

and the trade is chiefly in horses, grain, and flax. The town, which was formerly fortified, was besieged by Duguesclin in 1378; it was taken by the English in 1418 and again in 1421, and by Admiral de Coligny in 1563. The fortress was razed in 1589. Population in 1872, 5806.

BERNBURG, a city of Anhalt in Germany, and formerly the capital of the now incorporated duchy of Anhalt-Bernburg. It consists of three parts, the *Allstadt* or old town, the *Bergstadt* or hill-town, and the *Neustadt* or new town,—the *Bergstadt* on the right and the other two on the left of the River Saale, which is crossed by a rather massive stone bridge. It is a well-built city, the principal public buildings being the Government house, the church of St Mary, the Gymnasium, and the house of correction. The castle, formerly the ducal residence, is in the *Bergstadt*, defended by moats, and surrounded by beautiful gardens. The industries of the town include the manufacture of snuff, paper, starch, and pottery; and a considerable traffic is carried on, especially in grain, both by river and by railway. Bernburg is of great antiquity. The *Bergstadt* was fortified by Otto III. in the 10th century, and the new town was founded in the 13th. For a long period the different parts were under separate magistracies, the new town uniting with the old in 1560, and the *Bergstadt* with both in 1824. Prince Frederick Albert removed the ducal residence to Ballenstedt in 1765. Population in 1872, inclusive of the domain and the suburb of Waldau, 15,709.

BERNE. See **BERN**.

BERNERS, JULIANA, prioress of Sopewell manery, near St Albans, was the daughter of Sir James Berners, who was beheaded in the reign of Richard II. She was celebrated for her beauty, her spirit, and her passion for field sports. To her is attributed the *Treatyse perteynyng to Hawkynge, Huntynge, and Fysshynge with an Angle*; also a right noble *Treatyse on the Lygnage of Cot Armours, endynge with a Treatyse which specyfyeth of Blasynge of Armys*, printed in folio by Wynkyn de Worde in 1496. The first and rarest edition, printed at St Albans in 1486, does not contain the treatise on fishing. Haslewood, who published an edition of the work (in fac-simile of that of Wynkyn de Worde) in 1811, folio, London, has examined with the greatest care the author's claims to figure as the earliest female writer in the English language. His preliminary dissertations contain all the scanty information that is to be had concerning her.

BERNI, FRANCESCO, Italian poet, was born about 1490 at Lamporecchio, in Bibbiena, a district lying along the Upper Arno. His family was of good descent, but excessively poor. At an early age he was sent to Florence, where he remained till his 19th year. He then set out for Rome, trusting to obtain some assistance from his uncle, the Cardinal Bibbiena. The cardinal, however, did nothing for him, and he was obliged to accept a situation as clerk or secretary to Ghiberti, datary to Clement VII. The duties of his office, for which Berni was in every way unfit, were exceedingly irksome to the poet, who, however, made himself celebrated at Rome as the most witty and inventive of a certain club of literary men, who devoted themselves to light and sparkling effusions. So strong was the admiration for Berni's verses, that mocking or burlesque poems have since been called *poesie bernesca*. About the year 1530 he was relieved from his servitude by obtaining a canonry in the cathedral of Florence. In that city he died in 1536, according to tradition poisoned by Duke Alessandro de' Medici, for having refused to poison the duke's cousin, Ippolito de' Medici; but considerable obscurity rests over this story. Berni stands at the head of Italian comic or burlesque poets. For lightness, sparkling wit,

variety of form, and fluent diction, his verses are unsurpassed. Perhaps, however, he owes his greatest fame to the recasting (*Rifacimento*) of Boiardo's *Orlando Innamorato*. The enormous success of Ariosto's *Orlando Furioso* had directed fresh attention to the older poem, from which it took its characters, and of which it is the continuation. But Boiardo's work, though good in plan, could never have achieved wide popularity on account of the extreme ruggedness of its style. Berni undertook the revision of the whole poem, avowedly altering no sentiment, removing or adding no incident, but simply giving to each line and stanza due gracefulness and polish. His task he completed with marvellous success; scarcely a line remains as it was, and the general opinion has pronounced decisively in favour of the revision over the original. To each canto he prefixed a few stanzas of reflective verse in the manner of Ariosto, and in one of these introductions he gives us the only certain information we have concerning his own life. It should be noticed that Berni appears to have been favourably disposed towards the Reformation principles at that time introduced into Italy, and this may explain the bitterness of some remarks of his upon the church. The first edition of the *Rifacimento* was printed posthumously in 1541, and it has been supposed that a few passages either did not receive the author's final revision, or have been retouched by another hand. The *Opere Burlesche* have been published separately. A partial translation of Berni's *Orlando* was published by W. S. Rose, 1823. (See for full information Panizzi's Boiardo, 1830-31.)

