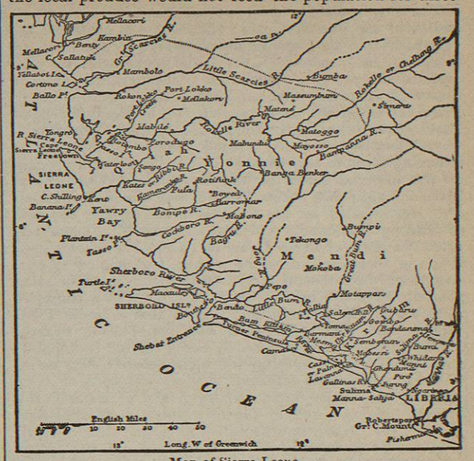
Baldassare Peruzzi (1481-1537), who was excellent in many branches of art and especially celebrated for his frescos and studies in perspective and chiaroscuro; Giovanni Antonio Bazzi, otherwise known as Il Sodoma (1477-1549), who, born at Vercelli in Piedmont and trained at Milan in the school of Leonardo da Vinci, came to Siena in 1504 and there produced his finest works; Domenico Beccafumi, otherwise known as Micharino (1486-1550), noted for the Michelangelesque daring of his designs; and Francesco Vanni.

Side by side with these painters marches a notable band of sculptors and architects, such as Lorenzo Maitani, architect of the Orvieto cathedral (end of 13th century); Camaino di Crescentino; Tino di Camaino, sculptor of the monument to Henry VII. in the Campo Santo of Pisa; Agostino and Agnolo, who in 1330 carved the fine tomb of Bishop Guido Tarlati in the cathedral of Arezzo; Lando di Pietro (14th century), architect, entrusted by the Sienese commune with the proposed enlargement of the cathedral (1339); Giacomo della Quercia, whose lovely fountain, the Fonte Gaia, in the Piazza del Campo has been recently restored by the sculptor Sarrocchi; Lorenzo di Pietro (Il Vecchietta), a pupil of Della Quercia and an excellent artist in marble and bronze; Francesco di Giorgio Martino (1439-1502), painter, sculptor, military engineer, and writer on art; Giacomo Cozzarelli (15th century); and Lorenzo Mariano, surnamed Il Marrina (16th century). (C. PA.)

SIERADZ, a town of Russian Poland, in the government of Kalisz (Kalish), situated on the Warta, 127 miles south-west of Warsaw. It is one of the oldest towns of Poland, founded prior to the introduction of Christianity, and was formerly known as Syra or Syraz. The annals mention it in 1139. Several *seims* were held there during the 13th to 15th centuries, and it was a wealthy town until nearly destroyed by a fire in 1447. It is full of historical interest for the Poles. The old castle, which suffered much in the Swedish war, was destroyed by the Germans in 1800. There are two churches dating from the 12th and 14th centuries. Sieradz, after having been the chief town of a *voivództvo*, has now no importance. Its population was 15,040 in 1884.

SIERRA LEONE, a British colony on the West Coast of Africa, the capital of which, Freetown, lies in 8° 39′ N. lat. and 13° 14′ W. long. It consists of Sierra Leone proper, part of the Quiah country to the east, Tasso Island, &c., in the Sierra Leone estuary, part of the Bullom country to the north, the Los Islands to the north of the Mellicoury (Mellacorée) river, the Banana Islands to the south of the main settlement, Sherbro (Sherboro) Island and part of the Sherbro country, the Turner peninsula, W. E. Tucker's territory, and generally all the seaboard south to the mouth of the Manoh (Manna) river, which is now recognized as the northern boundary of Liberia. The British territory and protectorate are estimated to have an area of about 3000 square miles; and, though it has not all been formally annexed, the whole coast region from the mouth of the Scarcies in 8° 55′ N. lat. to that of the Manoh in 6° 55′ may be considered as British, at least to the exclusion of any other European sovereignty.

Sierra Leone proper is a peninsula about 18 miles long from north-west to south-east by about 12 broad. It lies between the Sierra Leone estuary on the north and Yawry Bay on the south. Lengthwise it is traversed by a range of high hills attaining a height of 3000 feet in the Sugar Loaf and nearly as much in Mount Horton farther south. From the mainland the peninsula is physically separated by the Bance or Bunce river (properly estuary), which receives the Waterloo Creek and other small streams. Towards the east and south-east the peninsula sinks to the level of the great alluvial zone which extends along the larger portion of this district of the African coast. The hills seem to consist of some kind of igneous rock (popularly misnamed granite) and of beds of red sandstone, the disintegration of which has given a dark-coloured ferruginous soil of moderate fertility. The "lofty green trees" which clothed the "mountain" at the time of its discovery (Cadamosto) have for the most part been destroyed, though Sugar Loaf is still timbered to the top and the peninsula is verdant with abundant vegetation. The Negroes give so little attention to agriculture that the local produce would not feed the population for three



Map of Sierra Leone.

months. Among the productions of the peninsula are cola nuts, ginger (in large quantities), malagetta pepper, castor-oil, maize, cassava, ground nuts, and (in small quantities) cotton. Native coffee was discovered in Quiah in 1796, and the growing of Liberian coffee and cocoa has since 1880 been attempted with some success.

