreads out along the southern slopes of the Pyrenees from Navarre to the Mediterranean. The lower members of the Cretaceous series include an important freshwater formation (sandstones and clays), which extends from the Cantabrian coast through the provinces of Santander, Burgos, Soria, and Logroño, and is supposed to represent the English Wealden series. The higher members comprise massive hippurite limestones, and in the Pyrenean district representatives of the upper subdivisions of the system, including the Danian.

Deposits of Tertiary age cover rather more than a third of Spain. They are divisible into two great series, according to their mode of origin in the sea or in fresh water. The marine Tertiary accumulations commence with those that are referable to the Eocene series, consisting of nummulitic limestones, marls, and siliceous sandstones. These strata are developed in the basin of the Ebro, and in a belt which extends from Valencia through Murcia and Andalusia to Cadiz. Marine Miocene deposits occupy some small tracts, especially on the coast of Valencia. But most of the sandy Tertiary rocks of that district are Pliocene. The Tertiary masses of Andalusia have coarse conglomerates (Middle Miocene) at their base, followed by thick beds of Bryozoa molasse and younger (Pliocene) beds. These strata are especially noteworthy for containing an important metalliferous deposit, that of the native silver of Herrerias, which is found in a Pliocene bed in the form of flakes, needles, and crystals. But the most extensive and interesting Tertiary accumulations are those of the great lakes which in Oligocene and Miocene time spread over so large an expanse of the tableland. These sheets of fresh water covered the centre of the country, including the basins of the Ebro, Jucar, Guadalquivir, Guadalquivir, and Tagus. They have left behind them thick deposits of clays, marls, gypsum, and limestone, in which numerous remains of the land-animals of the time have been preserved.

Quaternary deposits spread over about a tenth of the area of the country. The largest tract of them is to be seen to the south of the Cantabrian chain; but another, of hardly inferior extent, flanks the Sierra de Guadarrama, and spreads out over the great plain from Madrid to Cáceres. Some of these alluvial accumulations indicate a former greater extension of the snowfields that are now so restricted in the Spanish sierras. Remains of the reindeer are found in caves in the Pyrenees.

Eruptive rocks of many different ages occur in different parts of Spain. The most important tract covered by them is that which stretches from Cape Ortegal to Coria in Estremadura and spreads over a large area of Portugal. They likewise appear in Castile, forming the sierras of Gredos and Guadarrama; farther south they rise in the mountains of Toledo, in the Sierra Morena, and across the provinces of Cordova, Seville, Huelva, and Badajoz as far as Evora in Portugal. Among the minor areas occupied by them may be especially mentioned those which occur in the Triassic districts. Of rocks included in the eruptive series the most abundant is granite. There occur also quartz-porphyr (Sierra Morena, Pyrenees, &c.), diorite, porphyrite, diabase (well developed in the north of Andalusia, where it plays a great part in the structure of the Sierra Morena), ophite (Pyrenees, Cadiz), serpentine (forming an enormous mass in the Serrania de Ronda), trachyte, liparite, andesite, basalt. The last four rocks occur as a volcanic series distributed in three chief districts—that of Cape Gata, including the south-east of Andalusia and the south of Murcia, that of Catalonia, and that of La Mancha.

Climate.—In accordance with its southerly position, its differences of elevation, and the variety in its superficial configuration in other respects, Spain presents within its borders examples of every kind of climate to be found on the northern hemisphere, with the sole exception of that of the torrid zone. As regards temperature, the heat of the tableland is characterized by extremes as great as are to be met with in almost any part of central Europe. The northern and north-western maritime provinces, on the other hand, have a climate as equable, and, it may be added, as moist, as that of the west of England or Scotland.

Four zones of climate are distinguished. The first zone may be called that of the tableland, although to it also the greater part of the Ebro basin may be referred. This is the zone of the greatest extremes of temperature. Even in summer the nights are often decidedly cold, and on the high parameras it is not a rare thing to see hoar-frost in the morning. In spring cold wetting mists occasionally envelop the land for entire days, while in summer the sky is often perfectly clear for weeks together. At all seasons of the year sudden changes of temperature, to the extent of from 30° to 50° F., are not infrequent. The air is extremely dry, which is all the more keenly felt from the fact that it is almost constantly in motion. At Madrid (2150 feet above sea-level) it regularly