BERNINI, GIOVANNI LORENZO, an Italian artist, born at Naples in 1598, was more celebrated as an architect and a sculptor than as a painter. At a very early age his great skill in modelling introduced him to court favour at Rome, and he was specially patronized by Maffeo Barberini, afterwards Pope Urban VIII., whose palace he designed. None of his sculptured groups at all come up to the promised excellence of his first effort, the Apollo and Daphne, nor are any of his paintings of particular merit. His busts were in so much request that Charles I. of England, being unable to have a personal interview with Bernini, sent him three portraits by Vandyck, from which the artist was enabled to complete his model. His architectural designs, including the great colonnade of St Peter's, brought him perhaps his greatest celebrity. Louis XIV., when he contemplated the restoration of the Louvre, sent for Bernini, but did not adopt his designs. The artist's progress through France was a triumphal procession, and he was most liberally rewarded by the great monarch. He died at Rome in 1680, leaving a fortune of over £100,000. Few artists have had so wide renown in their own day; time has enabled us to judge more accurately of his merits.

BERNOULLI, or BERNOULLI, a name illustrious in the annals of science, belonging to a family of respectability, originally of Antwerp. Driven from their country during the oppressive government of Spain for their attachment to the Reformed religion, the family sought first an asylum at Frankfort (1583), and afterwards at Basel, where they ultimately obtained the highest distinctions. In the course of a century eight of its members successfully cultivated various branches of mathematics, and contributed powerfully to the advance of science. The most celebrated of the family were James, John, and Daniel; but, for the sake of perspicuity they may be considered as nearly as possible in the order of family succession.

J. JAMES BERNOULLI was born at Basel on the 27th December 1654. He was educated at the public school of Basel, and also received private instruction from the learned Hoffmann, then professor of Greek. At the conclusion of his philosophical studies at the university, some

geometrical figures, which fell in his way, excited in him a passion for mathematical pursuits, and in spite of the opposition of his father, who wished him to be a clergyman, he applied himself in secret to his favourite science. In 1676 he visited Geneva on his way to France, and subsequently travelled to England and Holland. While at Geneva he taught a blind girl several branches of science, and also how to write; and this led him to publish *A Method of Teaching Mathematics to the Blind*. At Bordeaux his *Universal Tables on Dialling* were constructed; and in London he was admitted to the meetings of Boyle, Hooke, Stillingfleet, and other learned and scientific men.

On his final return to Basel in 1682, he devoted himself to physical and mathematical investigations, and opened a public seminary for experimental physics. In the same year he published his essay on comets, *Conamen Novi Systematis Cometarum*, which was occasioned by the appearance of the comet of 1680. This essay, and his next publication, entitled *De Gravitate Ætheris*, were deeply tinged with the philosophy of Descartes, but they contain truths not unworthy of the philosophy of the *Principia*.

James Bernoulli cannot be strictly called an independent discoverer; but, from his extensive and successful application of the calculus, he is well deserving of a place by the side of Newton and Leibnitz. As an additional claim to remembrance, he was the first to solve Leibnitz's problem of the isochronous curve, and to determine the catenary, or curve formed by a chain suspended by its two extremities, which he also showed to be the same as the curvature of a sail filled with wind. This led him on to another curve, which, being formed by an elastic plate or rod fixed at one end and bent by a weight applied to the other, he called the elastic curve, and which he showed to be the same as the curvature of an impervious sail filled with a liquid. In his investigations respecting cycloidal lines and various spiral curves, his attention was directed to the loxodromic and logarithmic spirals, in the last of which he took particular interest from its remarkable property of reproducing itself under a great variety of conditions.

In 1696 he proposed the famous problem of isoperimetric figures, and offered a reward for its solution. This problem engaged the attention of British as well as Continental mathematicians; and its proposal gave rise to a painful quarrel between the brothers. John offered a solution of the problem; his brother pronounced it to be wrong. John then amended his solution, and again offered it, and claimed the reward. James still declared it to be no solution, and soon after published his own. In 1701 he published also the demonstration of his solution, which was accepted by De l'Hôpital and Leibnitz. John, however, held his peace for several years, and then dishonestly published, after the death of James, another incorrect solution; and not until 1718 did he admit that he had been in error. Even then he set forth as his own his brother's solution purposely disguised.

In 1687 the mathematical chair of the University of Basel was conferred upon James; and in the discharge of its duties he was so successful as to attract students from other countries. Some of his pupils became afterwards professors in the universities of Germany. He was once made rector of his university, and had other distinctions bestowed on him. He and his brother John were the first two foreign associates of the Academy of Sciences at Paris; and, at the request of Leibnitz, they were both received as members of the Academy of Berlin. In 1684 he had been offered a professorship at Heidelberg; but his marriage with a lady of his native city led him to decline the invitation. Intense application brought on infirmities and a slow fever, of which he died on the 16th of August 1705, with the resignation of a Christian and the firmness

of a philosopher. Like another Archimedes, he requested that, as a monument of his labours and an emblem of his hope of a resurrection, the logarithmic spiral should be engraven on his tombstone, with these words. *Eadem mutata resurgo*.