The rainfall of Sierra Leone, according to the Colonial Hospital observations at Freetown, is from 150 to 169 inches per annum. The three months of January, February, and March are practically rainless; the rains, commencing in April or May, reach their maximum in July, August, and September, and rapidly diminish in October, November, and December. It sometimes rains for thirty hours on end, but generally twelve hours of rain are followed by twenty-four, thirty, or more hours of clear and pleasant weather. At the barracks (150 feet higher than the hospital) there are about 40 inches more rain, and at Kissy, 3 miles distant, some 18 or 20 inches less. The annual temperature indoors is from 78° to 86°. The highest reading for 1880 was 95° and the lowest 69°·33. During the dry season, when the climate is very much like that of the West Indies, there occur terrible tornadoes and long periods of the harmattan,—a north-east wind, dry and desiccating, and carrying with it those clouds of fine dust which the sailors designate "smokes." The dangers of the climate have long been exaggerated. The low swampy regions are like those of other tropical countries, and Freetown, being badly placed and carelessly kept, is too often a hotbed of malaria and fever; but the higher districts are not the "white man's grave."

According to the census of 1880, the population of the colony was as follows:—peninsula of Sierra Leone with British Quiah, 53,862; Isles de Los, 1371; occupiers of factories on the Sierra Leone river paying rent to Government, 52; island of Tasso, 828; British Sherbro (including Bonthe, Mocolo, Mokate, Runteh, York Island, Yelbana, Victoria, Tasso, Bendu, and Jamaica), 4333,—total 60,446. But the census officials deem the actual population to be much greater, that of British Sherbro, for example, being pretty certainly 8000 or 9000. Ethnographically Sierra Leone is almost "an epitome of Africa." The following are the more important races that can be distinctly classified:—Mandingos, 1190; Timmanehs, 7443; Joloffs, 189; Baggas, 340; Mendis, 3088; Sherbros, 2882; Gallinas, 697; Limbas, 493; Susus (Soosoos), 1470; Fulahs, 225; Lokkos, 1454; Serrakulis, 129; Bulloms, 129; Krumen, 610. The direct descendants of the liberated slaves now number 35,430. The Akus or people of Yoruba and the Eboes from the eastern banks of the Niger are most easily distinguished. The white residents number only 163, almost entirely a floating population.

Most of the inhabitants depend upon trade, and are collected at the north end of the peninsula, in FREETOWN (*q. v.*) and the neighbouring villages. Freetown has a good supply of pure water, and great improvements in sanitation have recently been effected. Among the villages in the peninsula may be mentioned Kissy (founded in 1817), the seat of two hospitals for male and female incurables, Gloster (1816), Bathurst (1818), Leopold (1817), Charlotte (1818), Regent (1812), Leicester (1809).

According to the census returns of 1880, there were in Sierra Leone 18,660 Episcopalians, 17,098 Wesleyans and Methodists, 2717 of Lady Huntingdon's connexion, and 369 Roman Catholics. Since 1861-62 there has been an independent Episcopal Native Church; but the Church Missionary Society, which in 1804 sent out the first missionaries to Sierra Leone and has spent about £500,000 on the colony, still maintains certain educative agencies. Fourah Bay college, built by the society on the site of General Turner's estate (1½ miles east of Freetown) and opened in 1828 with six pupils, one of whom was Bishop Crowther, was affiliated in 1876 to Durham university, and has a high-class curriculum. Other institutions are the grammar-school (1846), the Wesleyan high school, and the Annie Walsh Memorial Female Institution.

The following figures show the average value of the principal exports in recent years:—

	Benni Seed.	Cola Nuts.	Ginger.	Ground Nuts.	Hides.	Palm Kernels.	Palm Oil.	Rubber.	Gum Copal.
	£	£	£	£	£	£	£	£	£
877-8	6,847	23,731	11,989	30,808	12,607	116,822	35,869	41,941	12,671
1882	10,001	25,547	7,916	15,217	13,545	101,164	47,317	96,674	11,262
1883	9,721	31,661	13,409	11,282	12,326	81,578	21,954	89,732	14,780
1884	3,776	40,002	16,804	4,846	17,674	68,377	17,774	50,894	12,539

With the exception of the ginger, most of these products are brought down the rivers from the interior, and the development of trade has been grievously hampered by inter-tribal wars in non-British territory. A considerable falling off is observable in those articles which require cultivation or labour, or are bulky in transit. Cola nuts have steadily increased in quantity,—that part of the Limba country where they are principally grown being in comparative peace. The supply of india-rubber has decreased, partly through destruction of the trees, partly through war in the Yonnie country. Gum copal is brought from the northern rivers. The Mendi country sends a good deal of rice, which is also grown largely in Sherbro. The total value of all the exports was on an average for 1877-81 £382,620, and for 1882-83 £413,148. The corresponding figures for the imports were £424,447 and £429,273.