freezes so hard in December and January that skating is carried on on the sheet of water in the Buen Retiro; and, as winter throughout Spain, except in the maritime provinces of the north and north-west, is the season of greatest atmospheric precipitation, snowfalls are frequent, though the snow seldom lies long except at high elevations. The summers, on the other hand, are not only extremely warm but almost rainless, the sea-winds being deprived of their moisture on the edge of the plateau. In July and August the plains of New Castile and Estremadura are sunburnt wastes; the roads are several inches deep with dust; the leaves of the few trees are withered and discoloured; the atmosphere is filled with a fine dust, producing a haze known as *calina*, which converts the blue of the sky into a dull grey. In the greater part of the Ebro basin the heat of summer is even more intense. The treeless mostly steppe-like valley with a bright-coloured soil acts like a concave mirror in reflecting the sun's rays, and, moreover, the mountains and highlands by which the valley is enclosed prevent to a large extent the access of winds, and thus hinder the renewal of the air, which in the lowest parts is little disturbed.

The second zone is that of the Mediterranean provinces, exclusive of those of the extreme south. In this zone the extremes of temperature are less, though the summers here also are warm, and the winters decidedly cool, especially in the north-east.

The southern zone, to which the name of African has been given, embraces the whole of Andalusia as far as the Sierra Morena, the southern half of Murcia, and the province of Alicante. In this zone there prevails a genuine subtropical climate, with extremely warm and almost rainless summers and mild winters, the temperature hardly ever sinking below freezing-point. The hottest part of the region is not the most southerly district but the bright-coloured steppes of the coast of Granada, and the plains and hill terraces of the south-east coast from Almería to Alicante. Snow and frost are here hardly known. It is said that at Malaga snow falls only about once in twenty-five years. The winter, in fact, is the season of the brightest vegetation: after the long drought of summer the surface gets covered once more in late autumn with a fresh green varied with bright-coloured flowers, and so it remains the whole winter through. On the other hand, the eastern part of this zone is the part of Spain which is liable to be visited from time to time by the scorching and blasting *levante*, the name given in Spain to the sirocco, as well as by the *solano*, a moist and less noxious east wind.

The fourth zone, that of the north and north-west maritime provinces, presents a marked contrast to all the others. The temperature is mild and equable; the rains are abundant all the year round, but fall chiefly in autumn, as in the west of Europe generally. Monthly roses bloom in the gardens at Christmas as beautifully and as plentifully as in summer. The chief drawback of the climate is an excess of rain in some parts, especially in the west. Santiago de Compostella, for example, has one of the highest rainfalls on the mainland of Europe (see table below).

The figures given in the following table (I.),¹ although based only on data of short periods (from 3½ to 20 years), will help to illustrate the preceding general remarks. Greenwich is added for the sake of comparison.

Station.	Height in feet.	Mean Temperature, F.			Rain-fall in inches.	
		Jan.	July.	Year.		
Tableland zone	Leon.....	2600	37°	73°	53°	19
	Madrid.....	2150	41	76	56	15
Southern zone	San Fernando	90	52	75	63	30
	Malaga.....	75	54	79	70	...
Mediterranean zone	Murcia.....	140	49	79	63	14
	Mahon.....	...	52	77	64	27
Northern maritime zone	Bilbao.....	50	46	70	58	46
	Oviedo.....	750	43	66	54	36
	Santiago.....	750	45.5	66	55	66
Greenwich.....	...	39	63	50	25	

Vegetation.—The vegetation of Spain exhibits a variety in keeping with the differences of climate just described. The number of endemic species is exceptionally large, the number of monotypic genera in the Peninsula greater than in any other part of the Mediterranean domain. The endemic species are naturally most numerous in the mountains, and above all in the loftiest ranges, the Pyrenees and the Sierra Nevada; but it is a peculiarity of the Spanish tableland, as compared with the plains and tablelands of central Europe, that it also possesses a considerable number of endemic plants and plants of extremely restricted range. This fact, however, is also in harmony with the physical conditions above described, being explained by the local varieties, not only of climate, but also of

¹ By conversion from Th. Fischer's *Klima der Mittelmeerlande*.

soil. Altogether no other country in Europe of equal extent has so great a wealth of species as Spain. According to the *Prodromus Floræ Hispanicæ* of Willkomm and Lange (completed in 1880), the number of species of vascular plants then ascertained to exist in the country was 5096.

Spain may be divided botanically into four provinces, corresponding to the four climatic zones.