James Bernoulli wrote elegant verses in Latin, German, and French; but although these were held in high estimation in his own time, it is on his mathematical works that his fame now rests. These are—(1.) *Jacobi Bernoulli Basiliensis Opera*, Genevæ, 1744, 2 tom. 4to; (2.) *Ars Conjectandi, opus posthumum: accedunt tractatus de Seriebus Infinitis, et epistola (Gallice scripta) de Ludo Pilæ Reticularis*, Basiliæ, 1713, 1 tom. 4to.

J. JOHN BERNOULLI, brother of the preceding, was born at Basel on the 7th August 1667. His education was begun at six years of age; and after finishing his literary studies he was sent to Neuchâtel to learn commerce and acquire the French language. But at the end of a year he renounced the pursuits of commerce, returned to the University of Basel, and was admitted to the degree of bachelor in philosophy, and a year later, at the age of 18, to that of master of arts. In his studies he was aided by his elder brother James. Chemistry, as well as mathematics, seems to have been the object of his early attention; and in the year 1690 he published a dissertation on effervescence and fermentation. The same year he went to Geneva, where he gave instruction in the differential calculus to Fatio de Duiller, and afterwards proceeded to Paris, where he enjoyed the society of Malebranche, Cassini, De Lahire, and Varignon. With the Marquis de l'Hôpital he spent four months at his country house in the study of the higher geometry and the resources of the new calculus. His independent discoveries in mathematics are numerous and important. Among these were the exponential calculus, and the curve called by him the *linea brachistochrona*, or line of swiftest descent, which he was the first to determine, pointing out at the same time the beautiful relation which this curve bears to the path described by a ray or particle of light passing through strata of variable density, such as our atmosphere. On his return to his native city he studied medicine, and in 1694 took the degree of M.D. At this period he married into one of the oldest families in Basel; and although he had declined a professorship in Germany, he now accepted an invitation to the chair of mathematics at Groningen (*Commercium Philosophicum*, epist. xi. and xii.) There, in addition to the learned lectures by which he endeavoured to revive mathematical science in the university, he gave a public course of experimental physics. During a residence of ten years in Groningen, his controversies were almost as numerous as his discoveries. His dissertation on an electrical appearance of the barometer first observed by Picard, and discussed by John Bernoulli under the name of mercurial phosphorus, or mercury shining in vacuo (*Diss. Physica de Mercurio lucente in vacuo*), procured him the notice of royalty, and engaged him in controversy. Through Leibnitz he received from the king of Prussia a gold medal for his supposed discoveries; but Hartsoecker and some of the French academicians disputed the fact. The family quarrel about the problem of isoperimetric figures above mentioned began about this time. In his dispute with his brother, in his controversies with the English and Scotch mathematicians, and in his harsh and jealous bearing to his son Daniel, he showed a temper mean, unfair, and violent. He had declined, during his residence at Groningen, an invitation to Utrecht, but accepted in 1705 the mathematical chair in the university of his native city, vacant by the death of his brother James; and here he remained till his death. His inaugural discourse was on the "new analysis," which he so successfully applied in investigating

various problems both in pure and mixed mathematics. At the request of the magistracy of Basel he applied himself to correct the relaxed discipline of the university.

He was several times a successful competitor for the prizes given by the Academy of Sciences of Paris; and the subjects of his essays were, the laws of motion (*Discours sur les Lois de la Communication du Mouvement*, 1727), the elliptical orbits of the planets, and the inclinations of the planetary orbits (*Essai d'une Nouvelle Physique Céleste*, 1735). In the last case his son Daniel divided the prize with him. Some years after his return to Basel he published an essay, entitled *Nouvelle Théorie de la Manœuvre des Vaisseaux*. It is, however, his works in pure mathematics that are the permanent monuments of his fame. D'Alembert acknowledges with gratitude, that "whatever he knew of mathematics he owed to the works of John Bernoulli." He was a member of almost every learned society in Europe, and one of the first mathematicians of a mathematical age. He was as keen in his resentments as he was ardent in his friendships; fondly attached to his family, he yet disliked a deserving son; he gave full praise to Leibnitz and Euler, yet was blind to the excellence of Newton. Such was the vigour of his constitution that he continued to pursue his usual mathematical studies till the age of eighty. He was then attacked by a complaint at first apparently trifling; but his strength daily and rapidly declined till the 1st of January 1748, when he died peacefully in his sleep.

