in the longitudinal direction, but different segments may be stretched radially with different degrees of tension so as to resemble a series of tense strings of gradually increasing length. Each string would then respond to a vibration of a particular pitch communicated to it by the hair-cells. The exact mechanism of the hair-cells and of the membrana reticularis, which looks like a damping apparatus, is unknown.

II. *Physiological Characters of Auditory Sensation.*—1. Under ordinary circumstances auditory sensations are referred to the outer world. When we hear a sound, we associate it with some external cause, and it appears to originate in a particular place, or to come in a particular direction. This feeling of *exteriority* of sound seems to require transmission through the membrana tympani. Sounds which are sent through the walls of the cranium, as when the head is immersed in, and the external auditory canals are filled with, water, appear to originate in the body itself. It is probable, however, that the external character of ordinary auditory sensations may be more the result of habit than due to any anatomical peculiarity of the ear itself.

2. An auditory sensation lasts a short time after the cessation of the exciting cause, so that a number of separate vibrations, each capable of exciting a distinct sensation if heard alone, may succeed each other so rapidly that they are fused into a single sensation. If we listen to the puffs of a syren, or to vibrating tongues of low pitch, the single sensation is usually produced by about 30 or 35 vibrations per second; but there can be no doubt, as was first pointed out by Helmholtz, that when we listen to beats of considerable intensity, produced by two adjacent tones of sufficiently high pitch, the ear may follow as many as 132 intermissions per second.

3. The sensibility of the ear for sounds of different pitch is not the same. It is more sensitive for acute than for grave sounds, and it is probable that the maximum degree of acuteness is for sounds produced by about 3000 vibrations per second, that is near $fa^5\sharp$. Sensibility as to pitch varies much with the individual and with the training to which he has subjected himself. Thus some musicians may detect a difference of $\frac{1}{1000}$th of the total number of vibrations, while other persons may have difficulty in appreciating a semitone. This power of appreciating differences of pitch is termed a correct or just ear, and there can be no doubt of its improvement by cultivation.

4. Hearing with two ears does not appear materially to influence auditive sensation, but probably the two organs are enabled, not only to correct each other's errors, but also to aid us in determining the locality from whence a sound originates. It is asserted by Fechner that one ear may perceive the same tone at a slightly higher pitch than the other, but this may probably be due to some slight pathological condition in one ear. If two tones, produced by two tuning forks of equal pitch, are produced one near each ear, there is a uniform single sensation; if one of the tuning forks be made to revolve round its axis in such a way that its tone increases and diminishes in intensity, neither fork is heard continuously, but both sound alternately, the fixed one being only audible when the revolving one is not. It is difficult to decide whether excitations of corresponding elements in the two ears can be distinguished from each other. It is probable that the resulting sensations may be distinguished, provided one of the generating tones differs from the other in intensity or quality, although it may be the same in pitch.

5. Hitherto we have considered only the audition of a single sound, but it is possible also to have simultaneous auditive sensations, as in musical harmony. It is difficult to ascertain what is the limit beyond which distinct auditory sensations may be perceived. We have in listening to an orchestra a multiplicity of sensations which produces a total effect, while, at the same time, we can with ease single out and notice attentively the tones of one or two special instruments. Thus the pleasure of music may arise partly from listening to simultaneous, and partly from the effect of contrast or suggestion in passing through successive, auditory sensations.

The principles of harmony belong to the subject of music, but it is necessary here briefly to refer to these from the physiological point of view. If two musical sounds reach the ear at the same moment, an agreeable or disagreeable sensation is experienced, which may be termed a *concord* or a *discord*, and it can be shown by experiment with the syren (see Acoustics) that this depends upon the vibrational numbers of the two tones. The octave (1:2), the twelfth (1:3), and double octave (1:4), are absolutely consonant sounds; the fifth (2:3) is said to be perfectly consonant; then follow, in the direction of dissonance, the fourth (3:4), major sixth (3.5), major third (4:5), minor sixth (5:8), and the minor third (5:6). Helmholtz has attempted to account for this by the application of his theory of *beats*.