The most northerly territory belonging to the colony is the little group of the Los Islands (Islas de los Idolos), about 80 miles north-north-west of Freetown to the south of Sangareah Bay. Tamara or Futabar to the west and Factory Island to the east "enclose, like an atoll, an inner basin, in the centre of which lies the much smaller Crawford Island." The highest point is a knoll some 450 feet above sea-level in Tamara. All these islands are richly clothed with palm trees and flowering underwood. Factory Island is occupied by a French trading settlement. At one time the islands were a great seat of the slave-trade and about 1812-13 were garrisoned by British troops for the suppression of the traffic. The climate was then found to be exceedingly fatal

The small island of Matakong, 25 miles south-east, is also British. On the mainland the watershed between the Great Scarcies and the Mellicoury (Mellacorée) has been adopted as the boundary between the French and English protectorates or annexation-areas. The Great Scarcies river (Rio dos Carceres) appears to take its rise in the highlands of the Futa-Jallon not far from the sources of the Senegal, but its upper course has not been completely explored. It is navigable for boats a long way inland, though the ascent from the sea is interrupted by rapids a short distance above Kambia, an important Mohammedan town. The Little Scarcies has its headwaters to the north-east of Falaba, a town of the Sulima country, built in 1768 and visited by Laing (1822), Winwood Reade (1869), and Zweifel and Moustier (1879). The Rokelle or Mabilé river, which falls into the Sierra Leone estuary, is formed by the drainage of the Koranko country. On a creek which reaches the estuary near the Rokelle mouth stands (at the head of navigation) the important township of Port Lokko, a mission station of the Church Missionary Society. The maritime country between the Scarcies and Sierra Leone is called North Bullom (*i.e.*, low land); the tribe of the same name has been expelled from much of its territory by the Susus (whose country is the unexplored tract to the south of 11° N. lat.) and the Timmanehs (Timnis). At the angle of Yawry Bay lies the mouth of the Ribbi or Kates river, and about 10 miles farther south is the common outflow of the Kamaranka and the Bompé. At the south side of the bay the small cluster of Plantain Islands corresponds to the Banana Islands on the north off Cape Shilling, which were ceded to the British in 1819 and are noted for their healthiness. Southward opens the broad estuary of the Sherbro (popularly river), which lies between the island of Sherbro, annexed in 1862, and the territory of the same name. The estuary receives the Bagru from the Manoh-Bagru country and the Jong river, whose headstream, the Bampanna, rises far inland in the same country as the Rokelle and has a breadth of 200 feet at Mayosso. From the sea the Jong is navigable for steamers to Matonghbah (or Matubah). It is connected by the Little Bûm Creek with the Great Bûm river, which passes through the Mendi country and descends into the alluvial seaboard by rapids at Motappan. The Bûm loses itself in a curious network of lagoons and creeks separated from the ocean by the long low tract of Turner's peninsula. The upper Kittam joins it from the east, and by another creek communicates with the Palma or Cassi Lake (20 miles long), which in its turn has a connexion with the Gallinas river (7° S. lat.). On the narrow strip of land between the ocean and the lake lies Lavanna, an important trading port, where a short line of railway has been laid down. Parallel with the Gallinas flows the Moah or Sulimah river (falls at Whidaro), at the mouth of which is the town of Sulimah; and about 10 miles farther east is the Manoh river. The countries inland between the Manoh and the Sulimah are Gbemna or Massaquoi, Soro, M'perri, Barrie, Cowrah, &c.

History.—Sierra Leone (in the original Portuguese form Sierra Leona) was known to its native inhabitants as Romarong or the Mountain, and received the current designation from the Portuguese discoverer Piedro de Cintra (1462) on account of the lion-like roaring of the thunder on its hill-tops. An English fort was built on the Sierra Leone estuary towards the close of the 17th century, but was soon afterwards abandoned. In 1786 Dr Smeathman proposed his scheme for founding on the peninsula a colony of liberated African slaves; and in 1787 Captain Thompson, having purchased the territory from Naimbana or King Tom of the Timmanehs, commenced the settlement with 400 Negroes and 60 Europeans. Owing mainly to the utter shiftlessness of the settlers and partly to a hostile attack by a body of natives, this first attempt proved a complete failure. In 1791 Falconbridge collected the surviving fugitives and laid out a new settlement (Granville's Town); and the promoters of the enterprise—Granville Sharp, William Wilberforce, William Ludlam, Sir Richard Carr Glynn, &c., hitherto known as the St George's Bay Company—obtained a charter incorporating them as the Sierra Leone Company (31 Geo. III. c. 55). In 1792 Clarkson introduced into the colony 1200 Negroes from the Bahamas and Nova Scotia. Afzelius the botanist and Nordenskjöld the mineralogist were sent out to explore the capabilities of the country; but the latter soon after died at Port Lokko (Port Logo). In 1794 the settlement, which had been again transferred to Freetown, was plundered by the French. An attempt to found a similar colony on Bulama (mouth of the Rio Grande) was a complete failure (Dalrymple and Beaver). In 1800 the company was allowed to make laws not repugnant to those of England, but in 1807 it was glad to transfer all its rights to the crown. Sydney Smith's jest that Sierra Leone had always two governors, one just arrived in the colony and the other just arrived in England, is but a slight exaggeration. There were eight changes between 1808 and 1824, and as many between 1865 and 1881. The names of Zachary Macaulay, Sir Charles Macarthy, Sir Stephen J. Hill, Sir Arthur Kennedy, Sir Samuel Rowe, and A. E. Havelock deserve to be mentioned. In 1825 General Turner concluded a treaty placing Turner's peninsula, &c., under British protection; but effect was not given to it till 1881. In 1875 the mouths of the Kates, Kamaranka, Bompé, and Cockboro were annexed, and in 1883 the seaboard towards the Liberian frontier. British influence has been peacefully advancing inland under Sir Samuel Rowe. In 1866 Sierra Leone was made the seat of government of the new general government of the British settlements on the West Coast of Africa (comprising Sierra Leone, Gambia, the Gold Coast, and Lagos, each of which was to have a legislative council); but in 1874 the Gold Coast and Lagos were raised to a separate government, and the Gambia alone remains attached to Sierra Leone.