His writings were collected under his own eye by Cramer, professor of mathematics at Geneva, and published under the title of *Johannis Bernoulli Operi Omnia*, Lausan. et Genev. 4 tom. 4to. His interesting correspondence with Leibnitz appeared under the title of *Gul. Leibnitii et Johannis Bernoulli Commercium Philosophicum et Mathematicum*, Lausan. et Genev. 1745, 2 tom. 4to.

III. NICHOLAS BERNOULLI, the eldest of the three sons of John Bernoulli, was born in 1695. His early indications of genius were carefully cherished. At the age of eight he could speak German, Dutch, French, and Latin. When his father returned to Basel he went to the university of that city, where, at the age of sixteen, he took the degree of doctor in philosophy, and four years later the highest degree in law. Meanwhile the study of mathematics was not neglected, as appears not only from his giving instructions in geometry to his younger brother Daniel, but from his writings on the differential, integral, and exponential calculus, and from his father considering him, at the age of twenty-one, worthy of receiving the torch of science from his own hands. ("Lampada nunc tradam filio meo natu maximo, juveni xxi. annorum, ingenio mathematico aliisque dotibus satis instructo," *Com. Phil.* ep. 223). With his father's permission he visited Italy and France, and during his travels formed friendship with Varignon and with Riccati, one of the first mathematicians of Italy. The invitation of a Venetian nobleman induced him again to visit Italy, where he resided two years, till his return to be a candidate for the chair of jurisprudence at Basel. He was unsuccessful, but was soon afterwards appointed to a similar office in the University of Bern. Here he resided three years, his happiness only marred by regret on account of his separation from his brother Daniel, with whom he was united in sentiment and pursuits. Both were appointed at the same time professors of mathematics in the Academy of St Petersburg; but this office Nicholas enjoyed for little more than eight months. At the end of July 1726 he was cut off in the prime of life by a lingering fever. Sensible of the loss which the nation had sustained by his death, the Empress Catherine ordered him a funeral at the public expense. Some of his papers are published in his father's works, and others in the *Acta Eruditorum* and the *Comment. Acad. Petropol.*

IV. DANIEL BERNOULLI, the second son of John Bernoulli, was born 9th February 1700, at Groningen. He studied medicine and became a physician, but his attention was early directed also to geometrical studies. The severity of his father's manner was ill calculated to encourage the first efforts of one so sensitive; but fortunately, at the age of eleven, he became the pupil of his brother Nicholas. He afterwards studied in Italy under Michelotti and Morgagni. After his return, though only twenty-four years of age, he was invited to become president of an academy then projected at Genoa; but, declining this honour, he was, in the following year, appointed professor of mathematics at St Petersburg. In consequence of the state of his health, however, he returned to Basel in 1733, where he was appointed professor of anatomy and botany, and afterwards of experimental and speculative philosophy. In the labours of this office he spent the remaining years of his life. He had previously published some medical and botanical dissertations, besides his *Exercitationes quaedam Mathematicae*, containing a solution of the differential equation proposed by Riccati and now known by his name. In 1738 appeared his *Hydrodynamica*, in which the equilibrium, the pressure, the reaction, and varied velocities of fluids are considered both theoretically and practically. One of these problems, illustrated by experiment, deals with an ingenious mode of propelling vessels by the reaction of water ejected from the stern. Some of his experiments on this subject were performed before Maupertuis and Clairaut, whom the fame of the Bernoullis had attracted to Basel. With a success equalled only by Euler, Daniel Bernoulli gained or shared no less than ten prizes of the Academy of Sciences of Paris. The first, for a memoir on the construction of a clepsydra for measuring time exactly at sea, he gained at the age of twenty-four; the second, for one on the physical cause of the inclination of the planetary orbits, he divided with his father; and the third, for a communication on the tides, he shared with Euler, MacLaurin, and another competitor. The problem of vibrating cords, which had been some time before resolved by Taylor and D'Alembert, became the subject of a long discussion conducted in a generous spirit between Bernoulli and his friend Euler. In one of his early investigations he gave an ingenious though indirect demonstration of the problem of the parallelogram of forces. His labours in the decline of life were chiefly directed to the doctrine of probabilities in reference to practical purposes, and in particular to economical subjects, as, for example, to inoculation, and to the duration of married life in the two sexes, as well as to the relative proportion of male and female births. He retained his usual vigour of understanding till near the age of eighty, when his nephew James relieved him of his public duties. He was afflicted with asthma, and his retirement was relieved only by the society of a few chosen friends. In the spring of 1782, after some days' illness, he died, like his father, in the repose of sleep. Excluded by his professional character from the councils of the republic, he nevertheless received all the deference and honour due to a first magistrate. He was wont to mention the following as the two incidents in his life which had afforded him the greatest pleasure,—that a stranger, whom he had met as a travelling companion in his youth, made to his declaration "I am Daniel Bernoulli" the incredulous and mocking reply, "And I am Isaac Newton;" and that, while entertaining König and other guests, he solved without rising from table a problem which that mathematician had submitted as difficult and lengthy.