Beats are observed when two sounds of nearly the same pitch are produced together, and the number of beats per second is equal to the difference of the number of vibrations of the two sounds. Beats give rise to a peculiarly disagreeable intermittent sensation, comparable to what is experienced on watching a flickering light, and the painful sensation may arise from intermittent irritation of the auditory nerve filaments. The maximum roughness of beats, according to Helmholtz, is attained by 33 per second; beyond 132 per second, the individual impulses are blended into one uniform auditory sensation. When two notes are sounded, say on a piano, not only may the first, fundamental, or prime tones beat, but partial tones of each of the primaries may beat also, and as the difference of pitch of two simultaneous sounds augments, the number of beats, both of prime tones and of harmonics, augments also. The physiological effect of beats, though these may not be individually distinguishable, is to give roughness to the ear. If harmonics or partial tones of prime tones coincide, there are no beats; if they do not coincide, the beats produced will give a character of roughness to the interval. Thus in the octave and twelfth, all the partial tones of the acute sound coincide with the partial tones of the grave sound; in the fourth, major sixth, and major third, only two pairs of the partial tones coincide, while in the minor sixth, minor third, and minor seventh, only one pair of the harmonics coincide. For details, see Helmholtz, *On Sensations of Tone as a Physiological Basis for the Theory of Music*, translated by Alexander J. Ellis, London, 1875.

Diseases of the Ear.—Deafness may arise from obstruction of the external ear occasioned by disease of various kinds; from ulceration, thickening, or perforation of the membrana tympani; from inflammatory affections, both acute and chronic, of the middle and internal ear; from obstruction of the Eustachian tube caused by inflammation of its lining membrane, leading to thickening and accumulation of mucus or pus; from diseases of the throat blocking up the end of the Eustachian tube; and, lastly, from disease of the auditory nerve or of the terminal apparatus connected with it in the membranous labyrinth. *Otitis*, or ear-ache, is an inflammation, usually of a rheumatic nature, of some portion of the external auditory canal. Most frequently occurring in weakly individuals, it causes intense pain, which shoots over the head on the affected side. It may lead to the formation of a small abscess in one of the wax glands found in the passage. Hot applications by fomentations or warm poultices give relief, and if an abcess forms, it ought to be carefully lanced. *Otorrhœa* is a muco-purulent discharge, often of a fœtid odour, from the ears of scrofulous children. It frequently occurs during teething, and it may be one of the sequelæ of scarlet fever, or measles, or small-pox. When pus flows from the ear, it may come from the membrane lining the deeper portion of the external meatus, or from the middle ear by a hole in the membrana tympani, or from diseased portions of bone near the middle, or internal ear. The treatment, of course, varies according to the cause, but generally the discharge may be lessened in quantity, and at all events rendered less offensive, by the use of weak injections of carbolic acid or of Condy's fluid. *Concretions*, consisting of accumulations of wax, often hard and adherent, may block up the external meatus. Frequently these may not impair the sense of hearing, but they give rise to distressing noises of various kinds. They may be got rid by the careful use of injections of soap and hot water. *Polypi*, usually hard and firm, but sometimes soft and gelatinous, occur in the external meatus. The external ear may become hypertrophied, as in idiots; it may contain concretions of urate of soda, as in gout; and it may be the seat of fibrous tumours. In the insane, large tumours, filled with blood, termed *hæmatoma*, sometimes occur. One of the most common causes of deafness in children is chronic enlargement of the tonsils from repeated quinseys or from a strumous habit. Frequently also the Eustachian tube is occluded, but by passing a delicate catheter along the tube, and sometimes by inflating artificially the tympanum with air, hearing may be restored. It is difficult to diagnose, and still more difficult to treat, diseases of the internal ear, in consequence of its delicacy of structure and inaccessible situation. Pathological states of the internal ear may give rise to distressing *entotic* phenomena, such as whizzing, buzzing, hissing, blowing, or clanging sounds; and if they are not relieved by washing out the external ear, or by inflating the middle ear by the Eustachian tube, or by counter-irritation by means of small blisters or the application of tincture of iodine behind the ears, nothing more can be done. (J. G. M.)

EARL (Latin, *comes*; French, *compte*), a title and rank of nobility now the third in the order of the British peerage, and, accordingly, intervening between marquis and viscount. Earl, however, was the highest title and rank of the English nobles *post conquestum* until the year 1337, when by Edward III. the Black Prince was created duke of Cornwall. The "earl" of England was identical with *comte* or *compte* of France; and, so long as Norman-French continued to be spoken in this country, the English "earls" were styled "counts" as well in England as on the Continent. These powerful barons represented and succeeded the Saxon thanes who were *ealdormen*, their own title evidently having been derived from the *jarl* of Scandinavia.