Besides the older works of Falconbridge (1794), Winterbottom (1803), Walker (1847), Shrewe (1847), Poole (1850), see the various works of Robert Clarke (*Sketches of the Colony of Sierra Leone*, 1863, &c.) and Dr Africanus B. Horton (*West African Countries and Peoples*, 1868, &c.); A. Menzies, "Exploratory Expedition to the Mende Country," in *Church Miss. Intell.*, 1864; A. B. C. Sidthorpe, *Hist. of Sierra Leone*; T. R. Griffith, "Sierra Leone, Past, Present, and Future," in *Proc. Roy. Col. Inst.*, 1881-82, vol. xiii.; "Britische Annexionen an der Sierra-Leone-Küste," in *Petermann's Mitt.*, 1883. (H. A. W.)

SIEYÈS, EMMANUEL JOSEPH (1748-1836), one of the chief political thinkers and writers of the period of the French Revolution and the first empire, was born at Fréjus (Var) on 3d May 1748. He was destined for the church, was educated by the Jesuits, became a licentiate of the canon law, and, having early distinguished himself by the astuteness and originality of his ideas, was appointed vicar-general by the bishop of Chartres. He shared the political fervour of the party of advance, and was fearlessly logical in working out the new and as yet indistinct princi

ples of reform. An excellent opportunity was provided for the inculcation of his views by the invitation which Necker addressed to all French writers to publish their opinions upon the mode of convening the states-general. Sieyès startled his countrymen by the issue of various pamphlets upon the political situation, and particularly by his daring and original treatise upon the Third Estate, with its three famous divisions in question and answer:—"1st, What is the Third Estate?—Everything. What has it hitherto been in the political order?—Nothing. What does it demand?—To become something." He attacked unsparingly the privileged classes, and indeed in this his most famous work he constructed, single-handed and at once, a programme for the Revolution. The influence of the book and of its author soon became enormous, and in 1789 the Abbé Sieyès was elected by the city of Paris as a representative to the states-general, where he was the first to propose that the three estates should meet together in one assembly. On the rejection of his motion he boldly suggested the formation of an "assembly of representatives of France already verified." He was not, however, successful as a speaker, his style being obscure and his matter too compressed for oral expression,—faults which disappeared when he committed his thoughts to writing. Yet he was one of the leaders of the assembly, and was appointed a member of the committee on the constitution. His published speech in opposition to the power of absolute veto by the king brought him still further into notice. But he recognized his inaptitude for public speaking, and, although even Mirabeau declared that the silence of Sieyès was a public calamity, he stood aside while his own ideas were being developed amidst violence and riot both within and without the constituent and afterwards the legislative assembly. As excess followed upon excess in the wild course of the Revolution Sieyès had neither the courage nor the power to quell the riot. In danger of becoming a suspect, and fearful of his life, he emerged from obscurity in November 1793, on the occasion of the installation of Reason in Notre Dame. Before the national convention he denied his faith, abjuring the title of priest, professing that his only worship was that of liberty and equality and his only religion the love of humanity and country, and concluding by formally renouncing to the state the commuted pension which he enjoyed in lieu of his former benefice. The overthrow of the Jacobins at last overcame his fears and in March 1795 he is found publicly lauding the memory of those guillotined Girondists in whose defence he, two years before, had never once lifted his voice.

In the same year (1795) the ex-abbé was commissioned by the Convention to The Hague, where he successfully concluded an offensive and defensive alliance between the United Provinces and France. Without Sieyès no framing of a constitution could be attempted, and he was accordingly appointed member of a commission to draw up organic laws, the constitution of 1793 having been found unworkable. When the commission brought forward its report Sieyès did not dissent; but he proposed to the Convention a separate scheme of his own, the specialty of which was the provision for the appointment of a constitutional jury which should be charged with the duty of revising all legislative decrees against which the challenge was brought that they were themselves at variance with the constitution. His scheme was, however, rejected in favour of the new constitution, and from that moment he became its secret enemy. He was elected one of the first directory of five, but he declined the honour. In 1798 he was appointed the plenipotentiary of France to Prussia, where he was received with great honour and where he speedily began to plot against the Government he represented. He communicated his views to Napoleon, then in Egypt. Meanwhile (1799) he was again elected to the directory, and, his plans being ripe, he accepted office. Then came the *coup d'état* of 18th Brumaire (9th November 1799), in which Sieyès took so important a part, but in which he was unquestionably overborne by the genius and audacity of Bonaparte. The provisional consulate composed of Napoleon, Sieyès, and Ducos lasted but a few weeks. After a little Sieyès is a count of the empire and the proprietor of Crosne (Seine-et-Oise), while Napoleon is able to boast of how he has bribed the ex-abbé out of his constitutional views. Amid the political changes of France, Sieyès on the second return of the Bourbons fled to Brussels; but after the revolution of 1830 he felt it safe to return to Paris, where he died on 20th June 1836.