Like his father, he was a member of almost every learned society of Europe, and he succeeded him as foreign associate of the Academy of Paris. Several of his investigations are contained in the earlier volumes of the *St*

Petersburg Memoirs; and his separately published works are—(1.) *Dissertatio Inaugur. Phys. Med. de Respiratione*, Basil., 1721, 4to; (2.) *Positiones Anatomico-Botanicae*, Basil., 1721, 4to; (3.) *Exercitationes quaedam Mathematicae*, Venetiis, 1724, 4to; (4.) *Hydrodynamica*, Argentorati, 1738, 4to.

V. JOHN BERNOULLI, the youngest of the three sons of John Bernoulli, was born at Basel on the 18th May 1710. He studied law and mathematics, and, after travelling in France, was for five years professor of eloquence in the university of his native city. On the death of his father he succeeded him as professor of mathematics. He was thrice a successful competitor for the prizes of the Academy of Sciences of Paris. His prize subjects were, the capstan, the propagation of light, and the magnet. He enjoyed the friendship of Maupertuis, who died under his roof while on his way to Berlin. He himself died in 1790. His two sons, John and James, are the last noted mathematicians of the family.

VI. NICHOLAS BERNOULLI, cousin of the three preceding, and son of Nicholas Bernoulli, one of the senators of Basel, was born in that city on the 10th October 1687. He visited England, where he was kindly received by Newton and Halley (*Com. Phil.* ep. 199), held for a time the mathematical chair at Padua, which Galileo had once filled, and was successively professor of logic and of law at Basel, where he died on the 29th of November 1759. He was editor of the *Ars Conjectandi* of his uncle James. His own works are contained in the *Acta Eruditorum*, the *Giornale de' Letterati d'Italia*, and the *Commercium Philosophicum*.

VII. JOHN BERNOULLI, grandson of the first John Bernoulli, and son of the second of that name, was born at Basel on the 4th December 1744. He studied at Basel and at Neuchâtel, and when thirteen years of age took the degree of doctor in philosophy. At nineteen he was appointed astronomer royal of Berlin. Some years after, he visited Germany, France, and England, and subsequently Italy, Russia, and Poland. On his return to Berlin he was appointed director of the mathematical department of the academy. Here he died on the 10th July 1807. His writings consist of travels and astronomical, geographical, and mathematical works. In 1774 he published a French translation of Euler's *Elements of Algebra*. He contributed several papers to the Academy of Berlin.

VIII. JAMES BERNOULLI, younger brother of the preceding, and the second of this name, was born at Basel on the 17th October 1759. Having finished his literary studies, he was, according to custom, sent to Neuchâtel to learn French. On his return he studied law and took a degree. This study, however, did not check his hereditary taste for geometry. The early lessons which he had received from his father were continued by his uncle Daniel, and such was his progress in the exact sciences that at the age of twenty-one he was called to undertake the duties of the chair of experimental physics, which his uncle's advanced years rendered him unable to discharge. He afterwards accepted the situation of secretary to Count de Brenner, which afforded him an opportunity of seeing Germany and Italy. In Italy he formed a friendship with Lorgna, professor of mathematics at Verona, and one of the founders of the Italian society for the encouragement of the sciences. He was also made corresponding member of the Royal Society of Turin; and, while residing at Venice, he was, through the friendly representation of Fuss, admitted into the Academy of St Petersburg. In 1788 he was named one of its mathematical professors. In the following year he married a daughter of Albert Euler, son of the illustrious Euler.

This marriage was soon tragically dissolved by the death of the husband, who was drowned while bathing in the Neva in July 1789. Several of his papers are contained in the first six volumes of *Nova Acta Acad. Scien. Imper. Petropol.*, in the *Acta Helvetica*, in the *Memoirs of the Academies of Berlin and Turin*, and in his brother John's publications. He also published separately some juridical and physical theses, and a German translation of *Mémoires du Philosophe de Merian*.

BEROSUS was a Chaldean priest who lived in the time of Alexander the Great and his immediate successors. He translated the history of his native country, Babylonia, into the Greek language, and dedicated the work to one of the Greek kings of Syria named Antiochus. His work is principally known through the fragments of Polyhistor and Apollodorus, two writers in the 1st century before the Christian era, who are quoted by Eusebius and Syncellus.

The work of Berosus professed to commence with the creation of the universe, and the history was carried down to his own time. A few quotations at second or third hand, and the bare outlines of his system of chronology, are all that has been transmitted to us through the copyists of Berosus; but the close connection throughout between his story and the Bible, and the knowledge that he drew his information from the records of Babylonia, have always invested these fragments with great importance,—an importance which has been increased of late, since the discovery of several cuneiform inscriptions confirming different parts of his history.