The nature of a modern earldom is readily understood, since it is a rank and dignity of nobility which, while it confers no official power or authority, is inalienable, indivisible, and descends in regular succession to all the male heirs of the body of the grantee until, on their failure, it merges in the Crown. Not so was it with either the nature or the descent of the ancient earldoms of England. In early feudal times titles independent of office did not exist. The earls, or *comites*, of those days, therefore, were actual officers, each having supreme authority in his own earldom, or "county," under the Crown; each one of them also deriving from his earldom a certain fixed revenue, the possession of which was at once an apanage of his official dignity as earl, and the evidence of his lawful and recognized title to it. But an earldom has long ceased to be endowed with any official associations whatever, and has become merely a title by which its owners in male succession inherit and hold the dignity, third in rank, of a peerage. In like manner, the descent and tenure of the ancient earldoms differed in many highly important particulars from the simple succession of the modern dignity. In the course of their chequered history, we find ancient earldoms, instead of passing by a quiet and clearly defined succession from father to son, constantly depending on the rights of female inheritance; they are seen to have been obtained by many a husband *jure uxoris;* they appear to have been transferred in an arbitrary manner, or actually to have been divided between coparceners, or to have been retained for a while by the Crown and let out to farm. At the same time, under such strange conditions as these, and amidst conflicting vicissitudes, until they finally merged in the Crown, the ancient earldoms retained their vitality. They might descend very irregularly, and become vested in successive families, but still they did not become extinct; nor were the claims of legal inheritance wholly forgotten or superseded; and, even if for a time they had been latent or had actually been superseded, they emerged under more favourable circumstances, and under fresh arrangements or modifications they were again recognized by the Crown.

An earl is "Right Honourable," and is styled "My Lord." His eldest son bears his father's "second title," and therefore, that second title being in most cases a viscounty, he generally is styled "Viscount;" under all circumstances, however, the eldest son of an earl takes precedence immediately after the viscounts. The younger sons of earls are "Honourable," but all their daughters are "Ladies." In formal documents and instruments, the sovereign, when addressing or making mention of any peer of the degree of an earl, usually designates him "trusty and well-beloved cousin,"—a form of appellation first adopted by Henry IV., who either by descent or alliance was actually related to every earl and duke in the realm. The wife of an earl is a countess; she is "Right Honourable," and is styled "My Lady."

The coronet of an earl has, rising from a golden circlet, eight lofty rays of gold, each of which upon its point supports a large pearl; also, between each pair of rays, at their bases, there is a golden conventional leaf, the stalks of all these leaves being connected with the rays and with each other so as to form a continuous wreath. In representations, five of the elevated rays with their pearls and four of the leaves are shown. The cap and lining of the coronet, if worn or represented, are the same as those of the ducal coronet. An earl's coronet without cap or lining is represented in the annexed figure.

Earl's Coronet.

In the monumental effigies of noble personages, which yet remain from the Middle Ages, there are many highly interesting representations of the varieties of coronets worn by the earls of those days and by their countesses, before this coronet had assumed its present fixed and definite character. Thus, early in the 15th century, effigies of an earl and countess of Arundel, at Arundel, have very rich coronets. The earl's has a series of leaves and of clusters of three small balls or pearls alternating, all of them being raised to a considerable height above the circlet, the clusters rising rather higher than the leaves. The coronet of the countess differs in having the raised clusters set alternately with single balls or pearls that are less elevated.[1]

The coronet of a countess now in all respects is the same as that of an earl. The scarlet parliamentary robe of an earl has three doublings of ermine. The duke of Norfolk, who is premier duke, as earl of Arundel, Surrey, and Norfolk, is premier earl of England; also he holds his earldom of Arundel, a feudal dignity (as it was adjudged by

[1] In his effigy at Warwick, 1439, the crest of Richard Beauchamp, earl of Warwick, rises from a plain circlet that is surmounted by a series of pearls slightly raised, but without any leaves. Still later in the century, 1483, Isabel Plantagenet, countess of Essex, in her brass at Little Easton in Essex, has a series of leaves, no less than thirteen in number, that rise to a uniform slight elevation above the front of an ample coronet; and about the same time, 1487, the coronets of another earl and countess of Arundel have their circlets heightened with an uninterrupted series of architectural conventional leaves, and once more, at Hever, in Kent, the brass to Sir T. Boleyn, K.G., earl of Wiltshire and Ormonde, represents the maternal grandfather of Queen Elizabeth, with the insignia of the Garter, and wearing a rich coronet, the circlet of which is set with small pearls in contact, not raised, and so numerous that upwards of twenty are displayed.