SIGALON, XAVIER (1788-1837), French painter, born at Uzès (Gard) towards the close of 1788, was one of the few leaders of the romantic movement who cared for treatment of form rather than of colour. The son of a poor rural schoolmaster, he had a terrible struggle before he was able even to reach Paris and obtain admission to Guérin's studio. But the learning offered there did not respond to his special needs, and he tried to train himself by solitary study of the Italian masters in the gallery of the Louvre. The Young Courtesan (Louvre), which he exhibited in 1822, at once attracted attention and was bought for the Luxembourg. The painter, however, regarded it as but an essay in practice and sought to measure himself with a mightier motive; this he did in his Locusta (Nîmes), 1824, and again in Athaliah's Massacre (Nantes), 1827. Both these works showed incontestable power; but the Vision of St Jerome (Louvre), which appeared at the salon of 1831, together with the Crucifixion (Issengeaux), was by far the most individual of all his achievements, and that year he received the cross of the Legion of Honour. The terrors and force of his pencil were not, however, rendered attractive by any charm of colour; his paintings remained unpurchased, and Sigalon found himself forced to get a humble living at times by painting portraits, when Thiers, then minister of the interior, recalled him to Paris and entrusted him with the task of copying the Sistine fresco of the Last Judgment for a hall in the Palace of the Fine Arts. On the exhibition, in the Baths of Diocletian at Rome, of Sigalon's gigantic task, in which he had been aided by his pupil Numa Boucoiran, the artist was visited in state by Gregory XVI. But Sigalon was not destined long to enjoy his tardy honours and the comparative ease procured by a small Government pension; returning to Rome to copy some pendants in the Sistine, he died there of cholera on 9th August 1837.

See Julius Meyer, *Gesch. d. französischen Kunst*; Villot, *Cat. Tableaux, Louvre*; C. Blanc, *Histoire des Peintres, École Française*.

SIGHTS. A sight for shooting may be defined as an apparatus for determining the point of impact of a projectile, in popular language, for "aiming" or "laying." In its simplest form it is scarcely recognizable as a sight. When an expert cricketer throws the ball straight to the wicket the eye and the hand assume that relative position which experience has taught to be correct, and the eye may be said to lay the hand on the wicket by means of the intervening muscles, which therefore constitute the sight. The next step towards accuracy is seen in the ordinary shot-gun, where the eye is placed over and behind the centre of the breech, and sees that a bead placed above the centre of the muzzle is in a direct line with the desired point of impact. If we add a notch at the centre of the breech to fix the eye more accurately, we shall have the hind-sight, the fore-sight, and the object brought into line, when the gun is correctly laid.

This would constitute a perfect direct mechanical sight

if we could assume (1) that the projectile was not subject to gravity; (2) that it had no tendency to deviate if passing through a calm atmosphere; (3) that the object aimed at was stationary; (4) that the weapon discharged was stationary; (5) that the atmosphere was still.

(1) The first condition is never realized: the projectile begins to drop towards the earth the moment it leaves the gun, and therefore to make it strike at a given level its first direction must be above this level. Hence the hind-sight must be raised to make the necessary correction, and the angle between the axis of the piece and the straight line connecting the elevated hind-sight with the fore-sight and object is called the "angle of elevation." Supposing the projectile to move *in vacuo* and to drop simply under the action of gravity, the calculation of the amount of elevation to be given for any range at any velocity would be easily made, but the resistance of the air renders the problem an exceedingly complicated and difficult one (see GUNNERY), and only approximate solutions have as yet been discovered. Next, supposing the hind-sight to be correctly elevated, it is evidently necessary to keep it upright; deviation to the right will cause the projectile to strike to the right of the object and deviation to the left to strike to the left of it. The amount of error is given by the equation

$$d = r \tan\theta \tan\epsilon,$$

where d = error in direction, r = range, θ = angle made by plane of elevation with the perpendicular, and ϵ = angle of elevation. The rifleman should study to keep the hind-sight as upright as possible, and indeed little error is likely to occur with a good shot from this cause. But the case is very different with a gun mounted on an uneven or moving platform, and many devices have been resorted to for automatically overcoming the difficulty. They all, however, belong to either the spirit-level or the pendulum type.

(2) Secondly, the projectile deviates of its own accord from the vertical plane. If it is unrifled, its imperfections of manufacture cause errors which may be in any direction, and which, therefore, cannot be compensated by any method of sighting. If it is rifled, the spin given to it renders these imperfections of little consequence, but, on the other hand, confers a constant tendency to deviation. If we lay a gun on the face of a clock, and the rifling causes a point on the surface of the shot to turn in the same direction as the hands, the shot will deviate to the right, contrariwise to the left. The cause and extent of this motion have never been thoroughly worked out. It appears to arise from the circumstance that the axis round which the shot rotates points always above the trajectory, since the principle of least resistance causes the direction of the axis to follow tardily the ever-changing curve; hence the pressure of the air, which of course acts in the direction of the trajectory, is greater on the lower than on the upper surface, and the unequal friction thereby set up causes the shot, as it were, to roll sideways; here also the principle of least resistance turns the axis slightly out of the vertical plane of fire towards the actual direction of the projectile. The path is doubly curved,—first, downwards by gravity, secondly, sideways by the rotation; the latter curve, seen in plan, is nearly a parabola. In order to correct this tendency of rifled projectiles to shoot round the corner, as it may be said, the hind-sight is inclined at an angle with the vertical, so that the more it is raised to give elevation the greater becomes the correction, which assumes the form of a curve not very dissimilar to that due to rotation. The amount of error is practically determined on the firing ground, and the proper angle for the sight is given by the formula

