immediate vicinity of the Rosstrappe, the Hexentanzplatz and other notable points in the Harz. Pop. (1905) 13,194. It is largely frequented as a summer resort and for its saline springs. It is also a brisk manufacturing centre, its chief pro­ducts being enamelled goods, iron-ware and machinery.

**THALES OF MILETUS** (640-546 b.c.), Greek physical philo­sopher, son of Examyus and Cleobuline, is universally recog­nized as the founder of Greek geometry, astronomy and philo­sophy. He is said by Herodotus and others to have been of Phoenician extraction, but the more common account (see Diogenes Laërtius) is that he was a native Milesian of noble birth. Zeller thinks that his ancestors belonged to the Cadmean tribe in Boeotia, who were intermingled with the Ionians of Asia Minor, and thus reconciles the conflicting statements. The nationality of Thales is certainly Greek and not Phoenician. The high estimation in which he was held by his contemporaries is shown by the place he occupied as chief of the seven “ wise men ” of Greece; and in later times amongst the ancients his fame was quite remarkable. It is well known that this name (σoψos) was given on account of practical ability; and in accord­ance with this we find that Thales had been occupied with civil affairs, and indeed several instances of his political sagacity have been handed down. Of these the most remarkable is the advice, praised by Herodotus, which he gave to his fellow- countrymen “ before Ionia was ruined ”—“ that the Ionians should constitute one general council in Teos, as the most central of the twelve cities, and that the remaining cities should nevertheless be governed as independent states ” (Herod. i. 170). It is probable, however, that in the case of Thales the appella­tion “ wise man,” which was given to him and to the other six in the archonship of Damasius (586 b.C.),@@1 was conferred on him not only on account of his political sagacity, but also for his scientific eminence (Plut. *Solon,* c. 3). To about the same time must be referred his celebrated prediction of the eclipse of the sun, which took place on the 28th of May 585 b.c. This event, which was of the highest importance, has given rise to much discussion. The account of it as given by Herodotus (i. 74) contains two statements:—(1) the fact that the eclipse did actually take place during a battle between the Medes and the Lydians, that it was a total eclipse (Herodotus calls it a “ night battle ”), that it caused a cessation of hostilities and led to a lasting peace between the contending nations; (2) that Thales had foretold the eclipse to the Ionians, and fixed the year in which it actually did take place. Various dates—ranging from 625 B.c. to 583 B.c.—have been assigned by different chrono- logists to this eclipse; but, since the investigations of Airy,@@2 Hind,@@3 and Zech,@@4 the date determined by them (May 28, 585 b.c.) has been generally accepted (for later authorities see Eclipse and Astronomy). This date agrees nearly with that given by Pliny *(H. N.* ii. 12). The second part of the statement of Herodotus—the reality of the prediction by Thales—has been frequently called in question, chiefly on the ground that, in order to predict a solar eclipse with any chance of success, one should have the command of certain astronomical facts which were not known until the 3rd century b.c., and then merely approximately, and only employed with that object in the following century by Hipparchus. The question, how­ever, is not whether Thales could predict the eclipse of the sun with any chance of success—much less whether he could state beforehand at what places the eclipse would be visible, as some have erroneously supposed, and which of course would have been quite impossible for him to do, but simply whether he

foretold that there would be a solar eclipse in that year, as stated by Herodotus. Now as to this there is quite a remarkable unanimity in the testimony of the ancients, and the evidence is of the strongest kind, ascending to Herodotus, and, according to the account of Diogenes Laërtius, even to Xenophanes, who was an Ionian, and not much later than Thales. Further, we know that in the 8th century b.c., there were observatories in most of the large cities in the valley of the Euphrates, and that professional astronomers regularly took observations of the heavens, copies of which were sent to the king of Assyria; and from a cuneiform inscription found in the palace of Senna­cherib at Nineveh, the text of which is given by George Smith,@@5 we learn that at that time the epochs of eclipses of both sun and moon were predicted as possible—probably by means of the cycle of 223 lunations or Chaldaean Saros—and that observa­tions were made accordingly.