Parliament, the 11th of Henry VI. 1433), by the fact of his hereditary possession of Arundel Castle only. As hereditary Earl-Marshal, his Grace of Norfolk is the head of the College of Arms. (C. B.)

EARLE, JOHN (1601?–1665), bishop of Worcester and afterwards of Salisbury, was born at York about 1601. He completed his education at Oxford, first entering Christ Church, and taking his degree of B.A. in 1619. He afterwards passed to Merton College, and graduated M.A. in 1624. He was appointed in 1631 proctor of the university, and the same year became chaplain to Philip, earl of Pembroke, then chancellor of the university. He was soon after presented by this nobleman to the rectory of Bishopstone, in Wiltshire, and, having been introduced to the king, Charles I., was appointed chaplain and tutor to Prince Charles. In 1642 Earle took his degree of D.D., and in the following year was elected one of the famous Assembly of Divines at Westminster. But his sympathies with the king and with the Church of England were so strong that he declined to sit. Early in 1643 he was chosen chancellor of the cathedral of Salisbury; but of this preferment he was soon after deprived. After Cromwell's great victory at Worcester, Earle went abroad, and was named clerk of the closet and chaplain to Charles II. He spent a year at Antwerp in the house of Izaak Walton's friend Dr Morley, who became afterwards bishop of Winchester. He next joined the duke of York (James II.) at Paris, returning to England at the Restoration. He was at once appointed dean of Westminster, and in 1661 was one of the commissioners for revising the liturgy. At the end of November 1662 he was consecrated bishop of Worcester, and was translated, ten months later, to the see of Salisbury. During the plague of London Bishop Earle attended the king and queen at Oxford, and there he died, November 17, 1665. Earle's chief title to remembrance is his witty and humorous work entitled *Microcosmography, or a Piece of the World discovered, in Essays and Characters*, which throws light on the manners of the time. First printed in 1628, it became very popular, and ran through eight editions in the lifetime of the author. A new edition with notes and appendix, containing much interesting matter, by Philip Bliss, was published in 1811. The style is quaint and epigrammatic; and the reader is frequently reminded of Thomas Fuller by such passages as this: "A university dunner is a gentlemen follower cheaply purchased, for his own money has hyr'd him." Several reprints of the book have been issued since the author's death; and in 1671 a French translation by J. Dymock appeared with the title of *Le vice ridiculé*. Earle was employed by Charles II. to make the Latin translation of the *Eikon Basilike*, published in 1649.

"Dr Earle," says Lord Clarendon in his *Life*, "was a man of great piety and devotion, a most eloquent and powerful preacher, and of a conversation so pleasant and delightful, so very innocent, and so very facetious, that no man's company was more desired and loved. No man was more negligent in his dress and habit and mien, no man more wary and cultivated in his behaviour and discourse. He was very dear to the Lord Falkland, with whom he spent as much time as he could make his own."

See especially Bliss's edition of the *Microcosmographie*, and Arber's Reprint, London, 1868.

EARLOM, RICHARD (1742–1822), English mezzotint engraver, was born in London in 1742. His natural faculty for art appears to have been first called into exercise by admiration for the lord mayor's state coach, just decorated by Cipriani. He tried to copy the paintings, and was sent to study under Cipriani. He displayed great skill as a draughtsman, and at the same time acquired without assistance the art of engraving in mezzotint. In 1765 he was employed by Alderman Boydell, then one of the most liberal promoters of the fine arts, to make a series of drawings from the pictures at Houghton Hall; and these he afterwards engraved in mezzotint. His most perfect works as engraver are perhaps the fruit and flower pieces after the Dutch artists Van Os and Van Huysum. Amongst his historical and figure subjects are—Agrippina, after West; Love in Bondage, after Guido Reni; the Royal Academy, the Embassy of Hyderbeck to meet Lord Cornwallis, and a Tiger Hunt, the last three after Zoffany; and Lord Heathfield, after Sir Joshua Reynolds. Earlom also executed a series of 200 facsimiles of the drawings and sketches of Claude Lorraine, which was published in 3 vols. folio, under the title of *Liber Veritatis* (1777–1819). Earlom died in London, October 9, 1822.