$$\tan\theta = \frac{d}{r \sin\phi}$$

(3) Every one who shoots birds on the wing is acquainted with the difficulties appertaining to the non-fulfilment of the third condition. The expert game-shot aims ahead of the object more or less, according to his judgment of the relative velocities of the projectile and the target and of the distance of the latter. Practice makes this comparatively easy at the short ranges of ordinary sport; but in the case of a heavy fort gun firing at a vessel under full steam 3000 yards off, it becomes evident that considerable allowance must be made. Put the mean horizontal velocity of the shot over a 3000 yards range at 1000 foot-seconds, the time of flight will be 9 seconds; if the ship is running past at the rate of 20 foot-seconds it will have traversed 180 feet during the shot's flight, and it will be necessary to direct the gun so much ahead of the desired point of impact. The angle of divergence in the case just given is $\tan^{-1}\cdot02$; and, supposing the horizontal velocity of the projectile to be constant throughout its flight, this angle would be correct for a ship running at a speed of 20 foot-seconds whatever the range.

(4) The fourth condition is rarely met with except on board ship, and it is evident that it obeys the same laws and is subject to the same kind of correction as the third. The correcting angle, however, is here given by the ship's speed across the line of fire and the starting velocity of the projectile.

(5) The fifth source of error differs from the others in being variable and uncontrollable. A gust of wind may spoil the best shot; and, though it is possible in practice to allow for deviation due to a steady breeze, yet the force and even the direction of the moving air differ so frequently at different parts of the trajectory that it has hitherto been found impossible to devise any satisfactory correction beyond that obtainable from knowledge of the point of impact of a previous shot. The effect of wind on direction may be calculated from the formula

$$D = Wt \sin\varphi - 990\frac{w}{Ag}\log\left\{\frac{Ag\,Wt\sin\phi}{500\,w}+1\right\},$$

where D = deflexion in feet, W = velocity of wind in feet per second, t = time of flight in seconds, ϕ = angle between direction of wind and line of fire, A = area of longitudinal section of shot in square feet, w = weight of shot in pounds, g = force of gravity. This formula assumes that the wind steadily carries the shot sideways without changing the parallelism of its axis, an assumption not greatly in error with heavy projectiles having the centre of gravity nearly coincident with the centre of figure. The effect of wind on range may be arrived at by adding or subtracting the velocity of the air, resolved in the direction of the object, to or from the horizontal velocity of the projectile and calculating by the tables (see GUNNERY) the loss or gain due to the increased or diminished resistance.

The accompanying diagrams (figs. 1, 2) represent what are called "speed-sights" in the royal navy, as applied to a 4-inch breech-loading gun. The gun is shown elevated at 8° for a range of 4600 yards. The hind or "tangent" sight is sloped sideways at an angle of 1° 30′ to correct the constant tendency of the projectile to deviate to the right. The sight is raised in the socket till the lowest visible graduation on the bar reads the required range on the face towards the breech and the elevation in degrees on the face towards the muzzle. A crosshead carries a leaf, which is traversed to the right or left by a double-threaded screw; this leaf is provided with a fine wire strung horizontally between two uprights; hence this form of sight is sometimes known as the H sight. The crosshead is graduated with two scales, one on the muzzle-face reading minutes of deflexion for giving any desired correction for wind or uneven platform, the other on the breech-face for allowing for the speed of the enemy in knots across the line of fire. The fore-sight is fixed in the gun, and cannot be raised or lowered. It has a crosshead provided with a traversing leaf, which carries a round bead on a thin support. The crosshead is graduated to allow for the speed of the firing vessel across the line of fire. In practice the gunner makes all these adjustments as nearly as he can judge, then takes up his

position about 4 feet behind the breech of the gun, holding the firing lanyard taut; when the object and the bead of the fore-sight appear to be on the centre of the wire across the H of the hind-sight he fires.

The forms of sights preferred by experts for accurate laying are extremely varied, and nothing but practice can determine the most suitable to individual eyesight. Where the eye can be brought close to the hind-sight, one of the best systems is that adopted for British field-guns, where a fine peep-hole constitutes the hind-sight, and the fore-sight consists of diagonal cross-wires; the first rapid or rough adjustment of the gun is made with the aid of a V-shaped notch on the hind-sight and an acorn point on the fore-sight. Some prefer pointers for the fore-sight, either O-shaped, so that the object appears between the cusps of the O—this is the French method—or placed diagonally like cross-wires with the intersection removed. Silvered vertical lines are preferred by many good shots. If the gun is mounted in a fixed position, say on a siege platform, and, if the relative positions of the target and some other object are known, it may be found convenient to lay the gun on the target by directing the sights at the other object. This is principally done in the case of howitzers dropping shells at high elevation into a work. They fire over a protecting bank and are laid by reversed sights from the muzzle backwards at a steeple, a pole, or other convenient object.

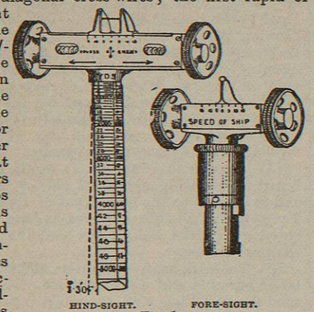


Fig. 1.

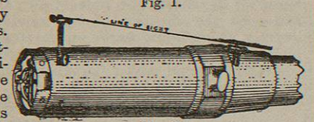


Fig. 2.
Speed-sights used in the British navy.

