was founded by Juan Bohon in 1544, on the opposite side of the river, and called by him Serena, after the town of that name in Spanish Estremadura, the birthplace of his chief, Pedro de Valdivia. Being shortly after destroyed by the Indians, it was rebuilt on its present site by Fran­cisco de Aguirre in 1549. Serena is the seat of a bishopric embracing the whole of Chili to the north, and of a court of appeal the jurisdiction of which extends to the province of Atacama. The town is well supplied with water. The principal edifice is the cathedral (1844-60), built of a light porous stone, 216 feet long and 66 broad. The town con­tains eight other churches, an excellent lyceum, a theatre, an episcopal palace, and several convents and charitable institutions. It is connected by rail with its port 9 miles to the south-west, and with the Tamaya copper-mines. A narrow-gauge line up the Elqui valley was opened in 1883. Brewing has recently become an important industry. The population of Serena was 12,293 in 1875, or, including the suburbs of the Pampa (Alta and Baja), 14,403.

SERENUS of Antissa, an ancient Greek geometer, the author of two treatises—*De Sectione Cylindri et Coni, libri duo—*which Halley has published in Greek and Latin along with his edition of the *Conics* of Apollonius of Perga. Great difference of opinion has existed as to his date : Halley says in his preface to the *Conics,* “We know nothing of Serenus except that he was born at Antissa, a town in the island of Lesbos; and that, besides his book *On the Section of the Cylinder,* and another *On the Section of the Cone,* he wrote commentaries on Apollonius; and that he lived before Marinus—the pupil of Proclus—as appears from the preface of Marinus to the *Data* of Euclid.” Montucla says vaguely that Serenus lived within the first four centuries of the Christian era. Chasles places him about the same time as Pappus. Bretschneider pointed out that Antissa was completely destroyed by the Romans in 167 B.C., and inferred thence that Serenus lived *c.* 220- 180 B.c. To this inference it has been fairly objected by Cantor, after F. Blass, that the name Serenus is Latin and that Antissa had been rebuilt at the time of Strabo. The statement of Halley that “ he lived before Marinus ” has been since repeated by many writers ; but Heiberg has pointed out *(Rev. Crit. d'Hist. et de Litt.,* 1881, p. 381) that the passage referred to in support of this statement is faulty, and that the name of Serenus is certainly not to be found in it. Th. H. Martin, in his edition of the *Astronomy* of Theon of Smyrna (Paris, 1849), has pub­lished a fragment which in the MS. follows the text of Theon and is headed *From the Lemmas of the Philosopher Serenus.* This is unquestionably the same as Serenus of Antissa, to whom this appellation “philosopher” is given in the titles of the two treatises edited by Halley. No con­clusion, however, can be drawn from this as to the date of Serenus, for the extract is not given by Theon but by an anonymous scholiast. M. Paul Tannery in an elaborate paper *(Bull. des Sc. Math. et Astron.,* 2d series, vii., 1883) has shown from the character of Serenus’s writings that he lived long after the brilliant period of Greek mathematics, and that he must be placed chronologically between Pappus and Hypatia, consequently in the 4th century. This determination of the date of Serenus is accepted by Cantor *(Zeitschrift für Math. und Phys.,* August 1885, p. 124).

In the treatise *On the Section of the Cone,* which is the less im­portant of the two books, Serenus, as he tells us in the preface, was the first to take up the particular branch of that subject with which he deals. In it he treats of the area of a triangle formed by cutting a cone, right or scalene, on a circular base by a plane through the vertex. He shows how “to cut a right cone whose axis is not less than the semi-diameter of the base by a plane through the vertex so that the triangle thus formed shall be equal to a given triangle” (Prop. 8), or “a maximum” (Prop. 13). He then considers the case of the scalene cone, solves the problem “to cut a given scalene cone by a plane through the vertex so as

to form an isosceles triangle” (Prop. 21), and shows that, “of the triangles which are formed by cutting a scalene cone through the axis, the greatest is the isosceles, the least that which is at right angles to the base of the cone ; of the rest, however, that which is nearer the greatest is greater than one more remote ” (Prop. 22). The general questions for a scalene cone, corresponding to the problems for the right cone (Props. 8 and 13), and which depend on solid loci for their solution, are not attempted. These have been solved by Halley in his edition of Serenus, p. 68 *sq.*