EAR-RING, an ornament worn pendent from the ear, and generally suspended by means of a ring or hook passing through the pendulous lobe of the ear. The general usage appears to have been to have ear-rings worn in pairs, the two ornaments in all respects resembling each other; in ancient times, or sometimes more recently among Oriental races, a single ear-ring has sometimes been worn. The use of this kind of ornament, which constantly was of great value and sometimes was made of large size, dates from the remotest historical antiquity, the earliest mention of ear-rings occurring in the book of Genesis. It appears probable that the ear-rings of Jacob's family, which he buried with his strange idols at Bethel, were regarded as amulets or talismans, such unquestionably being the estimation in which some ornaments of this class have been held from a very early period, as they still are held in the East. Among all the Oriental races of whom we have any accurate knowledge, the Hebrews and Egyptians excepted, ear-rings always have been in general use by both sexes; while in the West, as well as by the Hebrews and Egyptians, as a general rule they have been considered exclusively female ornaments. By the Greeks and Romans also ear-rings were worn only by women; and the prevalence of this fashion among the races of classic antiquity is illustrated in a singular manner by the ears of the famous statue of the Venus de' Medici being bored, evidently for the reception of pendent jewels. Ear-rings invariably occupy important positions among the various remains of ancient and mediæval goldsmiths' work that from time to time have rewarded the researches of archæological inquirers. And these early relics, with rare exceptions objects of great beauty and delicacy, never fail to exemplify the artistic styles of their periods, as they were prevalent among the races by whom each individual jewel was produced. Ear-rings of costly materials and elaborate workmanship have been brought to light in considerable numbers in the Troad and in Peloponnesus by Dr Schliemann; jewels of the same class, of exquisite beauty, and of workmanship that is truly wonderful, have been rescued from the sepulchres of ancient Etruria and Greece by Signor Castellani; other ear-rings of gold of characteristic forms have come down to our own times from the ancient Egyptians; we know well what styles of ear-rings were worn by the Romans of the empire and by the early Scandinavians; and recent researches among the burial places of our Anglo-Saxon predecessors in the occupancy of this island have led to the discovery of jewels in considerable numbers, which among their varieties include ear-rings executed in a style that proves the Anglo-Saxons to have made no inconsiderable advance in the arts of civilization. These same ornaments, which never have fallen into disuse, enjoy at the present day a very high degree of favour; like all other modern jewels, however, the ear-rings of our own times as works of arts can claim no historical attributes, because they consist as well of reproductions from all past ages and of every race as of fanciful productions that certainly can be assigned to no style of art whatever.

EARTH, FIGURE OF THE. The determination of the figure of the earth is a problem of the highest importance in astronomy, inasmuch as the diameter of the earth is the unit to which all celestial distances must be referred. Reasoning, doubtless, from the uniform level appearance of the horizon in any situation in which a spectator can be placed—the variations in altitude of the circumpolar stars as one travels towards the north or south, the disappearance of a ship standing out to sea, and perhaps other phenomena—the earliest astronomers universally regarded this earth as a sphere, and they endeavoured to ascertain its dimensions. Aristotle relates that the mathematicians had found the circumference to be 400,000 stadia. But Eratosthenes appears to have been the first who entertained an accurate idea of the principles on which the determination of the figure of the earth really depends, and attempted to reduce them to practice. His results were very inaccurate, but his method is the same as that which is followed at the present day—depending, in fact, on the comparison of a line measured on the earth's surface with the corresponding arc of the heavens. He observed that at Syene in Upper Egypt, on the day of the summer solstice, the sun was exactly vertical, whilst at Alexandria at the same season of the year its zenith distance was 7° 12′, or one-fiftieth of the circumference of a circle. He assumed that these places were on the same meridian; and, reckoning their distance apart as 5000 stadia, he inferred that the circumference of the earth was 250,000 stadia. A similar attempt was made by Posidonius, who adopted a method which differed from that of Eratosthenes only in using a star instead of the sun. He obtained 240,000 stadia for the circumference. But it is impossible to form any correct opinions as to the degree of accuracy attained in these measures, as the length of the stadium is unknown. Ptolemy in his *Geography* assigns the length of the degree as 500 stadia.

The Arabs, who were not inattentive to astronomy, did not overlook the question of the earth's magnitude. The caliph Almamoun, 814 A.D., having fixed on a spot in the plains of Mesopotamia, despatched one company of astronomers northwards and another southwards, measuring the journey by rods, until each found the altitude of the pole to have changed one degree. But the result of this measurement does not appear to have been very satisfactory. From this time the subject seems to have attracted no attention until about 1500, when Fernel, a Frenchman, measured a distance in the direction of the meridian near Paris by counting the number of revolutions of the wheel of his carriage as he travelled. His astronomical observations were made with a triangle used as a quadrant, and his resulting length of a degree was by a happy chance very near the truth.