The history of Berosus first described the chaos before the creation, presided over by the female Thalath or Omoroca (the chaotic sea), called Tiamat and Tisallat in the inscriptions; she was destroyed by Belus, and then the gods created the heavens and the earth. After this he gave the chronology of the Babylonian kingdom as follows:—

	Years
10 kings before the flood.....	432,000.
86 kings after the flood.....	34,080 or 33,091.
8 Median kings.....	224, or 234, or 190.
11 other monarchs.....	(number lost, in margin 48.)
49 Chaldean kings.....	453.
9 Arabian kings.....	245.
45 other kings.....	526.
After these reigned in Chaldea, Pul.	

The later part of the scheme of Berosus is lost, but detached extracts are quoted by some ancient historians.

In comparing the notices of Berosus with the Babylonian and Assyrian inscriptions, considerable difficulty is met with on account of the deficient information on both sides. The absence of chronological landmarks in the inscriptions, and the doubts as to the length of the third and fourth periods of Berosus, are serious difficulties in the way of the chronology, but in the absence of more satisfactory information the list of Berosus must be taken as the framework of Babylonian chronology.

The first period of Berosus, reaching from the creation to the flood, is said to have included 10 reigns and 432,000 years. The last two of these names are the only ones found with any certainty in the cuneiform inscriptions,—these are Ubara-tutu and Adra-basis, the Otiartes and Xisuthrus of Berosus. The deluge, which closed this period, is described in Berosus, and in the cuneiform inscriptions of the Izdubar legends.

The next period given by Berosus includes 86 kings, and a period of 34,080 or 33,091 years,—the number is uncertain, and certainly unhistorical. It is probable that the later sovereigns of this period were historical, and some of the names which are preserved are ordinary Babylonian compounds. Three names in a fragment of Baby-

Ionian chronology appear to belong to this period,—these are Ilu-kassat, Mulagunna, Abilkisu, who are given as successive sovereigns; and there is another probable king of the period, Izubar, who most likely represents the Biblical Nimrod. During this period the language and people of Babylonia are supposed to have been Turanian, and in round numbers it may be said to end about 2400 B.C.

About 2400 B.C., according to Berossus, Babylonia was overrun by a conquering tribe called by him "Medes." He has preserved in connection with this event the name of Zoroaster, and has given the dynasty 8 kings, the length of the period being placed variously at 234, 224, and 190 years. Where our authorities differ so much we can only make shift with a round number, and say the period was probably about 200 years, from 2400 to 2200 B.C. There is one name in the inscriptions supposed to belong to this period,—that of Kudur-nanhundi, king of Elam, who conquered Babylonia about 2280 B.C. Nothing is known as to the race here called Medes by Berossus, but it is conjectured that they were Elamites.

The next period of Berossus included 11 kings, the duration of the dynasty not being preserved. In the margin we have the number 48 years, but nothing is known of the origin of this number, and it appears too small for 11 kings. Perhaps we may provisionally allow about 200 years for this dynasty, 2200 to 2000 B.C. Nothing is known of the race or names of the monarchs.

About 2000 B.C. commenced a period including, according to Berossus, 49 kings and 458 years. The kings are called Chaldean, and appear to correspond with a famous line of sovereigns reigning at the cities of Ur, Karrak, and Larsa, commencing with the reign of Uruk, king of Ur. The centre of Babylonian power in their time lay in the south of the country, and many of the well-known temples and other buildings in this region were raised during their dominion. One of the monarchs in this period bore the name of Sargon; he was very celebrated, and of him a story is related similar to that of the infancy of Moses. He is said to have been concealed by his mother in an ark and floated on the River Euphrates. This great period ended with the defeat of Rim-agu, king of Larsa, by Hammurabi, who established a new dynasty, and made Babylon the capital about 1550 B.C.

The dynasty founded by Hammurabi appears to be the Arabian line of Berossus, which lasted under 9 kings for 245 years. Many of the kings of this period are known from the inscriptions. They first had extensive relations with the Assyrians, and about 1300 B.C. Tugulti-ninip, king of Assyria, conquered Babylon, and expelled the last Arab monarch. From this time commenced the direct influence of Assyria in Babylonia, and the period of this dynasty is counted by Berossus as 526 years. It probably ended with the time of Pul, a great king and conqueror, about whose personality and date there is much difference of opinion.

The next epoch in Babylonian history is that of Nabonassar, whose era commenced 747 B.C. From his time the history of Babylonia presents a constant series of conquests by the Assyrians, and revolts against them by the Babylonians, down to the time of Nabopolassar, who, after quelling a revolt in Babylonia, was made ruler of the country by the king of Assyria, and afterwards revolting against his master took Nineveh in concert with the Medes.

Nebuchadnezzar, son of Nabopolassar, who ascended the throne of Babylon 605 B.C., was one of the most celebrated kings in history, and is mentioned at length by Berossus, who then notices the revolutions at Babylon until the taking of the city by Cyrus 539 B.C.