In his preface to the treatise *On the Section of the Cylinder,* Serenus tells us that many geometers of his time supposed that the transverse sections of a cylinder were different from the elliptic sections of a cone, that he thought it right to refute this error and to prove that these sections were of the same kind. Having estab­lished this in a series of theorems ending with Prop. 18, he shows in Prop. 19 that “it is possible to exhibit a cone and a cylinder cutting one another in one and the same ellipse.” He then solves problems such as—“given a cone (cylinder) and an ellipse on it, to find the cylinder (cone) which is cut in the same ellipse as the cone (cylinder)” (Props. 20, 21) ; “given a cone (cylinder), to find a cylinder (cone), and to cut both by one and the same plane so that the sections thus formed shall be similar ellipses ” (Props. 22, 23) ; “given a cylinder cut in an ellipse, to construct a cone having the same base and altitude as the cylinder, so that the section of it by the same plane is an ellipse similar to the ellipse of the cylinder ” (Prop. 25). In Props. 26-29 he shows how to cut a scalene cylinder or cone in an infinite number of ways by two planes—which are not parallel—so as to form similar ellipses (subcontrary sections). He then gives some theorems: “all the straight lines drawn from the same point to touch a cylindrical surface, on both sides, have their points of contact on the sides of a single parallelogram” (Prop. 31); “all the straight lines drawn from the same point to touch a conical surface, on both sides, have their points of contact on the sides of a single triangle ” (Prop. 34). This last is proved by means of Prop. 33, where we find, indirectly stated, the property of an harmonic pencil.

SERES, Serres, or Siros, a town of Turkey in Europe, now at the head of a sanjak in the vilayet of Saloniki, is situated in the valley of the Strymon (Karasu), in a district so fertile as to bear among the Turks the name of Altin Ovassi or Golden Plain, and so thickly studded with vill­ages as to have, when seen from the heights of Rhodope, the appearance of a great city with extensive gardens. The principal buildings are the Greek archiepiscopal palace, the Greek cathedral, restored since the great fire of 1879, by which it was robbed of its magnificent mosaics and woodwork, the Greek gymnasium and hospital (the former built of marble), the richly endowed Eski Jami, and the ruins of the once no less flourishing Ahmed Pasha or Aghia Sophia mosque, whose revenues used to be derived from the Crimea. On a hill above the town are the ruins of a fortress described in a Greek inscription as a “ tower built by Helen in the mountainous region.” Cloth-factories and tanneries are the chief industrial establishments and lignite mines are worked in the neighbourhood with some success. The population is 30,000.

Seres is the ancient Seris, Siræ, or Sirrhæ, mentioned by Herod­otus in connexion with Xerxes’s retreat, and by Livy as the place where Æmilius Paulus received a deputation from Perseus. In the 14th century, when Stephen Dushan of Servia assumed the title emperor of Servia, &c., he chose Sirrhæ as his capital; and it remained in the hands of the Servians till its capture by Sultan Murad. In 1396 Bayazid summoned his Christian vassals to his camp at Sirrhæ.

SERFDOM. See Slavery.

SERGHIEVSKIY POSAD, or Troitze-Serghievsk, a town of Russia, in the government of Moscow, which has grown up round the monastery of Troitze-Serghievskaya Lavra, 44 miles by rail to the north-east of Moscow. It is situated in a beautiful country, intersected by pleasant little valleys and varied with woods, the buildings extend­ing partly over the hill occupied by the monastery and partly over the valley below. Including the extensive Kukuevsk suburbs, it had in 1884 31,400 inhabitants. There are several lower-grade schools, an infirmary for old women, and a school for girls. Numerous inns and hotels, some maintained by the monastery and others a rich source of revenue to it, accommodate the numerous pilgrims.