To secure greater accuracy than can be attained by the eye, telescopes are resorted to. It is obviously easy to apply to a match rifle a telescope with sufficient strength to resist the jar of firing, and to provide it with the necessary fittings for elevation, deflexion, &c.; but with ordnance the shock is much greater, and the telescope has to be removed before firing. This renders it difficult to secure a truly accurate attachment; but probably the immediate future will witness a sufficiently satisfactory solution of the problem as regards guns on firm platforms. Efforts have been made from time to time to overcome the necessity for extreme accuracy due to the short bearing of the telescope by bringing the fore-sight into play; this can be done either by great powers of adjustment of focus, so as to view first the fore-sight and then the target, or by adding a half-object lens, and so getting simultaneous images of fore-sight and target.

The application of electricity to the laying and firing of heavy guns has caused a remarkable development of the systems of sighting introduced recently into the forts which protect the shores of the United Kingdom. Suppose a battery of guns to command a channel, and that it is desired to concentrate their fire on a hostile vessel endeavouring to run past. Each detachment lays its gun both for elevation and direction in accordance with the figures which appear on a dial in the emplacement. Each dial is worked by electricity from an observing station away from the smoke and noise of the fort; as the hostile vessel approaches the observing officer follows its course on a chart. The observing station is placed at a considerable height above the water-line, so that a vertical base of calculation is obtained. Hence the angle of depression given by the telescope when pointing at the object indicates the range, and the direction of the telescope indicates the line of fire; these indications are automatically corrected for the positions of the guns. In practice the officer follows the ship's course, signals to the battery the line and distance of a point a little ahead of the vessel, and receives a signal from the battery that the guns are laid and ready. He then fires electrically as the ship is coming into the expected position. (E. M.)

SIGISMUND (1362-1437), German emperor, was born on 14th February 1362. After the death of his father, the emperor Charles IV., he received the margraviate of Brandenburg; and his betrothal with Mary, the daughter and heiress of Louis of Poland and Hungary, gave him a right to look forward to the succession in these two countries. But in 1383, when Louis died, the Poles chose Hedwig, Mary's sister, as their queen; and Sigismund was unable to marry Mary and to secure the crown of Hungary until 1387, as her rights had been seized by Charles of Durazzo, and after his death she had been made prisoner by the ban of Croatia. Sigismund was soon involved in a war with the Turks, and in order to obtain the means of carrying on the struggle he gave Brandenburg in pledge to his cousin Jobst of Moravia. Defeated at Nicopolis in 1396, Sigismund fled to Greece; and in his absence his wife died. When he returned to Hungary the people rose against him, made him prisoner, and gave the crown to Ladislaus of Naples. Sigismund escaped, and having sold the Altmark, which he had inherited from his brother John, he was able to collect an army and to crush the Hungarian rebellion. Meanwhile his brother Wenceslaus, king of the Romans, had been deposed, and Rupert of the Palatinate was chosen as his successor. In 1410 Rupert died, and Sigismund and Jobst of Moravia were both elected to the crown. Jobst died in the following year, and then Sigismund was universally recognized as king. One of the chief events of his reign was the assembling of the council of Constance, which met for the purpose of bringing the great schism in the church to an end. Sigismund marred his services in connexion with the council by assenting to the burning of John Hus, to whom he had granted a safe conduct. For this treachery he had to pay a heavy penalty, for it led indirectly to the Husite War, which raged for about sixteen years. In 1435 peace was restored, and Sigismund obtained possession of Bohemia. In 1415 he gave Brandenburg, which had been restored to him after Jobst's death, in fief to Frederick, burgrave of Nuremberg; and in 1423, in reward for services rendered in the Husite War, Frederick, margrave of Meissen, received the duchy of Saxony with the electoral dignity. Sigismund was crowned emperor in 1433, having obtained the Italian crown two years before. He died at Znaim in Moravia on 9th December 1437. He possessed considerable intellectual ability, but he never did full justice to his powers,—being recklessly extravagant and of a wayward and impulsive temper.

See Aschbach, *Geschichte Kaiser Sigismund's* (1838-45); Schroller, *Die Wahl Sigismund's zum römischen König* (1875); Bezold, *König Sigmund und die Reichskriege gegen die Husiten* (1872-77); Kerler, *Deutsche Reichstagsakten unter Kaiser Sigmund* (1878).

SIGISMUND, the name of three kings of Poland. See POLAND, vol. xix. pp. 290-291 and 294.

SIGMARINGEN, the seat of government of the Prussian administrative division of the same name, is a small town on the Danube with (1880) 4154 inhabitants. The division of Sigmaringen is composed of the two formerly sovereign principalities of Hohenzollern-Sigmaringen and Hohenzollern-Hechingen (see HOHENZOLLERN, vol. xii. p. 52) and has an area of 440 square miles, with a population in 1880 of 67,624. The Sigmaringen part of the Hohenzollern lands was the larger of the two (297 square miles) and lay mainly to the south of Hechingen, though the district of Haigerloch on the Neckar also belonged to it. The name of Hohenzollern is used much more frequently than the official Sigmaringen to designate the combined principalities.