The history of Berossus continued down to the conquest of Alexander the Great, and the reign of his patron Antiochus.

The writings and notices of Berossus were collected and published in Germany by Richter in 1825, and in England by Cory, in his *Ancient Fragments*. Later and excellent extracts and notices have been given by Canon Rawlinson and M. Lenormant, while the chronology of Berossus has exercised the ingenuity of Brandis, Oppert, Lenormant, Rawlinson, Hincks, and many other scholars. There is, however, no probability that any published system has correctly restored the dates of Berossus; the materials are at present insufficient for such a work. (G. S.)

BERRI, CHARLES FERDINAND, DUC DE, younger son of Charles X. of France, was born at Versailles on the 24th Jan. 1778. With his father, then Comte d'Artois, he had to leave France and for several years served in the army of Condé. He afterwards joined the Russian army, and in 1801 took up his residence in England, where he remained for thirteen years. During that time he married an English lady, by whom he had two children. The marriage was cancelled for political reasons in 1814, when the duke set out for France. His frank, open manners gained him some favour with his fickle countrymen, which was increased by his marriage in 1816 with the Princess Caroline Ferdinande Louise of Naples. On the 13th of February 1820 he was mortally wounded, when leaving the opera-house with his wife, by a man named Louvel. Seven months after his death the duchess gave birth to a son, who received the title of duke of Bordeaux. She was compelled to follow Charles X. in his retirement from France after July 1830, but it was with the resolution of returning speedily and making an attempt to secure the throne for her son. In April 1832 she landed near Marseilles, but receiving no support, was compelled to make her way towards the ever-loyal districts of La Vendée and Bretagne. Her followers, however, were defeated, and after much suffering, she was betrayed to the Government and imprisoned in the castle of Blaye. Here she gave birth to a son, the fruit of a secret marriage contracted with an Italian nobleman, son of the Marchese Lucchesi Palli. The announcement of this marriage at once deprived the duchess of the sympathies of her supporters. She was no longer an object of fear to the French Government, who released her in June 1833. She set sail for Sicily, and from that time till her death in April 1870 lived a retired life with her husband and his relatives.

BERRYER, PIERRE ANTOINE, a French advocate and parliamentary orator, was born at Paris, January 4, 1790, in the midst of the agitating events of the first year of the great Revolution. Berryer's father was an eminent advocate and parliamentary counsellor. The son was educated at the Collège de Juilly, on leaving which he adopted, in deference to his father's wishes, the profession of the law; but his own leaning at that time was to the church. After completing the usual course of professional studies, he was admitted advocate in 1811, and in the same year he married. In the great conflict of the period between Napoleon I. and the Bourbons, Berryer, like his father, was an ardent Legitimist; and in the spring of 1815, at the opening of the campaign of the Hundred Days, he followed Louis XVIII. to Ghent as a volunteer. After the second Restoration he distinguished himself as a courageous advocate of moderation in the treatment of the military adherents of the emperor. He was engaged, in conjunction with his father and Dupin, in the unsuccessful defence of Marshal Ney before the Chamber of Peers; and he undertook alone the defence of General Cambronne and General Debelle, procuring the acquittal of the former and the pardon of the latter. Proceedings were soon after com-

menced against him for some assertions in one of his speeches, but he escaped with nothing more severe than a censure by the Council of Advocates. By this time he had a very large business as advocate, and was engaged on behalf of journalists in many press prosecutions. He stood forward with a noble resolution to maintain the freedom of the press, and severely censured the rigorous measures of the police department. In 1830, not long before the fall of Charles X., Berryer was elected a member of the Chamber of Deputies. He appeared there as the champion of the king, and encouraged him in his tyrannical course. After the Revolution of July, when the Legitimists withdrew in a body, Berryer alone retained his seat as deputy; and though avowedly the friend of the deposed king, he took an independent course, not making himself an unscrupulous partizan, but guided in his advocacy or his opposition by reason and prudence. He was one of the influential men who resisted, but unsuccessfully, the abolition of the hereditary peerage. He advocated trial by jury in press prosecutions, the extension of municipal franchises, and other liberal measures. In May 1832 he hastened from Paris to see the duchess of Berri on her landing in the south of France for the purpose of organizing an insurrection in favour of her son, the duke of Bordeaux, since known as the count of Chambord. Berryer attempted to turn her from her purpose; and failing in this he set out for Switzerland. He was, however, arrested, imprisoned, and brought to trial as one of the insurgents. He was immediately acquitted. In the following year he pleaded for the liberation of the countess; made a memorable speech in defence of Chateaubriand, who was prosecuted for his violent attacks on the Government of Louis Philippe; and undertook the defence of several Legitimist journalists. In 1834 he defended two deputies in a Government prosecution for libel, and the same year opposed the passing of a new rigorous law against political and other associations. Among the more noteworthy events of his subsequent career were his defence of Louis Napoleon after the ridiculous affair of Boulogne, in 1840, and a visit to England in December 1843, for the purpose of formally acknowledging the pretender, the duke of Bordeaux, then living in London, as Henry V., and lawful king of France. This proceeding brought on him the censure of M. Guizot, then first minister of Louis Philippe. Berryer was an active member of the National Assembly convoked after the Revolution of February 1848, again visited the pretender, then at Wiesbaden, and still fought in the old cause. This long parliamentary career was closed by a courageous protest against the *coup d'état* of December 2, 1851. After a lapse of twelve years, however, he appeared once more in his forsaken field as a deputy to the Corps Législatif. Meanwhile he had been a diligent promoter of the much talked of fusion of the two branches of the Bourbon family, and had distinguished himself at the bar by great speeches on the trial of Montalembert in 1858, and in the civil proceedings set on foot by M. Patterson against Jerome Bonaparte in 1860. Berryer was elected member of the French Academy in 1854. A visit paid by this famous orator to Lord Brougham in 1865 was made the occasion of a banquet given in his honour by the benchers of the Temple and of Lincoln's Inn. In November 1868 he was removed by his own desire from Paris to his country seat at Augerville, and there he died on the 29th of the same month.