In the tableland province (including the greater part of the Ebro valley) the flora is composed chiefly of species characteristic of the Mediterranean region, generally of species confined to the Peninsula. A peculiar character is imparted to the vegetation of this province by the growth over large tracts of evergreen shrubs and large herbaceous plants belonging to the *Cistaceæ* and *Labiata*. Areas covered by plants of the former group are known to the Spaniards as *jarales*, and are particularly extensive in the Mancha Alta and on the slopes of the Sierra Morena, where the ladanum bush (*Cistus ladaniferus*) is specially abundant; those covered by plants of the latter group are known as *tomillares* (from *tomillo*, thyme), and occur chiefly in the south, south-west, and east of the tableland of New Castile. In the central parts of the same tableland huge thistles (such as the *Onopordum nervosum*), centaureas, artemisias, and other *Compositæ* are scattered in great profusion. From the level parts of these tablelands trees are almost entirely absent. On the lofty parameras of Soria and other parts of Old Castile the vegetation has an almost alpine character.

The southern or African province is distinguished chiefly by the abundance of plants which have their true home in North Africa (a fact easily understood when we consider the geologically recent land connexion of Spain with that continent), but is also remarkable for the occurrence within it of numerous Eastern plants (natives of Syria and Asia Minor), and plants belonging to South Africa and the Canaries, as well as natives of tropical America which have become naturalized here (see below under *Agriculture*). In this province the maritime parts of Malaga and Granada present scenes of almost tropical richness and beauty, while, on the other hand, in Murcia, Alicante, and Almería the aspect is truly African, fertile cases appearing in the midst of rocky deserts or barren steppes. A peculiar vegetation, consisting mainly of low shrubs with fleshy glaucous leaves (*Inula crithmoides*, &c.), covers the marismas of the Guadalquivir and various parts of the south-west coast where salt-marshes prevail. Everywhere on moist sandy ground are to be seen tall thickets of *Arundo Donax*.

The Mediterranean province is that in which the general aspect of the vegetation agrees most closely with that of southern France and the lowlands of the Mediterranean region generally. On the lower slopes of the mountains and on all the parts left uncultivated the prevailing form of vegetation consists of a dense growth of shrubs with thick leathery leaves, such as are known to the French as *maquis*, to the Italians as *macchie*, and are called in Spanish *monte bajo*,¹ shrubs which, however much they resemble each other in external appearance, belong botanically to a great variety of families.

The northern maritime province, in accordance with its climate, has a vegetation resembling that of central Europe. Here only are to be found rich grassy meadows adorned with flowers such as are seen in English fields, and here only do forests of oak, beech, and chestnut cover a large proportion of the area. The extraordinary abundance of ferns (as in western France) is likewise characteristic.

The forest area of Spain generally is relatively small. The whole extent of forests is estimated at little more than 3 millions of hectares (7½ million acres), or less than 6 per cent. of the area of the kingdom. Evergreen oaks, chestnuts, and conifers are the prevailing trees. The cork oaks of the southern provinces and of Catalonia are of immense value, but the groves containing this tree have suffered greatly from the reckless way in which the product is collected. Among other characteristic trees are the Spanish pine (*Pinus hispanica*), the Corsican pine (*P. Laricio*), the Pinsapo fir (*Abies Pinsapo*), and the *Quercus Tozza*, the last belonging to the slopes of the Sierra Nevada. Besides the date-palm the dwarf-palm grows spontaneously in some parts of the south, but it nowhere makes up a large element of the vegetation.

The Spanish steppes deserve a special notice, since they are not confined to one of the four botanical provinces, but are found in all of them except the last. Six considerable steppe regions are counted:—(1) that of Old Castile, situated to the south of Valladolid, and composed chiefly of hills of gypsum; (2) that of New Castile, in the south-east (the district of La Mancha); (3) the Aragonese, occupying the upper part of the basin of the Ebro; (4) the littoral, stretching along the south-east coast from Alicante to the neighbourhood of Almería; (5) the Granadine, in the east of Upper Andalusia (the former kingdom of Granada); and (6) the Bætic, in Lower Andalusia, on both sides of the valley of the Jénil. All of these are originally salt-steppes, and, where the soil is still highly impregnated with salt, have only a sparse covering of shrubs,

¹ As distinguished from *monte alto*, the collective name for forest trees.

mostly members of the *Salsolaceæ*, with thick, greyish-green, often downy leaves. A different aspect is presented by the grass steppes of Murcia, La Mancha, the plateaus of Guadix and Huescar in the province of Granada, &c., all of which are covered chiefly with the valuable esparto grass (*Macrochloa tenacissima*).