The wonderful fame of Thales amongst the ancients must have been in great part due to this achievement, which seems, more­over, to have been one of the chief causes that excited amongst the Hellenes the love of science which ever afterwards char­acterized them. Thales seems not to have left any writings behind him, though as to this there appears to be some doubt (see Diog. Laër. i. 23). Many anecdotes, amusing rather than instructive, are related of him, which have been handed down by Diogenes Laërtius and other writers. From some of them it would appear that he was engaged in trade, which is indeed expressly stated by Plutarch *(Solon, c.* 2). It is probable that in the pursuit of commerce he was led to visit Egypt. Of the fact that Thales visited Egypt, and there became acquainted with geometry, there is abundant evidence. Hieronymus of Rhodes (ap. Diog. Laër. i. 27) says, “ he never had any teacher except during the time when he went to Egypt and associated with the priests.” @@6

But the characteristic feature of the work of Thales was that to the knowledge thus acquired he added the capital creation of the geometry of lines, which was essentially abstract in its character. The only geometry known to the Egyptian priests was that of surfaces, together with a sketch of that of solids, a geometry consisting of some simple quadratures and elementary cubatures, which they had obtained empirically. Thales, on the other hand, introduced *abstract* geometry, the object of which is to establish precise relations between the different parts of a figure, so that some of them could be found by means of others in a manner strictly rigorous. This was a phenomenon quite new in the world, and due, in fact, to the abstract spirit of the Greeks.

The following discoveries in geometry are attributed to Thales:—

(1) the circle is bisected by its diameter (Procl. *op. cit.* p. 157);

(2) the angles at the base of an isosceles triangle are equal *(Id.* P∙ 250) ; (3) when two straight lines cut each other the vertically opposite angles are equal *(Id.* p. 299); (4) the angle in a semi­circle is a right angle;@@7 (5) the theorem Euclid i. 26 is referred to Thales by Eudemus (Procl. *op. cit.* p. 352). Two applications of geometry to the solution of practical problems are also attri­buted to him:—(1) the determination of the distance of a ship at sea, for which he made use of the last theorem ; (2) the deter­mination of the height of a pyramid by means of the length of its shadow: according to Hieronymus of Rhodes (Diog. Laër. i. 27) and Pliny *(N. H.* xxxvi. 12), the shadow’ was measured at the hour of the day when a man’s shadow is the same length as him­self. Plutarch, however, states the method in a form requiring the knowledge of Euclid vi. 4, but without the restriction as to the hour of the day *(Sept. Sap. Conviv.* 2). Further, we learn from Diogenes Laërtius (i. 25) that he perfected the things relating to the scalene triangle and the theory of lines. Proclus, too, in his summary of the history of geometry before Euclid, which he prob­ably derived from Eudemus of Rhodes, says that Thales, having visited Egypt, first brought the knowledge of geometry into Greece,

@@@1 Bretschneider *(Die Geom. vor Euklides,* p. 40), without stating his authority, gives “ between 585 and 583 b.c.” as the date of the archonship of Damasius. In this he is followed by some other recent writers, who infer thence that the name “ wise ” was con­ferred on Thales on account of the success of his prediction. The date 586 B.c., given above, which is taken from Clinton, is adopted by Zeller.

@@@2 “ On the Eclipses of Agathocles, Thales, and Xerxes,” *Phil. Trans.* vol. cxliii. p. 179 seq., 1853.

*@@@3 Athenaeum,* p. 919, 1852.

*@@@4 Astronomische, Untersuchungen der wichtigeren Finsternisse,* &c., P. 57, 1853.

*@@@5 Assyrian Discoveries,* p. 409.

@@@6 Cf. Pamphila and the spurious letter from Thales to Pherecydes, ap. Diog. Laër. ; Proclus, *In primum Euclidis Elementorum Librum Commentarii,* ed. Friedlein, p. 65; Pliny, *H. N.* xxxvi. 12; Iamblichus, *In Vit. Pythag.* 12; Plutarch, *Sept. Sap. Conviv.* 2, *De Iside,* 10, and *Plac.* i. 3, 1.

@@@7 This is unquestionably the meaning of the statement of Pamphila (temp. Nero), ap. Diog. Laër. i. 24, that he was the first person to describe a right-angled triangle in a circle.