BERTHOLLET, CLAUDE LOUIS, one of the most distinguished chemists of the French school, was born at Talloire, near Annecy, in Savoy, in 1748. He studied first at Chambéry, and subsequently at Turin, where he took his degree as a physician. In 1772 he settled at Paris, and soon became the medical attendant of Philip,

duke of Orleans. By the publication of a volume of chemical essays, he gained such reputation that he was admitted in 1781 into the Académie des Sciences. He was appointed Government superintendent of the establishment for the improvement of dyeing; and in 1791 he published his essay *Sur la Teinture*, a work that first systematized and chemically explained the principles of the art. It was translated into English by Dr. William Hamilton, 1794. Berthollet early adopted the chemical views of Lavoisier, and took part with him in the formation of a new system of chemical nomenclature. He confirmed, and extended the discoveries of Priestley on ammonia; discovered fulminating silver, and greatly extended our knowledge of the dephlogisticated marine acid of Scheele, for which the name of oxymuriatic acid was then proposed, and which is now termed chlorine. It was he who in 1785 first proposed to apply it to bleaching. He discovered the remarkable salt now called chlorate of potash; and we owe to him also an excellent essay on the chemical constitution of soaps. Berthollet's contributions to chemistry are scattered through the pages of the *Journal de Physique*, *Annales de Chimie*, *Mémoires de l'Institut*, and *Mémoires d'Arceuil*. At the commencement of the French Revolution the scarcity of saltpetre for the manufacture of gunpowder was much felt; and Berthollet was placed at the head of a commission for improving the processes for obtaining and purifying this important product within the territory of France. Soon afterwards we find him one of a commission for improving the processes in the smelting of iron, and converting it into steel. In 1792 he was appointed a director of the mint, and in 1794 he became a member of the committee on agriculture and the arts; while he filled the office of teacher of chemistry in the Polytechnic and Normal Schools of Paris, and took an active part in the remodeling of the National Institute in 1795. In the following year Berthollet and Monge were appointed heads of a commission to select in Italy the choicest specimens of ancient and modern art, for the national galleries of Paris. In 1798 Berthollet accompanied General Bonaparte to Egypt. On the overthrow of the Directory he was made a senator and a grand officer of the Legion of Honour. Under the empire he was created a count, and he sat as a peer on the restoration of the Bourbons. His last work was his curious essay on *Chemical Statics* (1803), in which he controverted the views of Bergman. Berthollet was a man of great modesty and unostentatious manners. For some years he lived retired at Arceuil, especially after the misconduct and suicide of his only son. He died at Paris of a painful malady bravely borne, November 6, 1822.

BERTHOUD, FERDINAND, a celebrated Swiss chronometer-maker, was born in Neuchâtel. The date of his birth is variously given as 1725, 1727, and 1729. His father was an architect, and the son was intended for the church; but, showing a taste for mechanics, he was placed under an experienced workman to be instructed in clock and watch making, and was afterwards sent to Paris to improve himself in the knowledge and practice of the art. He settled in Paris in 1745, and applied himself to the making of chronometers, an art which was then in its infancy. He soon attained distinction for the excellence of his workmanship and the accuracy of his chronometers. Fleurieu and Borda, by order of the French Government, made a voyage from La Rochelle to the West Indies and Newfoundland for the purpose of testing them, and they found that they gave the longitude with an error of only a quarter of a degree, after a cruise of six weeks. Satisfactory results were also obtained in the expedition of Verdun, Borda, and Pingré, which was appointed to try these chronometers and those of his only rival, Le Roy. Sully