The next geodesist, Willebrord Snell, took an immense step in the right direction by substituting a chain of triangles for actual linear measurement. The account of this operation was published at Leyden in 1617. He measured his base line on the frozen surface of the meadows near Leyden, and measured the angles of his triangles, which lay between Alkmaar and Bergen-op-Zoom, with a quadrant and semicircles. He took the precaution of comparing his standard with that of the French, so that his result was expressed in toises (the length of the toise is about 6·39 English feet). The work was recomputed and reobserved by Muschenbroek in 1729.

In 1637 an Englishman, Richard Norwood, published his own determination of the figure of the earth in a volume entitled *The Seaman's Practice, contayning a Fundamentall Probleme in Navigation experimentally verified, namely, touching the Compasse of the Earth and Sea and the quantity of a Degree in our English Measures*. It appears that he observed on the 11th June 1633 the sun's meridian altitude in London as 62° 1′, and on June 6, 1635, his meridian altitude in York as 59° 33′. He measured the distance between these places along the public road partly with a chain and partly by pacing. By this means, through compensation of errors, he arrived at 367,176 feet for the degree—a very fair result.

The application of the telescope to circular instruments was the next important step in the science of measurement. Picard was the first who in 1669, with the telescope, using such precautions as the nature of the operation requires, measured an arc of meridian. He measured with wooden rods a base line of 5663 toises, and a second or base of verification of 3902 toises; his triangulation extended from Malvoisine, near Paris, to Sourdon, near Amiens. The angles of the triangles were measured with a quadrant furnished with a telescope having cross wires in its focus. The difference of latitude of the terminal stations was determined by observations made with a sector on a star in Cassiopeia, giving 1° 22′ 55″ for the amplitude. The terrestrial measurement gave 78,850 toises, whence he inferred for the length of the degree 57,060 toises.

Hitherto geodetic observations had been confined to the determination of the magnitude of the earth considered as a sphere, but a discovery made by Richer turned the attention of mathematicians to its deviation from a spherical form. This astronomer, having been sent by the Academy of Sciences of Paris to the island of Cayenne, in South America, for the purpose of determining the amount of terrestrial refraction and other astronomical objects, observed that his clock, which had been regulated at Paris to beat seconds, lost about two minutes and a half daily at Cayenne, and that in order to bring it to measure mean solar time it was necessary to shorten the pendulum by more than a line. This fact, which appeared exceedingly curious, and was scarcely credited till it had been confirmed by the subsequent observations of Varin and Deshayes on the coasts of Africa and America, was first explained in the third book of Newton's *Principia*, who showed that it could only be referred to a diminution of gravity arising either from a protuberance of the equatorial parts of the earth and consequent increase of the distance from the centre or from the counteracting effect of the centrifugal force. About the same time, 1673, appeared the work of Huyghens entitled *De Horologio Oscillatorio*, in which for the first time were found correct notions on the subject of centrifugal force. It does not, however, appear that they were applied to the theoretical investigation of the figure of the earth before the publication of Newton's *Principia*. In 1690 Huyghens, following up the subject, published his treatise entitled *De Causa Gravitatis*, which contains an investigation of the figure of the earth on the supposition that the attraction of every particle is towards the centre.

Between 1684 and 1718 J. and D. Cassini, starting from Picard's base, carried a triangulation northwards from Paris to Dunkirk and southwards from Paris to Collioure. They measured a base of 7246 toises near Perpignan, and a somewhat shorter base near Dunkirk; and from the northern portion of the arc, which had an amplitude of 2° 12′ 9″, obtained for the length of a degree 56,960 toises; while from the southern portion, of which the amplitude was 6° 18′ 57″, they obtained 57,097 toises. The immediate inference from this was that the degree diminishing with increasing latitude, the earth must be a prolate spheroid. This conclusion was totally opposed to the theoretical investigations of Newton and Hnyghens, and created a great sensation among the scientific men of the day. The question was far too important to be allowed to remain unsettled, and accordingly the Academy of Sciences of Paris determined to apply a decisive test by the measurement of arcs at a great distance from each other. For this purpose some of the most distinguished