Fauna.—The Iberian Peninsula belongs to the Mediterranean subregion of the Palearctic region of the animal kingdom, a division which includes also the north of Africa. The forms that betray African affinities are naturally to be found chiefly in the south. Among the mammals that fall under this head are the common genet (*Genetta vulgaris*), which extends, however, pretty far north, and is found also in the south of France, the fallow-deer, the porcupine (very rare), and a species of ichneumon (*Heipestes viddringtonis*), which is confined to the Peninsula, and is the only European species of this characteristically African genus. The magot or Barbary ape (*Inuus caudatus*), the only species of monkey still found wild in Europe, is also a native of Spain, but the only flock still surviving, on the rock of Gibraltar, has often been on the point of extinction, and has to be renewed from time to time by importations from the north of Africa. Of the mammals in which Spain shows more affinity to the fauna of central and northern Europe, some of the most characteristic are the Spanish lynx (*Lynx pardinus*), a species confined to the Peninsula, the Spanish hare (*Lepus madritensis*), and the species mentioned in the article PYRENEES. The birds of Spain are very numerous, partly no doubt in consequence of the fact that the Peninsula lies in the route of those birds of passage which cross from Africa to Europe or Europe to Africa by way of the Straits of Gibraltar. Many species belonging to central Europe pass the winter in Spain, especially on the south-eastern coasts and in the valley of the Guadalquivir. Innumerable, for example, are the snipes which in that season are killed in the latter district and brought to the market of Seville. Among the birds of prey may be mentioned, besides the cinereous and bearded vultures, the Spanish vulture (*Gyps occidentalis*), the African or Egyptian vulture (*Neophron percnopterus*), which is found among all the mountains of the Peninsula, the Spanish imperial eagle (*Aquila adalberti*), the short-toed eagle (*Circæus gallicus*), the southern eagle-owl (*Bubo atheniensis*), besides various kites and falcons. Among gallinaceous birds, besides the red-legged partridge, which is met with everywhere on the steppes, there are found also the *Pterocles alchida* and *P. arenarius*; and from among the birds of other orders the southern shrike (*Lanius meridionalis*), the Spanish sparrow (*Passer cyaneus*), and the blue magpie (*Cyanopica cooki*) may be singled out as worthy of mention. The last is highly remarkable on account of its distribution, it being confined to Spain while the species most closely allied to it (*Cyanopica cyanea*) belongs to the east of Asia. The flamingo is found native in the Balearic Islands and on the southern coasts, and occasionally a stray specimen is to be seen on the tableland of New Castile. Other birds peculiar to the south are two species of quails, the Andalusian henipode (*Sturnia sylvatica*), confined to the plains of Andalusia, the southern shearwater (*Puffinus cinereus*), and other water-birds. Amphibians and reptiles are particularly numerous in the southern provinces, and among these the most remarkable are the large southern or eyed lizard (*Lacerta ocellata*), which sometimes attains 3 feet in length and is very abundant, the *Platydictylus saccularis*, the grey amphibian (*Balanus cinereus*), the European pond-tortoise (*Emys europæa*), and another species, *Emys siegizi*. Insect life is remarkably abundant and varied. More than 350 species of butterflies, many of them endemic, have been counted in the province of Madrid alone. Besides the ordinary European scorpion, which is generally distributed in southern Europe, there is another species, the sting of which is said to be still more severe, found chiefly in the basin of the Ebro. Trout abound in the mountain streams and lakes, barbel and many other species of *Cyprinidæ* in the rivers of the plains. For the sea fauna, see under *Fisheries* below.

Extent.—The total area of the mainland of Spain, according to the calculations of Strelbitsky, is 495,612 square kilometres or 191,365 square miles, that of the Balearic Islands 4982 square kilometres or 1923 square miles, and that of the Canary Islands, which, though belonging geographically to Africa, are administratively associated with the kingdom of Spain, 7611 square kilometres or 2939 square miles; so that the total area of the kingdom is 508,205 square kilometres or 196,225 square miles. This total agrees pretty closely with that in Justus Perthes's table given below (Table II.), although considerable differences will be observed in the areas assigned to the mainland provinces and the two island groups respectively. The length of the coast-line of the mainland, according to Strelbitsky, is 2662 miles, which is equivalent to 1 mile of coast for every 72 square miles of area, about the same proportion as in France. The greatest length from north-east to south-west is 420 miles.

Territorial Divisions and Population.—For administrative purposes the kingdom of Spain has since 1833 been divided into forty-nine provinces, forty-seven of which belong to the mainland.