SIGNALS, NAVAL. A system of naval signals comprises different methods of conveying orders or information to or from a ship in sight and within hearing, but at a distance too great to permit of hailing,—in other words, beyond the reach of the voice, even when aided by the speaking-trumpet. Signals are divided into classes according to the instruments with which and the circumstances under which they are made. There are sight and sound signals; flag, semaphore, fixed lantern, flashing, firework, horn or steam-whistle, and gun signals; day, night, fog, and distant signals. Besides these, there are other divisions, such as general, vocabulary, evolutionary, &c., which depend upon technical considerations and are matters of arrangement.

The necessity of some plan of rapidly conveying orders or intelligence to a distance was early recognized. Polybius describes two methods, one proposed by Æneas Tacitus more than three centuries before Christ, and one perfected by himself, which, as any word could be spelled by it, anticipated the underlying principle of recent systems. The signal codes of the ancients are believed to have been elaborate. Generally some kind of flag was used. Shields were also displayed in a preconcerted manner, and some have imagined that the reflected rays of the sun were flashed from them as with the modern heliograph (see HELIOGRAPHY). In the Middle Ages flags, banners, and lanterns were used to distinguish particular squadrons, and as marks of rank, as they are at present, also to call officers to the admiral, and to report sighting the enemy and getting into danger. The invention of cannon made an important addition to the means of signalling. In the instructions issued by Don Martin de Padilla in 1597 the use of guns, lights, and fires is mentioned. The introduction of the square rig permitted a further addition, that of letting fall a sail a certain number of times. Before the middle of the 17th century only a few stated orders and reports could be made known by signalling. Flags were used by day, and lights, occasionally with guns, at night. The signification then, and for a long time after, depended upon the position in which the light or flag was displayed. Orders, indeed, were as often as possible communicated by hailing or even by means of boats. As the size of ships increased the inconvenience of both plans became intolerable. Some attribute the first attempt at a regular code to Admiral Penn, but the credit of it is usually given to James II. when duke of York. Notwithstanding the attention paid to the subject by Paul Hoste and others, signals continued strangely imperfect till late in the 18th century. Towards 1780 Admiral Kempenfelt devised a plan of flag-signalling which was the parent of that now in use. Instead of indicating differences of meaning by varying the position of a solitary flag, he combined distinct flags in pairs. About the beginning of the 19th century Sir Home Popham improved a method of conveying messages by flags proposed by Mr Hall Gower, and greatly increased a ship's power of communicating with others. The number of night and fog signals that could be shown was still very restricted. In 1867 an innovation of prodigious importance was made by the adoption in the British navy of Captain Philip Colomb's flashing system, on which he had been at work since 1858. This is in general use in all fleets, though, oddly enough, on its first trial at sea it was condemned. It is not too much to say that the Colomb system has made it possible to handle, with confidence and safety, in darkness and fog, squadrons composed of the gigantic armour-clads of the day. Its adoption has not only contributed very materially to the increased efficiency of the British fleets but also immensely reduced the risk of accidents; and the saving to the tax-payer since its introduction may probably be estimated in hundreds of thousands of pounds.

In the British navy, which is copied by most others, sight-signals are made with flags, the semaphore, "flashes," fixed lanterns, and occasionally with fireworks, and for "distant" signals with flags, balls, and pendants displayed on account of shape but not of colour. Sound-signals are made with horns, steam-whistles, and guns. There are two sets of flags,—one of ten numbered from 1 to 10, and another of twenty-one called after letters of the alphabet. There are also pendants and a few special flags. The numbered flags are used with the general signal book, a kind of dictionary in which figures stand opposite sentences conveying orders or announcements. Opposite 123 might stand "hoist in all boats," which would mean that, when the flag called 1 was hoisted with 2 beneath it and 3 beneath 2, the ship or ships addressed—indicated by a special flag or by pendants—were ordered to hoist all boats in. The lettered flags are used with the vocabulary signal book, in which opposite collections of letters are put single words or small groups of words. Thus, if ABC were opposite the word "admiral" and STO opposite "will sail at noon," when the first three flags were hoisted the signalman on board each ship addressed would note them down with their signification. When all addressed had acknowledged the first "hoist" the flags would be hauled down and STO would be hoisted, to be acknowledged and noted in like manner. The admiral would thus have made known his intention of sailing at a given hour. From this it will appear that the general code is used for words of command and the vocabulary for long communications. The night signal book contains a limited number of definite orders and announcements made known by exhibiting lanterns, never more than four, arranged vertically, horizontally, or in a square. For a few signals some kind of firework is displayed. Fog-signals are made by firing different numbers of guns at fixed intervals. Owing to the slowness of flag-signalling, it is now, especially for the vocabulary and at moderate distances, largely superseded by the semaphore, an upright post with two arms moving in a vertical plane. The changed positions of the arms indicate letters and each word is spelled. Before the adoption of Captain Colomb's system, at night and in fogs only a few announcements could be made by signal, and sending messages was unknown. By a series of symbols formed of dots and short lines, like those of the Morse alphabet, he represents figures, letters, and special words. Thus ... means 3, and .— 7. The system can be employed in daylight, at night, and in fogs. In daylight long and short waves of a flag on a staff reproduce the flashes; in fogs long and short blasts on a fog-horn or steam-whistle; and at night the alternate exposure and concealment of the light of a lamp. Every order in the general signal book and every word in the vocabulary—by spelling, indeed, every word in the language—may be communicated by this system. Distant signals, now rarely used, are made by hoisting flags of different shapes at distances at which colours become invisible. The *Army and Navy Signal Book* contains the